



Quartermaster Harbor Nitrogen Management Study

Project Overview and
Preliminary Nitrogen Loading
Estimates to the Harbor

October 25, 2011





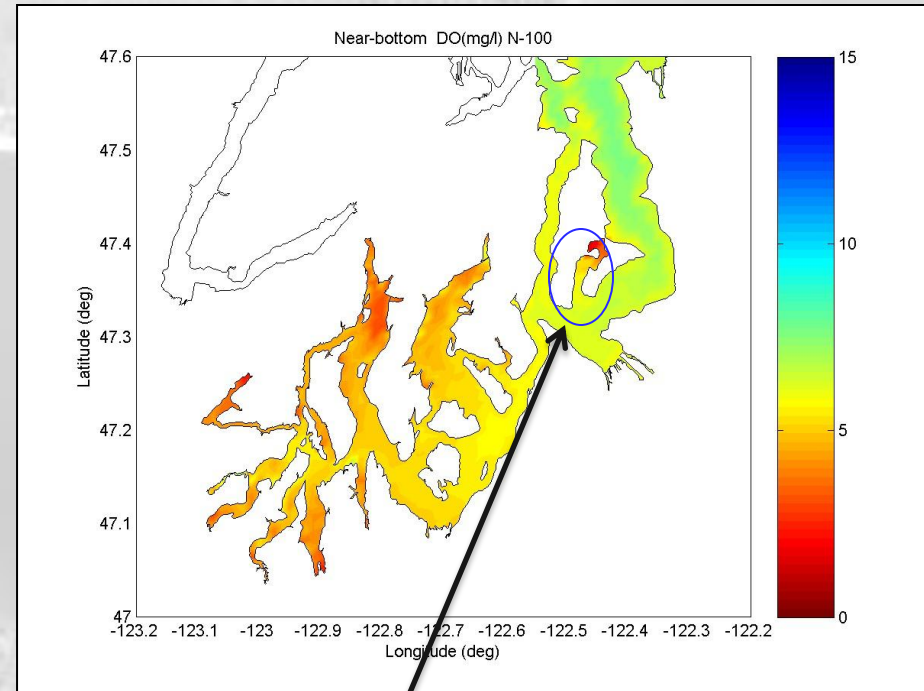
Study Team

- Jill Gable – Grant Project Officer, EPA
- Curtis DeGasperi – Project Manager, KC
- Eric Ferguson – Surface/Groundwater monitor, KC
- Kim Stark - Marine monitoring, KC
- Cheryl Greengrove – Environmental Science, UWT
- Julie Masura – Researcher, UWT
- Skip Albertson – Marine Modeler, Ecology
- Larry Stockton –Policy & Public Outreach, KC



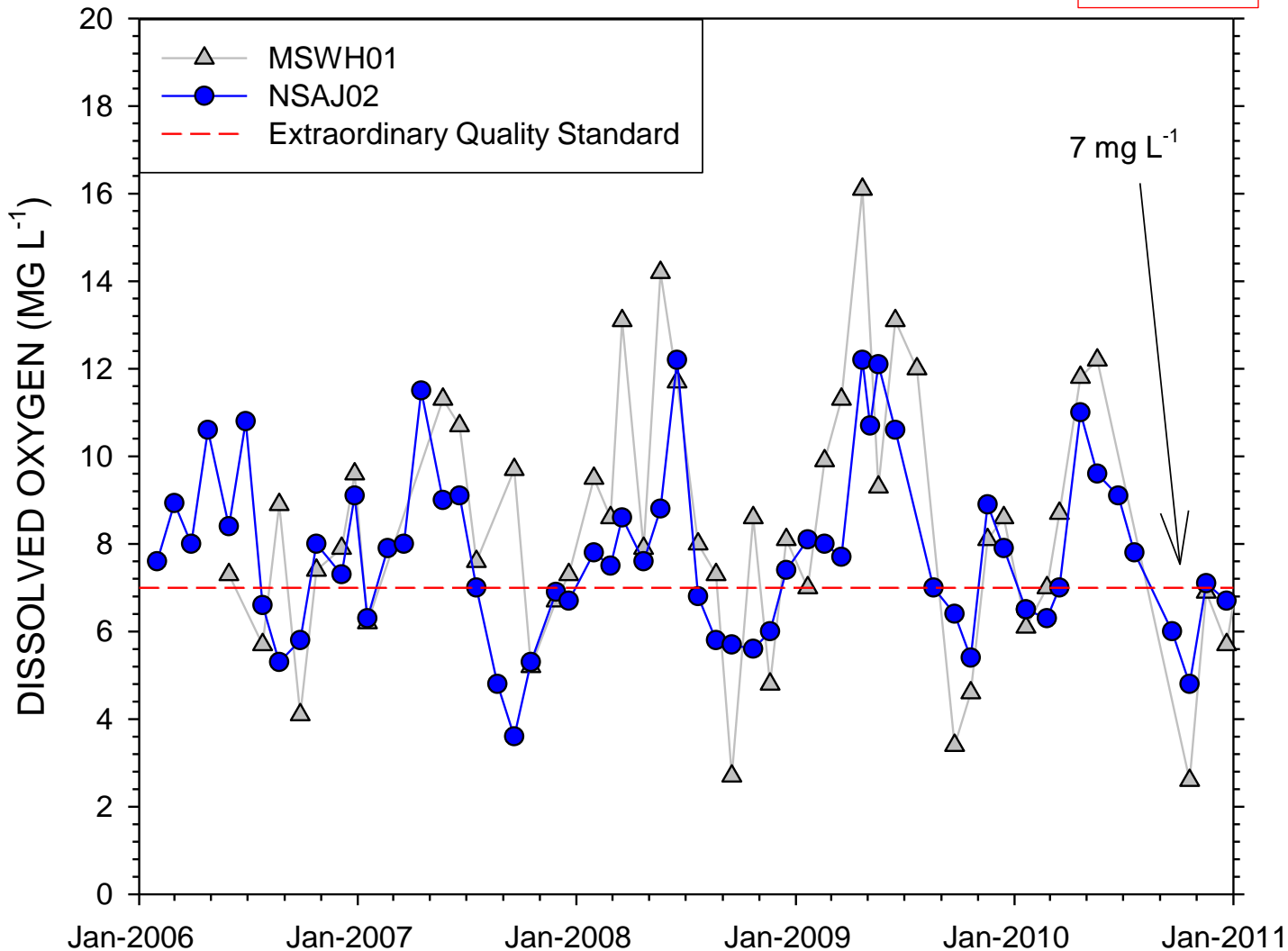
Quartermaster Harbor Nitrogen Management Study

- Problem: Low dissolved oxygen levels observed in harbor
- Low oxygen can be harmful to fish and other aquatic life like in South Puget Sound embayments



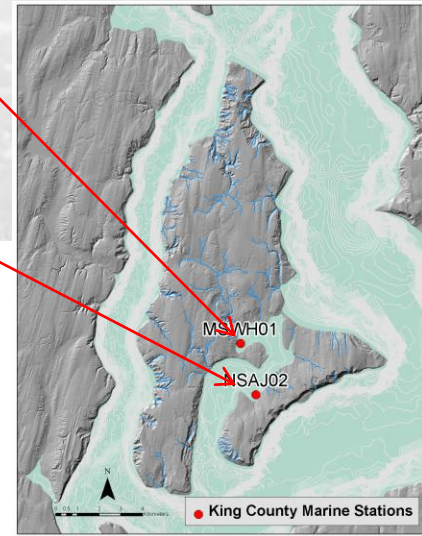
Quartermaster Harbor

Marine Monitoring



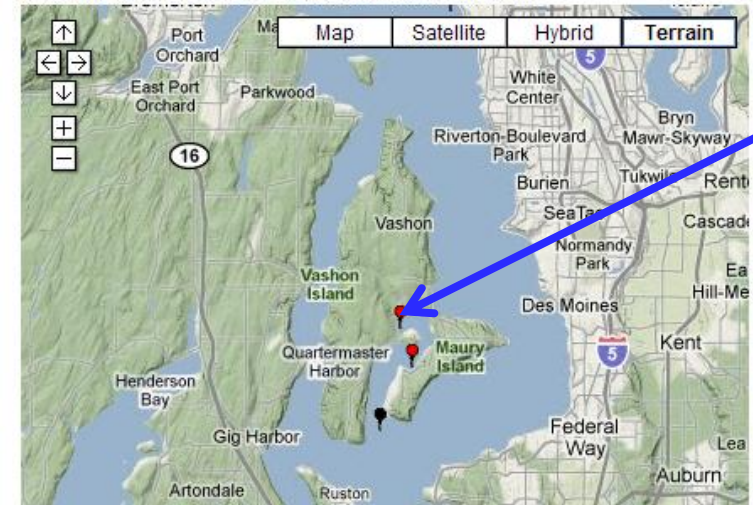
MSWH01

NSAJ02



King County Marine Moorings

You're in: Marine Mooring Home
Click an active site icon to view current condition

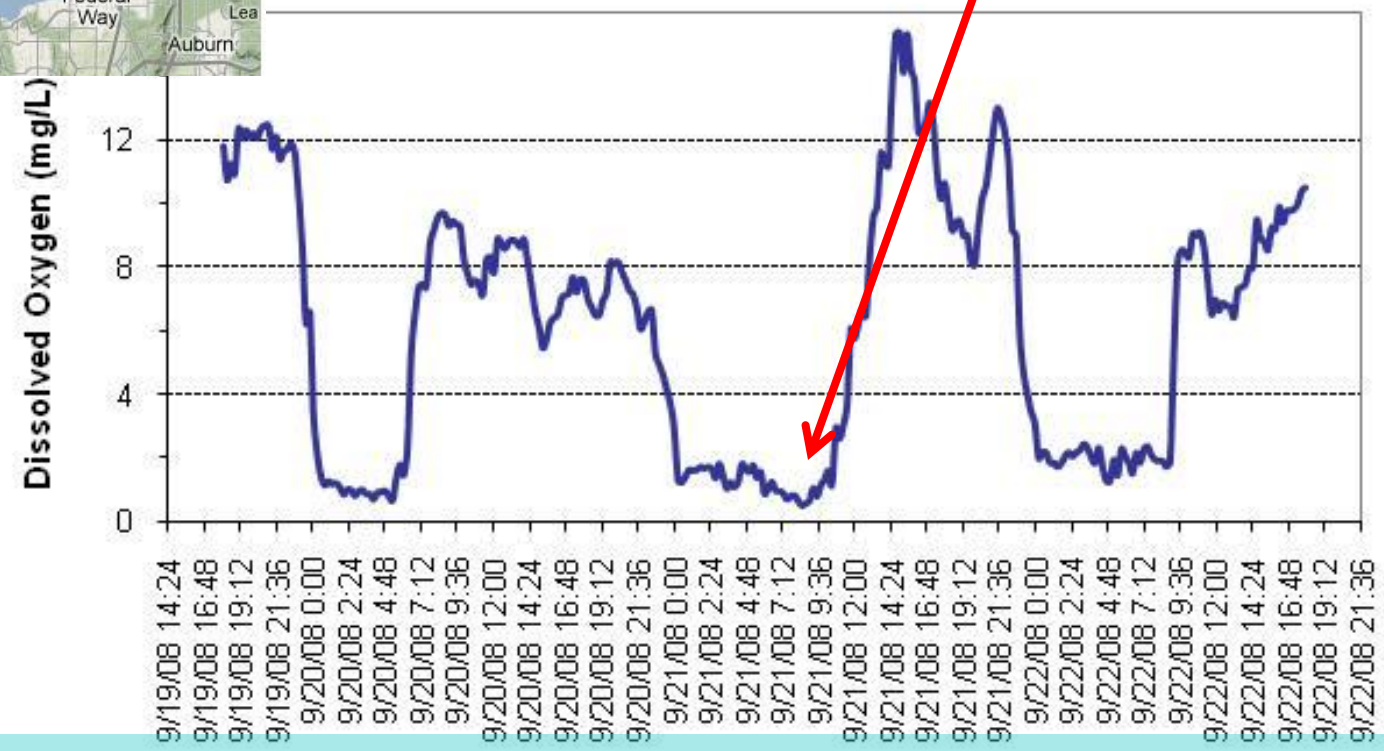


Yacht Club Mooring September 2008



< 1 mg/L

<http://green.kingcounty.gov/marine-buoy/>

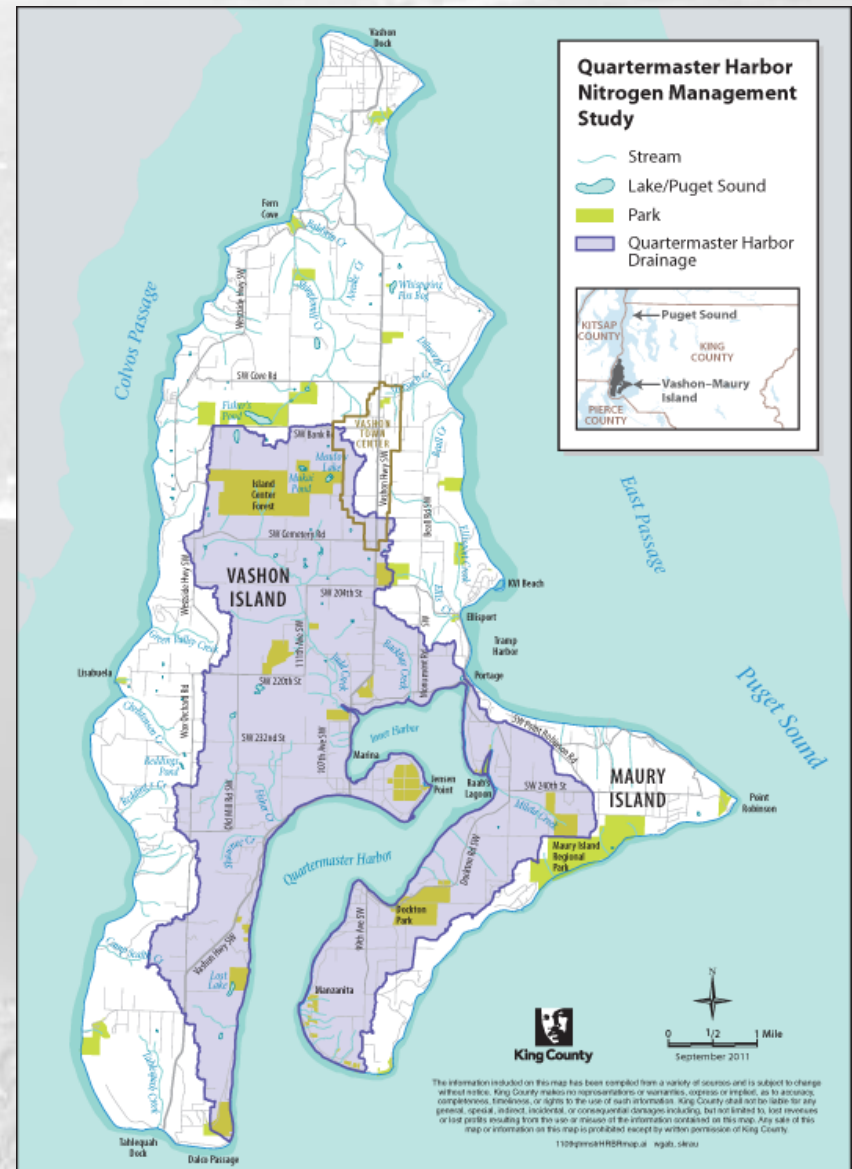


15-minute data - September 20 - 22, 2008

Quartermaster Harbor Nitrogen Management Study

Goal:

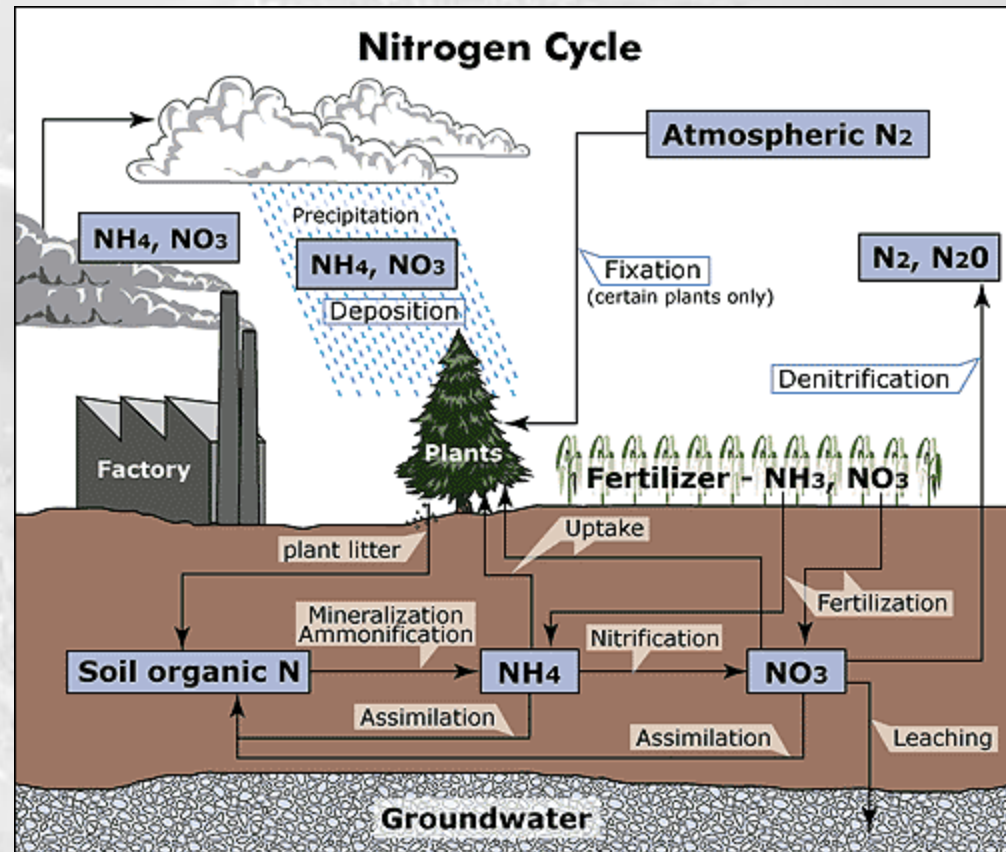
Determine how human activities (along with natural factors) affect low dissolved oxygen levels in Quartermaster Harbor



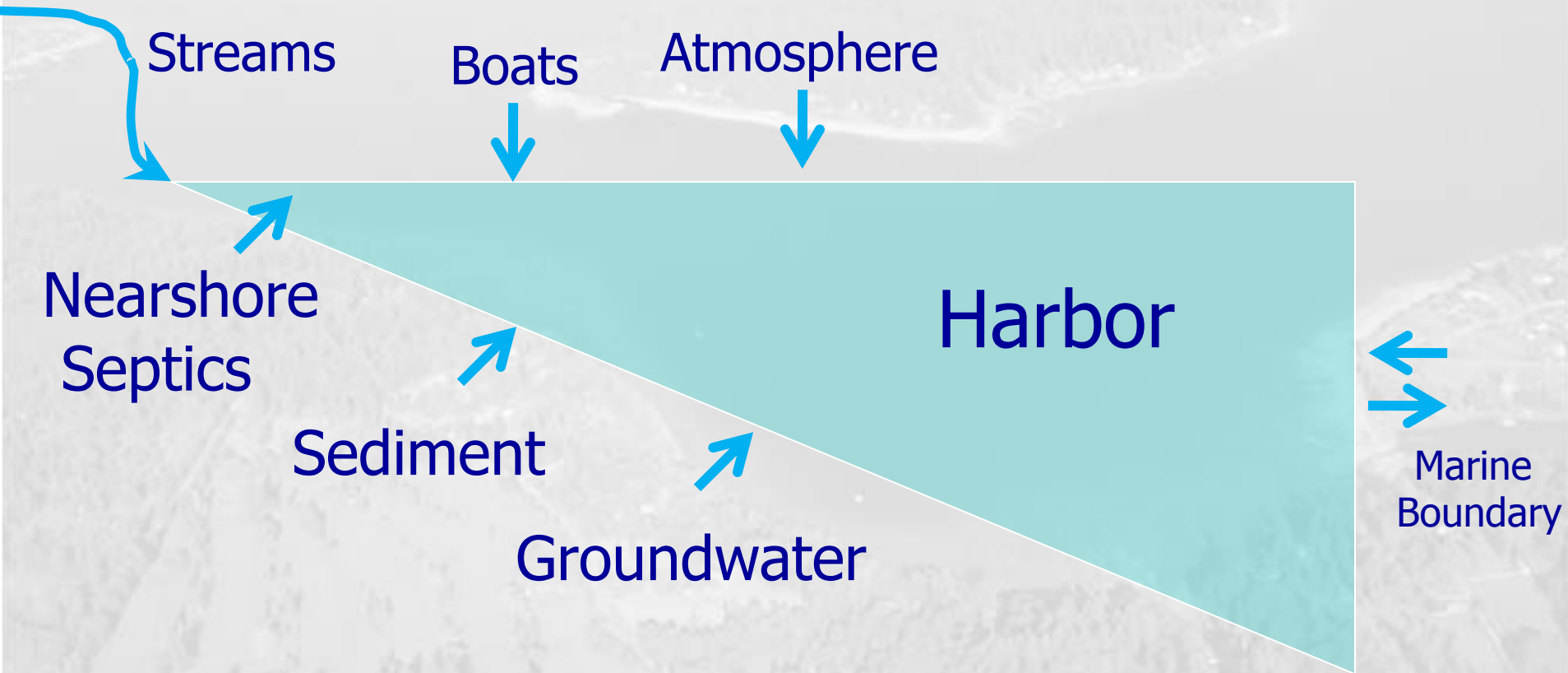
www.kingcounty.gov/QMHnitrogenstudy

Sources of Nitrogen on VMI

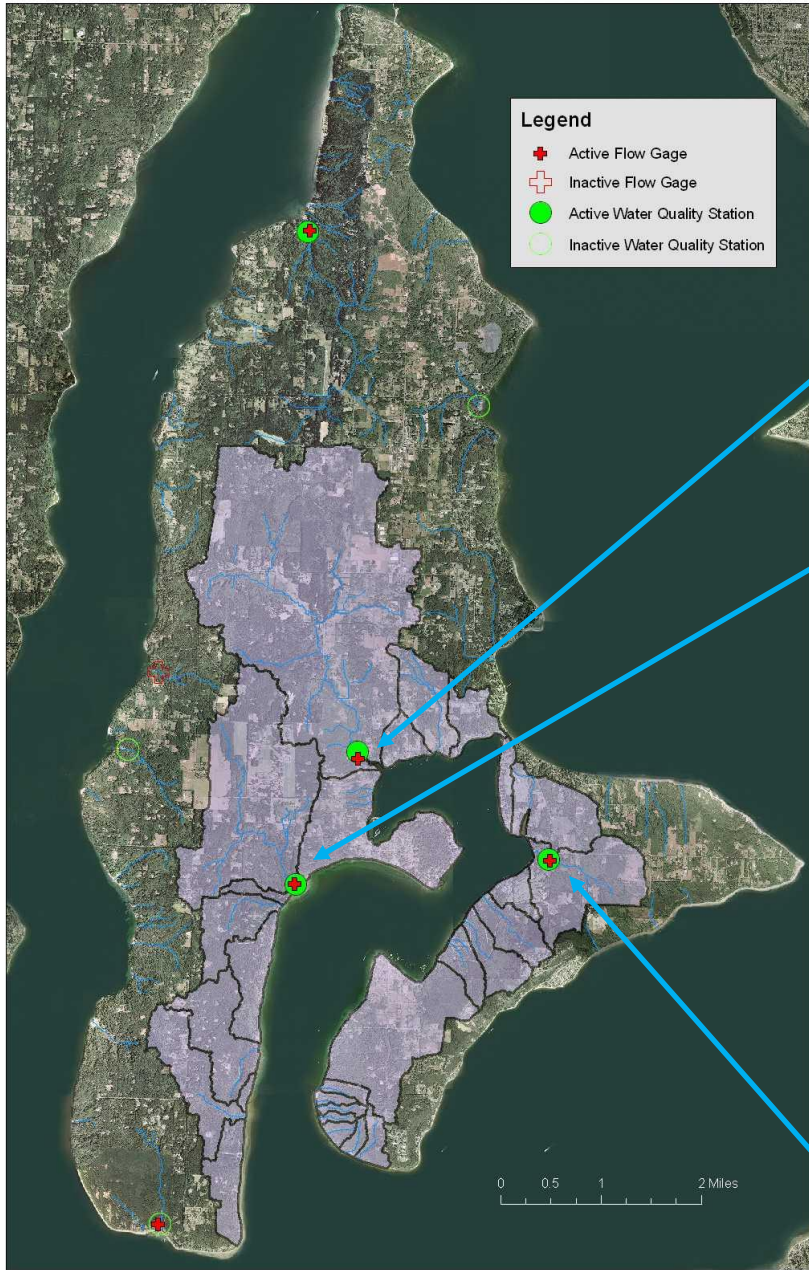
- Atmosphere
- Septics
- Livestock
- Fertilizer
- Alder
- Boats



Sources of Nitrogen to Quartermaster Harbor



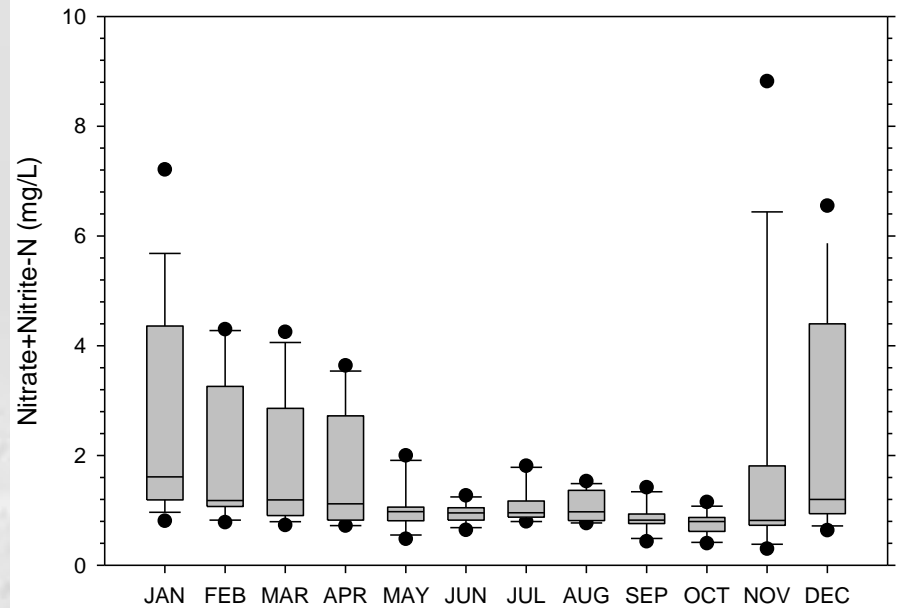
Streams Sampling Locations



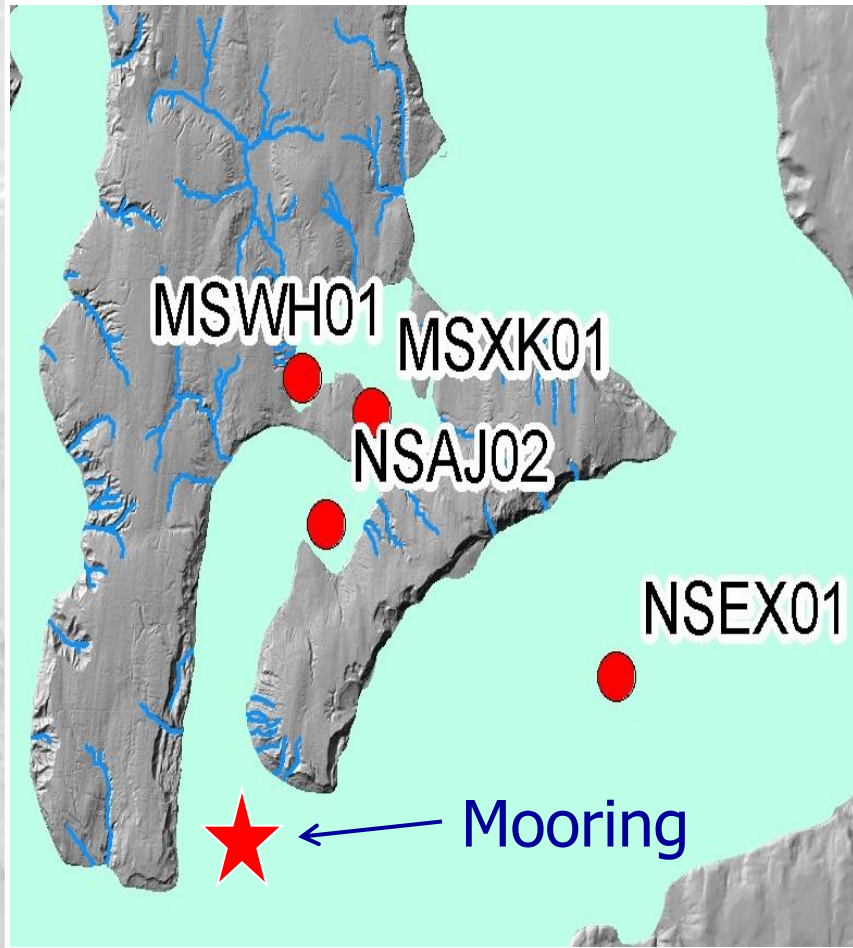
**Judd
Creek**

**Fisher
Creek**

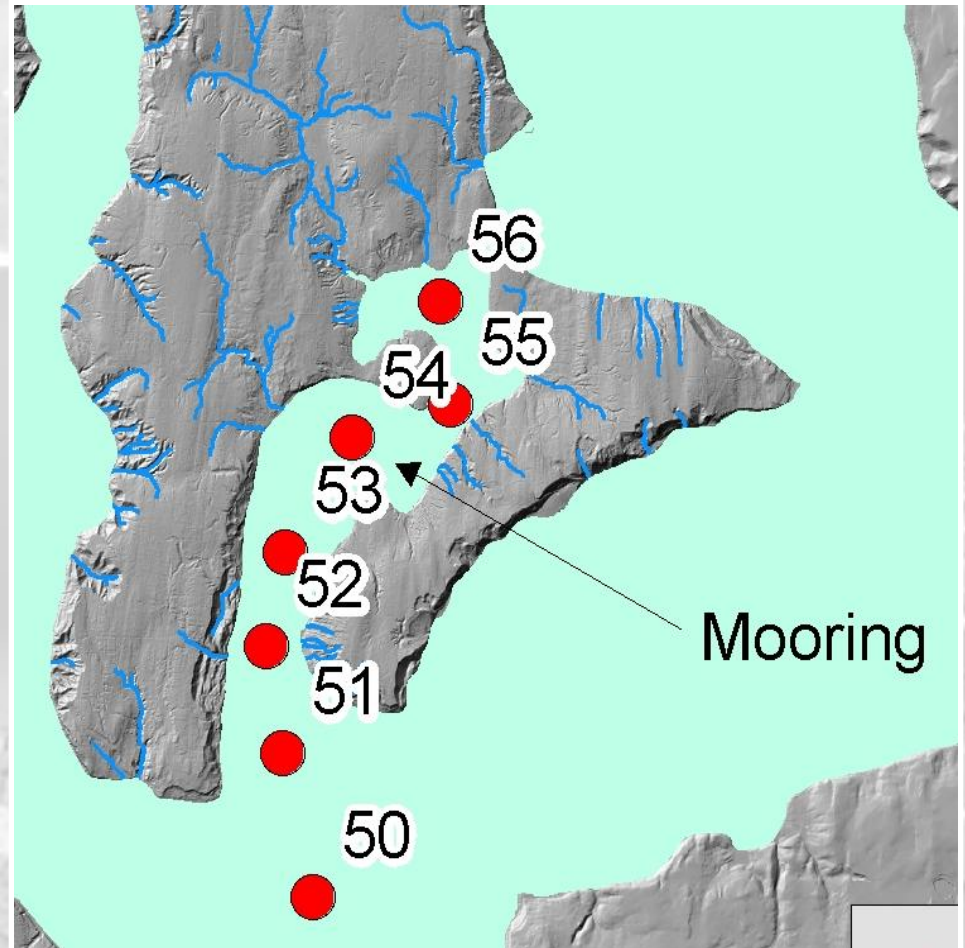
**Mileta
Creek**



Marine Monitoring Stations

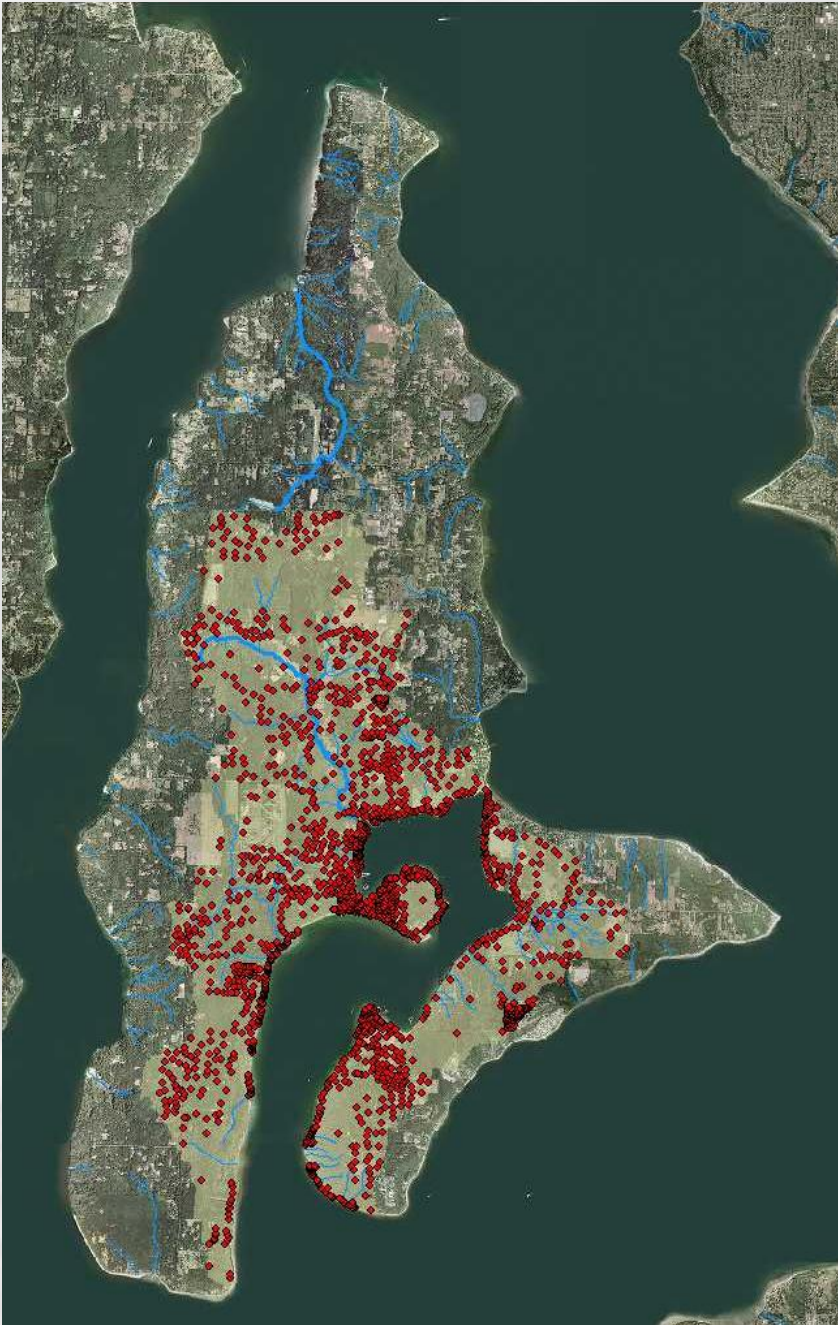


King County



UWT

Septic System Locations



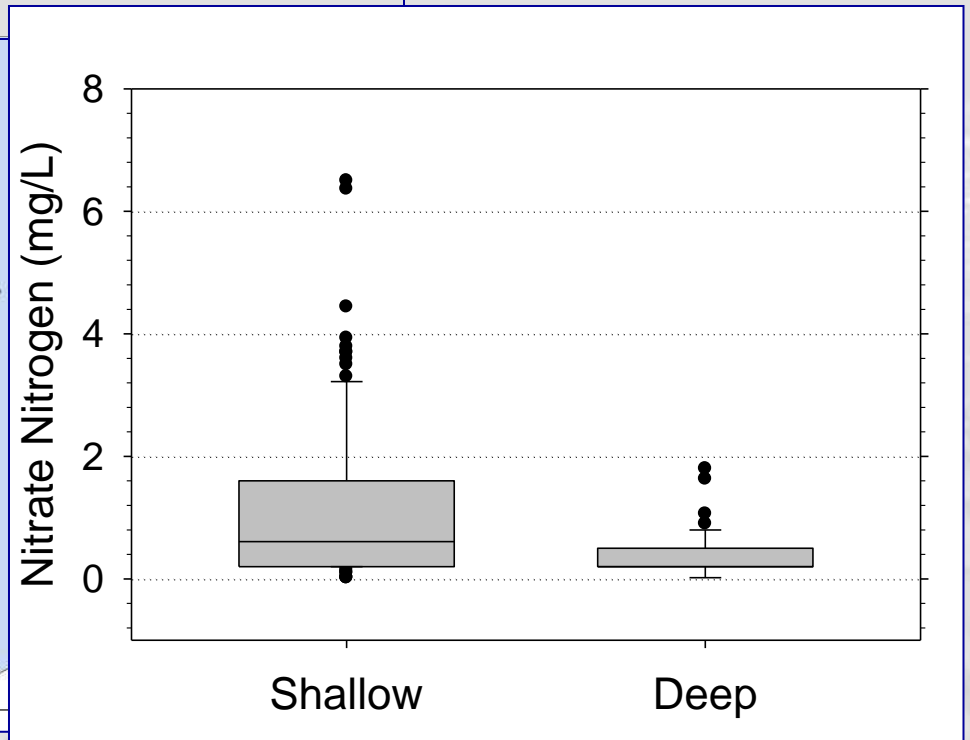
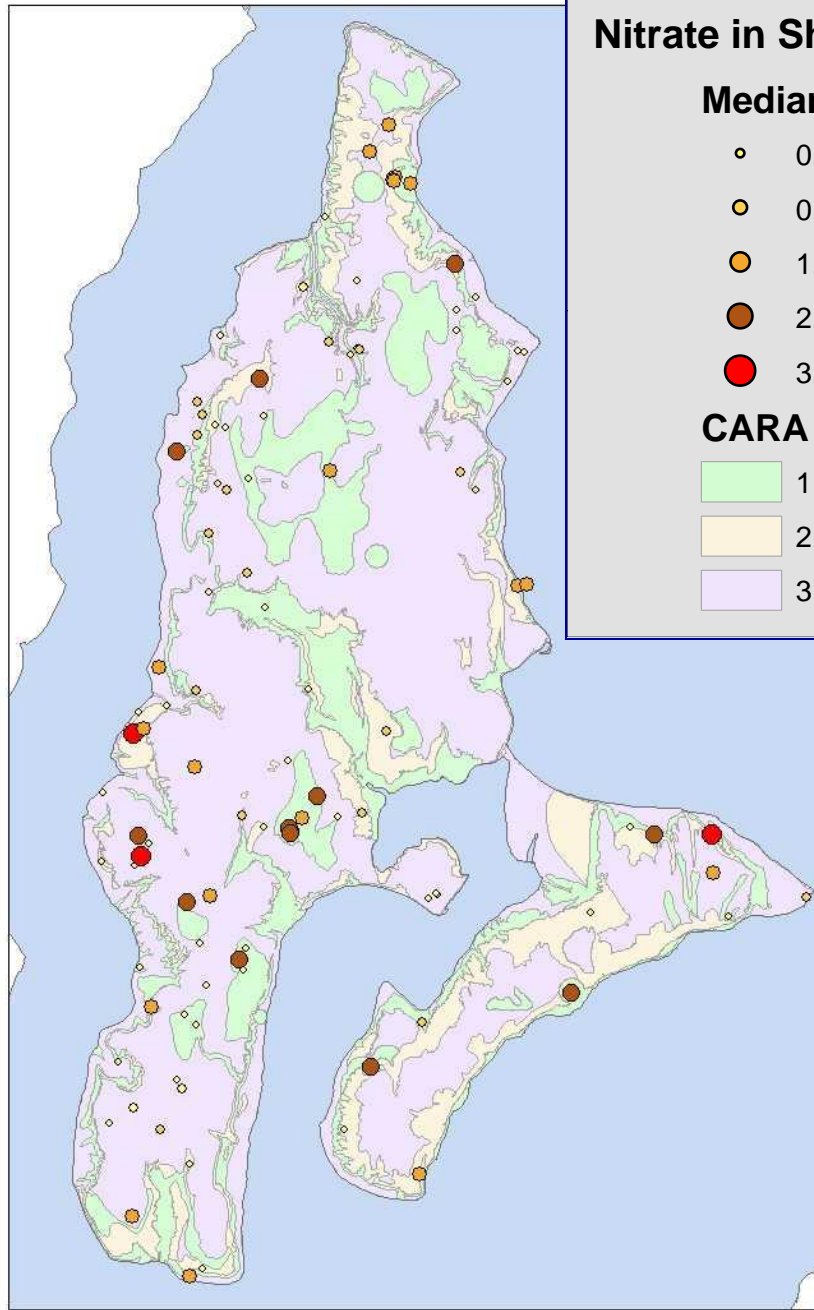
Nitrate in Shallow Groundwater

Median (mg NO₃-N/L)

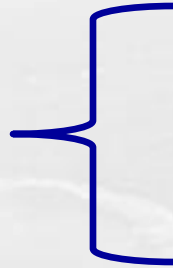
- 0.1 - 0.55
- 0.55 - 1.1
- 1.1 - 2.3
- 2.3 - 3.93
- 3.93 - 6.5

CARA CODE

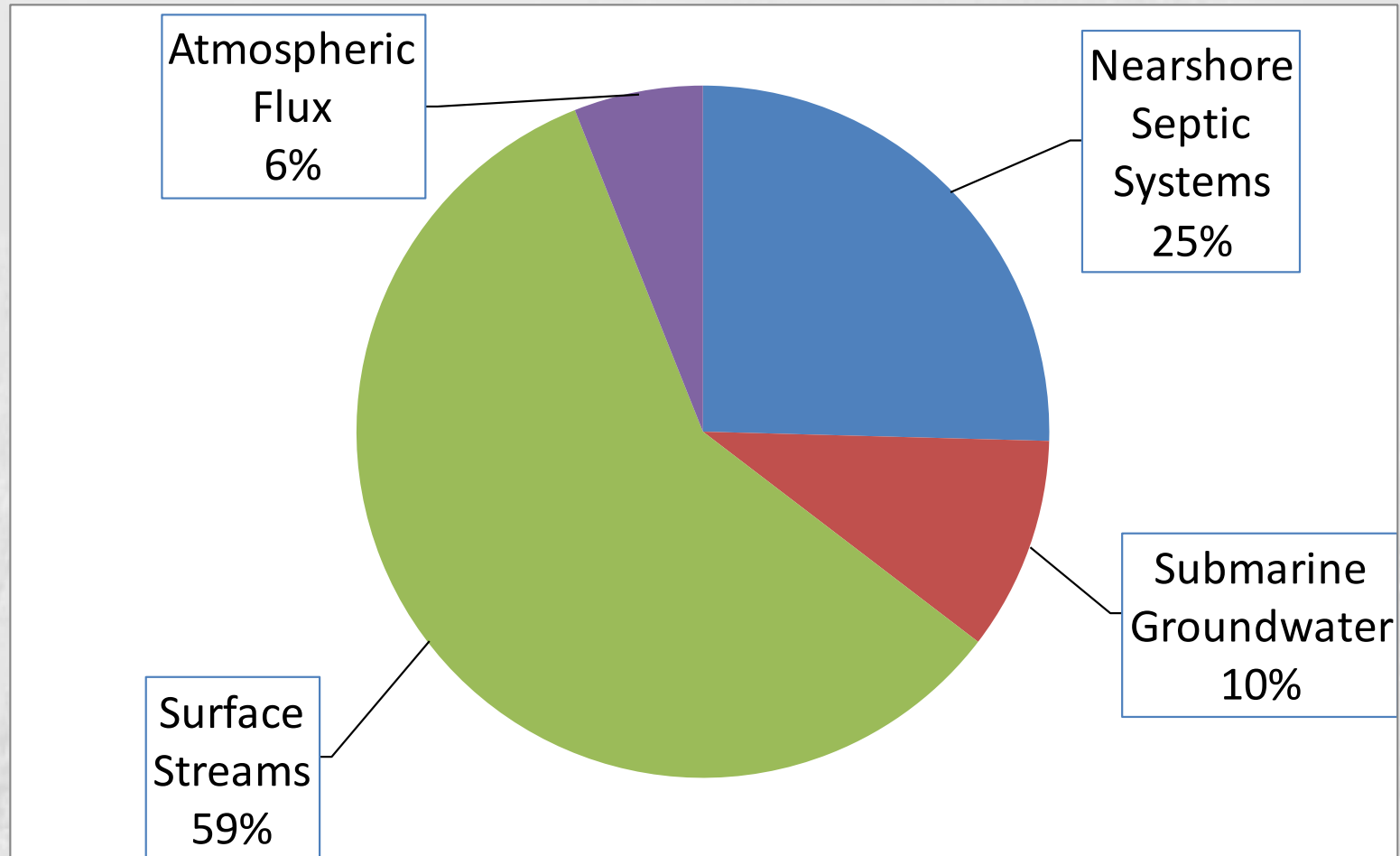
- 1
- 2
- 3



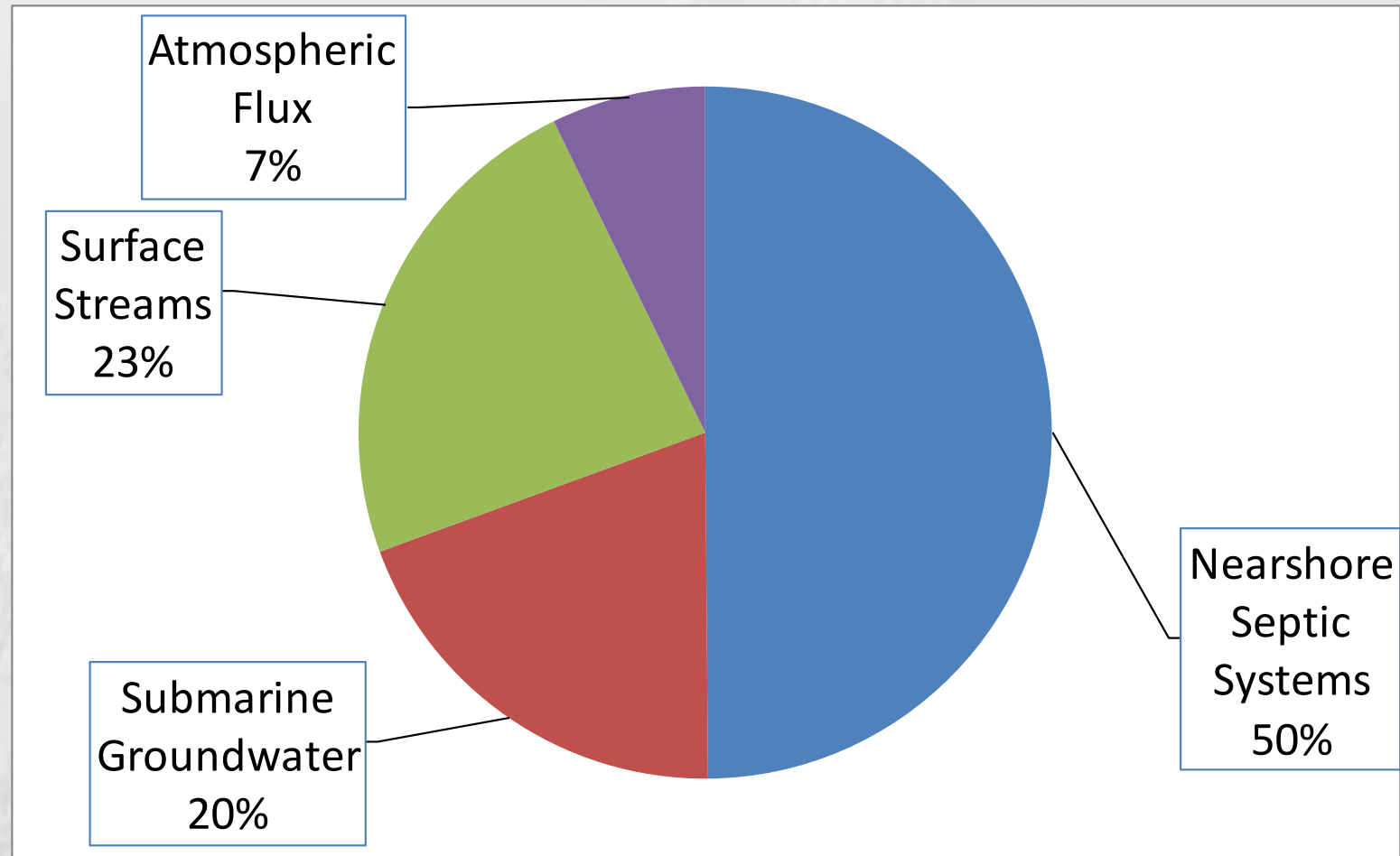
External N inputs
not assessed



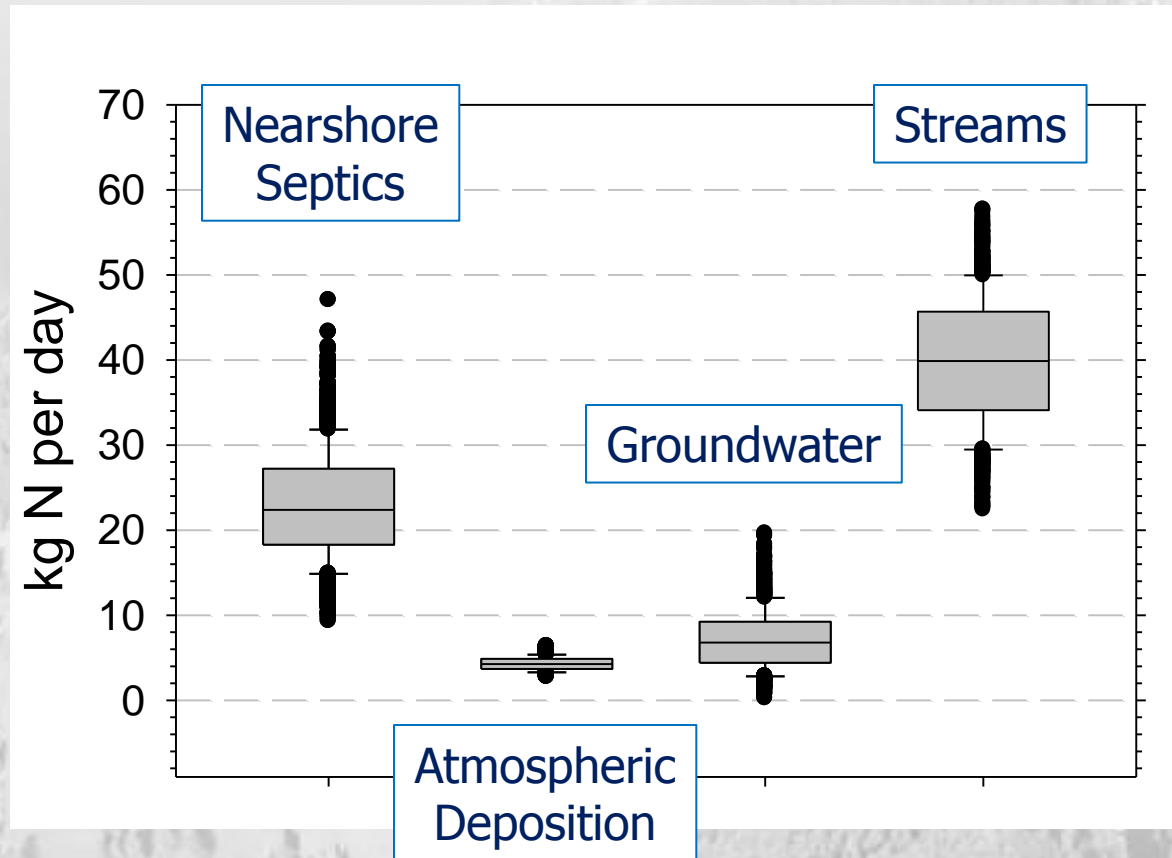
- Marine boundary
- Boats



July – October Estimates

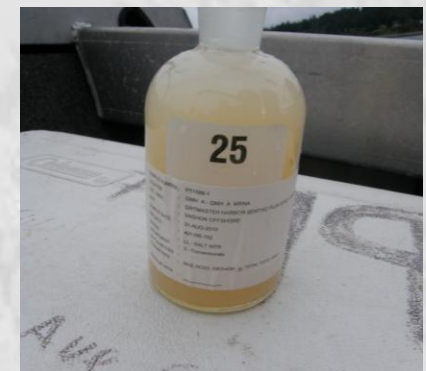
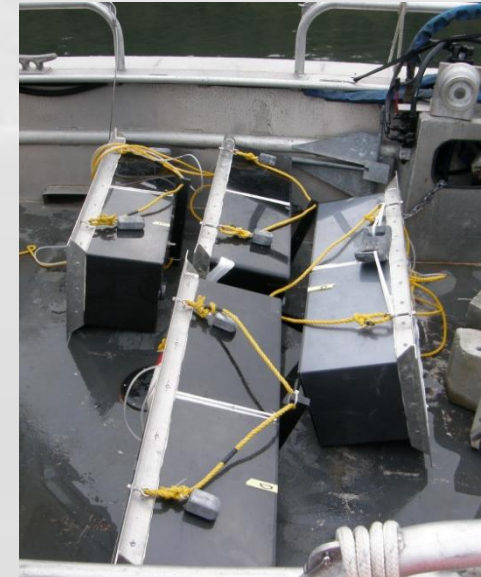
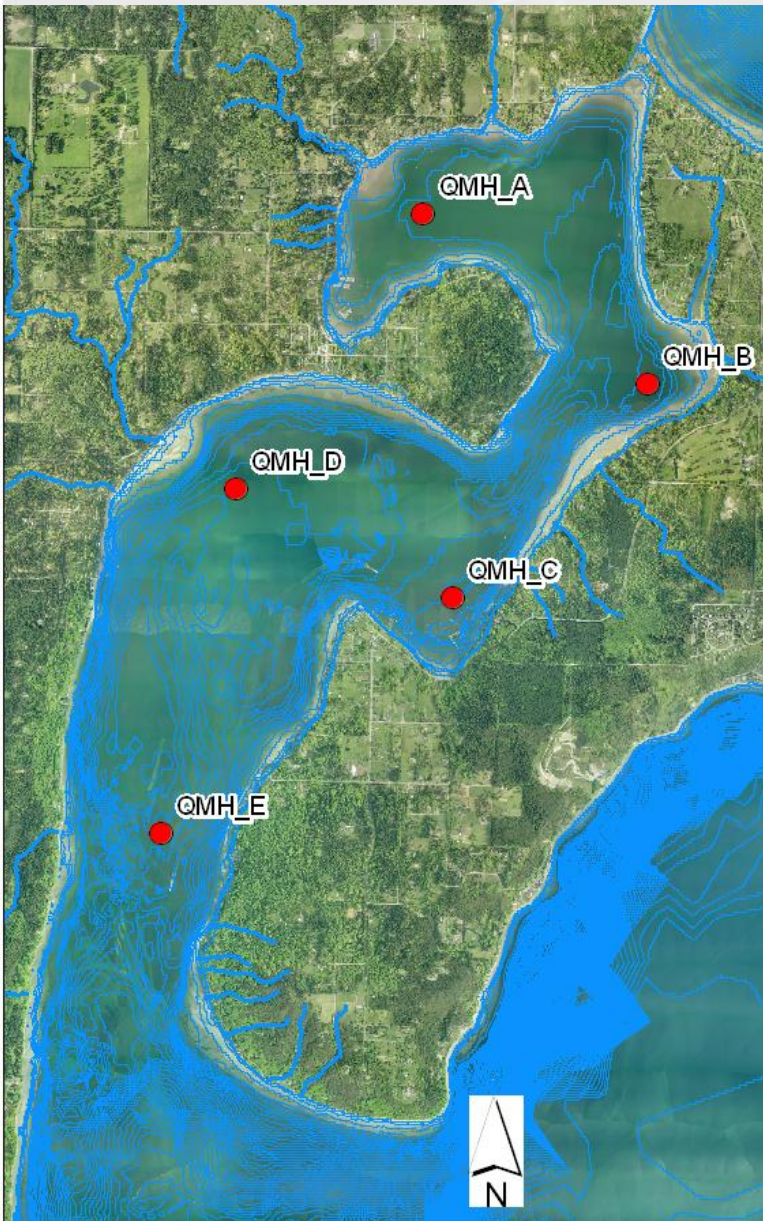


Uncertainty in Nitrogen Loading Estimates

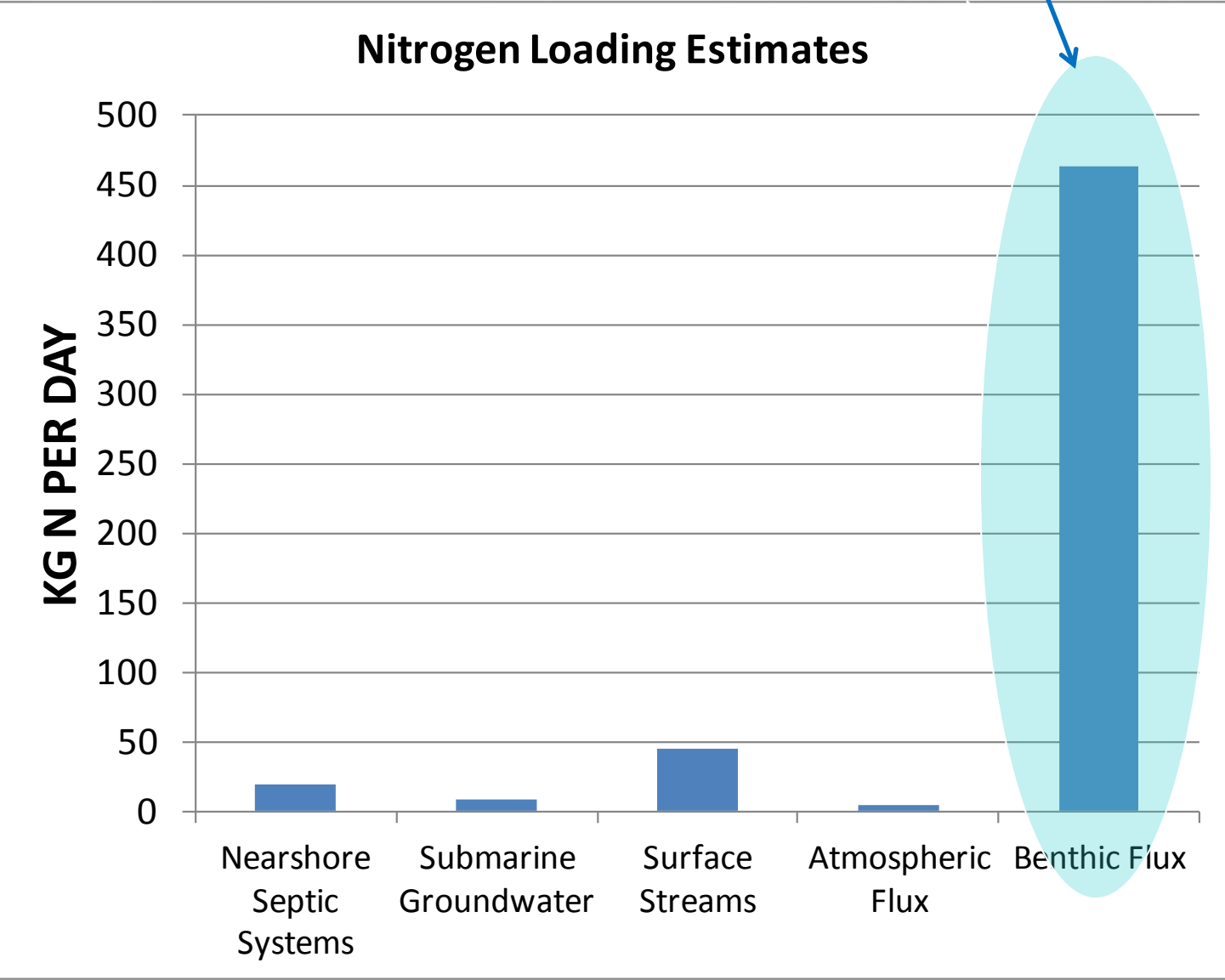


Benthic Flux Study

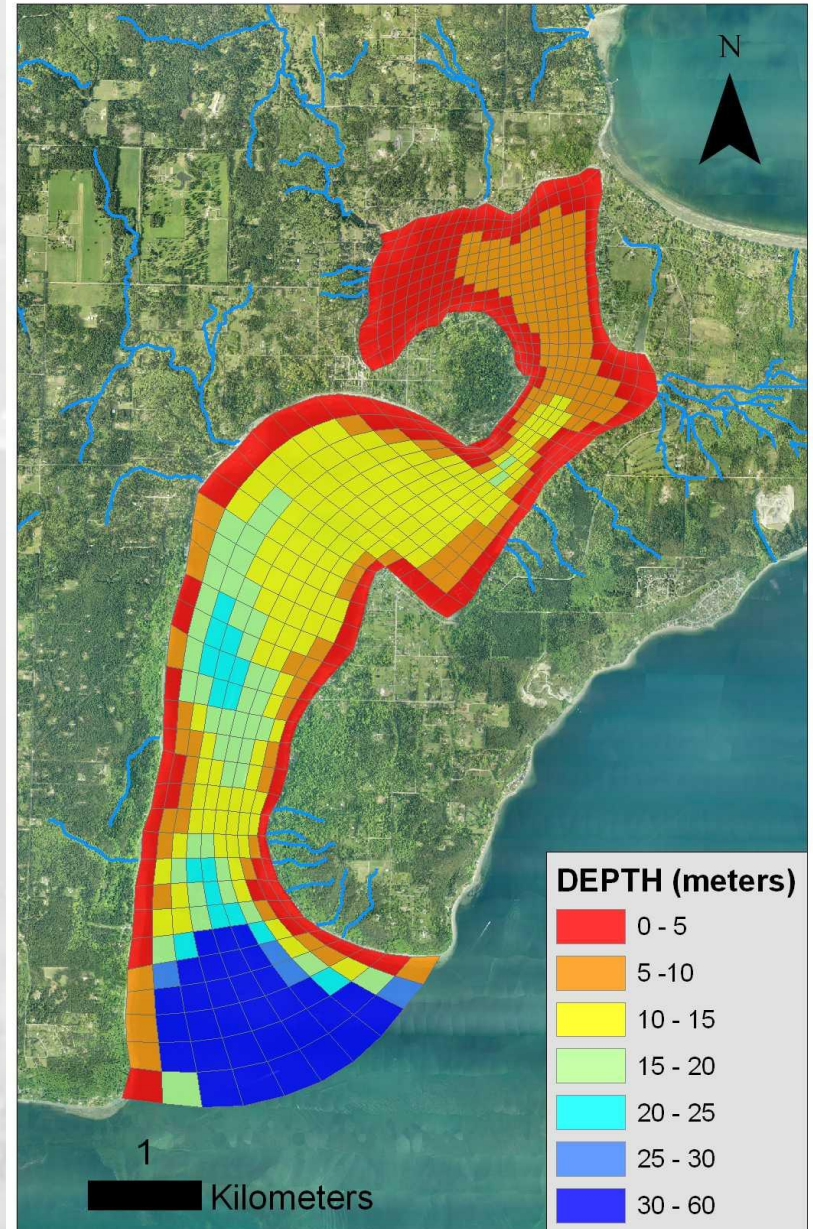
September 1-2, 2010



Seasonal Load (late summer)?



Generalized Environmental Modeling System for Surfacewaters (GEMSS®)



“Wicked” Problem

- No silver bullet
- Multiple nitrogen sources
- Puget Sound wide perspective forthcoming

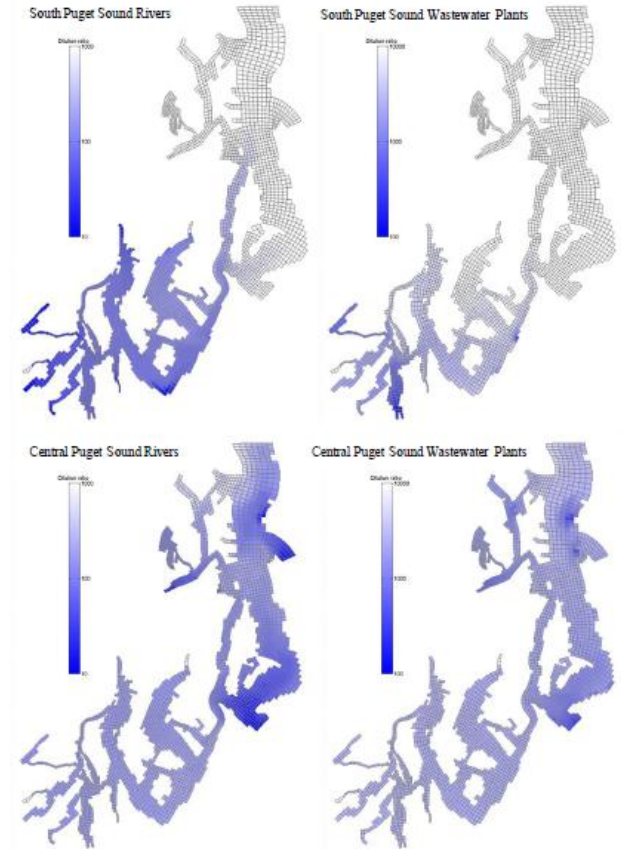


Figure ES-7. Dilution factors calculated from maximum water column dye concentrations for South and Central Puget Sound rivers and wastewater treatment plants for September 2007.

Questions?



Curtis DeGasperi
King County Water and Land Resources
(206) 684-1268
curtis.degasper@kingcounty.gov