Supporting Materials: Load Estimates*

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Abstract

This document includes figures and tables summarizing total loading estimates for the Lavaca River watershed.

1   Load estimation and summarization

Daily Nitrate-Nitrogen (NO_3-N) and Total Phosphorus (TP) loads at stream sites were predicted using fitted GAM models. Standard deviations and credible intervals from GAM models can be obtained by drawing samples from the multivariate normal posterior distribution of the fitted GAM (Wood 2006; Marra and Wood 2012; McDowell et al. 2021). Uncertainty in loads were reported as 95% credible intervals developed by drawing 1000 realizations of parameter estimates from the multivariate normal posterior distribution of the model parameters. We re-estimated the load for each realization and report the 2.5% and 97.5% quantiles. Monthly and annual loads were calculated by summing for each respective time period. Mean annual yields (daily load normalized by drainage area) were also calculated from daily load predictions to permit comparisons with other studies.
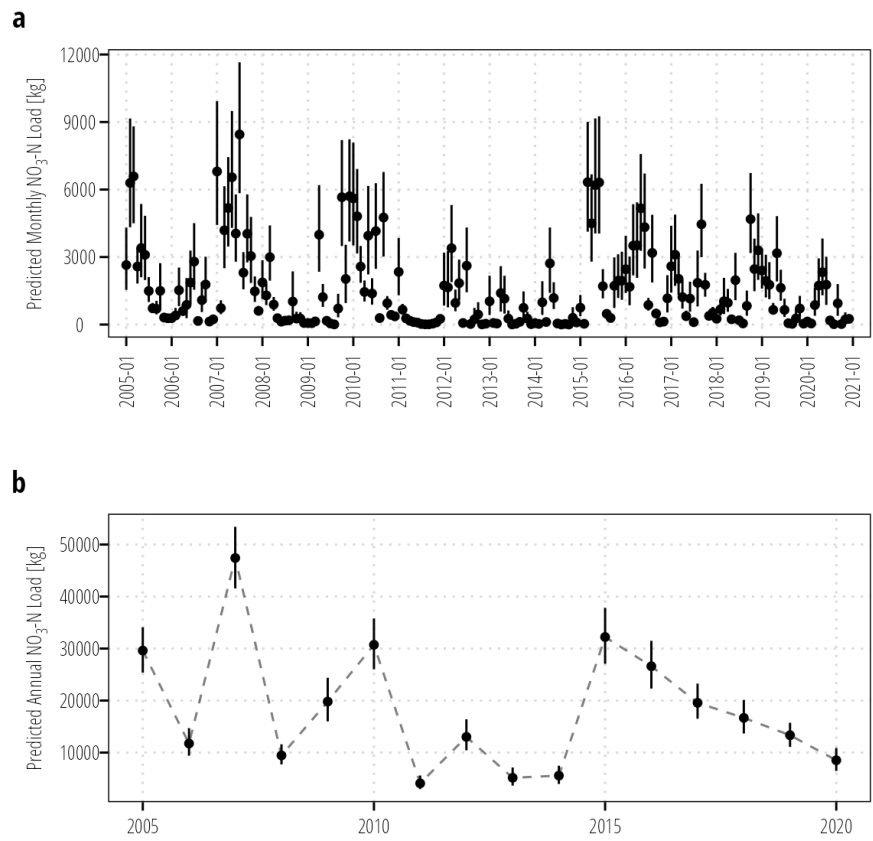
a

b

Figure 1: Aggregated (a) monthly and (b) annual NO_3-N loads at Lavaca River at Edna, USGS-08164000.
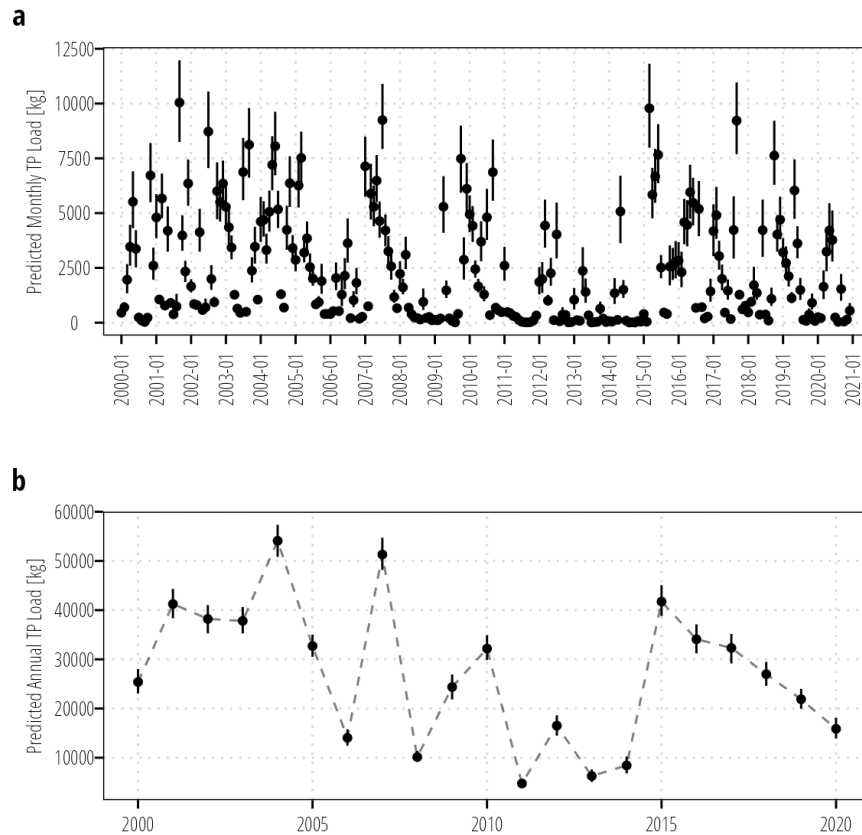
a

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Figure 2: Aggregated (a) monthly and (b) annual TP loads at Lavaca River at Edna, USGS-08164000.

2   Total Load Estimates

2.1   Lavaca River at Edna, USGS-08164000

2.2   Navidad River at Palmetto Bend Dam, Lake Texana

References

Marra, G., and Wood, S.N. 2012. Coverage Properties of Confidence Intervals for Generalized Additive Model Components: Coverage properties of GAM intervals.
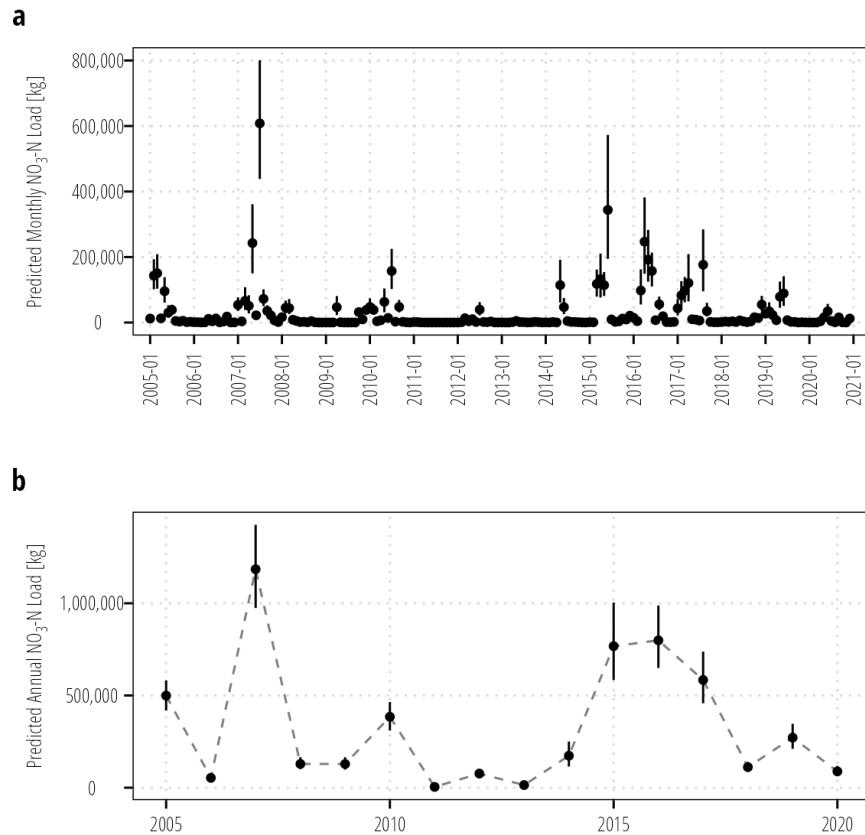
a

b

Figure 3: Aggregated (a) monthly and (b) annual NO_3-N loads at Palmetto Bend Dam at Lake Texana.

Scandinavian Journal of Statistics 39 (1): 53–74. https://doi.org/10.1111/j.1467-9469.2011.00760.x.

McDowell, R.W., Simpson, Z.P., Ausseil, A.G., Etheridge, Z., and Law, R. 2021. The implications of lag times between nitrate leaching losses and riverine loads for water quality policy. Scientific Reports 11 (1): 16450. https://doi.org/10.1038/s41598-021-95302-1.

Wood, S.N. 2006. ON CONFIDENCE INTERVALS FOR GENERALIZED ADDITIVE MODELS BASED ON PENALIZED REGRESSION SPLINES. Australian & New Zealand Journal of Statistics 48 (4): 445–64. https://doi.org/10.1111/j.1467-842X.2006.00450.x.
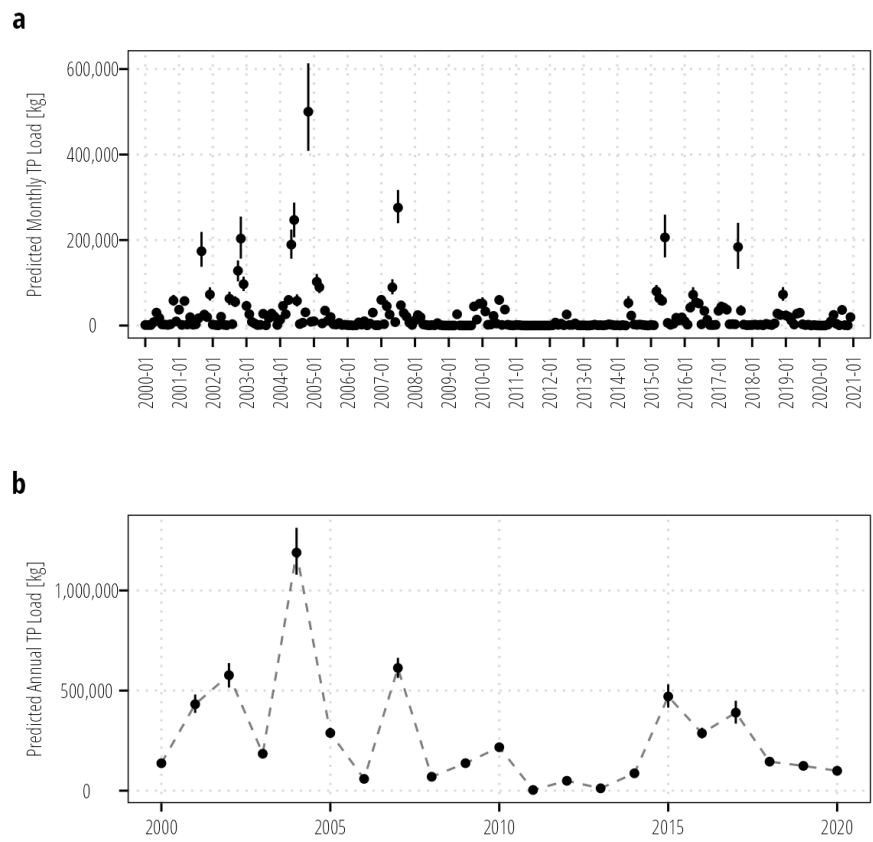
Figure 4: Aggregated (a) monthly and (b) annual TP loads at Palmetto Bend Dam at Lake Texana.