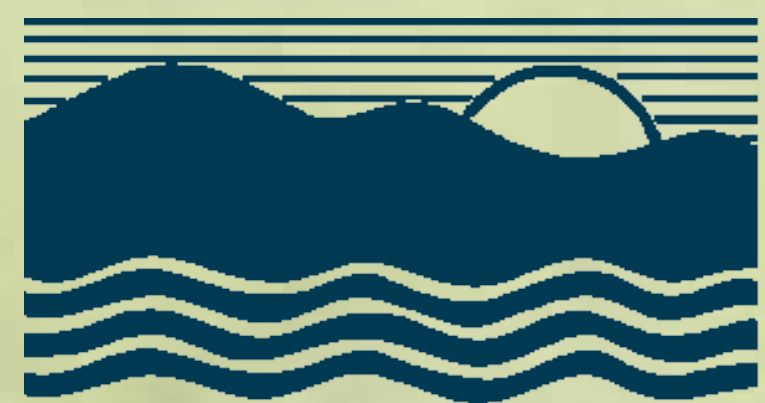


Understanding Spatial Variability of Water Quality to Promote Seagrass Restoration Success

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Basic Concept

Multiple stressors can limit the successful growth of submerged aquatic vegetation but water quality is clearly a major limitation for growth in many areas of historic presence. Our goal is to evaluate where opportunities exist to restore seagrass in the Patuxent and Potomac Rivers (Maryland), based on the presence and persistence of water quality conditions that meet SAV habitat needs.

We gather and evaluate monthly data on water quality using DATAFLOW, a vessel-based multi-parameter water quality sampling system that is linked to GPS positioning. DATAFLOW output is combined with supplemental data, models, and GIS modeling to create detailed spatial maps of water quality parameters and screen for acceptable habitat conditions.

The availability of spatially intensive sampling provides an opportunity to understand the fine-scale variability within the estuary, potential causes of water quality impairment, and the representativeness of the sparse sampling network that has been used historically to assess compliance with water quality regulations.

Results

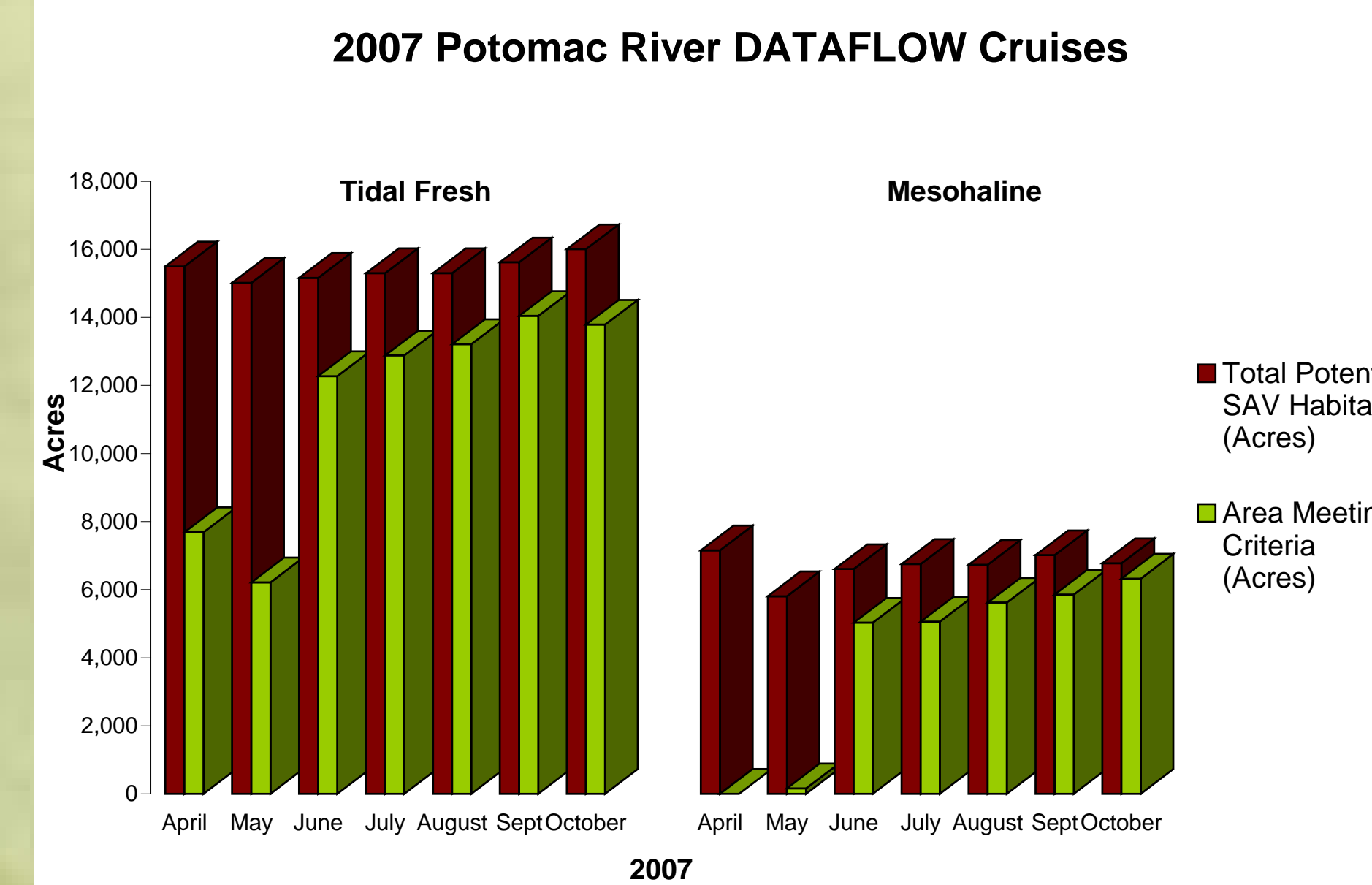
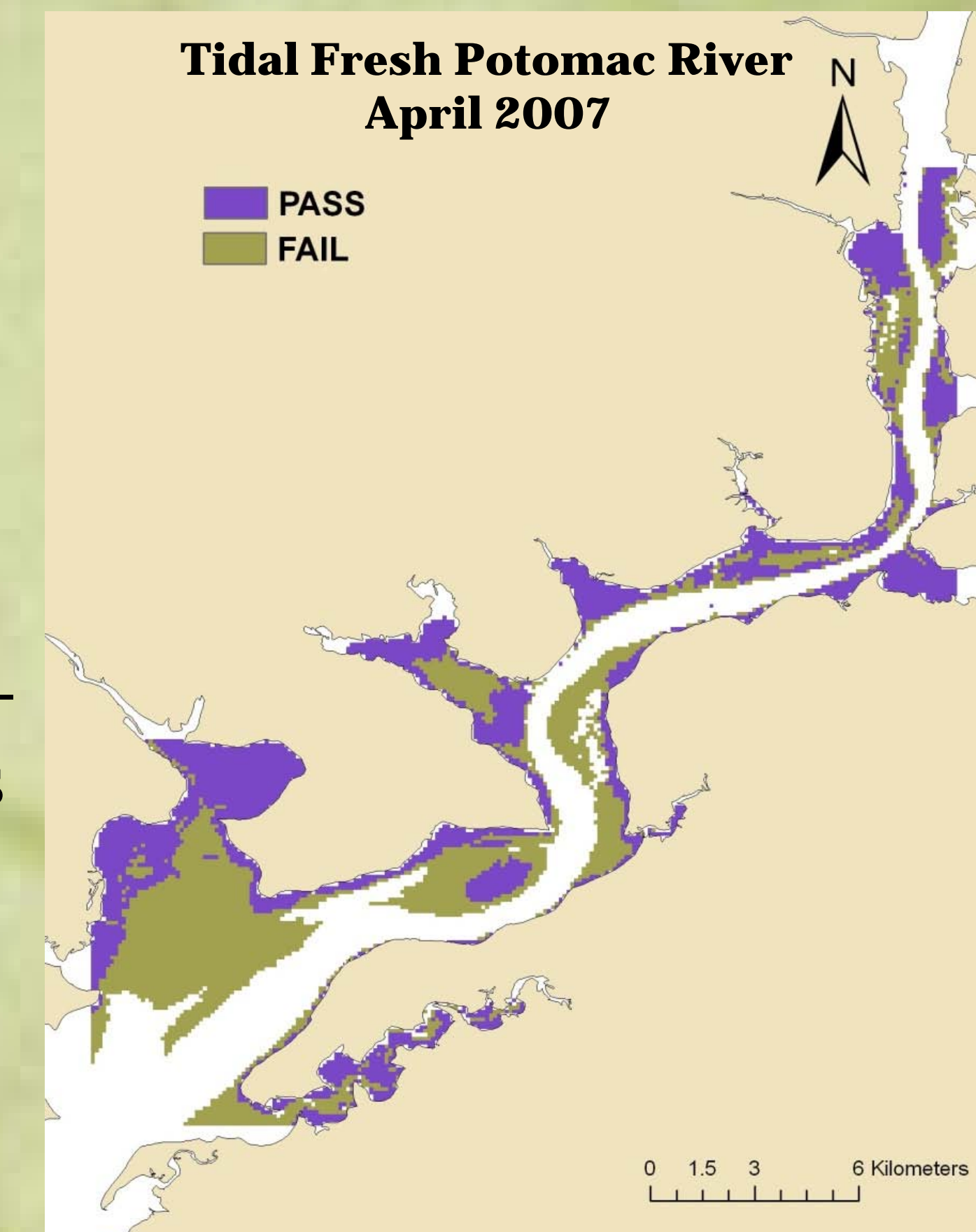
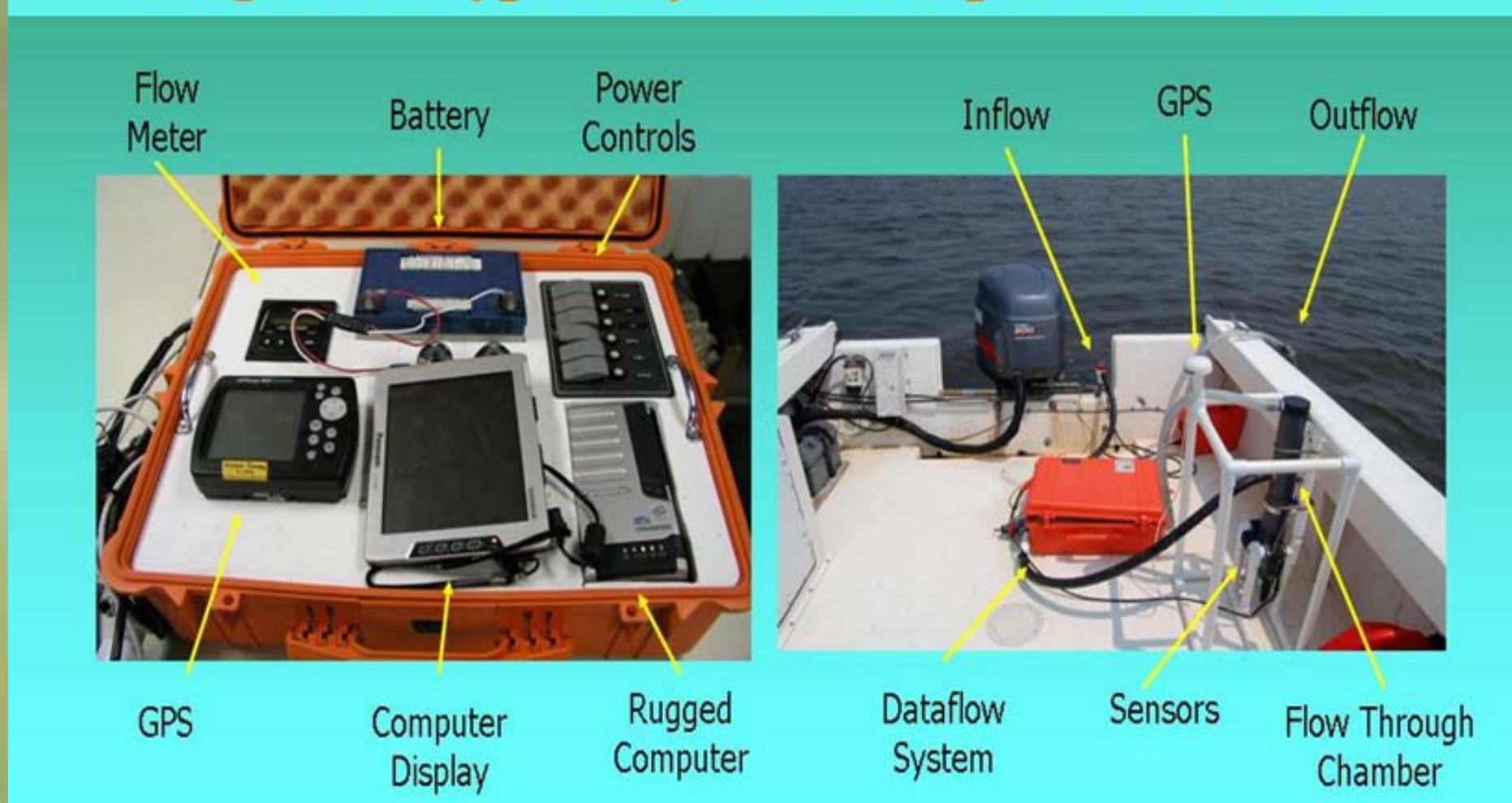
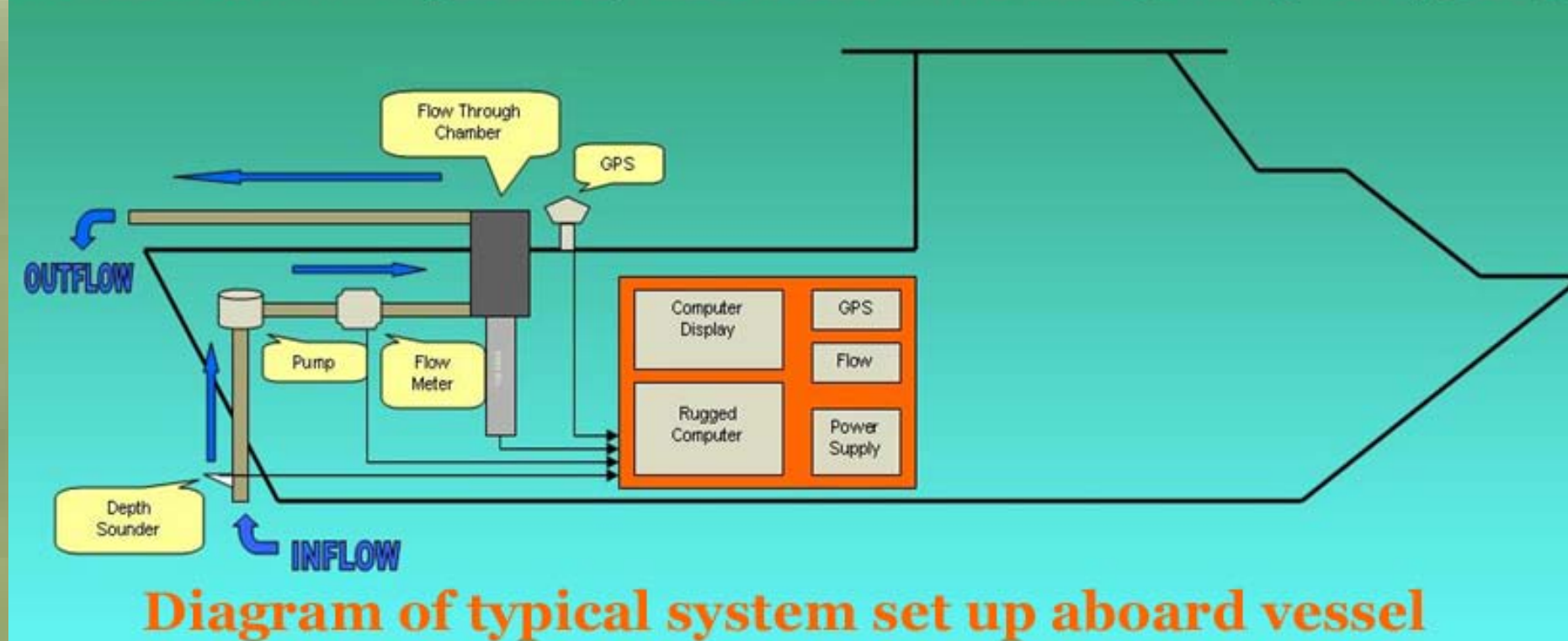
Screen for Habitat Pass/Fail

This April cruise is typical of early spring cruises which tend to show the greatest percentage of area failing to meet the water quality criteria. Both PLW and chlorophyll a standards were exceeded over substantial portions of the potential habitat of the tidal fresh segment in Spring 2007.

Salinity Regime	Water Quality Criteria for SAV Habitat				Depth (Z)
	Water Column Light Requirement (PLW)	Chlorophyll a (CHLA)	Dissolved Inorganic Phosphorus (DIP)	Dissolved Inorganic Nitrogen (DIN)	
Tidal Fresh	>13%	<15 µg/L	none	none	< 2 meters
Mesohaline	>22%	<15 µg/L	<0.01 mg/L	<0.15 mg/L	< 2 meters

Results for all SAV habitat criteria indicated that, except for the spring, relatively small areas were out of compliance with criteria in both the tidal fresh and mesohaline sections of the estuary in 2007. However, during spring, only 40-50% of potential habitat area in the tidal fresh met all criteria and little to no area in the mesohaline met all criteria.

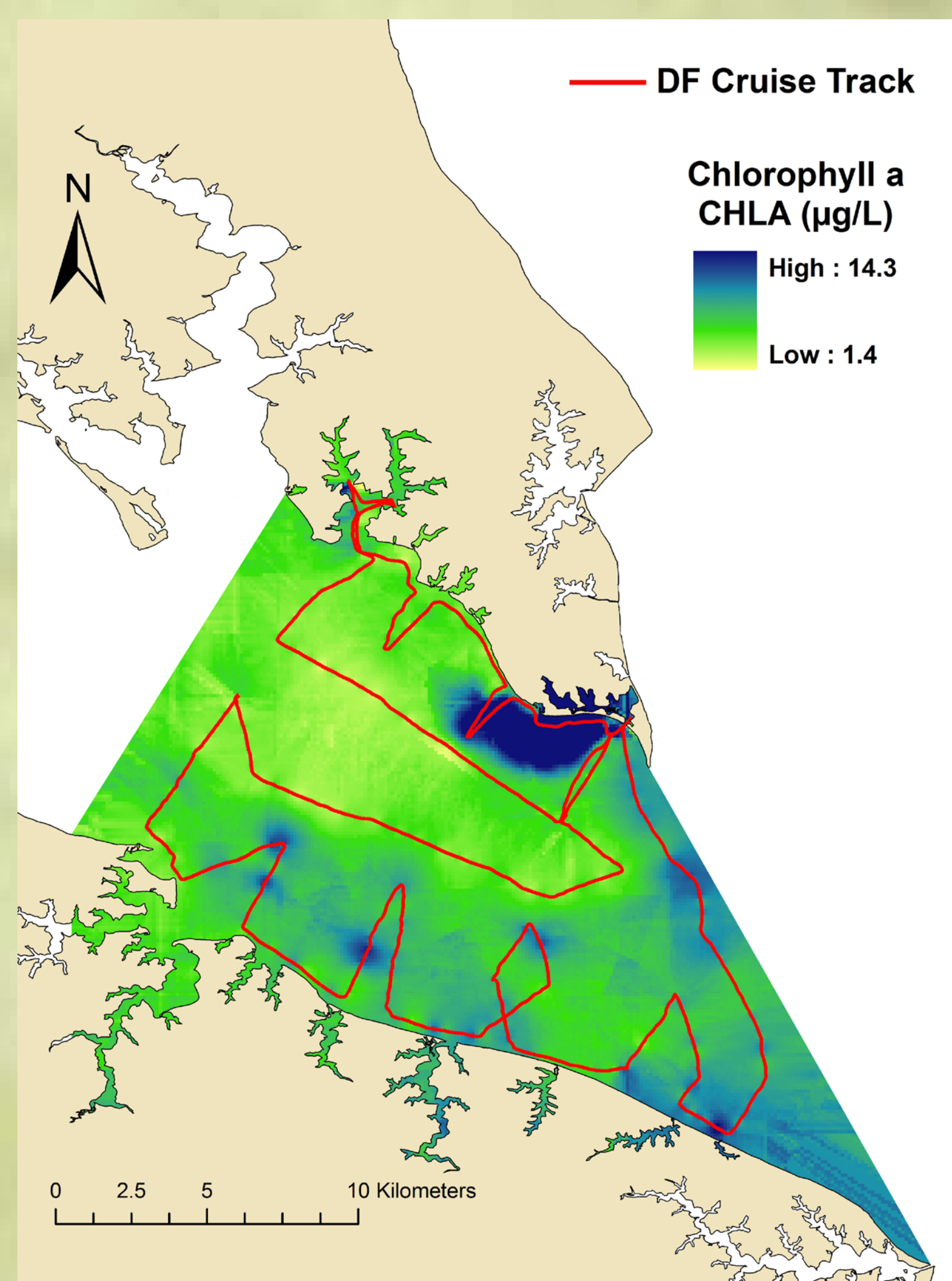
DATAFLOW - Spatially Intensive Water Quality Mapping



Understand the Fine Scale Variability

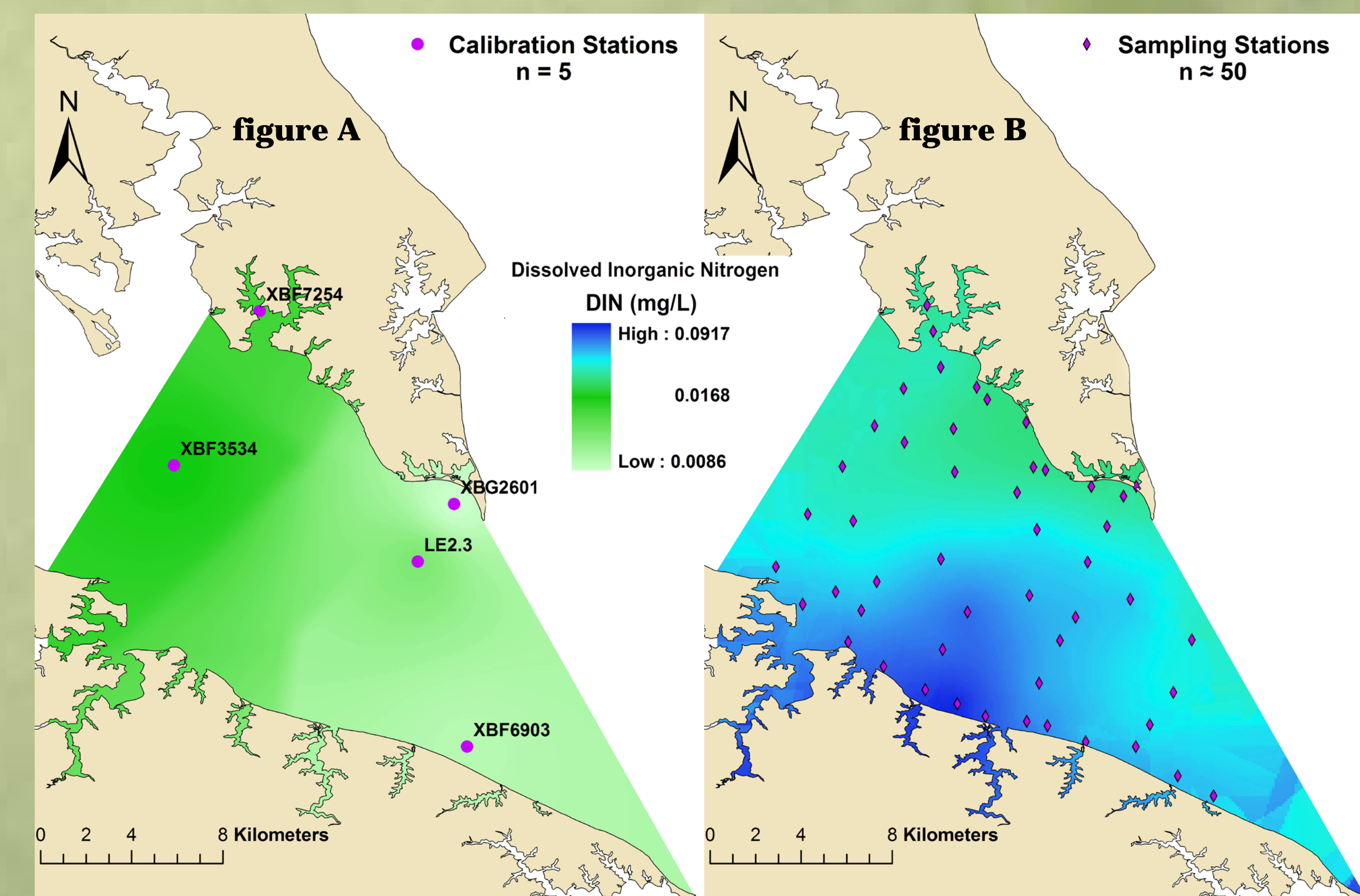
By collecting data at many points in the estuary and interpolating those measurements to cover unsampled areas, we create a much more detailed picture of the variability of water quality conditions than we had in the past.

Mesohaline Potomac River
August 2008
Estimation of Chlorophyll a



Compare Sparse to Detailed Data Network

A new sampling regime allowed us to explore the spatial heterogeneity of nutrient levels in the mesohaline Potomac. In past sampling years, only five stations were available to characterize the nutrient levels in the lower Potomac (figure A) because this variable is not measured with DATAFLOW. To better understand nutrient variability, we sampled 50 stations and were able to create a more detailed picture of nutrient concentrations (figure B) that may be useful for understanding nutrient sources and sinks.



August 2008 Lower Potomac River Interpolation of DIN at 5 stations vs. 50 stations