Nitrogen and Phosphorus Loadings to the Neuse and Pamlico River Estuaries, North Carolina

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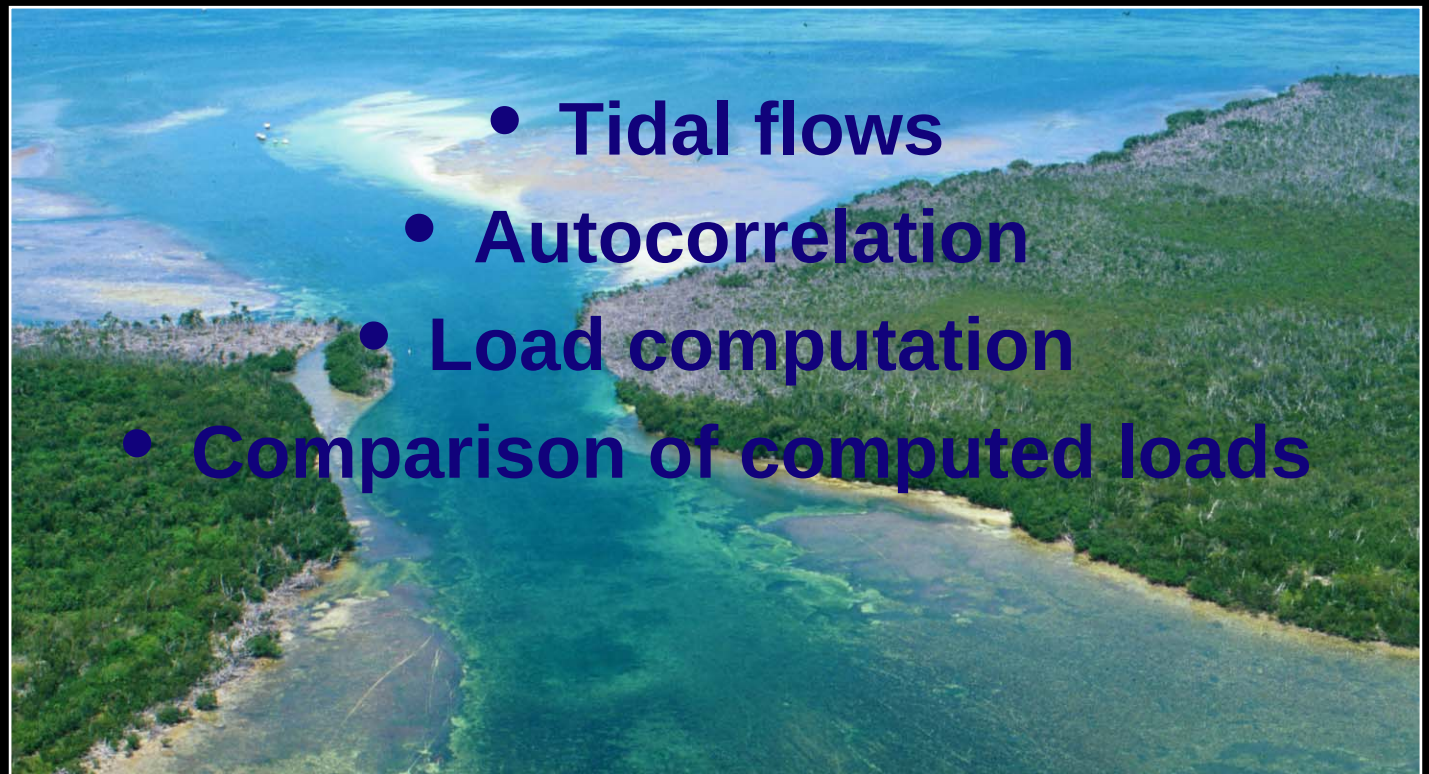
U.S. Department of the Interior
U.S. Geological Survey

OR

Some issues regarding computation of flux to coastal waters, using the Neuse River and Pamlico River Estuaries as examples.



- Tidal flows
- Autocorrelation
- Load computation
- Comparison of computed loads

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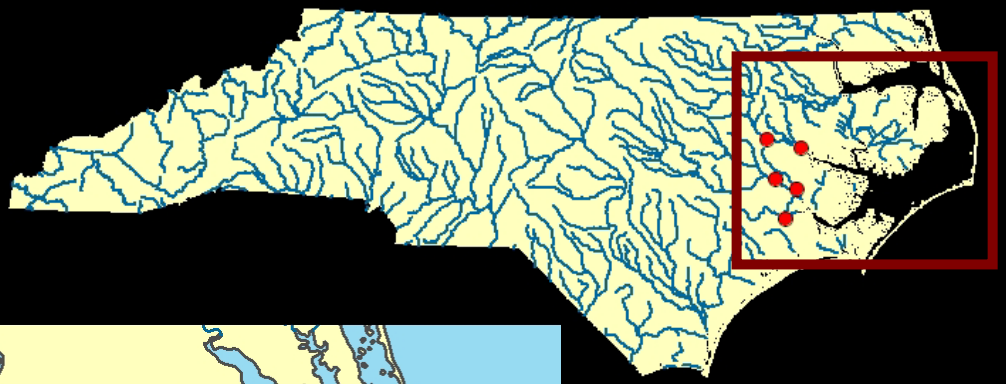
Study Site Locations



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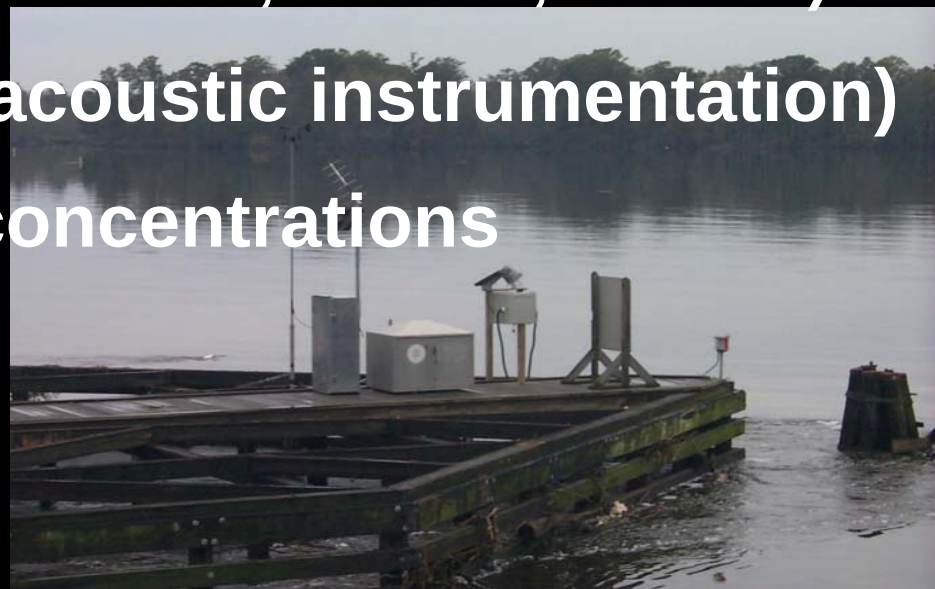
Data

- Pamlico—
  - Washington (strongly tidal; DA = 8,290 km^2)
  - Greenville (tidal at low flows; DA = 6,890 km^2)
- Neuse–
  - Swift Creek (tidal; DA = 697 km^2)
  - Trent River (tidal; DA = 958 km^2)
  - Neuse mainstem (tidal at low flows; DA = 10,100 km^2)
- Continuous streamflow (acoustic instrumentation)
- Daily to weekly nutrient concentrations
- Data from 1996 - 2003



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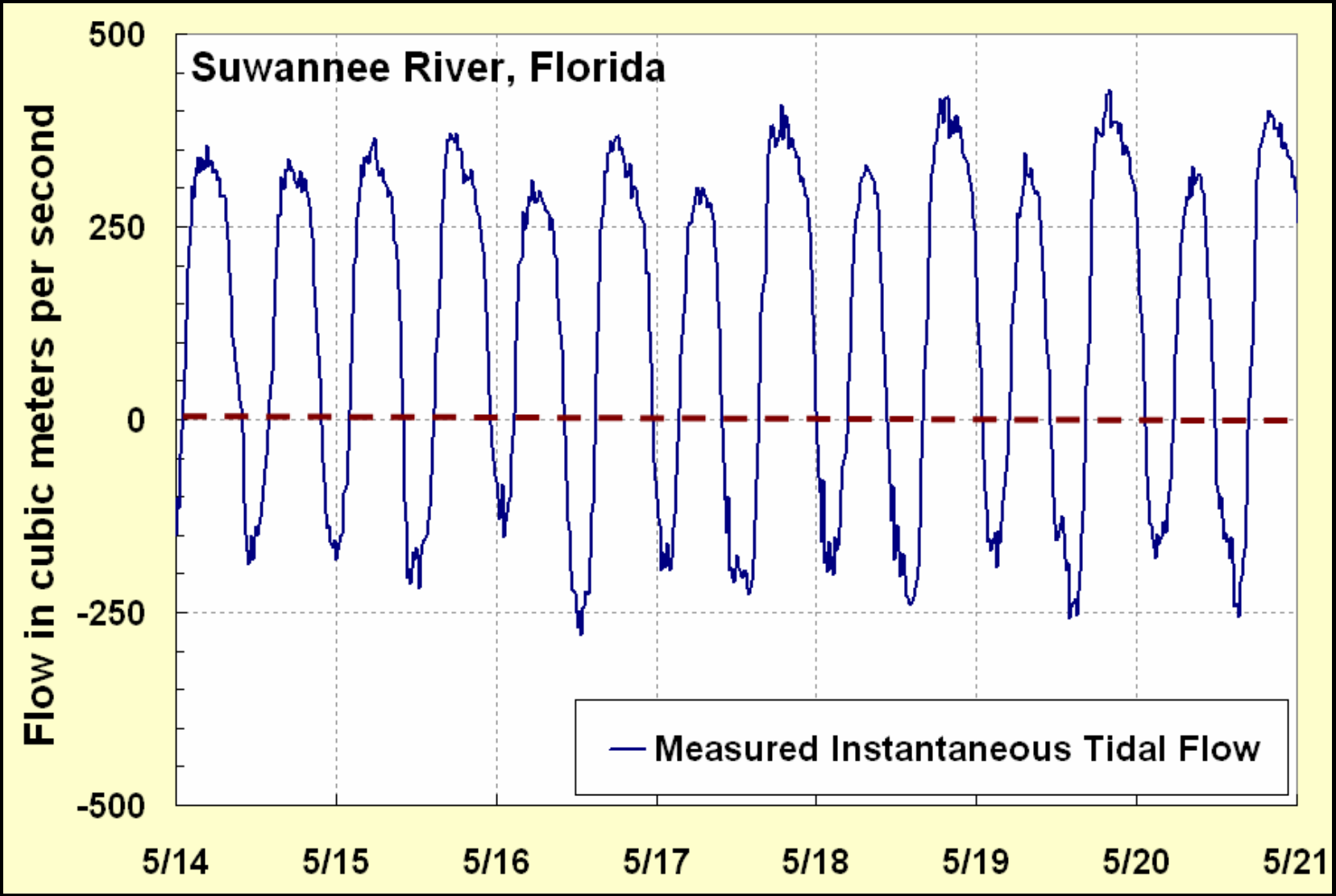
Tidal Flow, May 14 – 20, 2000



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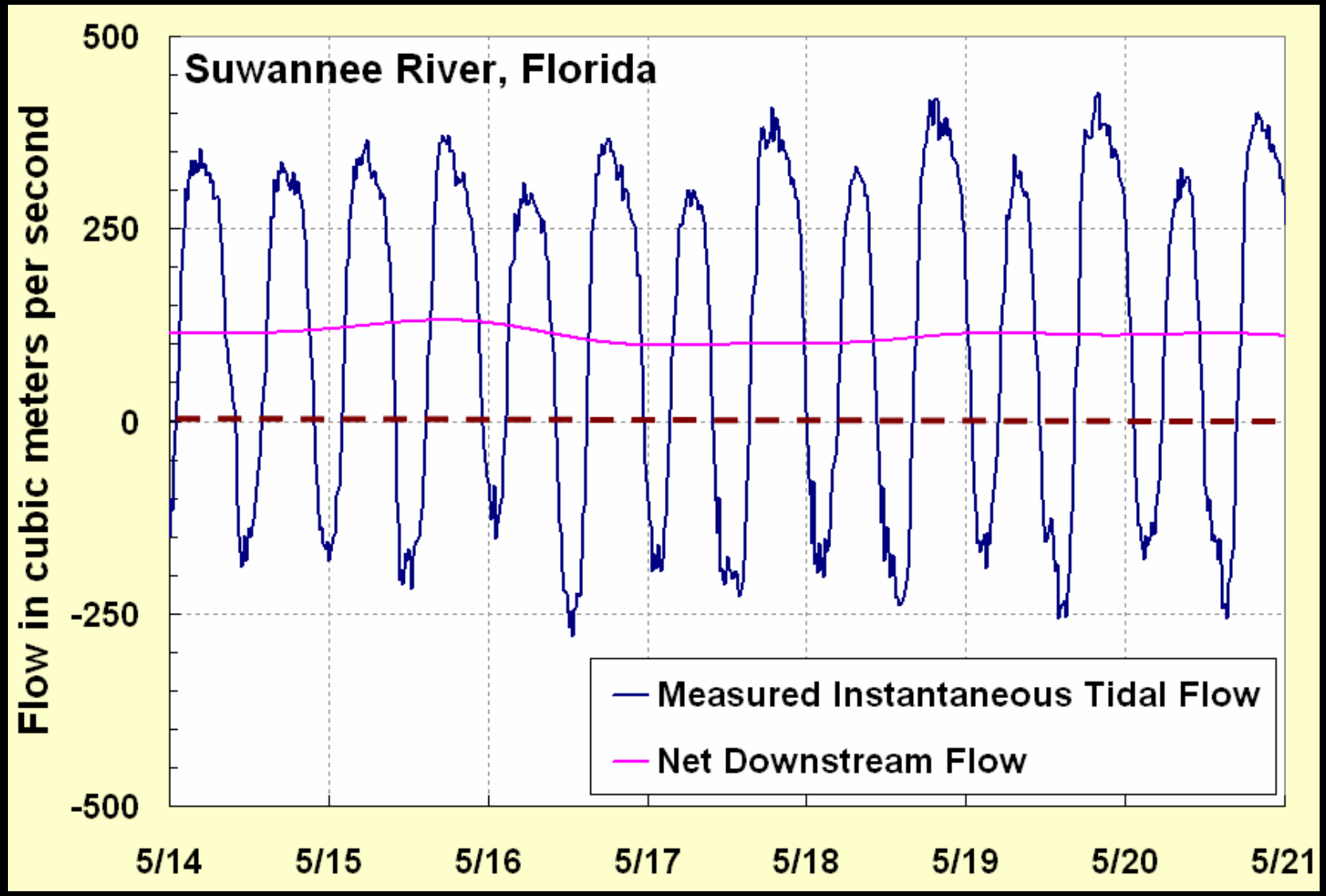
Net Downstream Flow



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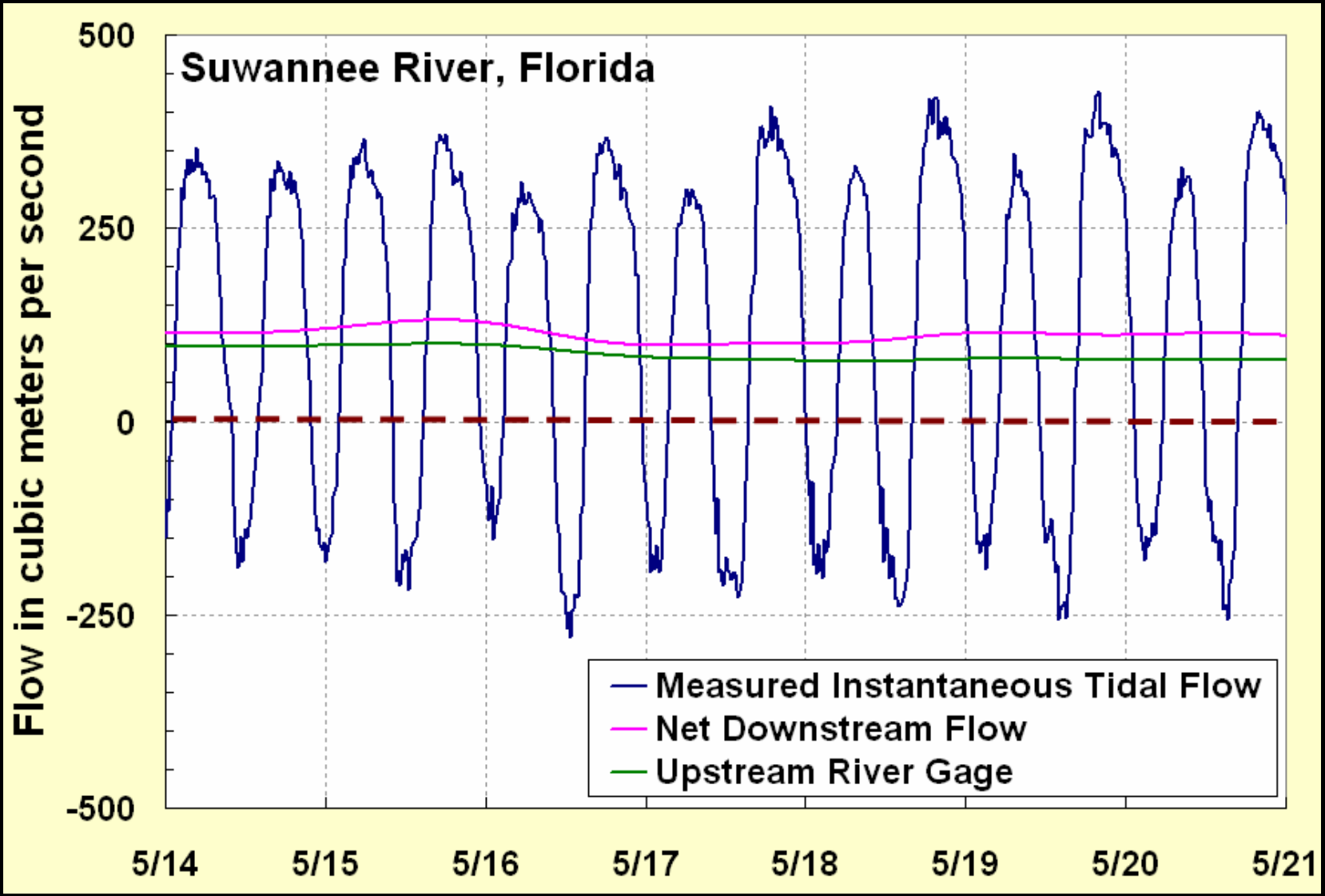
Net Downstream Flow and River Flow



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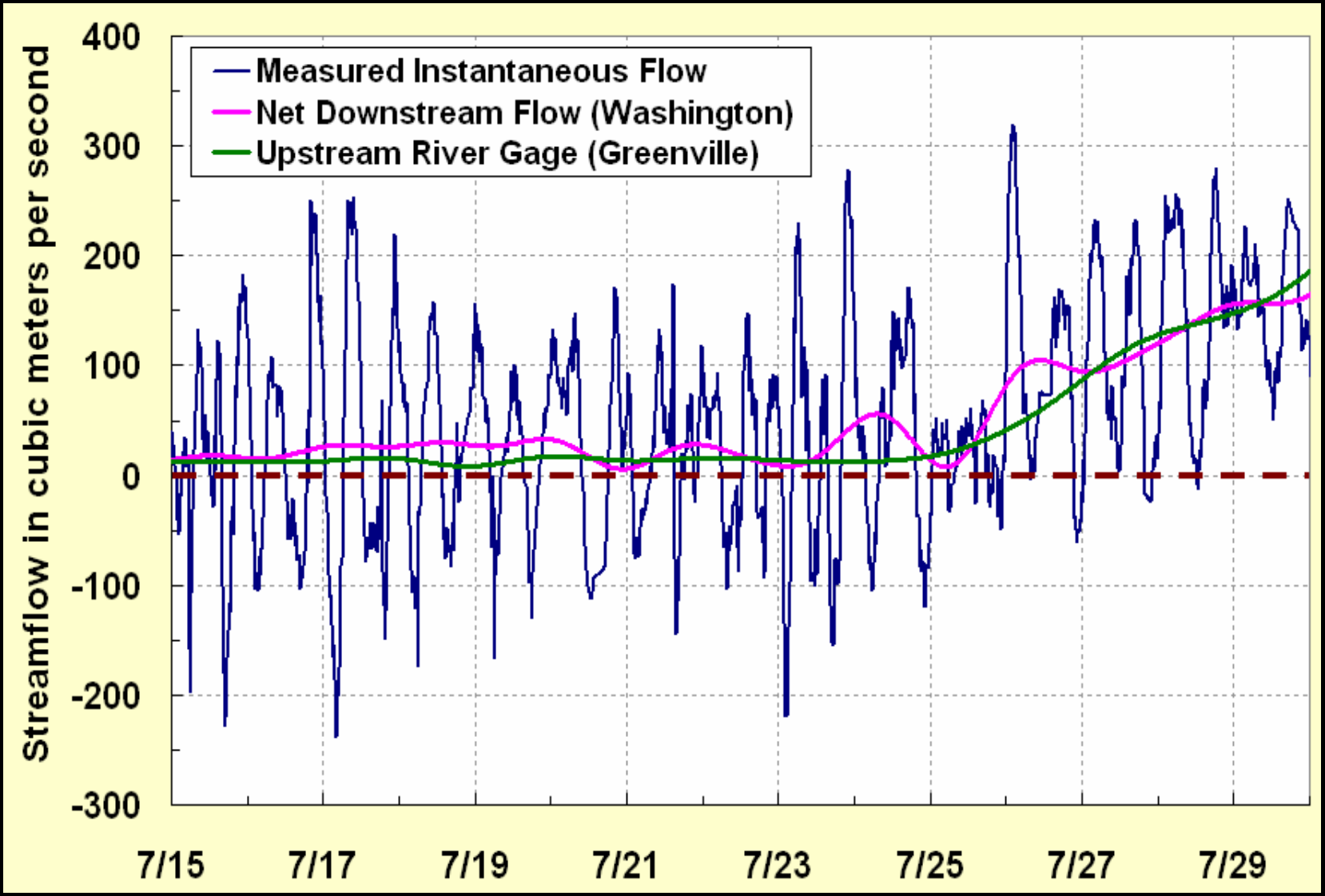
Tar – Pamlico River, July 2000



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Relevance to Loading Calculations

- Reliable continuous records of net downstream flow can be obtained in tidal rivers and estuaries.
- Therefore, fluxes at head of estuary can be calculated.
- Characteristics of tidal flows vary.

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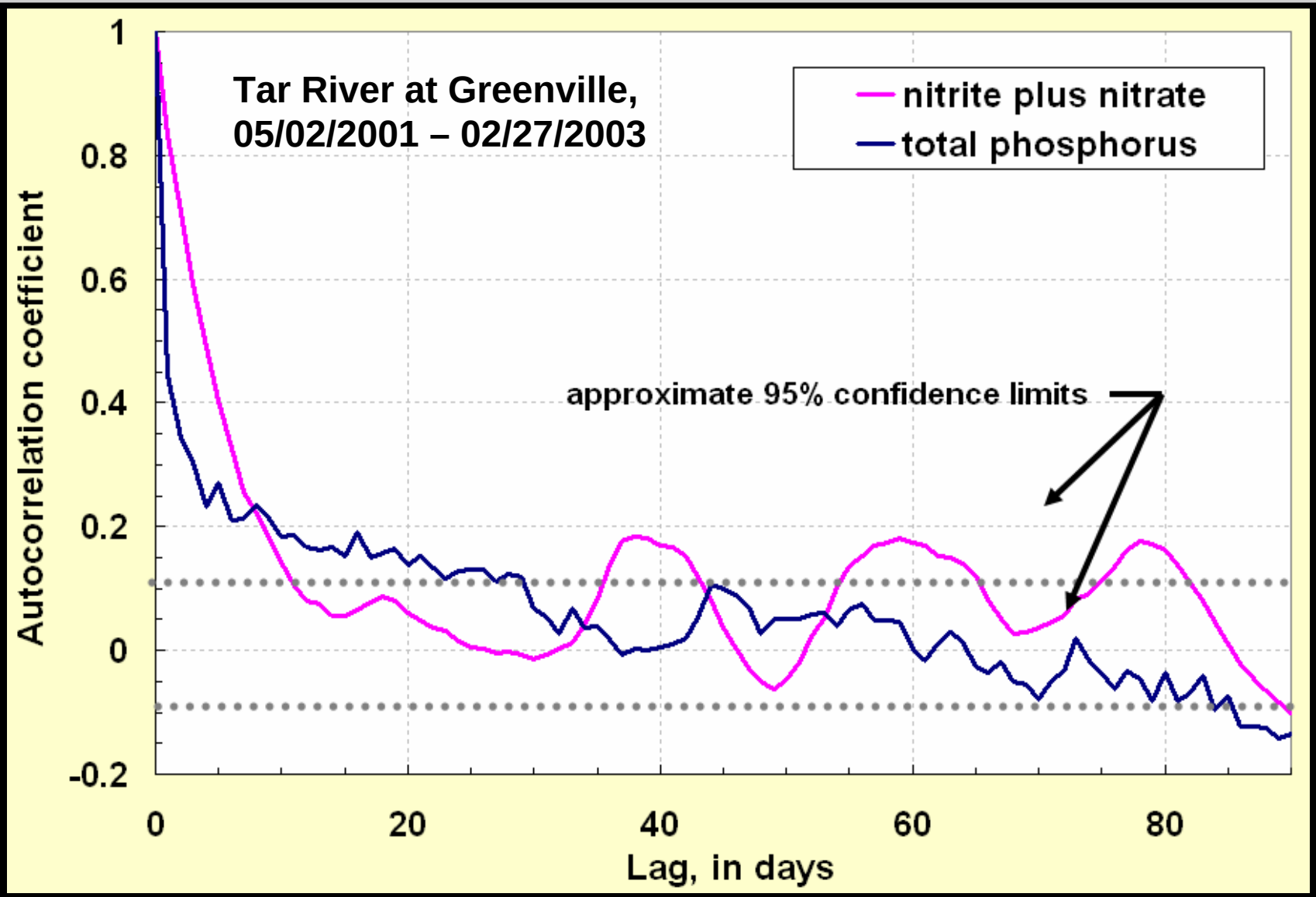
Autocorrelation of daily nutrient samples



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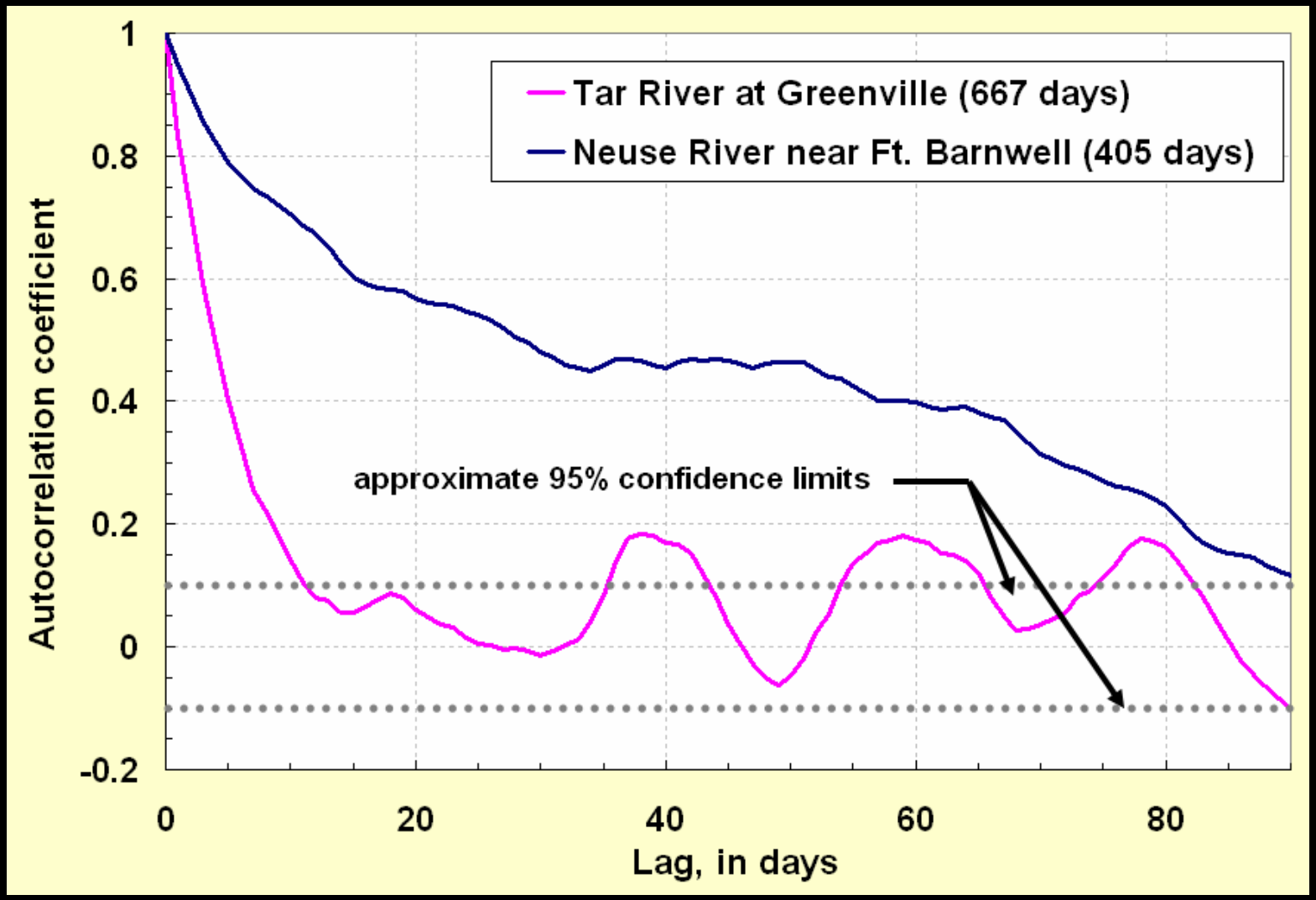
Autocorrelation of daily nitrate concentrations at 2 sites



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Relevance to Loading Calculations

- Examine samples for autocorrelation prior to developing load – discharge relations.
- Frequent sampling might substitute for load – discharge relations.

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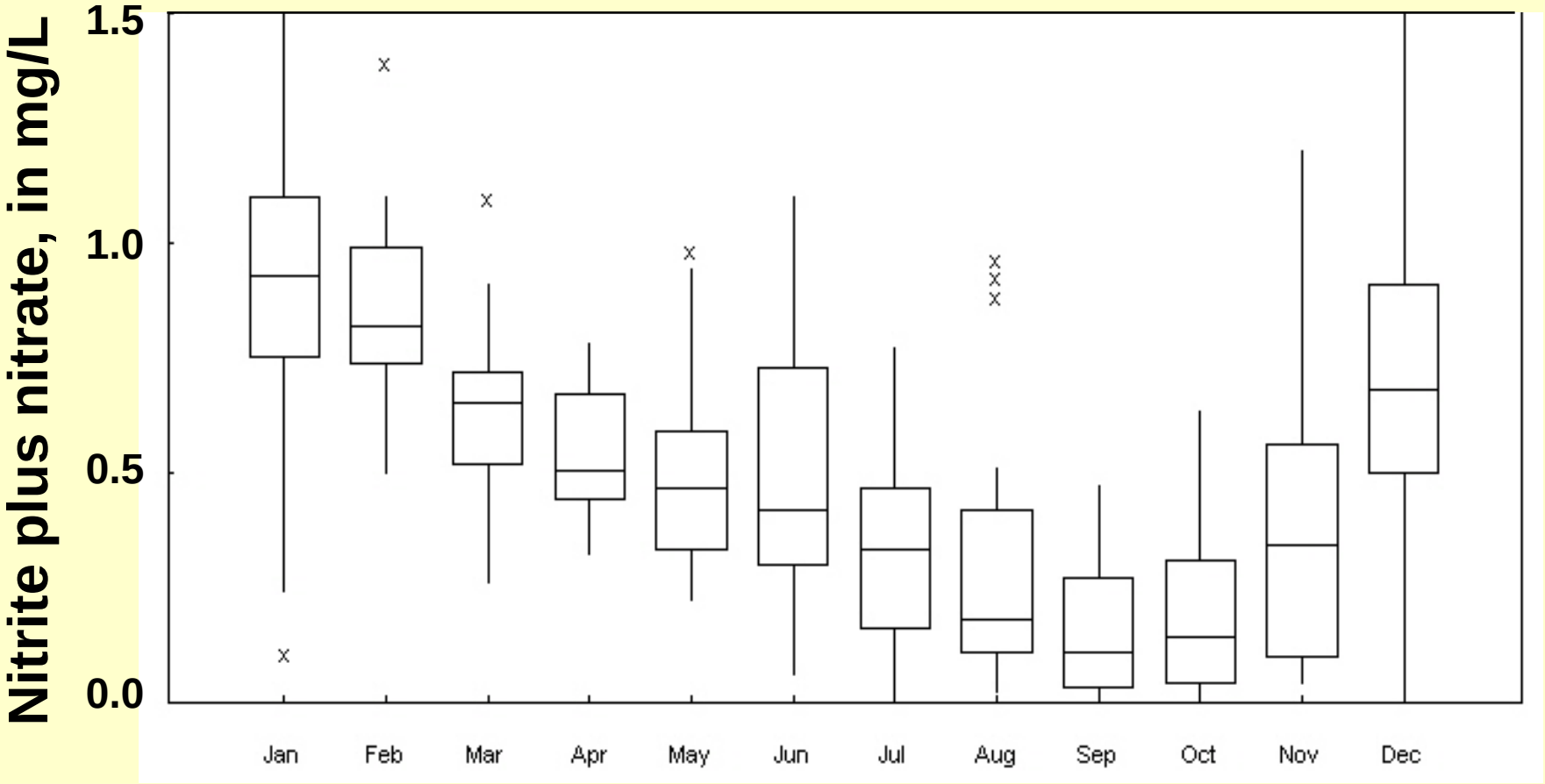
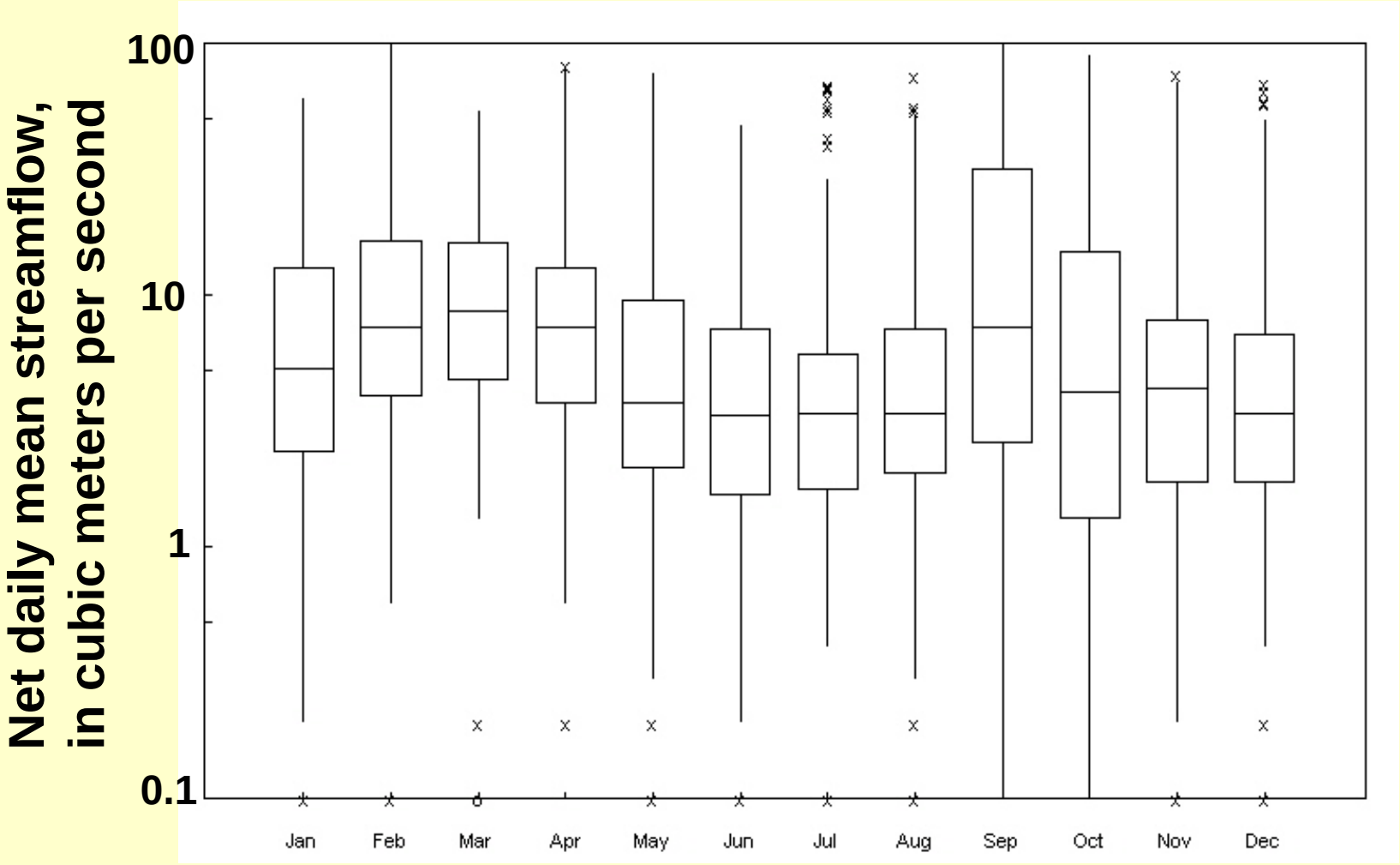
Seasonal Variation NO_3 Concentration



Seasonal Variation in Net Flow



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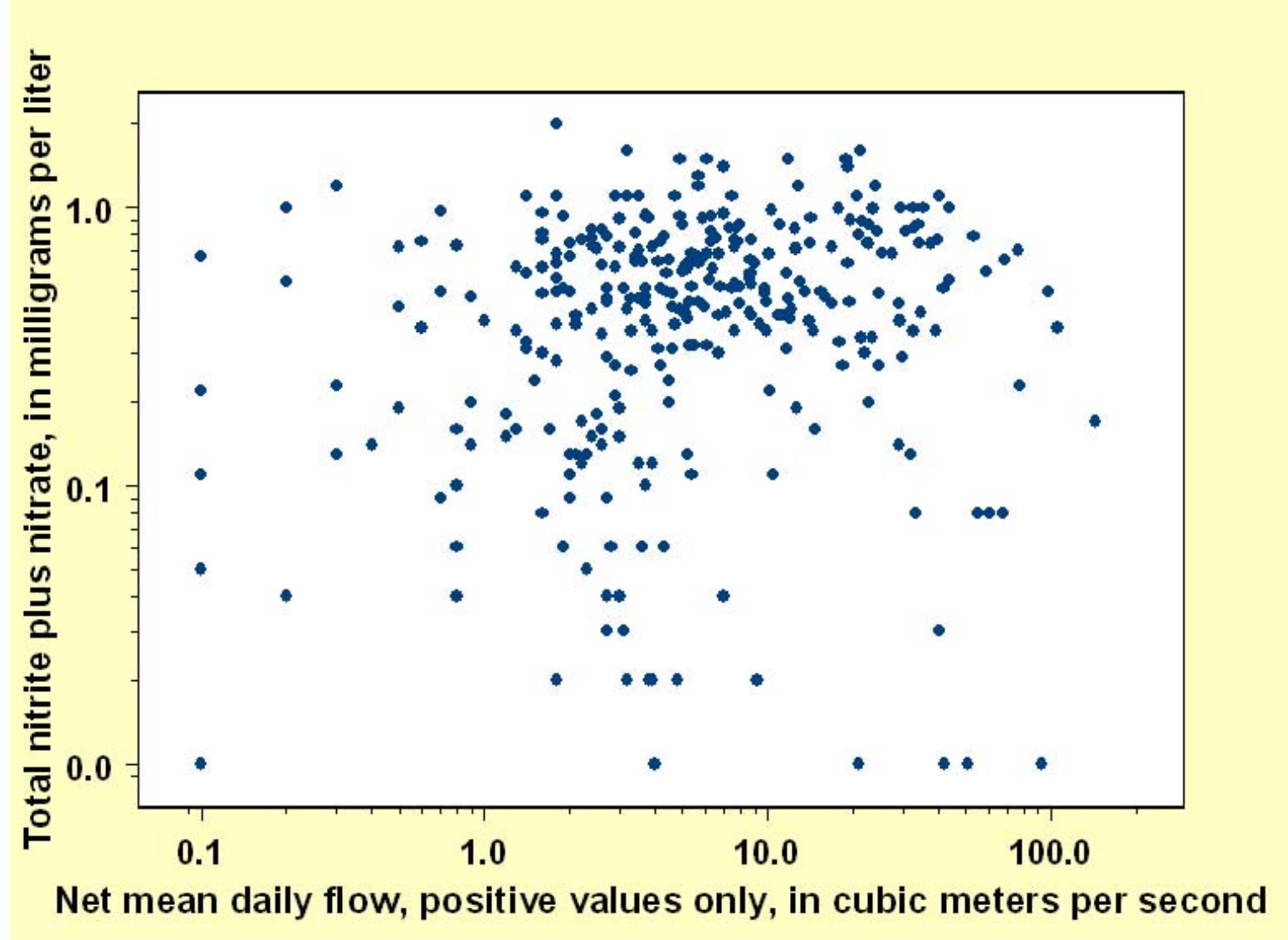
Swift Creek: Relation of Nitrate to Flow



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Swift Creek Nitrate Loads, 1999

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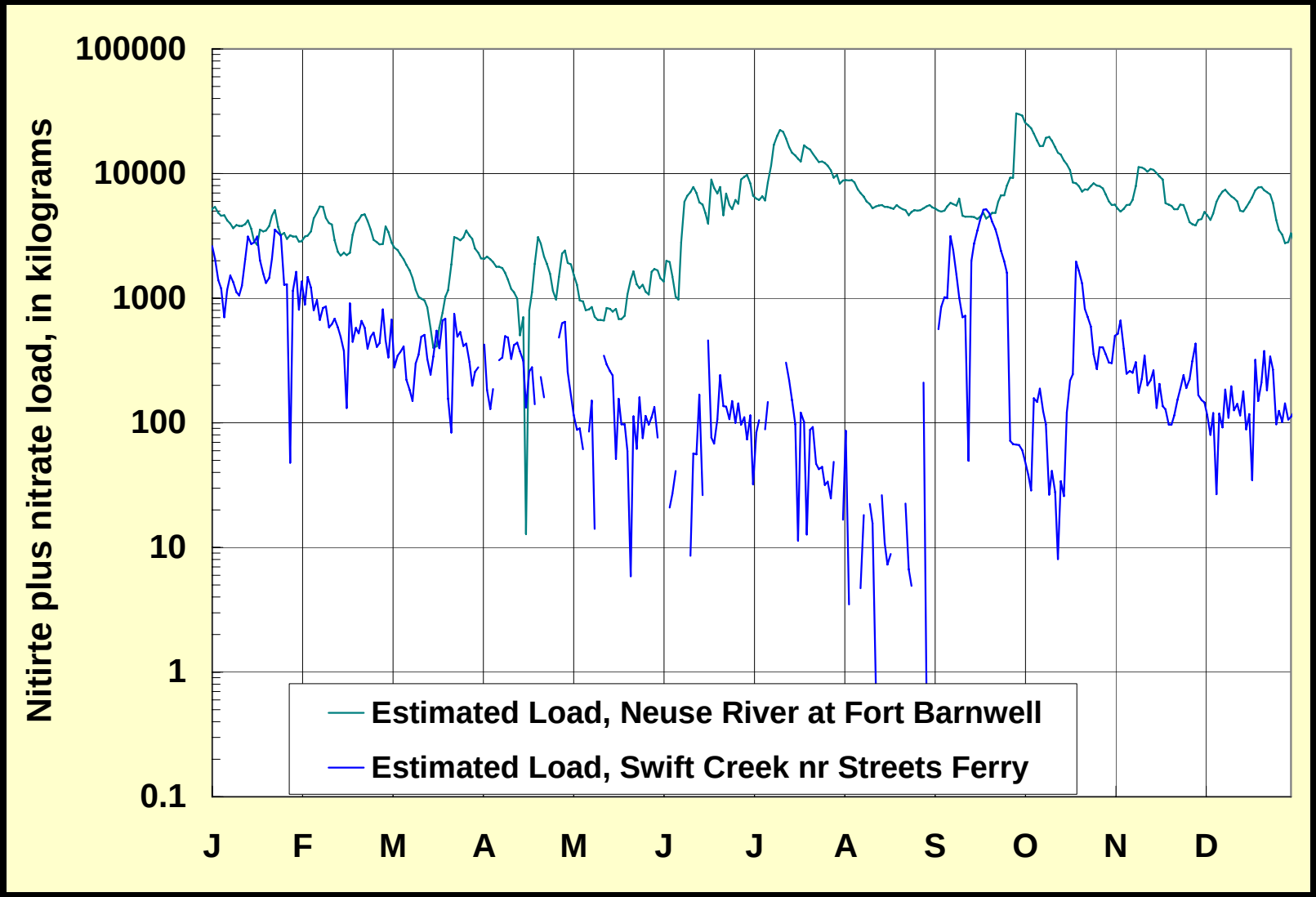
Neuse River Nitrate Loads, 1999



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Relevance to Loading Calculations

- Seasonality of nutrient concentrations not necessarily related to seasonality of flow.
- Load – discharge relations may not work well in tidal settings.
- Extrapolation of loads based in drainage area unadvisable.
- Frequent sampling provides can reduce uncertainty in loading estimates.

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For More Information

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