

WATER QUALITY OF THE CAPE FEAR RIVER PLUME: A PRELIMINARY ANALYSIS

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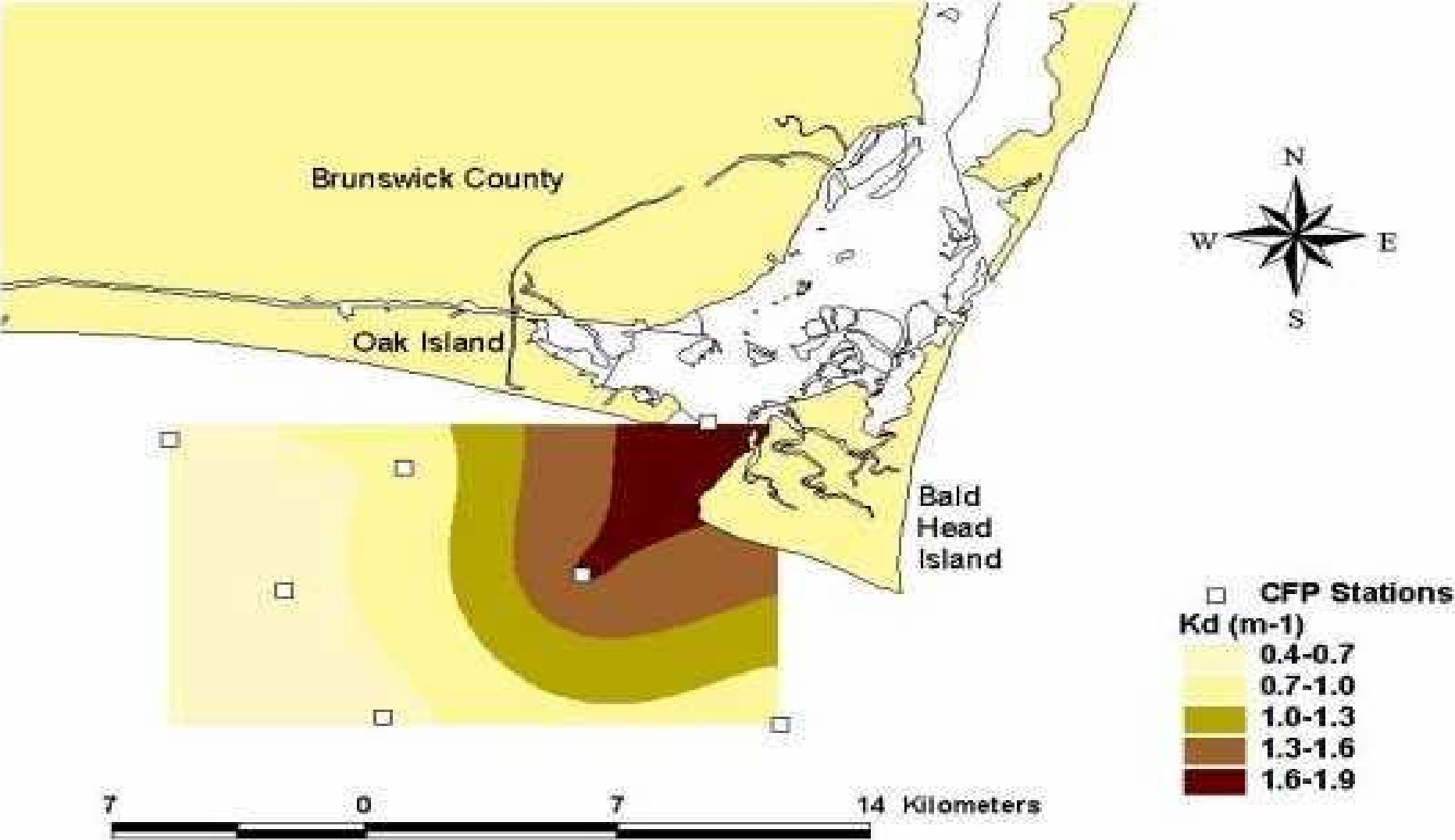
OBJECTIVES

- Conduct a long-term analysis of the Cape Fear River plume's impact on the coastal ocean
- Determine how river hydrology variations affect parameter distribution and magnitude
- Assess the function of the plume as an accumulator or producer of finfish and benthos

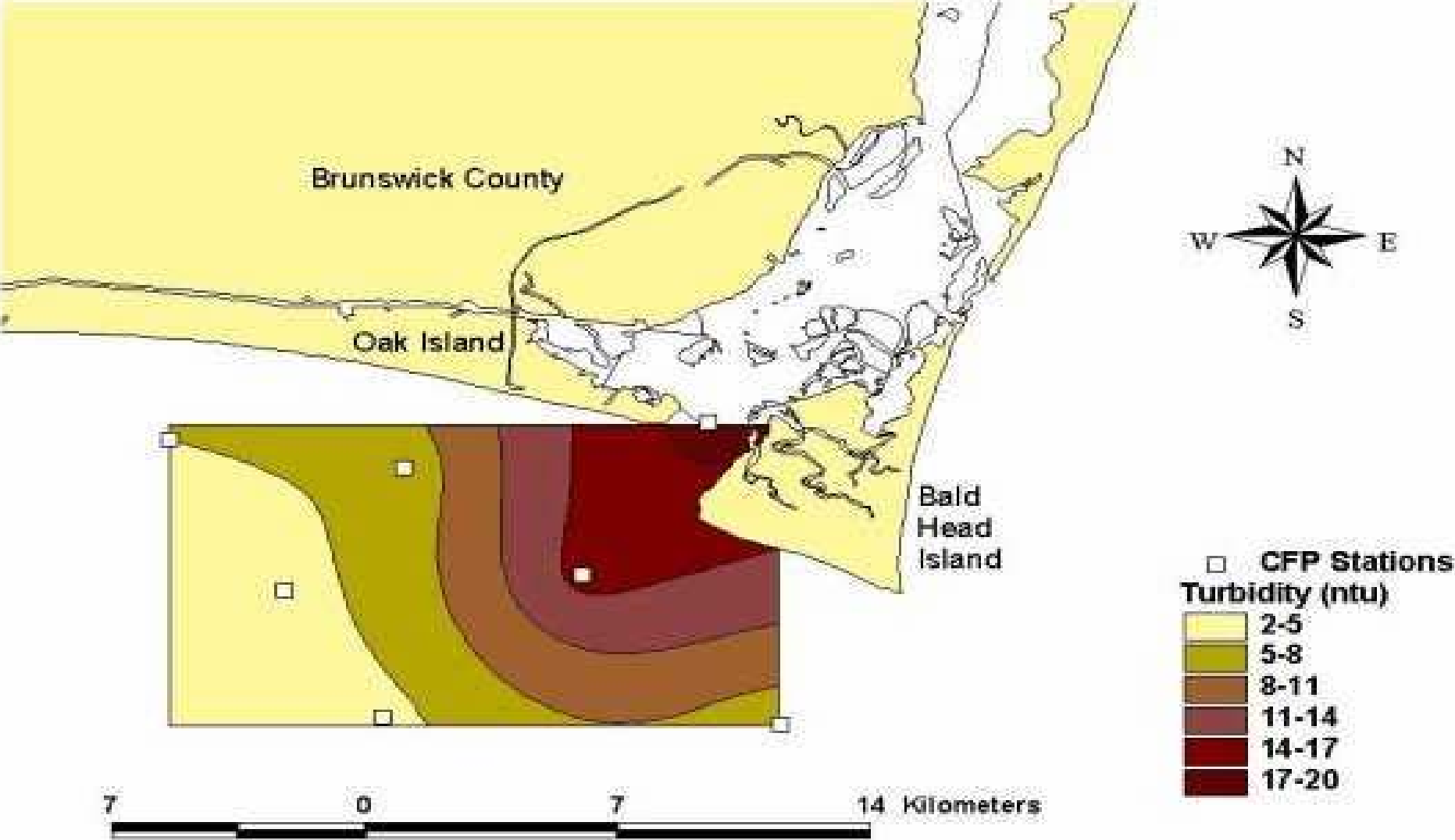
APPROACH

- **Conduct monthly sampling cruises to seven stations located within the lower estuary and coastal ocean within and outside of the plume**
- **Sample temperature, dissolved oxygen, salinity, turbidity, solar irradiance, chlorophyll, nitrogen, phosphorus, silicate, holoplankton and meroplankton**
- **Perform regression/correlation analyses to determine meteorological and hydrological influence on the plume and its chemistry**
- **Assess seasonal patterns of water quality within the plume influence area**

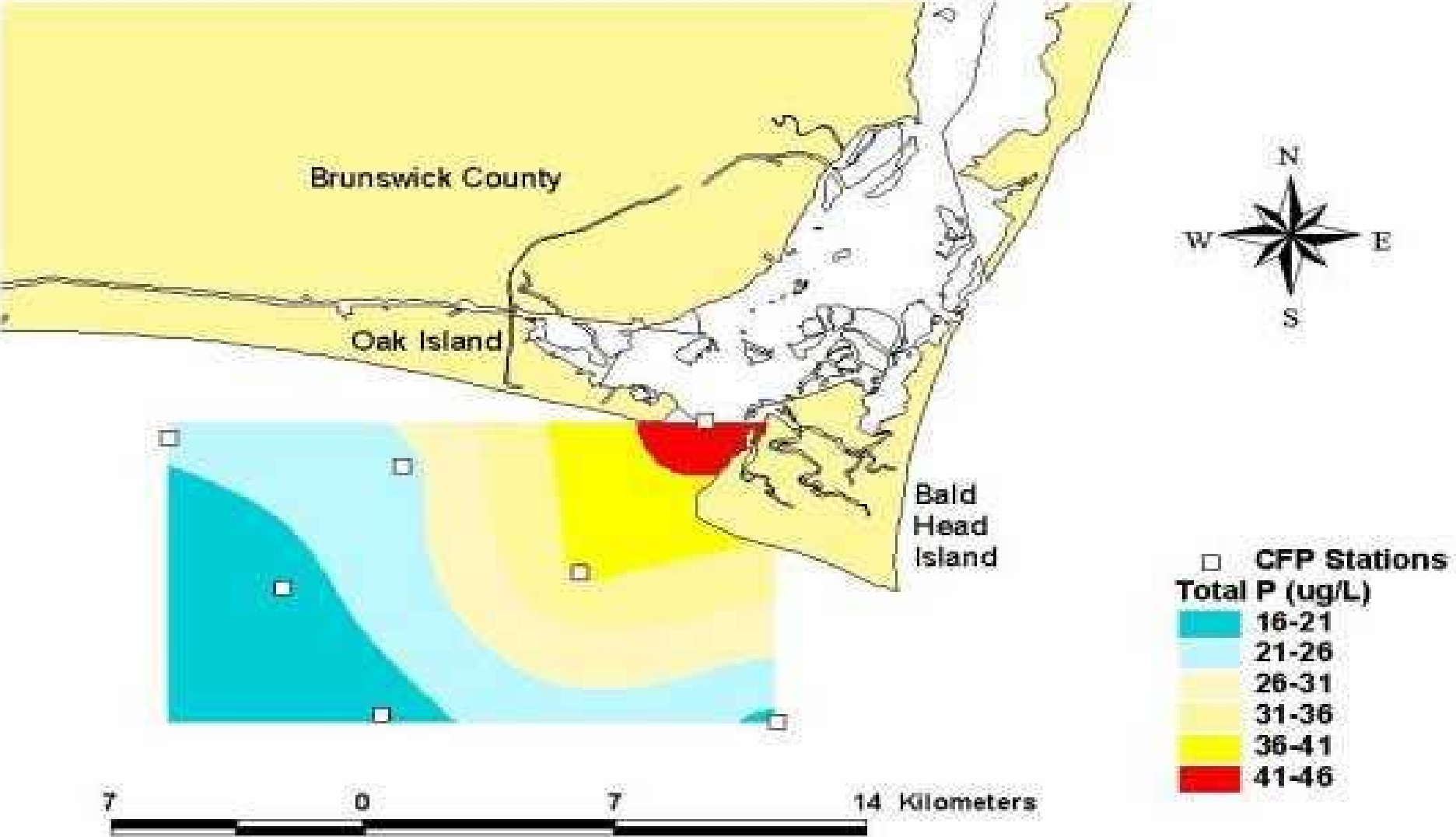
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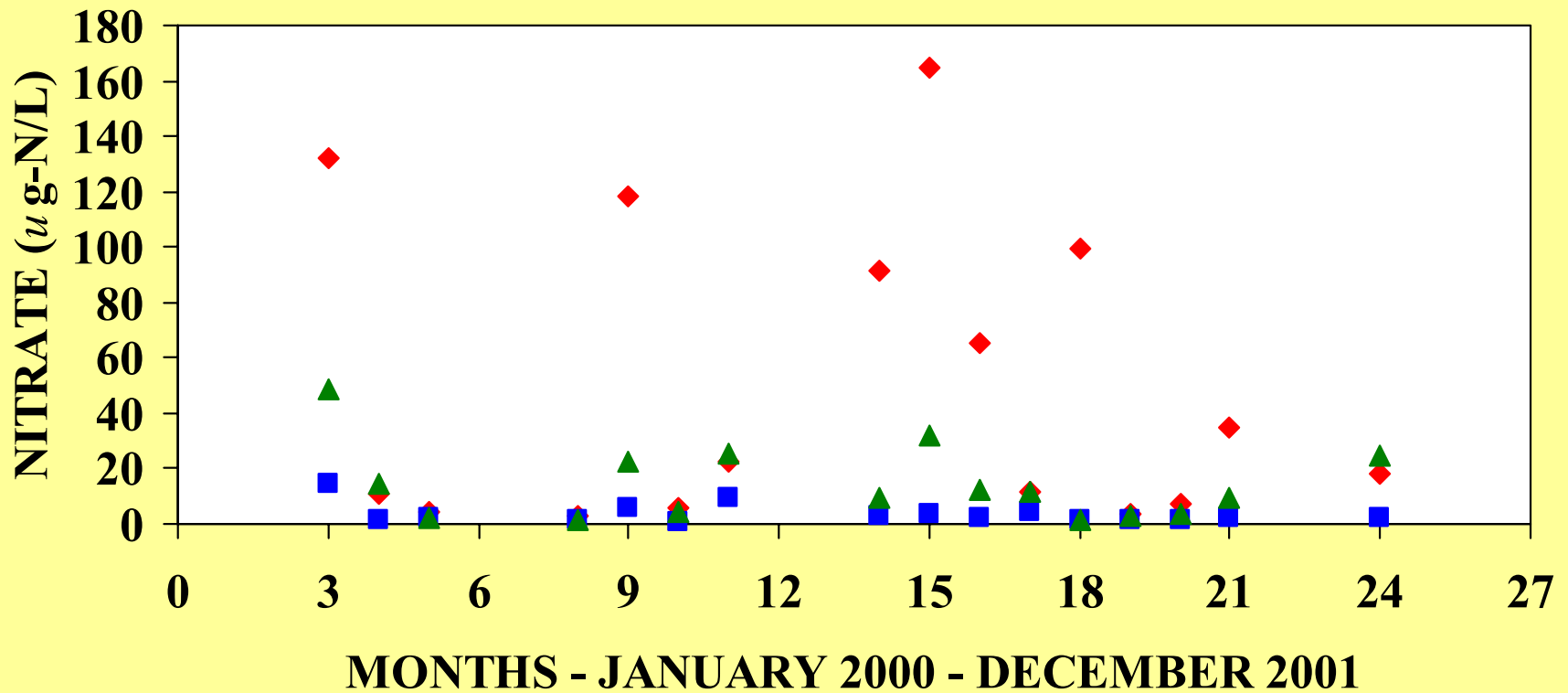


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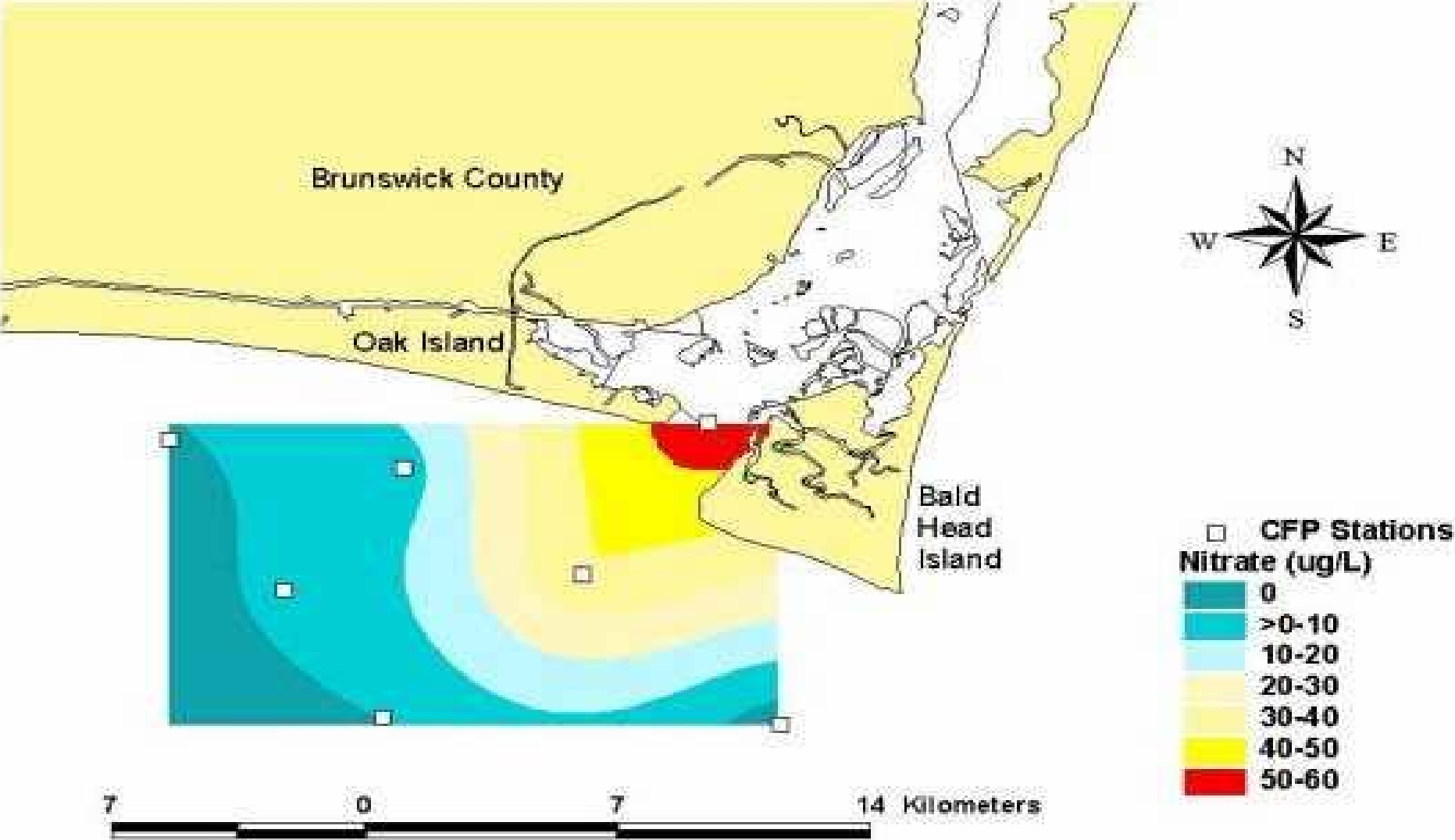


NITRATE VARIABILITY ASSOCIATED WITH THE CAPE FEAR RIVER PLUME (1=DIRECT PLUME, 3=CONTROL, 6=INDIRECT PLUME)

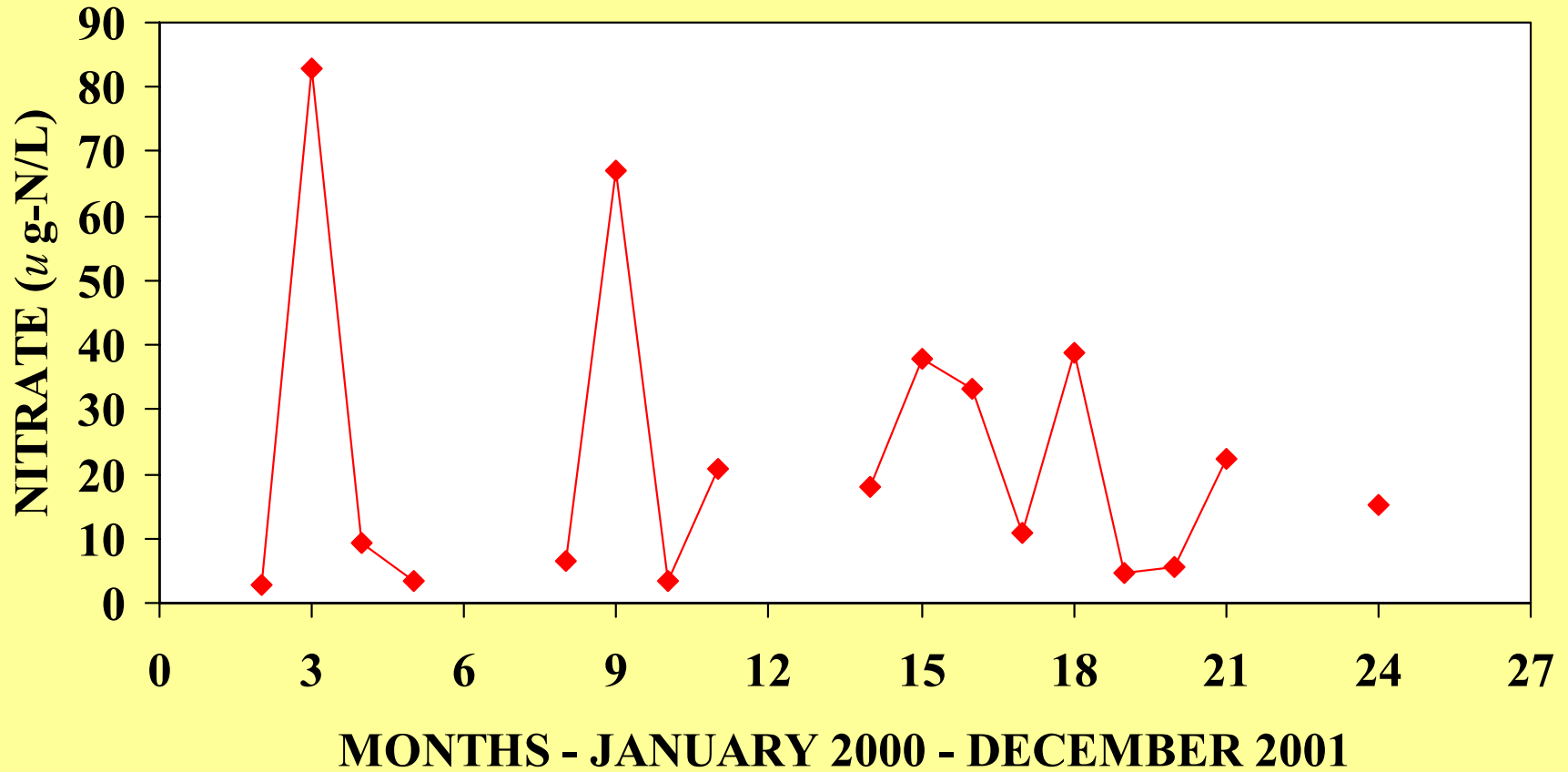
◆ St. 2 ■ St. 3 ▲ St. 6



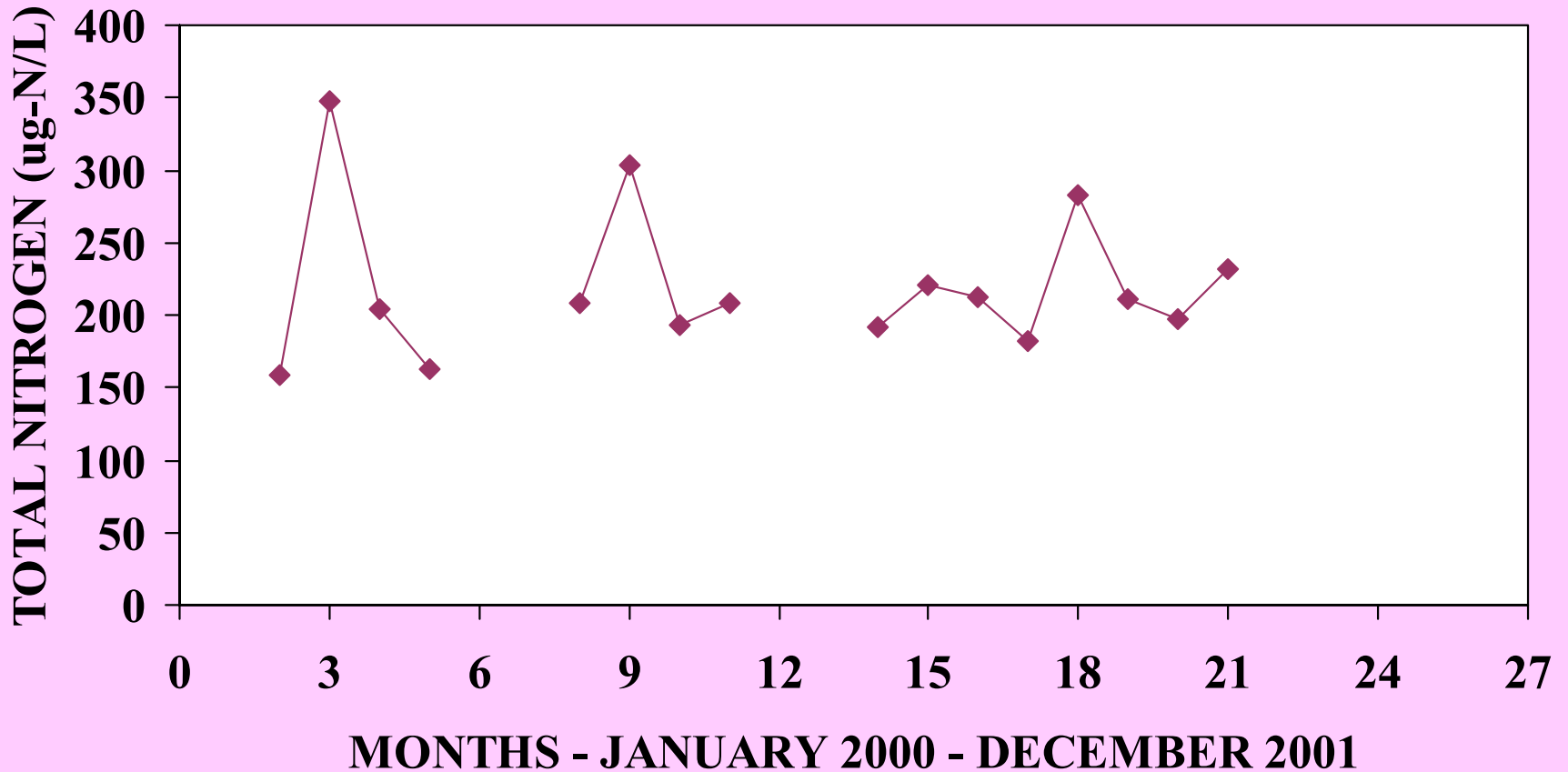
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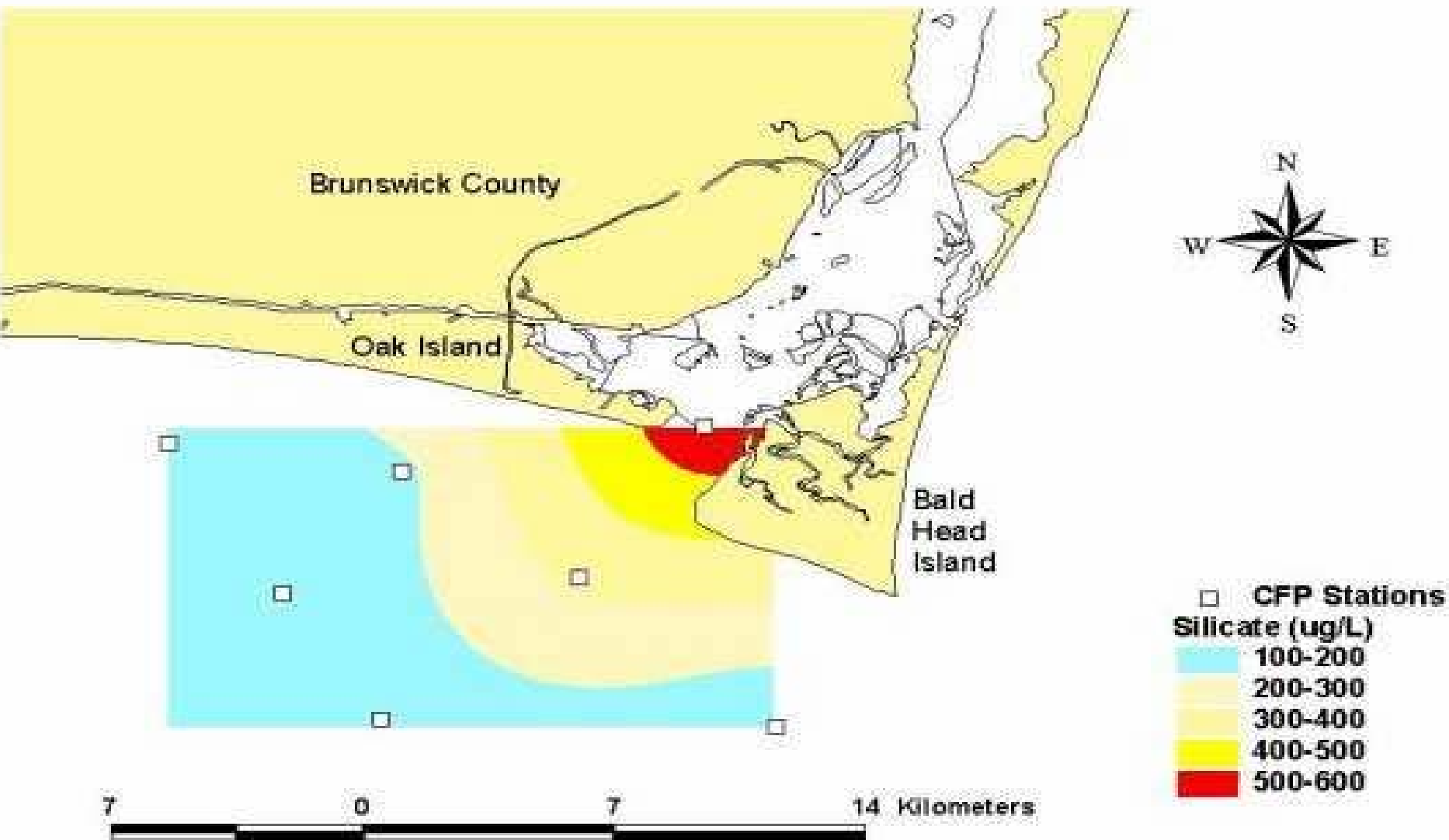
NITRATE VARIABILITY ASSOCIATED WITH THE CAPE FEAR RIVER PLUME - ALL STATIONS COMBINED



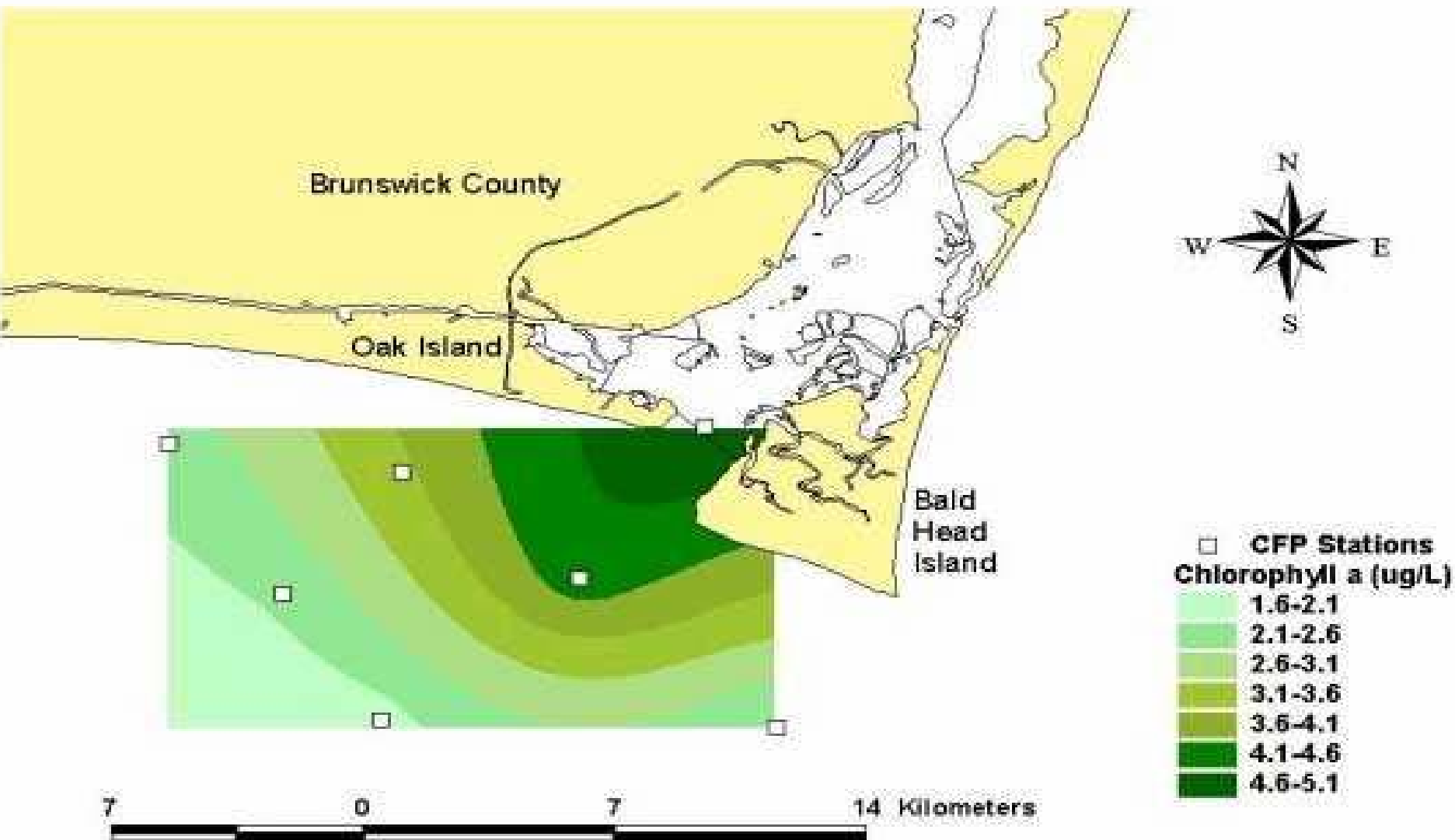
TOTAL NITROGEN VARIABILITY ASSOCIATED WITH THE CAPE FEAR RIVER PLUME – ALL STATIONS COMBINED



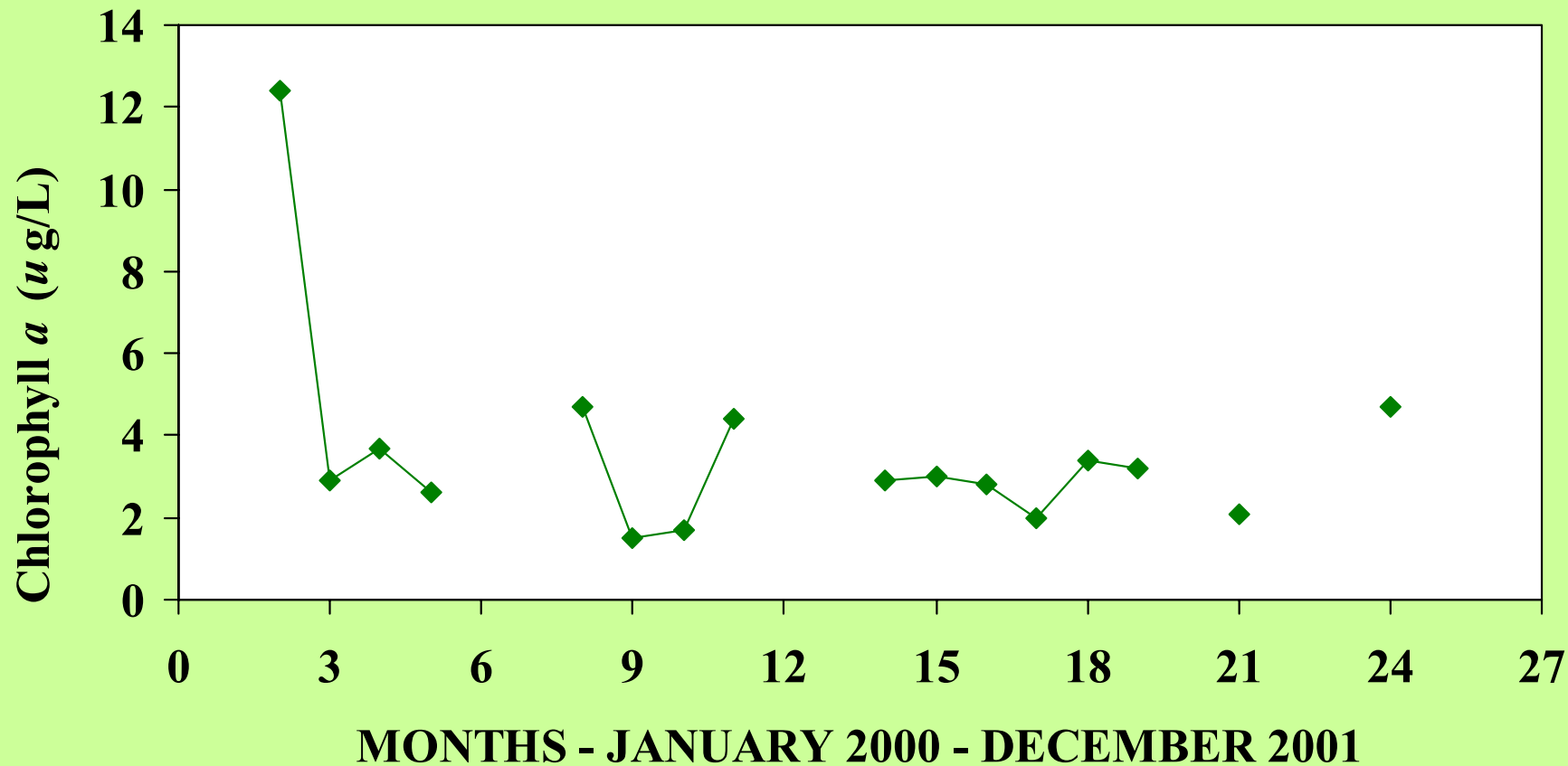
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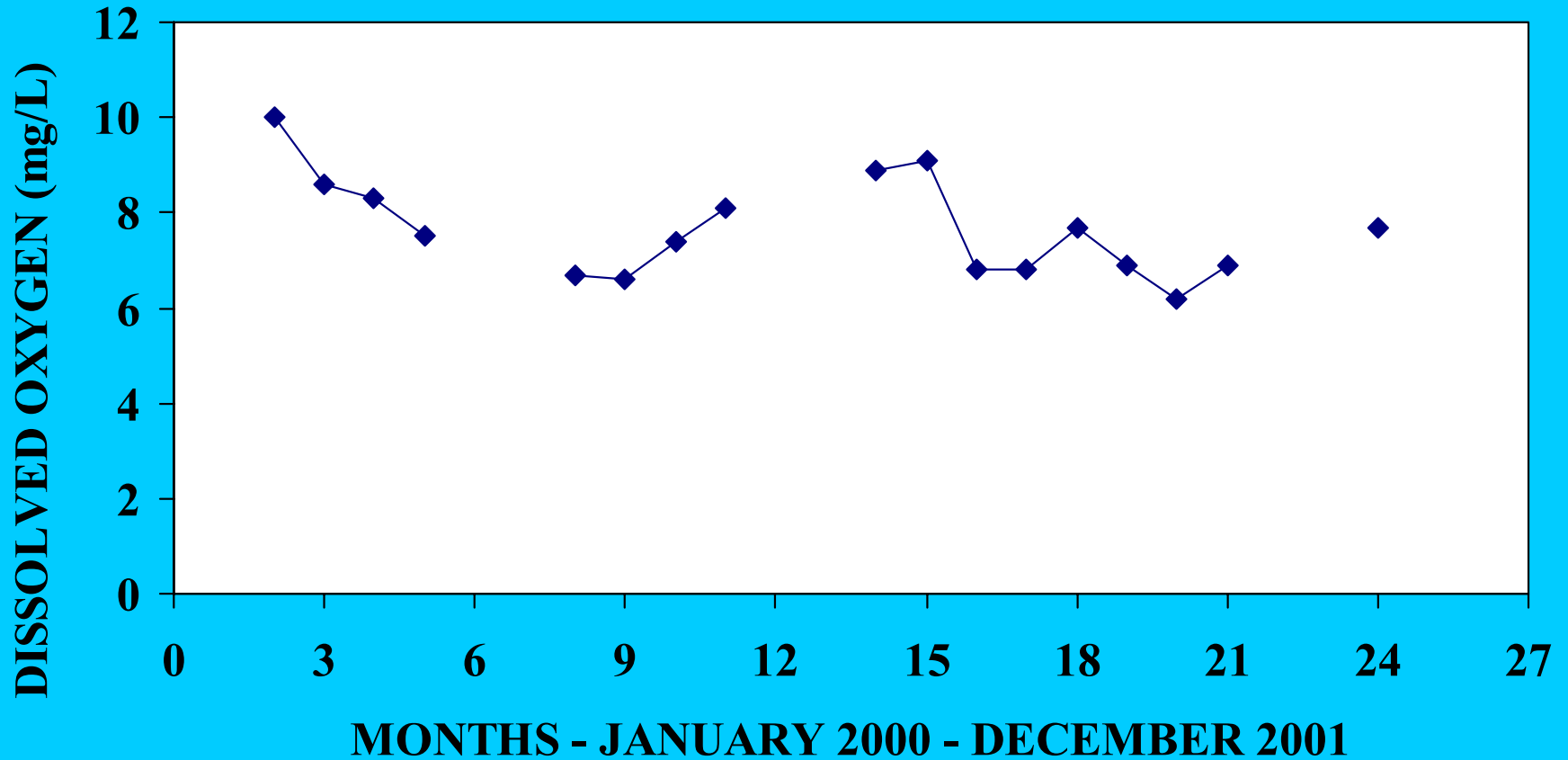
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CHLOROPHYLL *a* VARIABILITY ASSOCIATED WITH THE CAPE FEAR RIVER PLUME – ALL STATIONS COMBINED



DISSOLVED OXYGEN VARIABILITY ASSOCIATED WITH THE CAPE FEAR RIVER PLUME – ALL STATIONS COMBINED



CORRELATION ANALYSES

ALL STATIONS COMBINED

- **Turbidity positively correlated with light attenuation coefficient k_d**
- **Salinity negatively correlated with all nutrients**
- **River flow positively correlated with nitrate and chlorophyll a**
- **Chlorophyll a positively correlated with dissolved oxygen concentrations**

CORRELATION ANALYSIS

SPATIAL EFFECTS

- OUTER STATIONS - Positive correlation between river flow and nitrate, total nitrogen, and turbidity (but these relationships non-significant for inner stations)
- INNER STATIONS - Negative correlation between salinity and all nutrients (but only for nitrogen at outer stations)

PRELIMINARY CONCLUSIONS

- **Turbidity is a major influence on light attenuation in and near plume (mainstem of the Cape Fear River is a turbid Piedmont river)**
- **River flow has the most influence on the outwelling of nitrogen, as opposed to phosphorus or silicate**
- **River flow has a positive impact on phytoplankton biomass in and near plume**
- **Little seasonality expressed in plume nutrient and chlorophyll concentrations thus far (17 cruises in 2 years). Temperature effect expressed only for flow and dissolved oxygen**