Demonstration of a Multiscale Integrated Monitoring and Assessment in New York/New Jersey Harbor Estuary

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Acknowledgements

EMAP
Regions
State and Local Governments
Academic Partners
Image courtesy of NASA-JSC

Presentation Outline

- Background
- Demonstration of Multiscale Approach
- Summary

Background Information

Regulatory Context

Monitoring and Assessment Programs

Organizing Framework

The
305(b)
303(d)
Connec

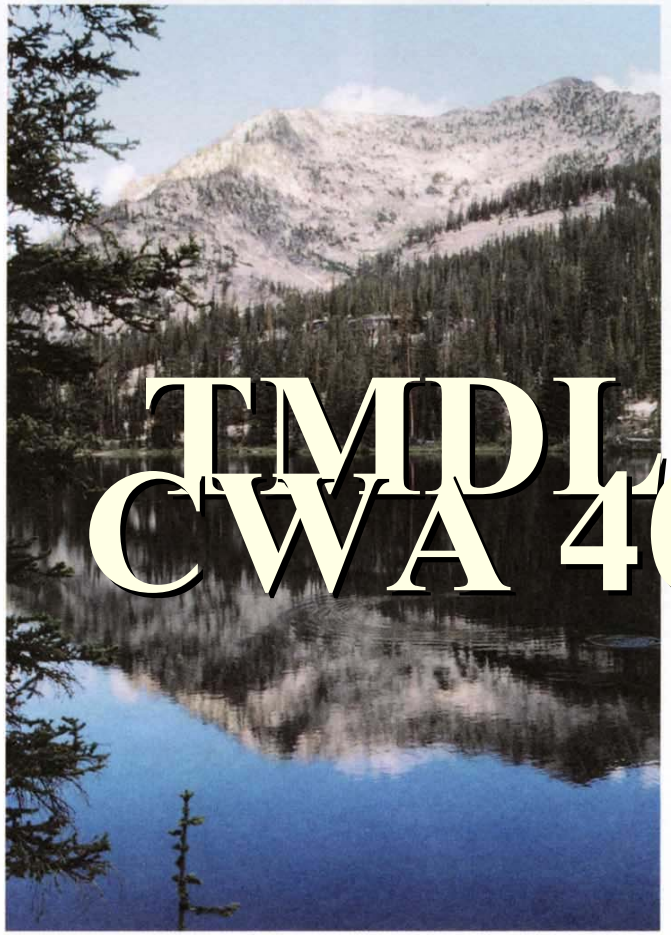
EPA

United States Environmental Protection Agency

Office of Water
Washington, DC 20460

EPA841-S-97-001
April 1998

The Quality of Our Nation's Water:



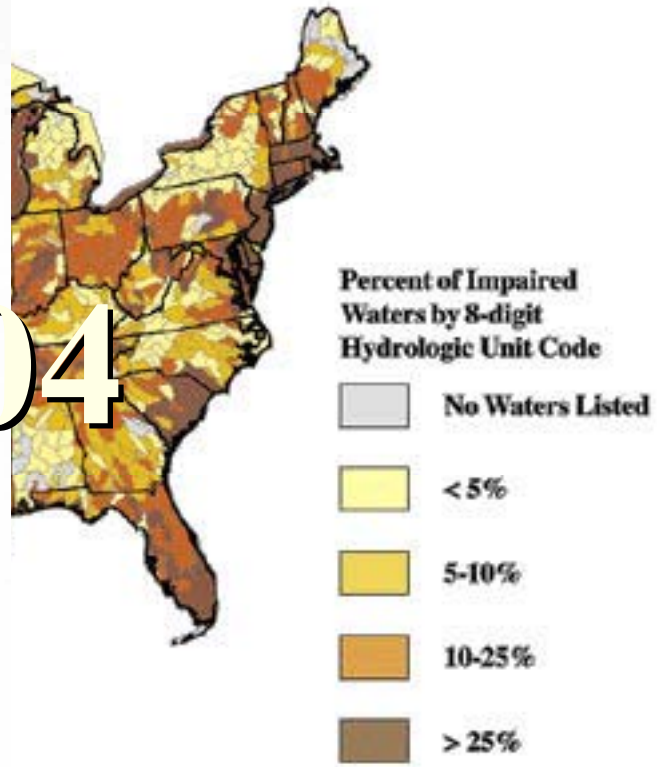
Executive Summary of the National Water Quality Inventory: 1996 Report to Congress

Clean Water A

305(b)

Water Quality Report

TMDL
CWA 404



Ecological/Biological Indicators

Probability Based Sampling

United States
Environmental Protection
Agency

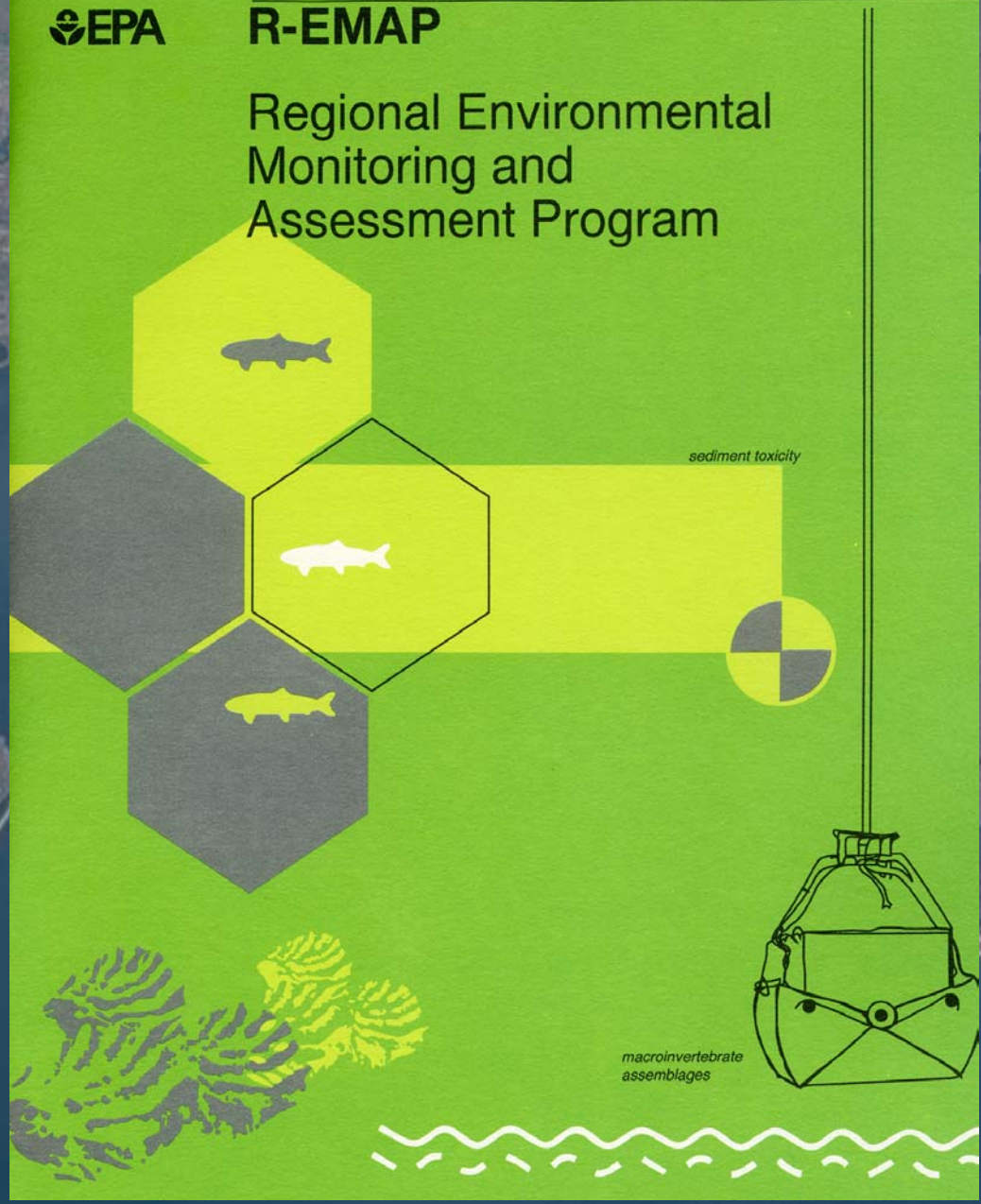
Office of Research and
Development
Washington, DC 20460

EPA/625/R-93/012
September 1993

EPA

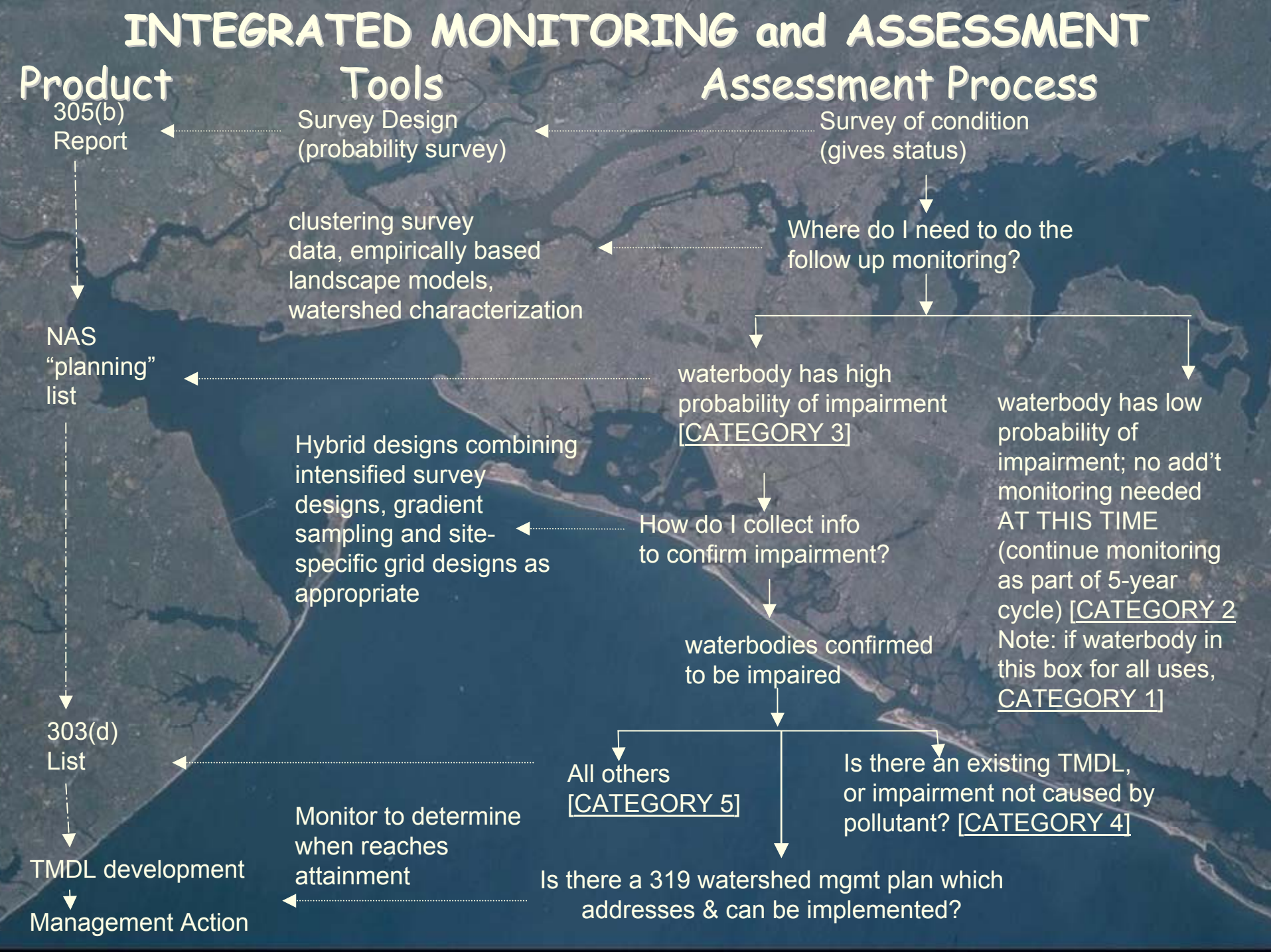
R-EMAP

Regional Environmental Monitoring and Assessment Program



REMAP

Test applicability of EMAP approach to answer questions about ecological conditions at regional and local scales


INTEGRATED MONITORING and ASSESSMENT
Product
Tools
Assessment Process
305(b) Report
Survey Design (probability survey)
Survey of condition (gives status)
clustering survey data, empirically based landscape models, watershed characterization
Where do I need to do the follow up monitoring?
NAS "planning" list
waterbody has high probability of impairment [CATEGORY 3]
waterbody has low probability of impairment; no add't monitoring needed AT THIS TIME (continue monitoring as part of 5-year cycle) [CATEGORY 2
Note: if waterbody in this box for all uses, CATEGORY 1]
Hybrid designs combining intensified survey designs, gradient sampling and site-specific grid designs as appropriate
How do I collect info to confirm impairment?
waterbodies confirmed to be impaired
303(d) List
All others [CATEGORY 5]
Is there an existing TMDL, or impairment not caused by pollutant? [CATEGORY 4]
Monitor to determine when reaches attainment
TMDL development
Is there a 319 watershed mgmt plan which addresses & can be implemented?
Management Action

Integrated Water Quality Monitoring & Assessment Report Guidance

Category 1: Waterbody attaining standards & no designated use threatened

Category 2: Waterbody attaining some designated uses; no use threatened; or insufficient or no data & info available to determine if remaining uses are attained or threatened

Category 3: Insufficient or no data & info to determine if any designated use is attained

Category 4: Waterbody is impaired or threatened for one or more use(s) but does not require development of a TMDL, as (a) TMDL is complete, (b) other pollution control requirements expected to result in attainment in near future, or (c) impairment not caused by a pollutant

Category 5: Water quality standard is not attained. Waterbody is impaired or threatened for one or more designated use(s) by a pollutant(s) and requires a TMDL

A Multiscale Demonstration of the Framework

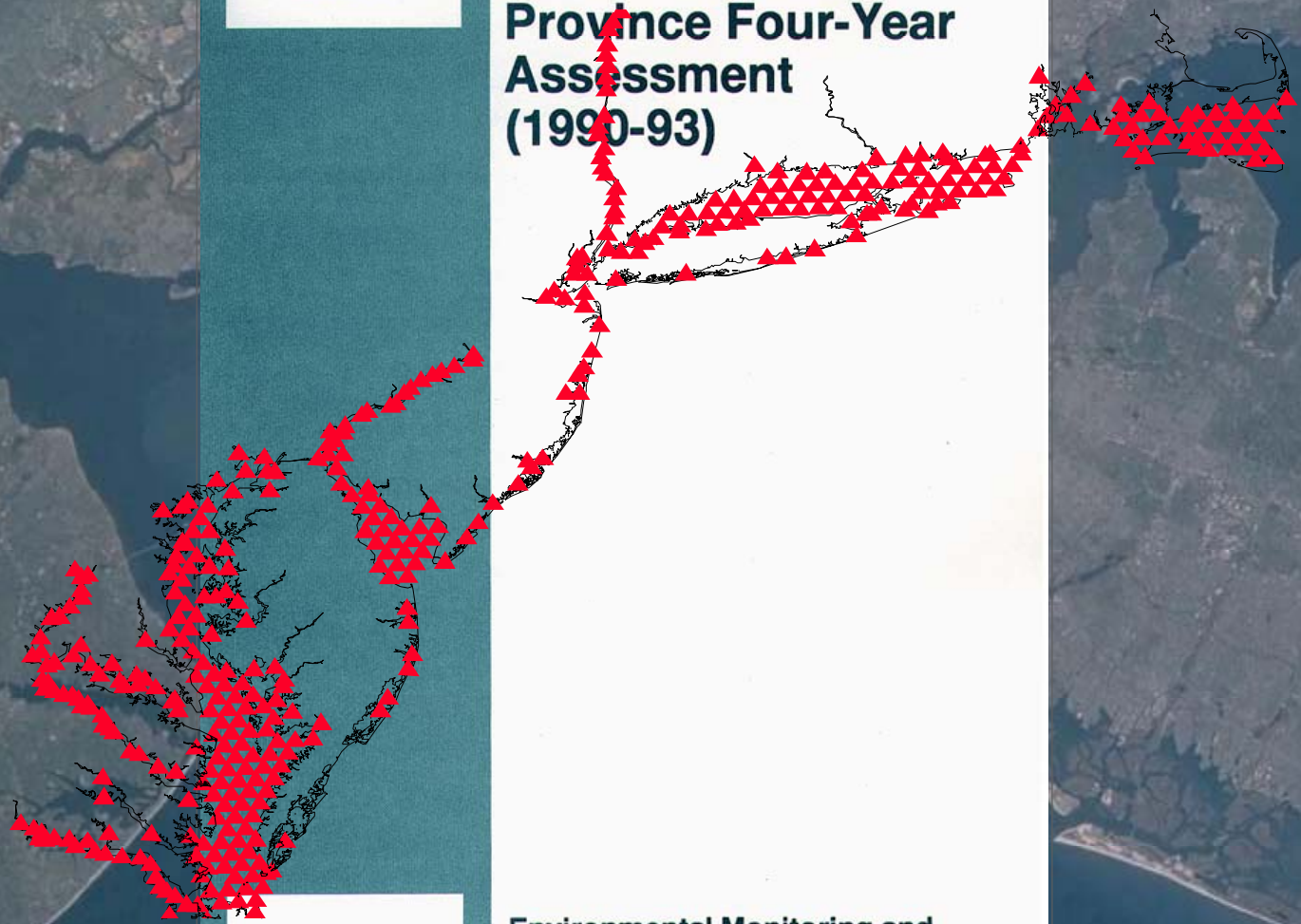
Regional scale

System scale

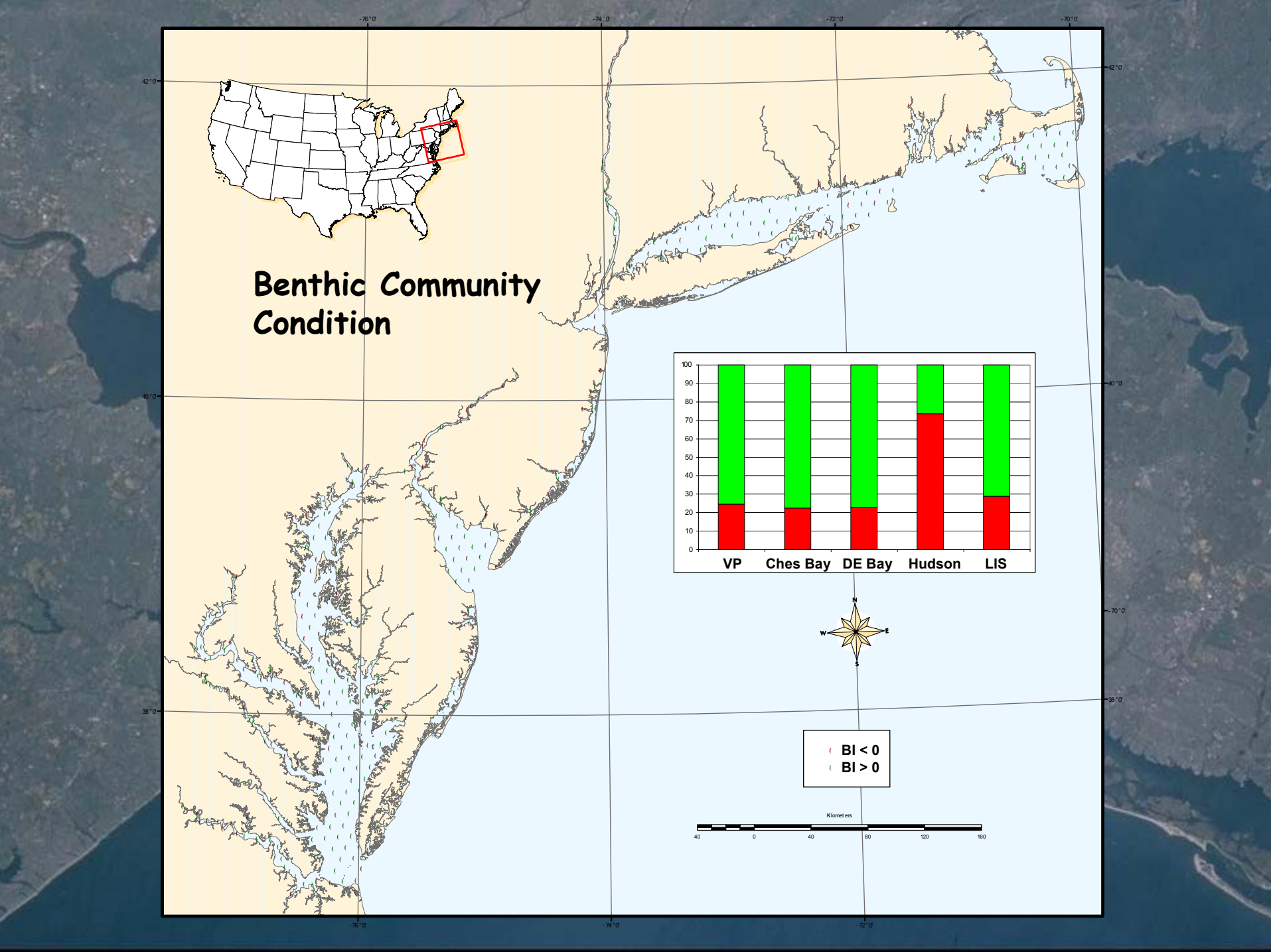
Management Action scale

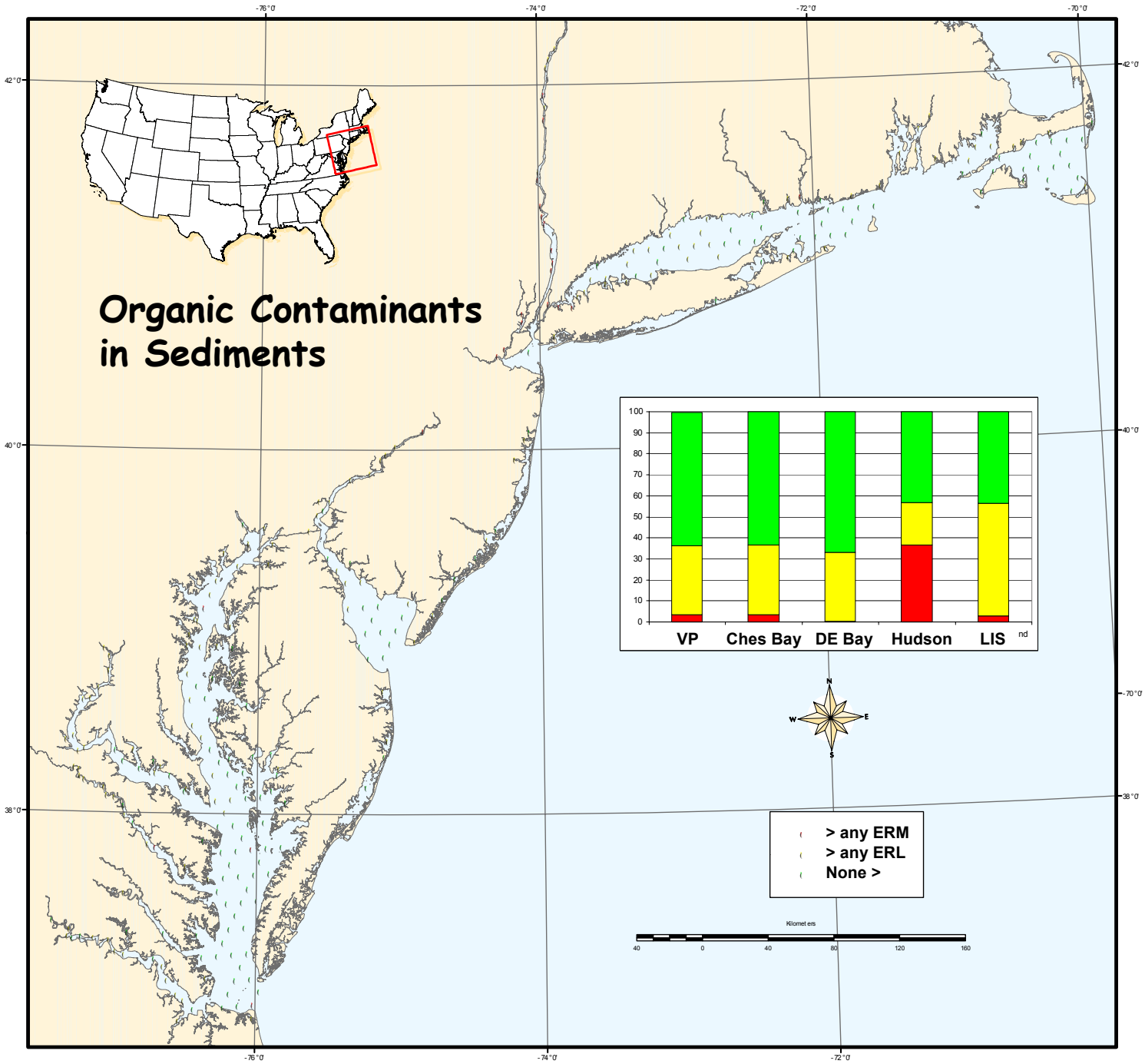
United States Environmental Protection Agency
Office of Research and Development Washington DC 20460
EPA/620/R-99/004 October 1999

EMAP-Virginian Province Four-Year Assessment (1990-93)



Environmental Monitoring and Assessment Program


Benthic Community Condition
100
90
80
70
60
50
40
30
20
10
0
VP
Ches Bay
DE Bay
Hudson
LIS
N
W
E
S
BI < 0
BI > 0
Kilometers
40
0
40
80
120
160
-76°0
-74°0
-72°0
-70°0
42°0
40°0
38°0


Organic Contaminants
in Sediments
100
90
80
70
60
50
40
30
20
10
0
VP
Ches Bay
DE Bay
Hudson
LIS
nd
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> any ERM
> any ERL
None >
Kilometers
40
0
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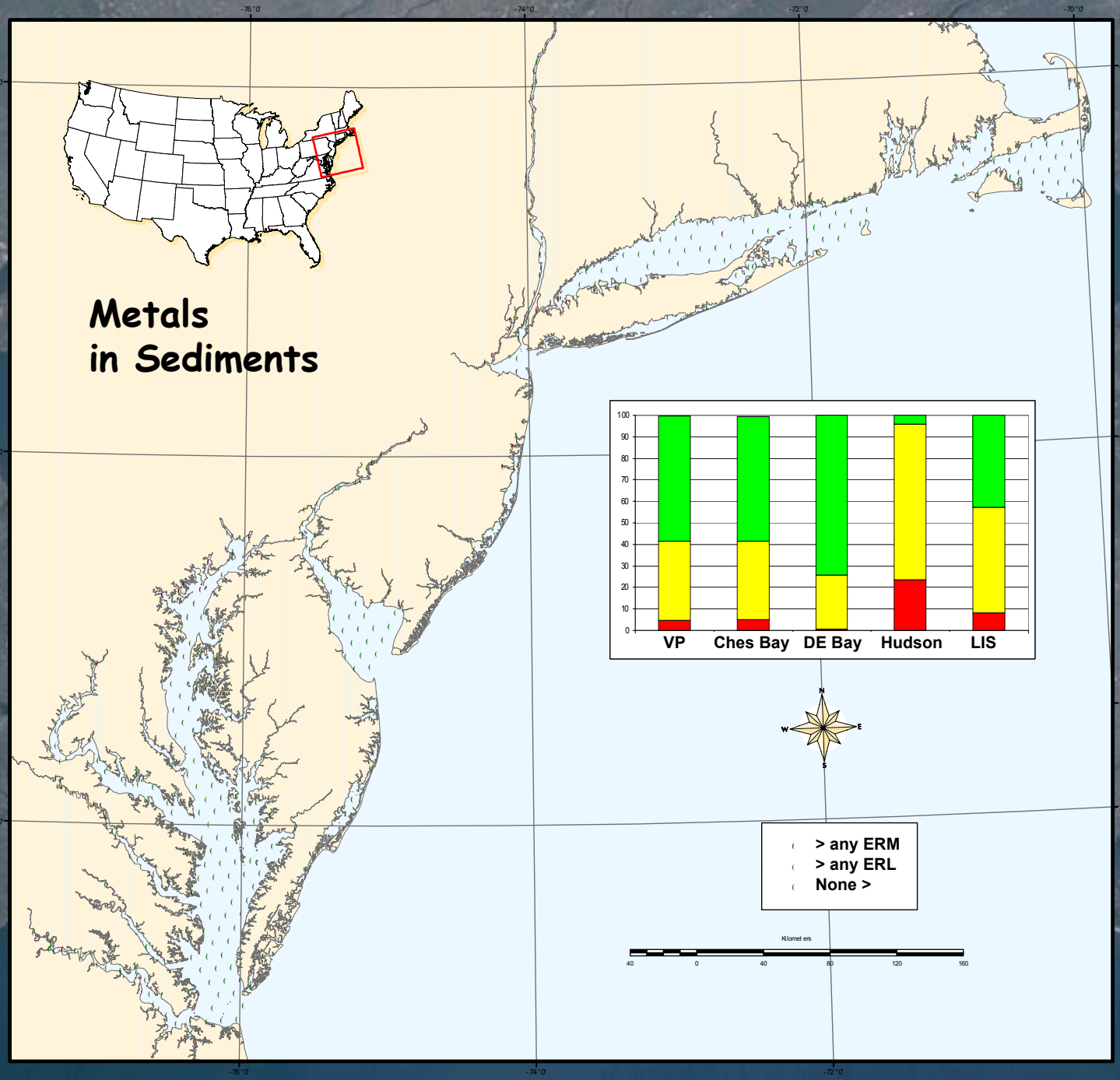
160
-76°0'
-74°0'
-72°0'
-70°0'
42°0'
40°0'
38°0'


Metals
in Sediments
100
90
80
70
60
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40
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20
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LIS
N
W
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S
> any ERM
> any ERL
None >
Kilometers
40
0
40
80
120
160

Association of Sediment Contamination with Impacted Benthic Communities

	Virginian Province	Chesapeake Bay	Delaware Bay	Hudson-Raritan	Long Island Sound
Exceed any ERM	9%	12%	< 1%	23%	9%
Exceed any ERM or ERL	69%	75%	39%	98%	83%

EMAP-VP Study Conclusions

Hudson-Raritan System has the largest percent area of impacted benthic communities

Hudson-Raritan has the strongest association for impacted benthic communities with sediment contamination

EPA/902-R-98-001
March 1998

Final Report

SEDIMENT QUALITY OF THE NY/NJ HARBOR SYSTEM

An Investigation under the Regional Environmental Monitoring and Assessment Program (R-EMAP)

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U.S. Environmental Protection Agency - Region 2
Edison, NJ

Joel S. O'Connor
U.S. Environmental Protection Agency - Region 2
New York, NY

Stephen B. Weisberg
Southern California Coastal Water Research Project
Westminster, CA

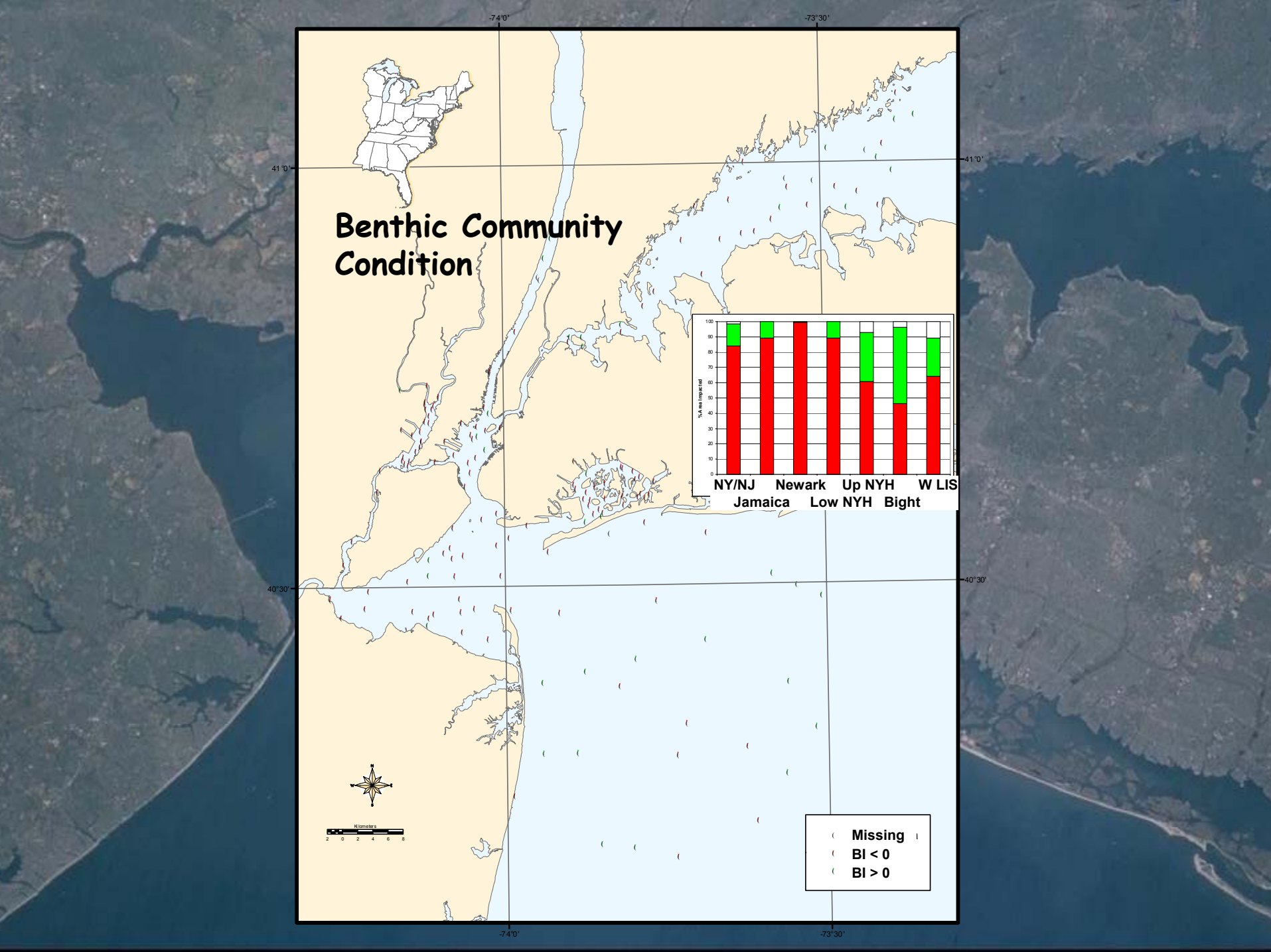
March 1998

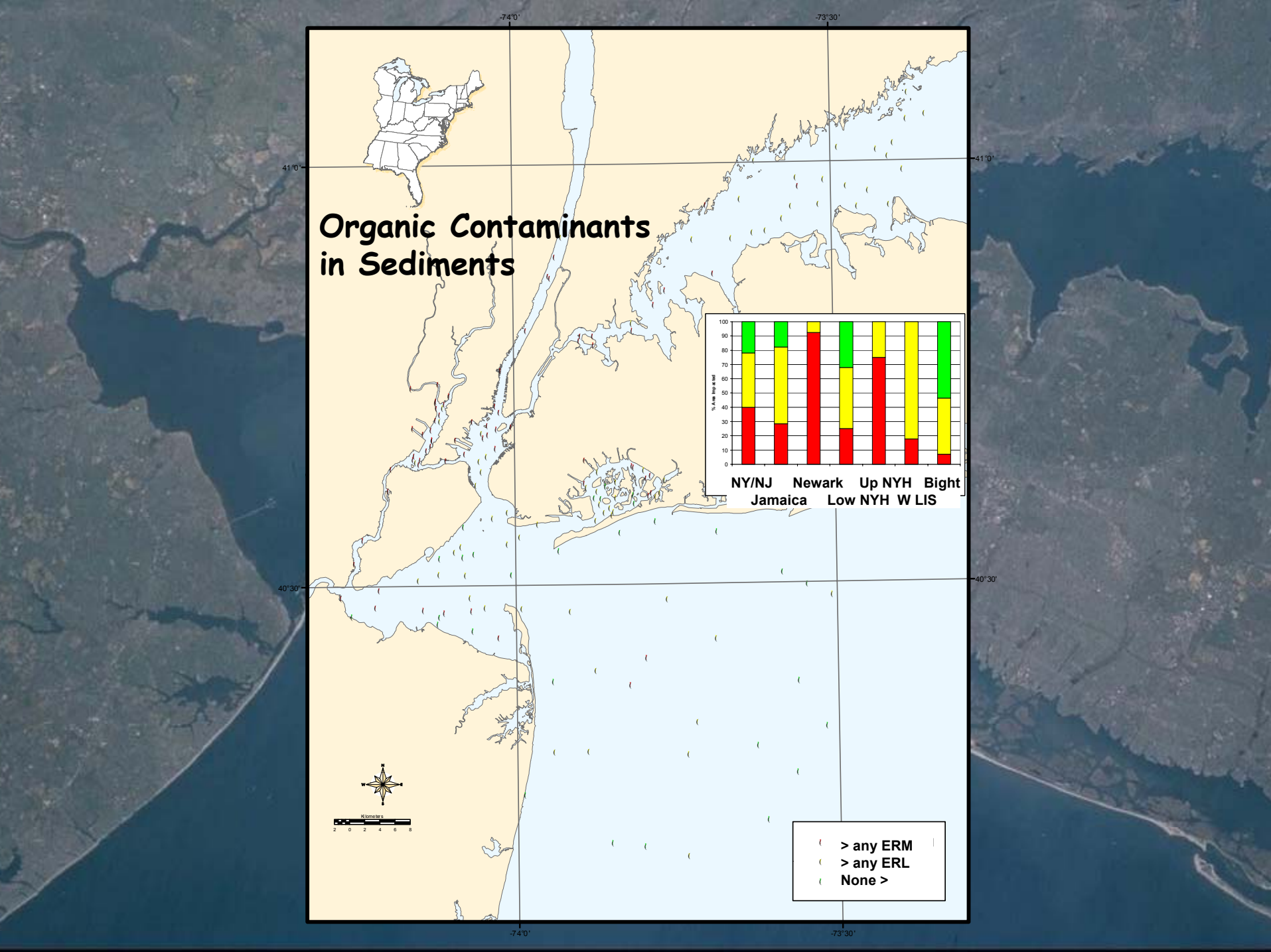
New York/New Jersey Harbor System REMAP Study Questions

What are the extent and magnitude of sediment degradation in the NY/NJ Harbor system?

Is the degree of degradation similar throughout the system, or is it more severe or widespread in particular sub-basins or areas?

Can the degradation be associated with particular contaminants or physical characteristics of the sediment?


-74°0'
-73°30'
41°0'
40°30'
Benthic Community Condition
%Area Impacted
NY/NJ Jamaica
Newark Low NYH
Up NYH Bight
W LIS
Missing
BI < 0
BI > 0
Kilometers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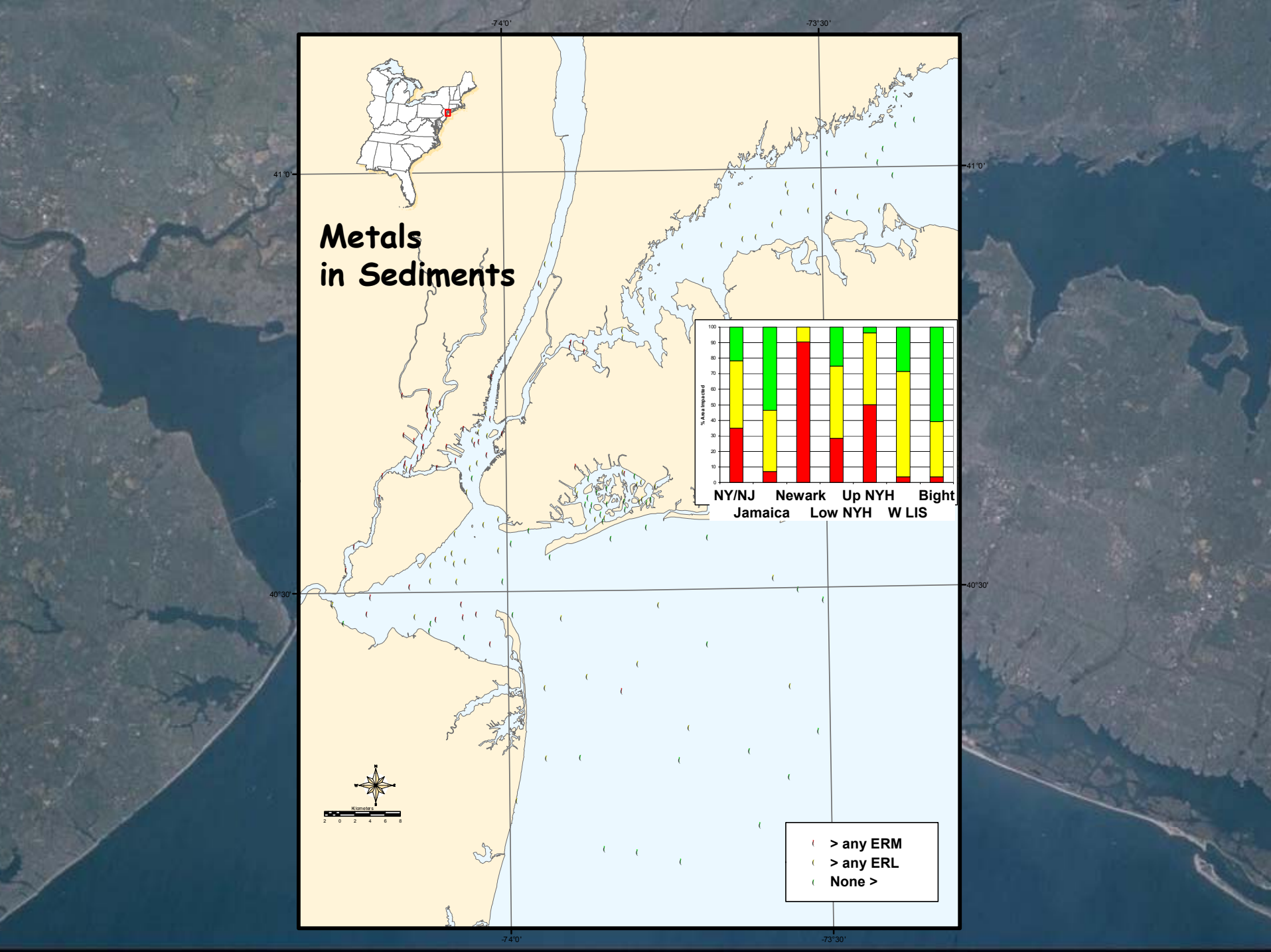
Organic Contaminants
in Sediments
100
90
80
70
60
50
40
30
20
10
0
NY/NJ
Jamaica
Newark
Low NYH
Up NYH
W LIS
Bight
Kilometers
2 0 2 4 6 8
> any ERM
> any ERL
None >


Metals
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-74°0'
-73°30'
41°0'
40°30'
% Area Impacted
NY/NJ
Jamaica
Newark
Low NYH
Up NYH
W LIS
Bight
> any ERM
> any ERL
None >

REMAP Study Conclusions

Contamination is widespread in the Harbor

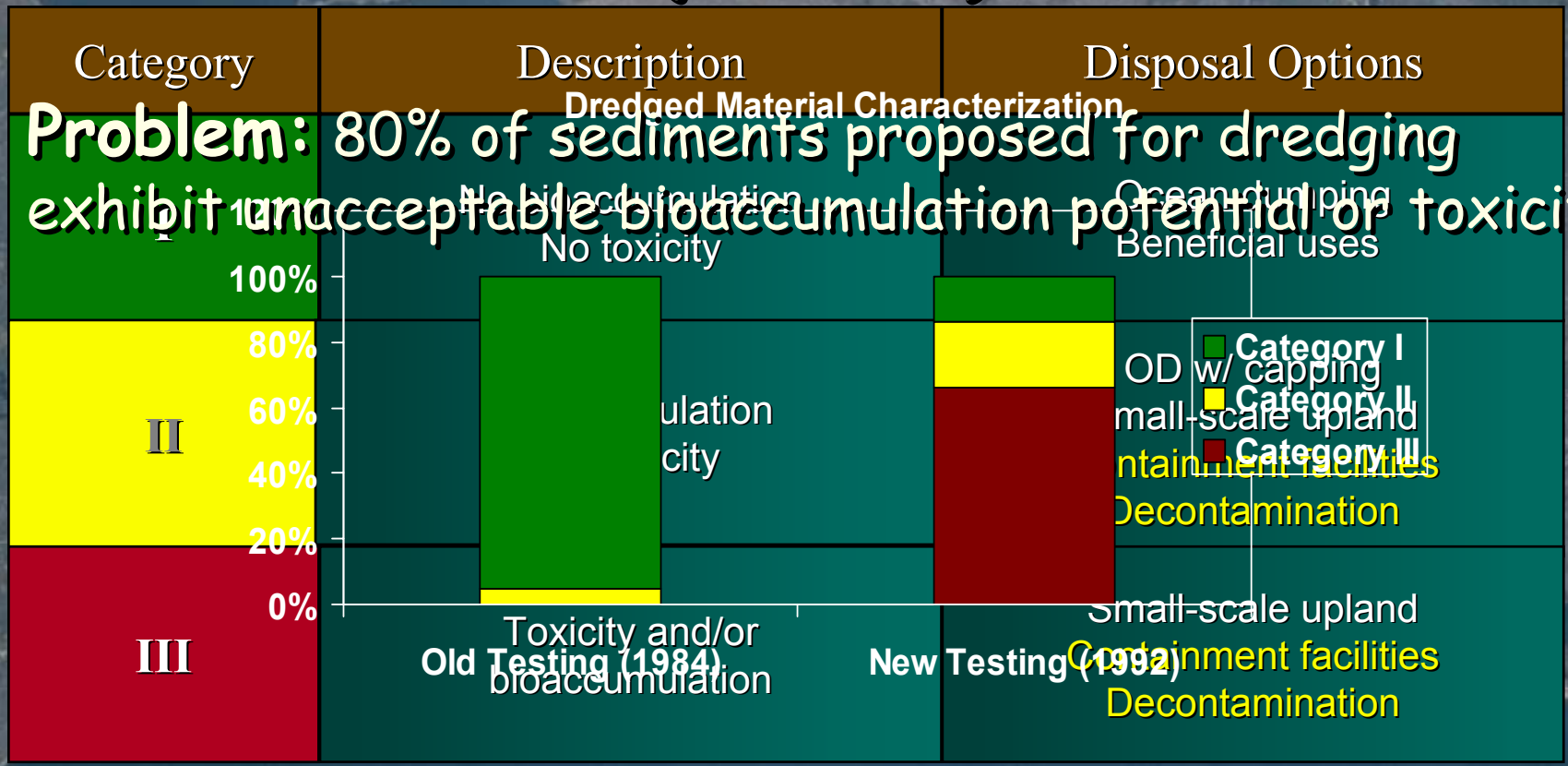
Contamination is distributed across chemical classes

Condition of benthic communities is strongly associated with chemical contamination

Compatible design and methods allow unbiased comparison of conditions with those across wider geographic area

Contamination Assessment and Reduction Project (CARP)

Problem: 80% of sediments proposed for dredging exhibit unacceptable bioaccumulation potential or toxicity



Contamination Assessment and Reduction Project (CARP)

Problem: 80% of sediments proposed for dredging exhibit unacceptable bioaccumulation potential or toxicity

Purpose: Establish scientifically sound basis for taking action to reduce ongoing and unacceptable chemical contamination of harbor sediments

Components: Modeling and monitoring

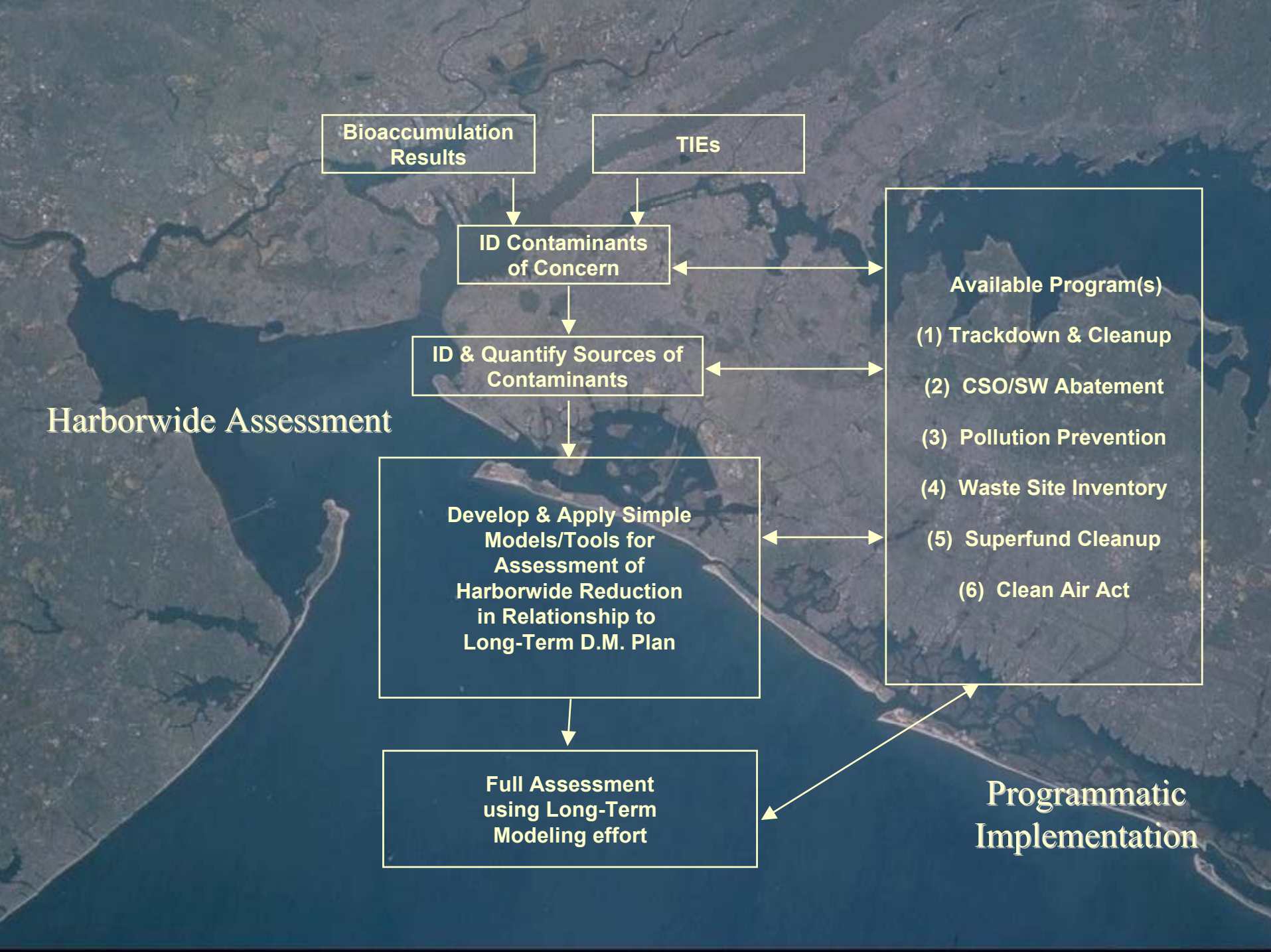
Question to be Addressed by CARP

What is relative importance of specific loadings of specific contaminants to the quality of dredged material today?

CARP Approach

Combine probability survey information with other data and modeling to achieve multiple purposes

- Baseline
- Benchmarks for other studies
- Modeling - develop/apply, identify gaps, projections
- Ability to detect change


Bioaccumulation Results
TIEs
ID Contaminants of Concern
ID & Quantify Sources of Contaminants
Develop & Apply Simple Models/Tools for Assessment of Harborwide Reduction in Relationship to Long-Term D.M. Plan
Full Assessment using Long-Term Modeling effort
Available Program(s)
(1) Trackdown & Cleanup
(2) CSO/SW Abatement
(3) Pollution Prevention
(4) Waste Site Inventory
(5) Superfund Cleanup
(6) Clean Air Act
Harborwide Assessment
Programmatic Implementation

Monitoring Plan

- External Sources
- Ambient Conditions
  - Water
  - Sediment
  - Biota

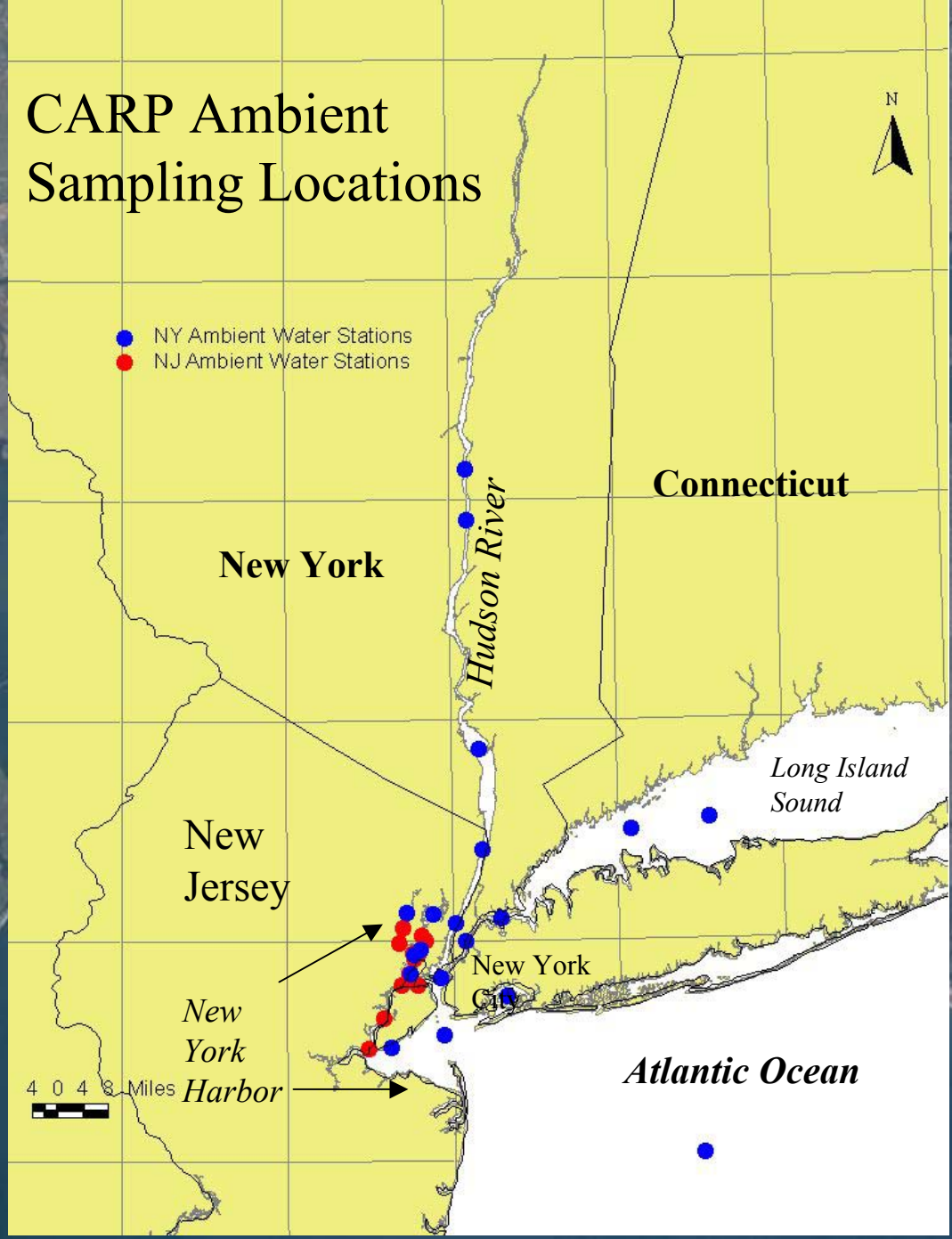
- PCBs
- PAHs
- Dioxins & Furans
- Hg & Cd
- DDT
- Chlordane
- Dieldrin

External Sources

- STPs
- CSOs & SWOs
- Direct Industrial Discharges
- Tributaries (Hudson, Mohawk, Passaic, Hackensack, Raritan Rivers & minor tributaries)
- Landfills
- Accidental Spills
- Atmospheric Deposition

Ambient Monitoring

- Water
  - 19 locations
  - 4 times per year
- Sediment
  - at water locations
  - Surficial sediments - REMAP coordination
  - Additional cores
- Biota
  - Zooplankton
  - Benthic invertebrates (bivalves, worms & shrimp)
  - Fish & Crabs (mummichog, white perch, striped bass, American eel, & blue crab)
  - Birds (cormorants)


CARP Ambient
Sampling Locations
N
NY Ambient Water Stations
NJ Ambient Water Stations
Connecticut
New York
Hudson River
Long Island
Sound
New
Jersey
New York
City
New
York
Harbor
Atlantic Ocean
4 0 4 8 Miles

Summary

Demonstration of a Multiscale Integrated Monitoring and Assessment in New York/New Jersey Harbor Estuary

→ Large geographic scale to management action level
→ **Compatible indicators and methods**
→ Appropriate design at each spatial level
→ Combine probability survey data with other data and analysis

INTEGRATED MONITORING and ASSESSMENT

Product

305(b) Report

NAS "planning" list

303(d) List

TMDL development

Management Action

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More Information

EMAP

www.epa.gov/EMAP

CARP

www.harborestuary.org/carp.htm

National Coastal Assessment:

www.epa.gov/EMAP/NCA

Other questions:

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paul.john@epa.gov

pesch.gerald@epa.gov