NUTRIENT AND CHLOROPHYLL PATTERNS IN RIVER-INFLUENCED LONG BAY VERSUS NON RIVER-INFLUENCED ONSLOW BAY OCEAN WATERS

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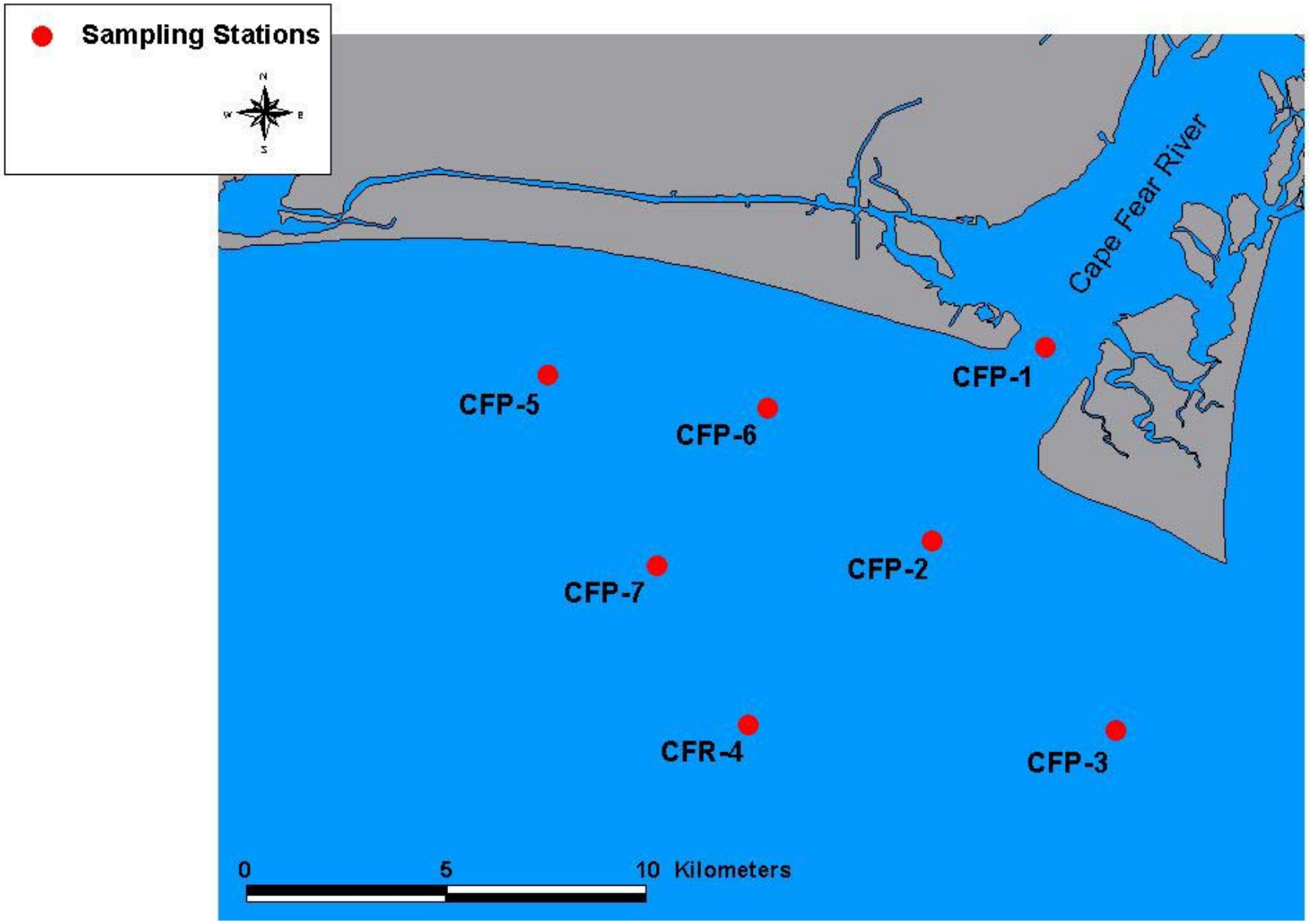
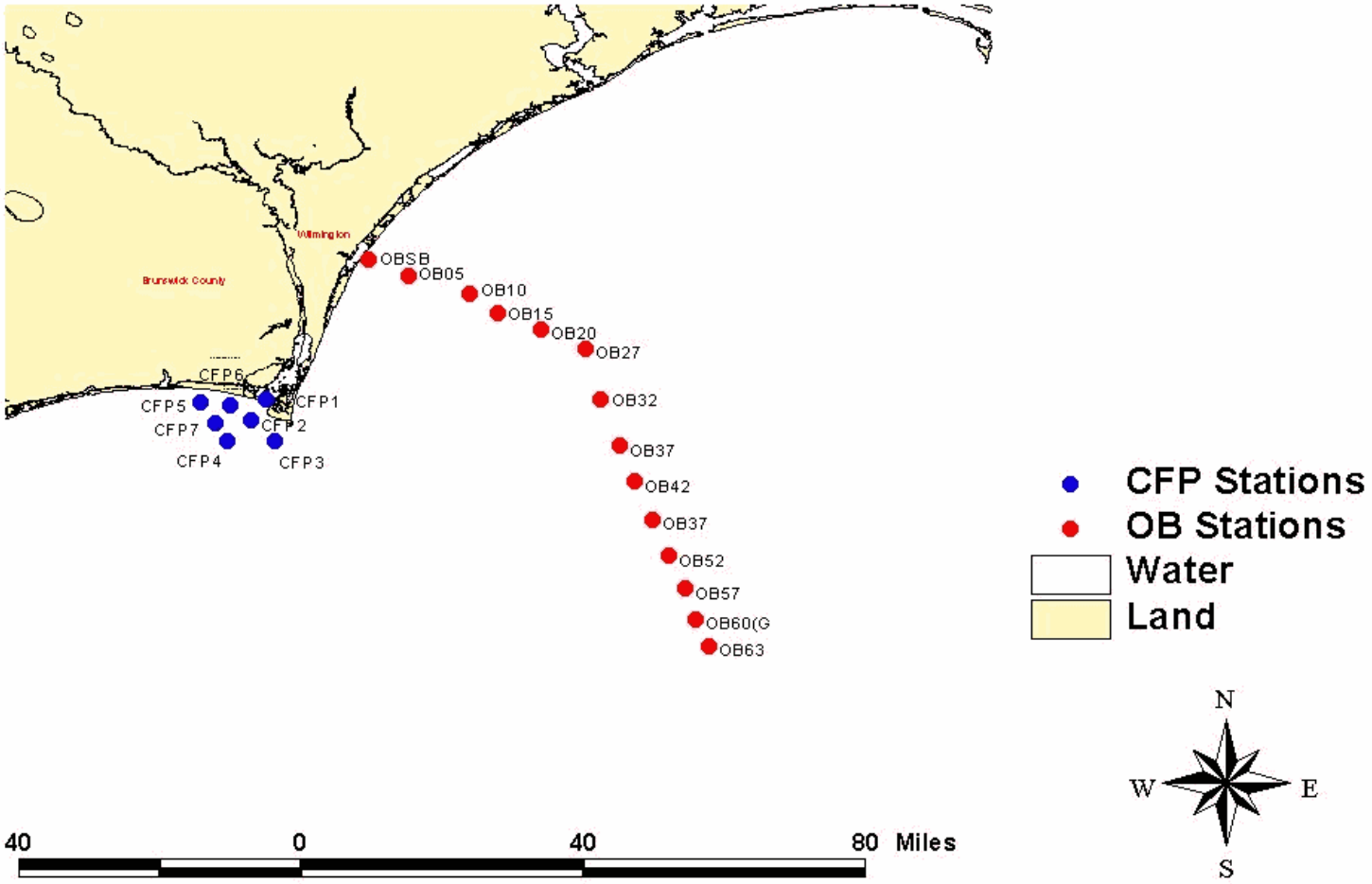
OVERALL PROJECT APPROACH – WATER QUALITY PORTION OF THE UNC WILMINGTON COASTAL OCEAN RESEARCH AND MONITORING PROGRAM (CORMP)

- Conduct monthly biological/chemical/physical sampling cruises to seven stations located in the lower Cape Fear estuary and coastal ocean within and outside of the plume
- Conduct bimonthly sampling of nutrients, chlorophyll, and irradiance characteristics along a 100 km transect in Onslow Bay, including surface, mid-depth, and bottom
- Perform regression/correlation analyses to determine meteorological and hydrological influences on the CFR plume and its ecology, and phytoplankton production in Onslow Bay

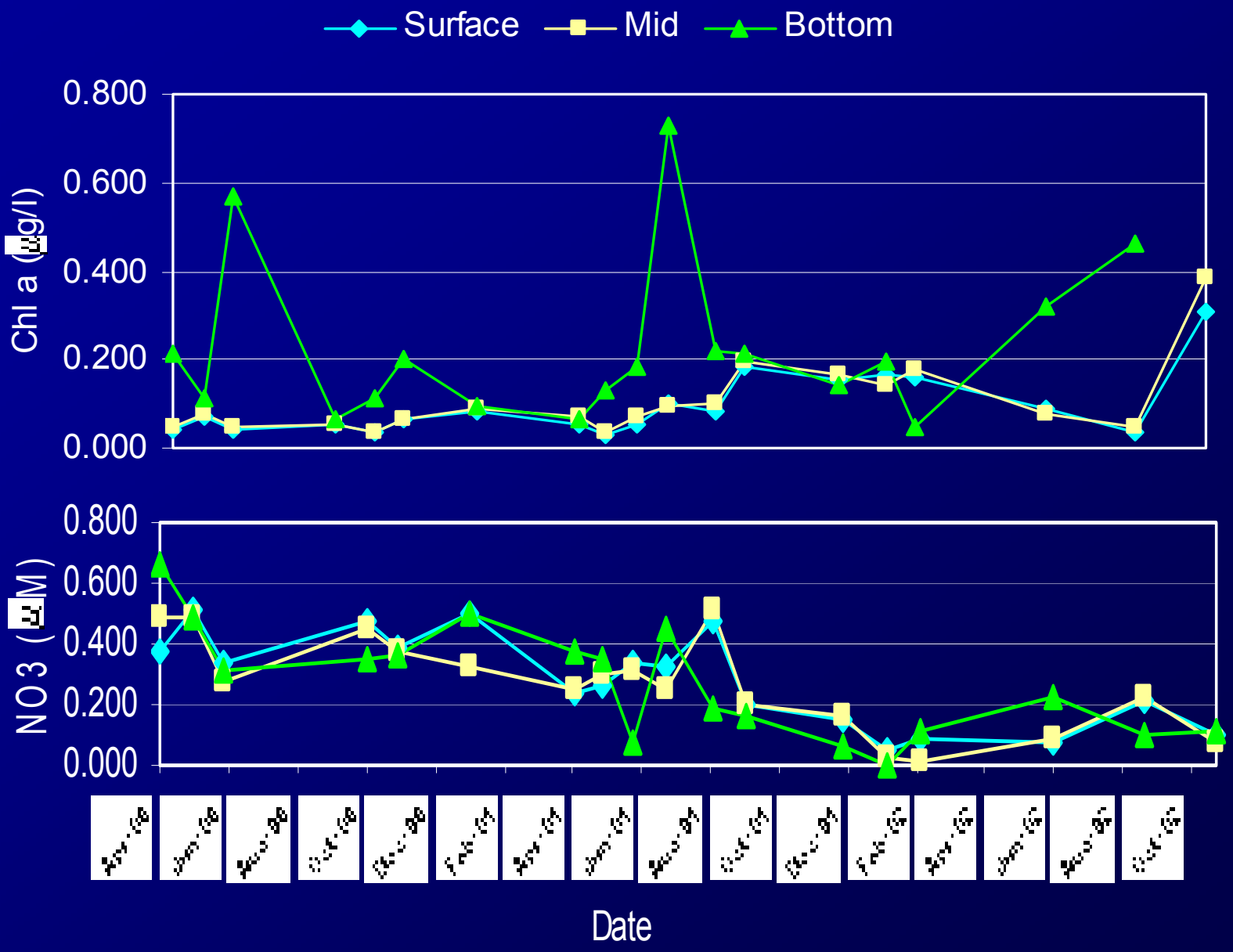
UNCW-COMP Plume Sampling Stations



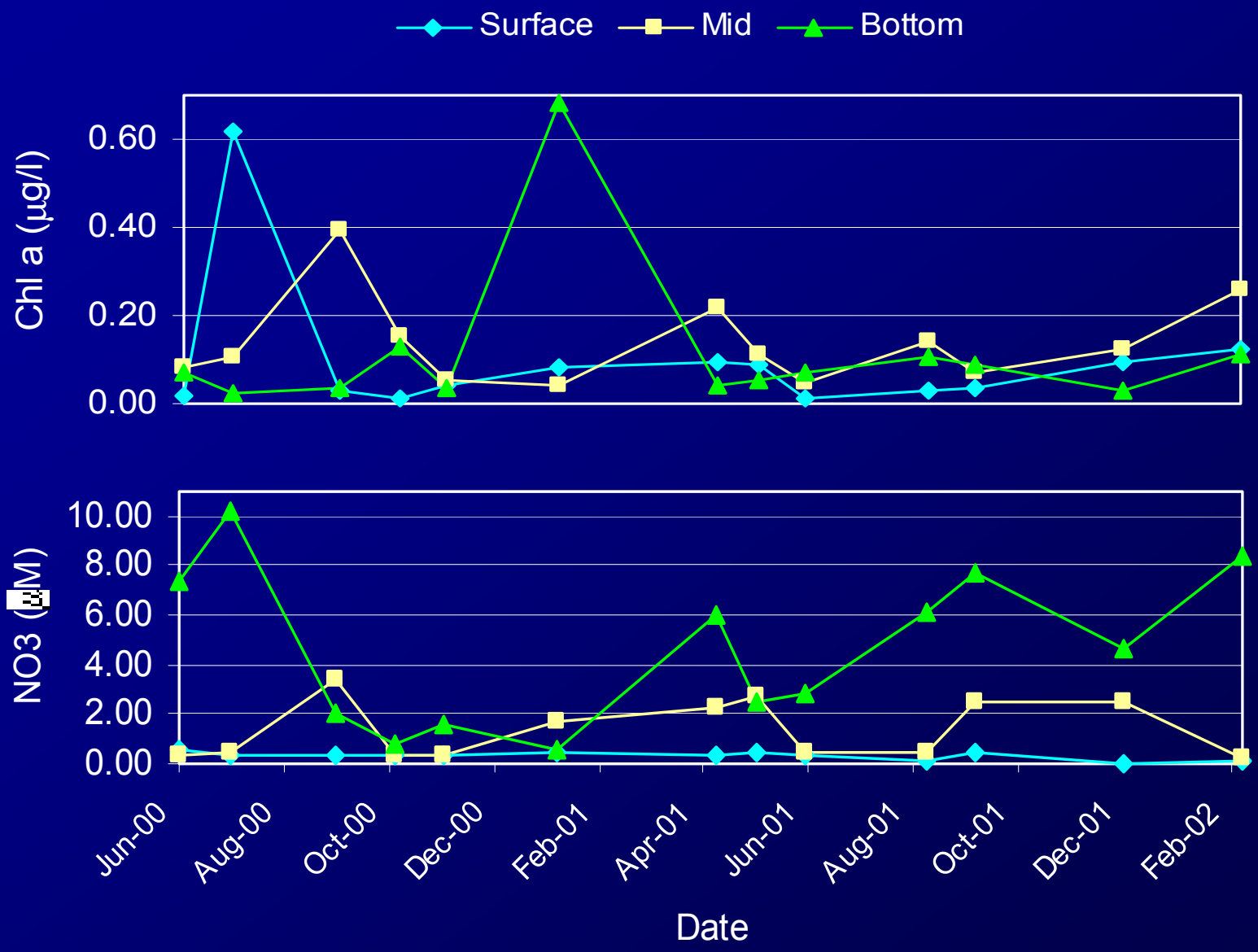
UNCW/NOAA Coastal Monitoring Program



Chlorophyll *a* and Nitrate Data for OB27



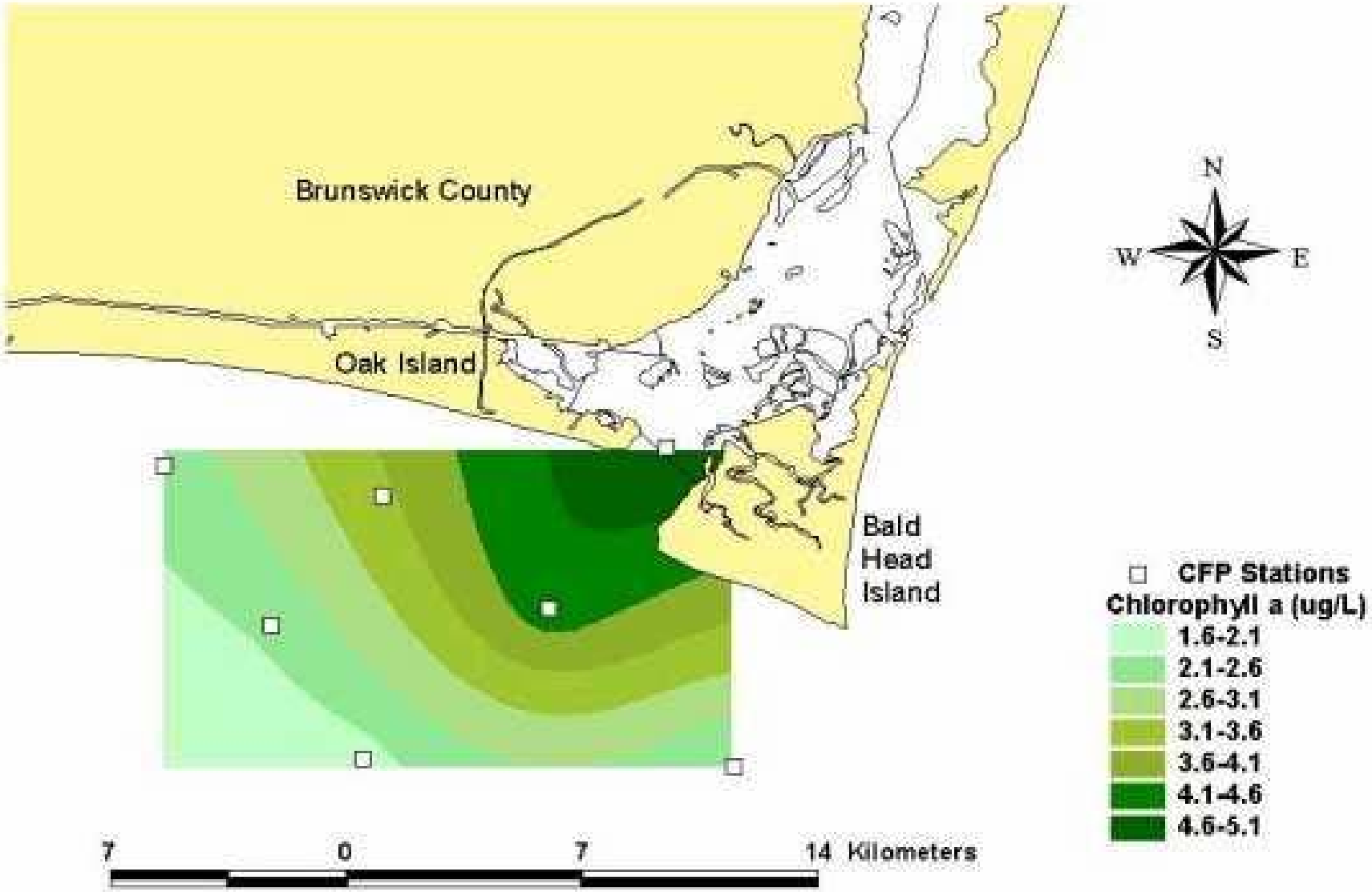
Chlorophyll *a* and Nitrate Data for OB63



ONSLOW BAY NUTRIENTS AND CHLOROPHYLL – PRELIMINARY RESULTS

- **Ammonium is the dominant inorganic nitrogen component at OB27– nitrate concentrations low (<0.6 μM) at all three depths**
- **Nitrate in bottom and mid-depth at OB63 is 10X that of OB27 (Gulf Stream intrusions?)**
- **Water column chlorophyll *a* is greatest near the bottom at OB27 (probably resuspension), but similar among depths at OB63 – light limitation likely retards phytoplankton production at 50-100 m depth (<0.01 % I_0)**
- **No seasonal signal detected in either nutrients or chlorophyll concentrations**

UNCW/NOAA Coastal Monitoring Program



AVERAGE SURFACE PARAMETER LEVELS
LONG BAY versus ONSLOW BAY

	LB plume	LB control	OB5	OB27	OB63
Nitrate (μM)	1.41	0.72	0.22	0.26	0.41
Chlor *a* (μg/L)	3.2	1.9	0.44	0.11	0.12
Kd / m	0.70	0.67	0.23	0.14	0.13
Depth	10 m	10 m	15 m	27 m	110 m
Iz as % Io	0.10%	0.12%	3.17%	2.28%	<0.01%
Distance	7 km	7 km	8 km	45 km	100 km

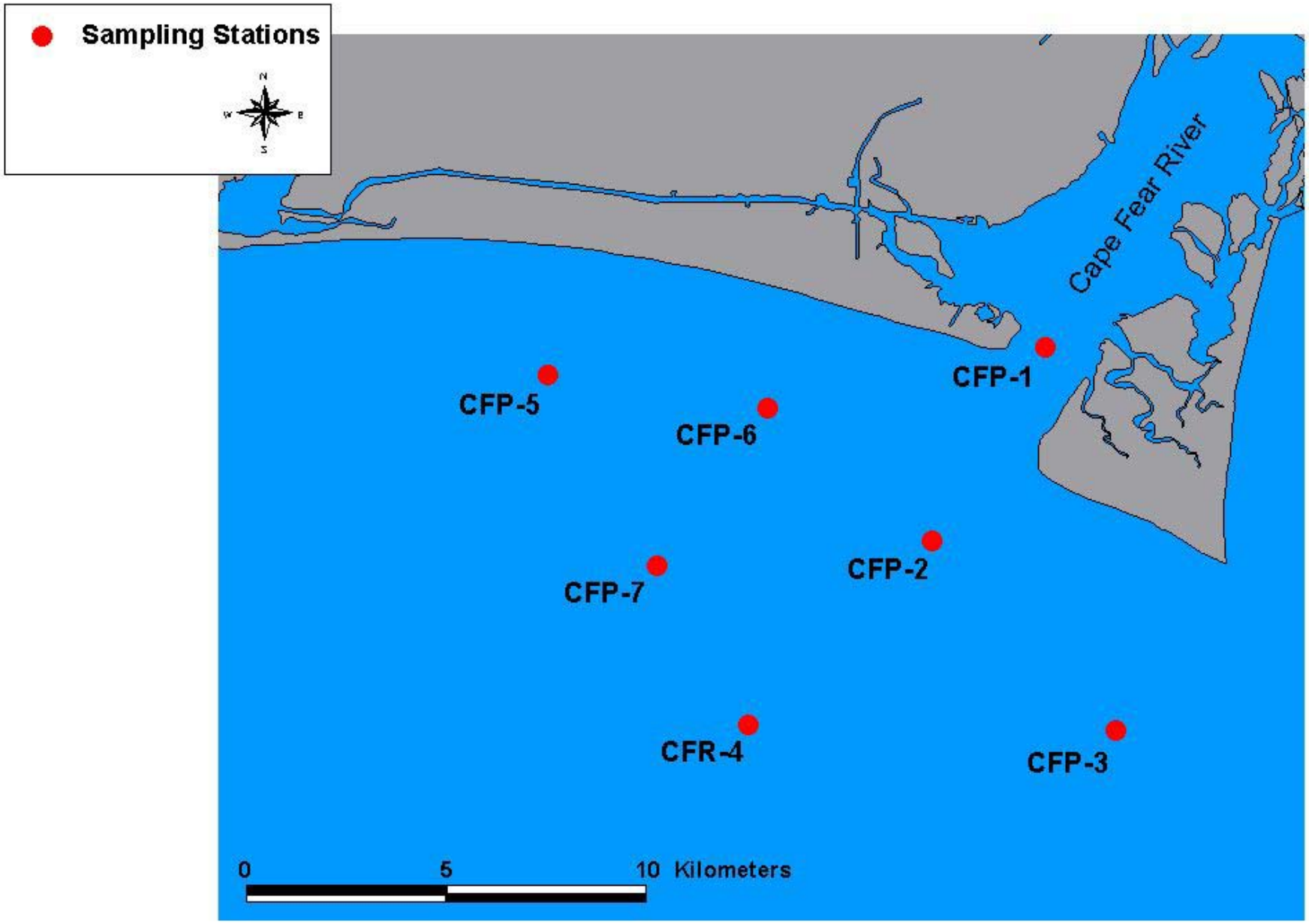
Onslow Bay – Long Bay Nearshore Comparisons

- **The Cape Fear plume station yielded greater nitrate and chlorophyll concentrations than a control station outside the plume in Long Bay**
- **Both Long Bay stations yielded chlorophyll 4-8X that of an Onslow Bay station of similar distance from shore, and nitrate 3-7X higher**
- **The influence of the Cape Fear River is thus evident outside of the plume in Long Bay**
- **The Cape Fear River typifies many rivers entering the South Atlantic bight from N.C. to North Florida**

More…

- **There is sufficient PAR (>2.3% of surface irradiance) to the bottom up to 40 km offshore in Onslow Bay, whereas PAR is <0.2% of surface irradiance in and near the CFR plume in Long Bay**
- **Much of the food web base is thus likely benthic microalgae-based in nearshore Onslow Bay, but phytoplankton-based in nearshore Long Bay**

UNCW-COMP Plume Sampling Stations



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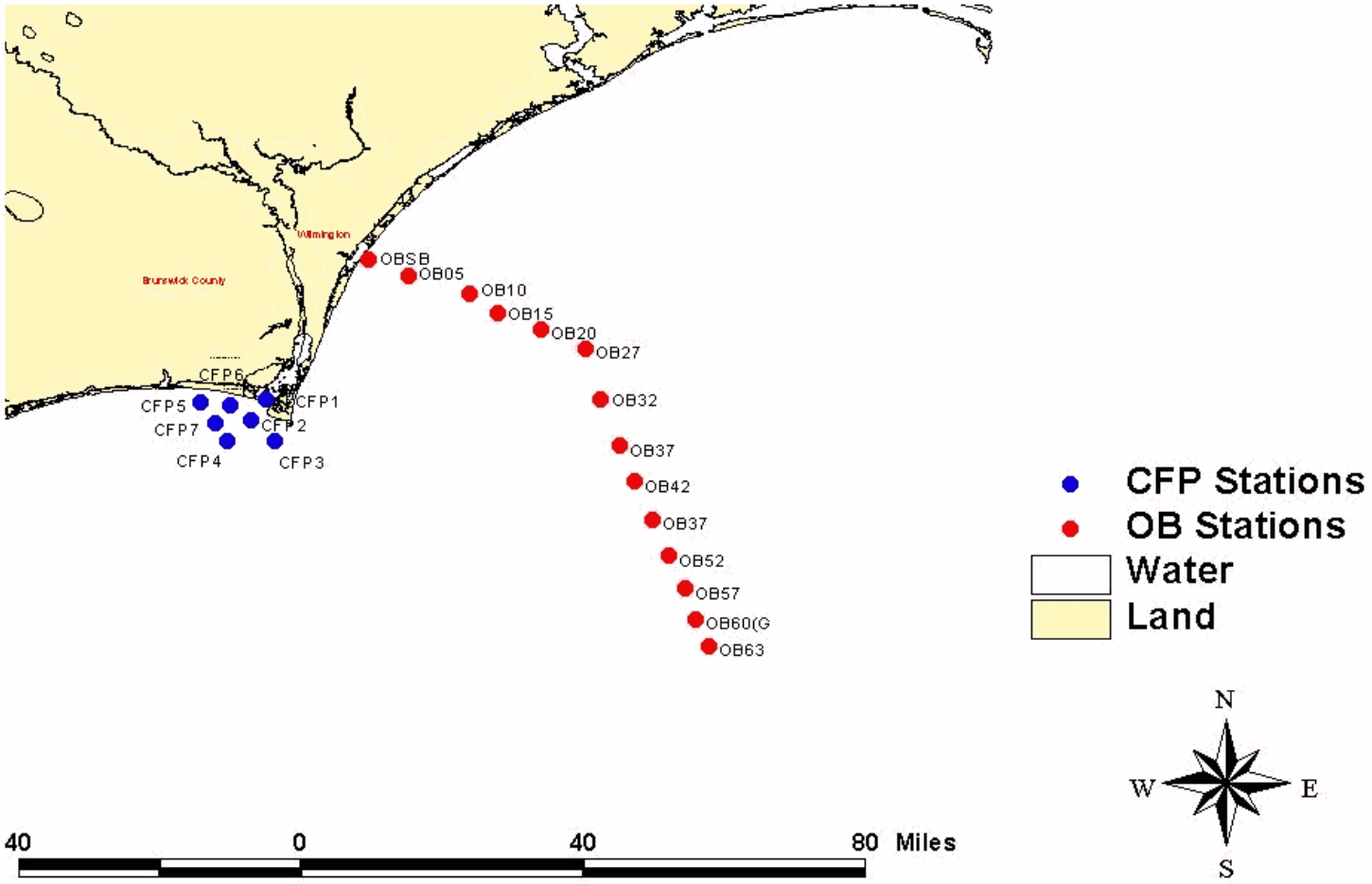

OTHER ONGOING CORMP EFFORTS AND FUTURE NEEDS AND GOALS

- Continue field collections in plume and further offshore to obtain signals during normal to high flow conditions – data thus far are largely from drought conditions
- Continue bioassay experiments to detect seasonal changes in limiting nutrients in the CFR plume
- Need physical/geological data in Long Bay to further assess inshore-offshore plume effects
- Look at plume data in terms of food chain stimulation, i.e. develop statistical approach to assess relationships among chlorophyll, benthos, fish
- Assess offshore water column nutrient concentrations and chlorophyll in terms of wind/weather events