Total N (TN) and total P (TP) loads for large river systems in NC were calculated at locations as close as possible to the heads of estuaries based on USGS gaged river flows (see metadata for river flows) and nutrient concentrations measured by the NC Div. of Water Resources Ambient Monitoring Program. Stations where nutrient concentration data were gathered is shown in Table 1 below. Loads were calculated from daily mean flow and approximately monthly concentration data using the USGS regression model, weighted regressions on time, discharge and season (WRTDS) (Hirsh et al. 2010). TN was calculated as the sum of total Kjeldhal nitrogen and nitrate/nitrite. An example script, “FormatCapeFearTN.m” used to sum the total Kjeldhal nitrogen and nitrate/nitrite values for each observation date is provided on Github in the scripts folder. For the WRTDS load modeling, a half window width of seven years and minimum number of observations of 50 were used. Otherwise, all other model parameters were left at their default values and can be provided in Hirsch et al. (2015). An example script, “NeuseNutrientLoad.R” for calculating TP loads for the Neuse River at Streets Ferry Bridge is included on Github in the scripts folder. Model estimates of daily TN and TP loads were summed by year to produce annual time series of loads. Annual TN and TP loads were summed to estimate loads to Albemarle Sound (Roanoke and Chowan Rivers), Pamlico Sound (Neuse and Tar Rivers), and the Cape Fear River Estuary (Cape Fear River). Total estuarine load was calculated as the sum of loads from these five rivers. Interannual variability in river flow often dominates trends in nutrient loading. In addition to calculating a non-biased estimate of nutrient loads, the WRTDS package also provides a flow normalized estimate of load which can be interpreted as the nutrient concentration that would have occurred during a year with average flow conditions. This model output is useful for understanding how changes in point sources, land use change and nutrient management have affected nutrient loads. The flow normalized loads are also included as separate time series for Albemarle Sound, Pamlico Sound, and Cape Fear River total N and total P loads.

|  |  |  |
| --- | --- | --- |
| Table 1. North Carolina Division of Water Resources Ambient Monitoring Program stations where TN and TP data were measured to calculate TN and TP loads | | |
| River | NC DWR Ambient Monitoring Program Station | Time span |
| Cape Fear River | B8350000 above Lock and Dam 1 | 1974-2019 |
| Neuse River | J7930000 at Streets Ferry Bridge | 1974-2019 |
| Tar River | 05250000 at Tarboro | 1974-2019 |
| Roanoke River | N9250000 near Plymouth | 1982-2019 |
| Chowan River | D0010000 near Riddicksville | 1974-2019 |

Hirsch, R.M., and De Cicco, L.A., 2015, User guide to Exploration and Graphics for RivEr Trends (EGRET) and dataRetrieval—R packages for hydrologic data (version 2.0, February 2015): U.S. Geological Survey Techniques and Methods book 4, chap. A10, 93 p., [*http://dx.doi.org/10.3133/tm4A10*](http://dx.doi.org/10.3133/tm4A10)*.*

Hirsch, R.M., D.L. Moyer, and S.A. Archfield, 2010. Weighted regressions on time, discharge, and season (WRTDS), With an application to Chesapeake Bay river inputs. *Journal of the American Water Resources Association* 46:857-880.