

Water quality data and trends

Supplementary figures for “Water Quality Trends and Eutrophication Indicators in a Large Subtropical Estuary: A Case Study of the Greater Charlotte Harbor System in Southwest Florida” by Medina et al. (<https://doi.org/10.1007/s12237-025-01488-2>).

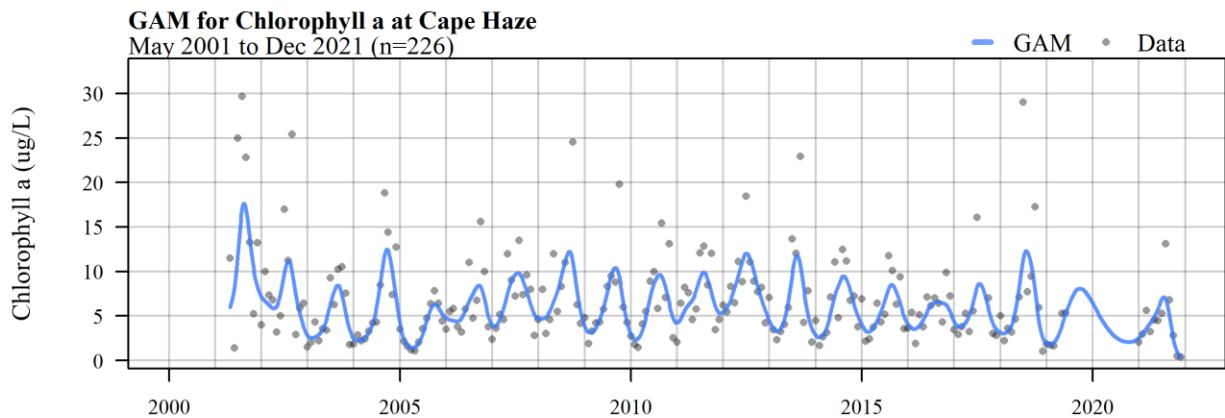
Each page in this document visualizes the following results for one of seven water quality parameters at one of 13 monitoring strata.

Top panel: Water quality data (2000–2021) with the GAM fit.

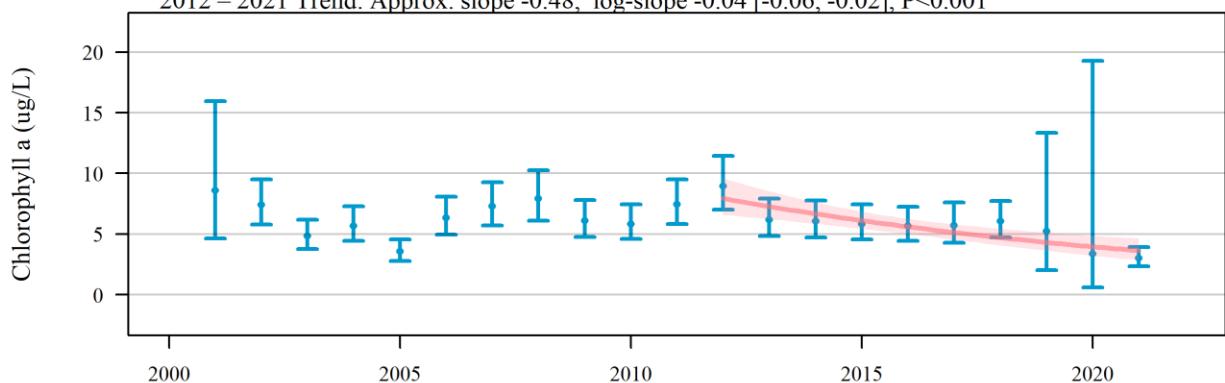
Middle panel: Annual mean values (with 95% CI) and 10-year trend with 95% CI (2012–2021).

Bottom panel: Annual mean values (with 95% CI) and 5-year trend with 95% CI (2017–2021).

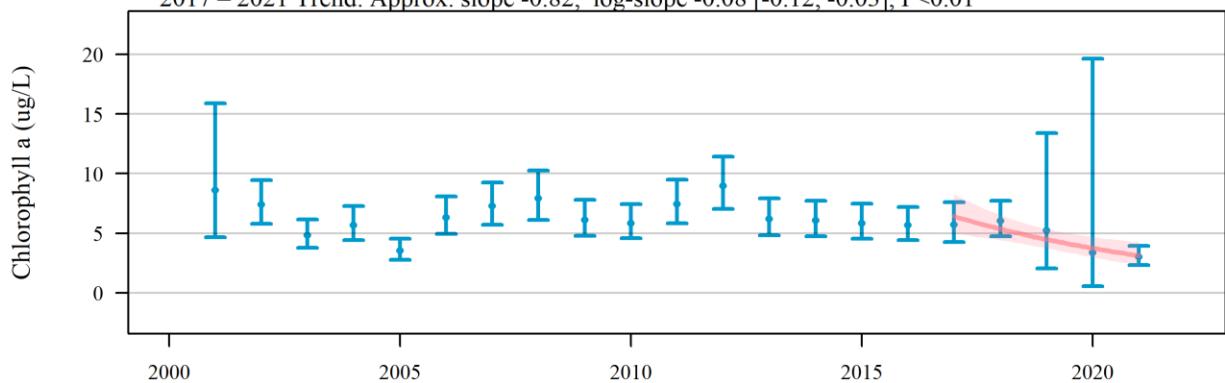
Trends for inorganic parameters (NH_x, NO_x, PO₄) are typically unreliable due to the large number of non-detect samples.

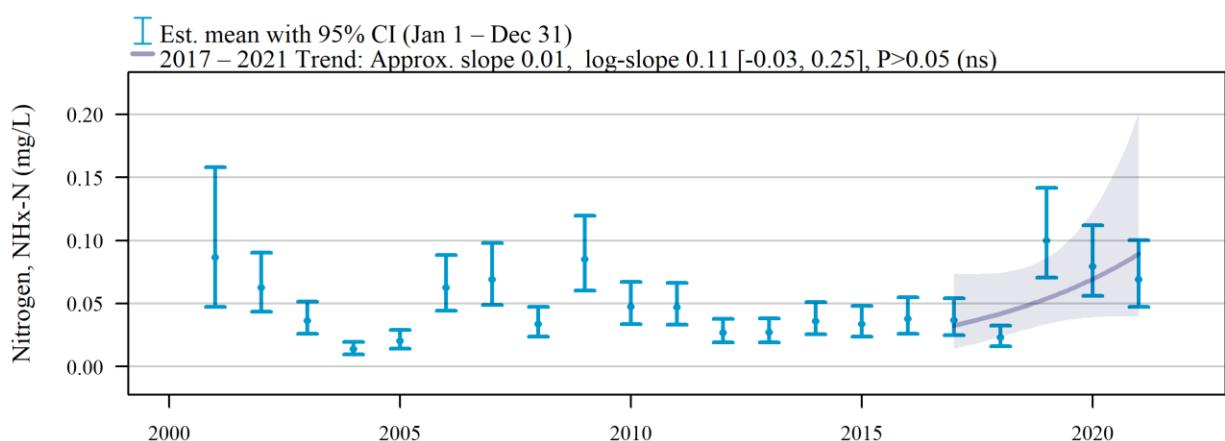
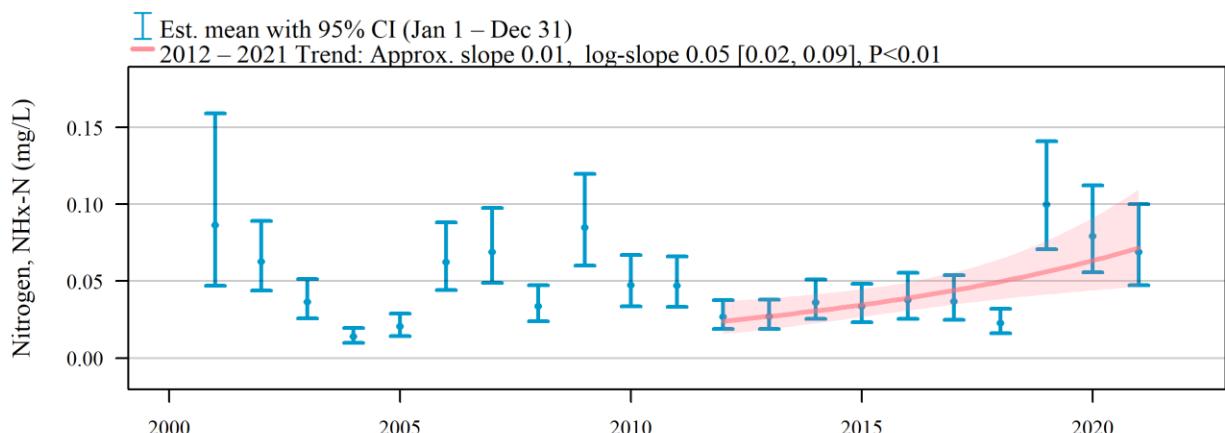
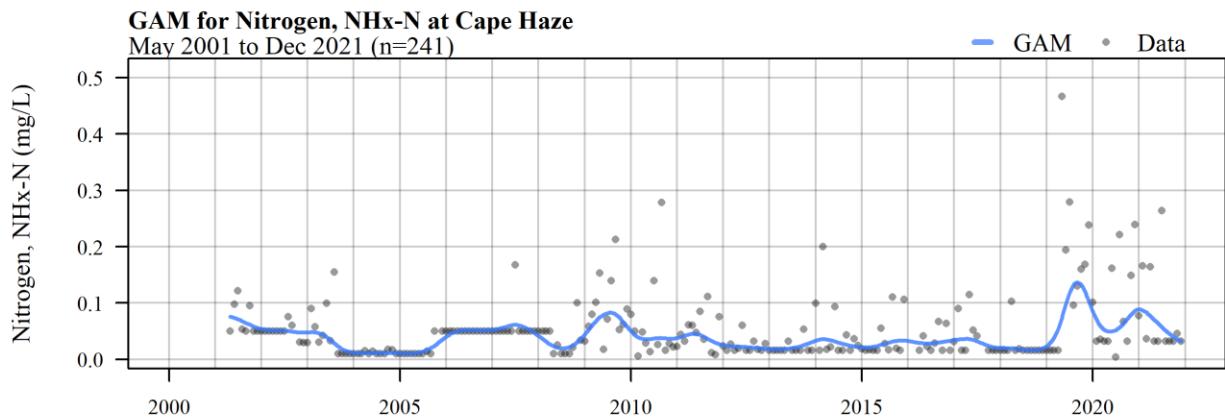


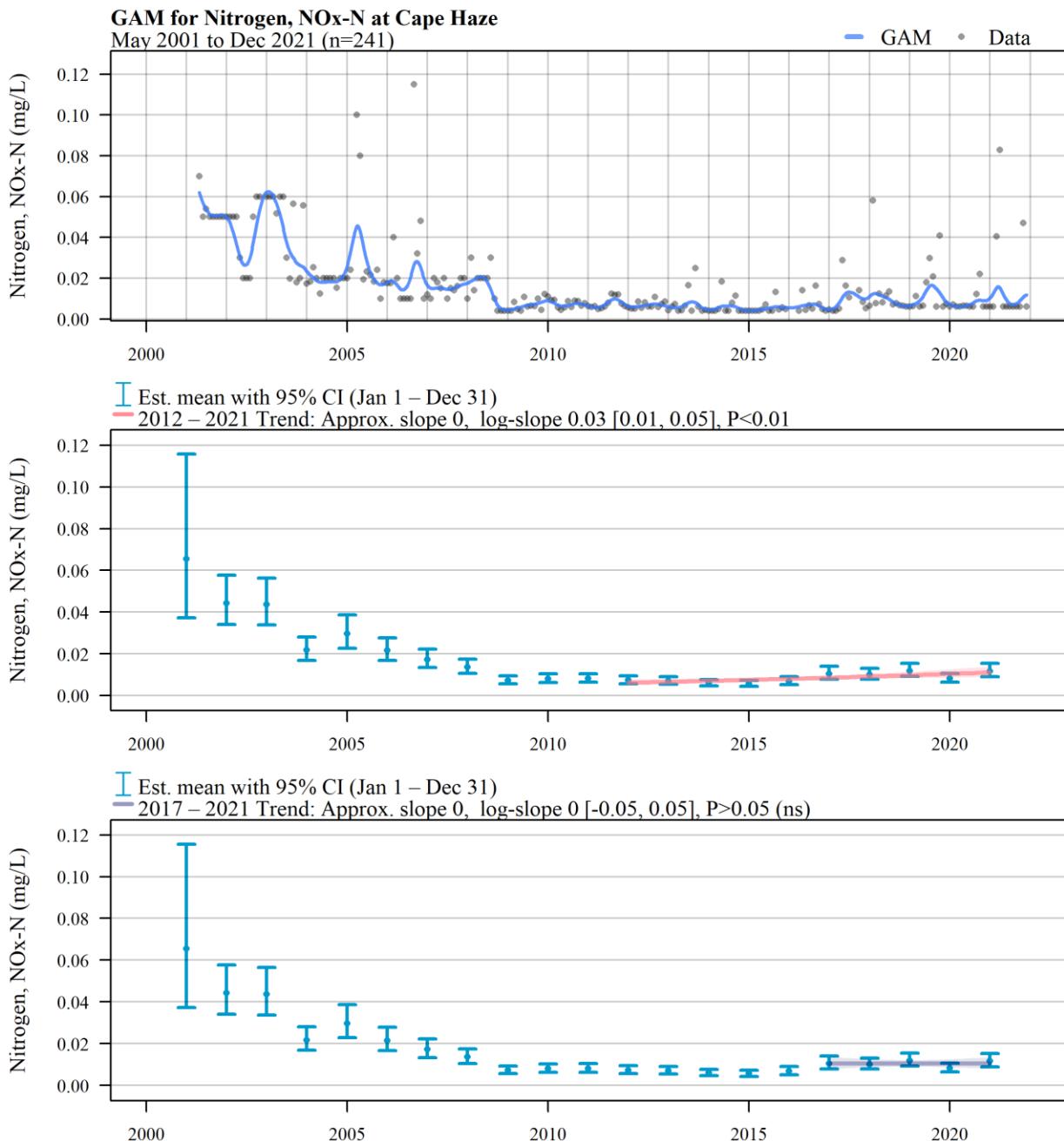
Est. mean with 95% CI (Jan 1 – Dec 31)
2012 – 2021 Trend: Approx. slope -0.48, log-slope -0.04 [-0.06, -0.02], P<0.001

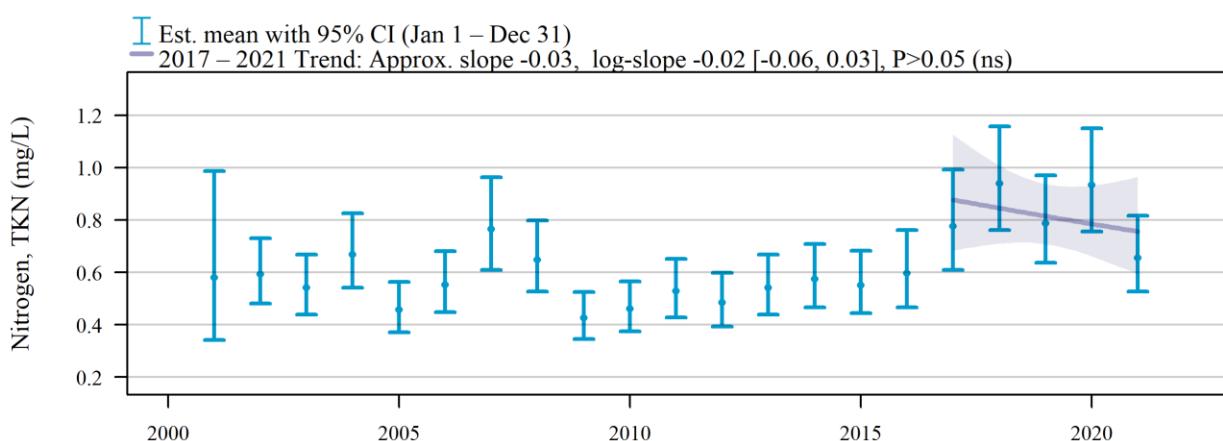
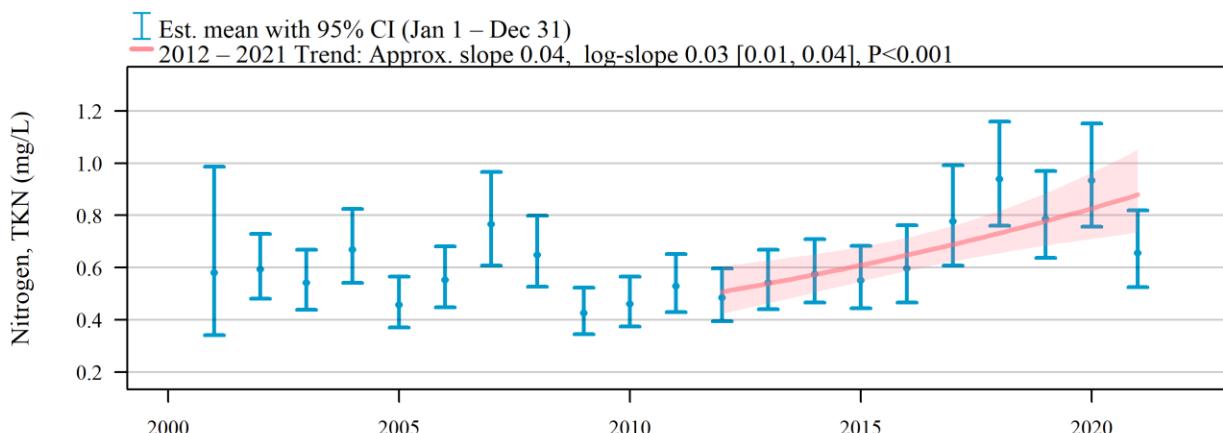
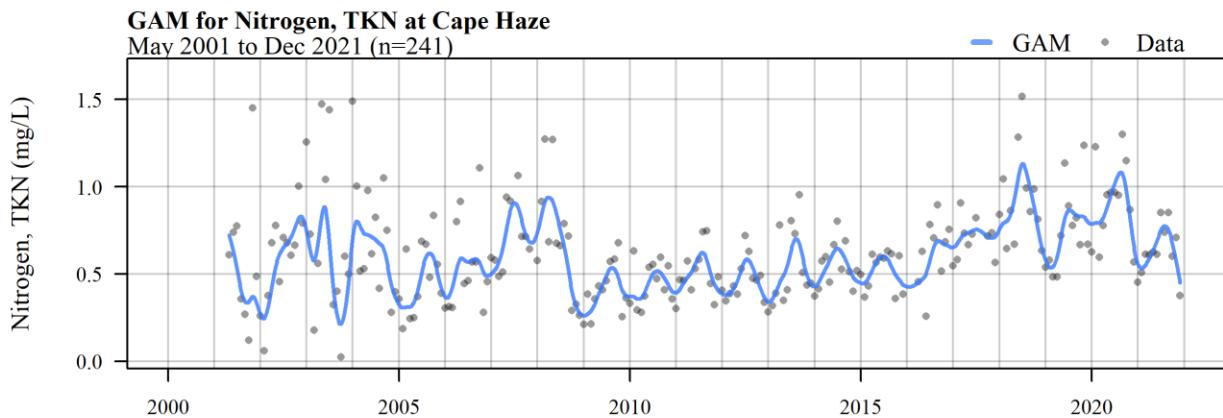


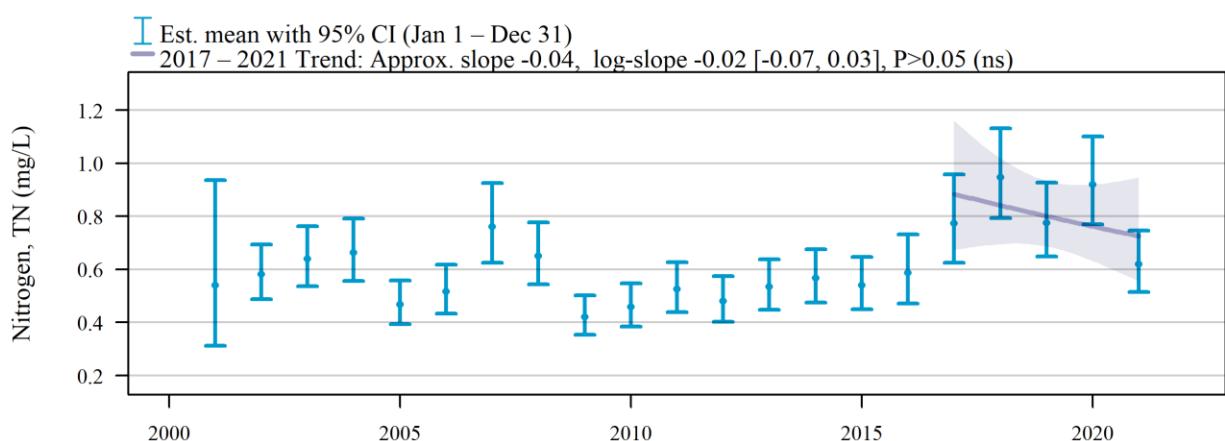
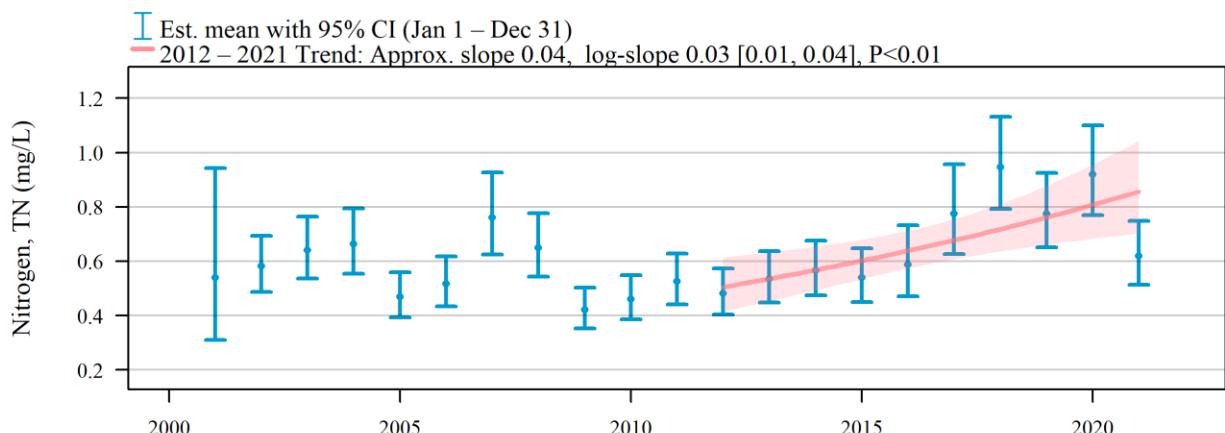
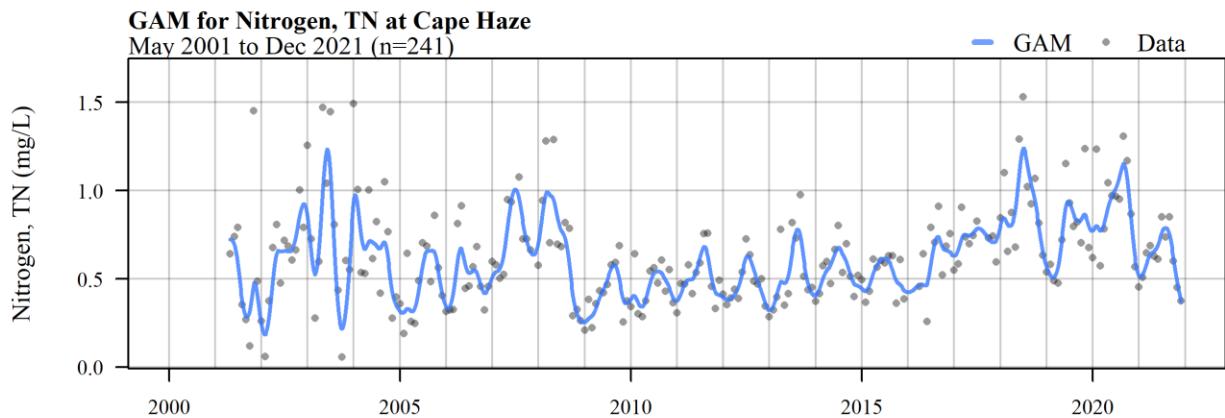
Est. mean with 95% CI (Jan 1 – Dec 31)
2017 – 2021 Trend: Approx. slope -0.82, log-slope -0.08 [-0.12, -0.03], P<0.01

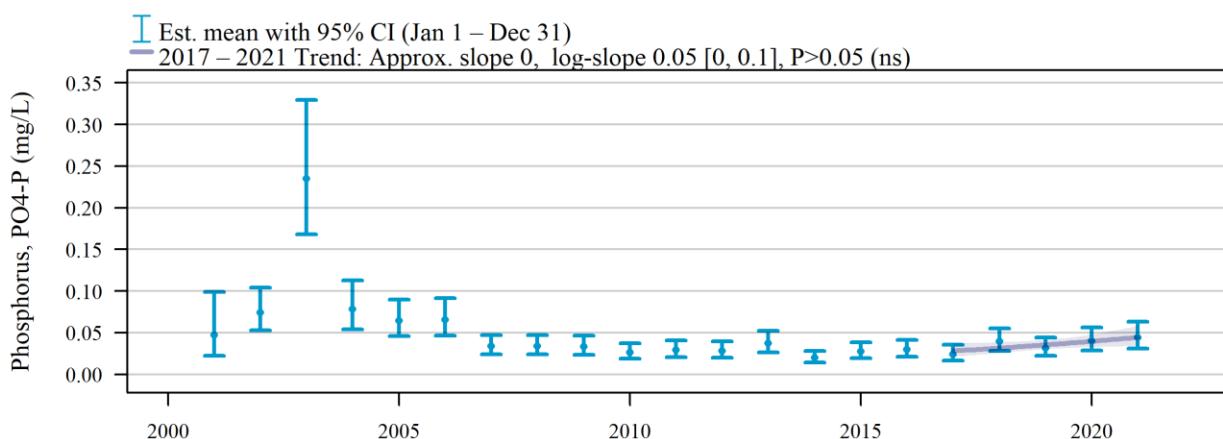
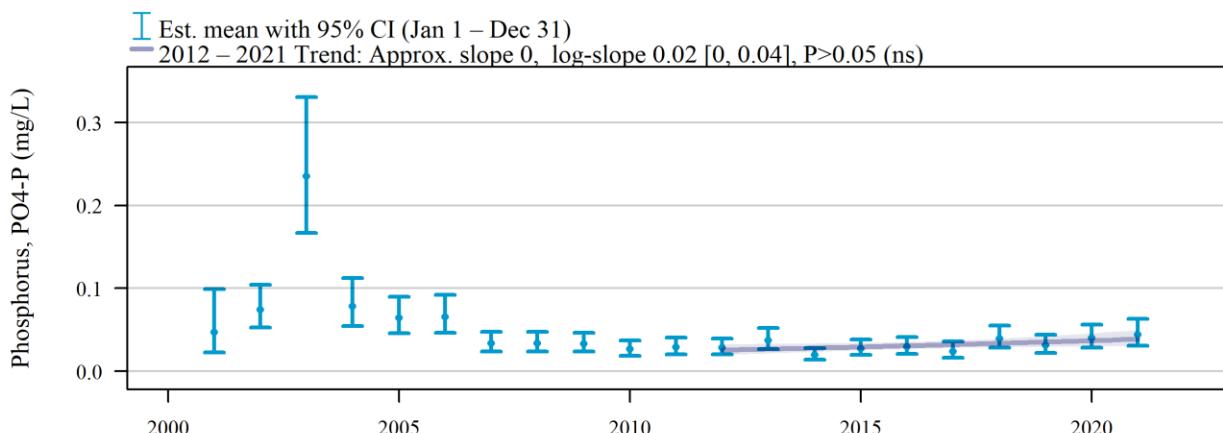
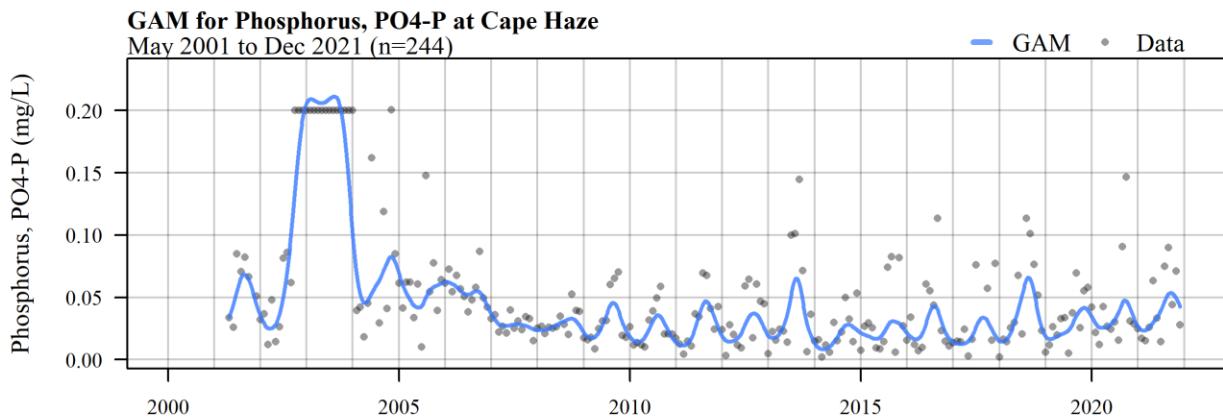


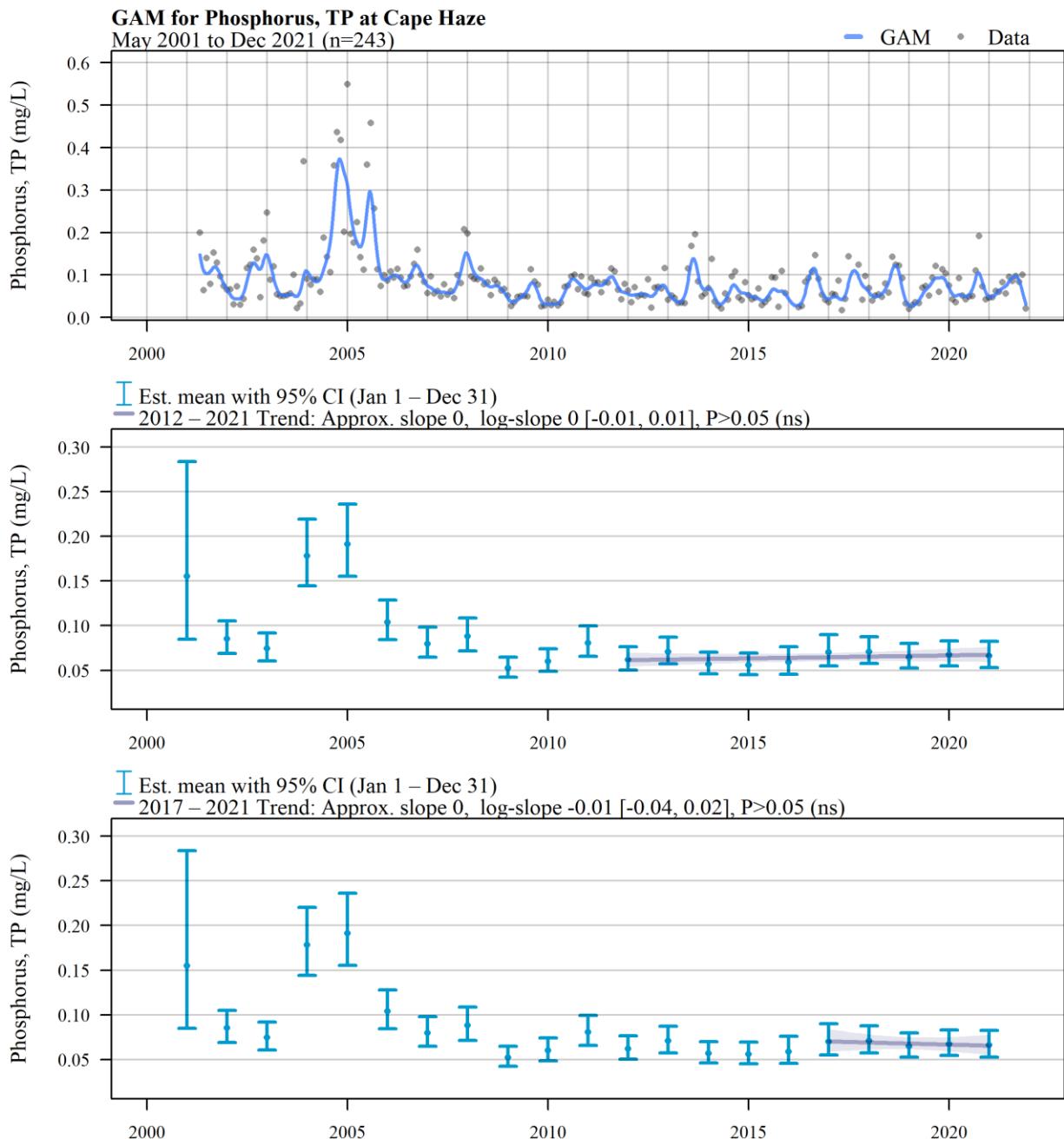


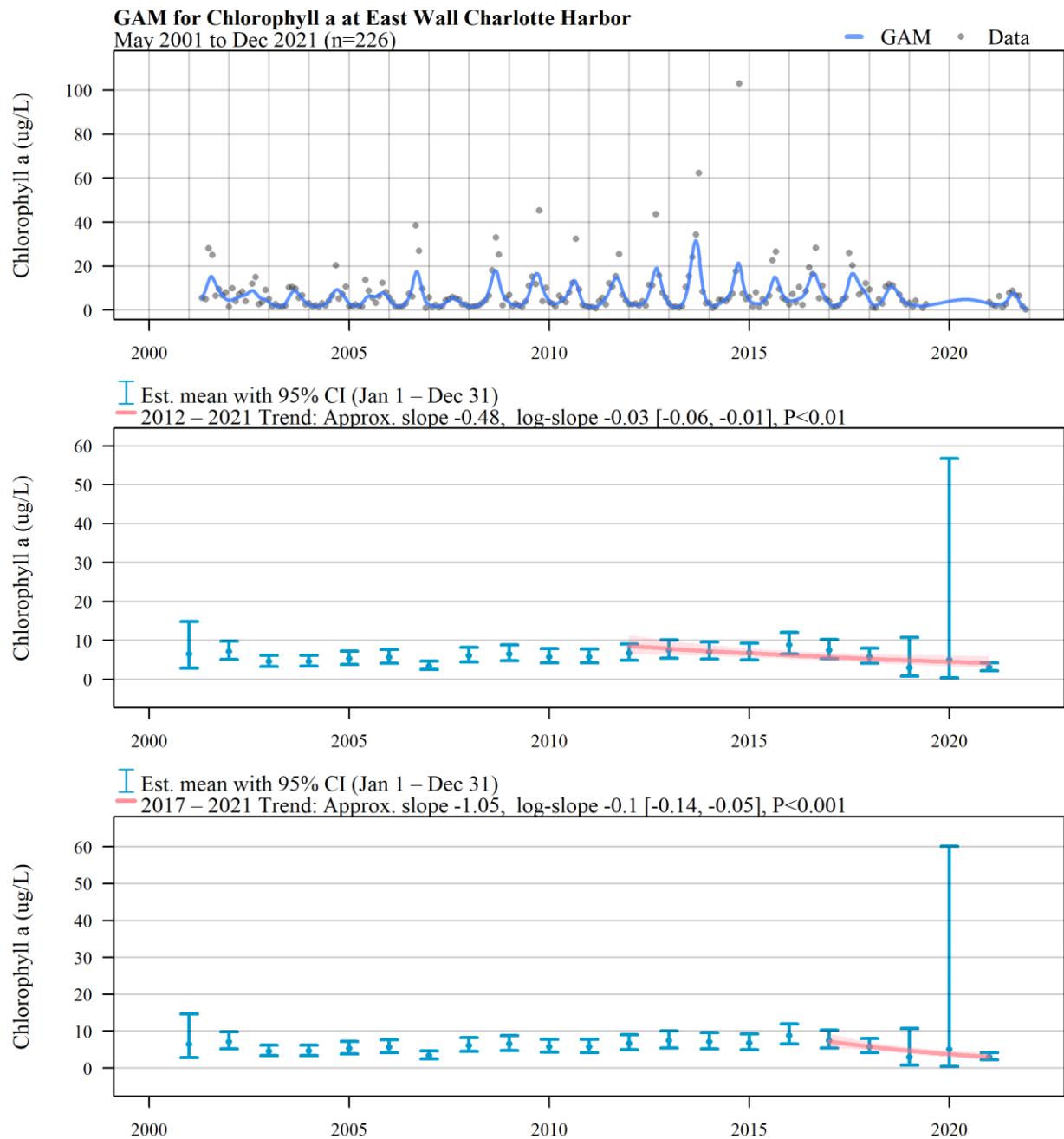


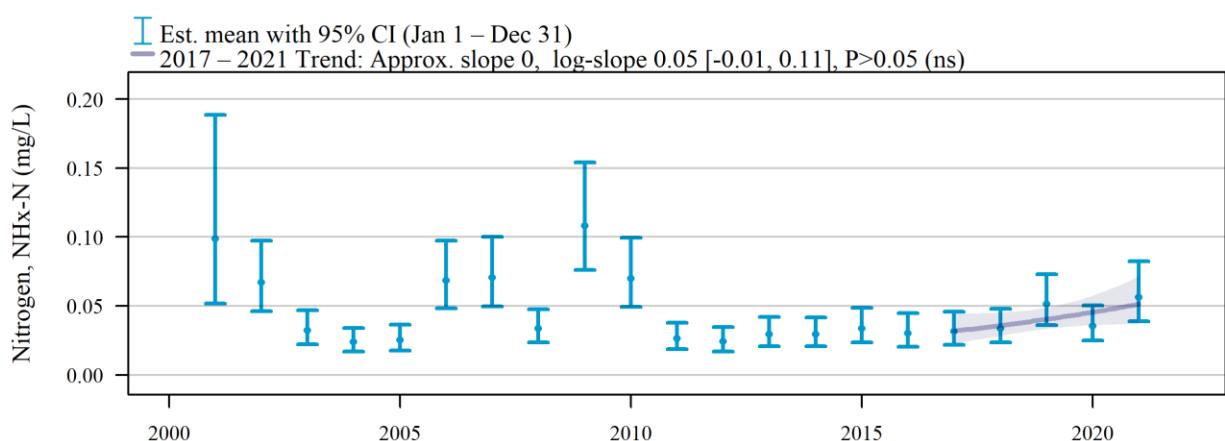
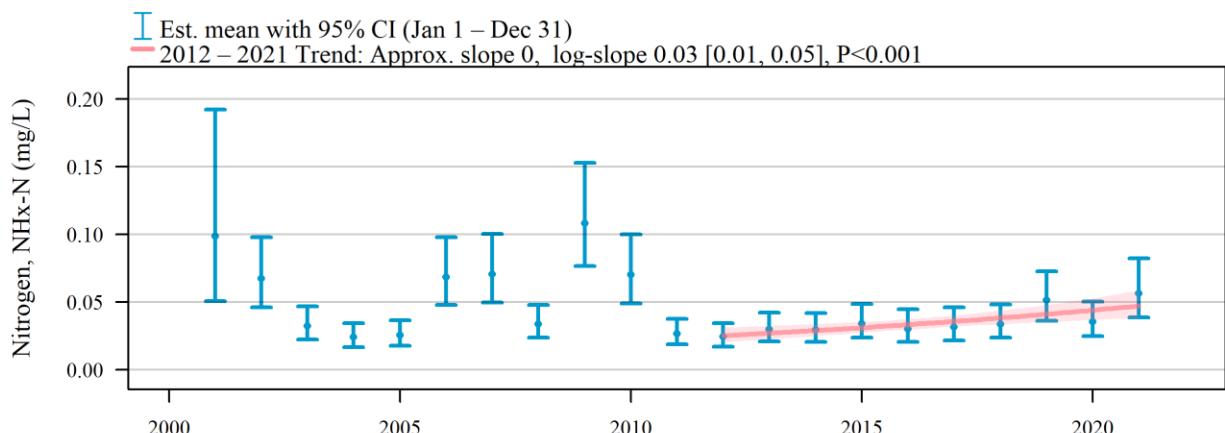
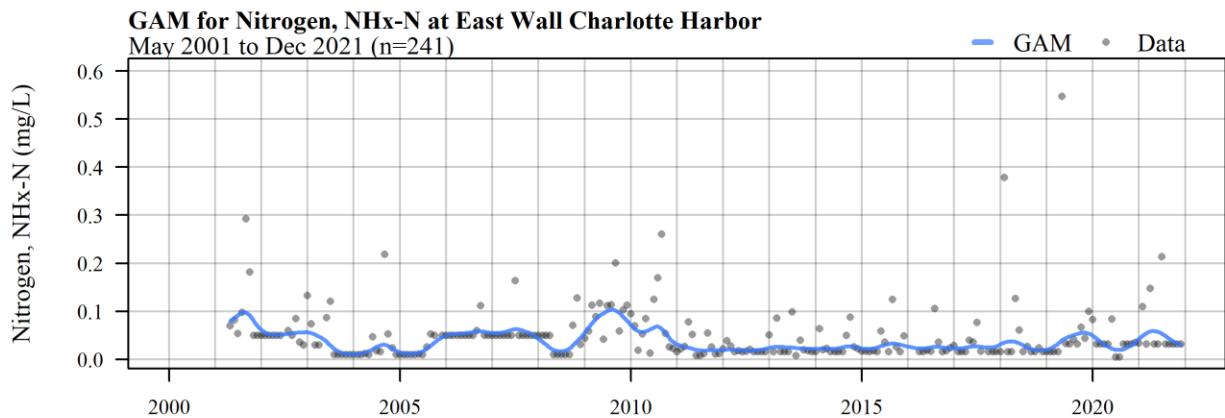


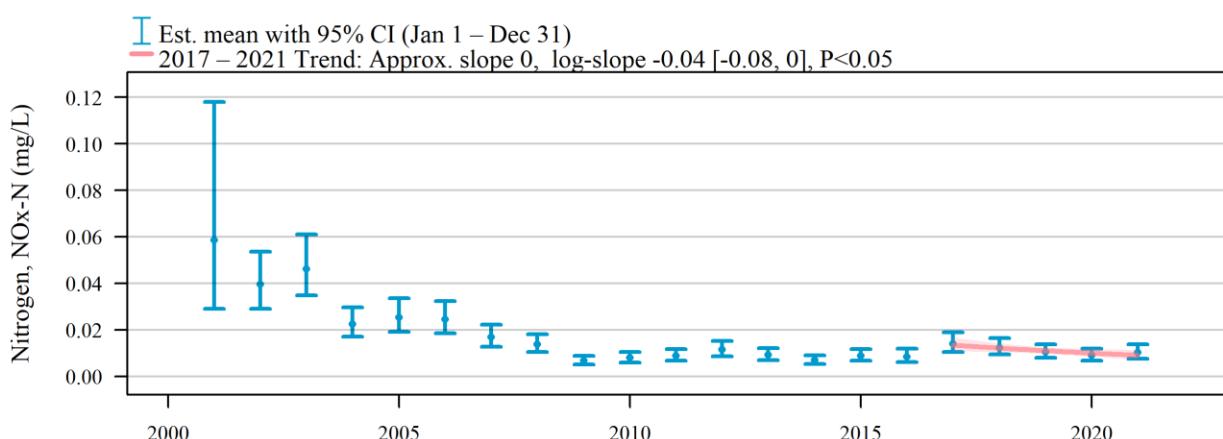
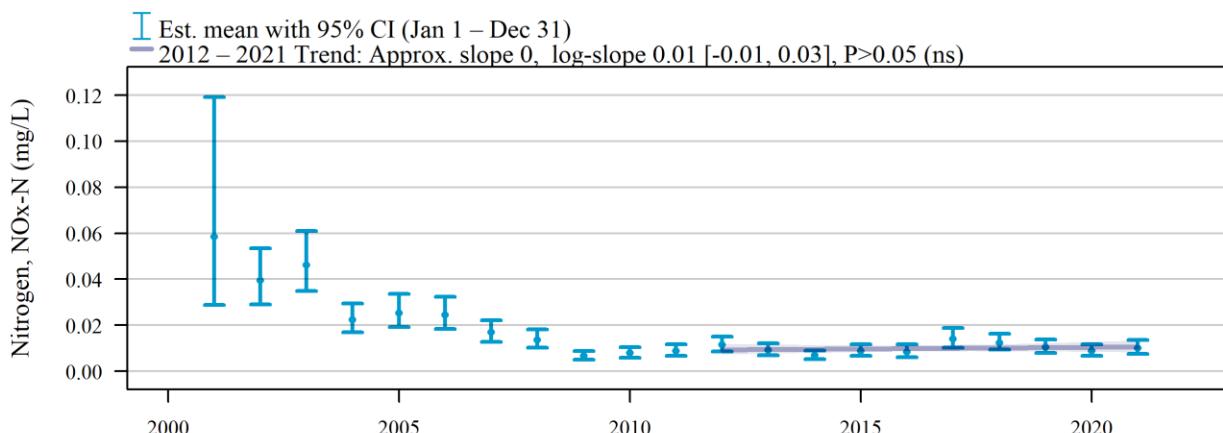
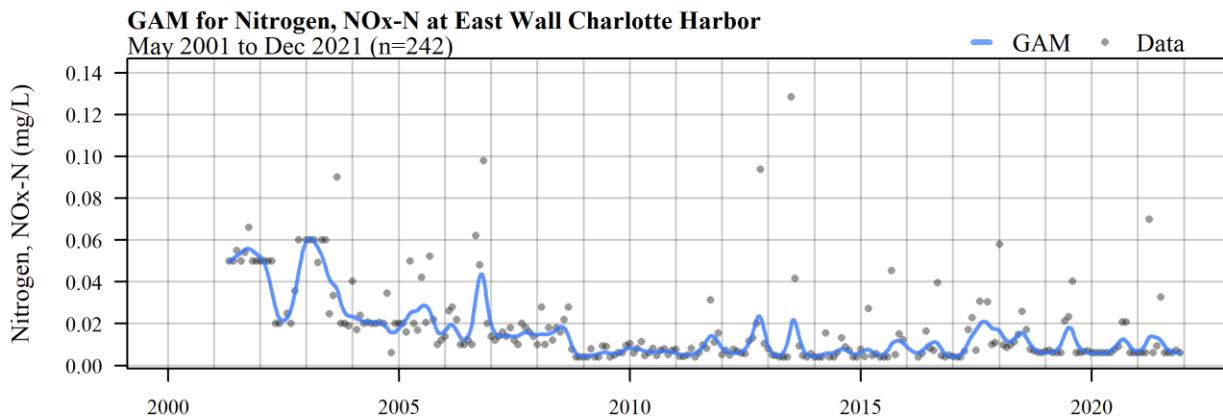


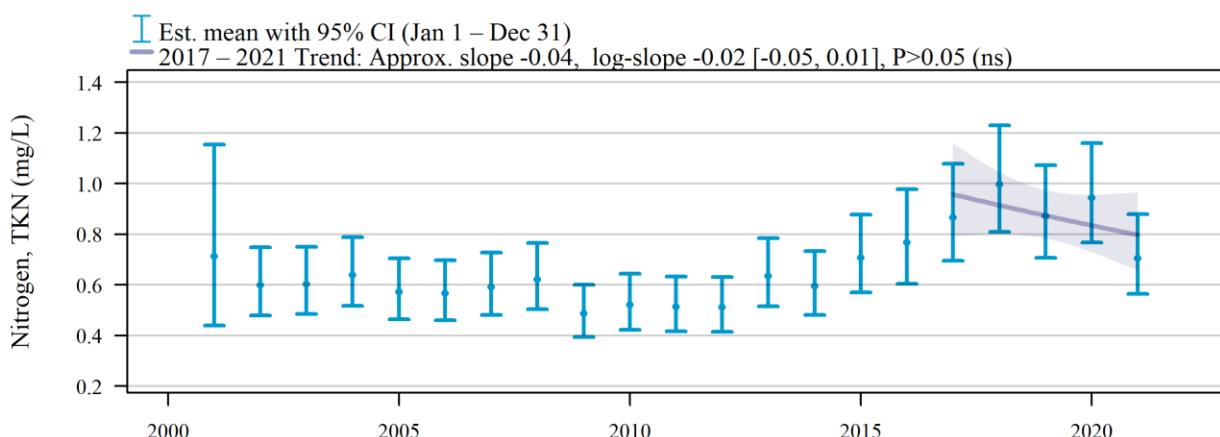
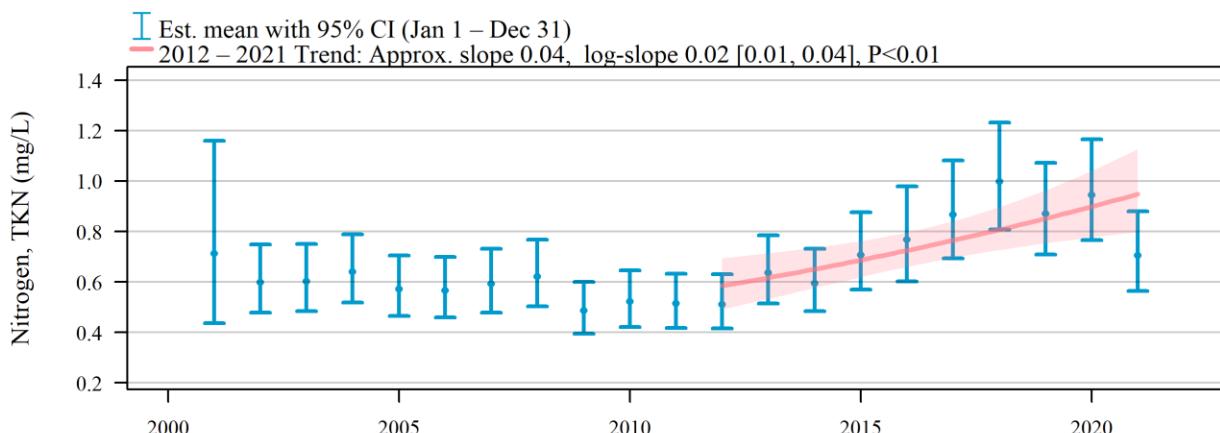
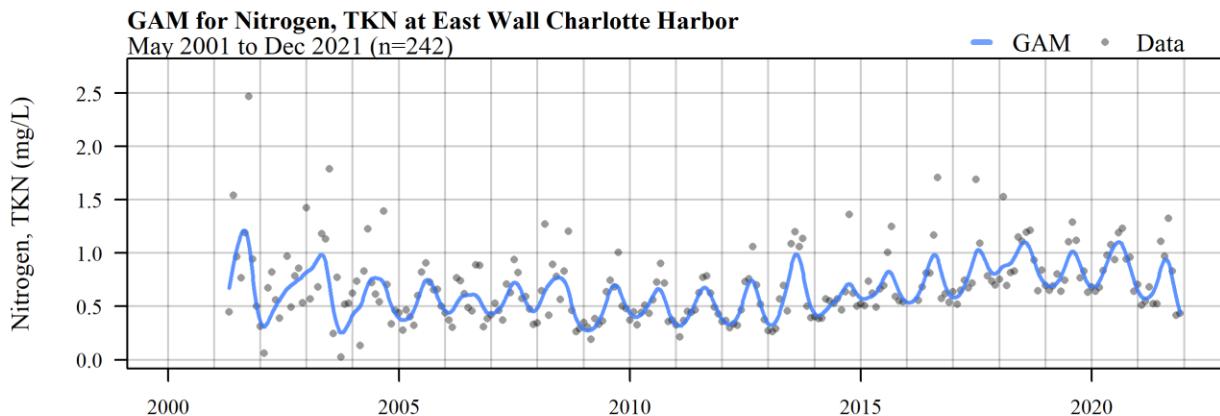




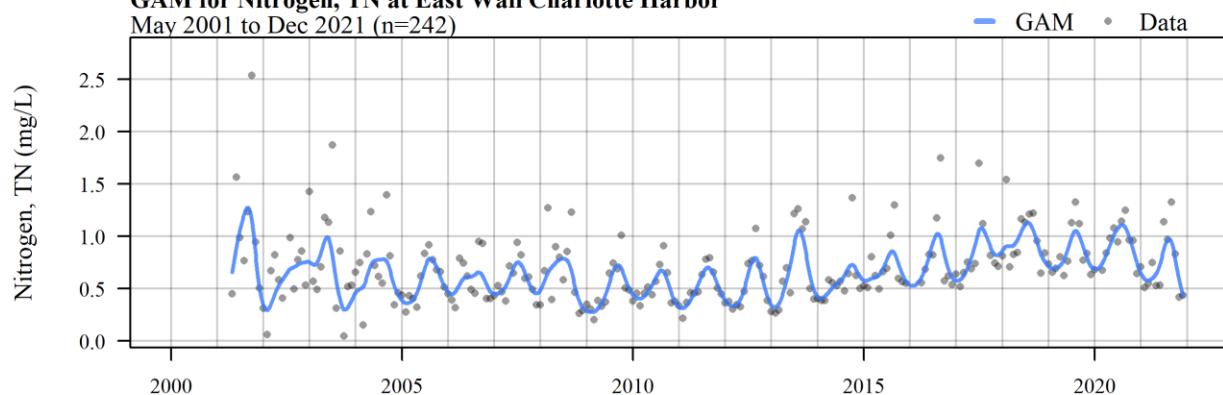




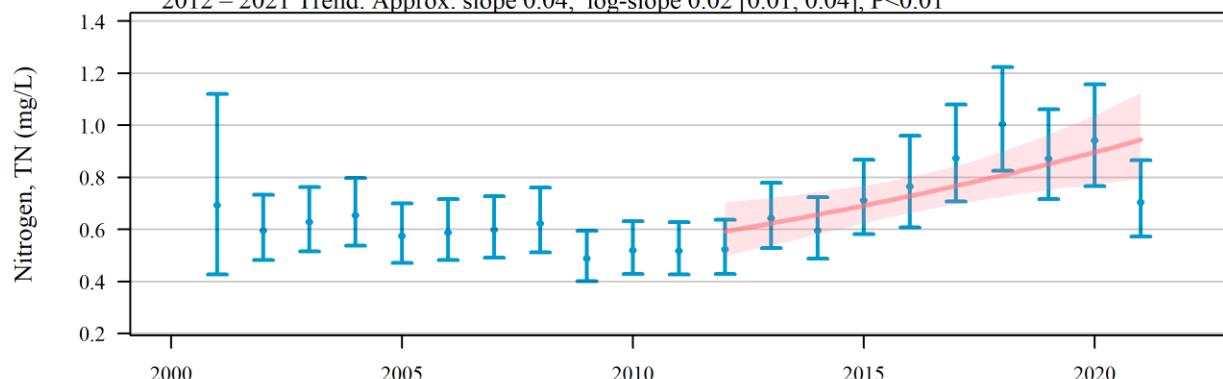




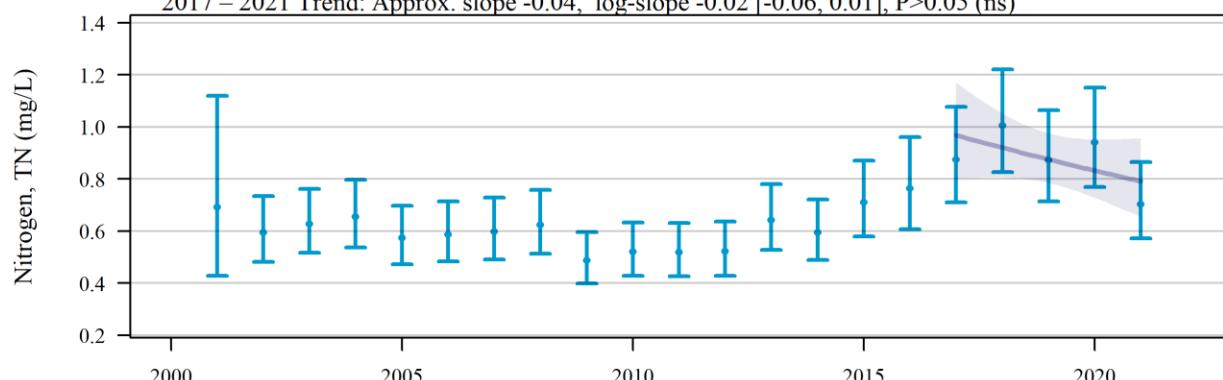
GAM for Nitrogen, TN at East Wall Charlotte Harbor
May 2001 to Dec 2021 (n=242)

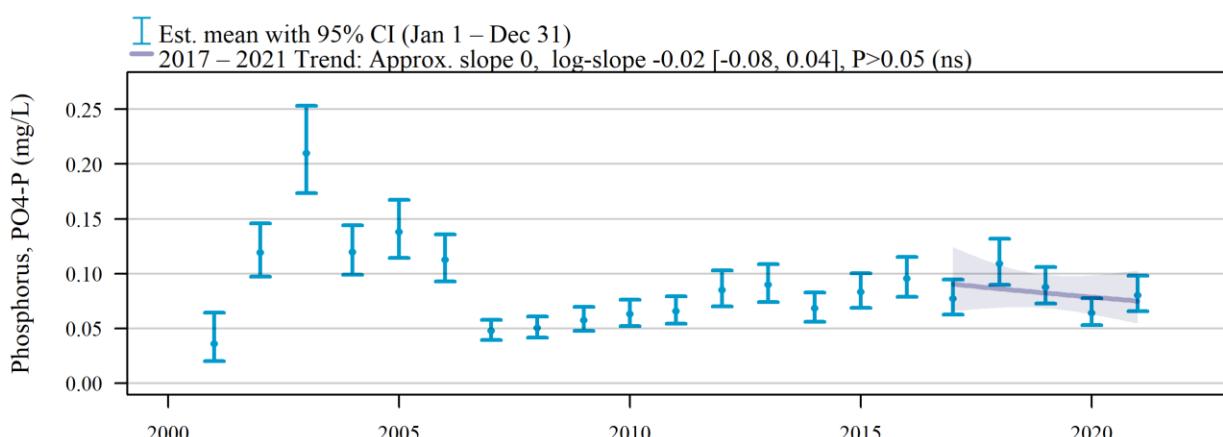
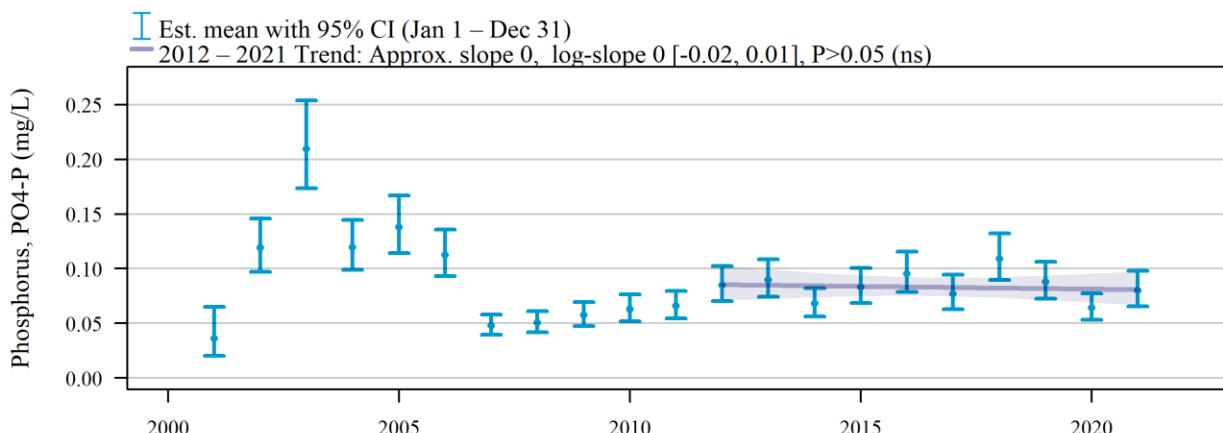
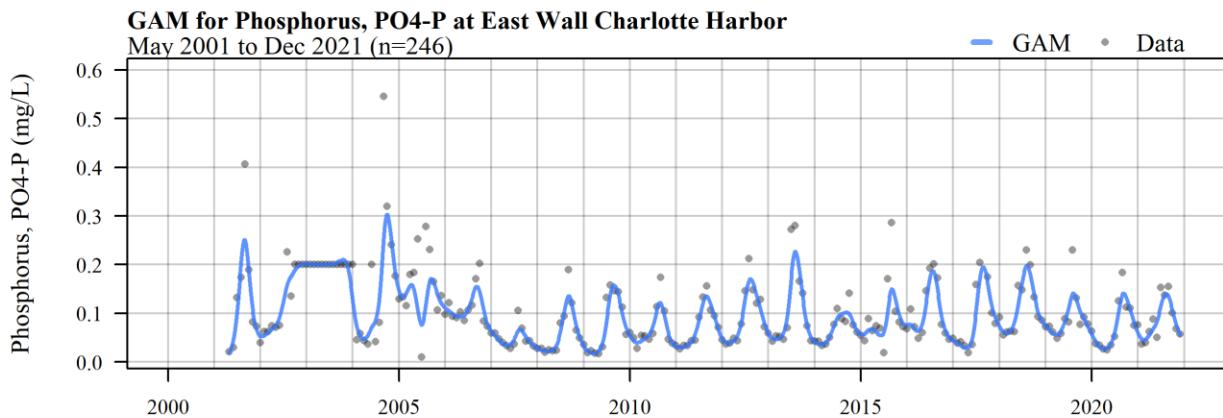


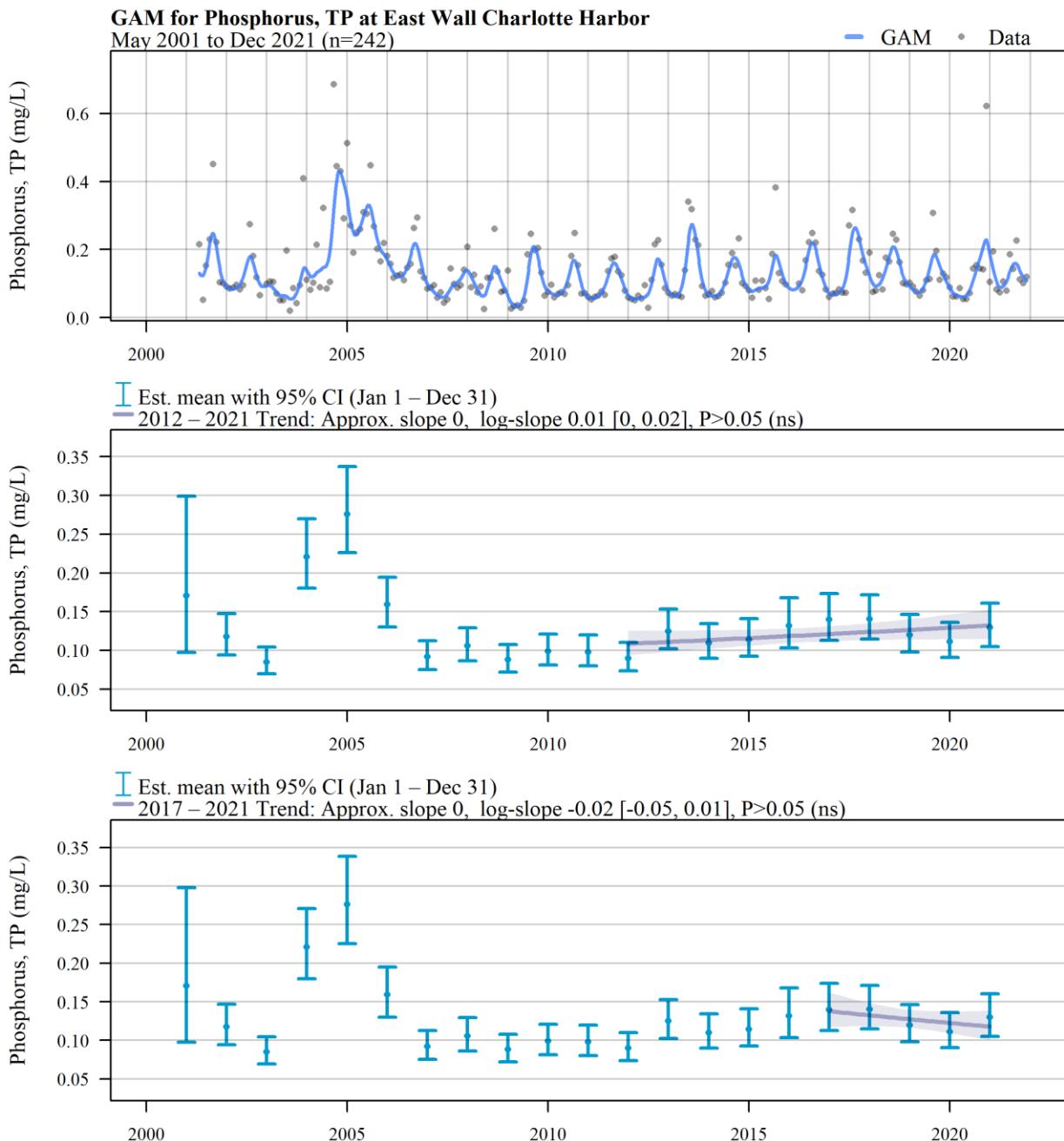
Est. mean with 95% CI (Jan 1 – Dec 31)
2012 – 2021 Trend: Approx. slope 0.04, log-slope 0.02 [0.01, 0.04], P<0.01

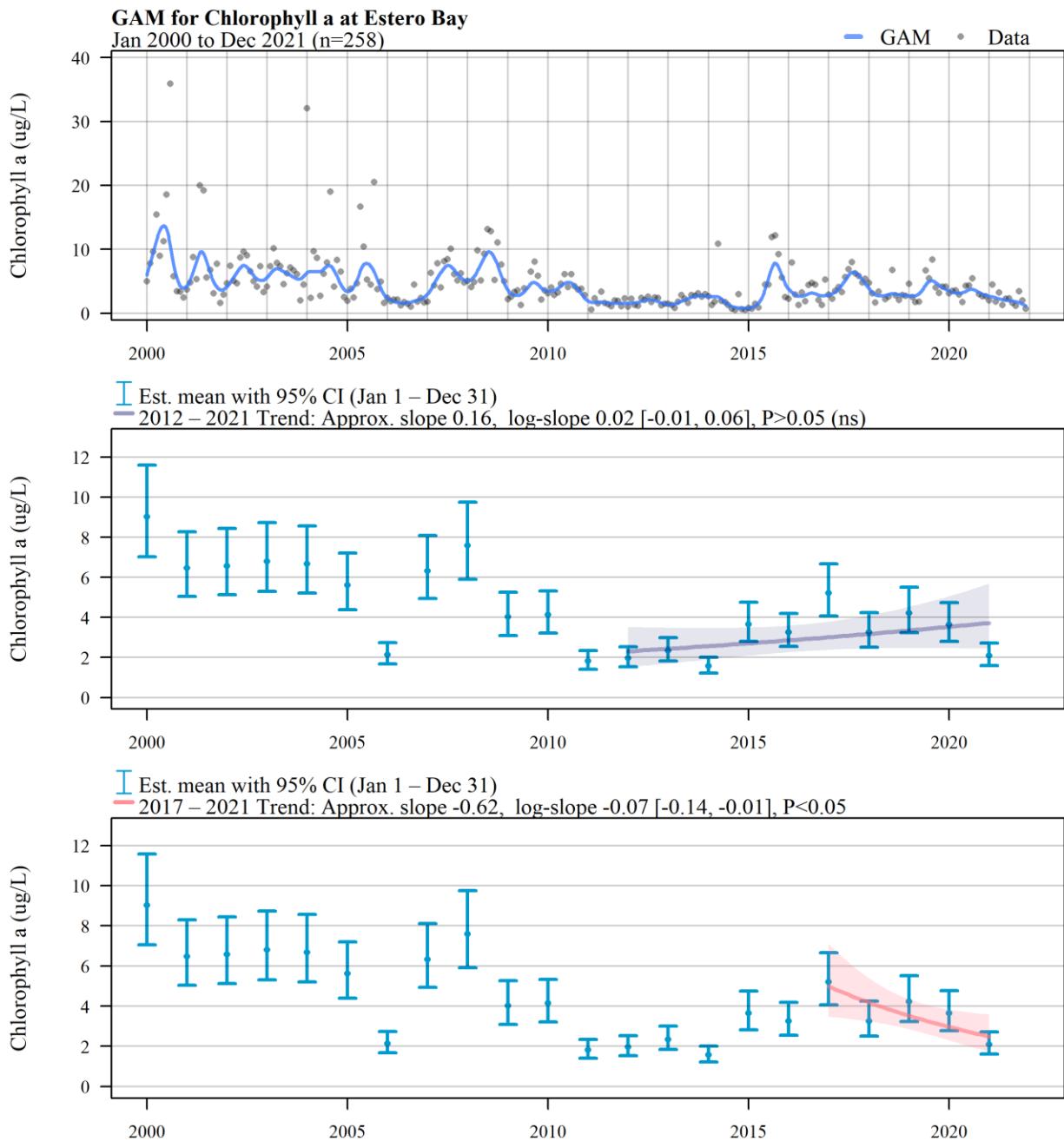


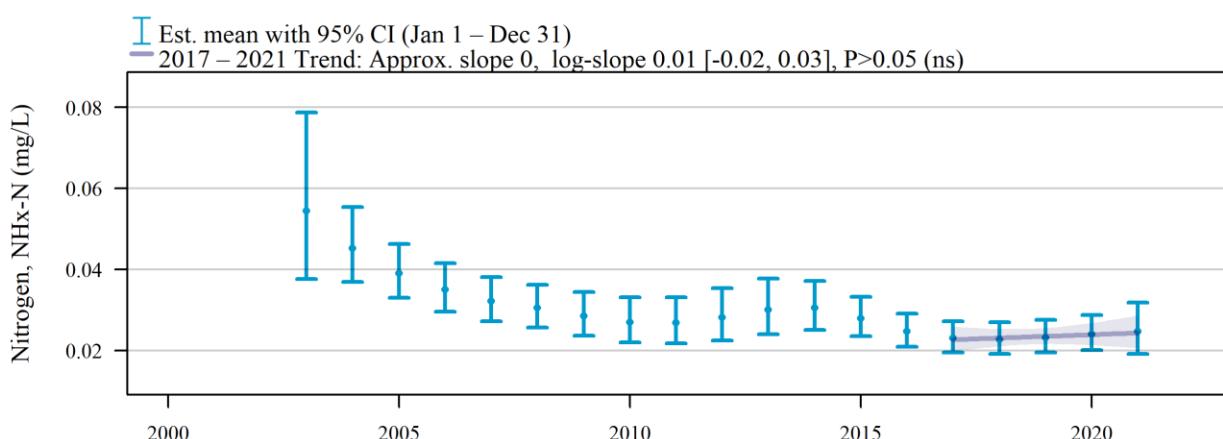
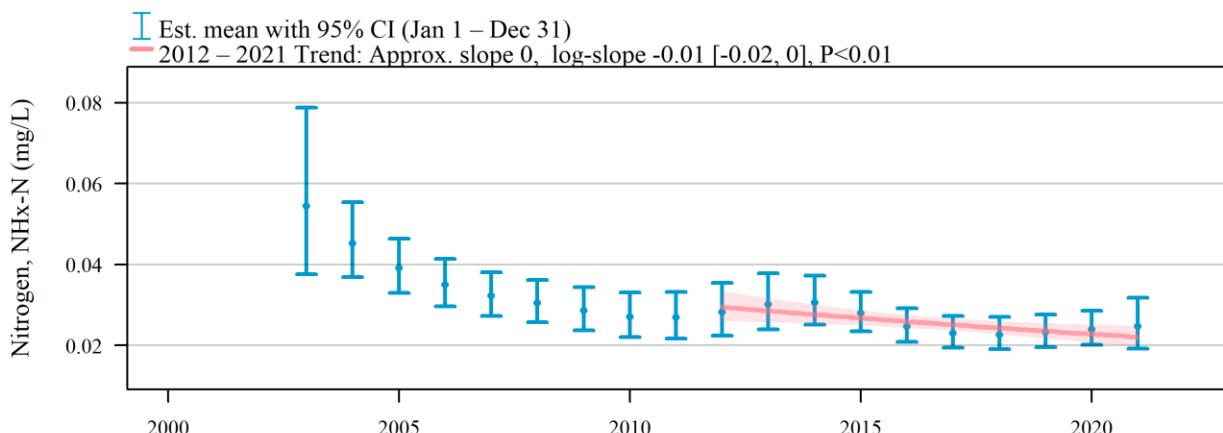
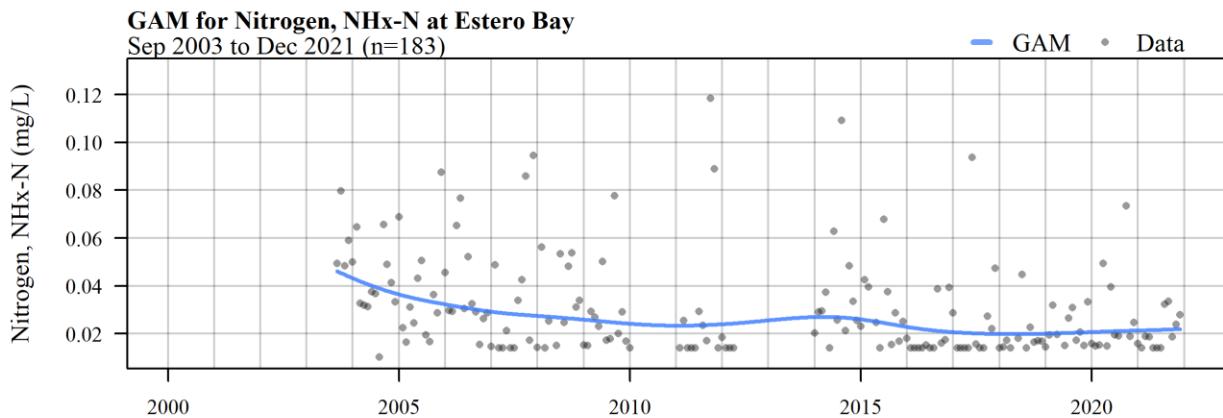
Est. mean with 95% CI (Jan 1 – Dec 31)
2017 – 2021 Trend: Approx. slope -0.04, log-slope -0.02 [-0.06, 0.01], P>0.05 (ns)

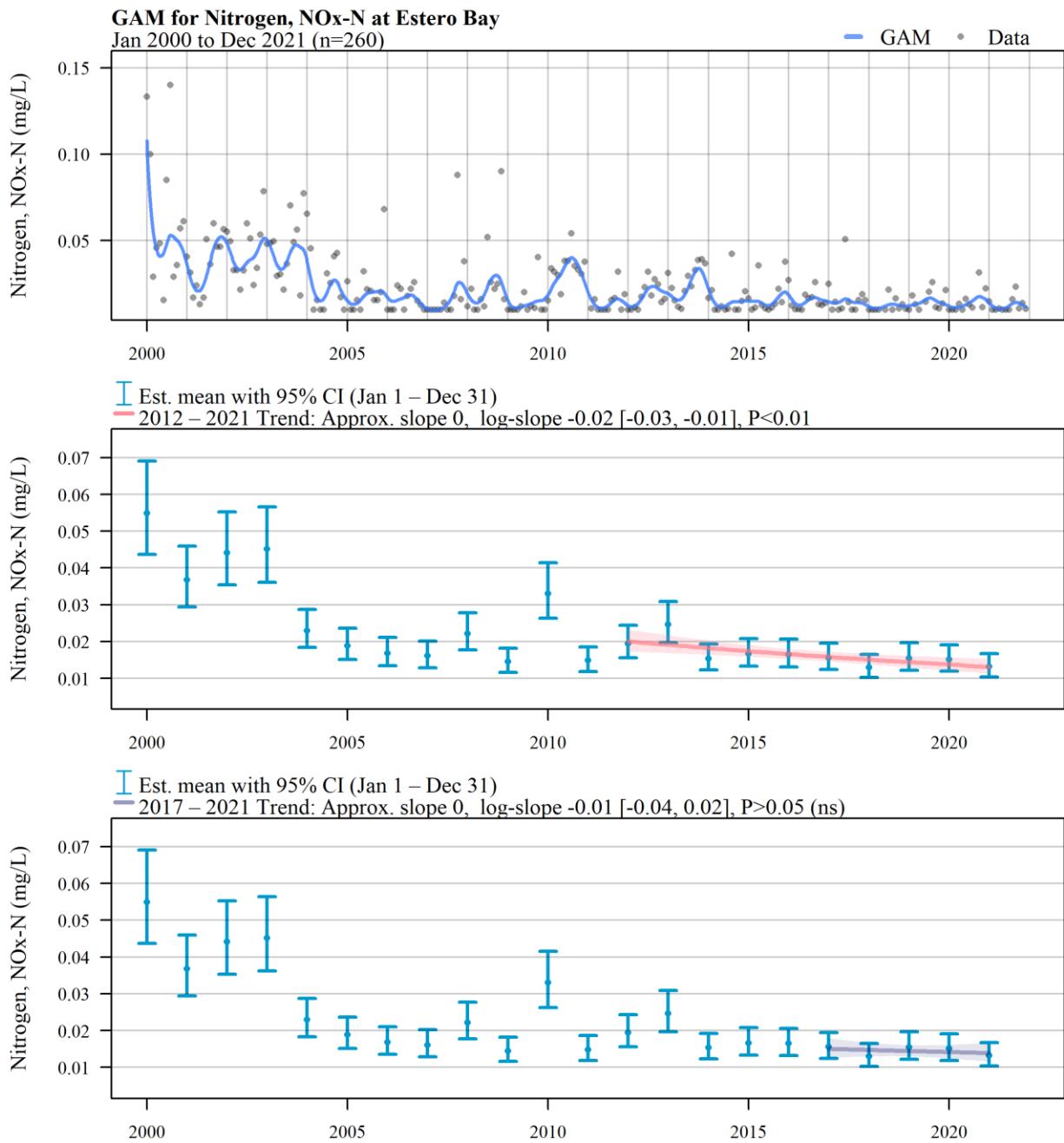


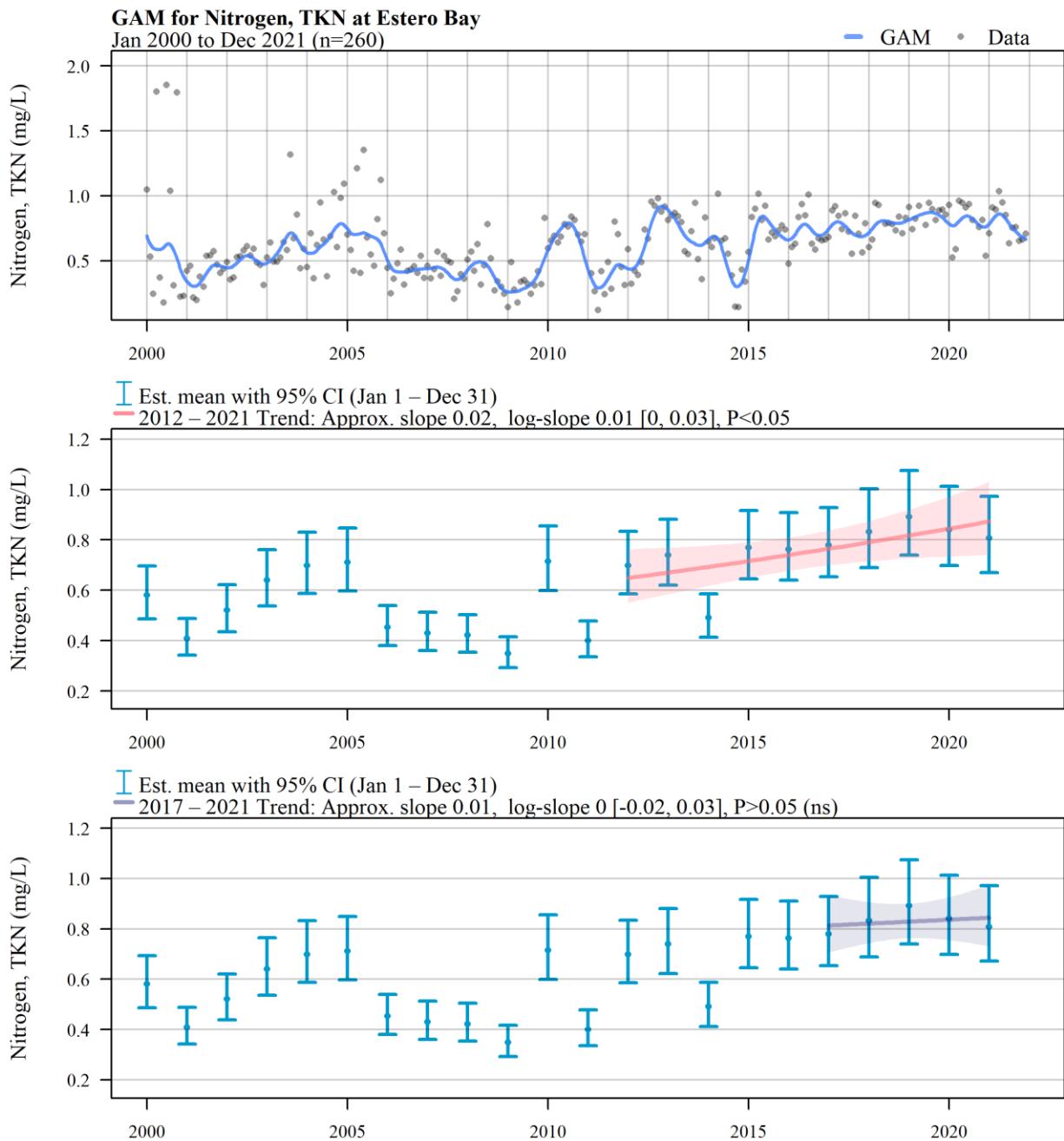


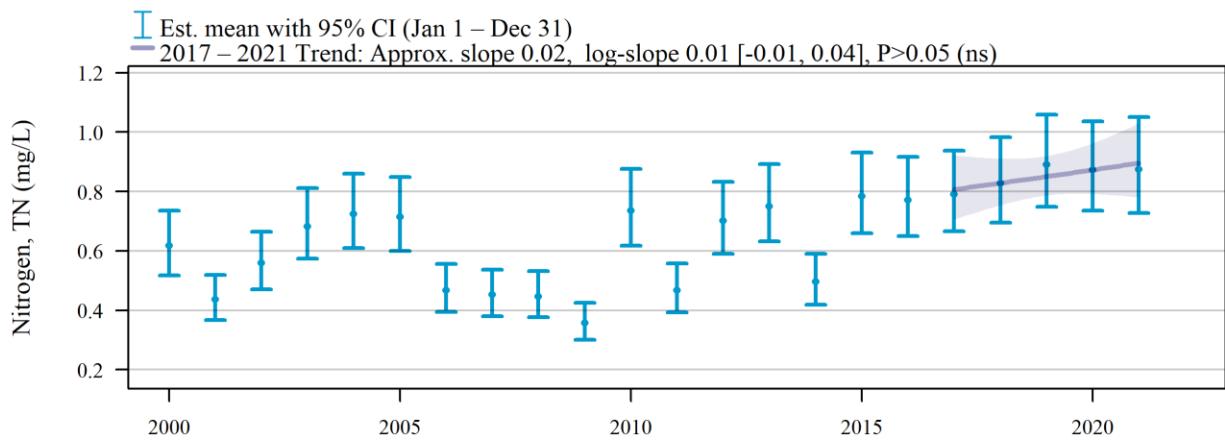
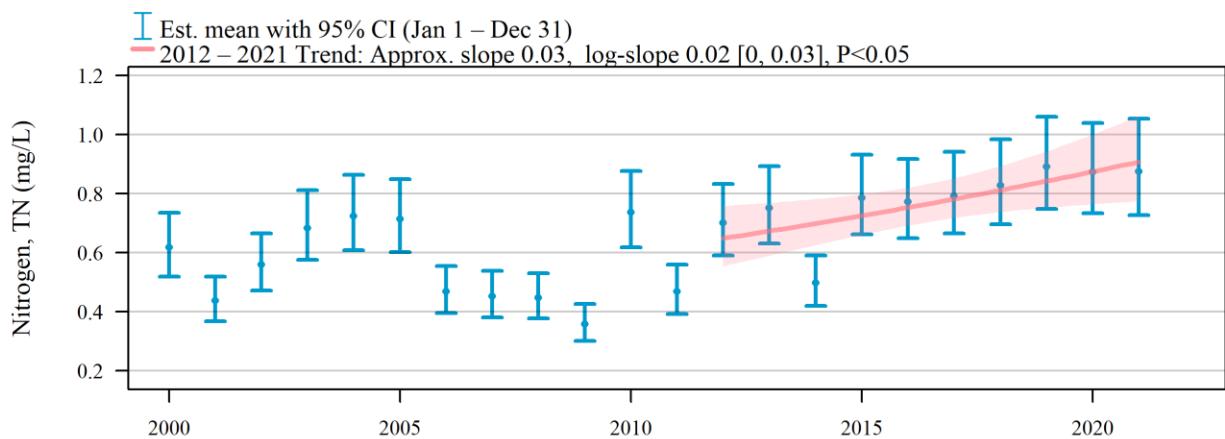
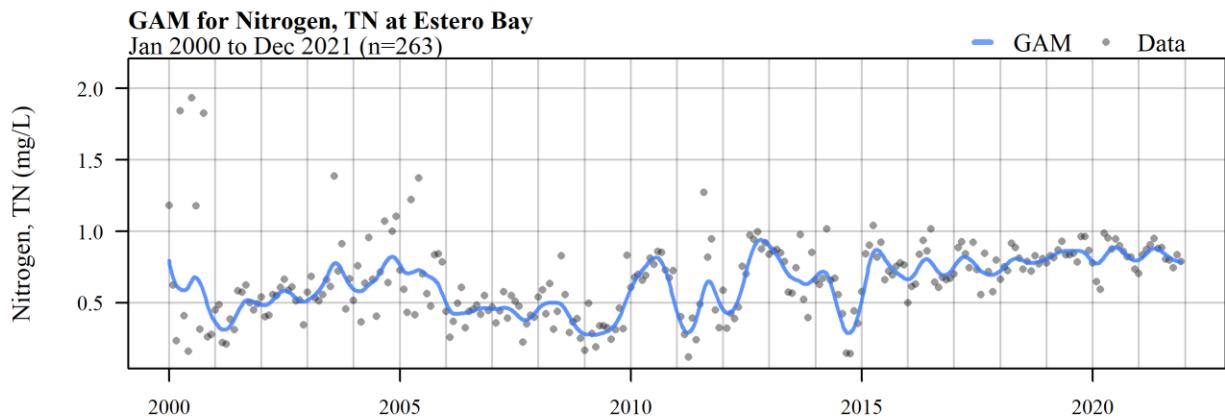


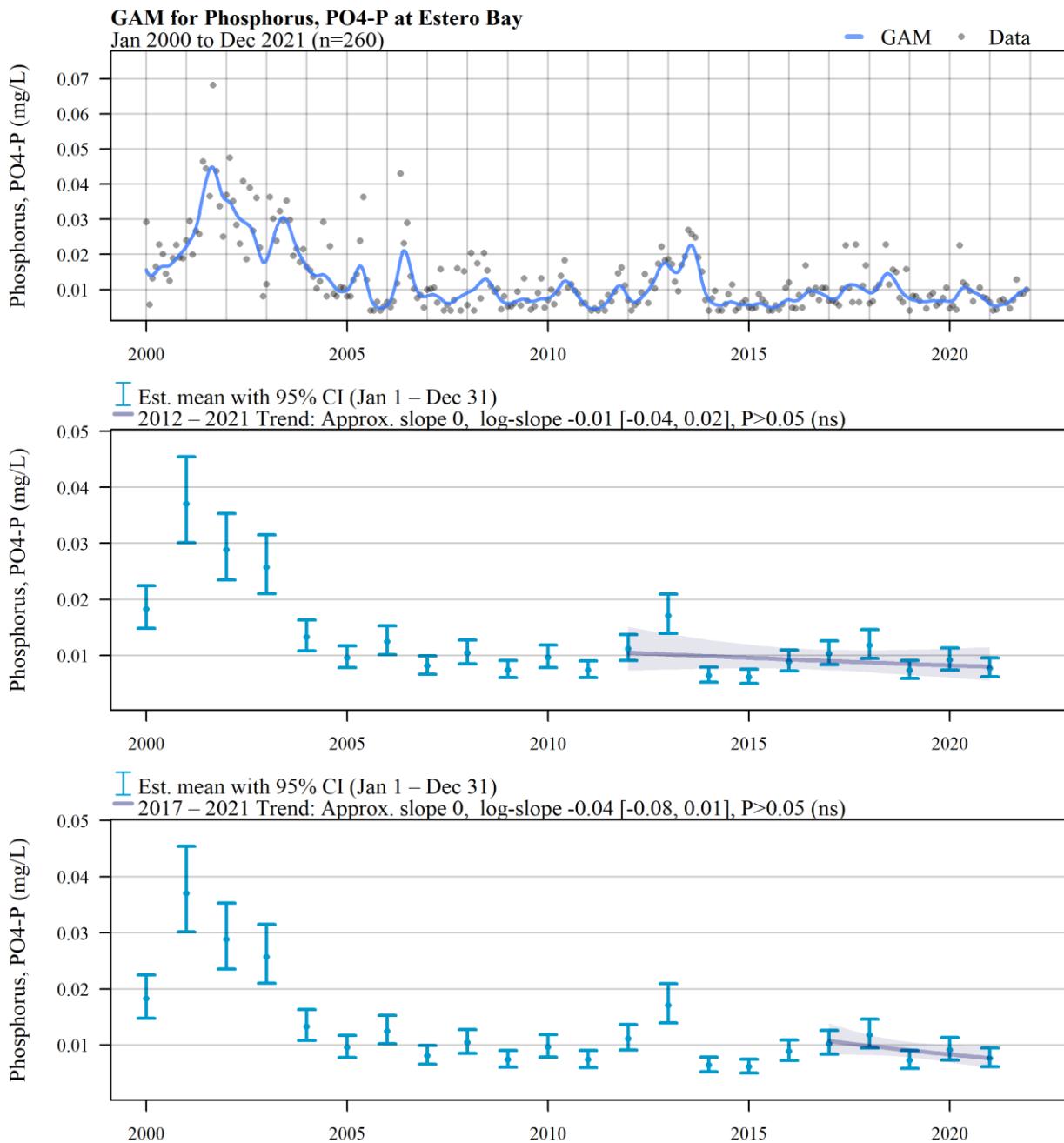


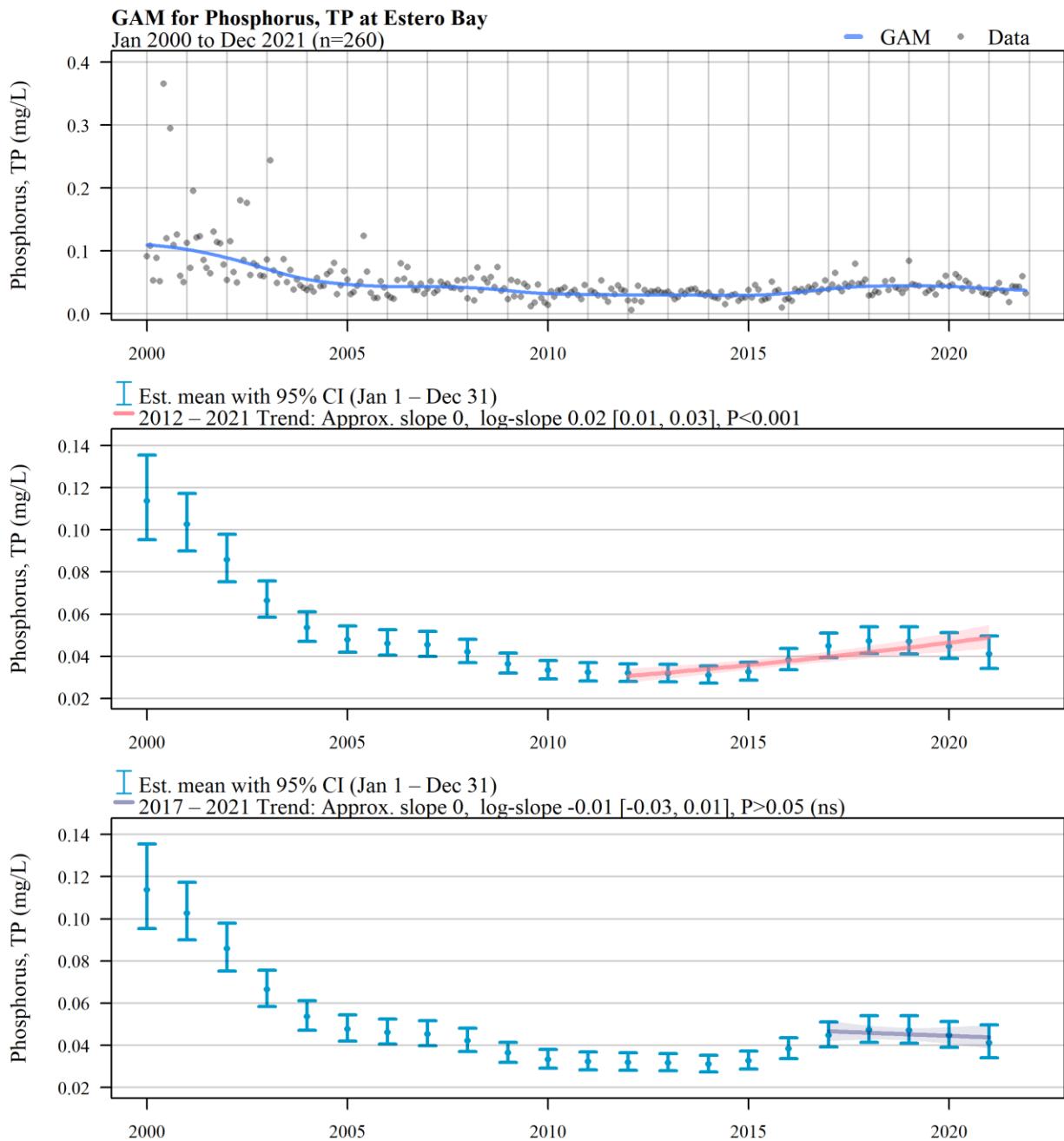


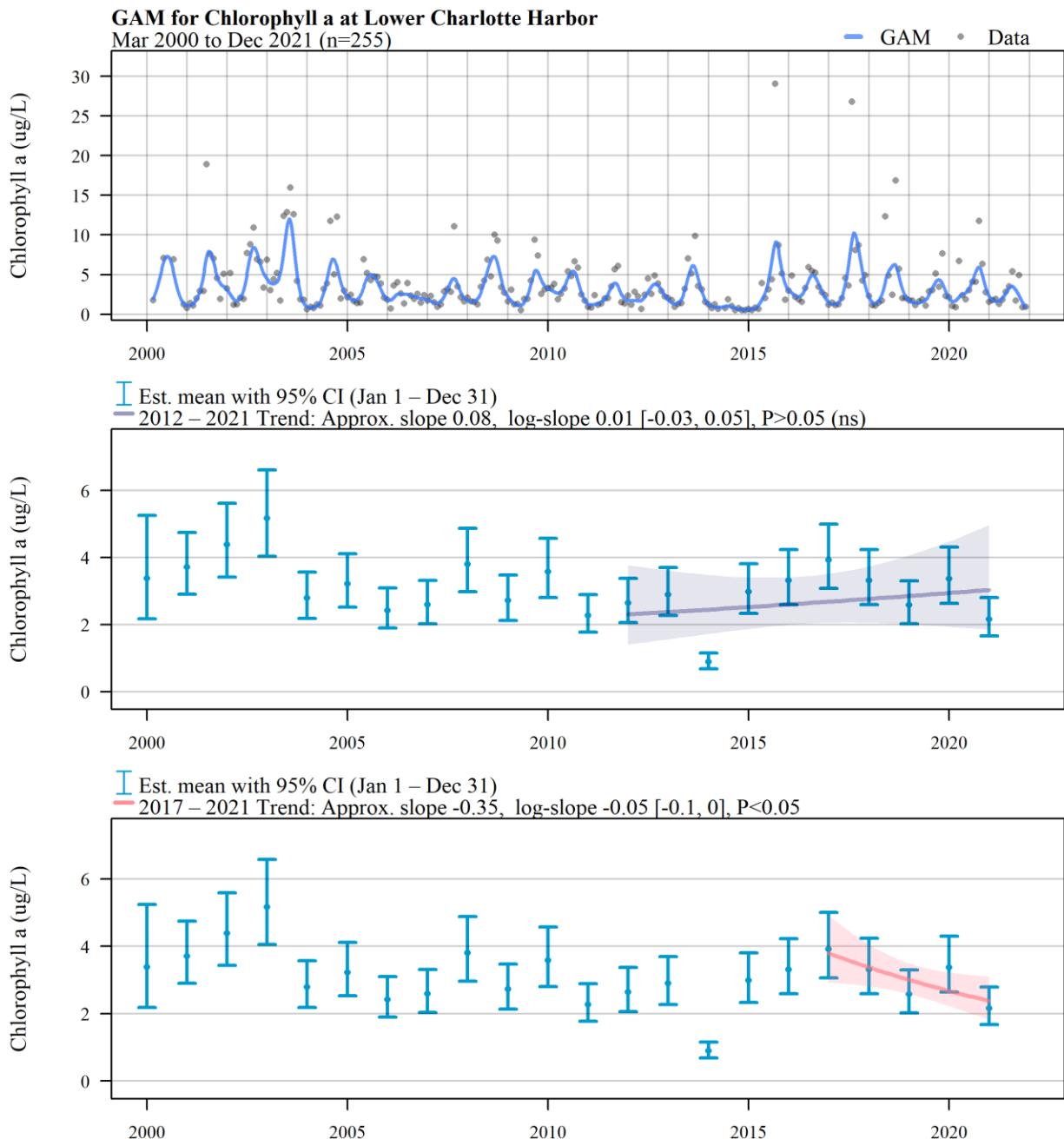


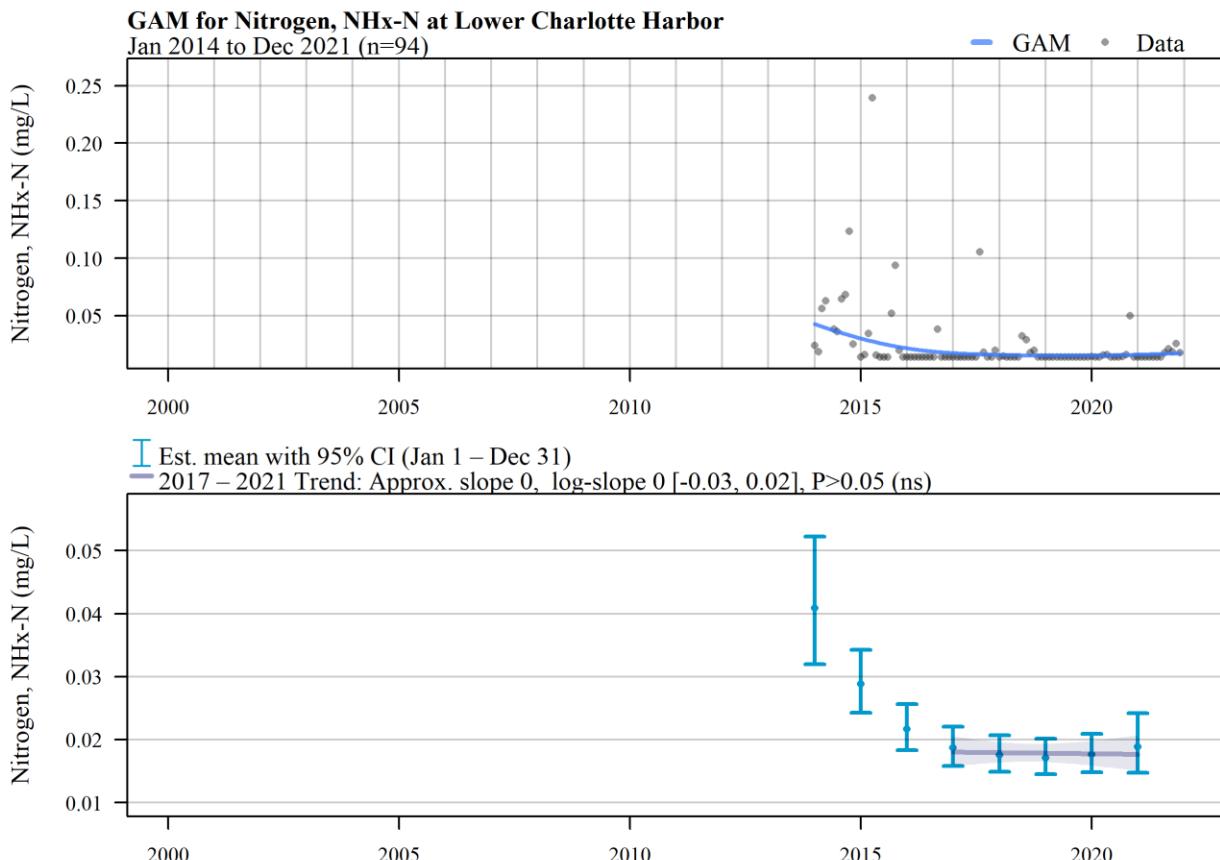


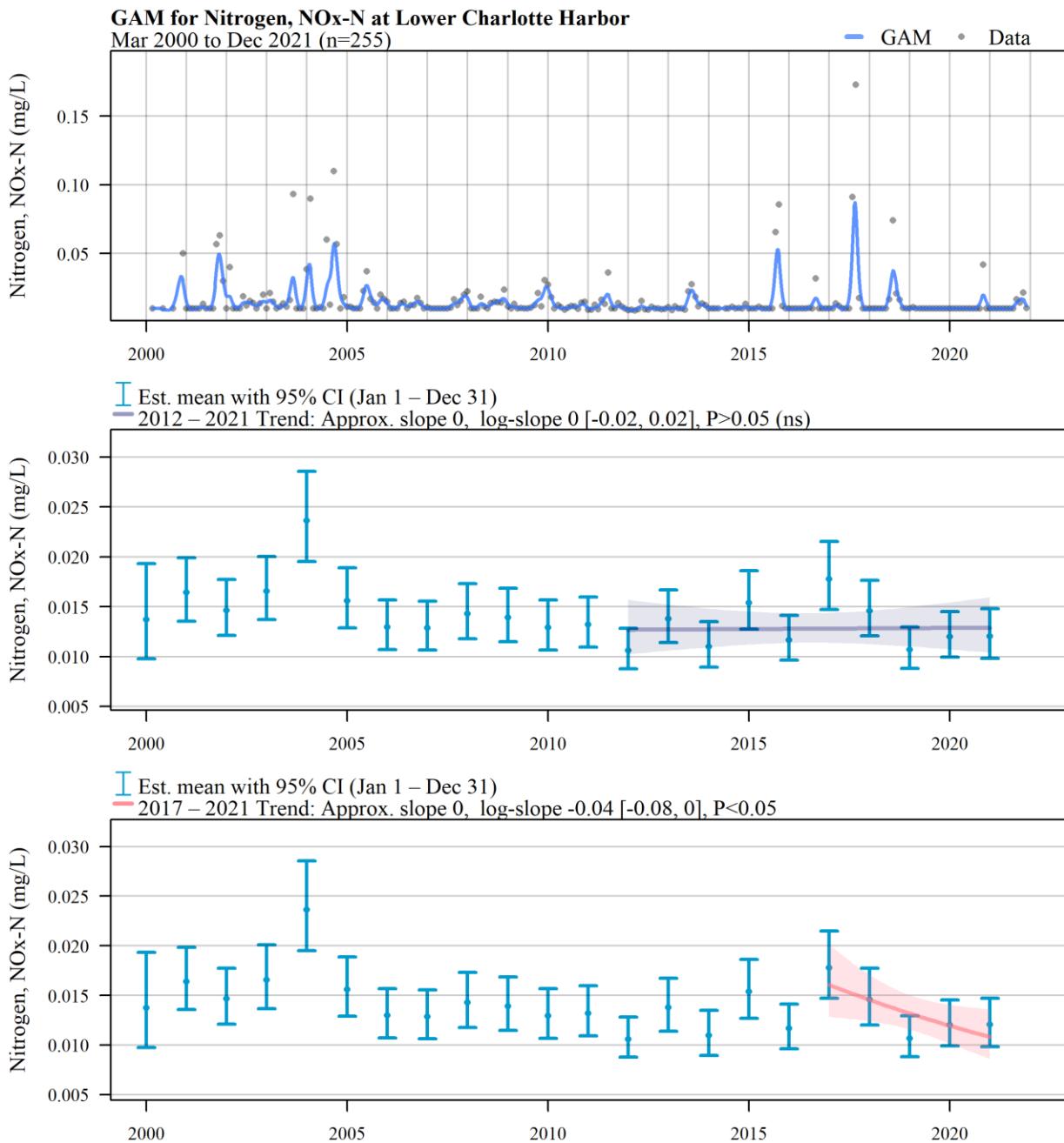






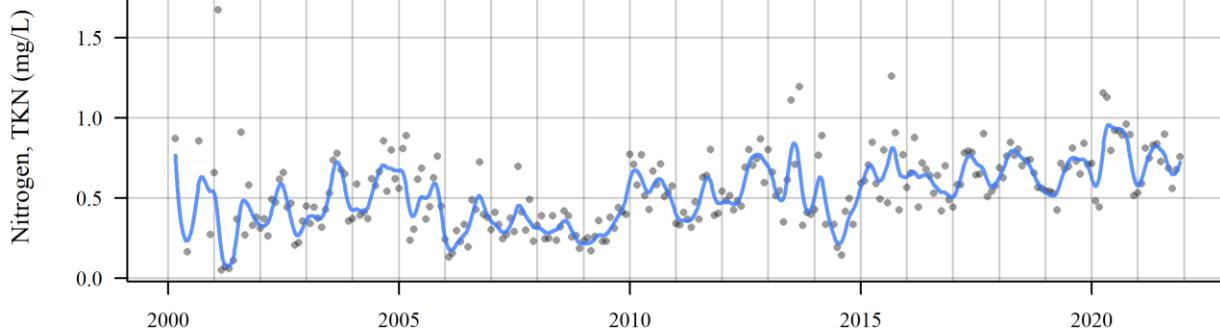




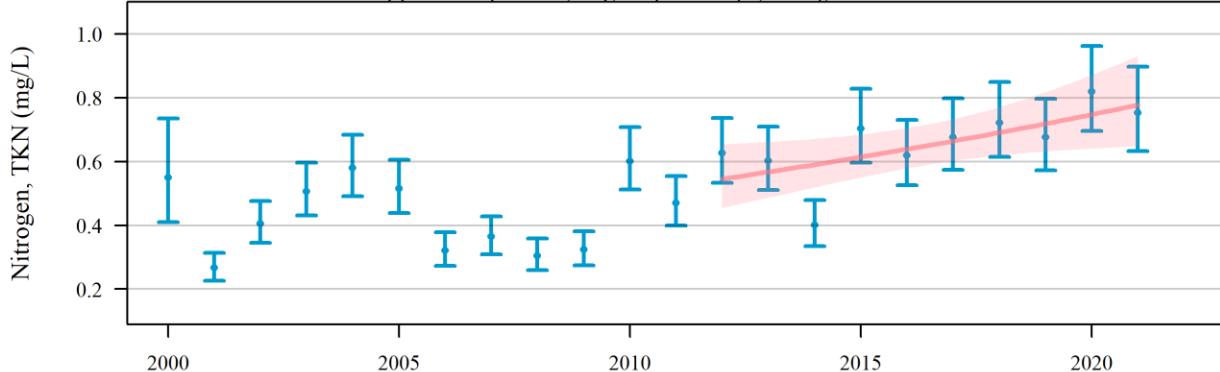


GAM for Nitrogen, TKN at Lower Charlotte Harbor
Mar 2000 to Dec 2021 (n=254)

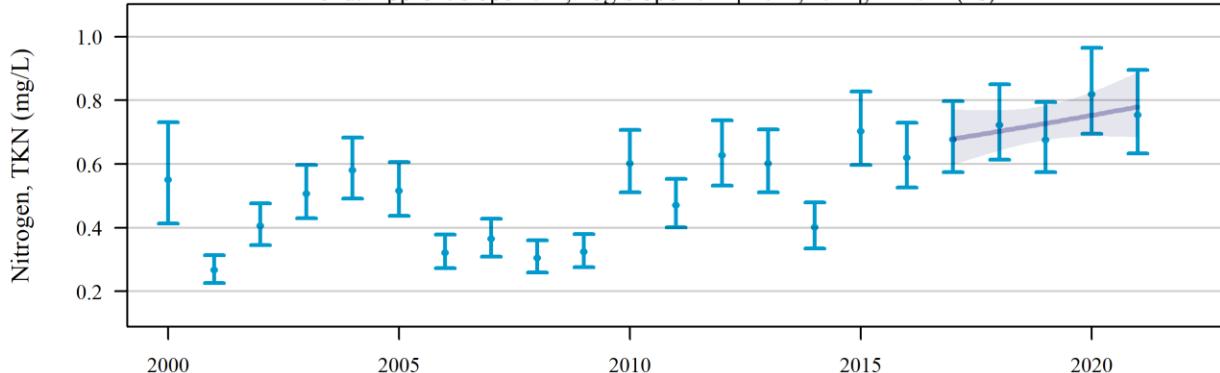
— GAM • Data

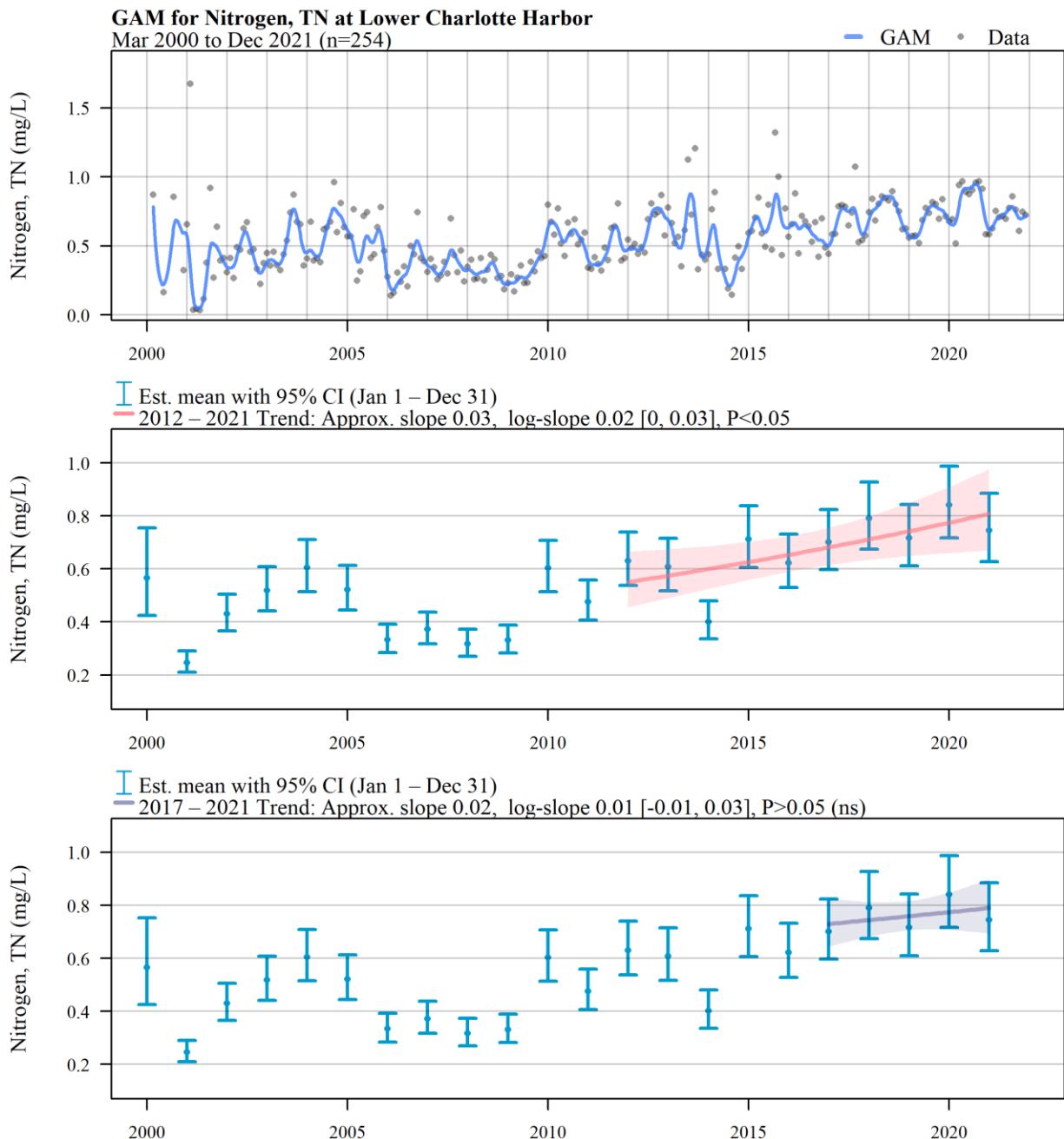


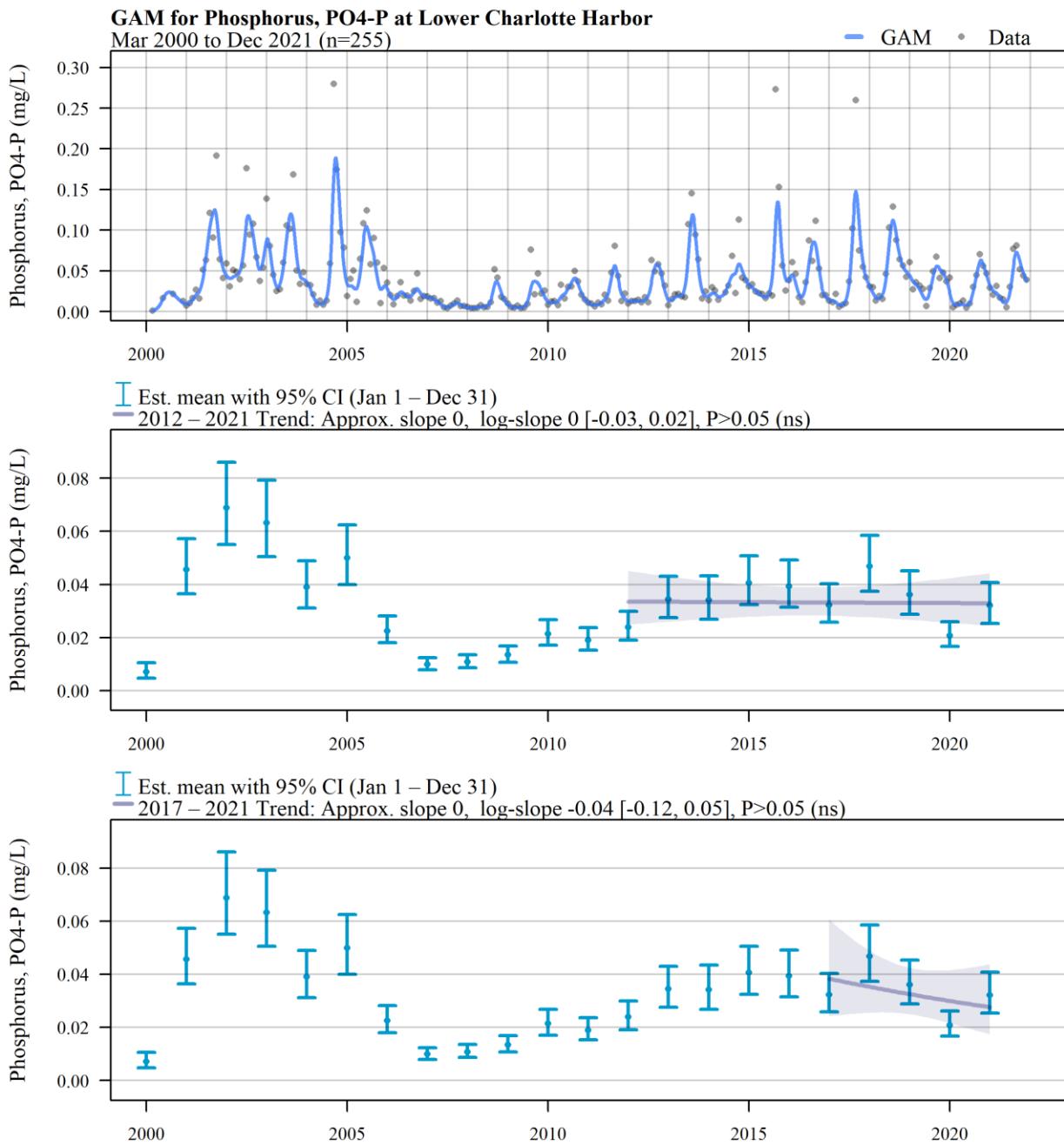
Est. mean with 95% CI (Jan 1 – Dec 31)
2012 – 2021 Trend: Approx. slope 0.03, log-slope 0.02 [0, 0.03], P<0.05

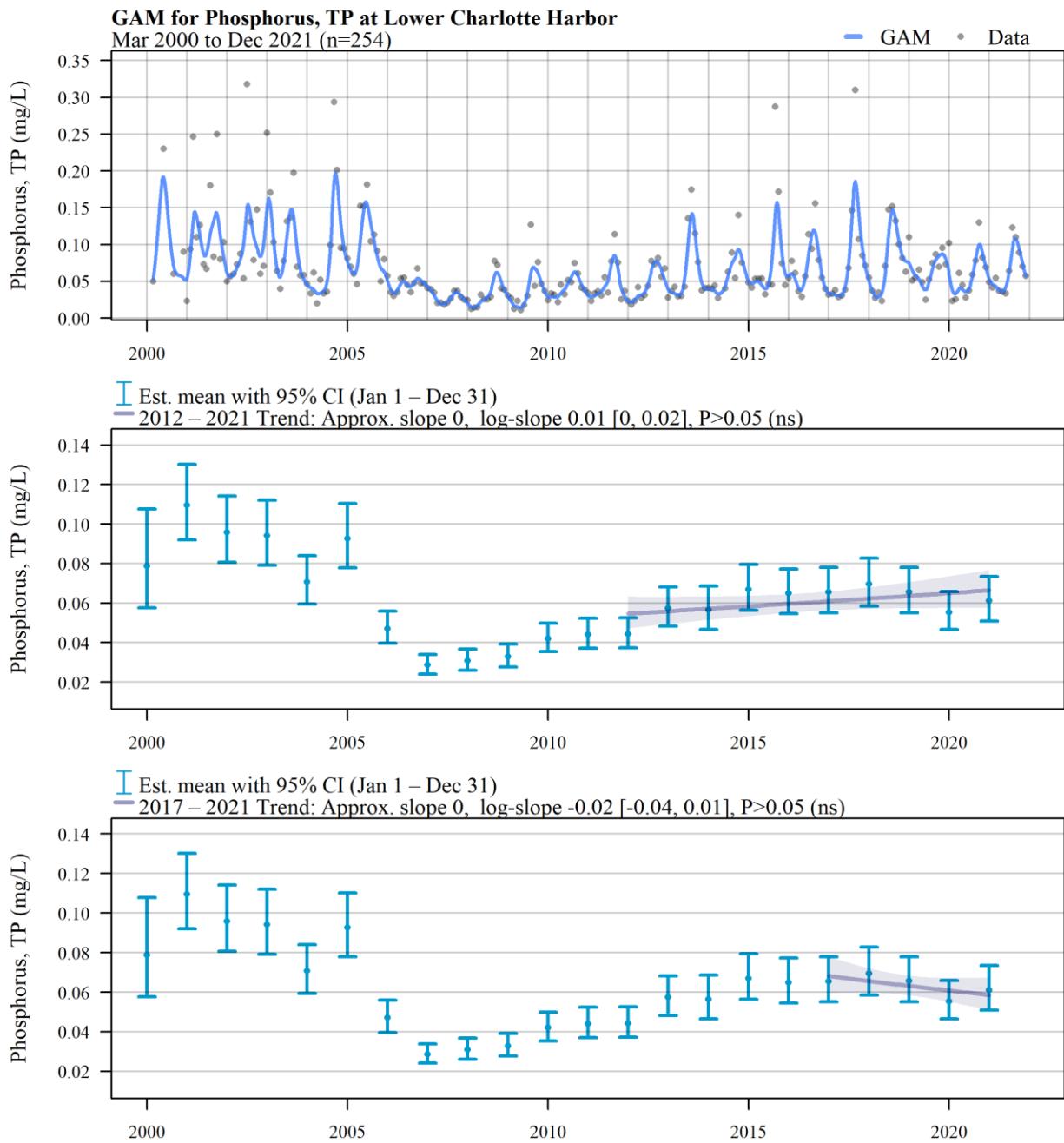


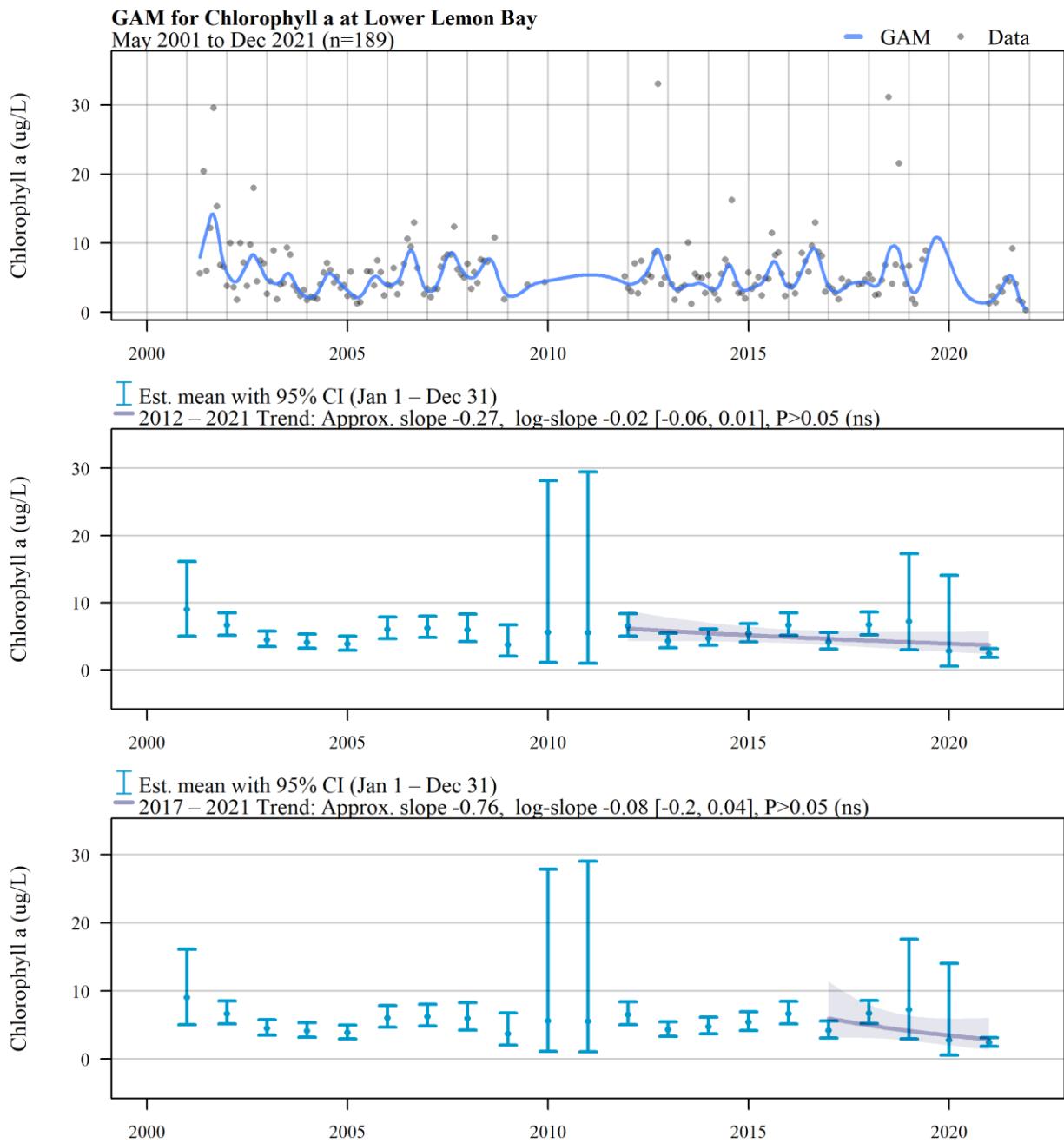
Est. mean with 95% CI (Jan 1 – Dec 31)
2017 – 2021 Trend: Approx. slope 0.03, log-slope 0.02 [-0.01, 0.04], P>0.05 (ns)

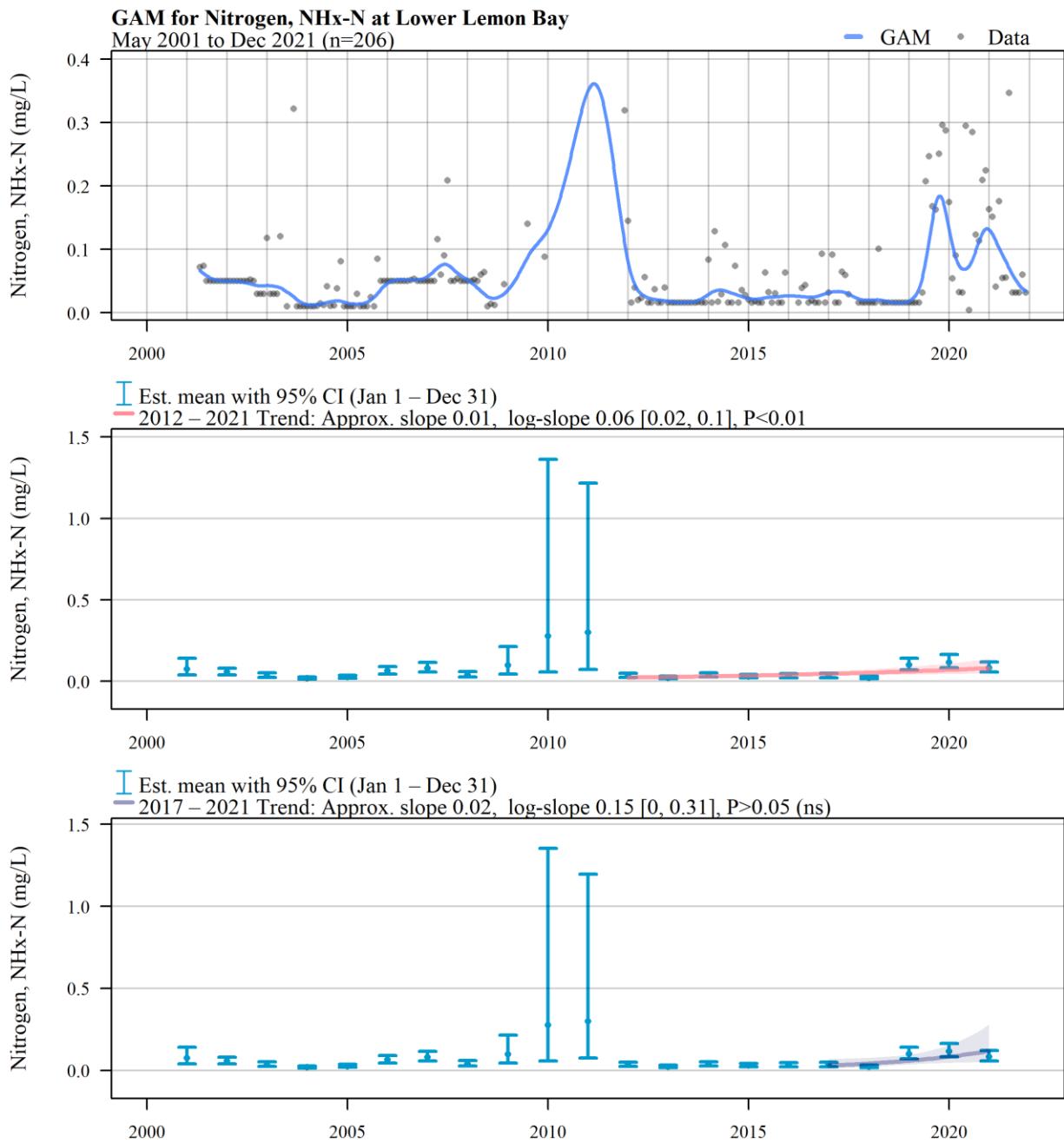


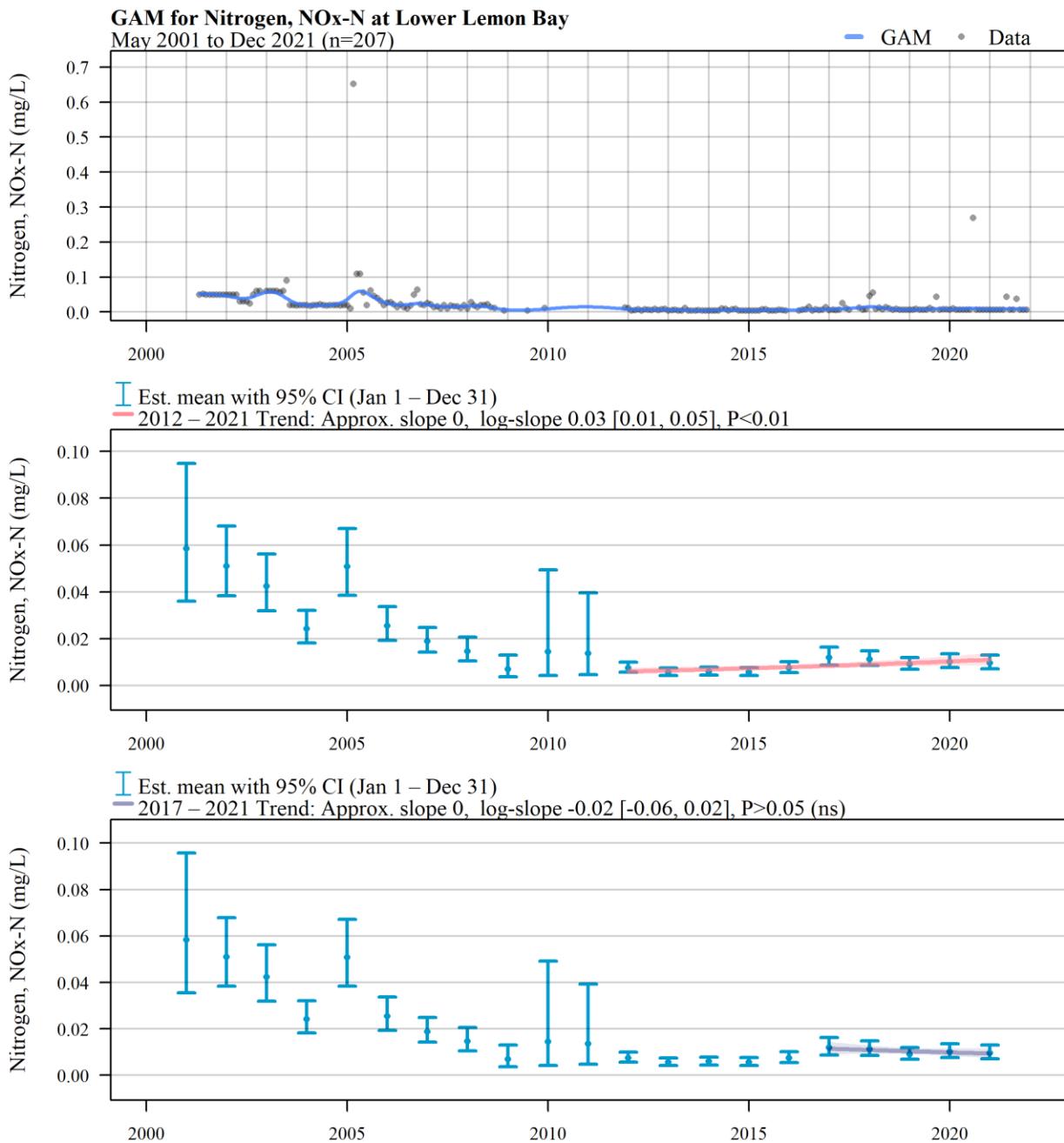




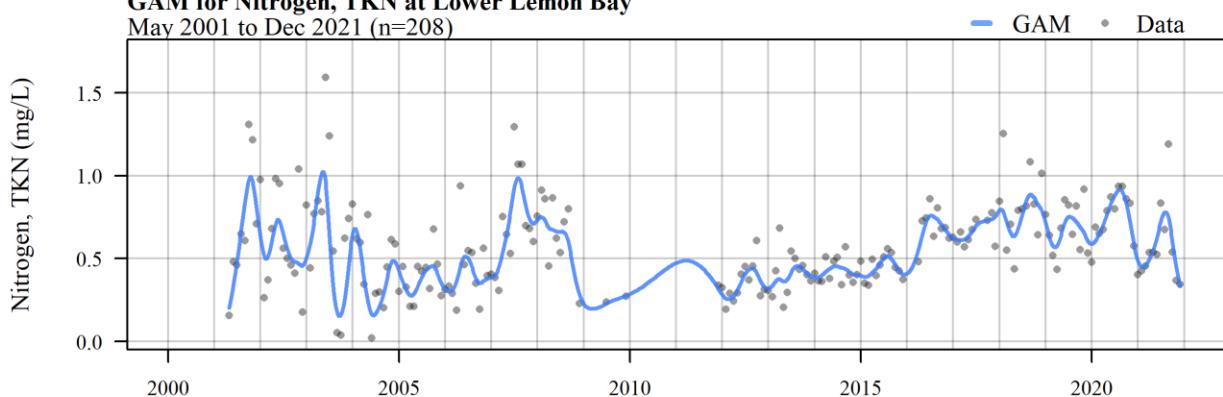




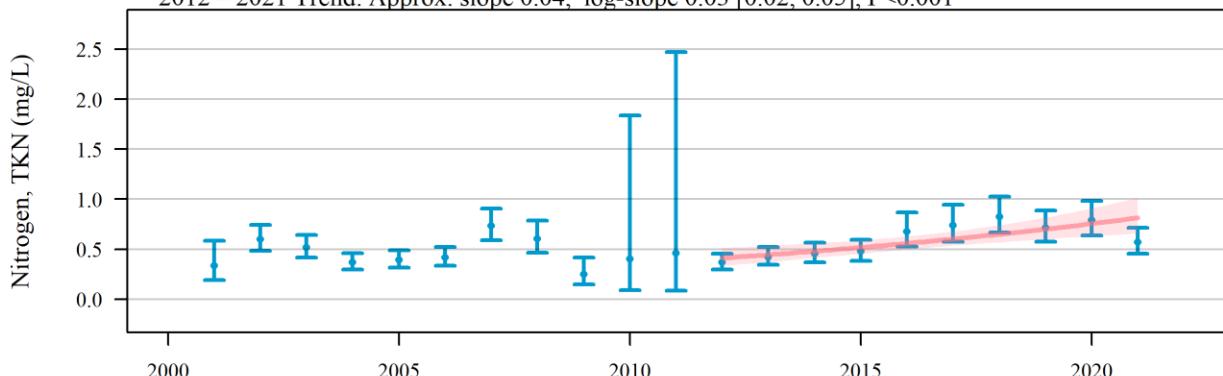




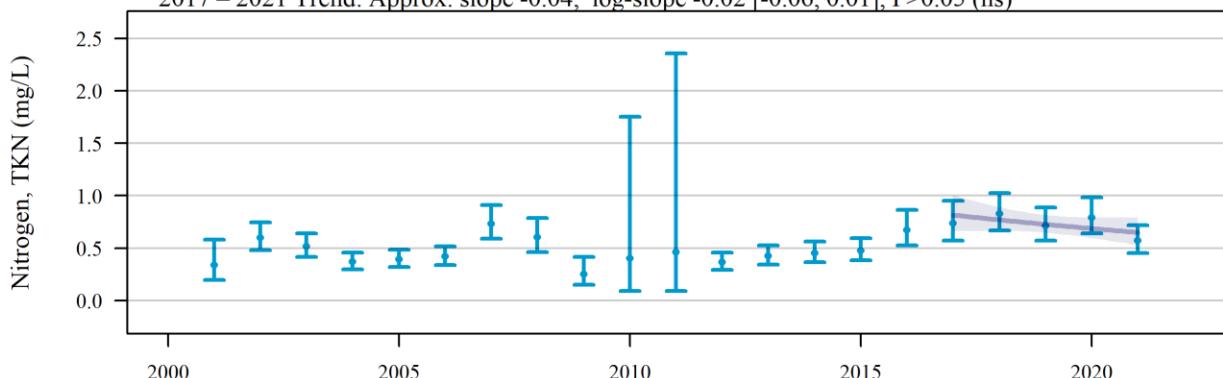
GAM for Nitrogen, TKN at Lower Lemon Bay
May 2001 to Dec 2021 (n=208)

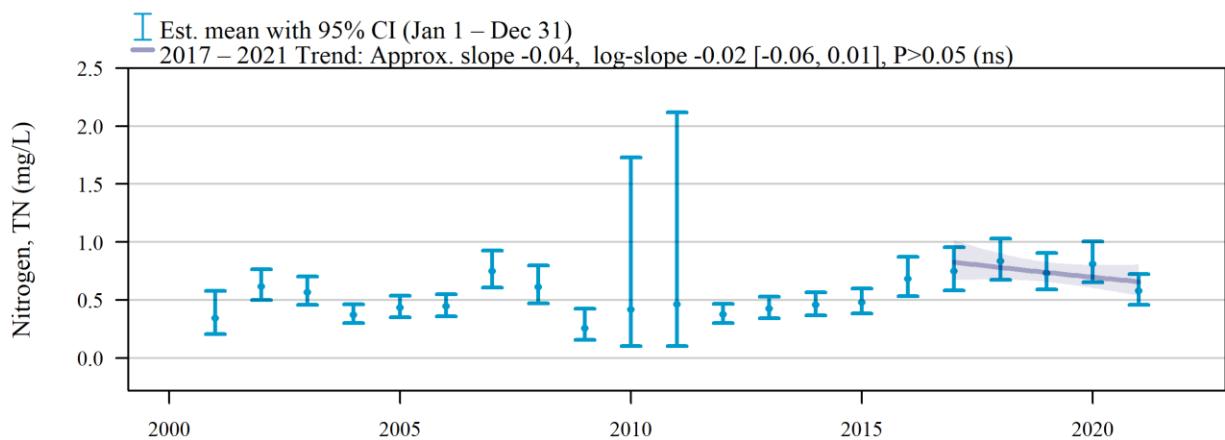
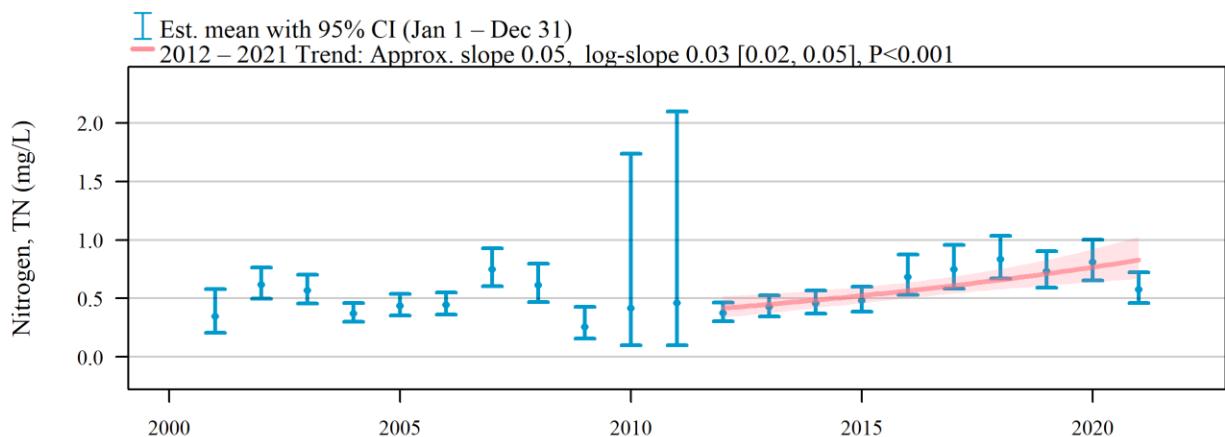
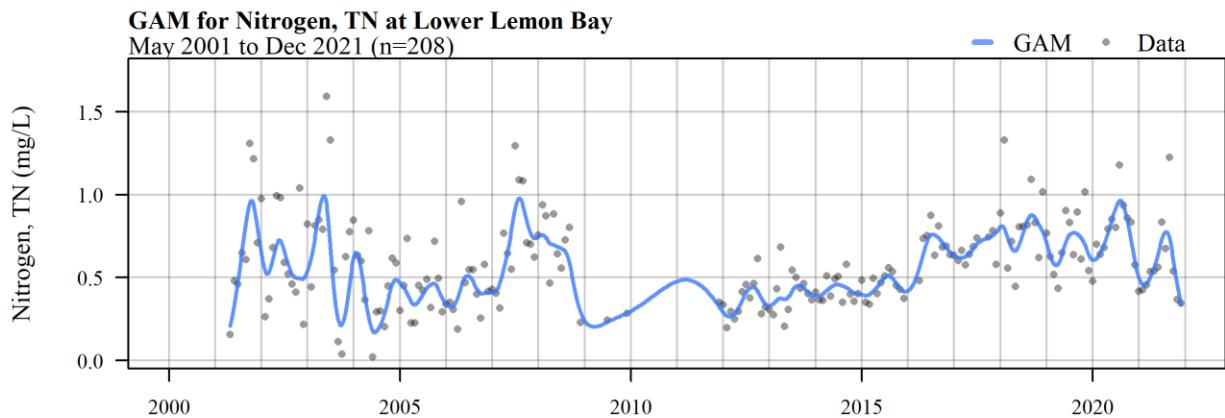


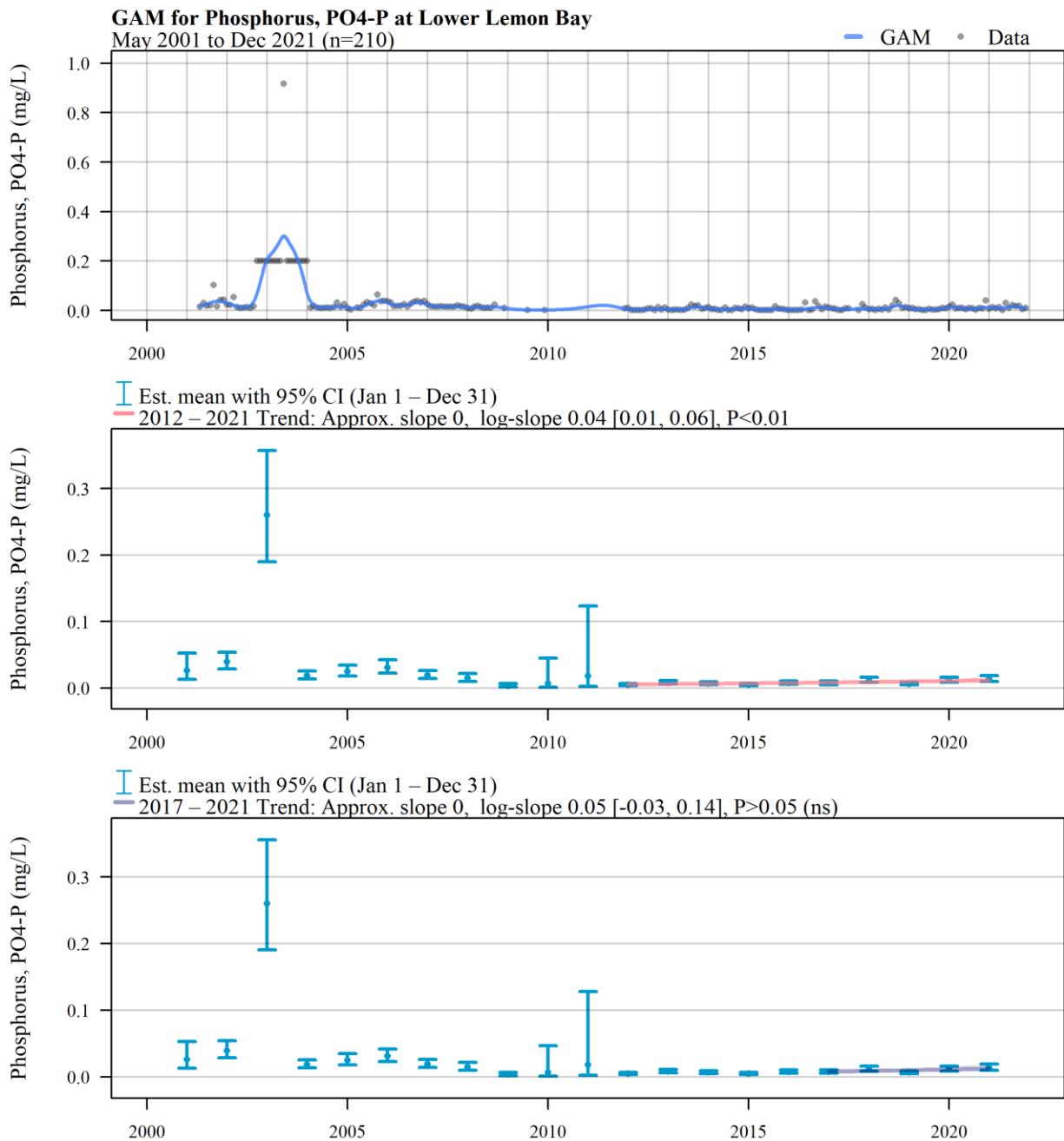
Est. mean with 95% CI (Jan 1 – Dec 31)
2012 – 2021 Trend: Approx. slope 0.04, log-slope 0.03 [0.02, 0.05], P<0.001



Est. mean with 95% CI (Jan 1 – Dec 31)
2017 – 2021 Trend: Approx. slope -0.04, log-slope -0.02 [-0.06, 0.01], P>0.05 (ns)

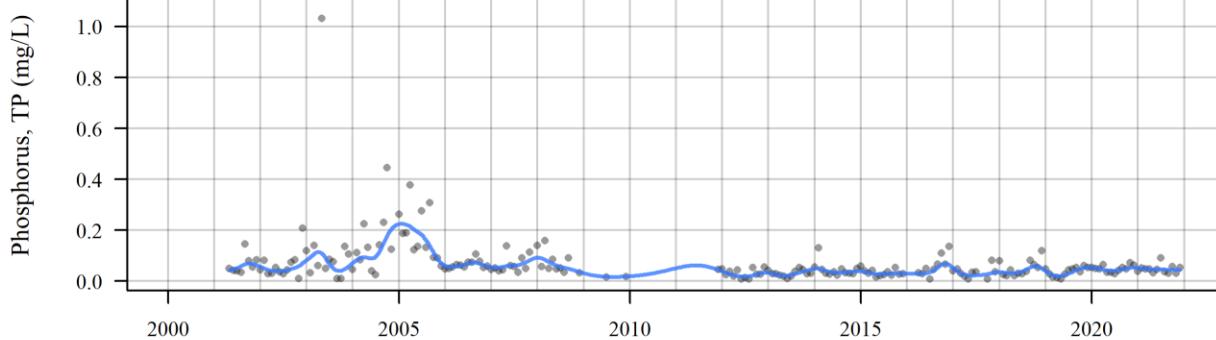




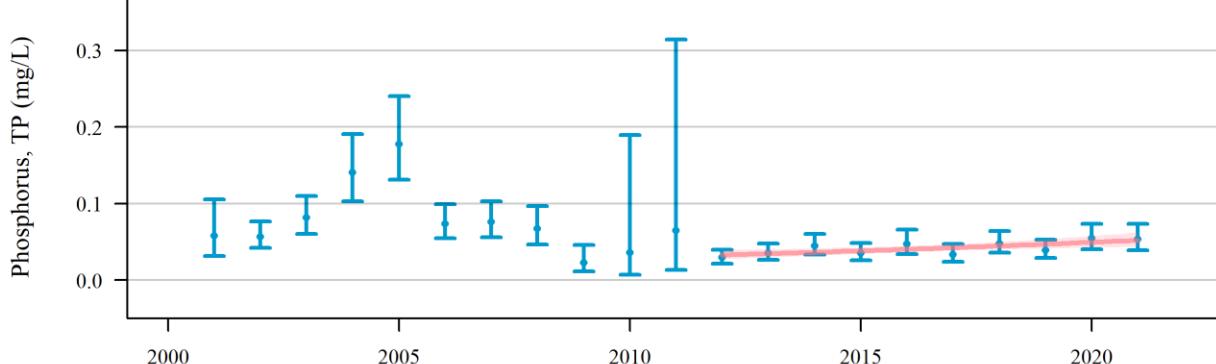


GAM for Phosphorus, TP at Lower Lemon Bay
May 2001 to Dec 2021 (n=206)

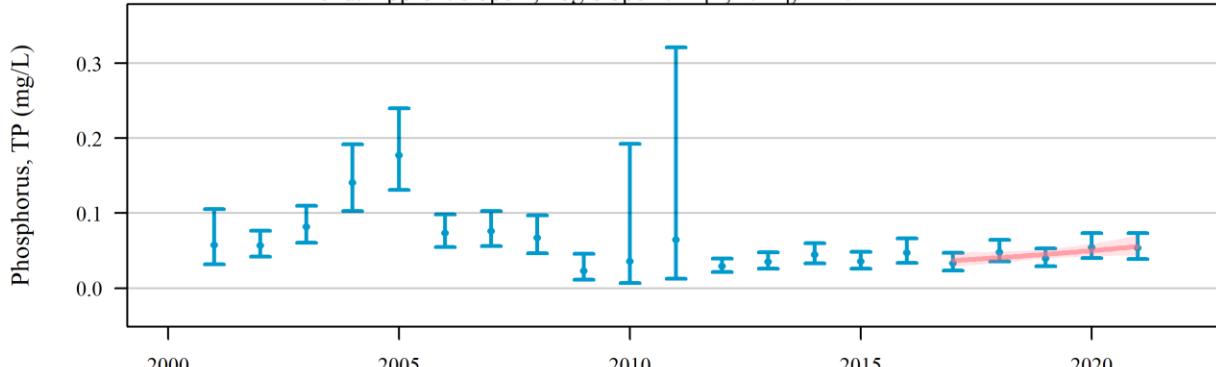
— GAM • Data

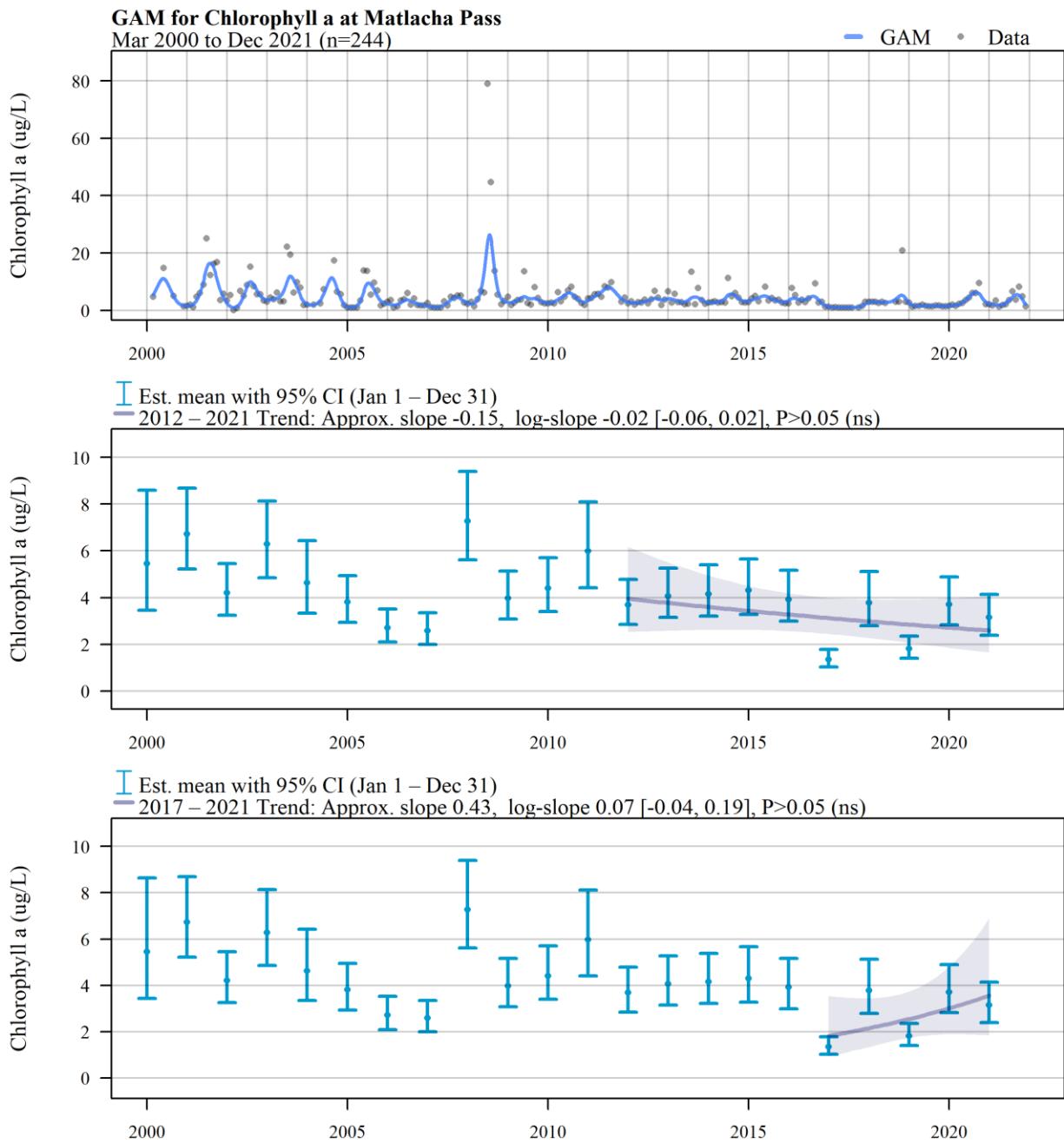


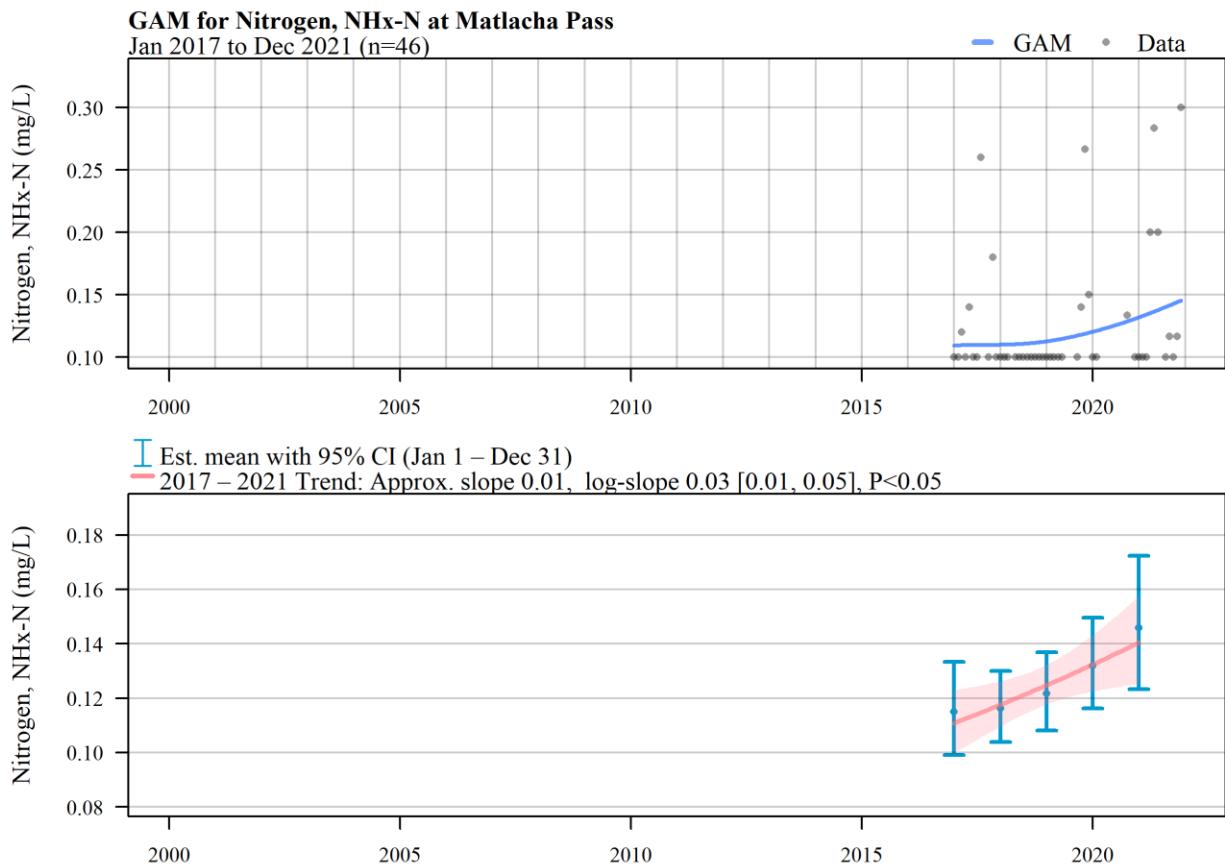
— Est. mean with 95% CI (Jan 1 – Dec 31)
— 2012 – 2021 Trend: Approx. slope 0, log-slope 0.02 [0.01, 0.04], P<0.01

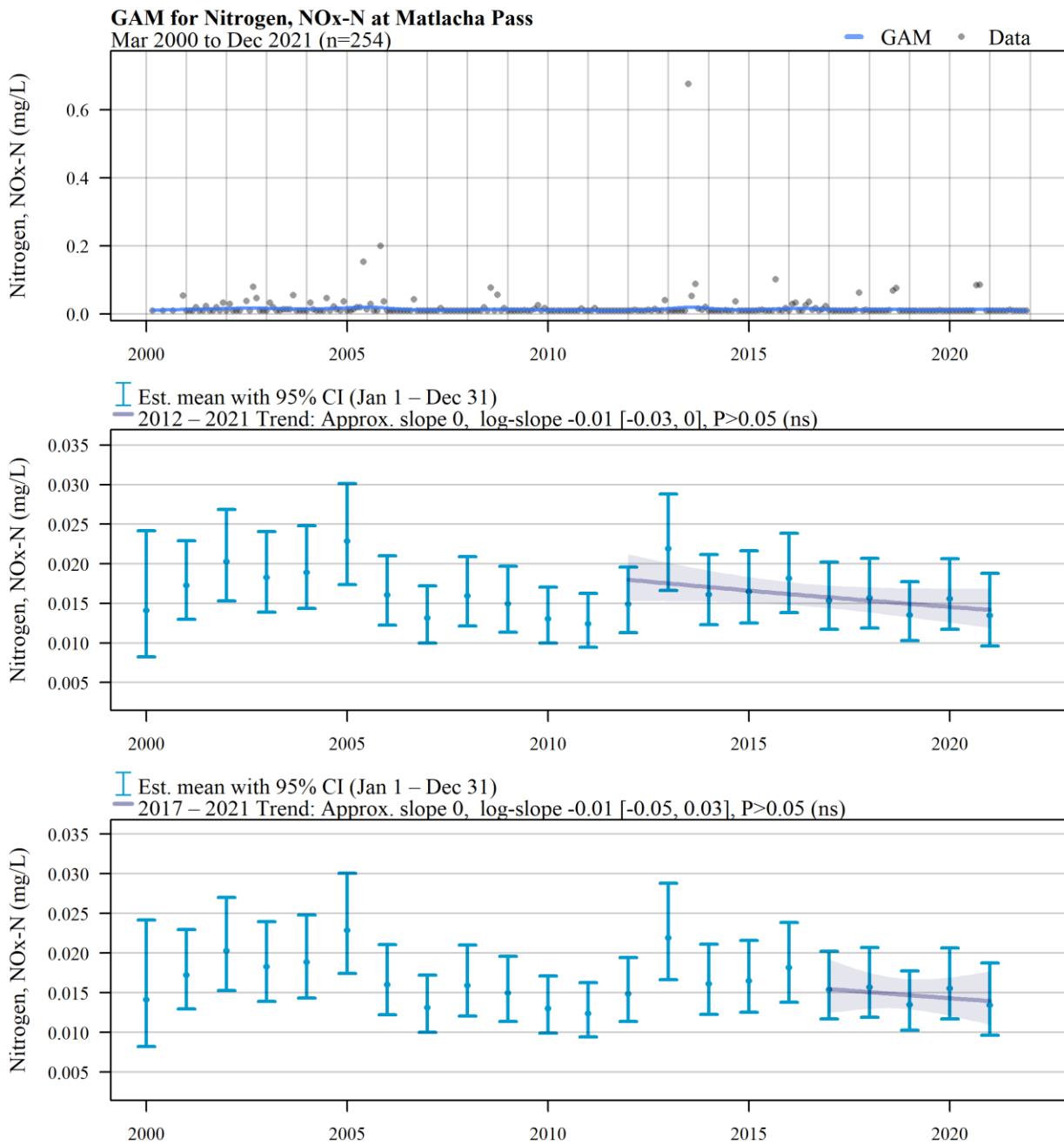


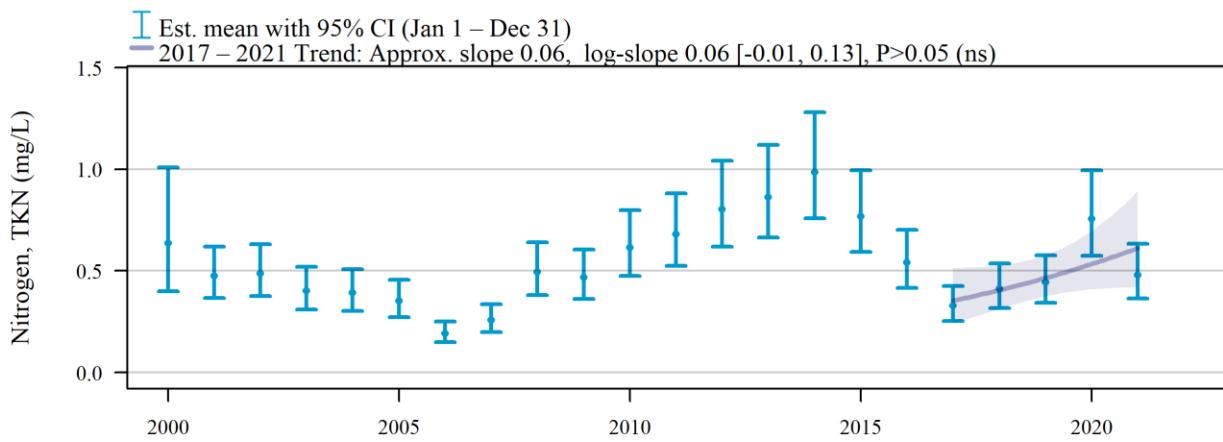
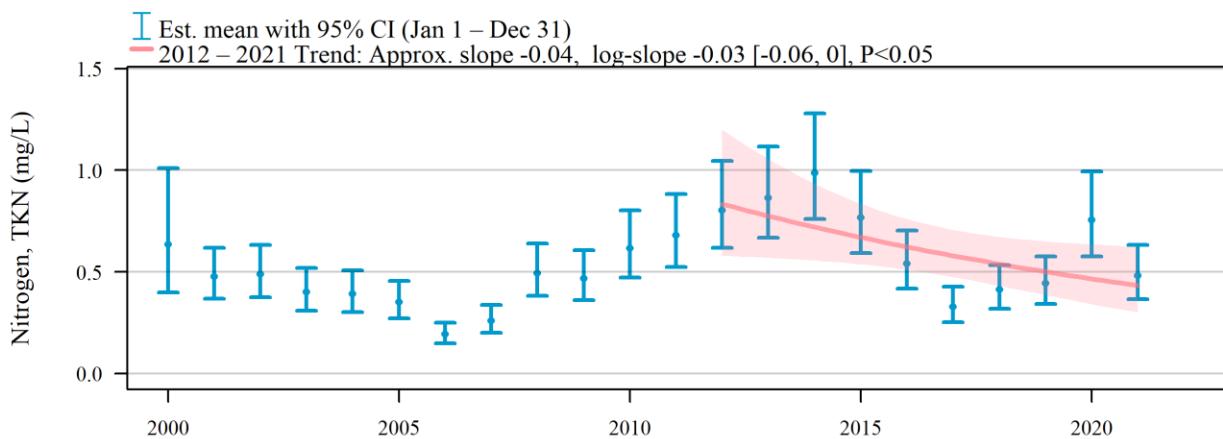
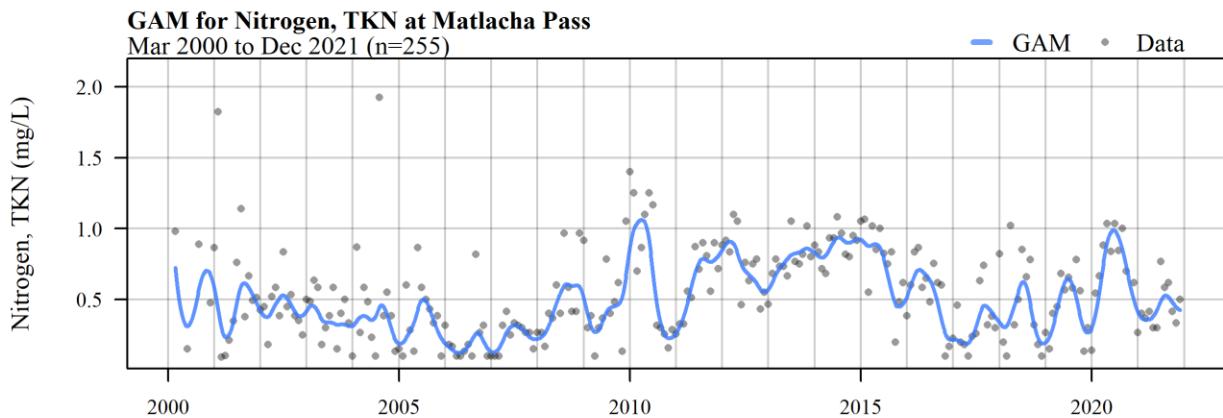
— Est. mean with 95% CI (Jan 1 – Dec 31)
— 2017 – 2021 Trend: Approx. slope 0, log-slope 0.05 [0, 0.09], P<0.05

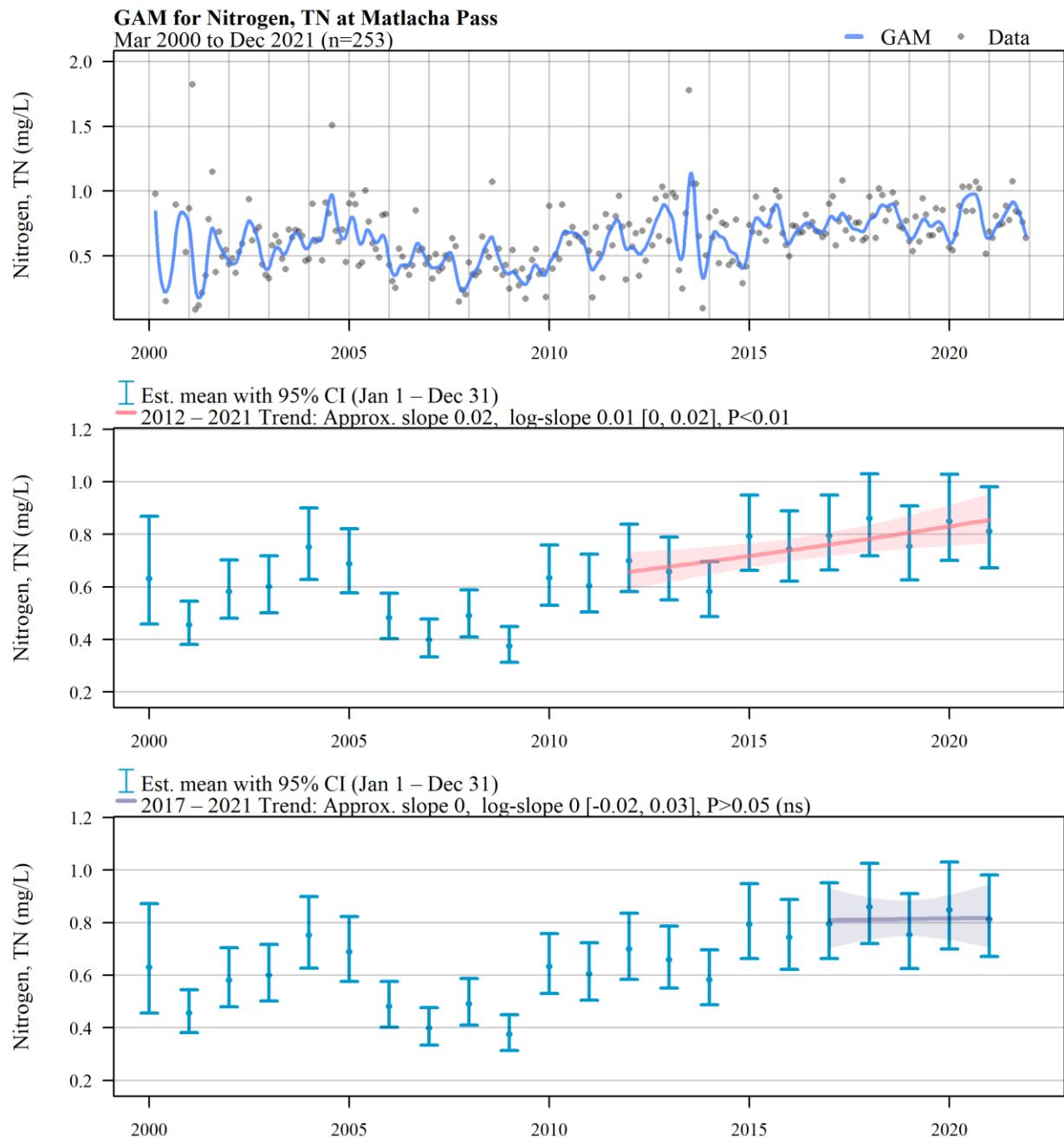


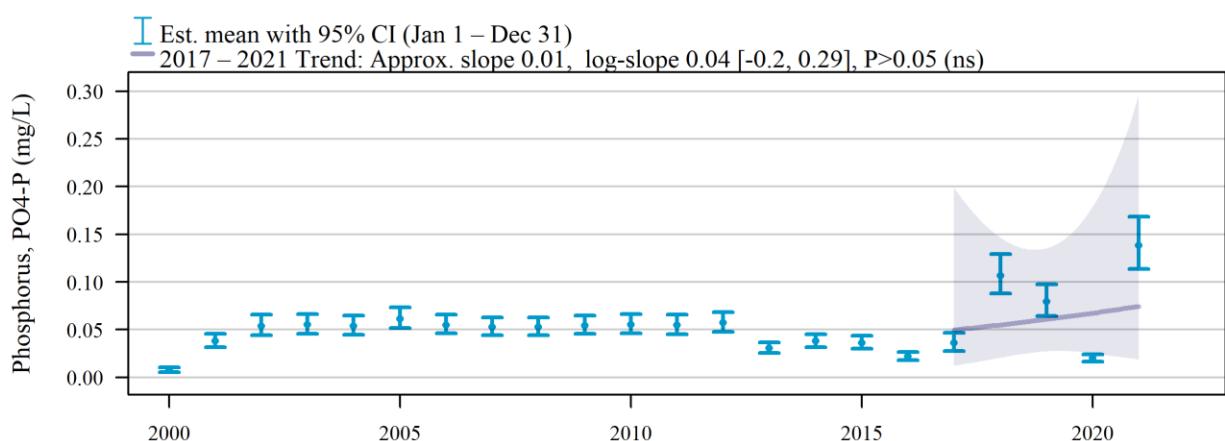
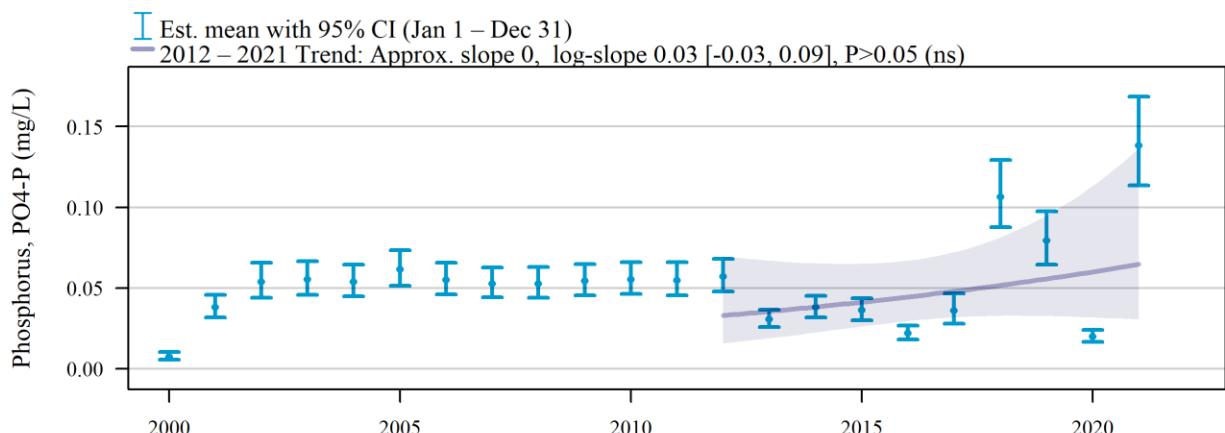
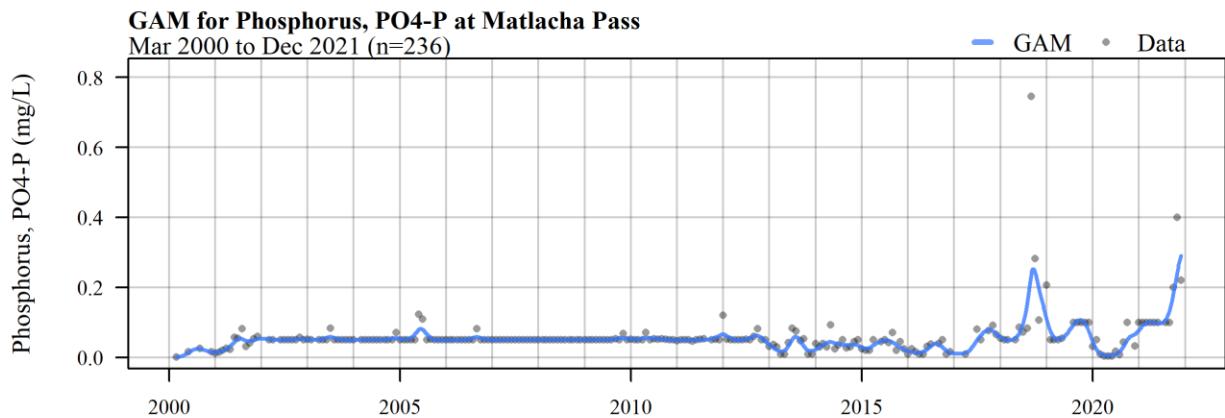


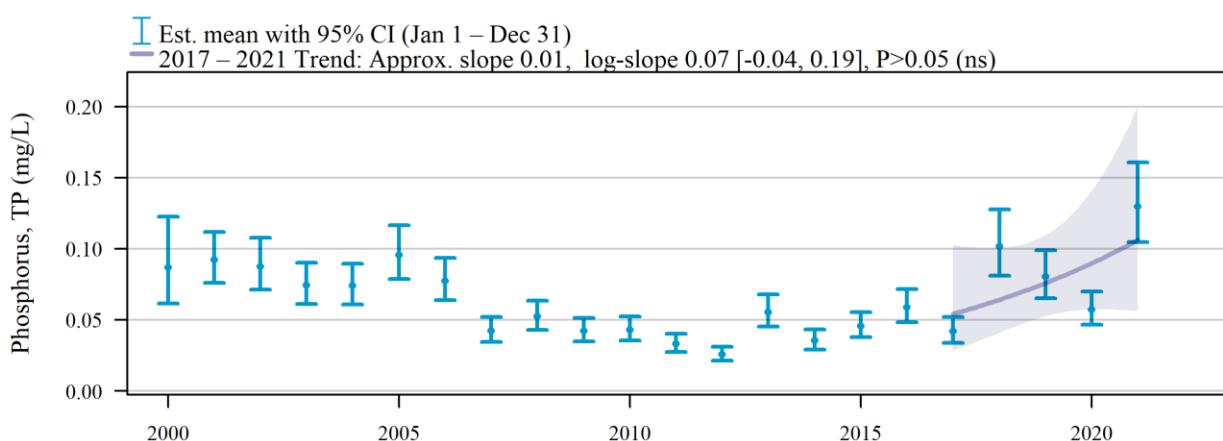
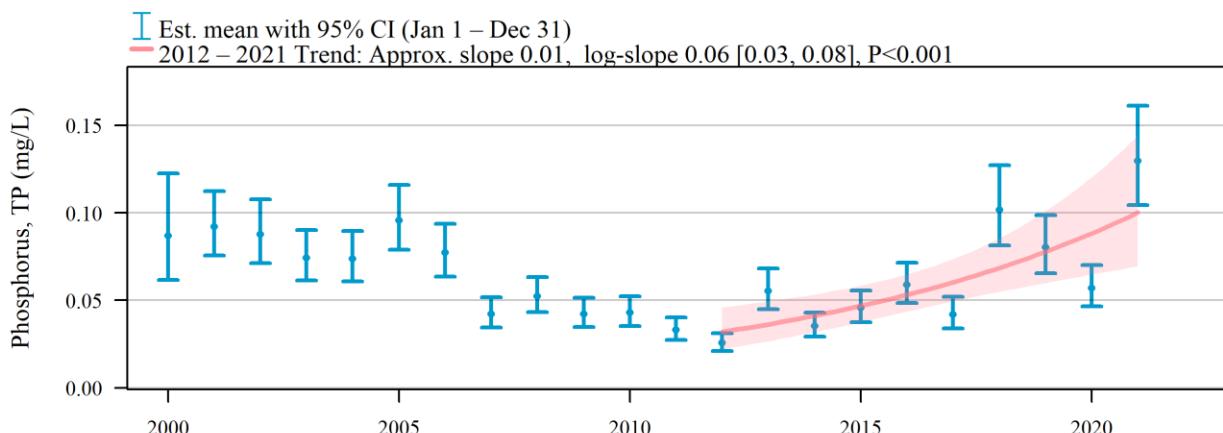
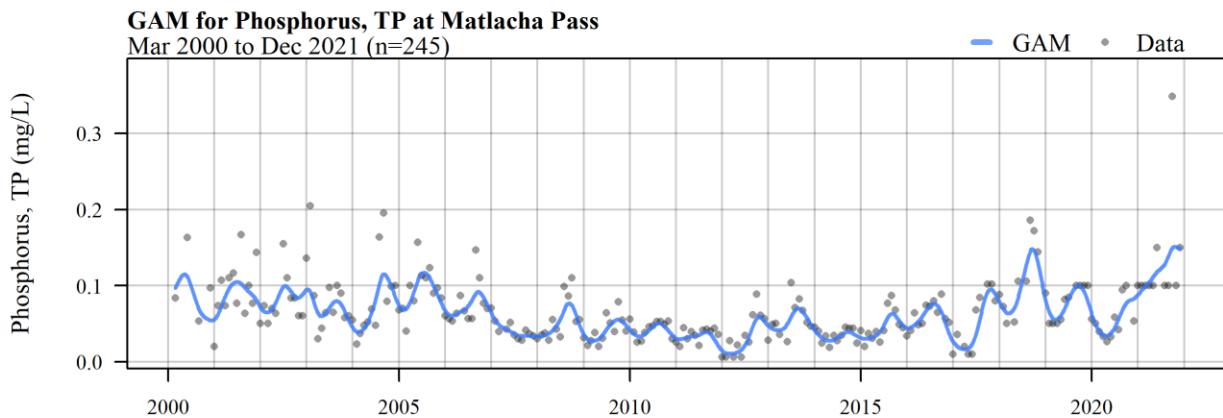


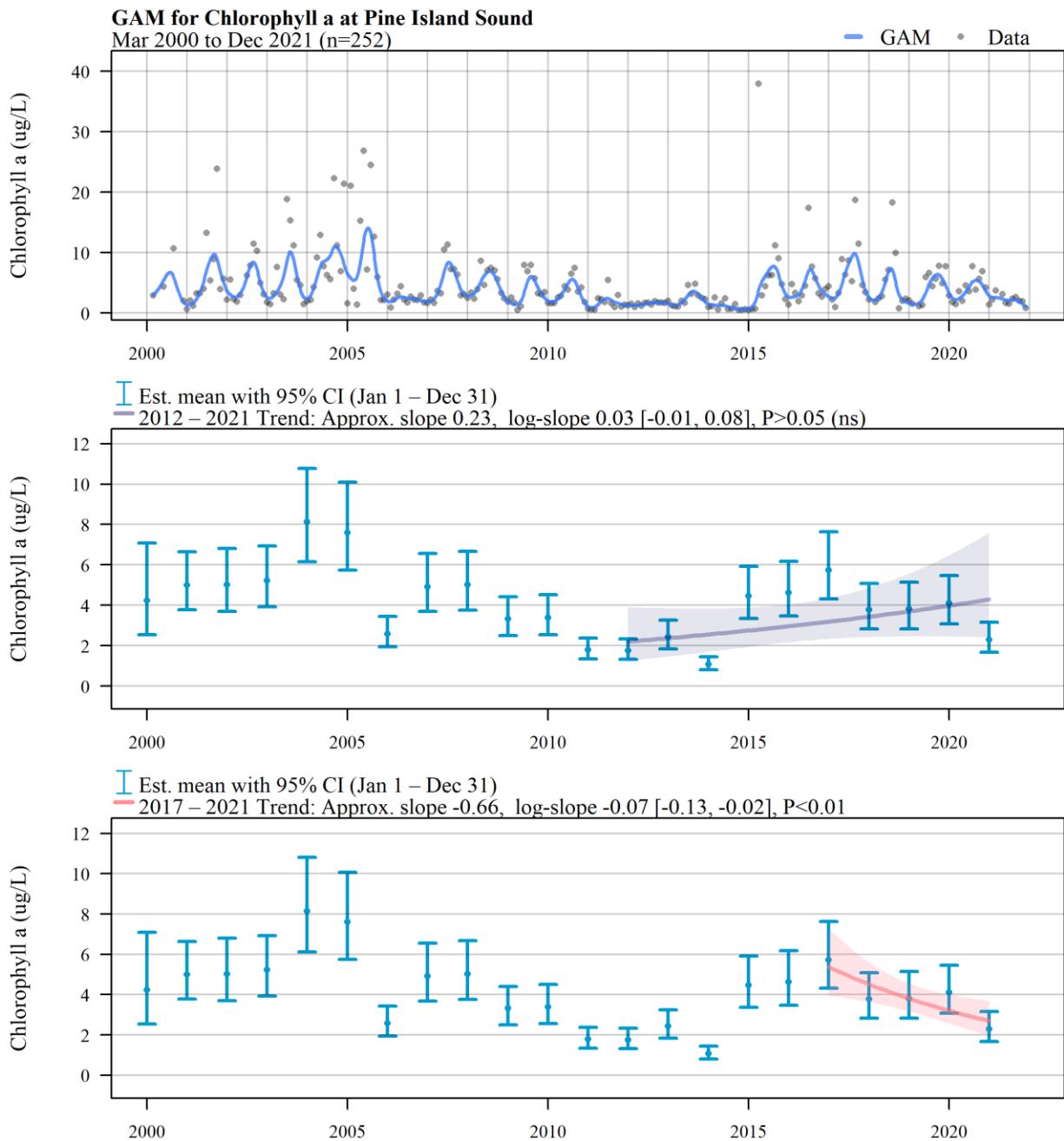




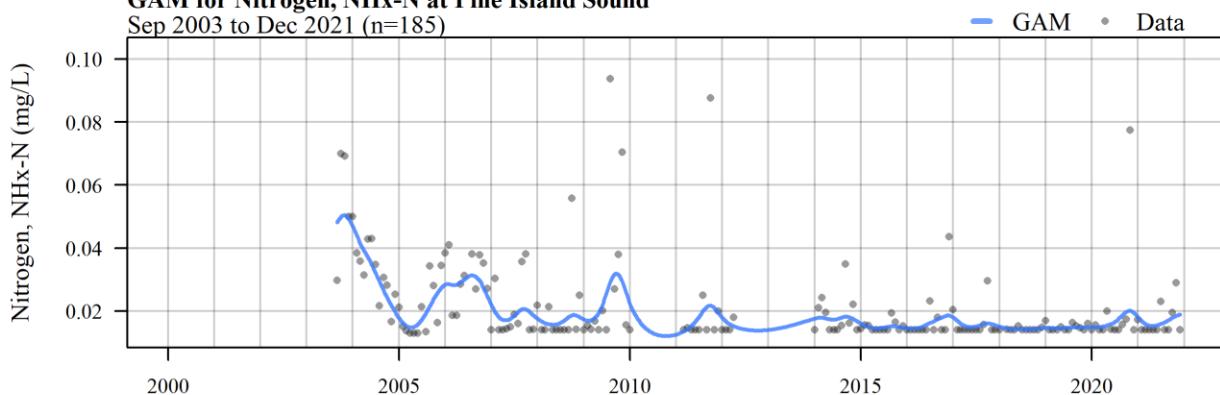




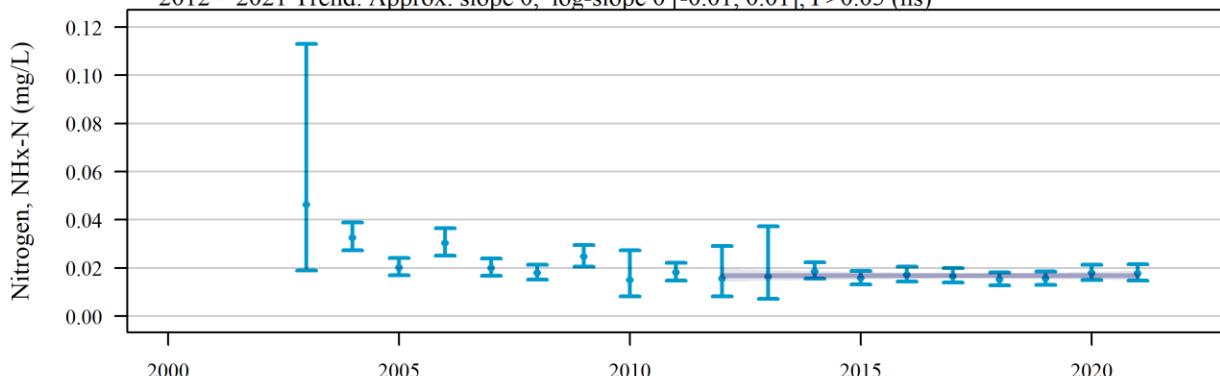




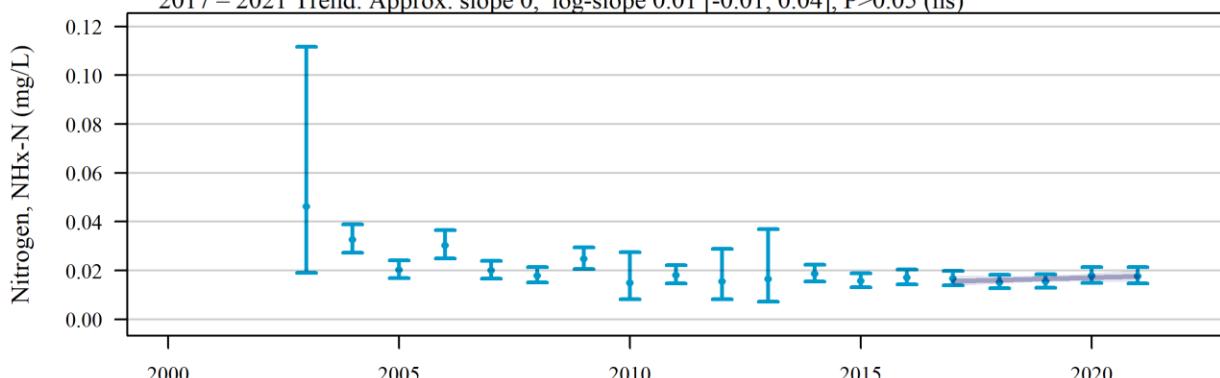
**GAM for Nitrogen, NH_x-N at Pine Island Sound
Sep 2003 to Dec 2021 (n=185)**

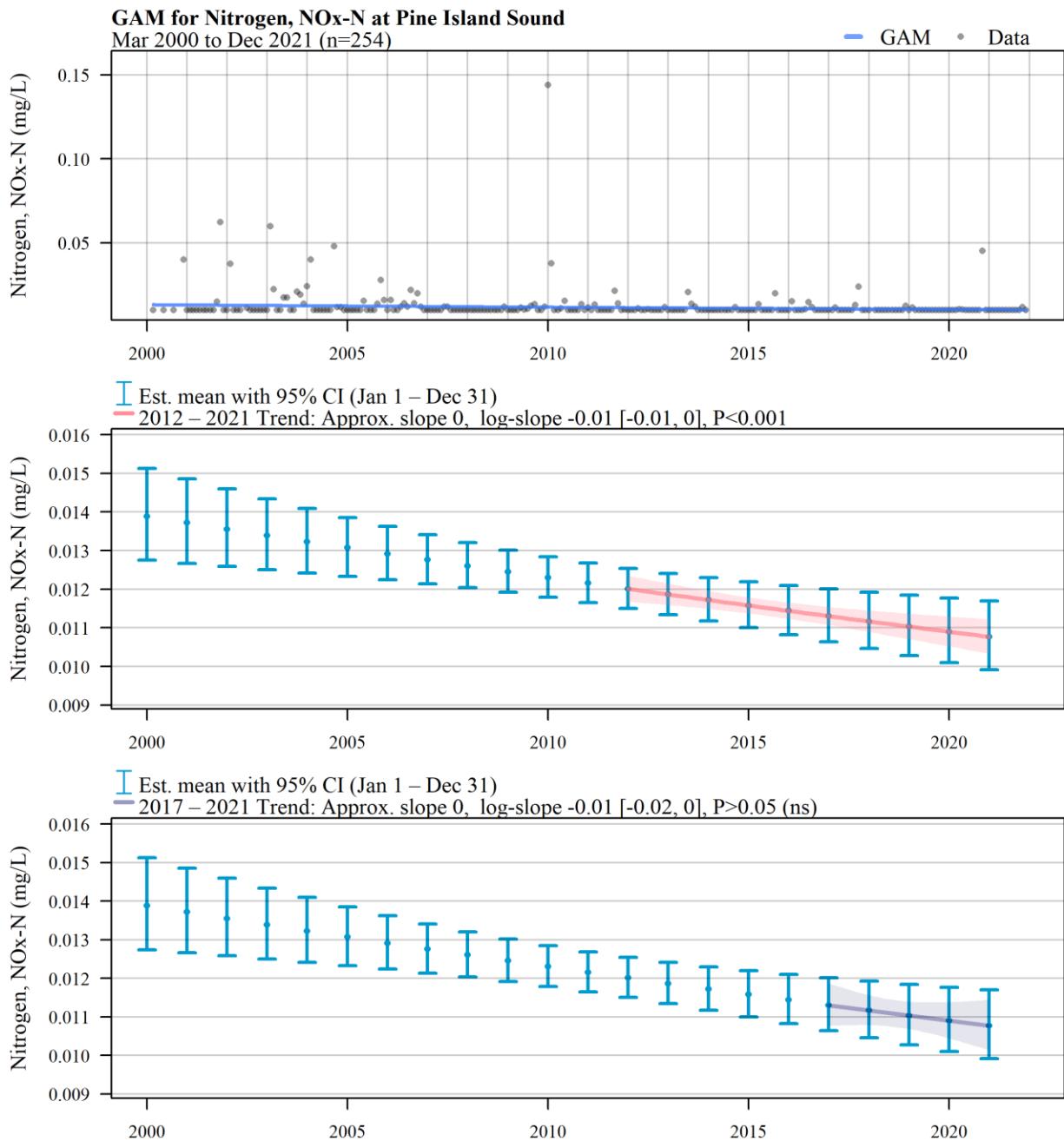


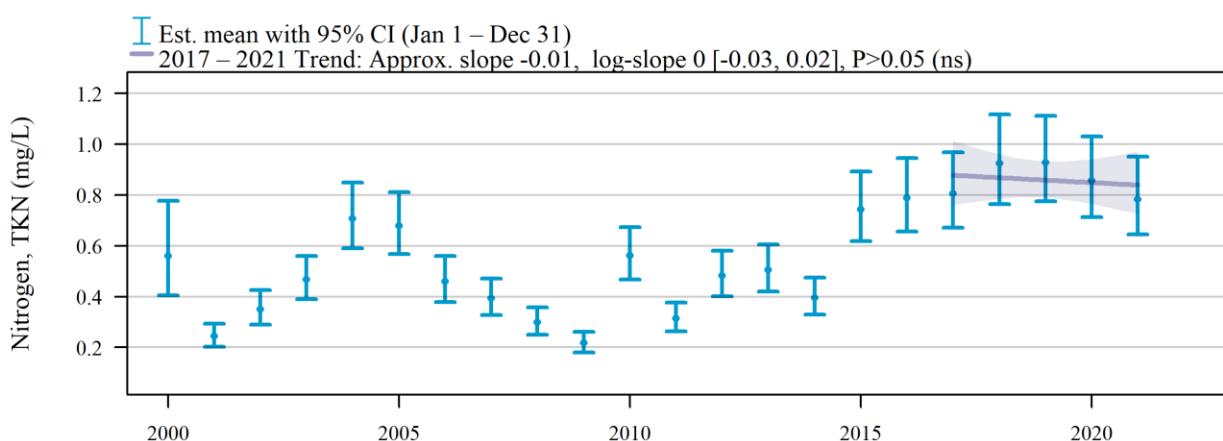
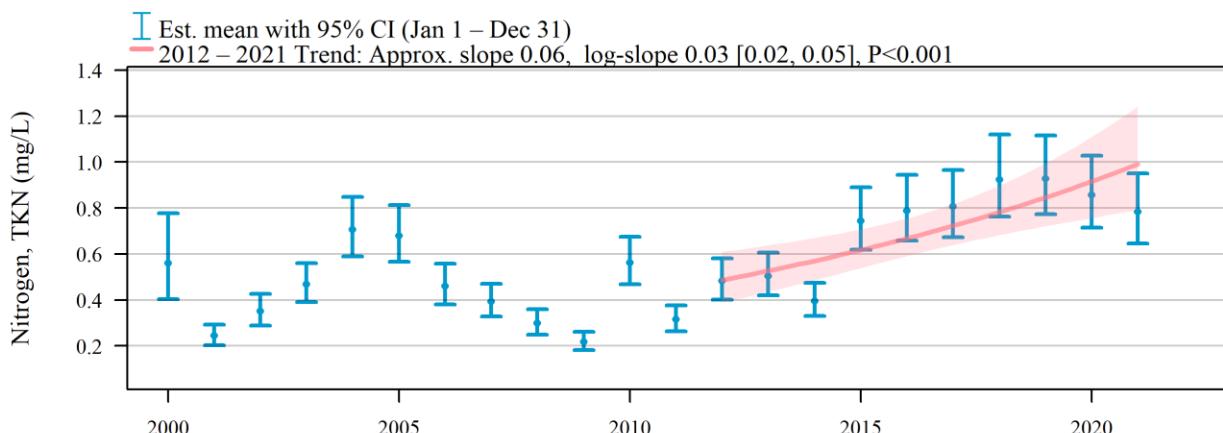
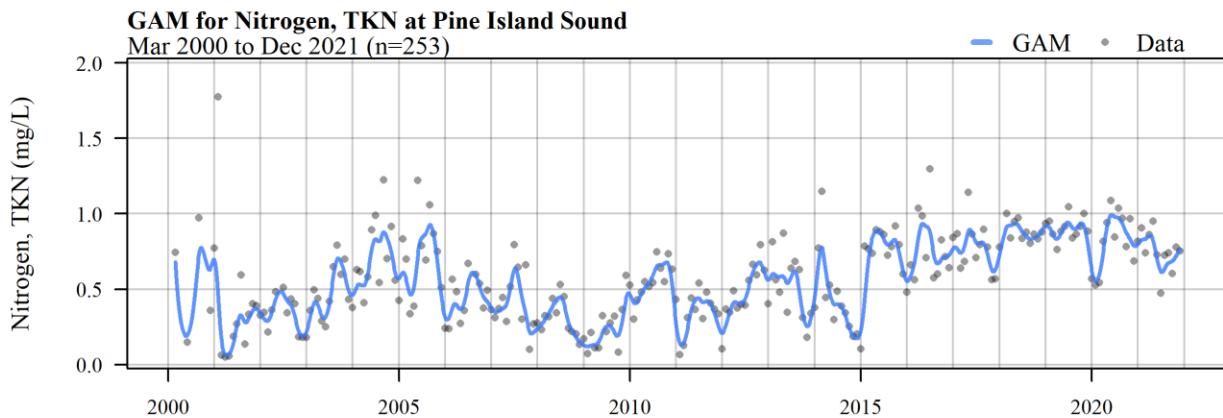
Est. mean with 95% CI (Jan 1 – Dec 31)
 2012 – 2021 Trend: Approx. slope 0, log-slope 0 [-0.01, 0.01], P>0.05 (ns)

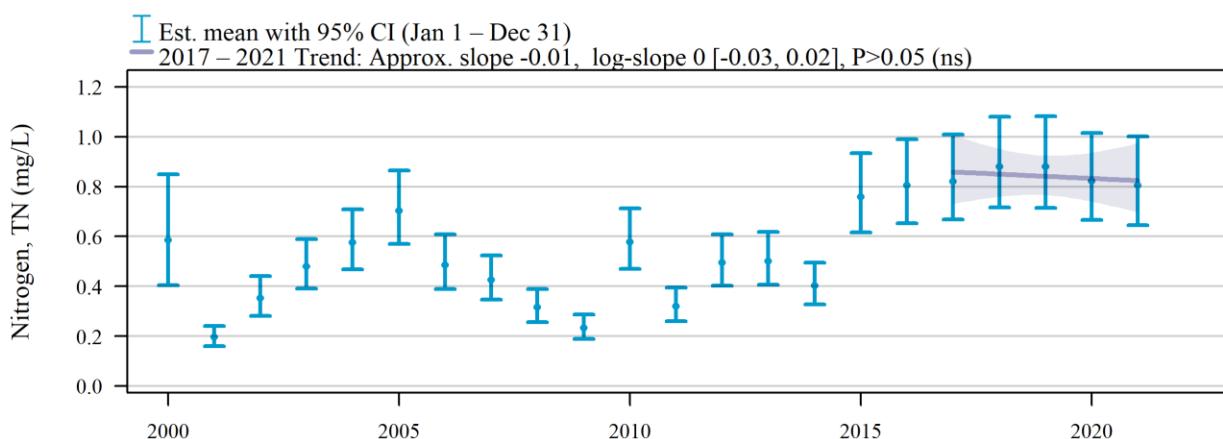
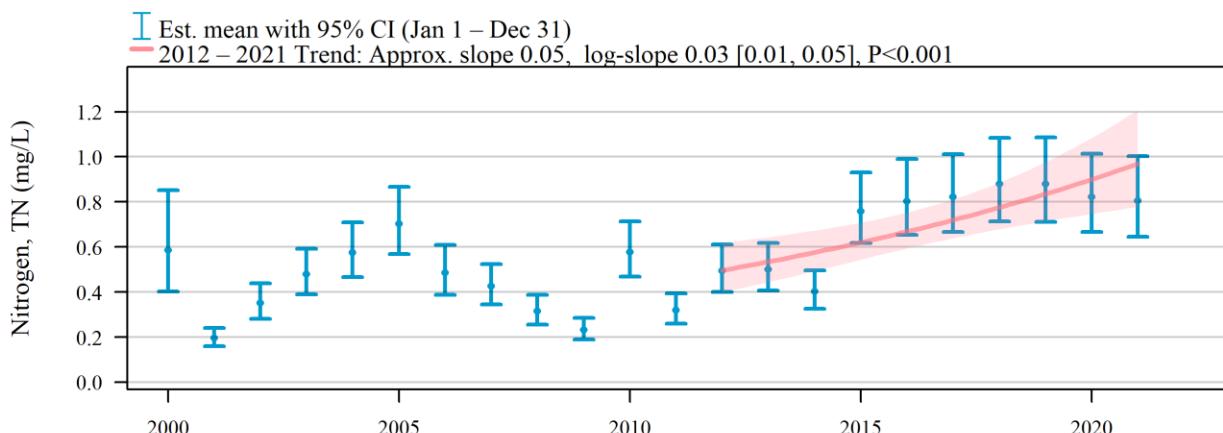
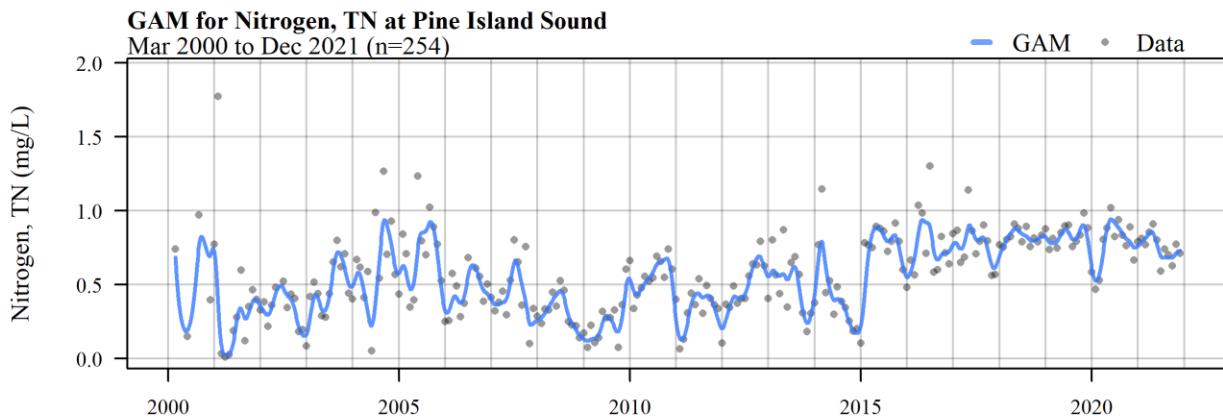


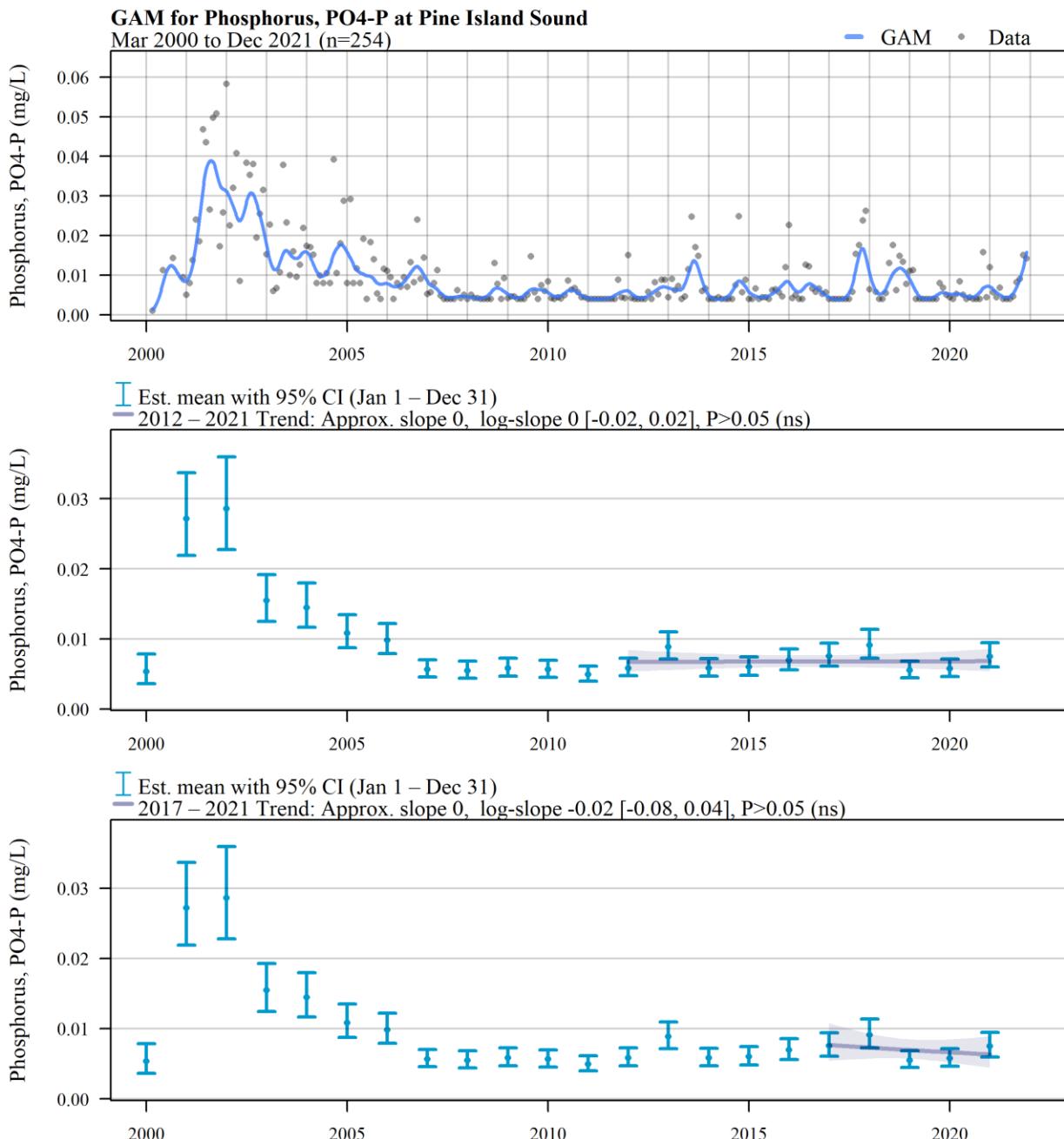
Est. mean with 95% CI (Jan 1 – Dec 31)
 2017 – 2021 Trend: Approx. slope 0, log-slope 0.01 [-0.01, 0.04], P>0.05 (ns)

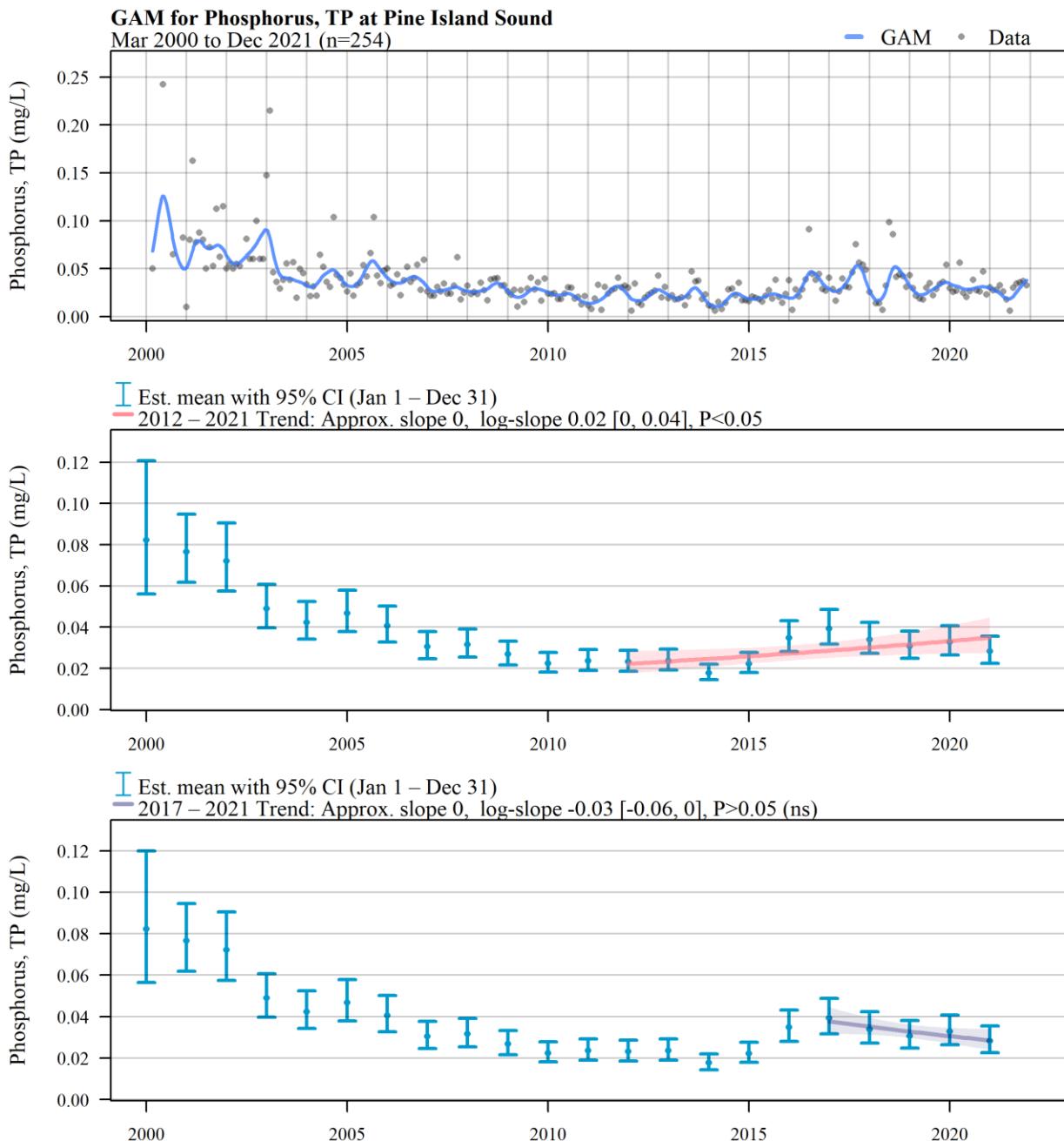


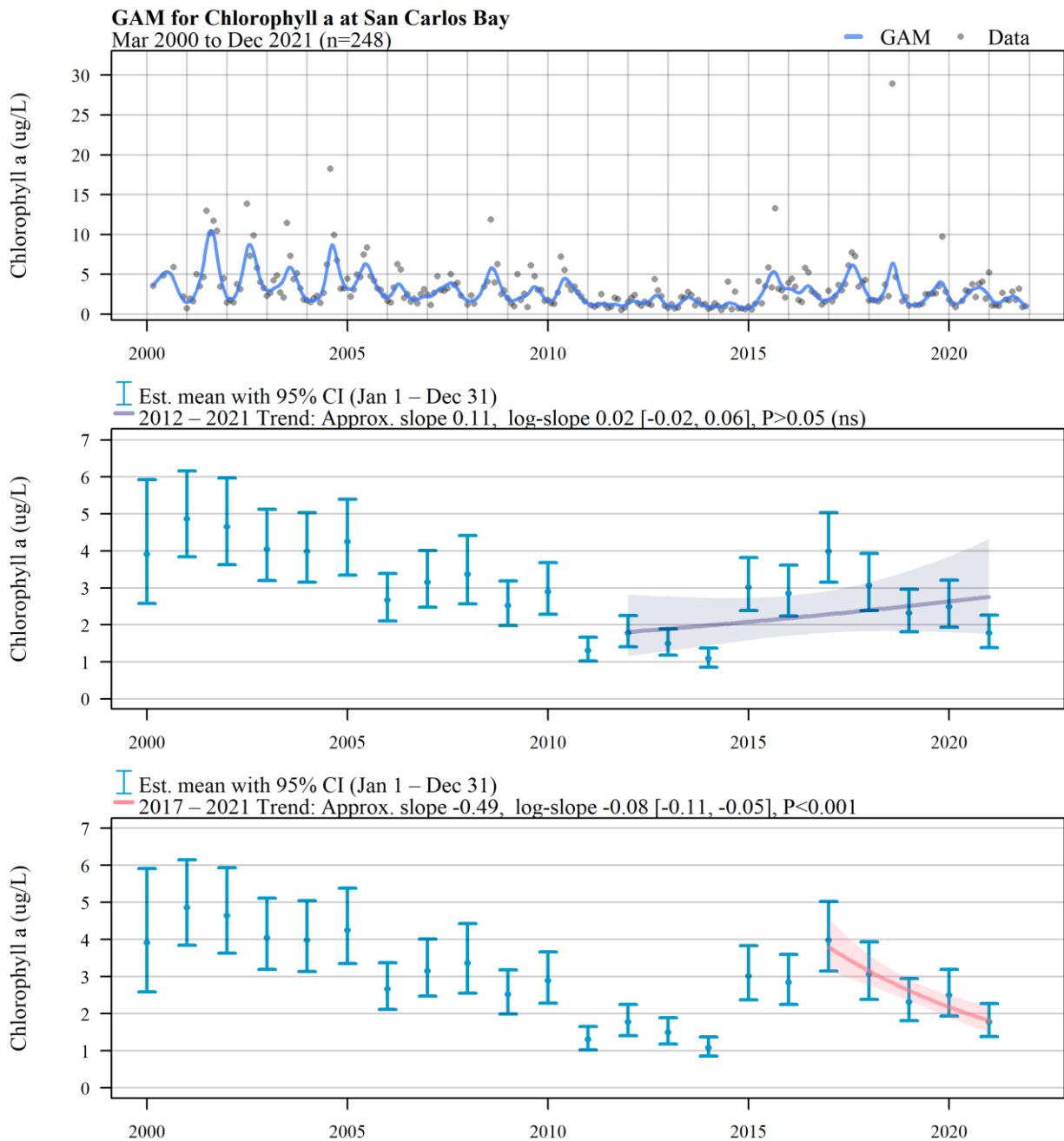


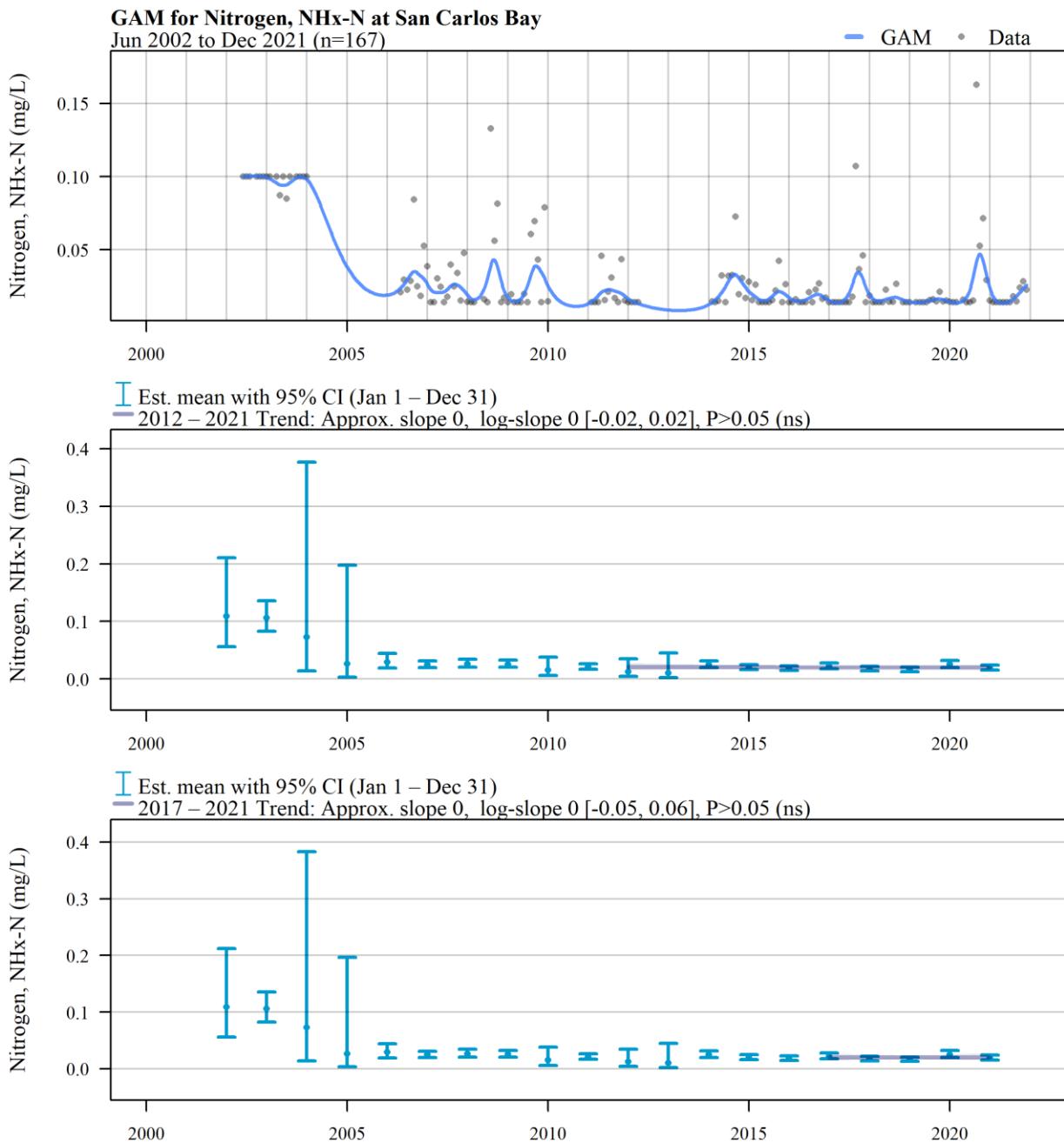


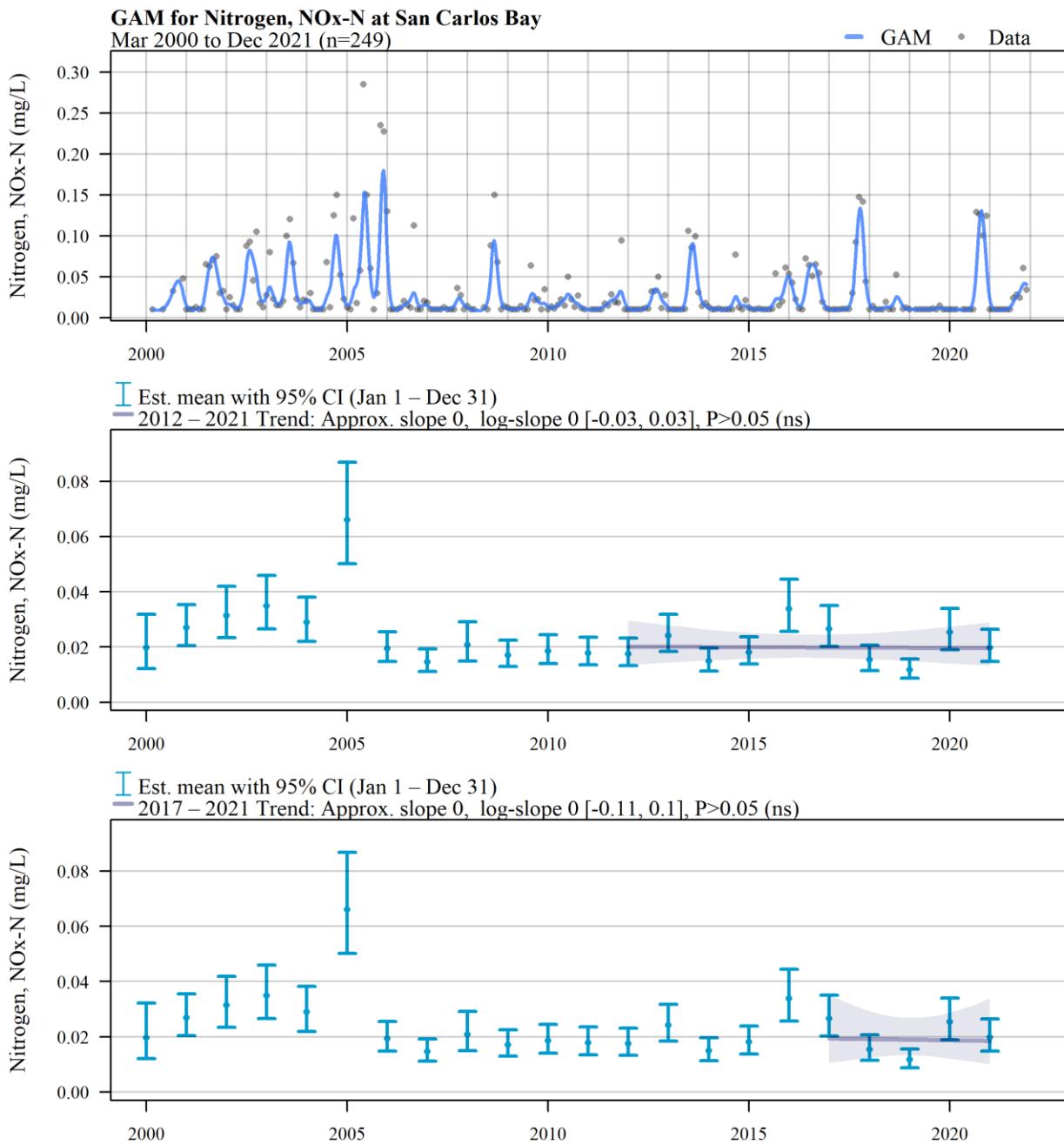


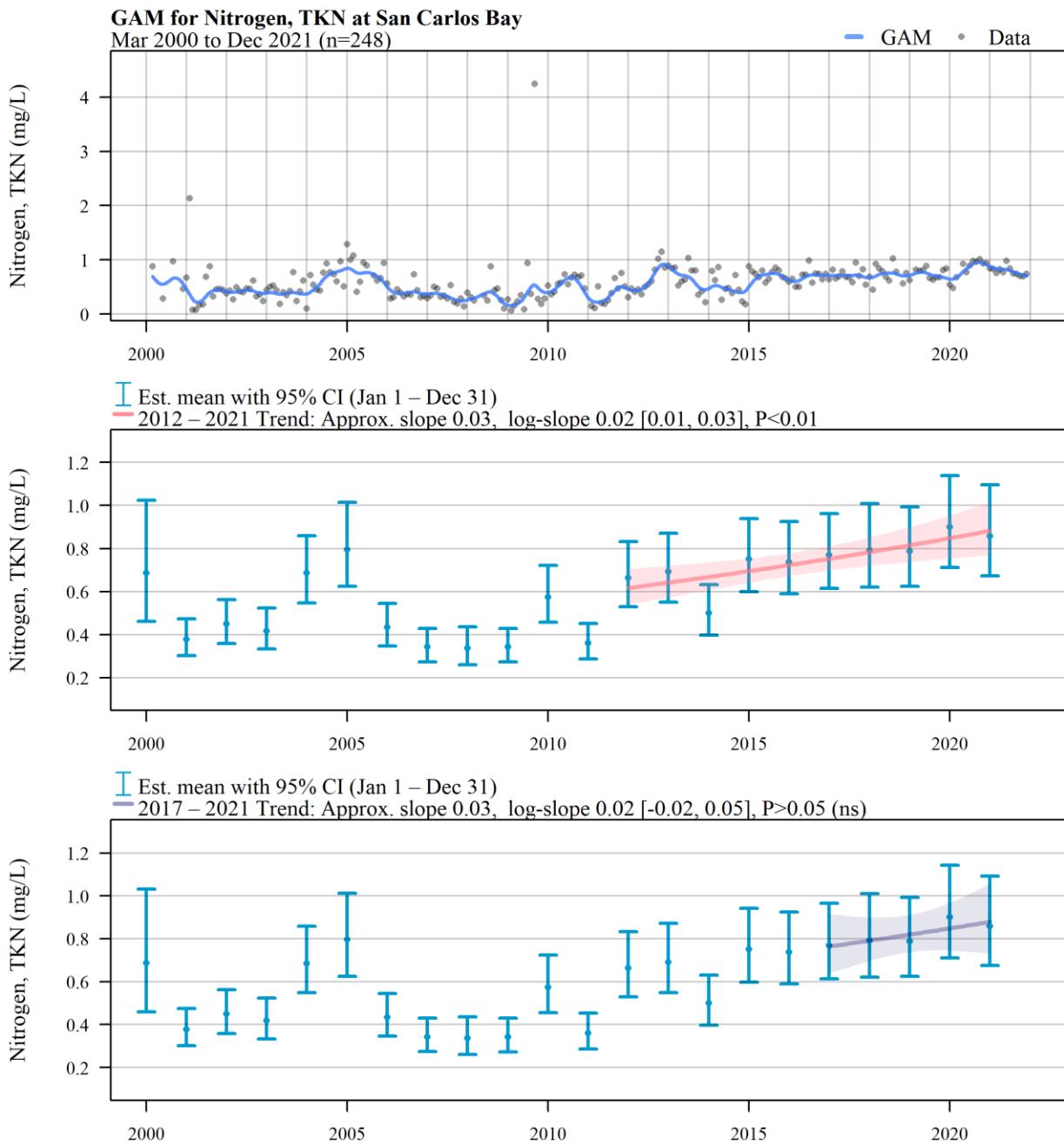


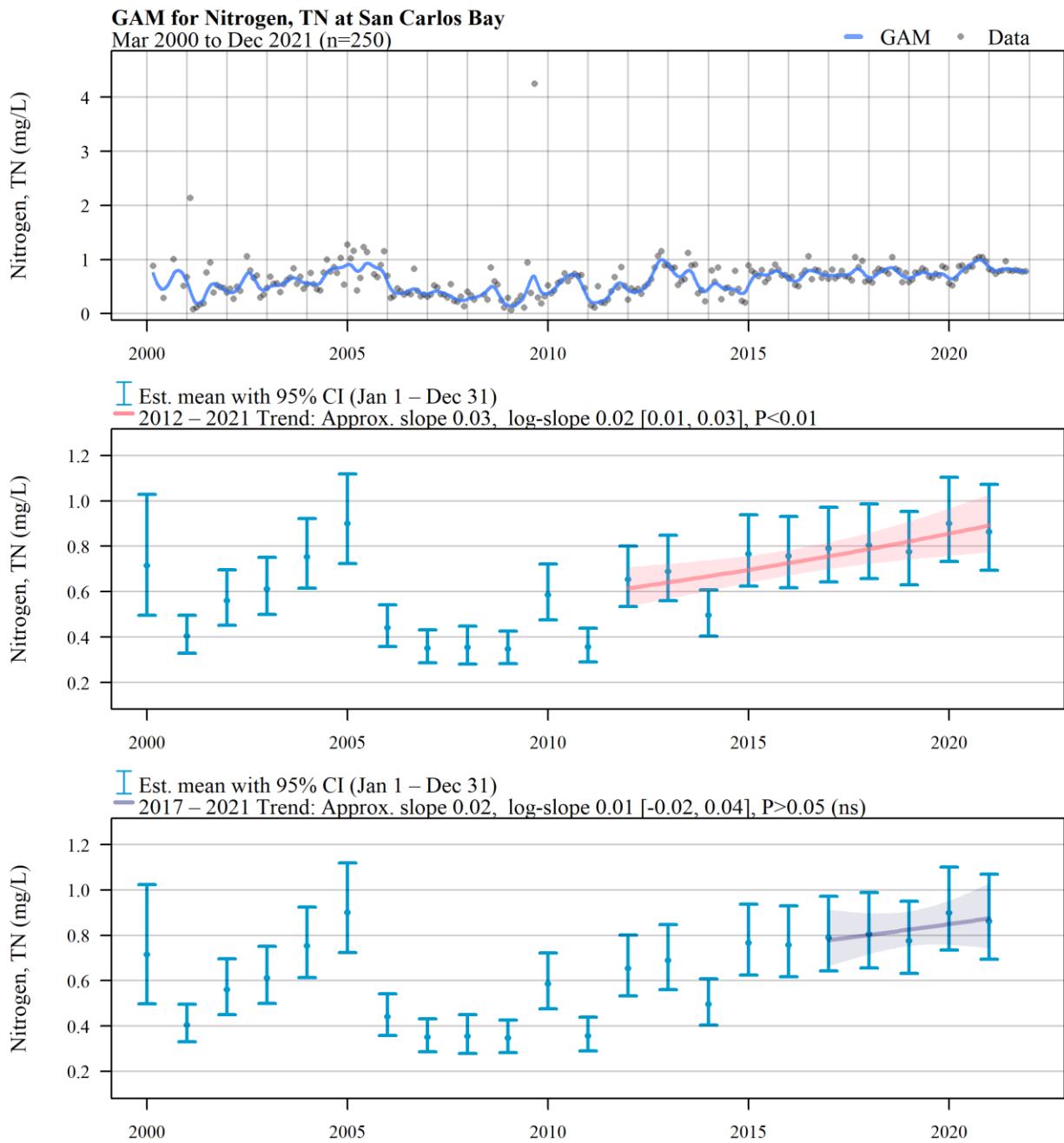


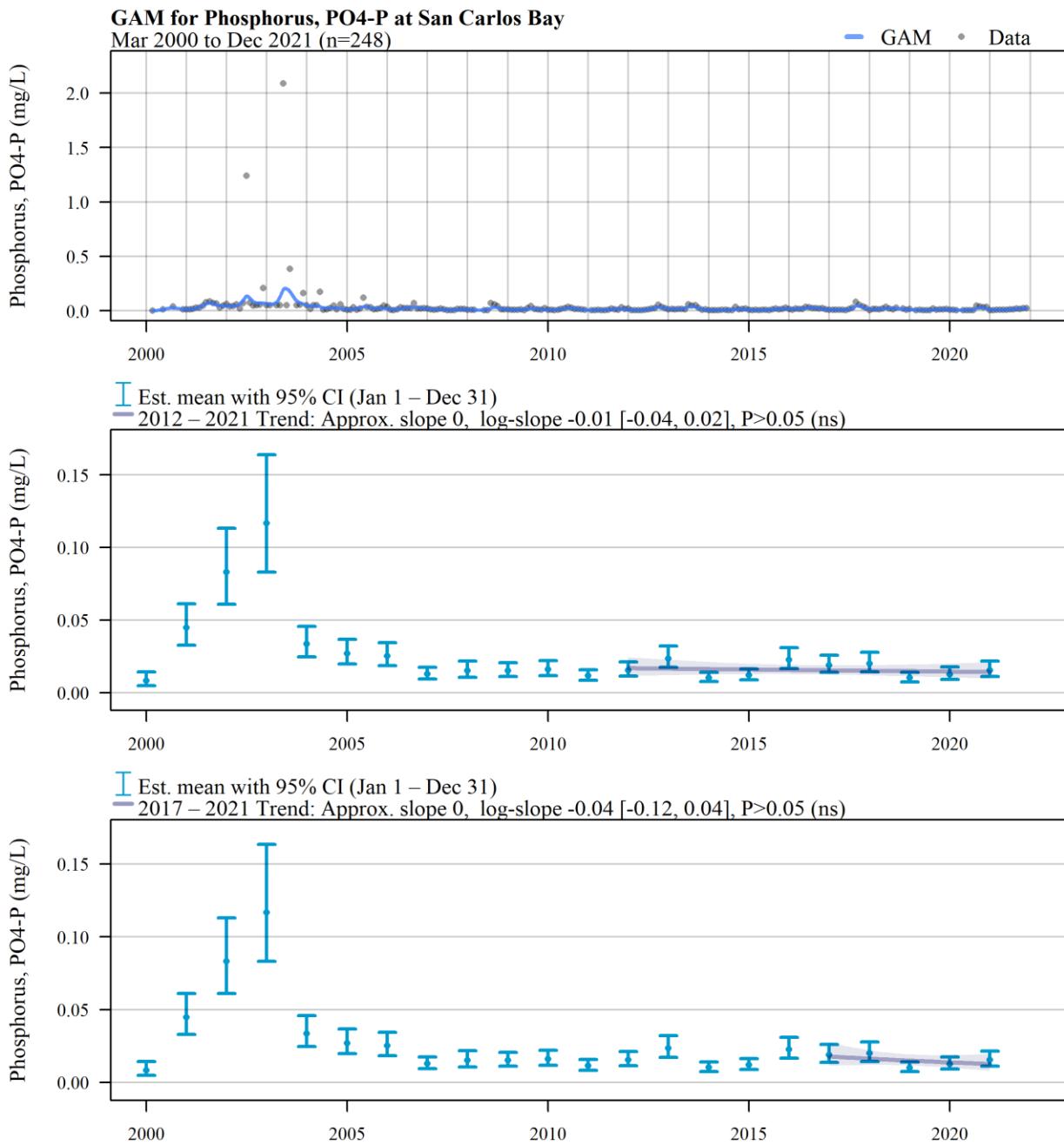


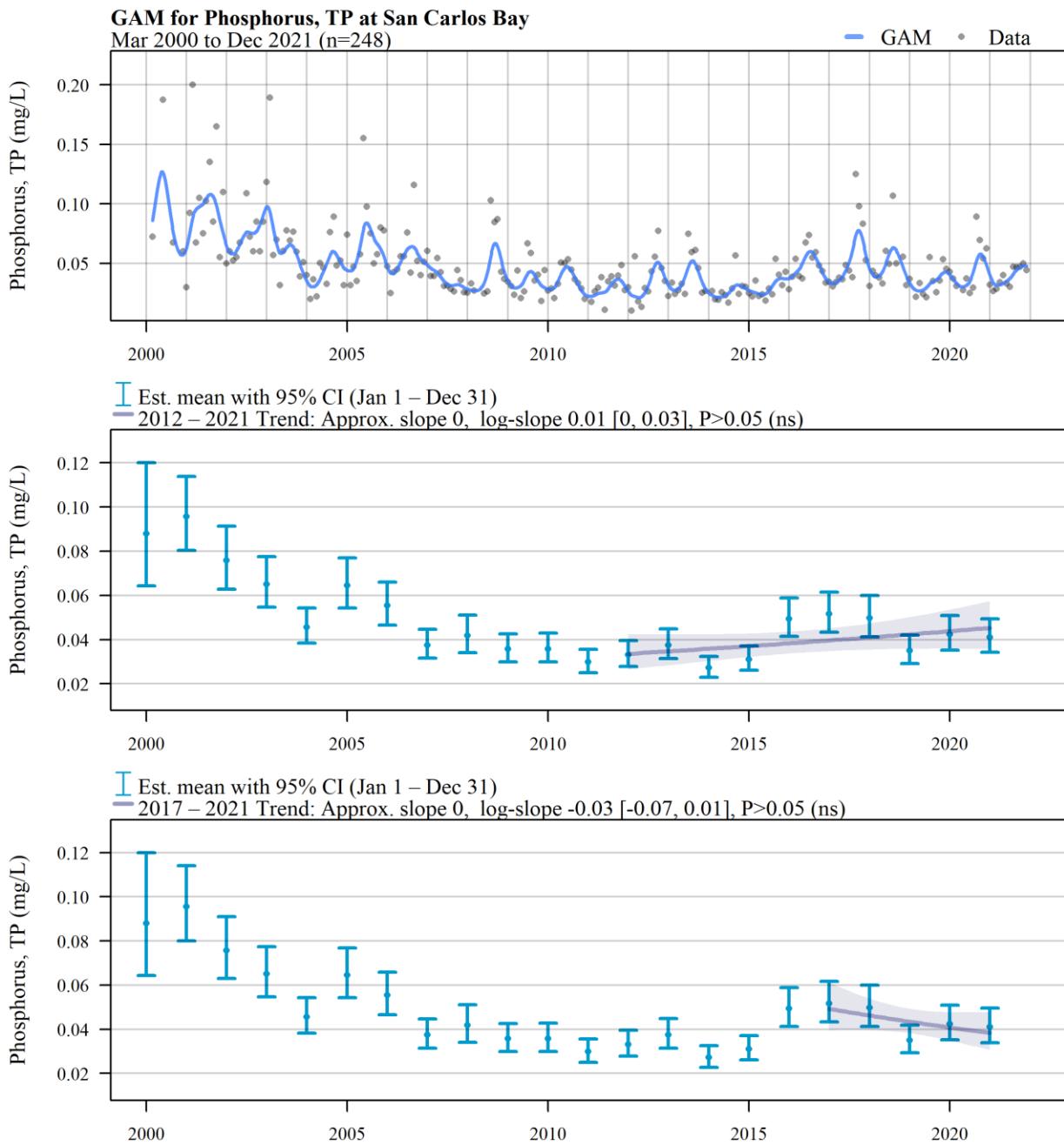


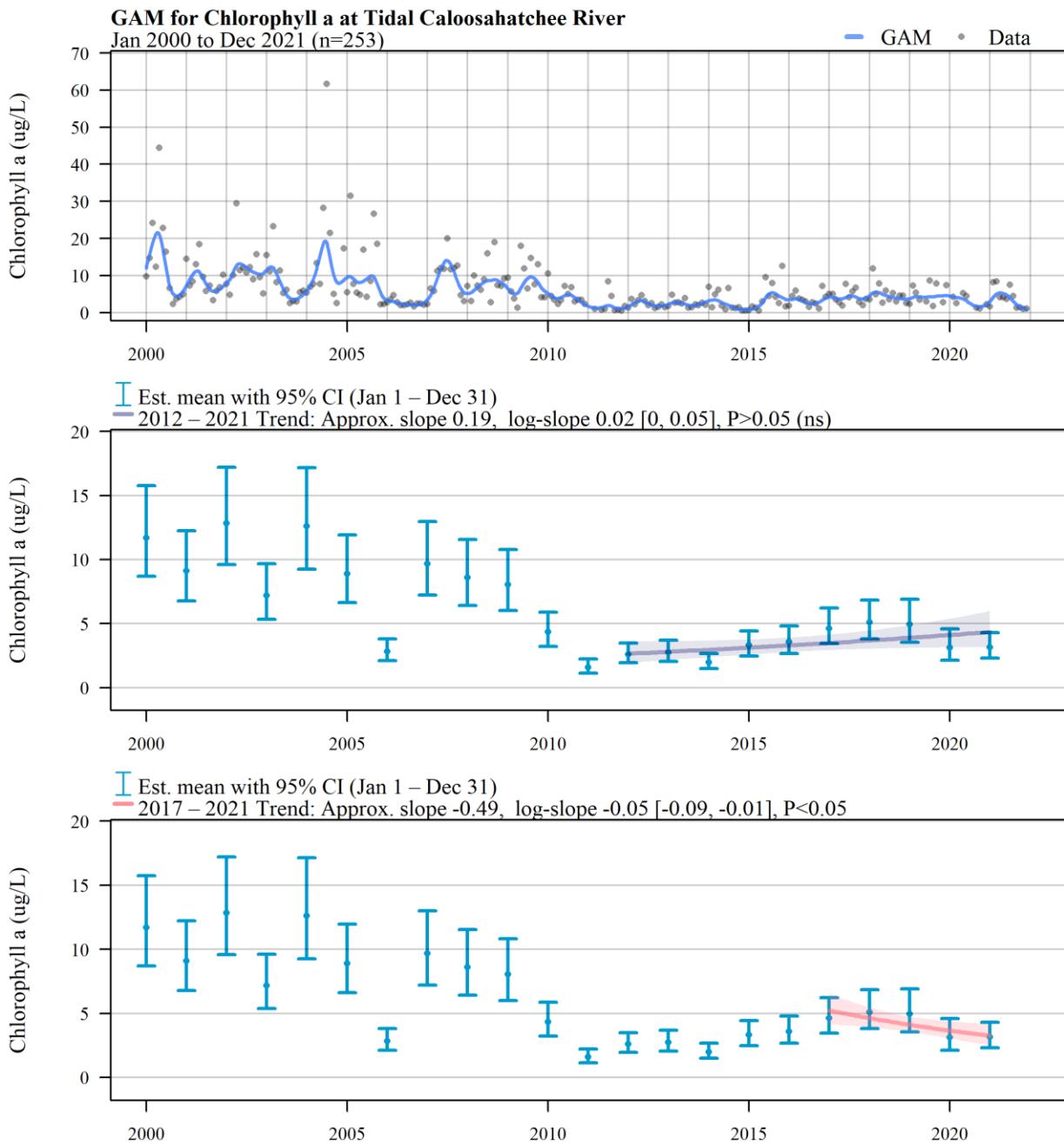






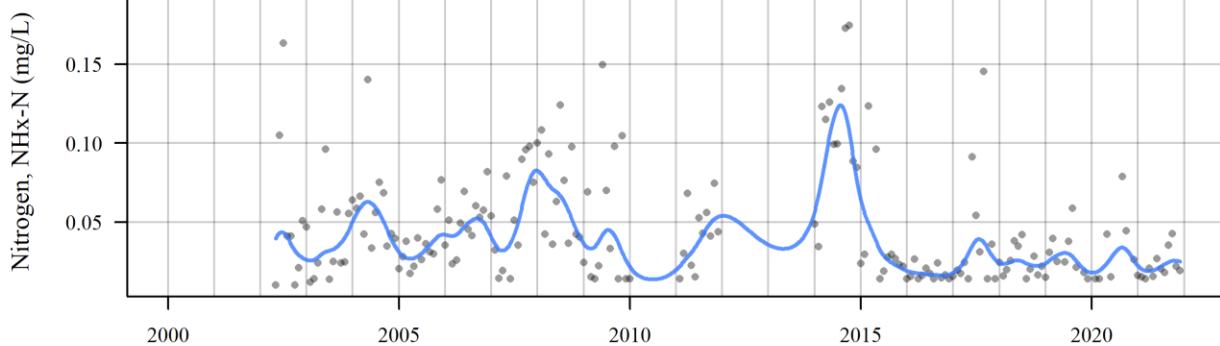




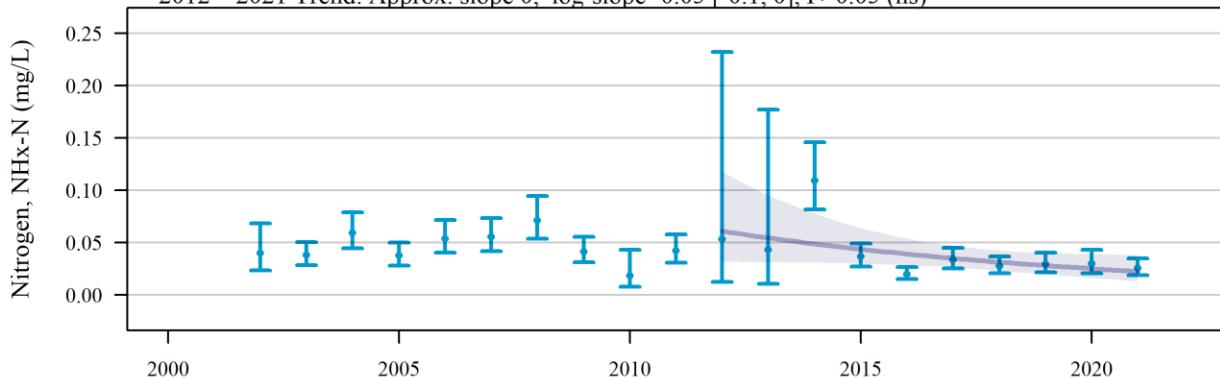


GAM for Nitrogen, NH_x-N at Tidal Caloosahatchee River
May 2002 to Dec 2021 (n=192)

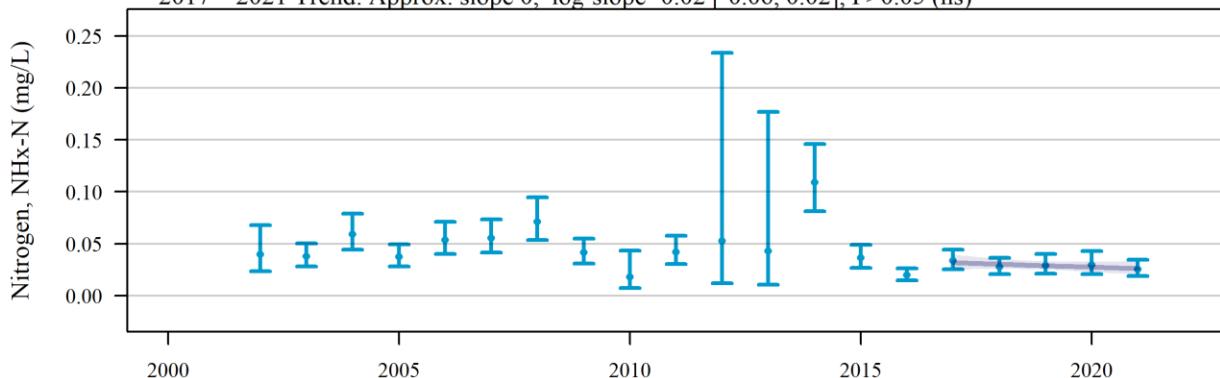
— GAM • Data



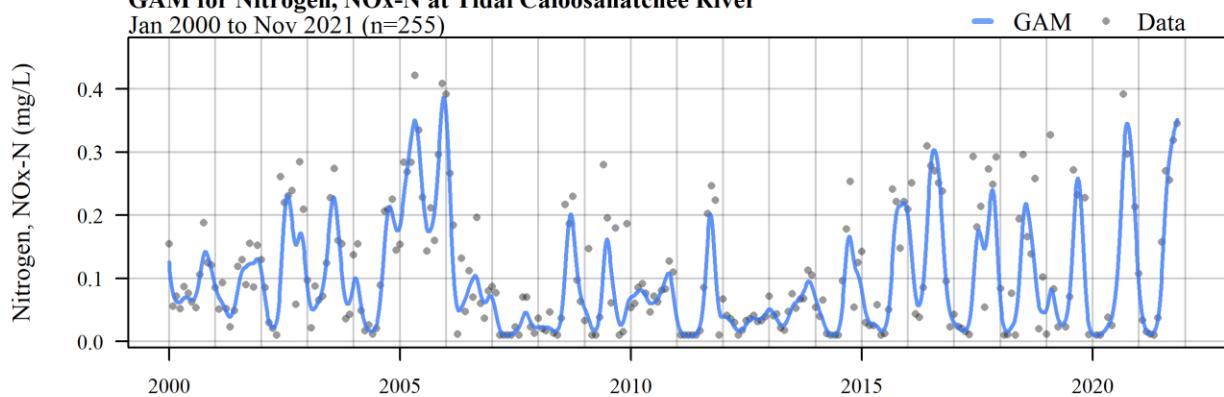
— Est. mean with 95% CI (Jan 1 – Dec 31)
— 2012 – 2021 Trend: Approx. slope 0, log-slope -0.05 [-0.1, 0], P>0.05 (ns)



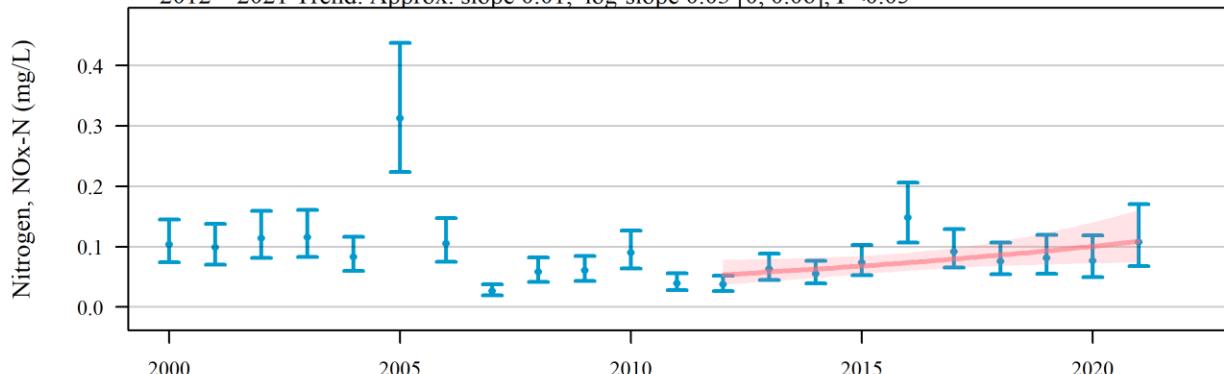
— Est. mean with 95% CI (Jan 1 – Dec 31)
— 2017 – 2021 Trend: Approx. slope 0, log-slope -0.02 [-0.06, 0.02], P>0.05 (ns)



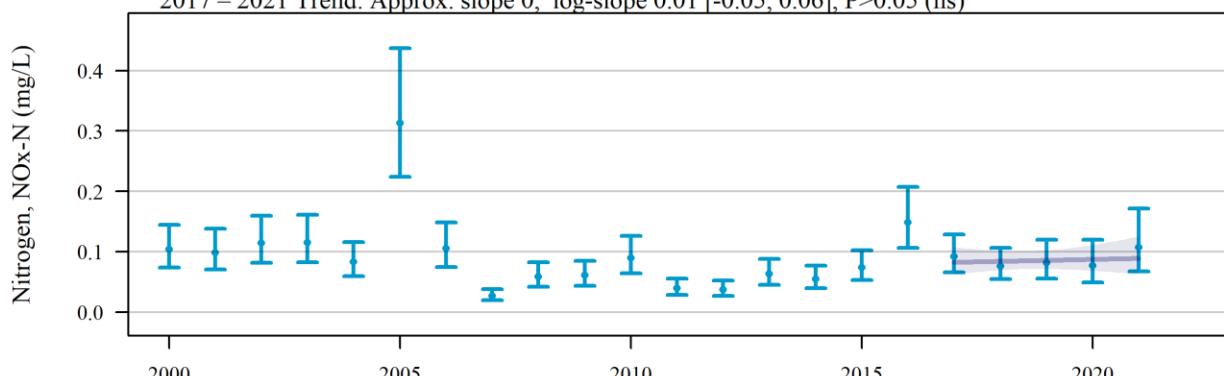
GAM for Nitrogen, NOx-N at Tidal Caloosahatchee River
 Jan 2000 to Nov 2021 (n=255)

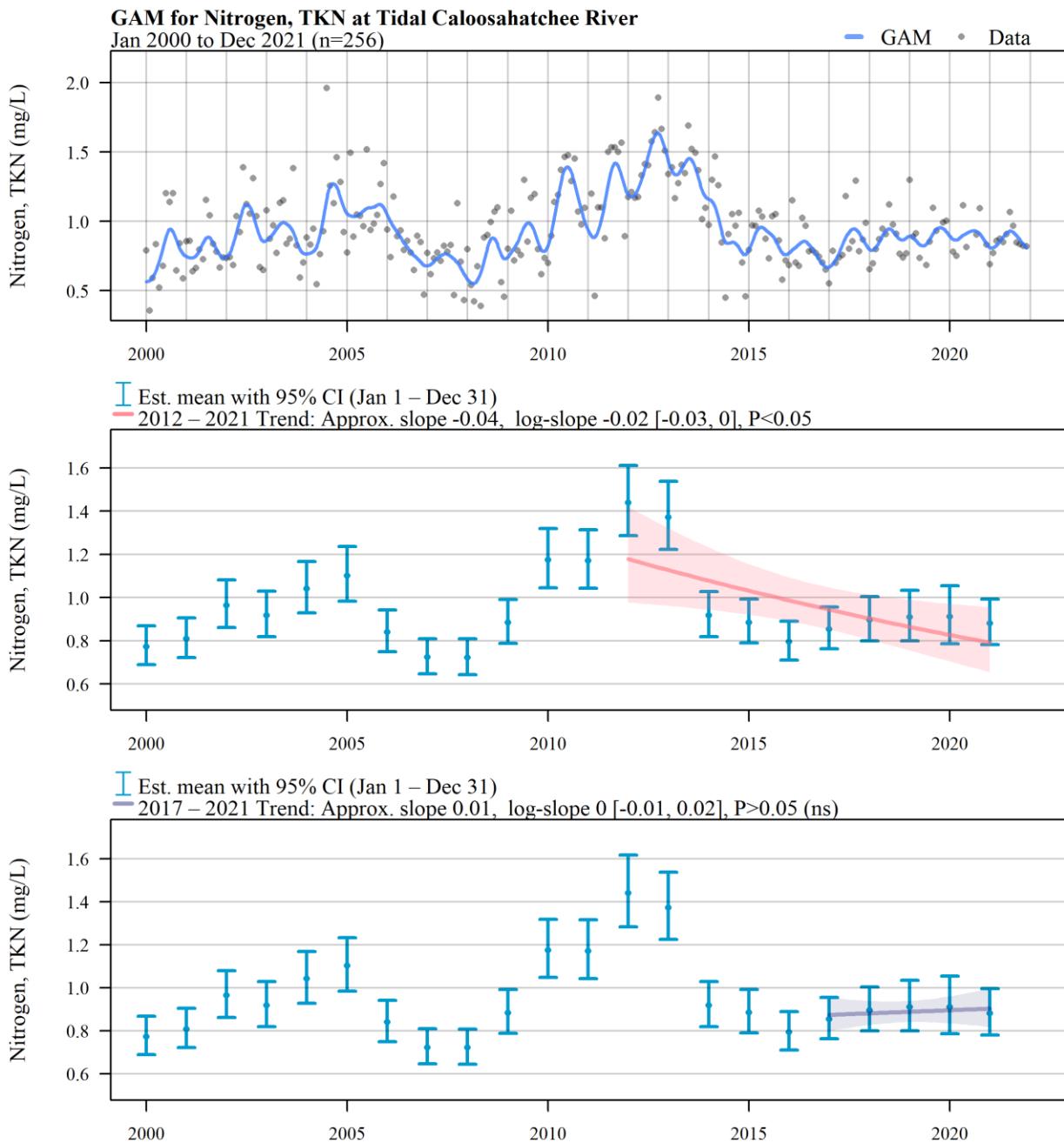


Est. mean with 95% CI (Jan 1 – Dec 31)
 2012 – 2021 Trend: Approx. slope 0.01, log-slope 0.03 [0, 0.06], P<0.05



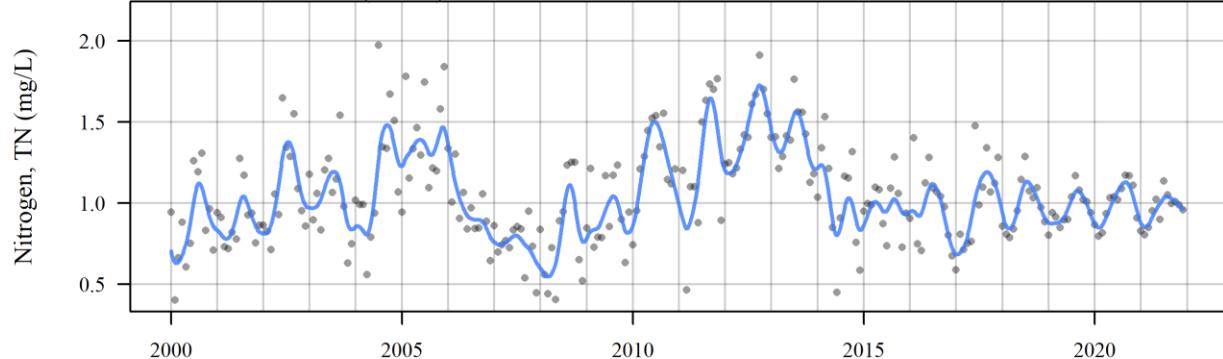
Est. mean with 95% CI (Jan 1 – Dec 31)
 2017 – 2021 Trend: Approx. slope 0, log-slope 0.01 [-0.05, 0.06], P>0.05 (ns)



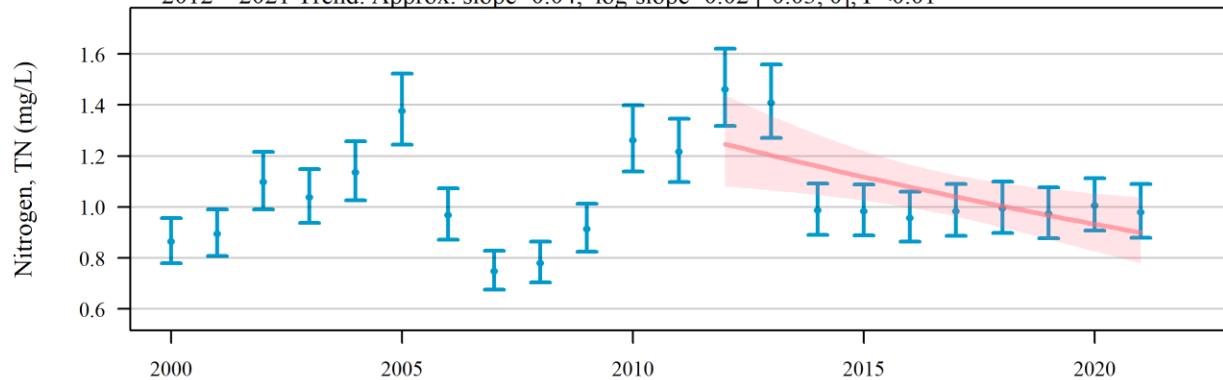


GAM for Nitrogen, TN at Tidal Caloosahatchee River
 Jan 2000 to Dec 2021 (n=263)

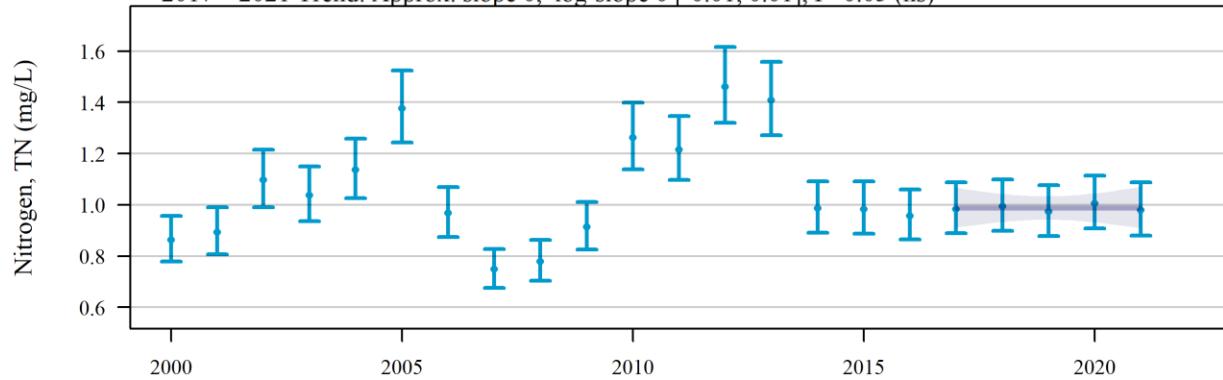
— GAM • Data

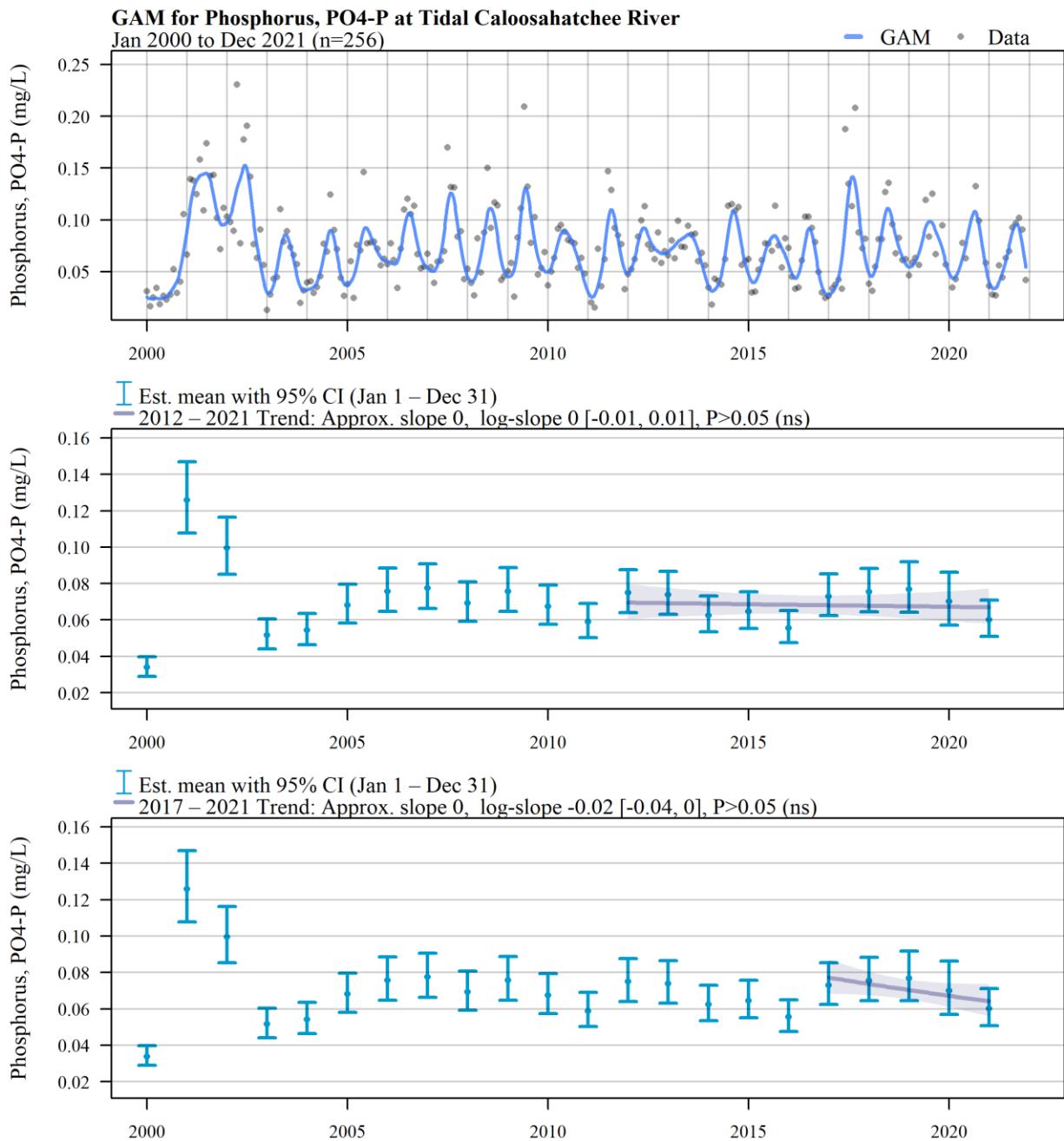


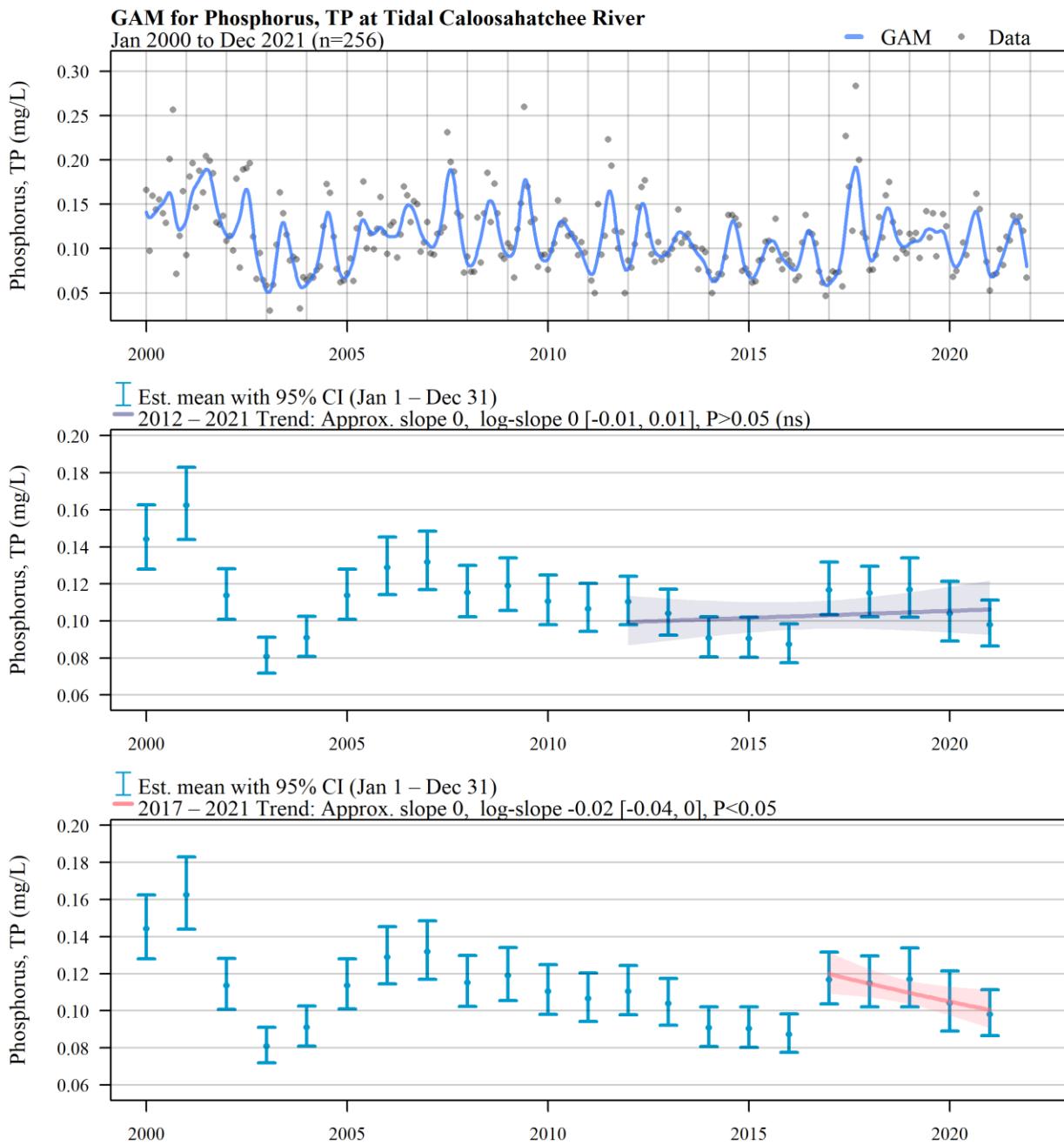
Est. mean with 95% CI (Jan 1 – Dec 31)
 2012 – 2021 Trend: Approx. slope -0.04, log-slope -0.02 [-0.03, 0], P<0.01

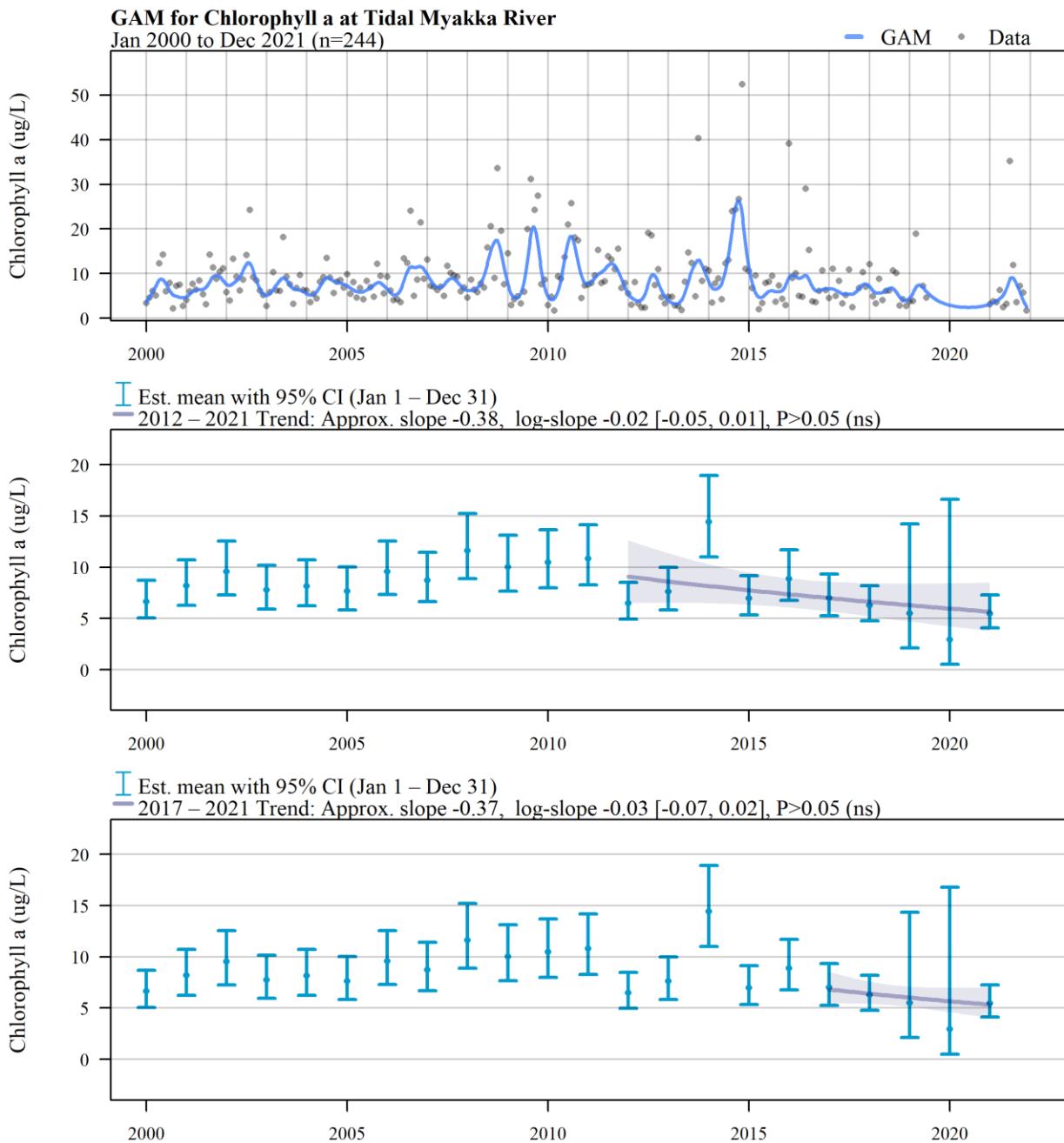


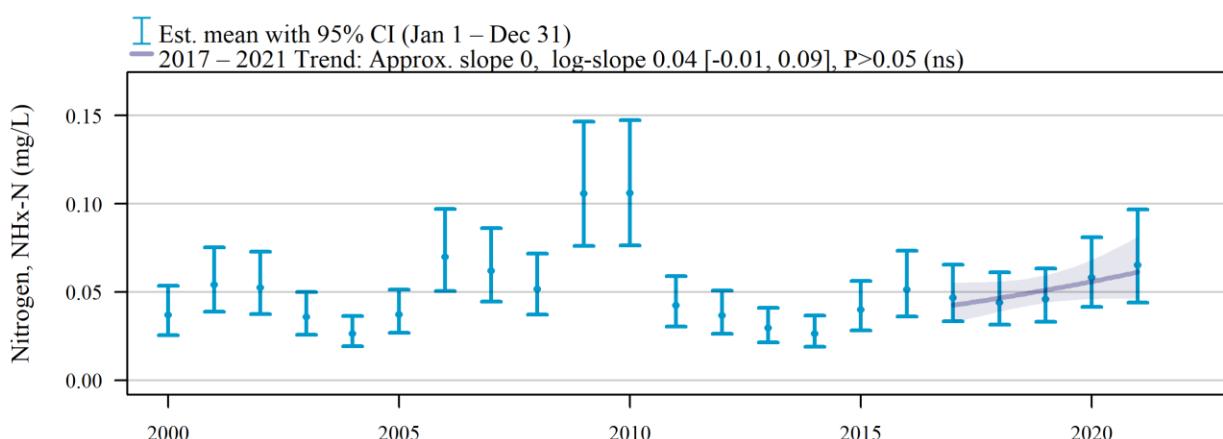
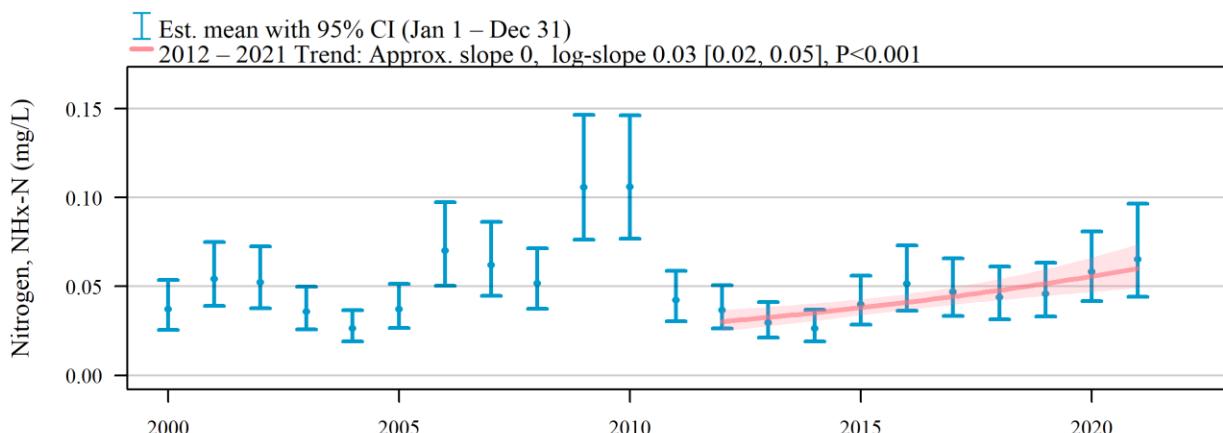
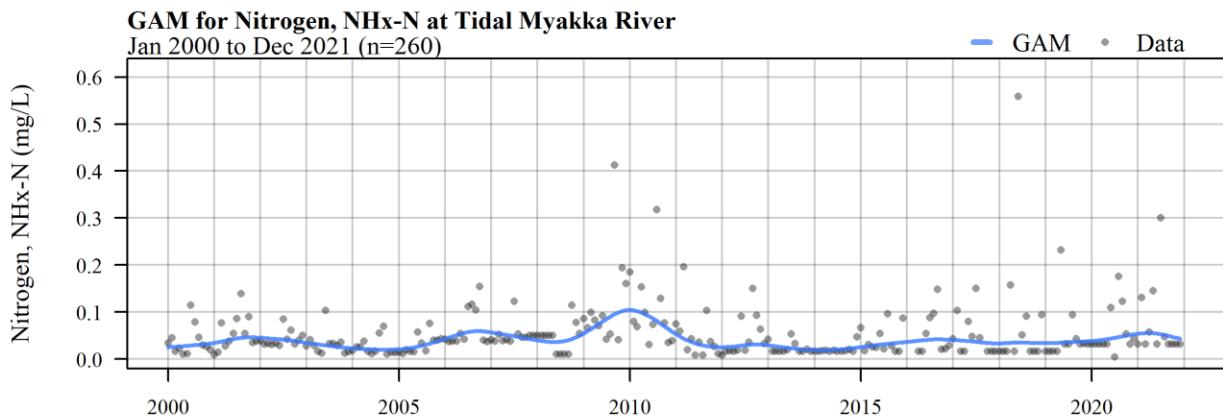
Est. mean with 95% CI (Jan 1 – Dec 31)
 2017 – 2021 Trend: Approx. slope 0, log-slope 0 [-0.01, 0.01], P>0.05 (ns)





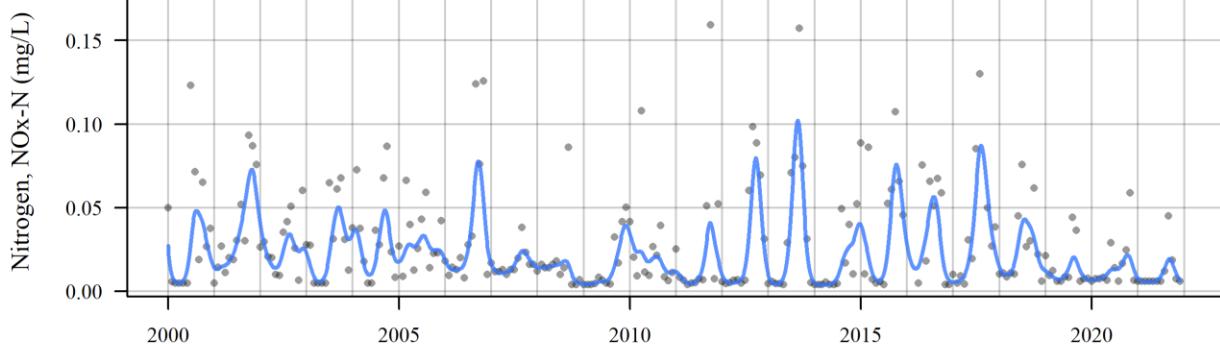




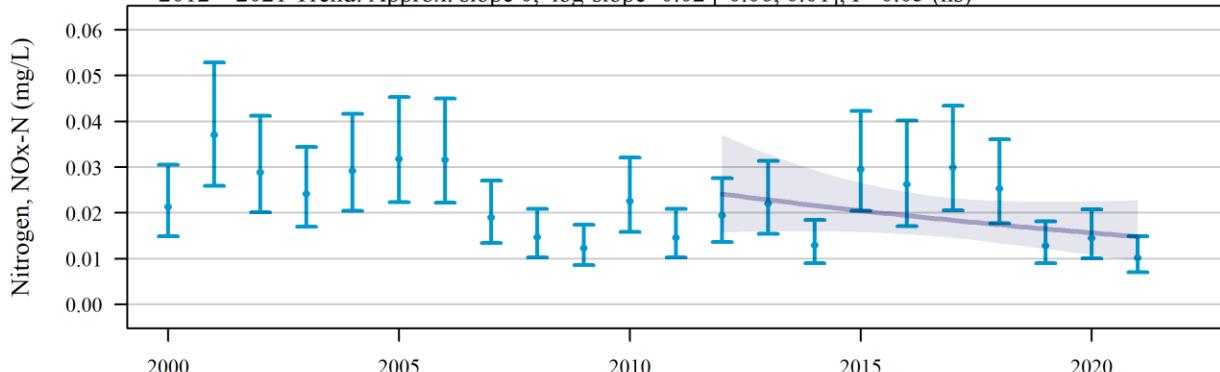


GAM for Nitrogen, NOx-N at Tidal Myakka River
 Jan 2000 to Dec 2021 (n=260)

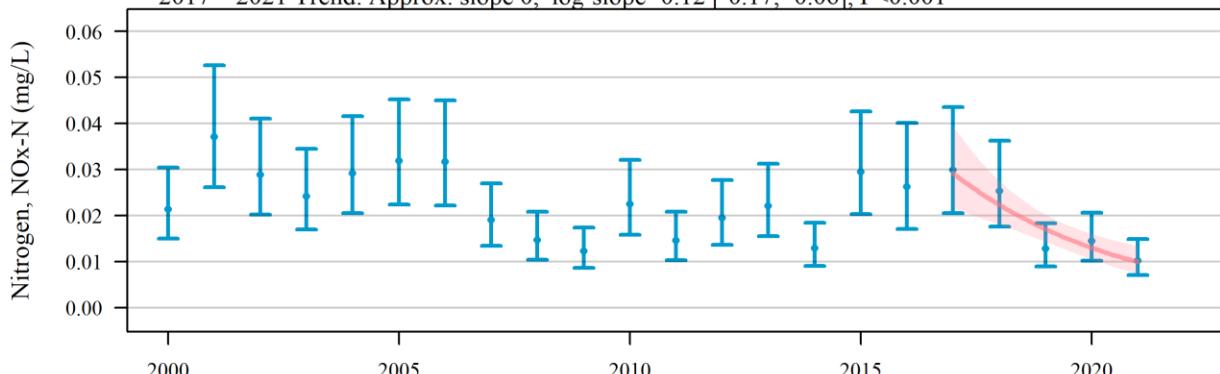
— GAM • Data

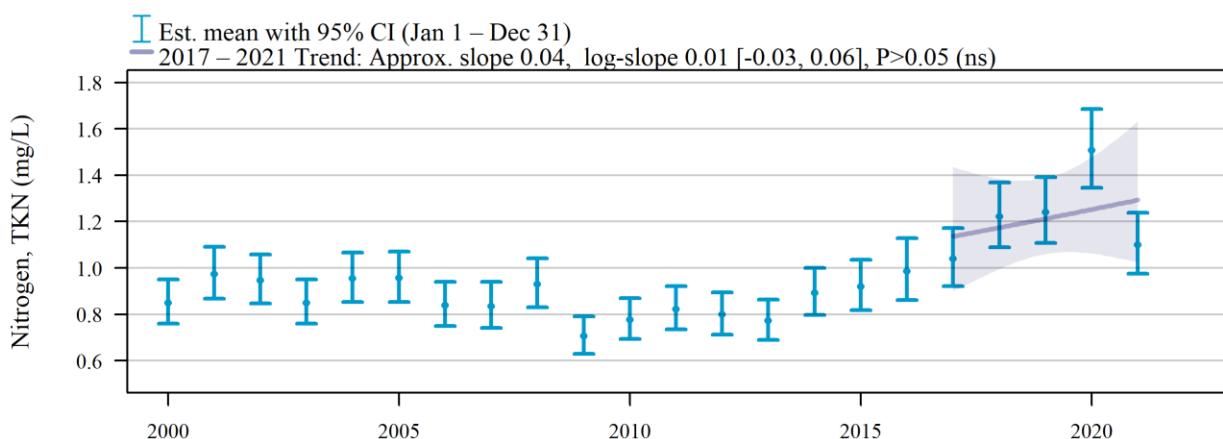
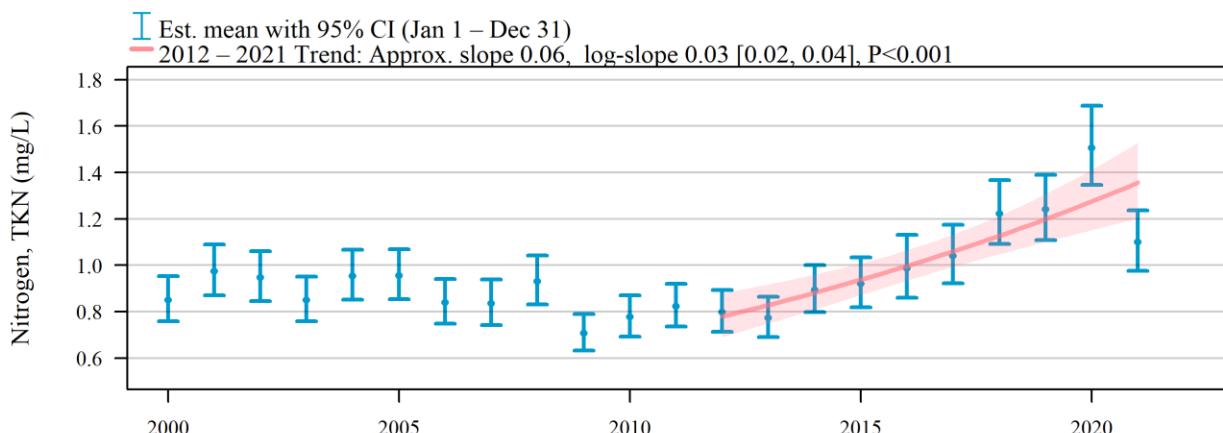
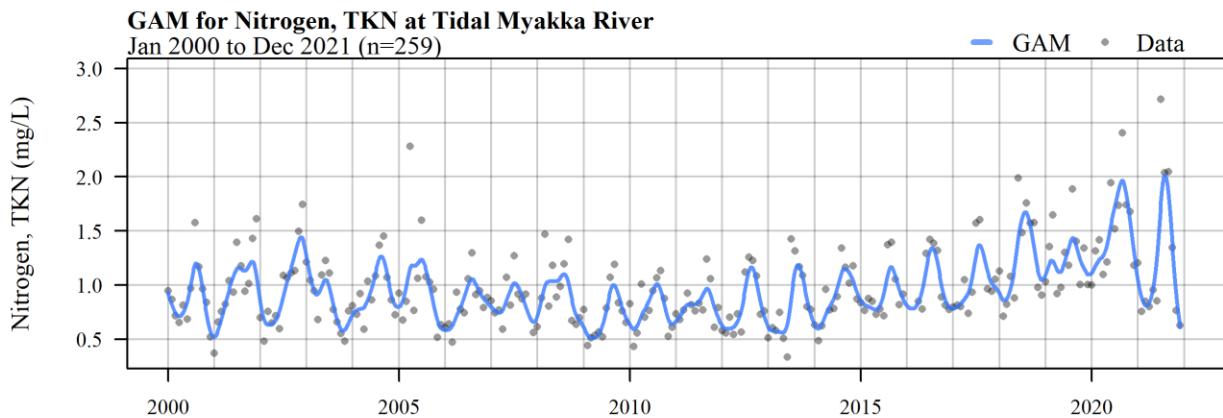


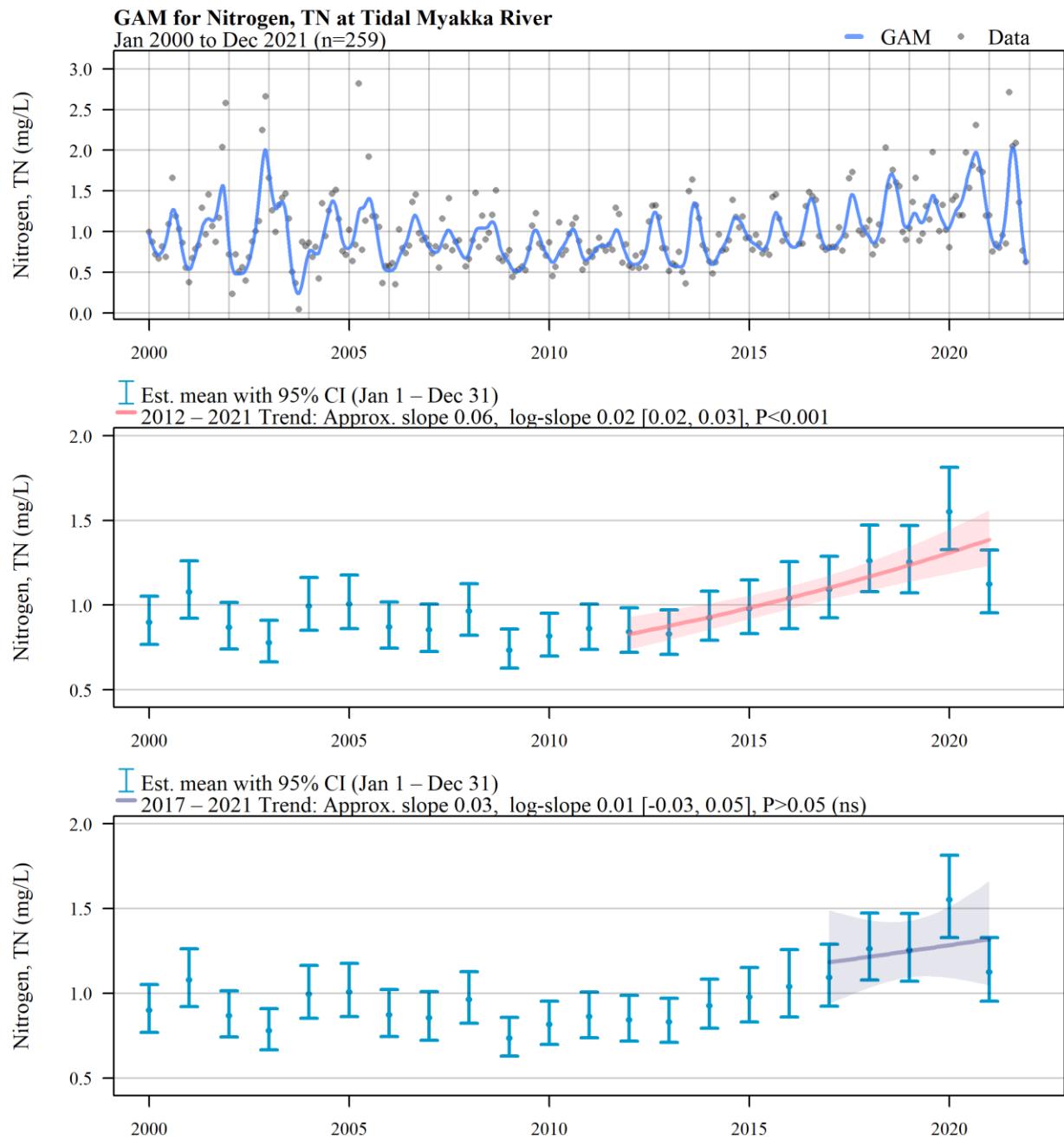
Est. mean with 95% CI (Jan 1 – Dec 31)
 2012 – 2021 Trend: Approx. slope 0, log-slope -0.02 [-0.06, 0.01], P>0.05 (ns)

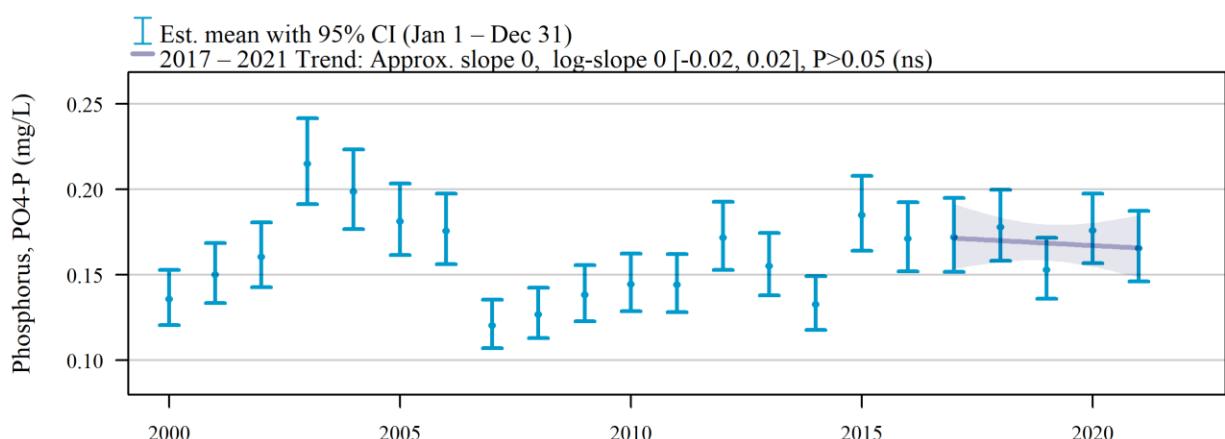
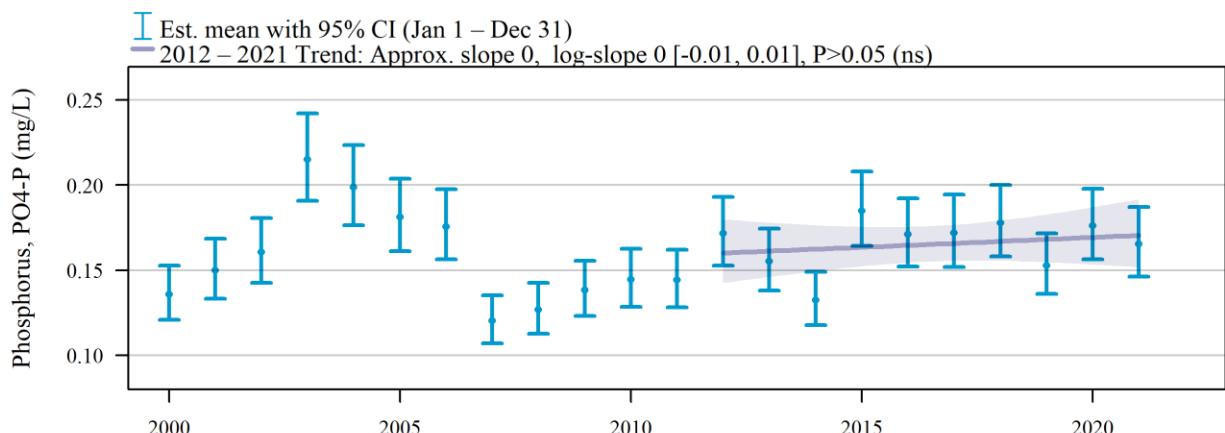
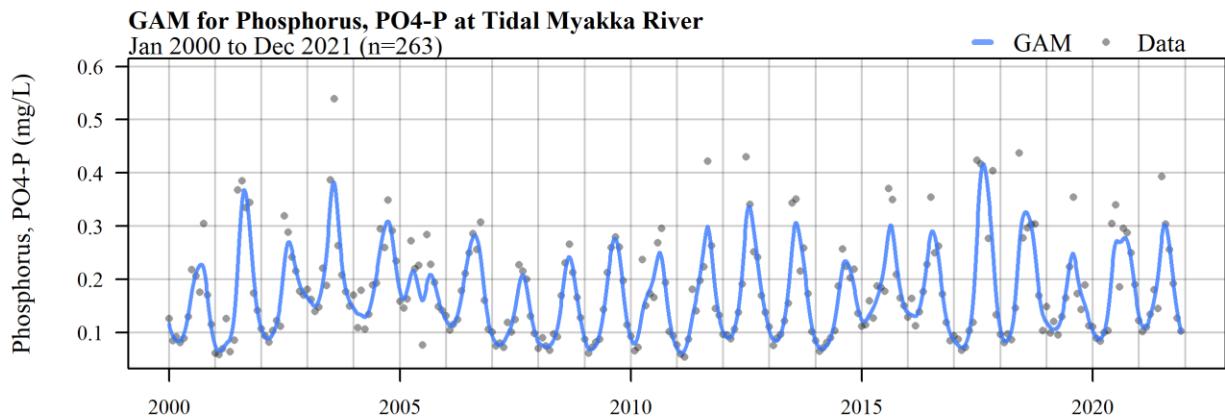


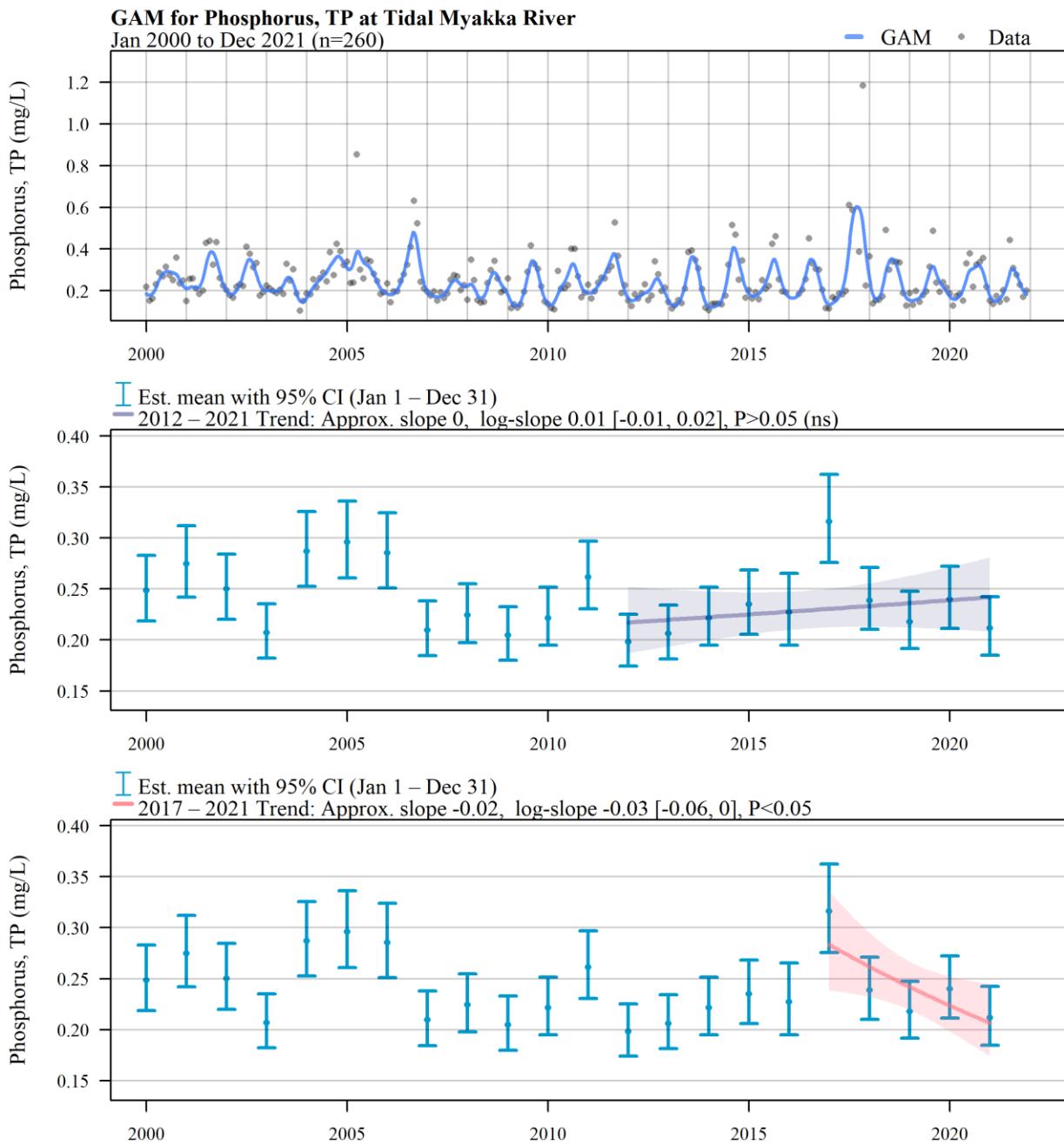
Est. mean with 95% CI (Jan 1 – Dec 31)
 2017 – 2021 Trend: Approx. slope 0, log-slope -0.12 [-0.17, -0.06], P<0.001

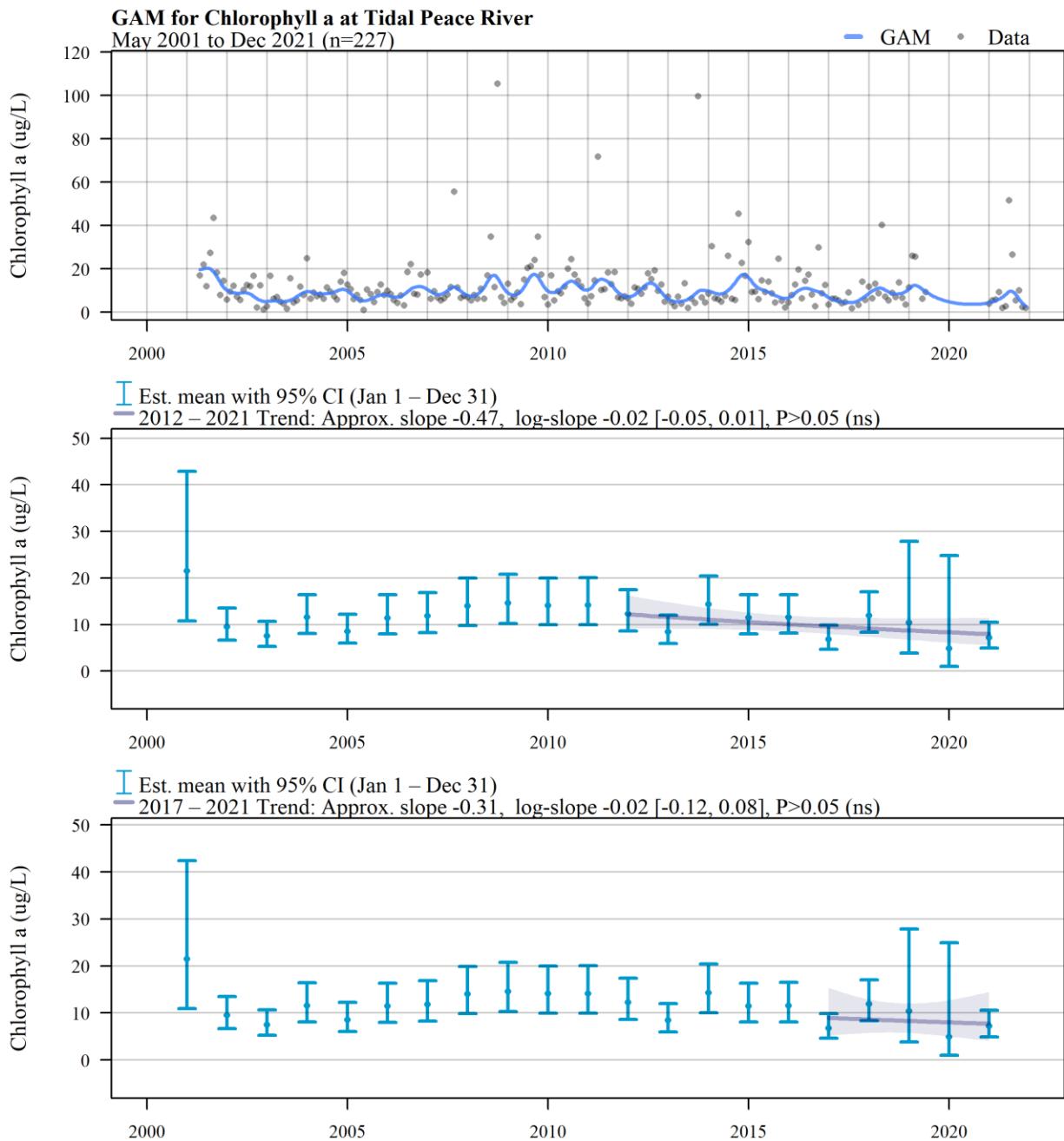


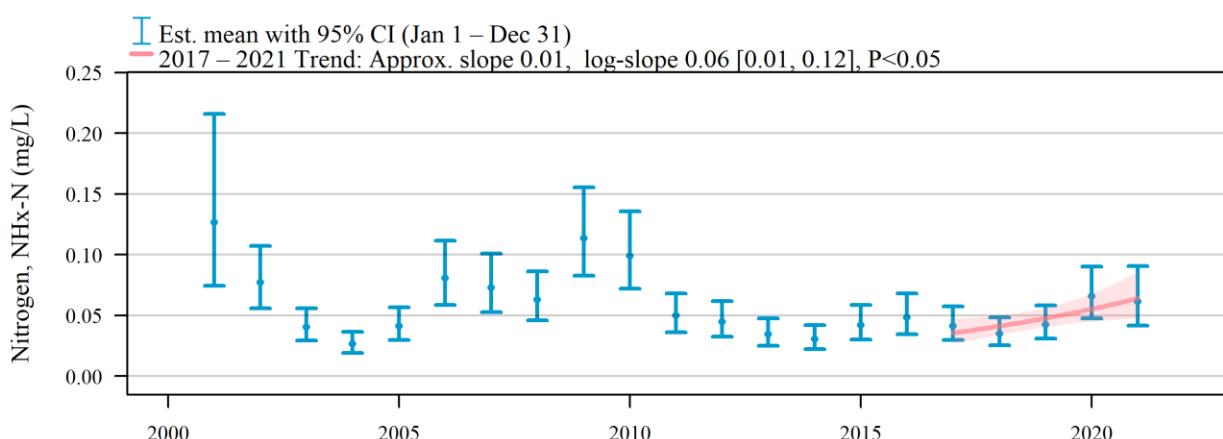
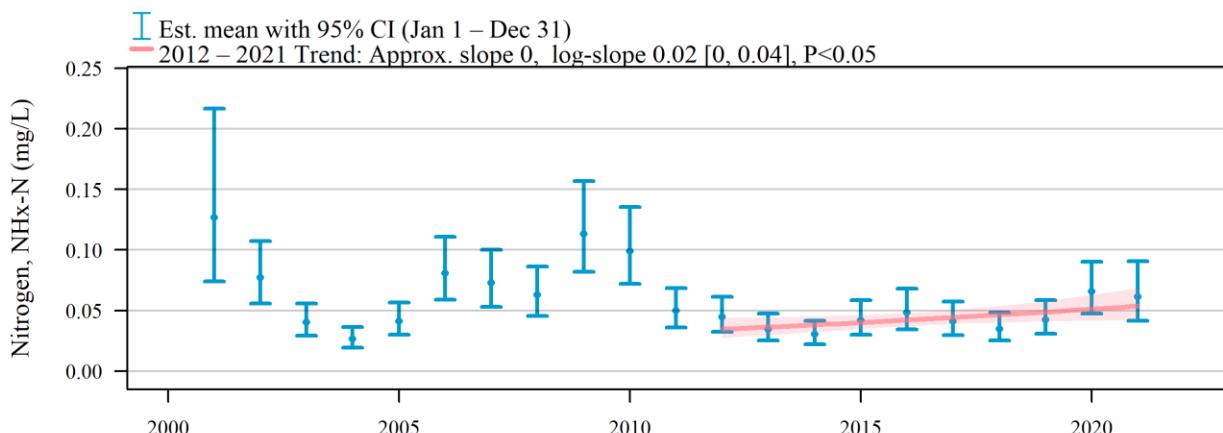
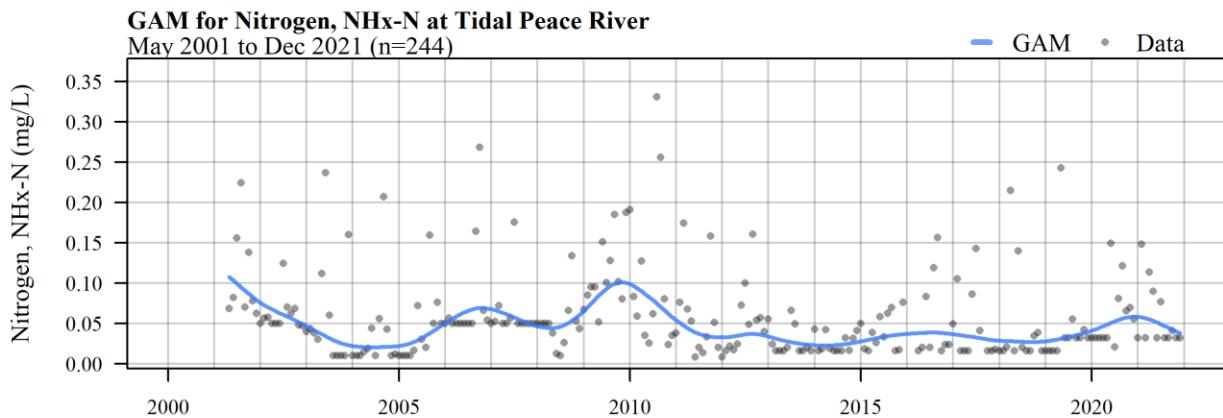


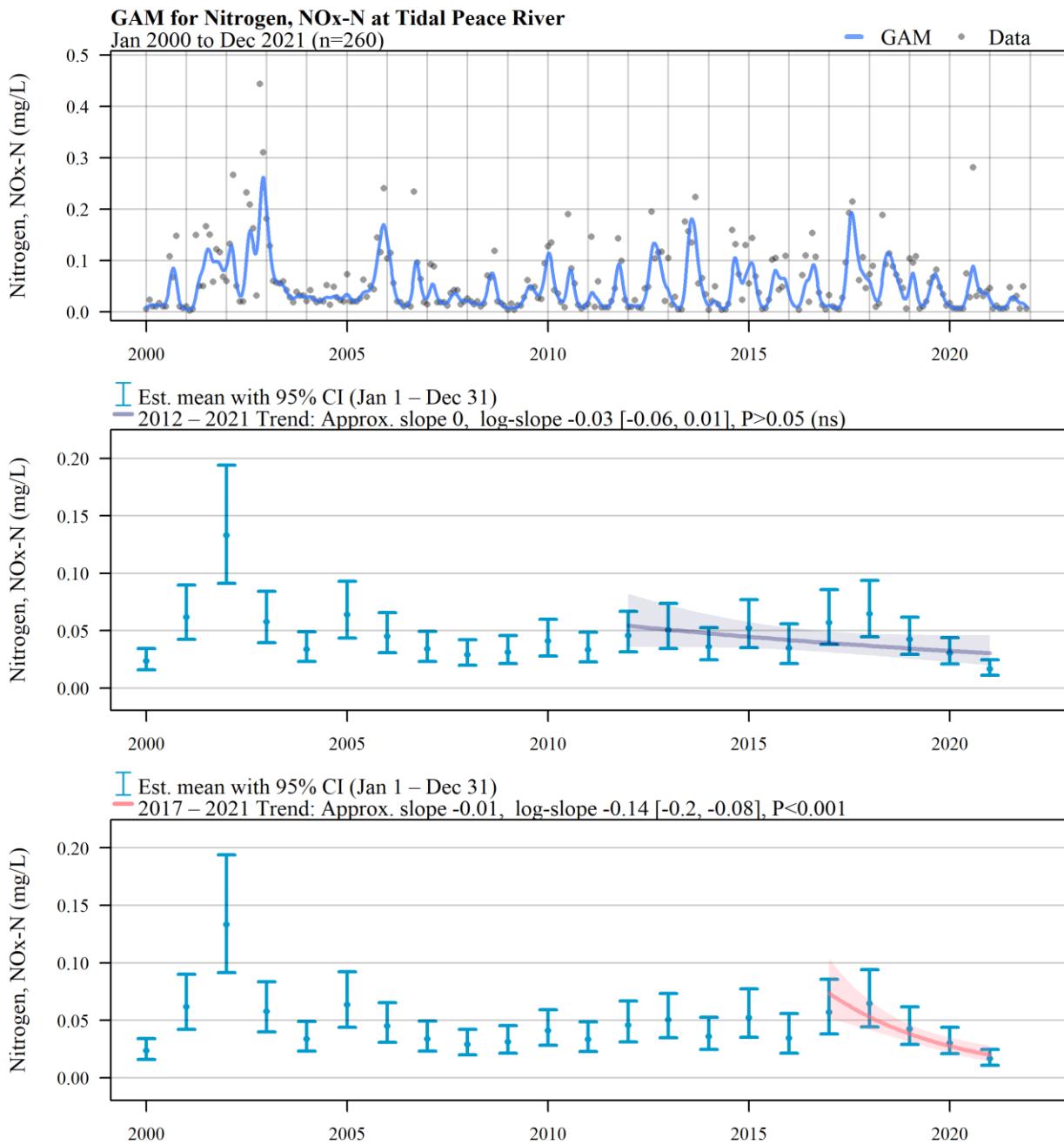


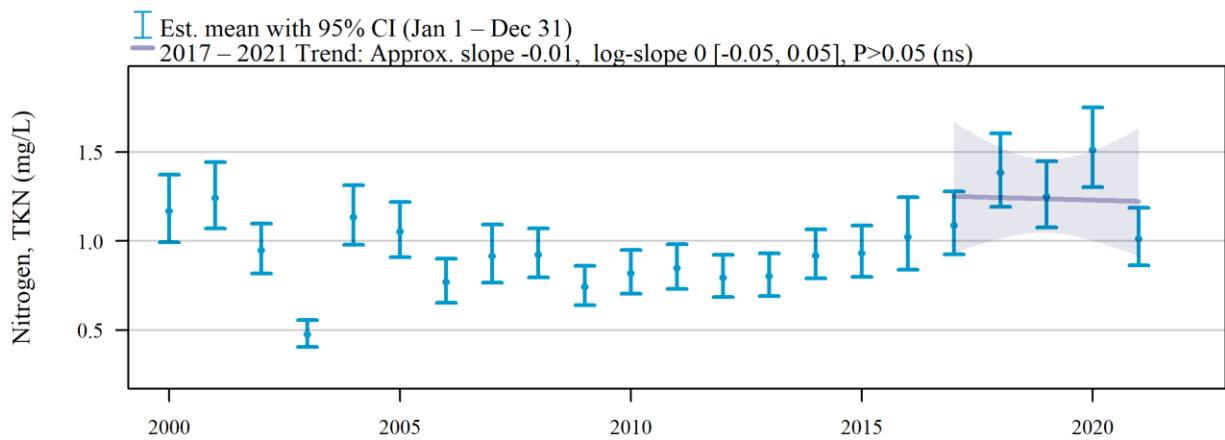
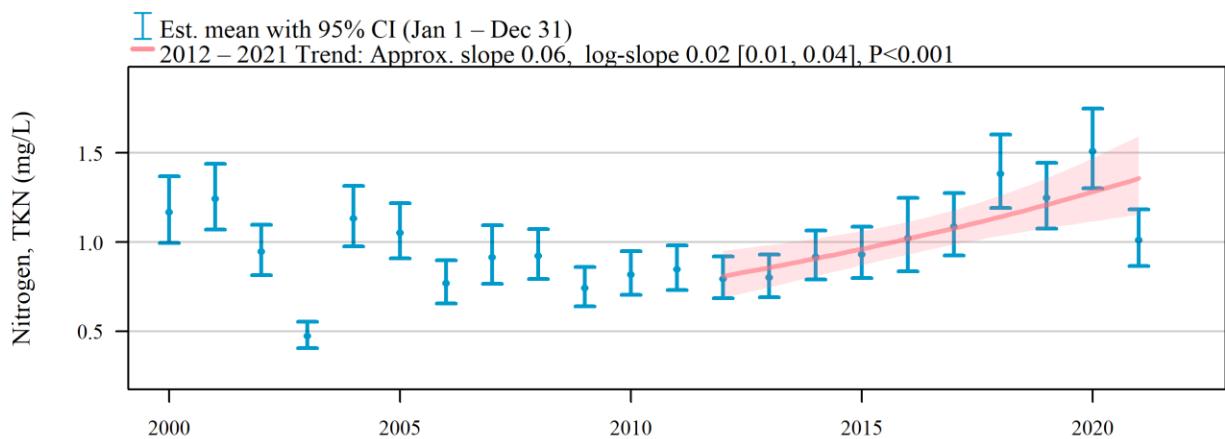
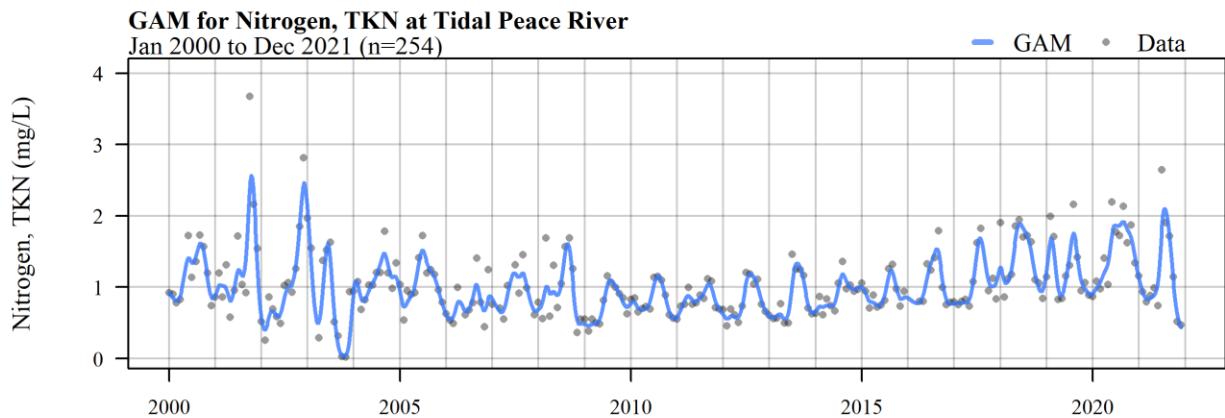


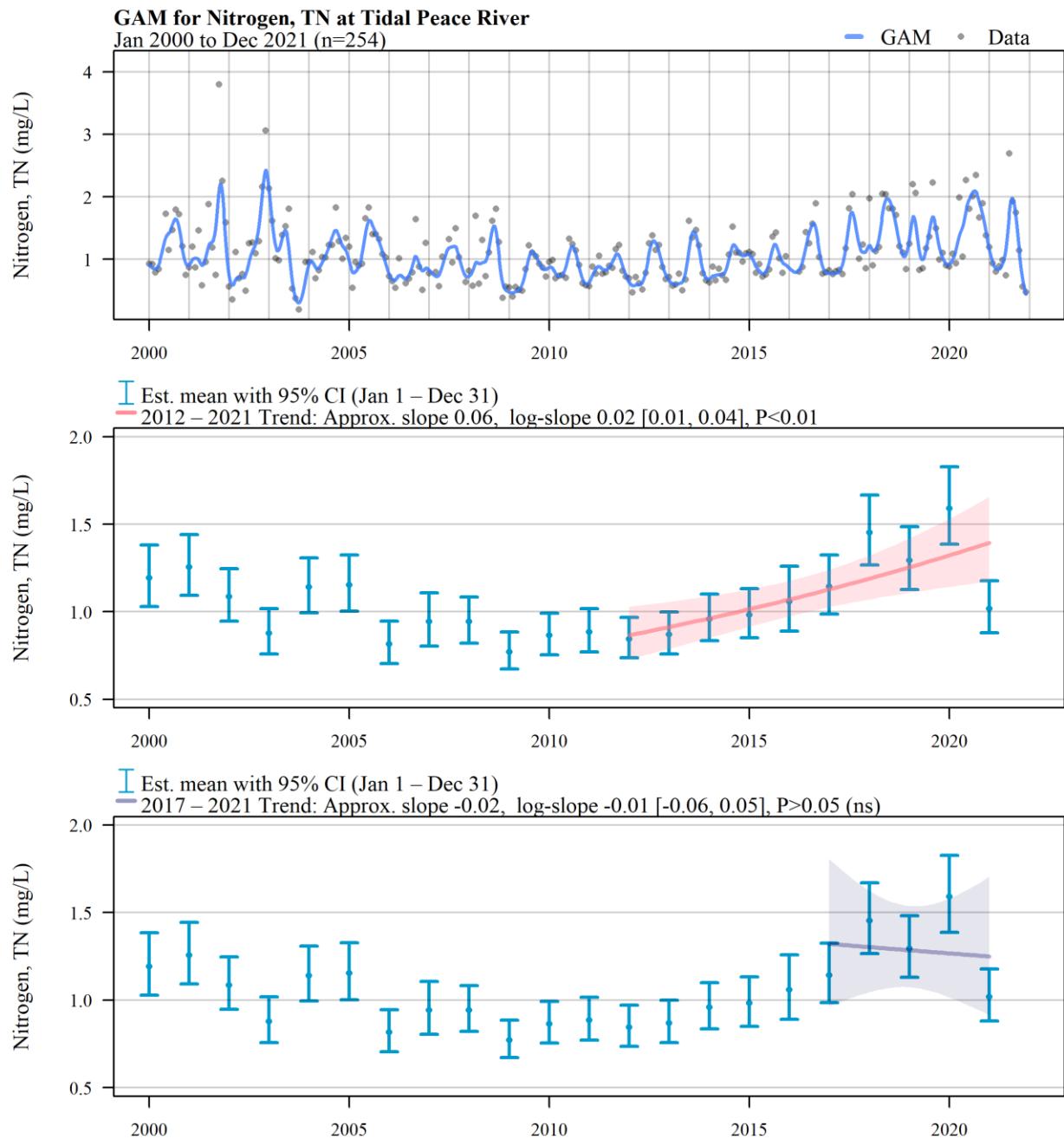


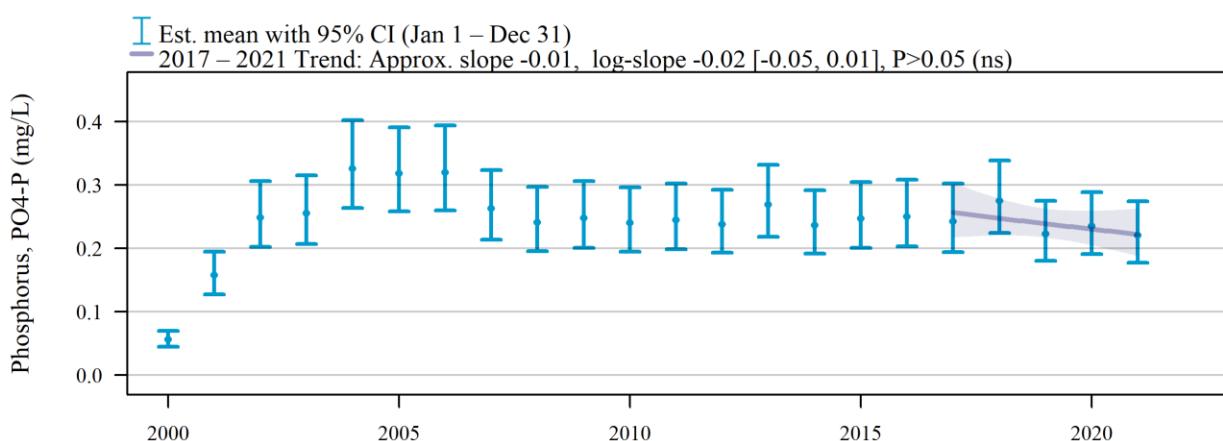
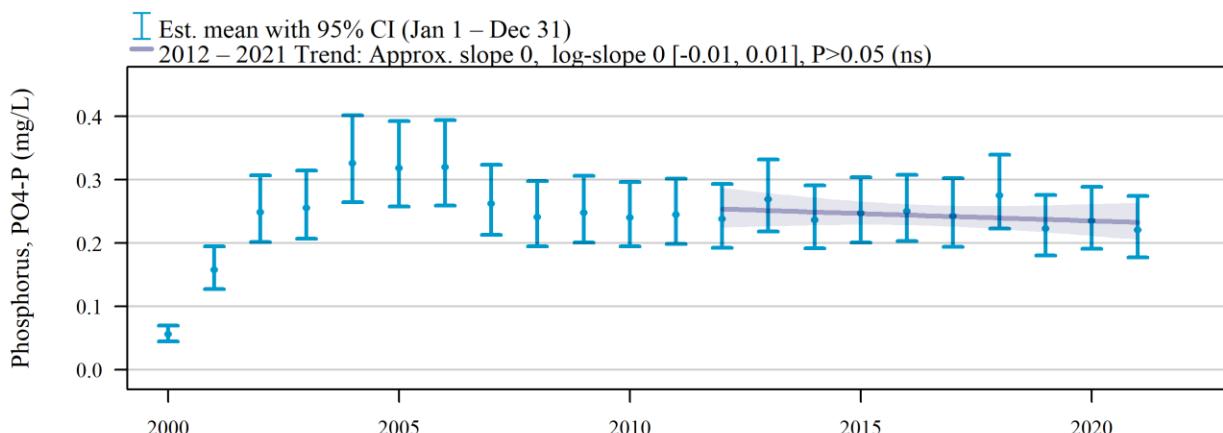
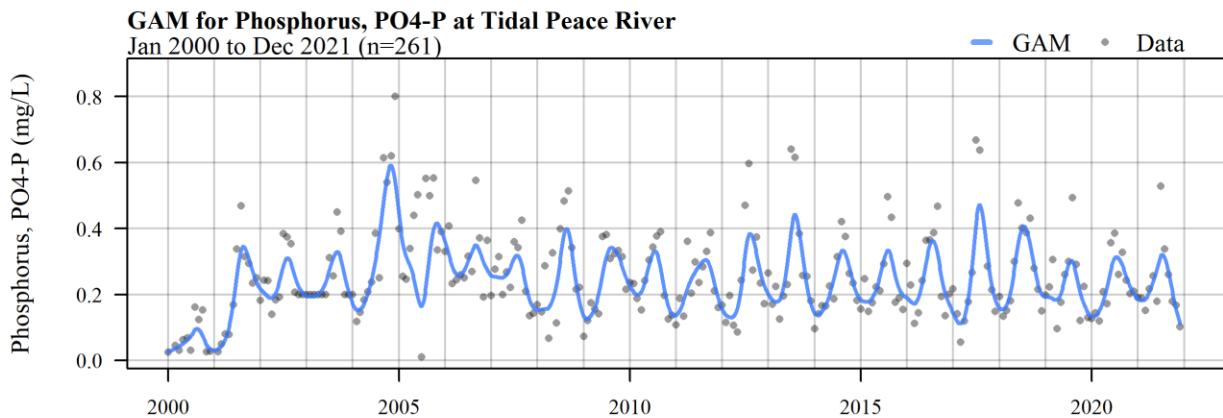


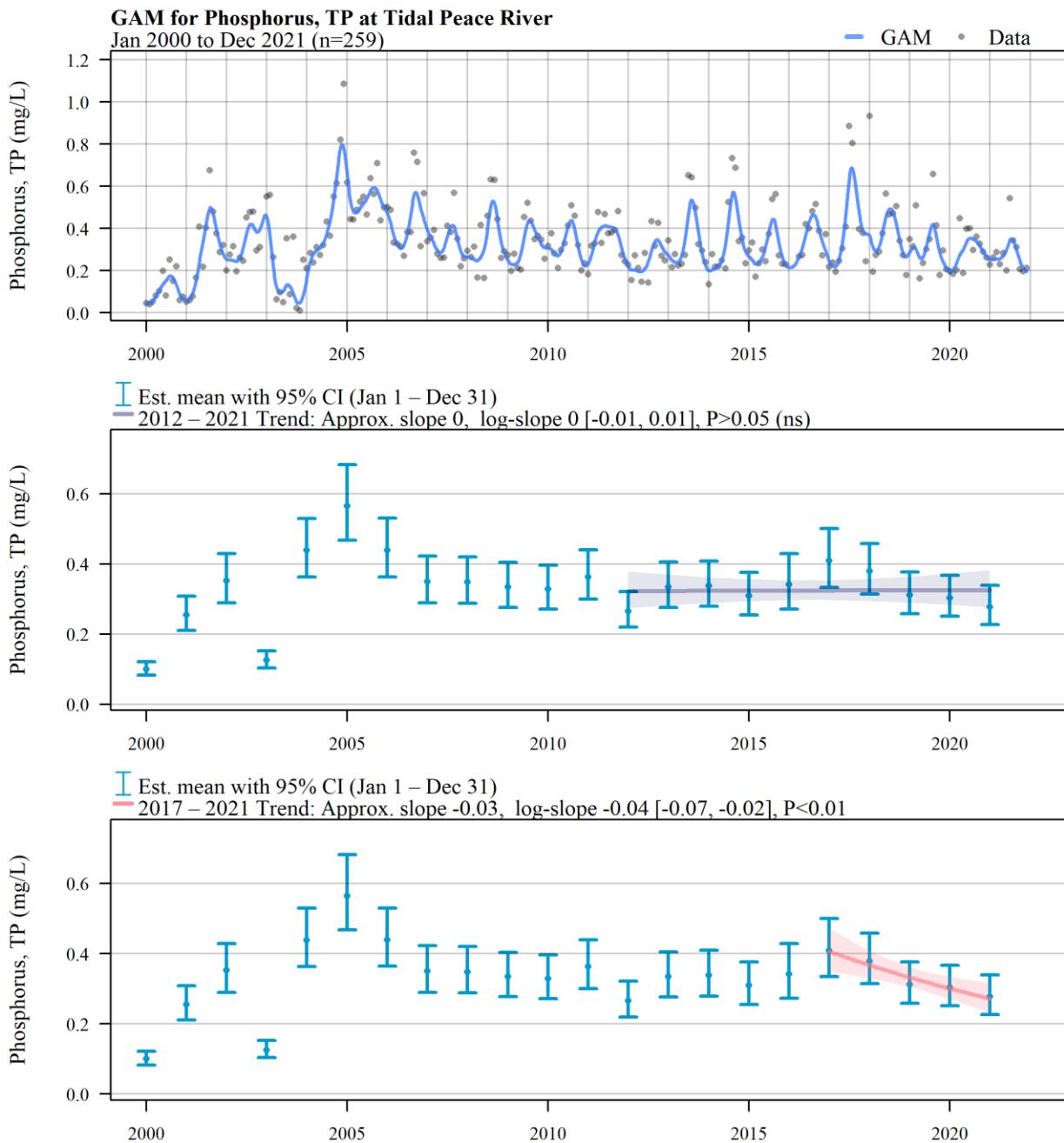


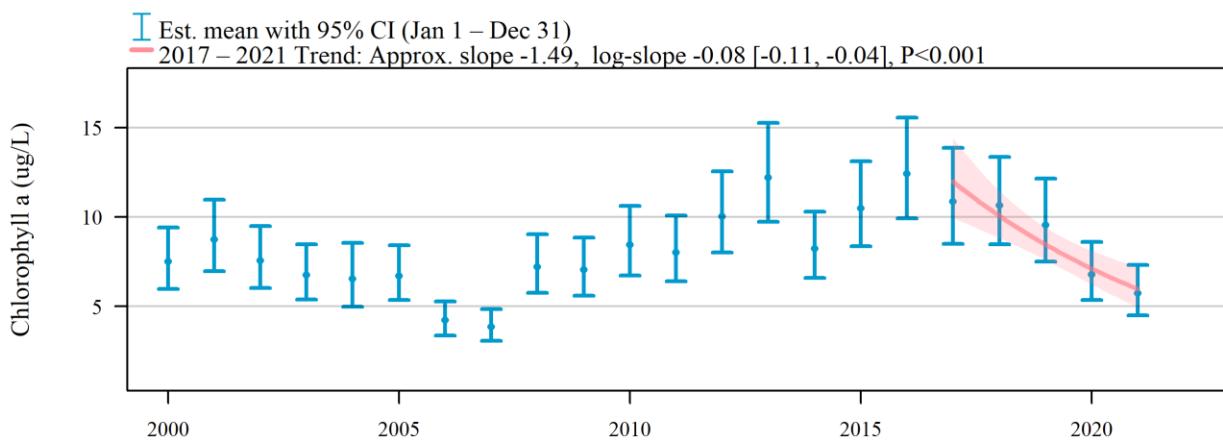
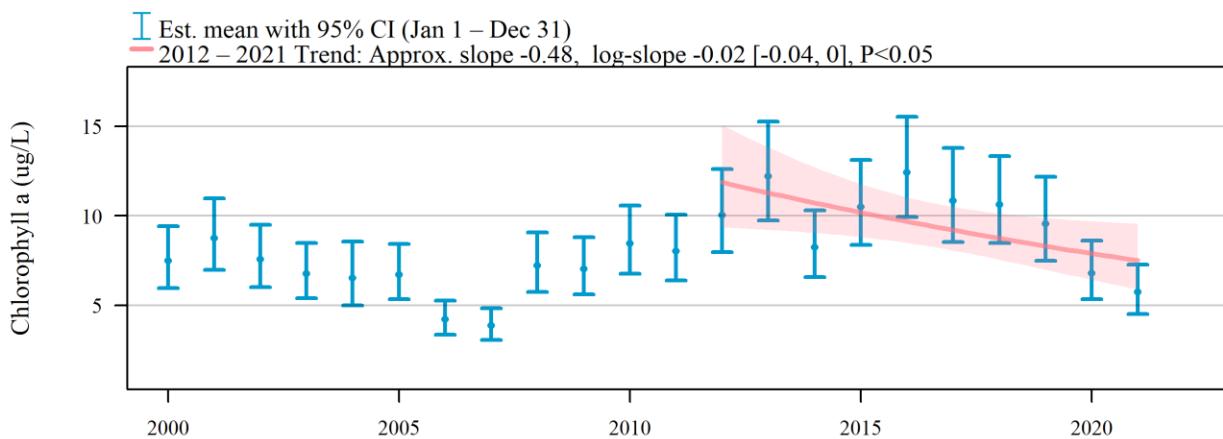
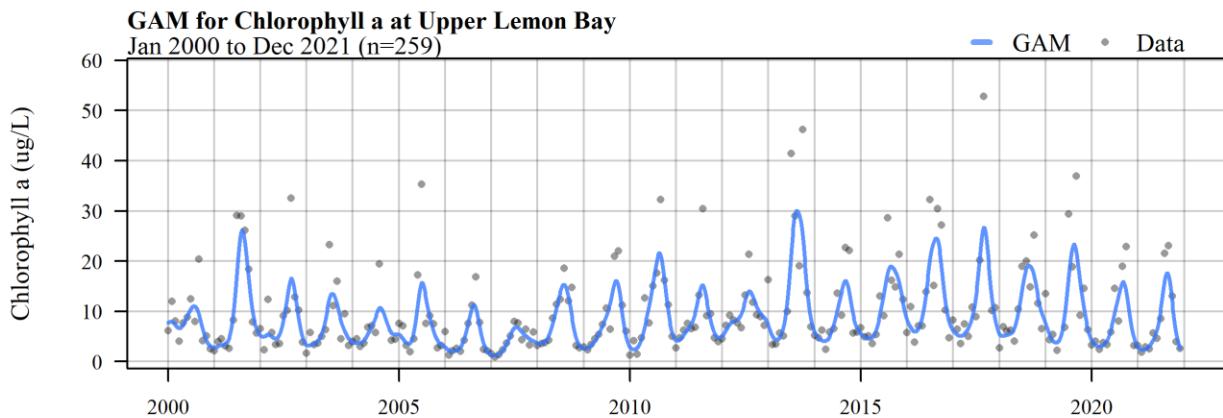


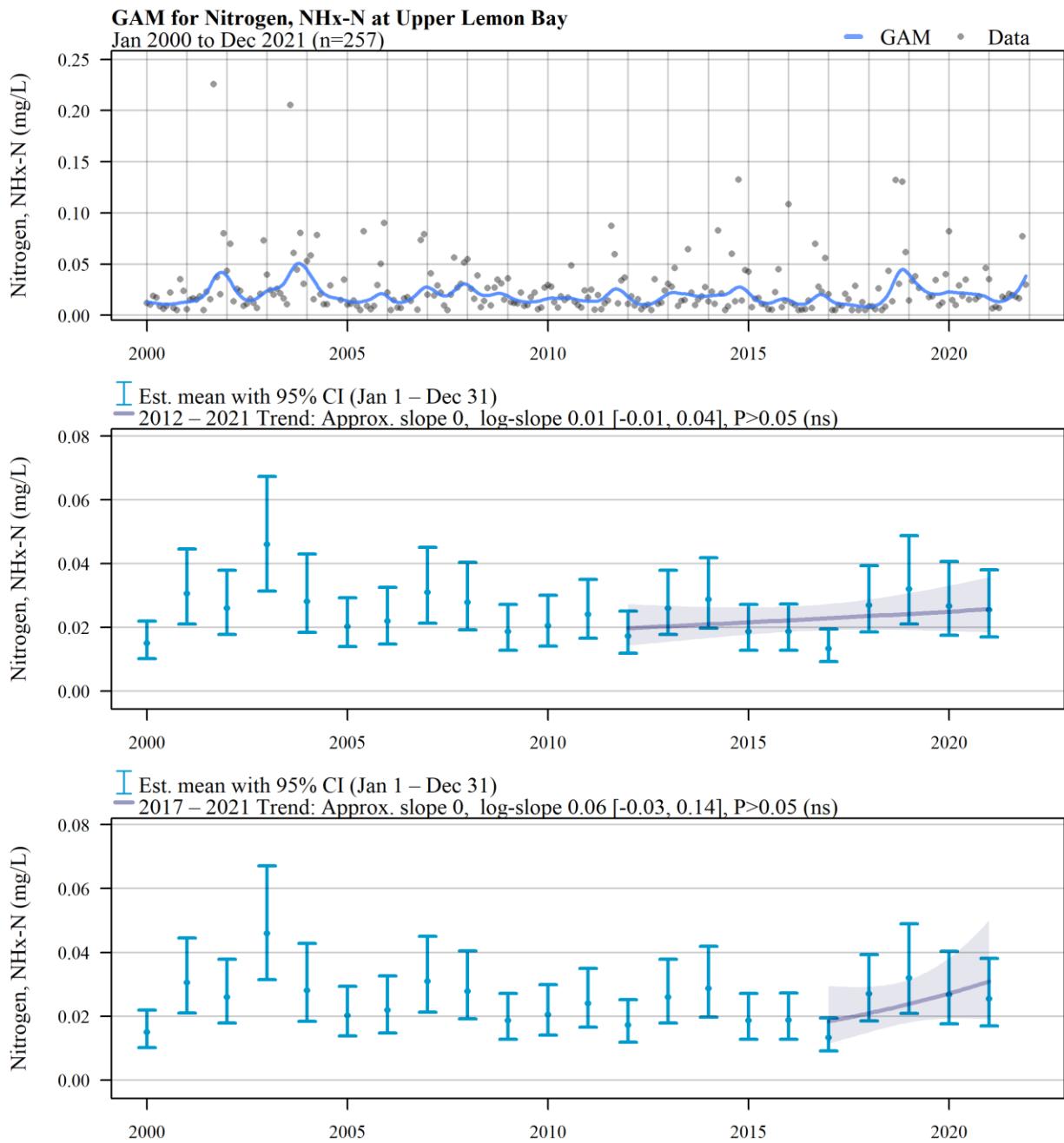


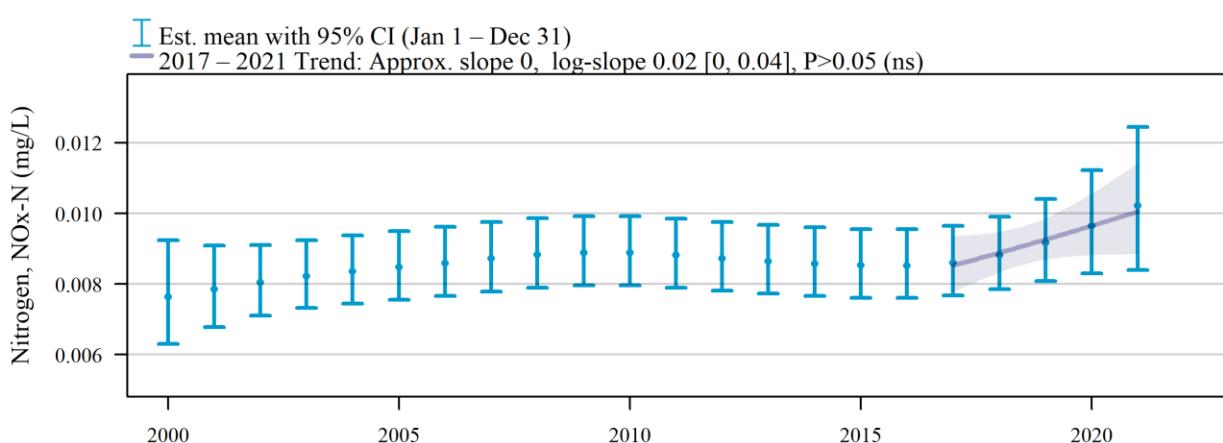
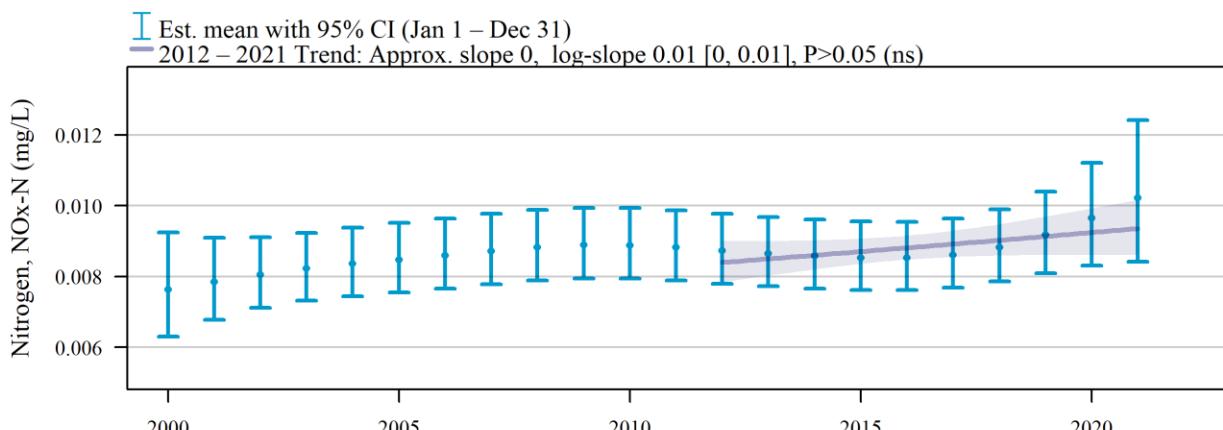
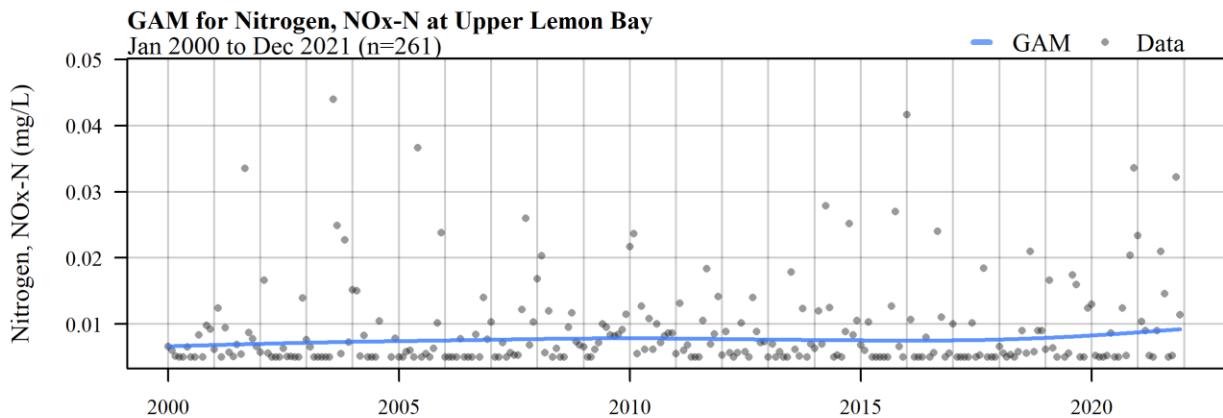




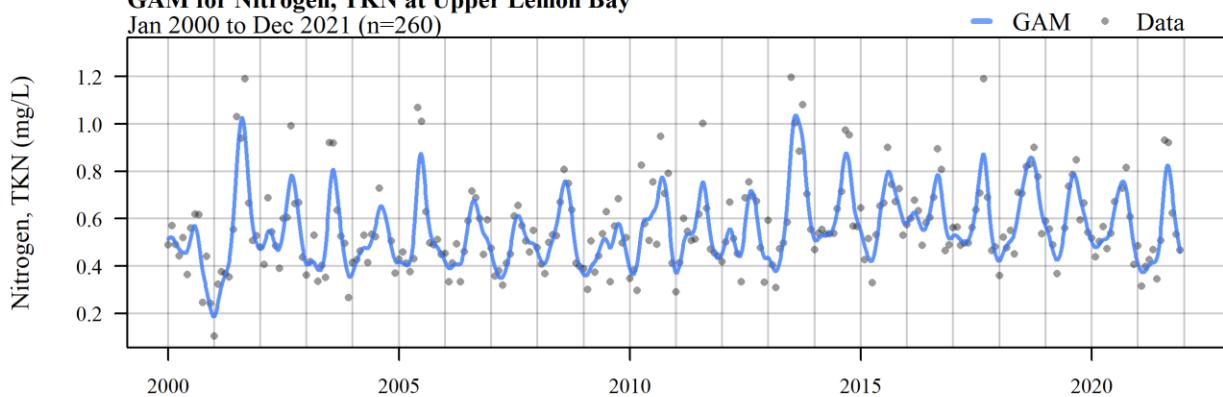




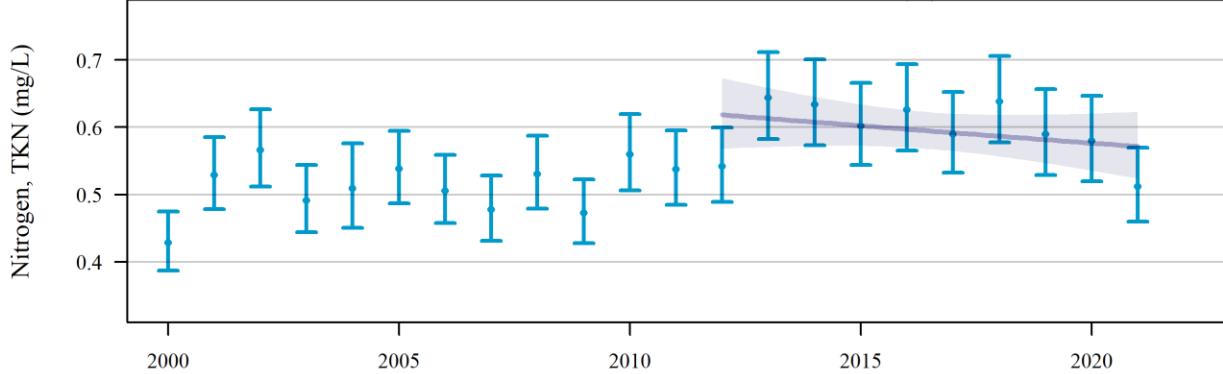




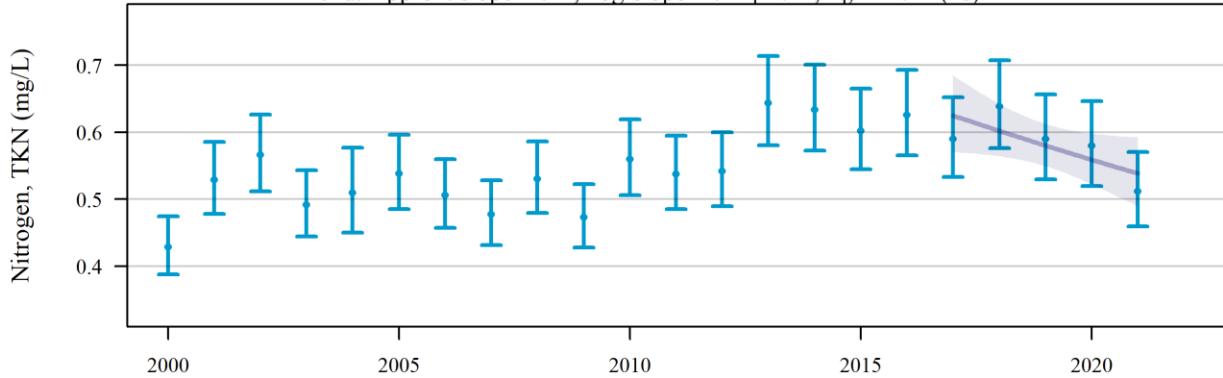
GAM for Nitrogen, TKN at Upper Lemon Bay
Jan 2000 to Dec 2021 (n=260)

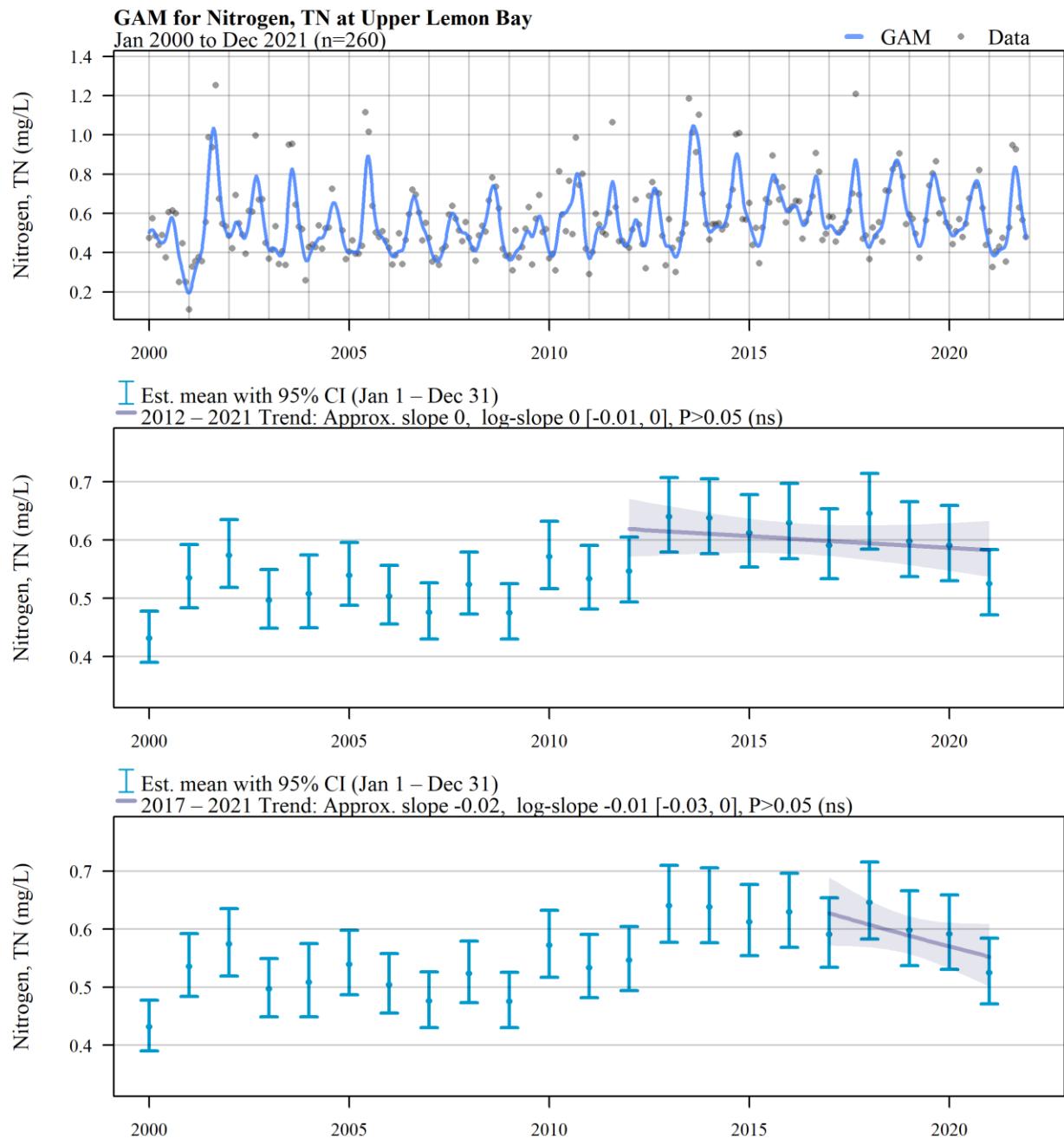


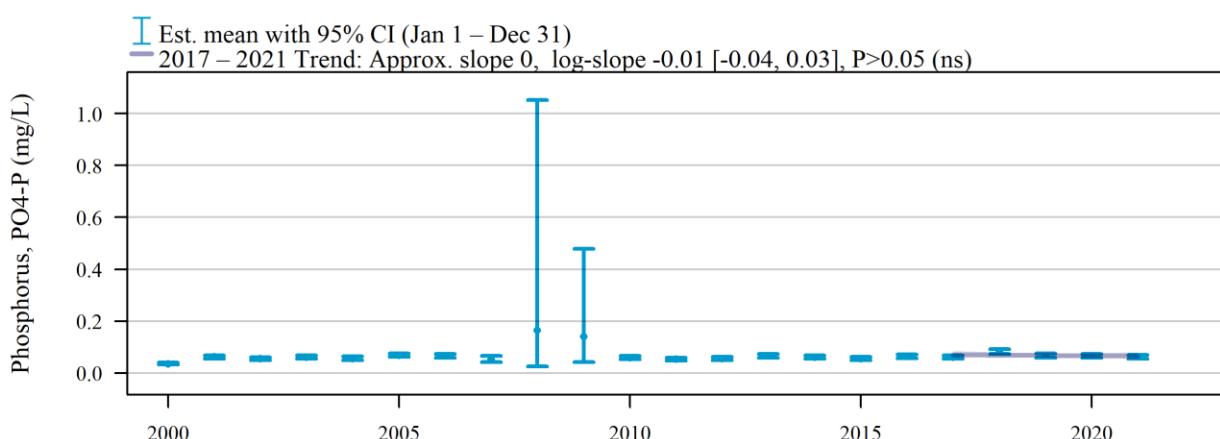
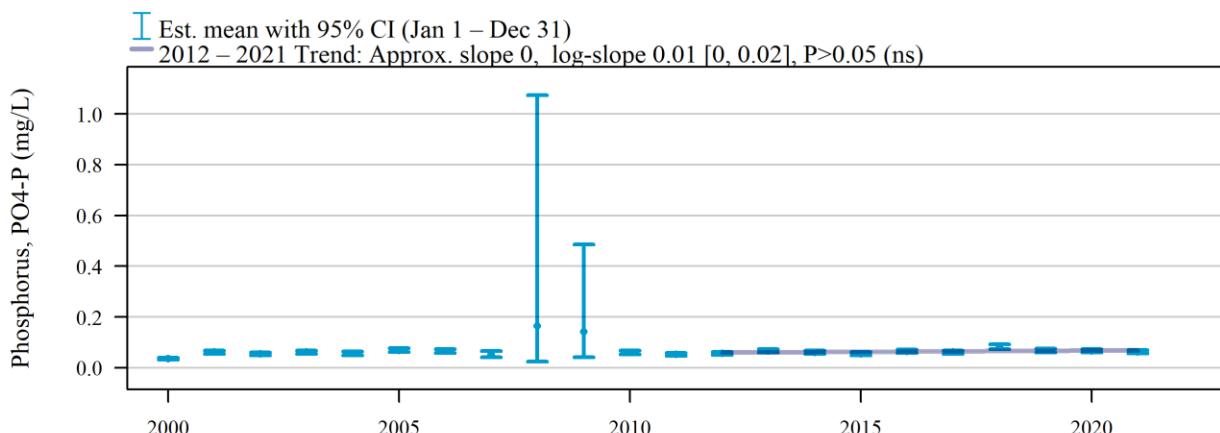
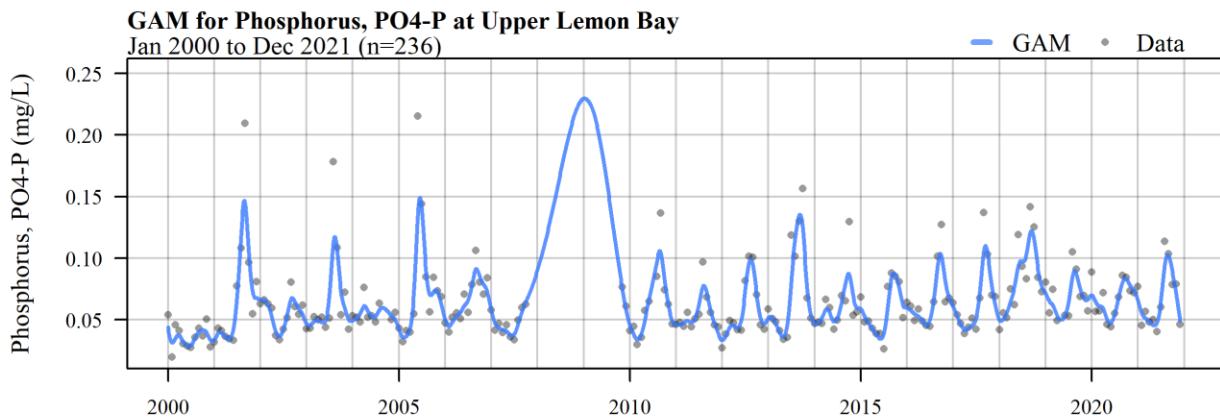
Est. mean with 95% CI (Jan 1 – Dec 31)
2012 – 2021 Trend: Approx. slope -0.01, log-slope 0 [-0.01, 0], P>0.05 (ns)

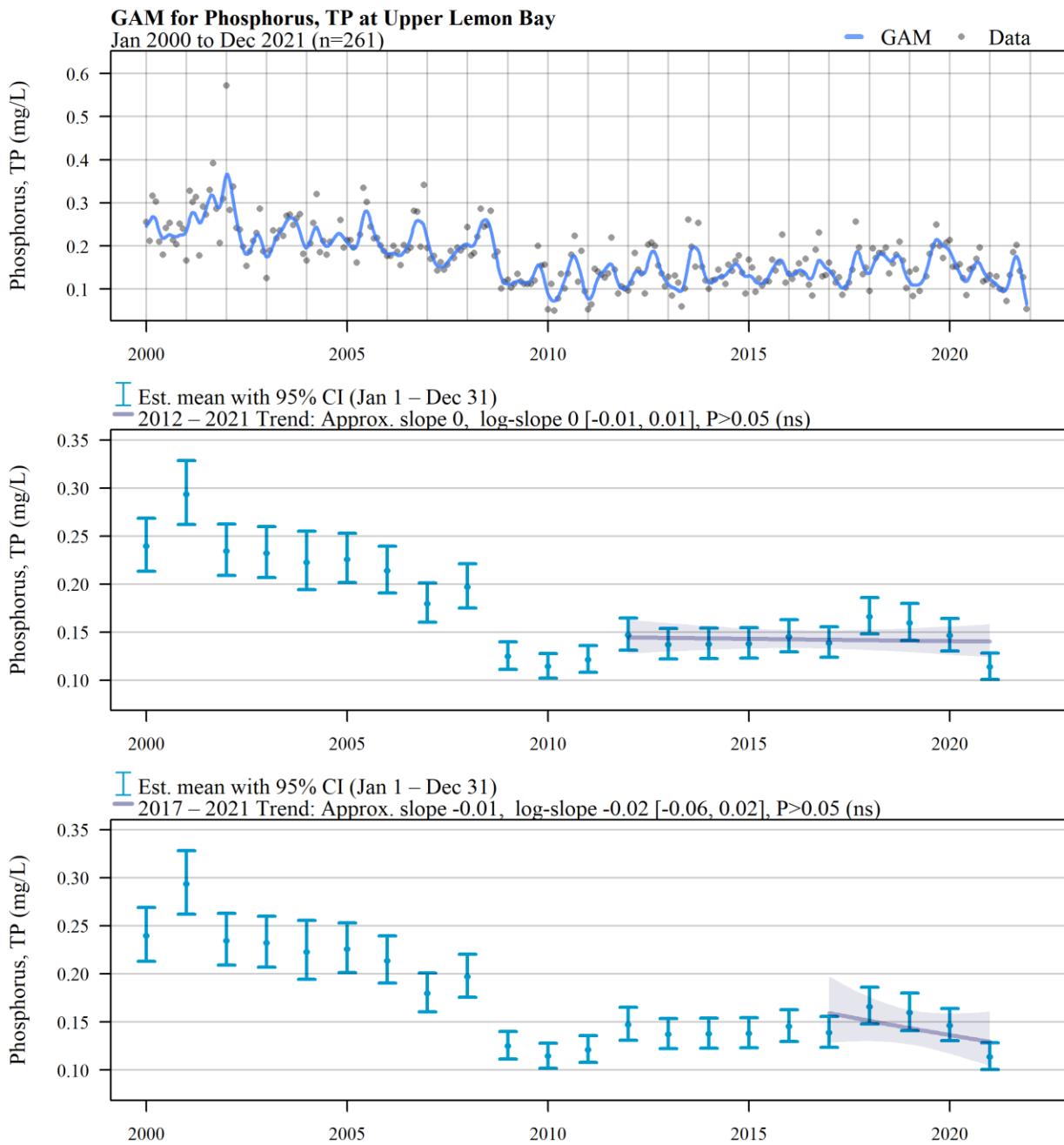


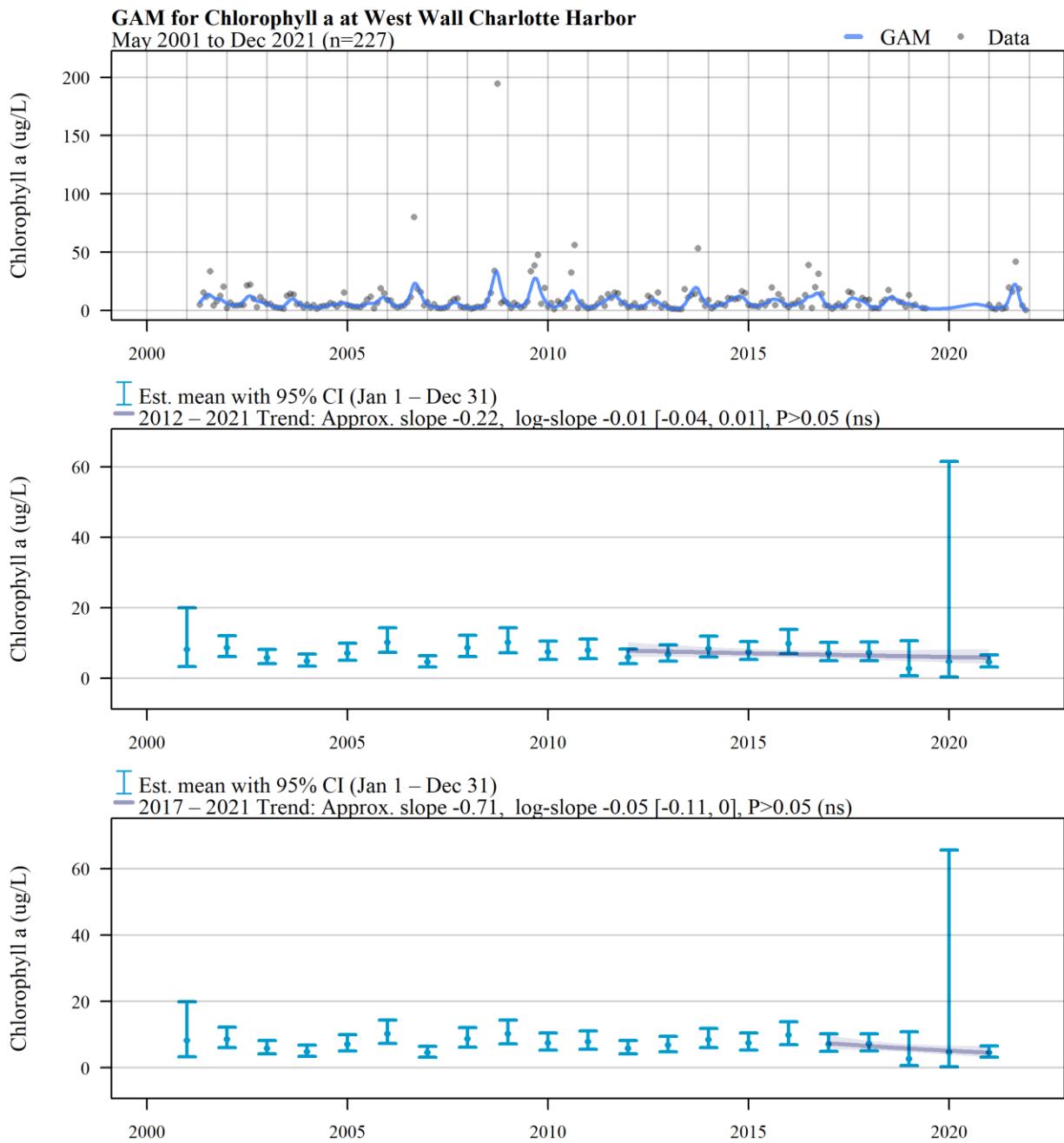
Est. mean with 95% CI (Jan 1 – Dec 31)
2017 – 2021 Trend: Approx. slope -0.02, log-slope -0.02 [-0.03, 0], P>0.05 (ns)

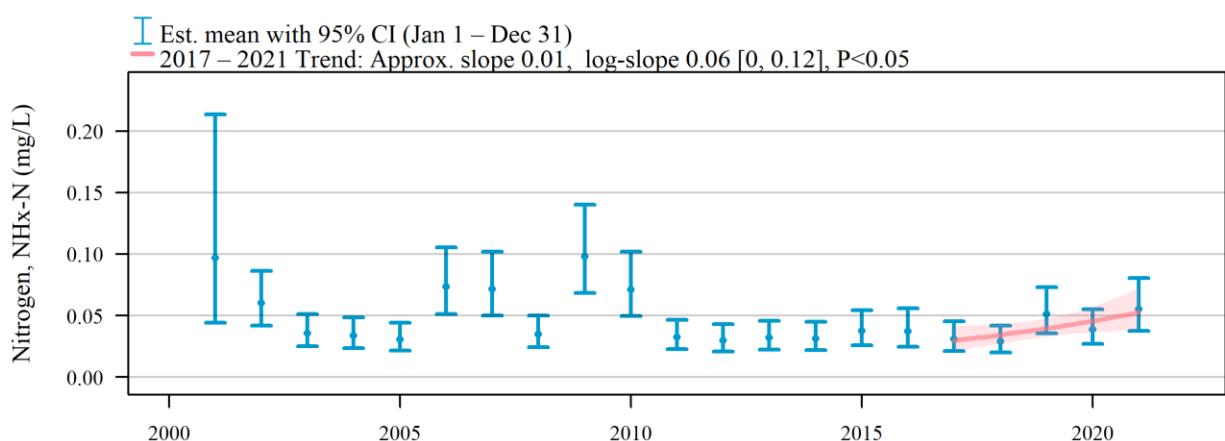
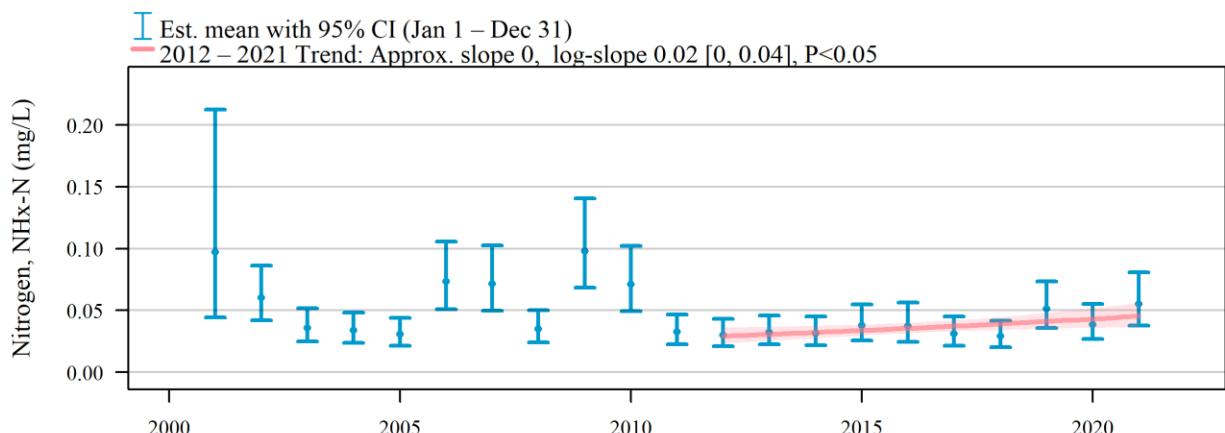
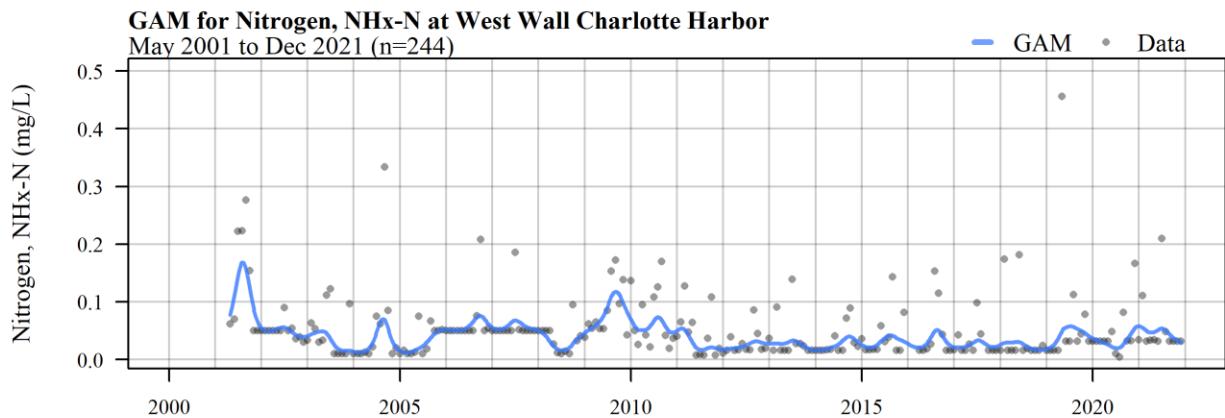


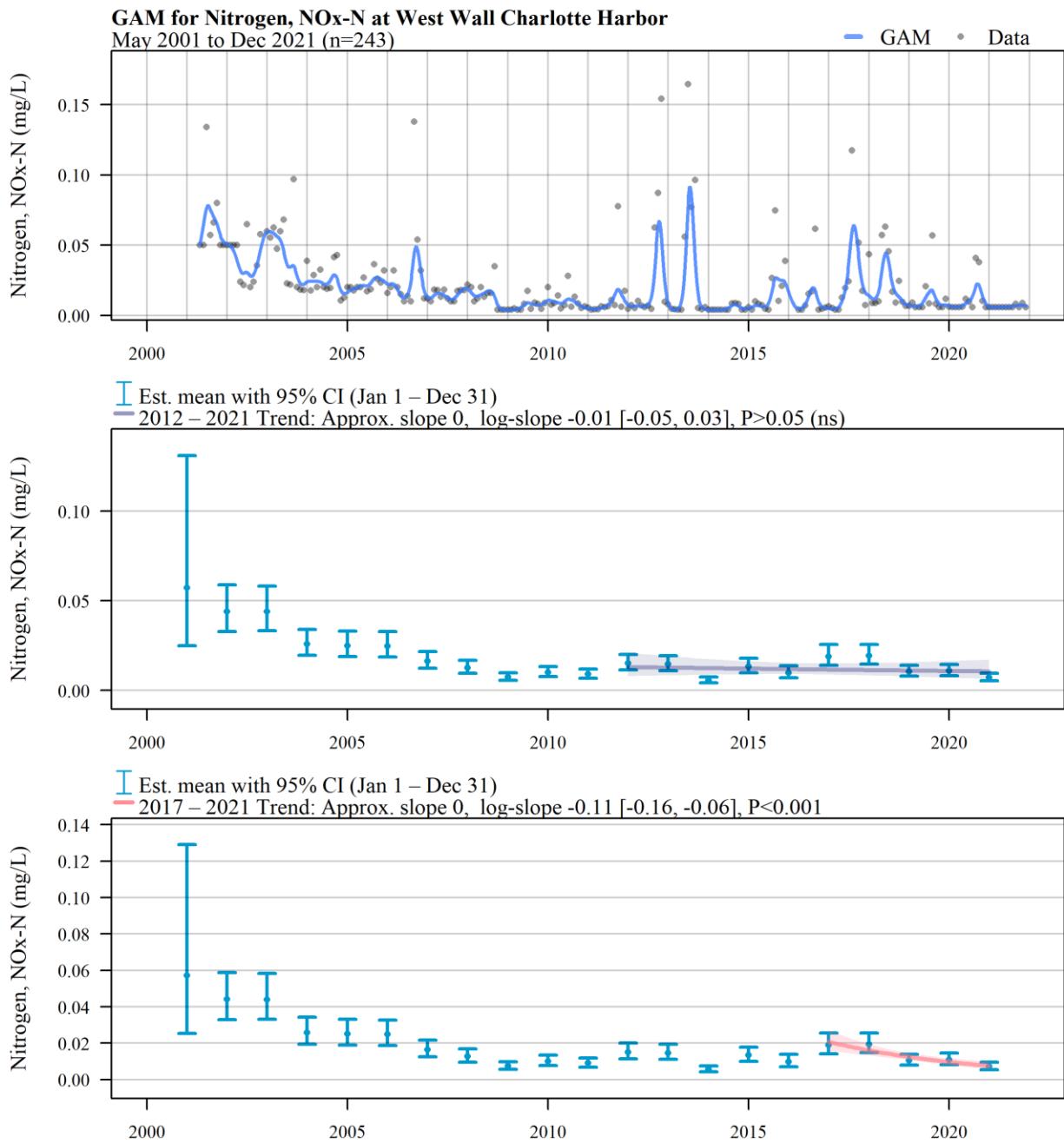






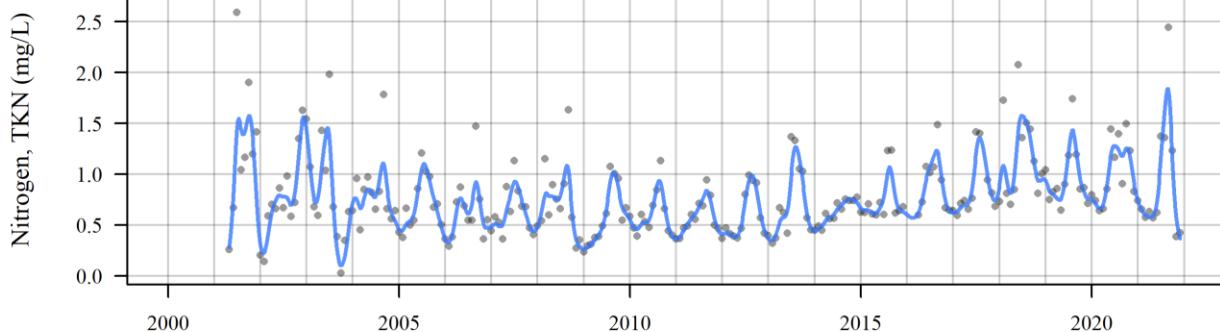




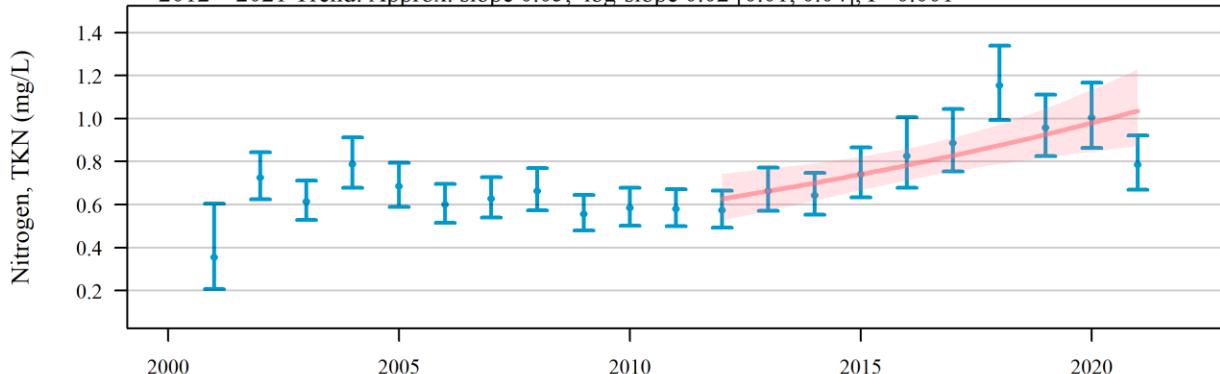


GAM for Nitrogen, TKN at West Wall Charlotte Harbor
May 2001 to Dec 2021 (n=244)

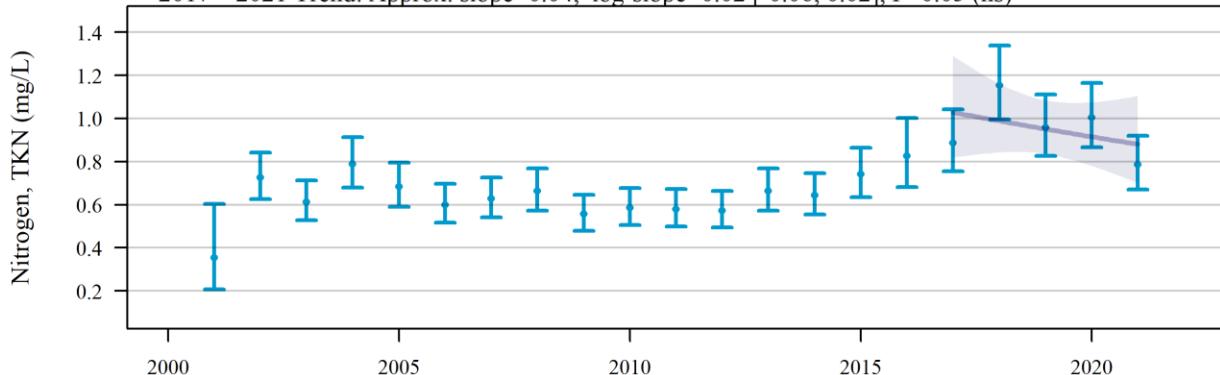
— GAM • Data

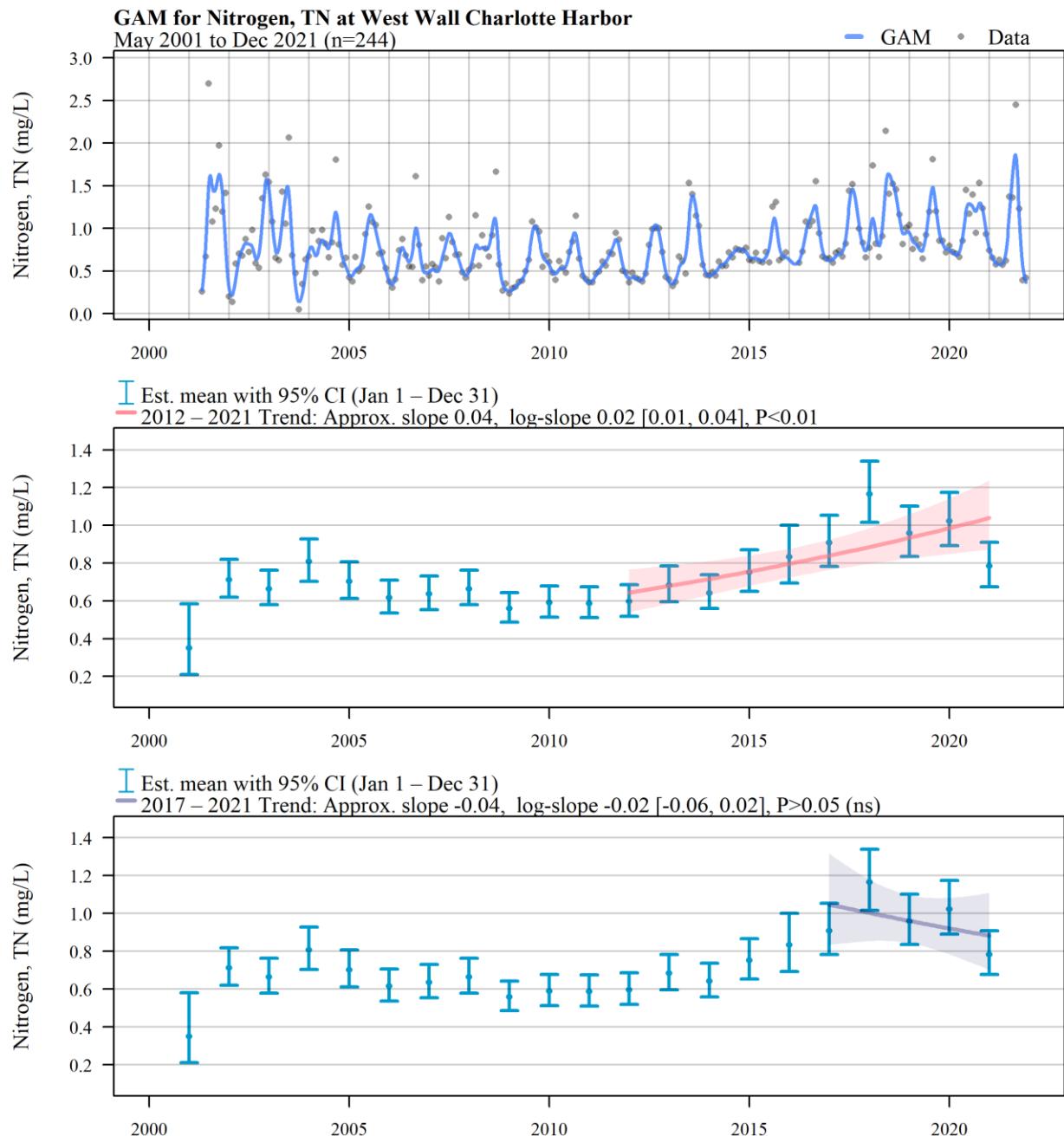


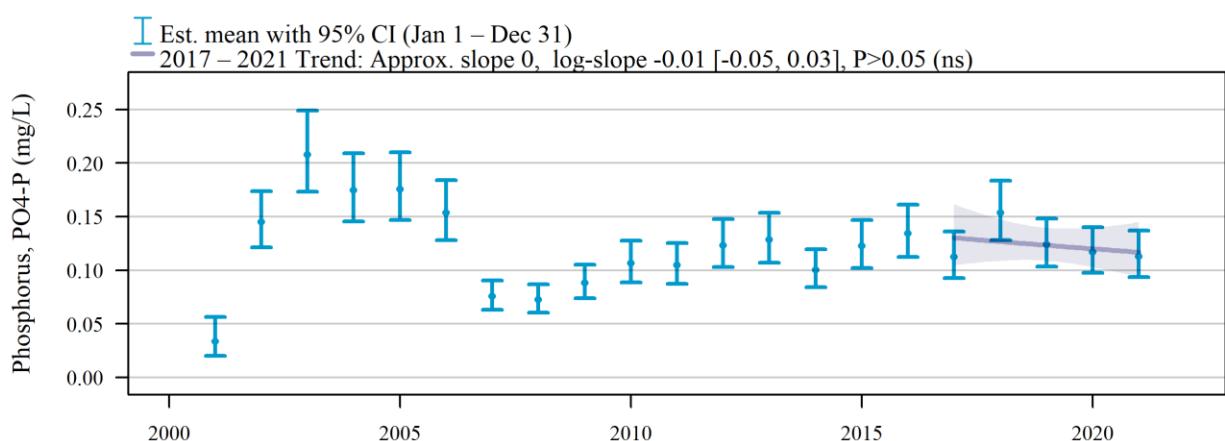
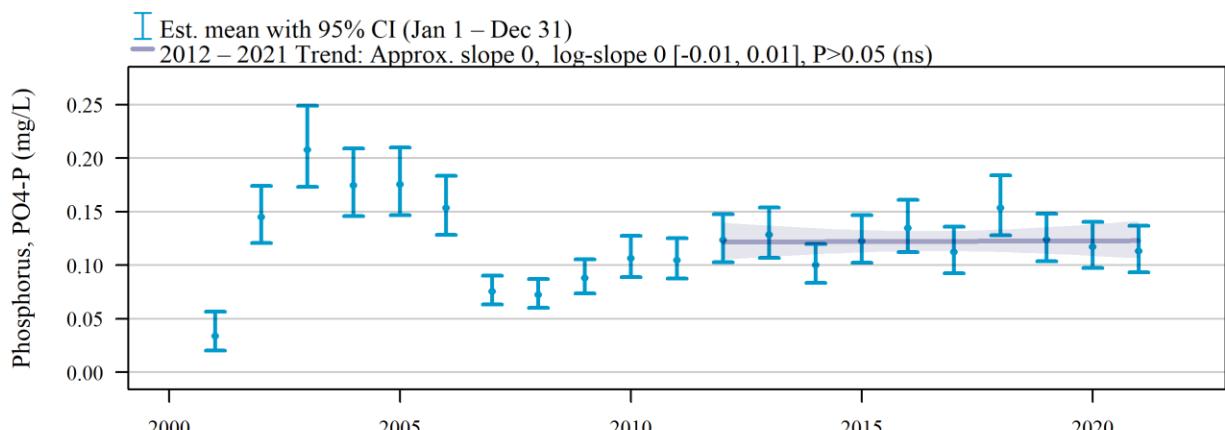
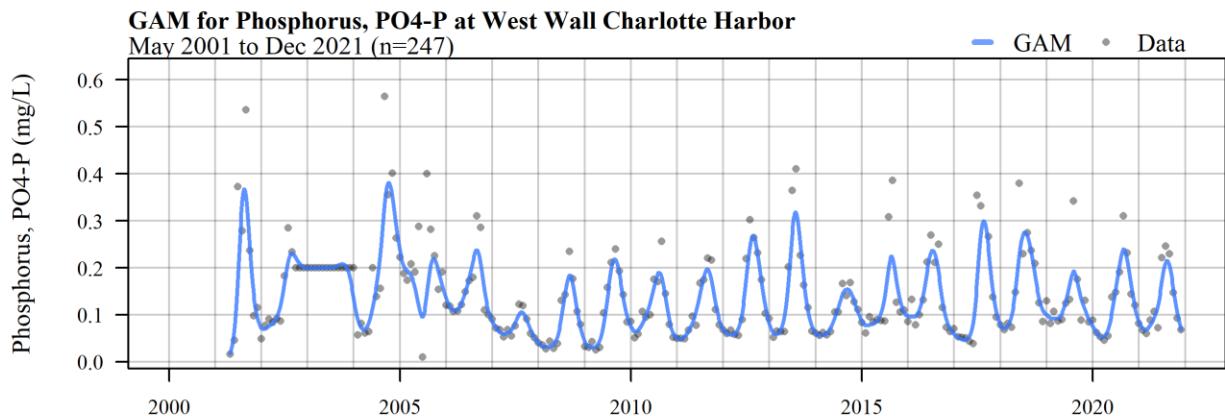
Est. mean with 95% CI (Jan 1 – Dec 31)
2012 – 2021 Trend: Approx. slope 0.05, log-slope 0.02 [0.01, 0.04], P<0.001



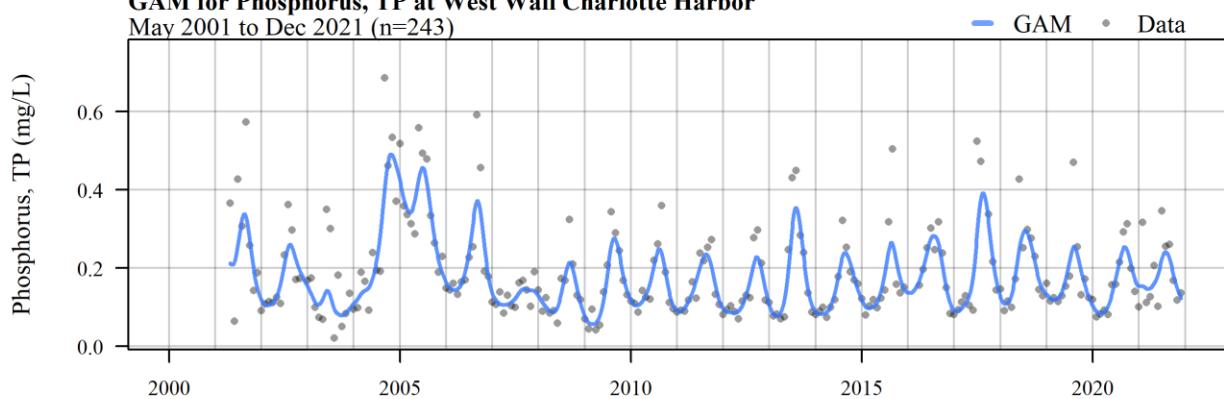
Est. mean with 95% CI (Jan 1 – Dec 31)
2017 – 2021 Trend: Approx. slope -0.04, log-slope -0.02 [-0.06, 0.02], P>0.05 (ns)



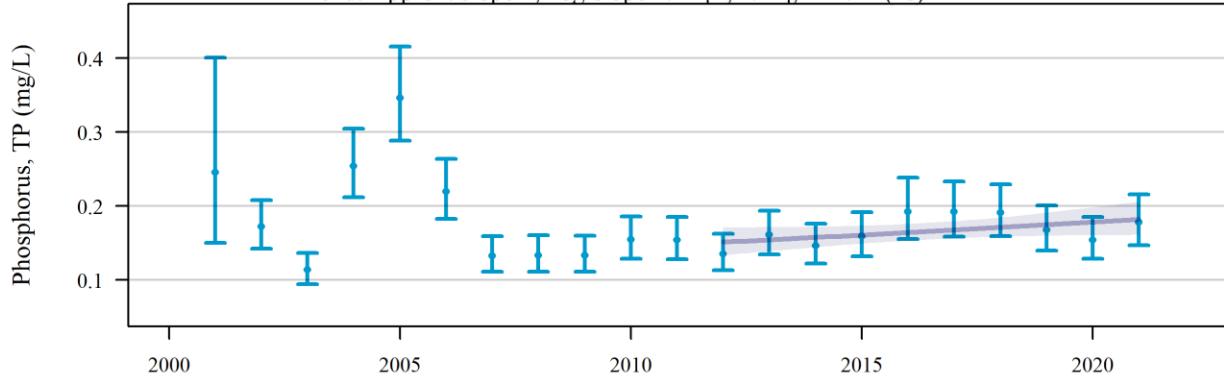




GAM for Phosphorus, TP at West Wall Charlotte Harbor
May 2001 to Dec 2021 (n=243)



Est. mean with 95% CI (Jan 1 – Dec 31)
 2012 – 2021 Trend: Approx. slope 0, log-slope 0.01 [0, 0.02], P>0.05 (ns)



Est. mean with 95% CI (Jan 1 – Dec 31)
 2017 – 2021 Trend: Approx. slope -0.01, log-slope -0.02 [-0.04, 0.01], P>0.05 (ns)

