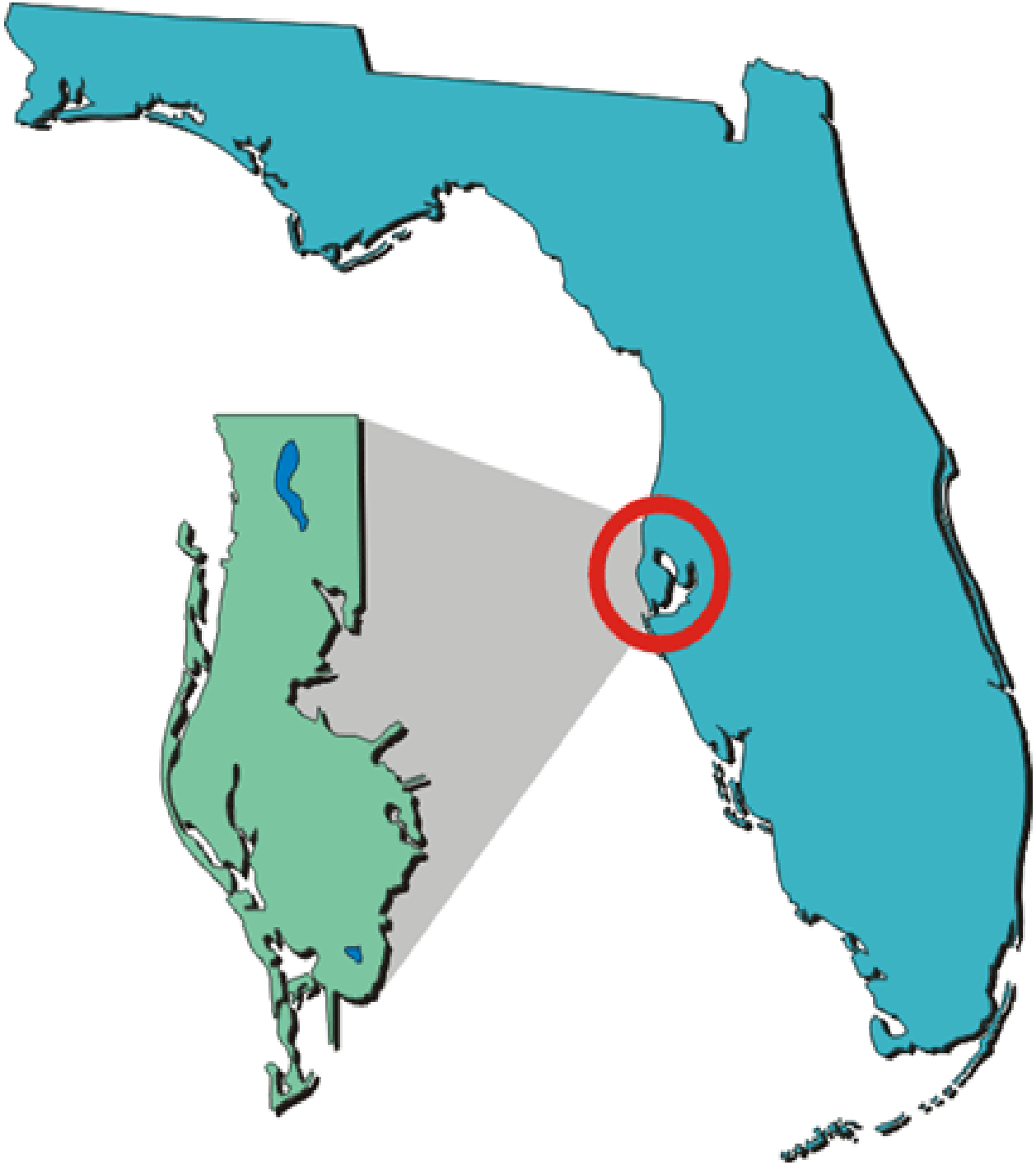
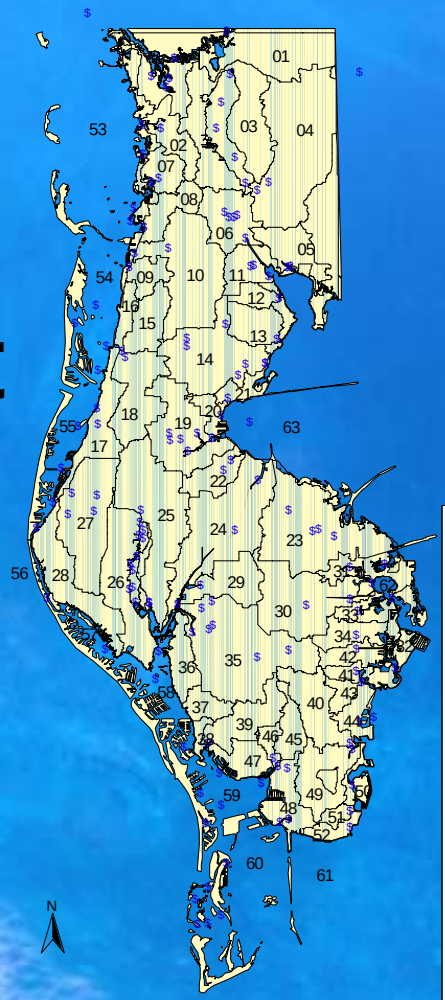
Assessing Pinellas County Surface Water Quality Using a Three-Tiered Monitoring Approach

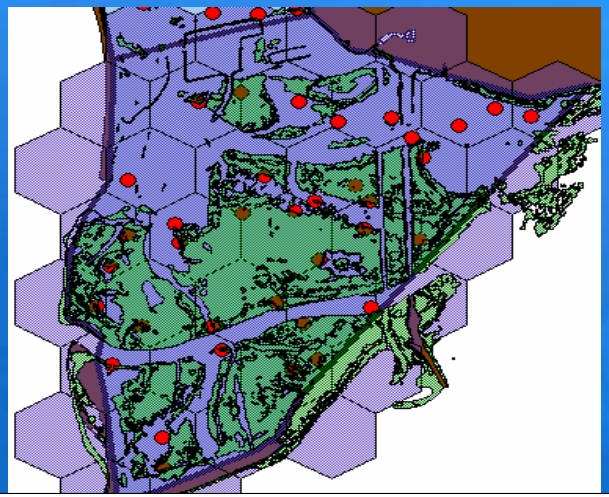
Kelli Hammer Levy and Mark Flock,
Pinellas County Department of Environmental Management
And
David Wade and Anthony Janicki,
Janicki Environmental, Inc.

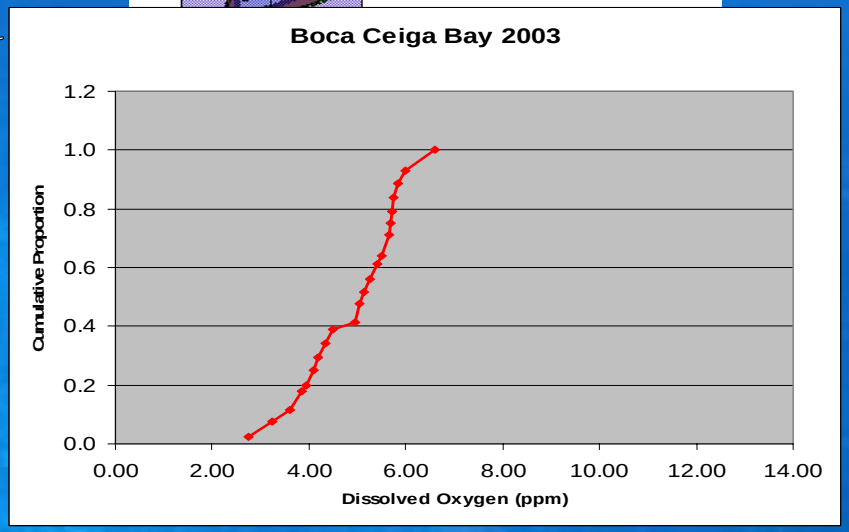


Water Quality Monitoring in Pinellas County

- Past
- Present
- Future

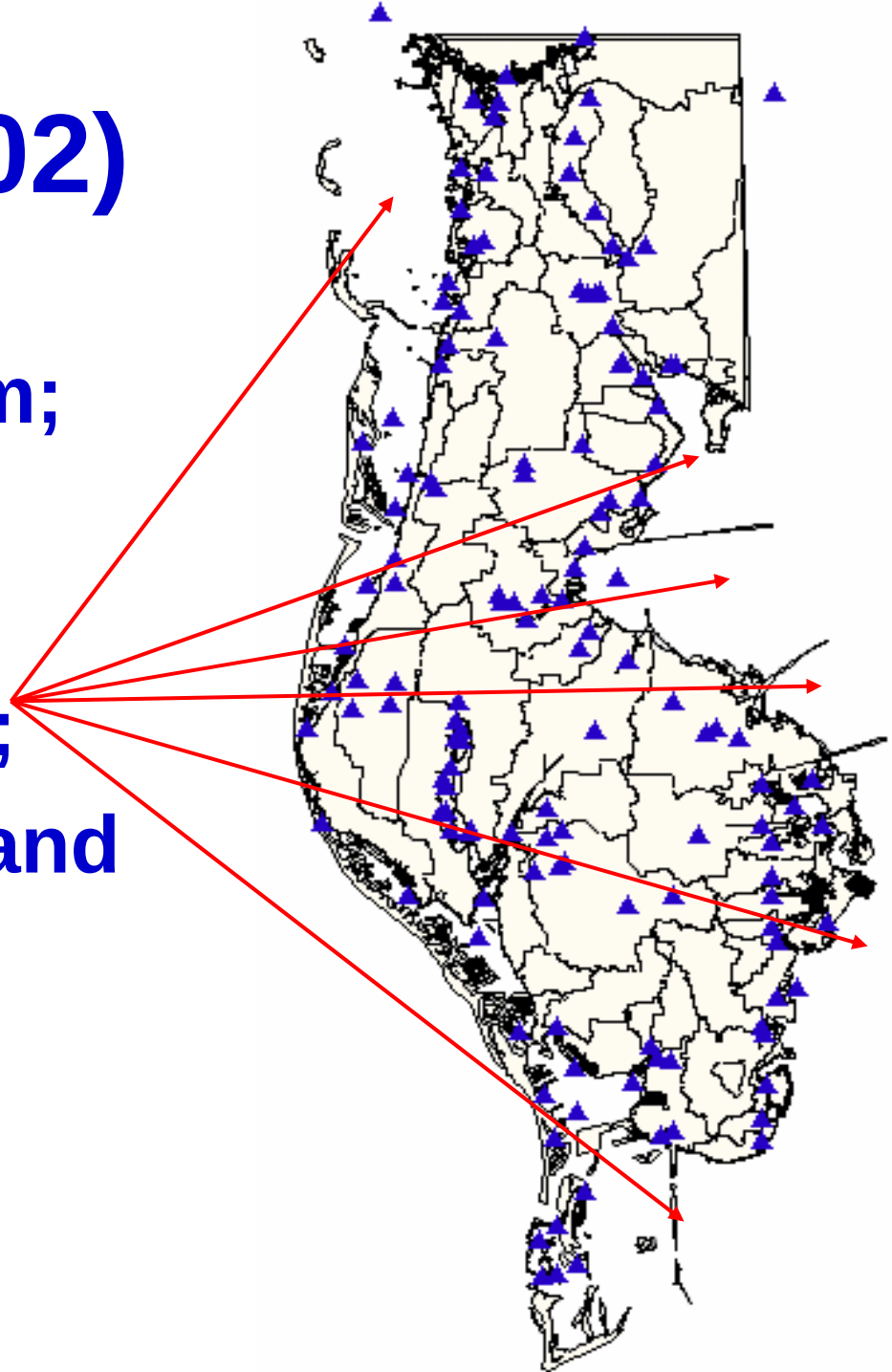






Past (1991-2002)

- Fixed site program;
- Professional judgement;
- Gaps in coverage;
- Tidal influences; and
- Limited trend analysis.



Present Three-Tiered Monitoring Approach

- Probabilistic monitoring design,
- Fixed site monitoring program,
- EMC development and BMP evaluations.

Probabilistic Design Objectives

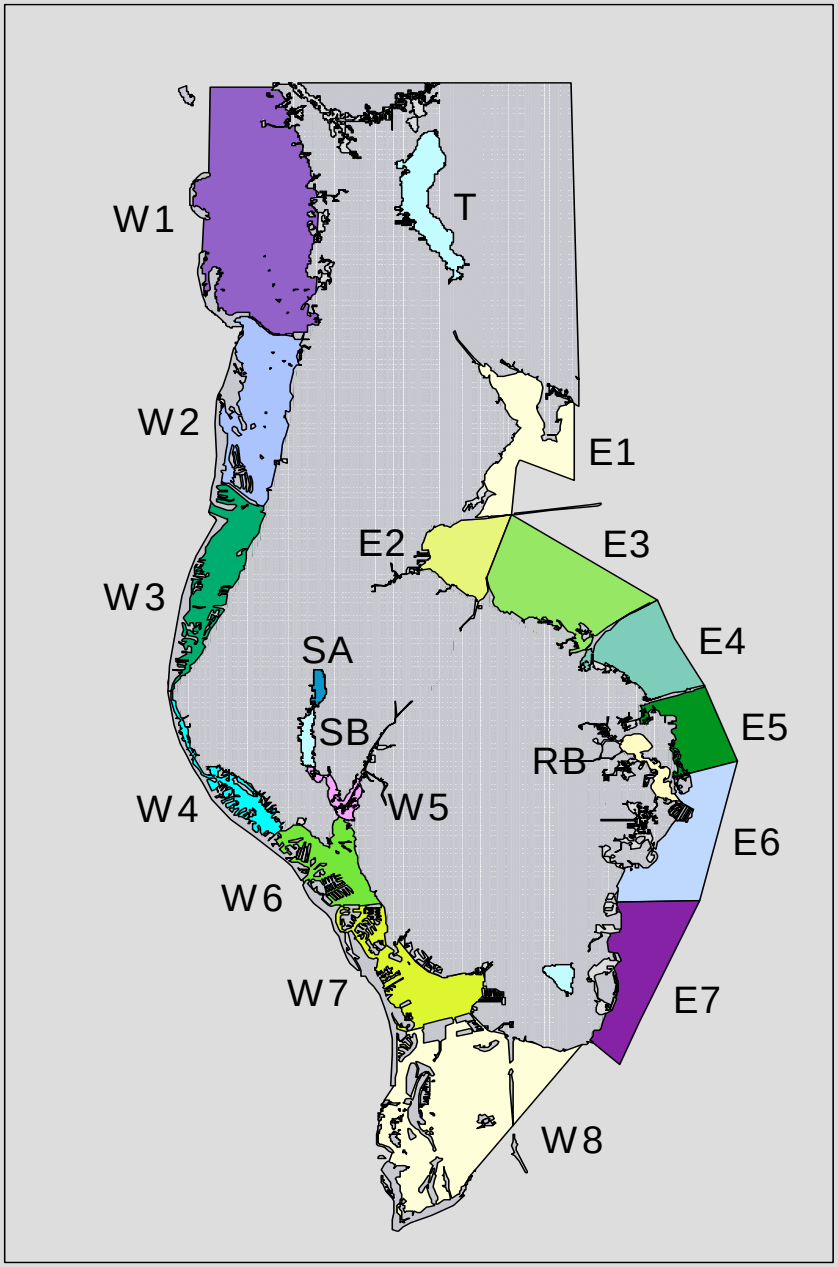
- NPDES permit obligations;
- Status and trend information;
- Reporting;
- State Policy and County Comprehensive Plan requirements;
- Identify problems;

Probabilistic Design Objectives

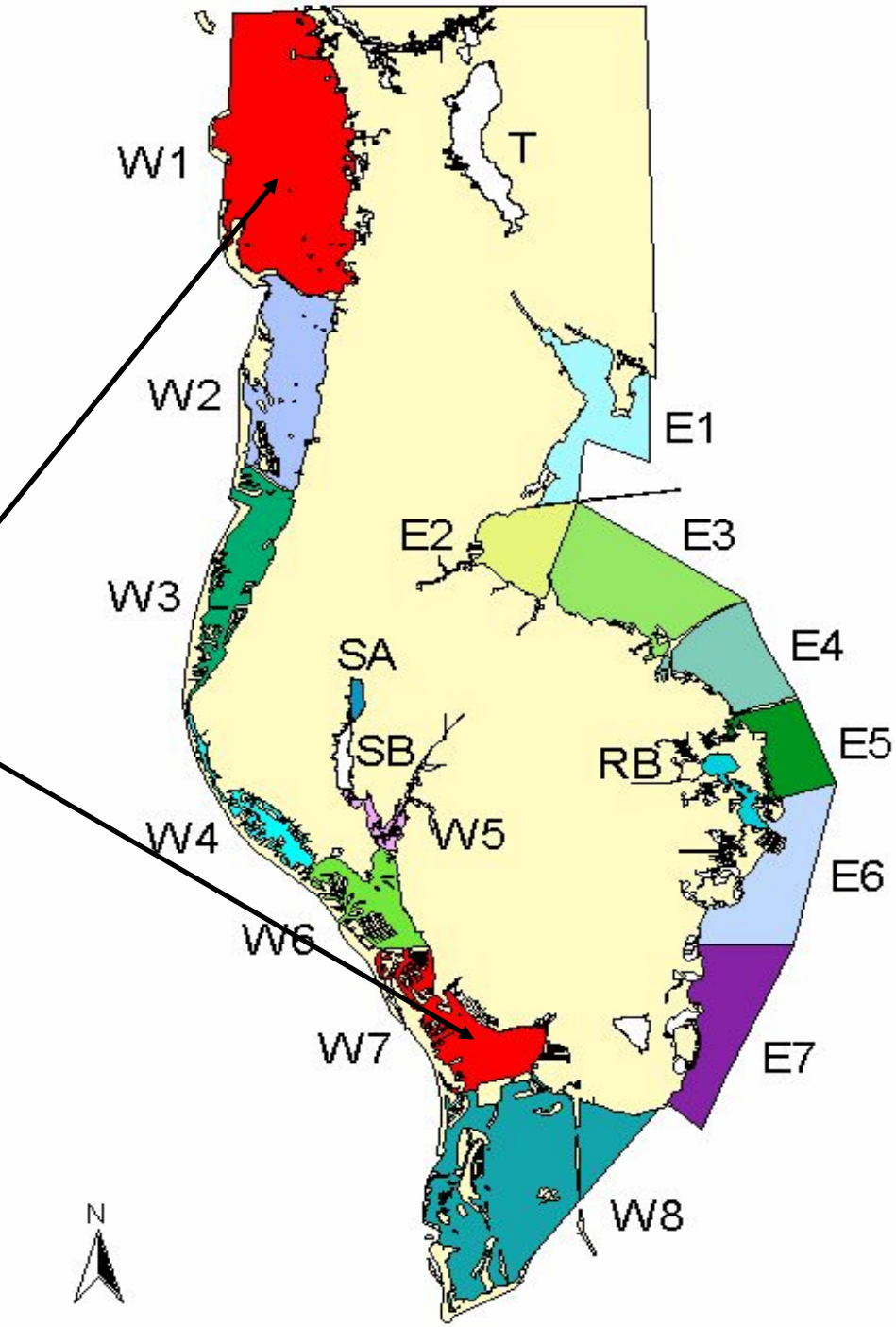
- Measure improvements;
- Prioritization of management efforts;
- Maximize effort and fill data gaps;
- Develop quantitative water quality targets;
- Aerial estimates of water quality; and
- Magnitude and direction of change.

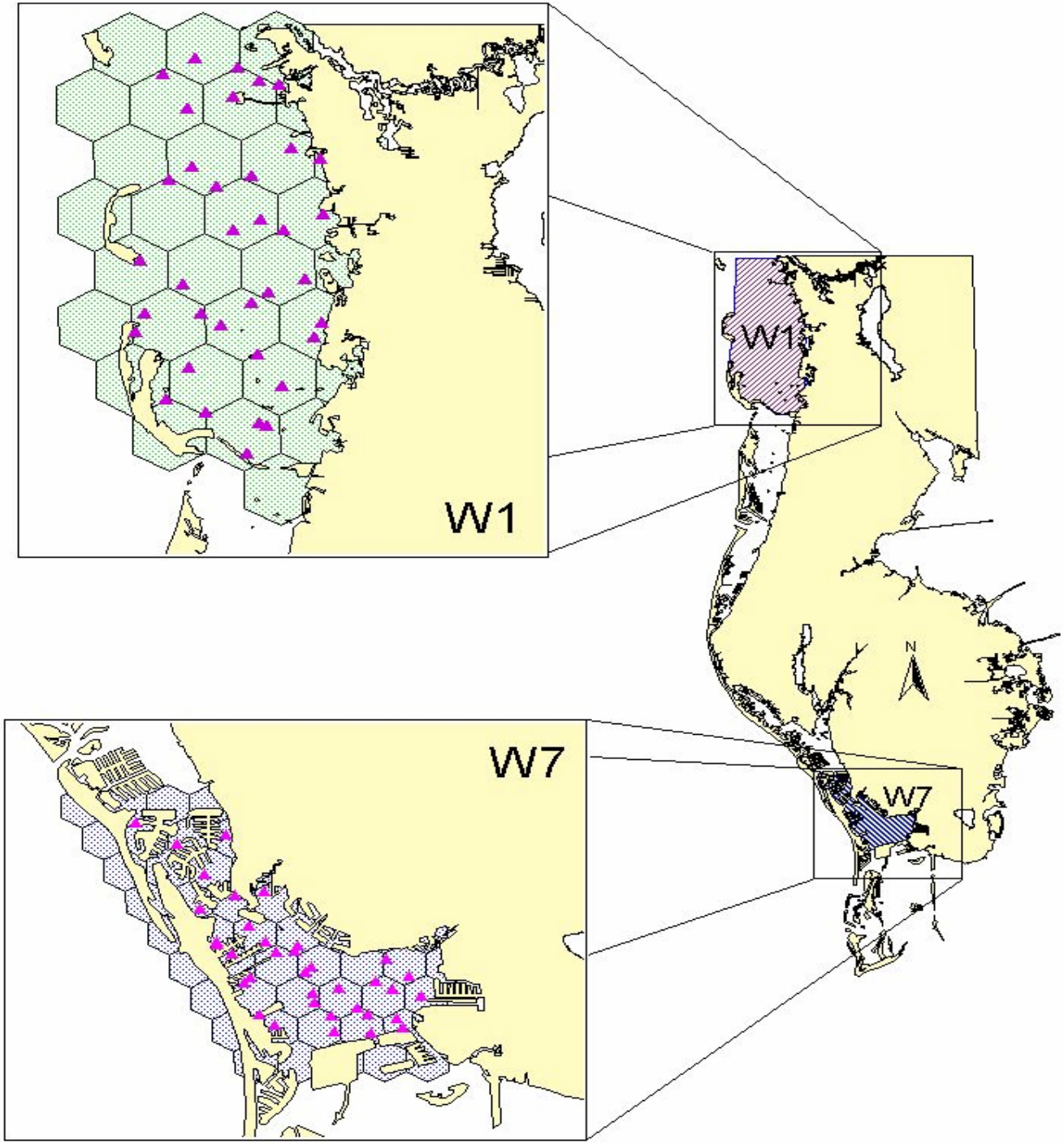
Probabilistic Program Design Elements

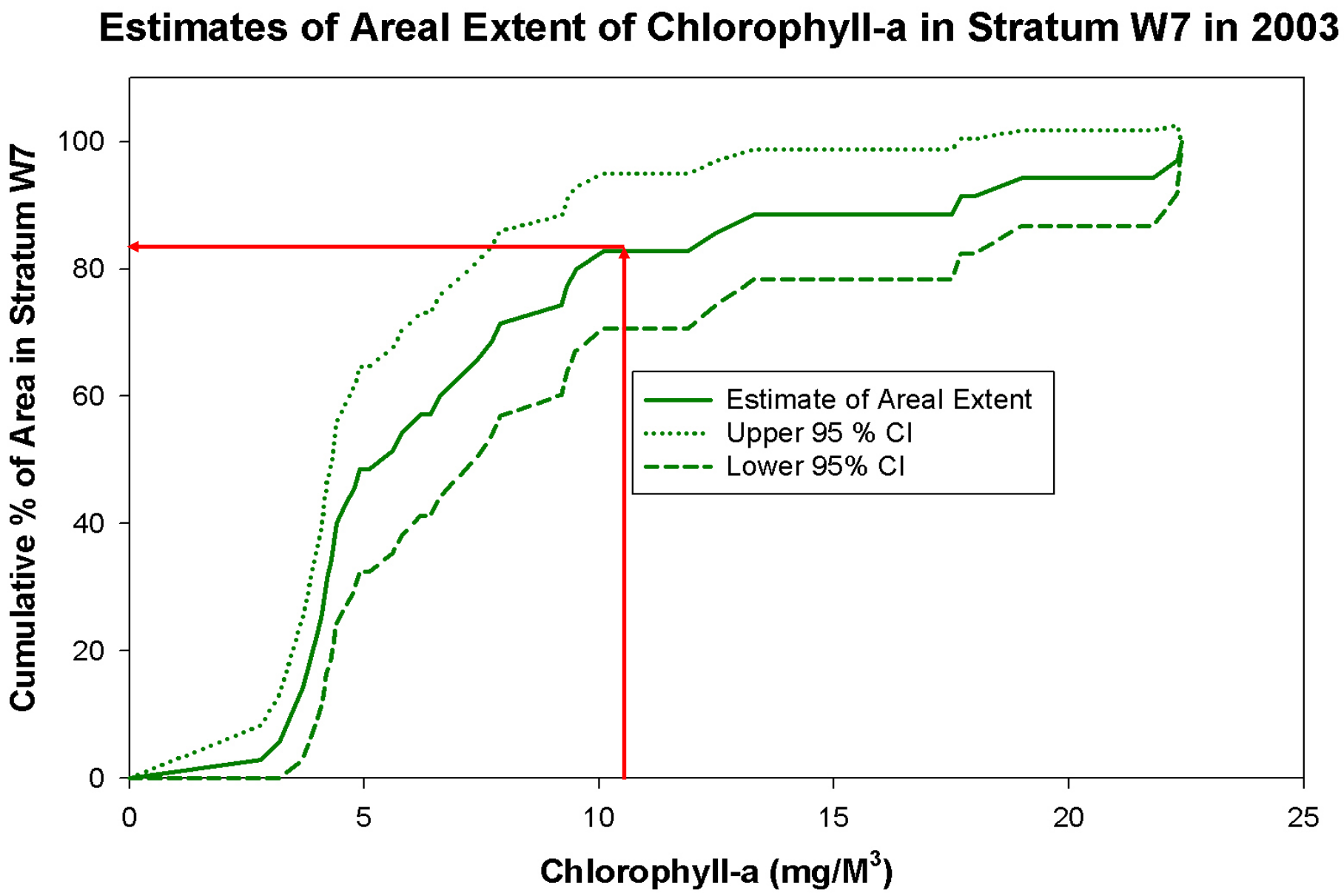
- Temporal sampling units
- Spatial sampling units
- Populations of interest

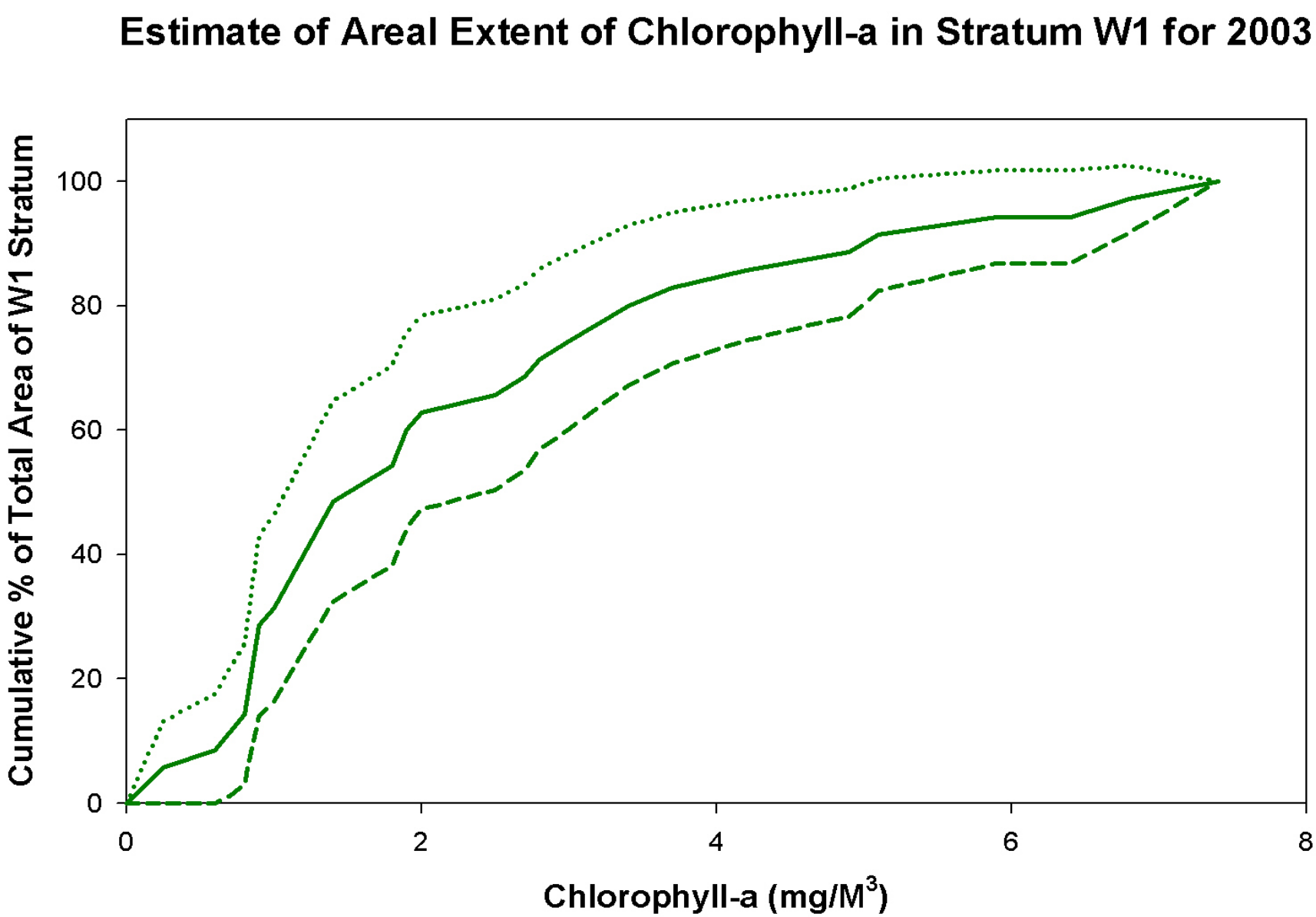


Discussion of 2003 Water Quality Results for Stratum W1 and W7

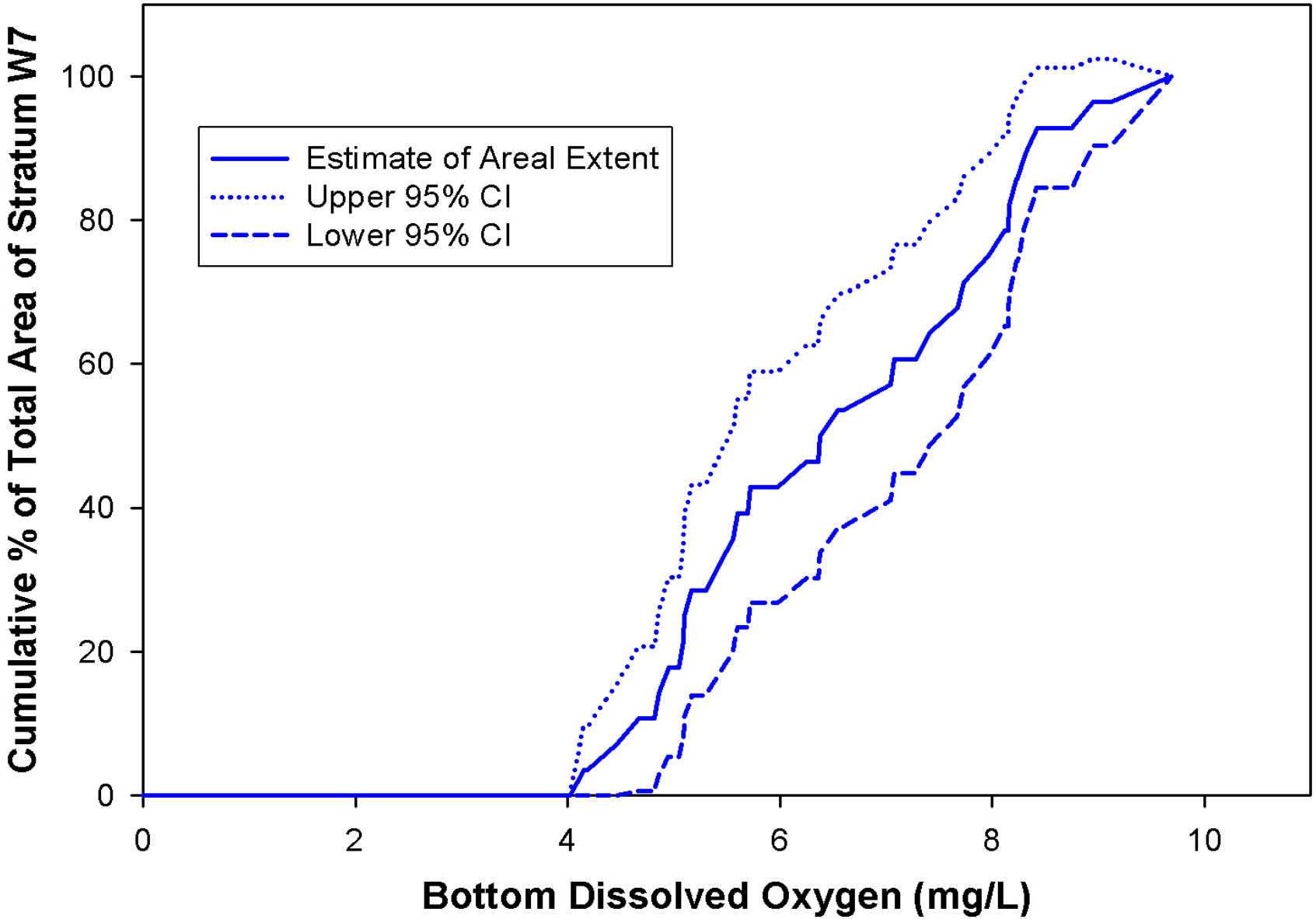



W1
W1
W7
W7
N

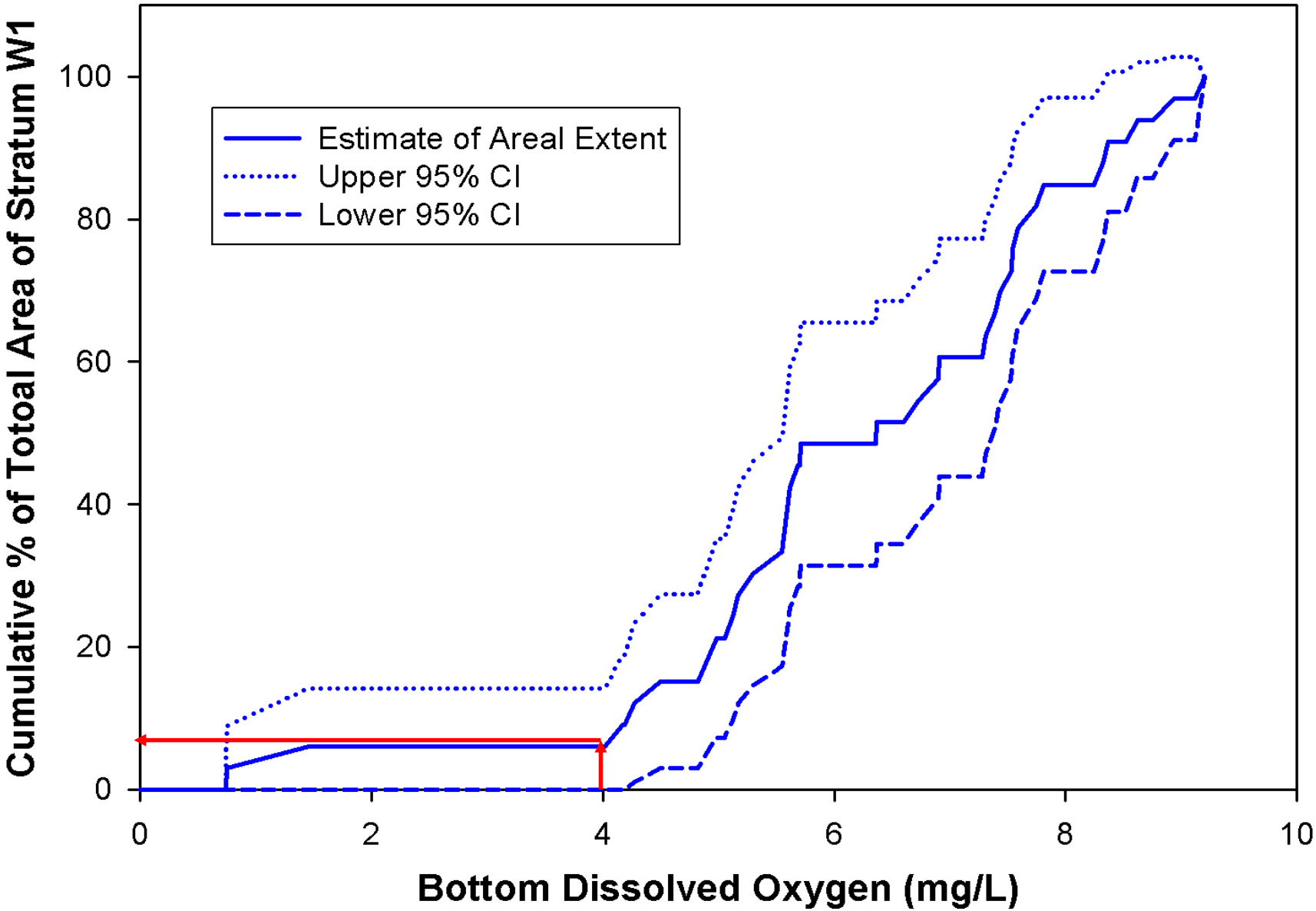

Estimates of Areal Extent of Chlorophyll-a in Stratum W7 in 2003
Cumulative % of Area in Stratum W7
100
80
60
40
20
0
0
5
10
15
20
25
Chlorophyll-a (mg/M3)
Estimate of Areal Extent
Upper 95 % CI
Lower 95% CI


Estimate of Areal Extent of Chlorophyll-a in Stratum W1 for 2003
Cumulative % of Total Area of W1 Stratum
100
80
60
40
20
0
0
2
4
6
8
Chlorophyll-a (mg/M3)

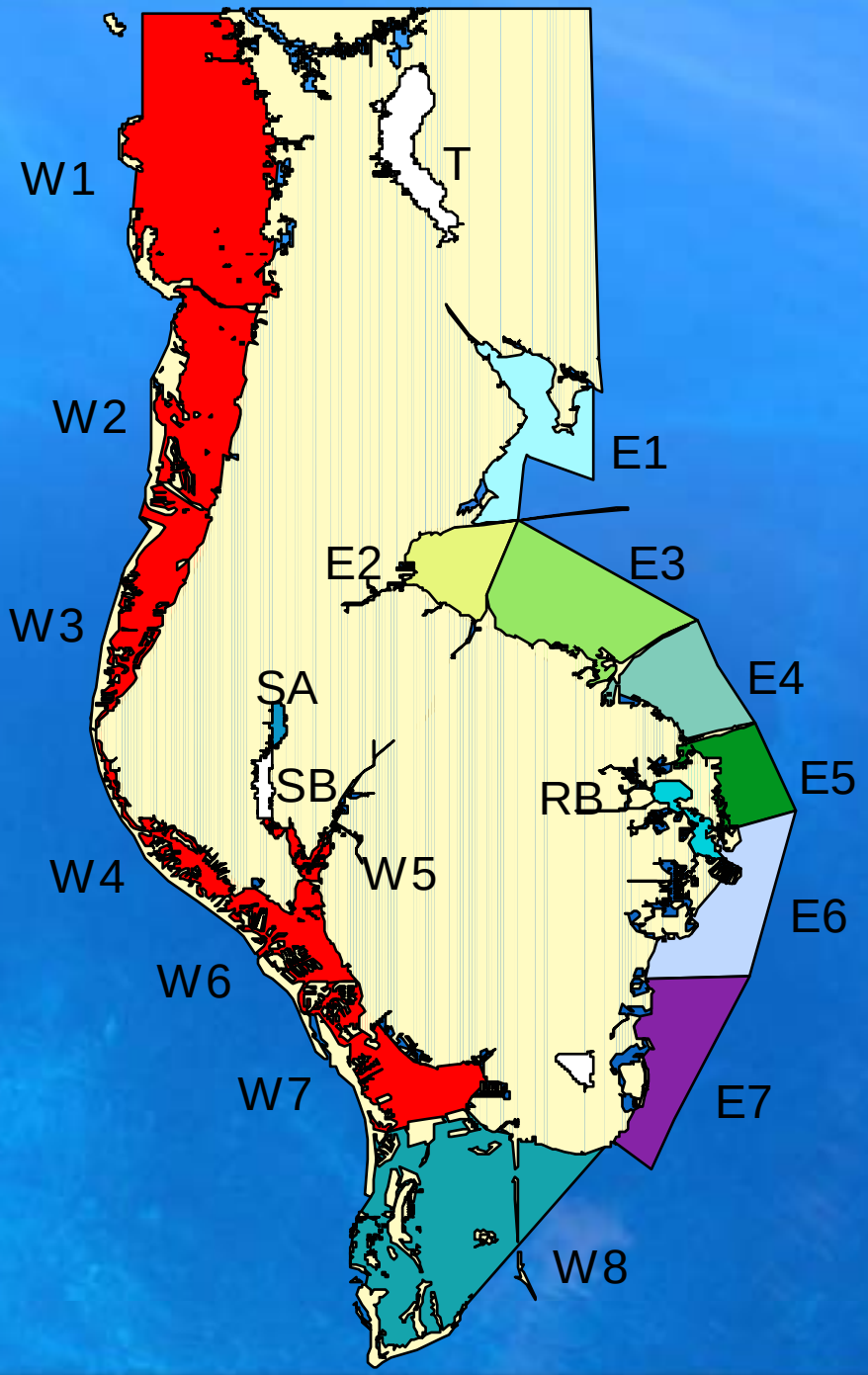
Estimates of Areal Extent of Bottom Dissolved Oxygen in Stratum W7 for 2003



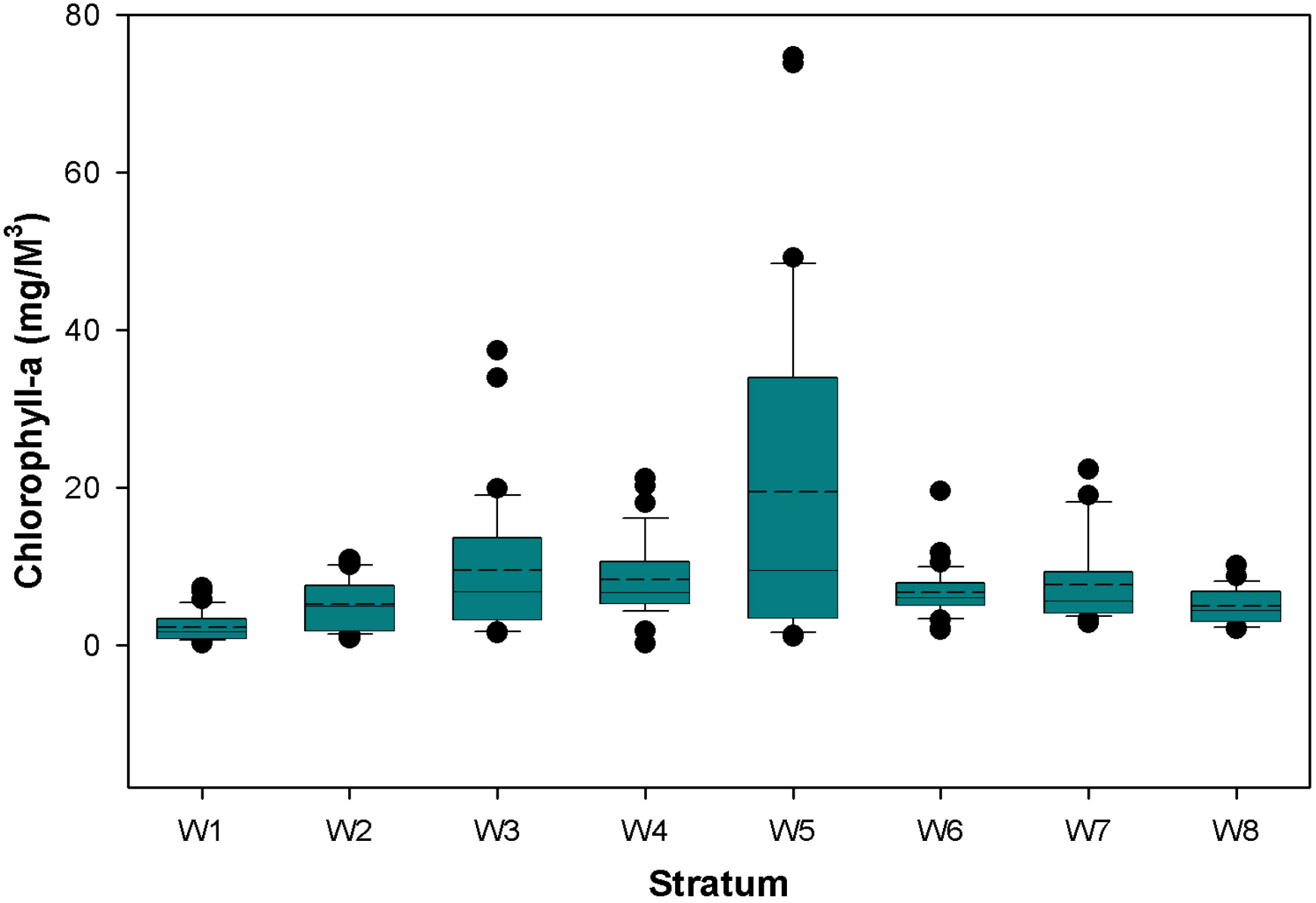
Estimates of Areal Extent of Bottom Dissolved Oxygen in Stratum W1 for 2003

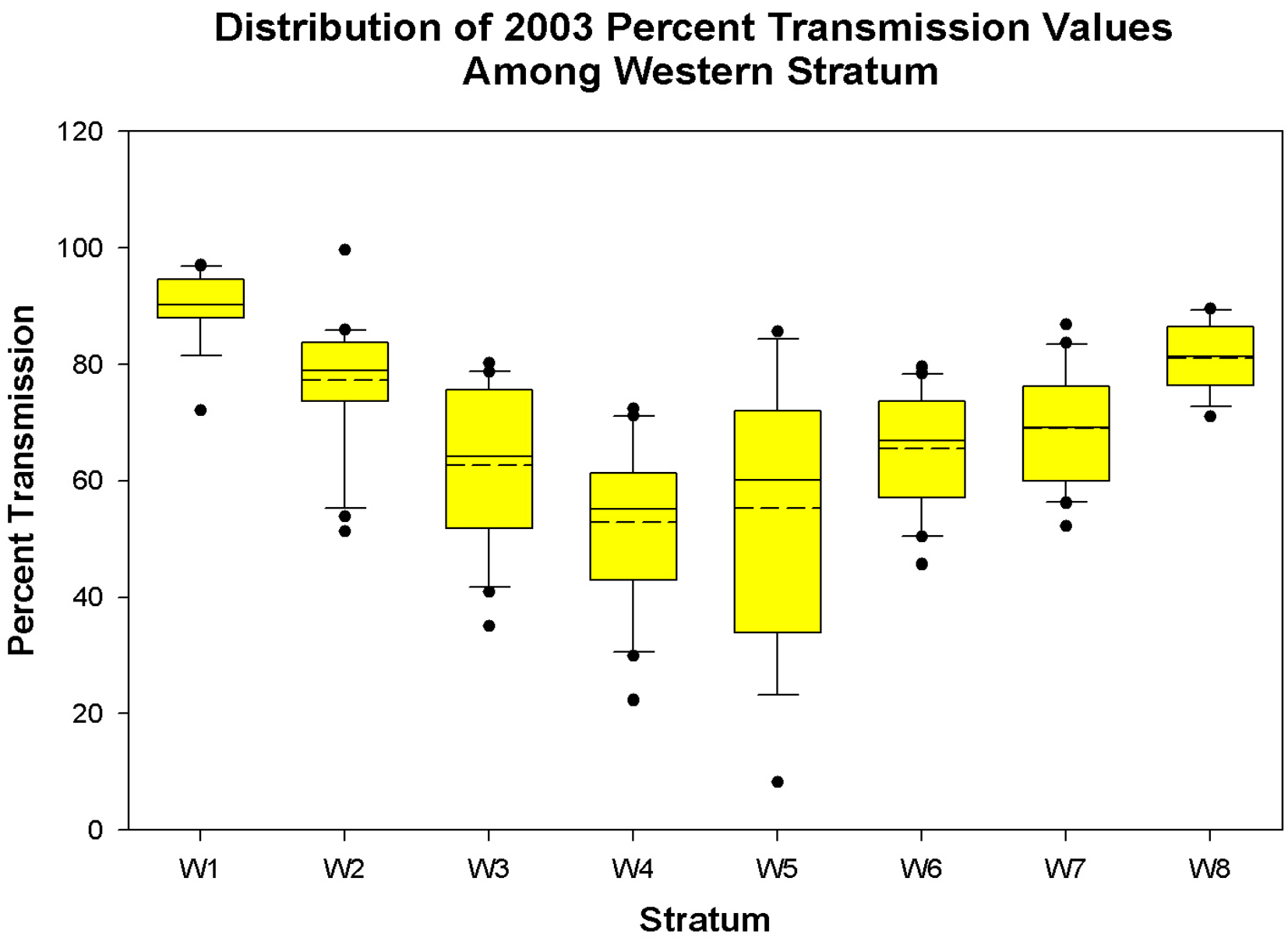


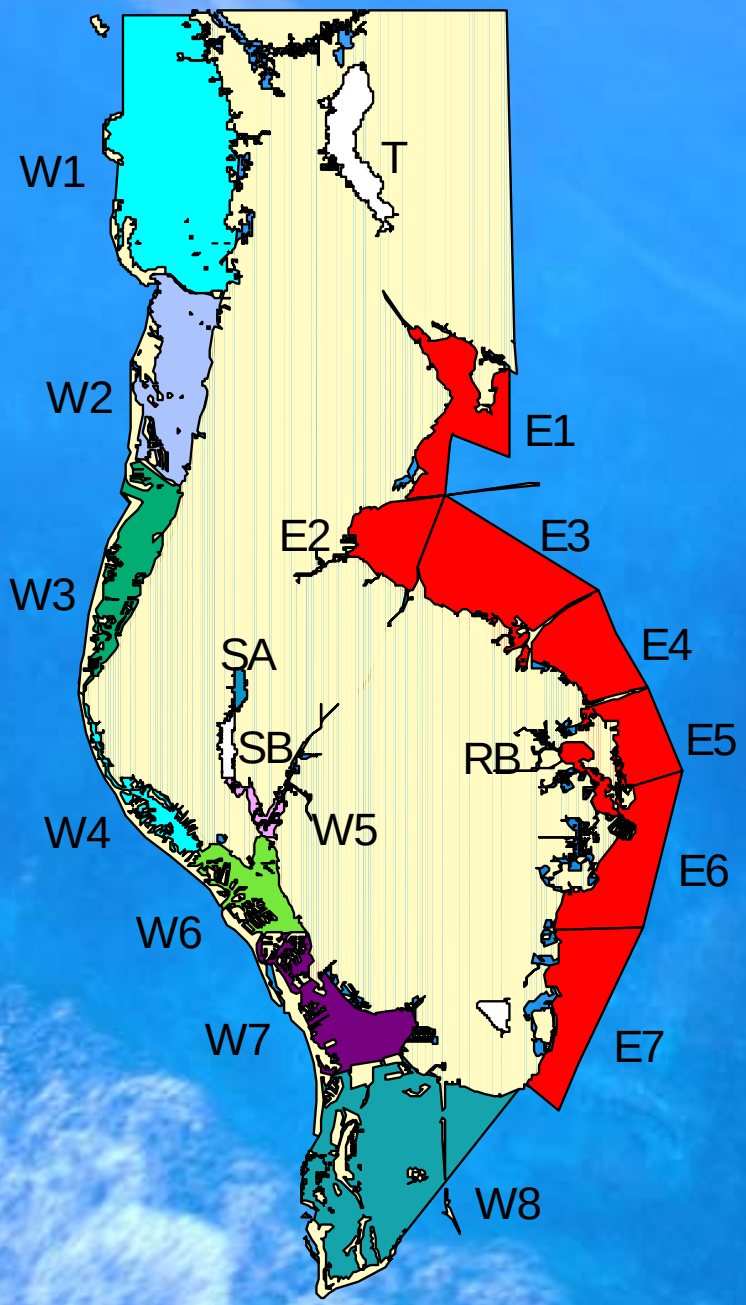
Discussion of 2003 Water Quality Among Western Stratum



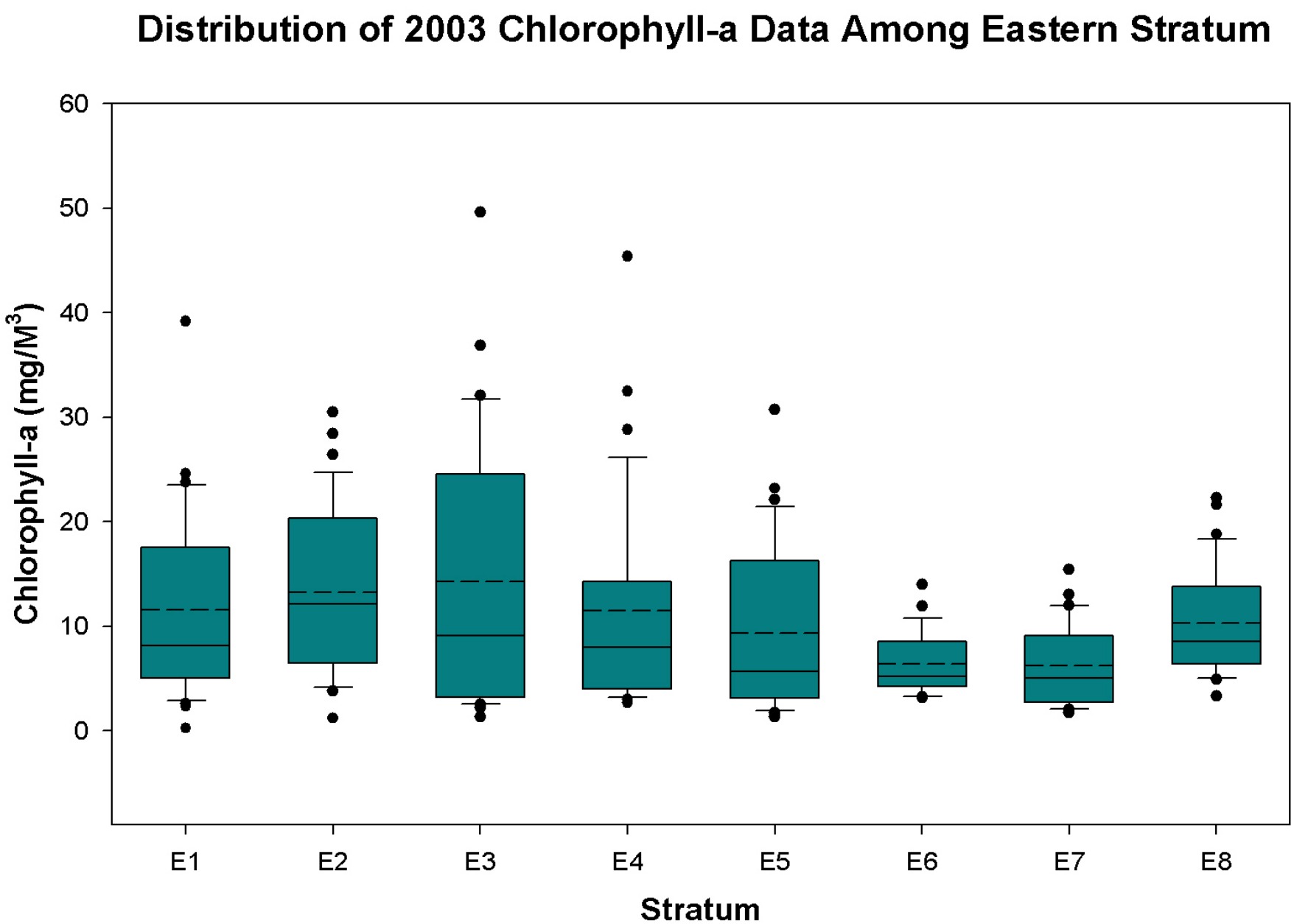
Distribution of 2003 Chlorophyll-a Among Western Stratum



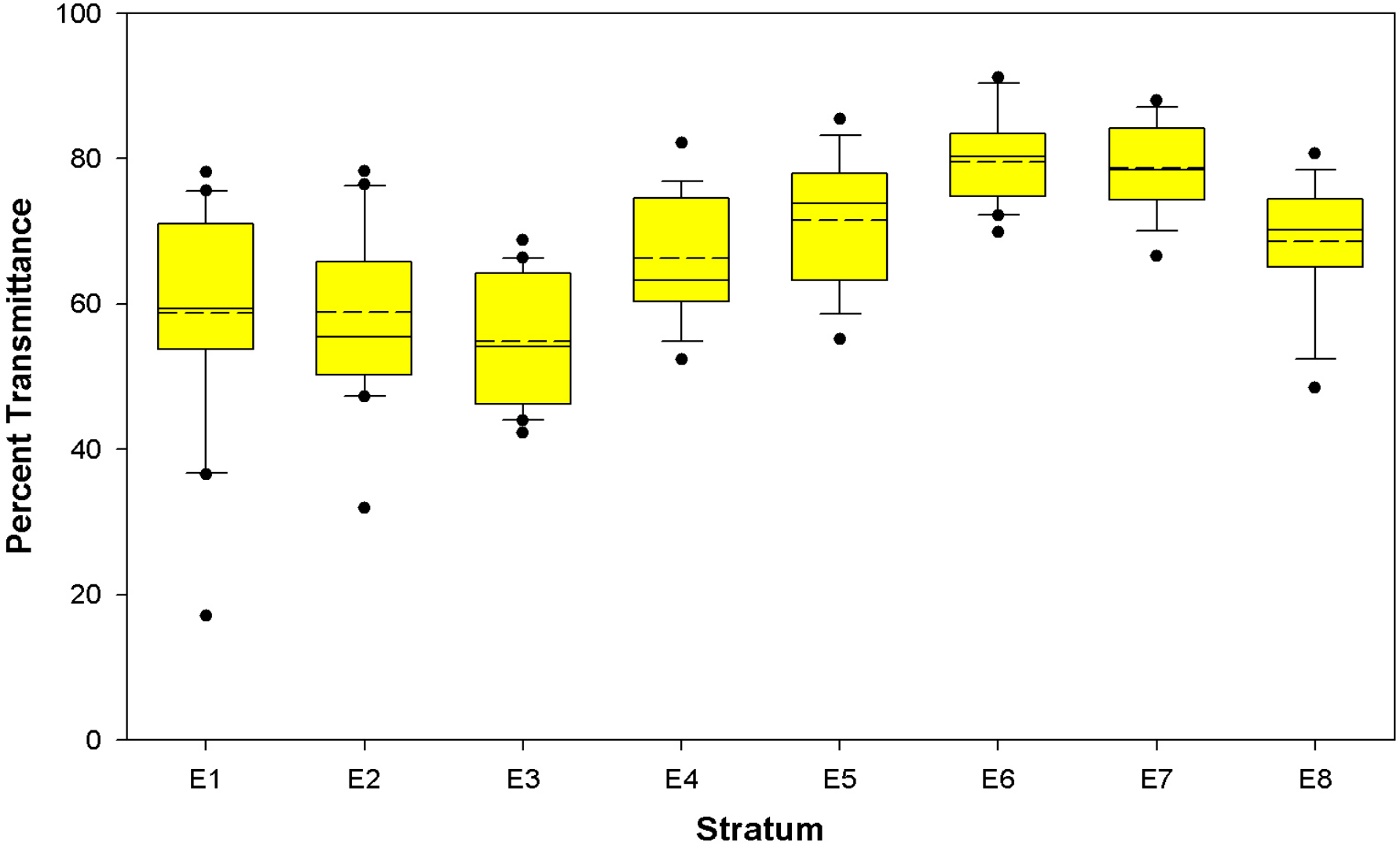

Distribution of 2003 Percent Transmission Values
Among Western Stratum
Percent Transmission
120
100
80
60
40
20
0
W1
W2
W3
W4
W5
W6
W7
W8
Stratum



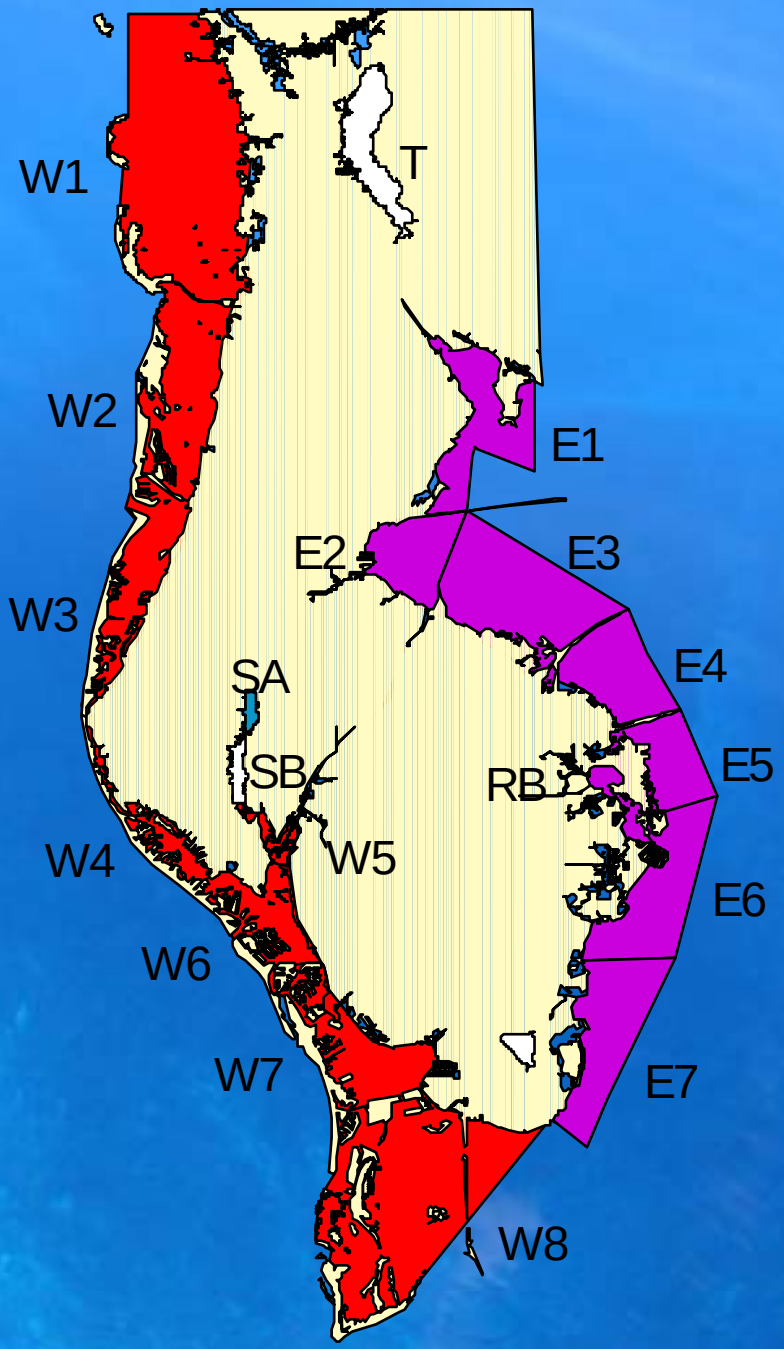
Discussion of 2003 Water Quality Among Eastern Stratum


Distribution of 2003 Chlorophyll-a Data Among Eastern Stratum
Chlorophyll-a (mg/M3)
60
50
40
30
20
10
0
E1
E2
E3
E4
E5
E6
E7
E8
Stratum

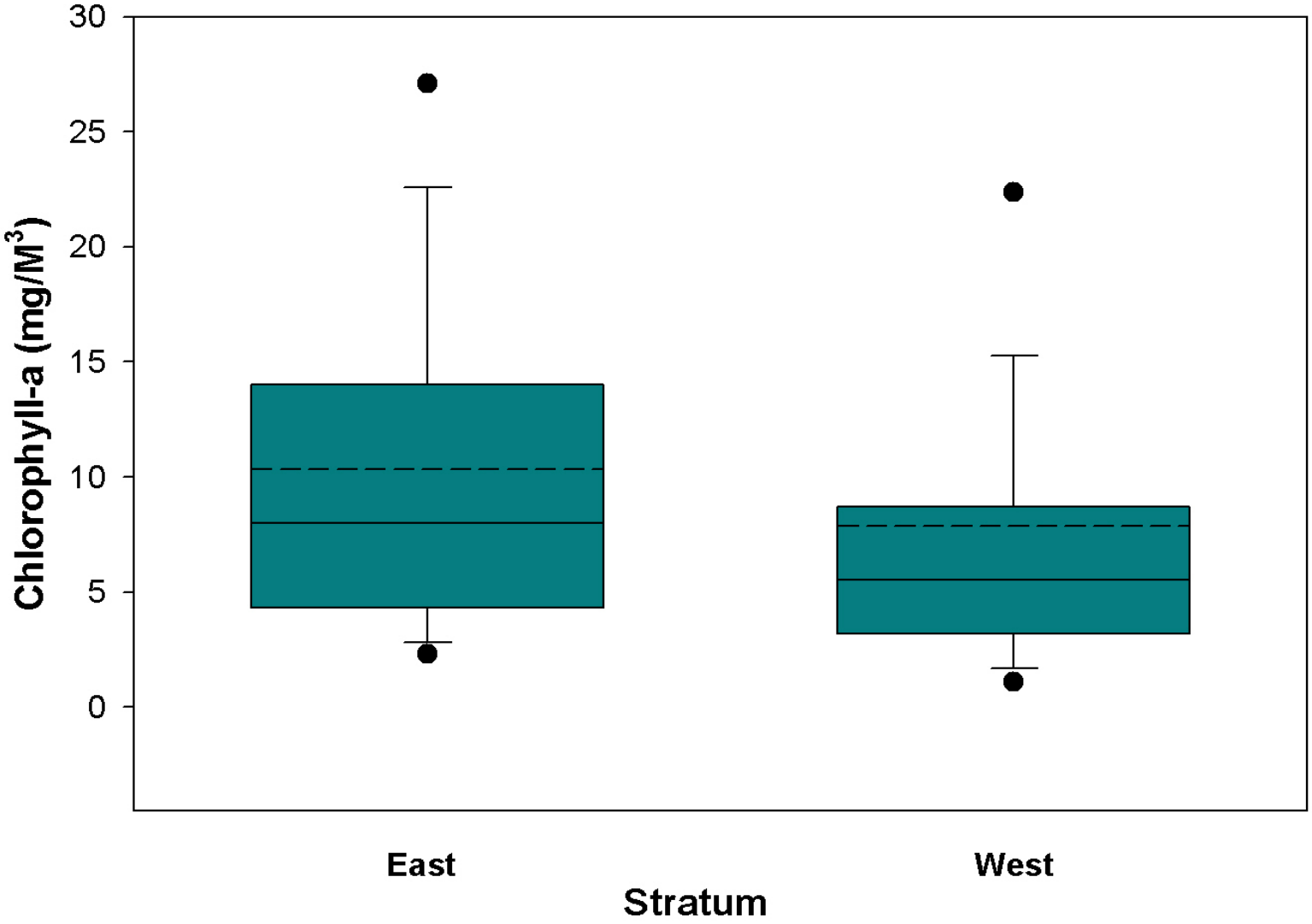
Distribution of 2003 Percent Transmittance Data Among Eastern Stratum

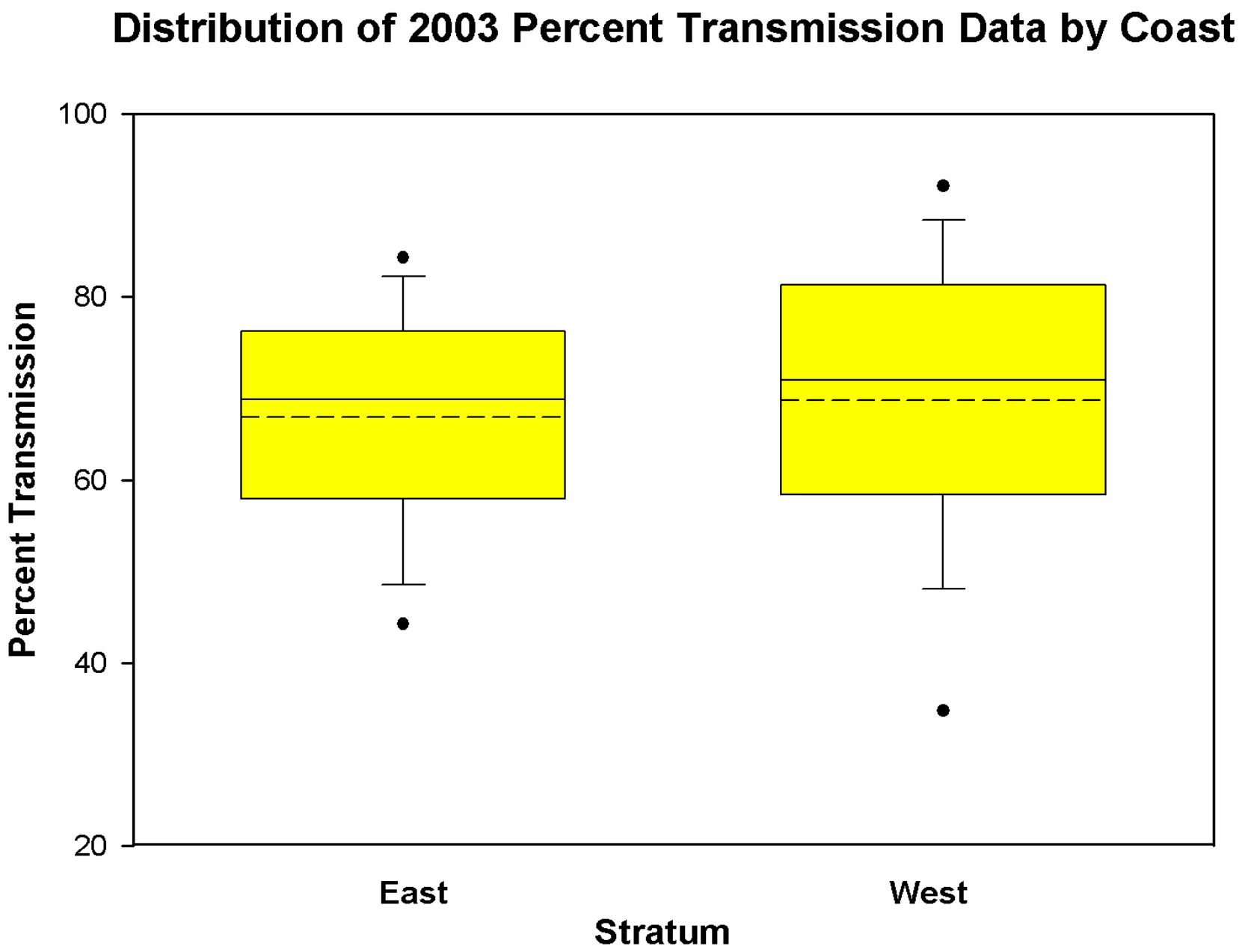


Discussion of 2003 Water Quality Eastern vs. Western Stratum



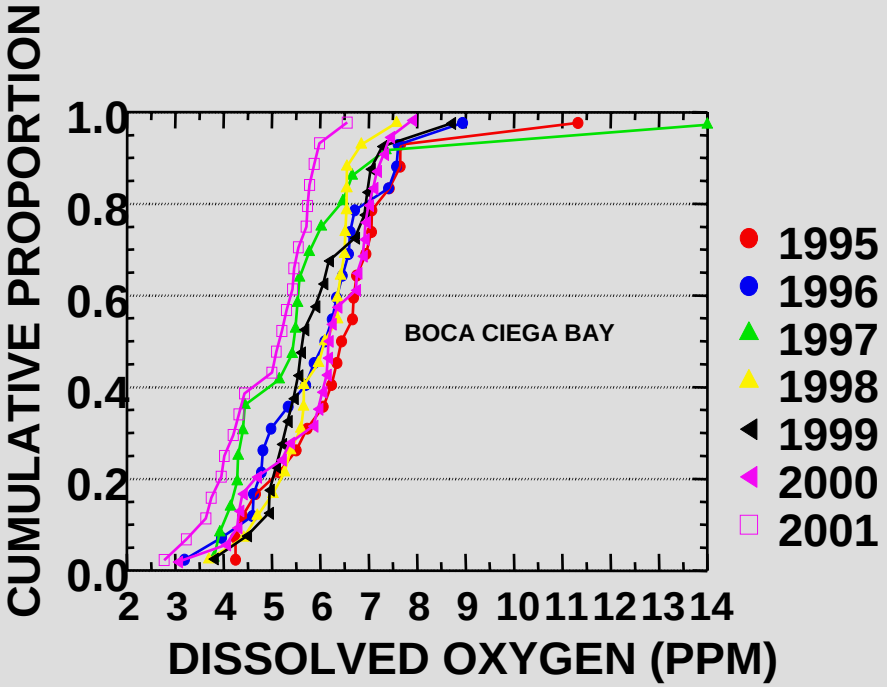
Distribution of 2003 Chlorophyll-a Data by Coast




Distribution of 2003 Percent Transmission Data by Coast
100
80
60
40
20
Percent Transmission
East
West
Stratum

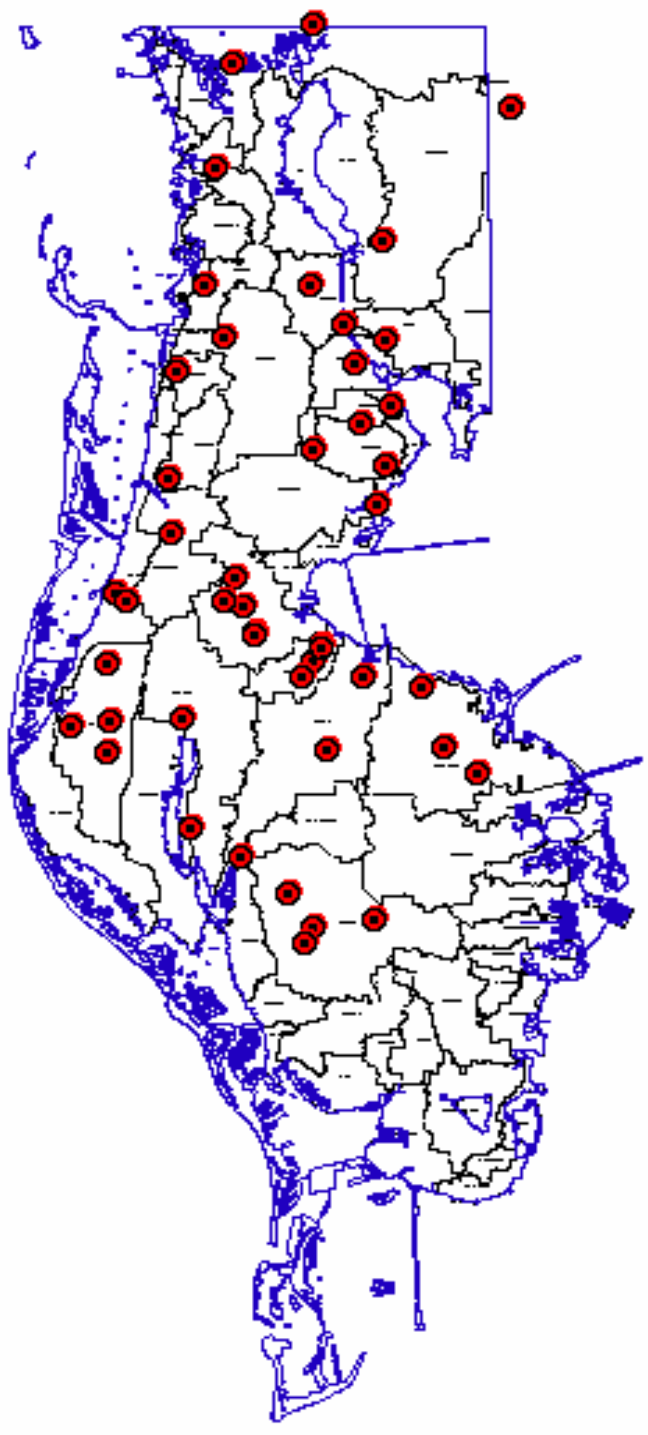
Reporting

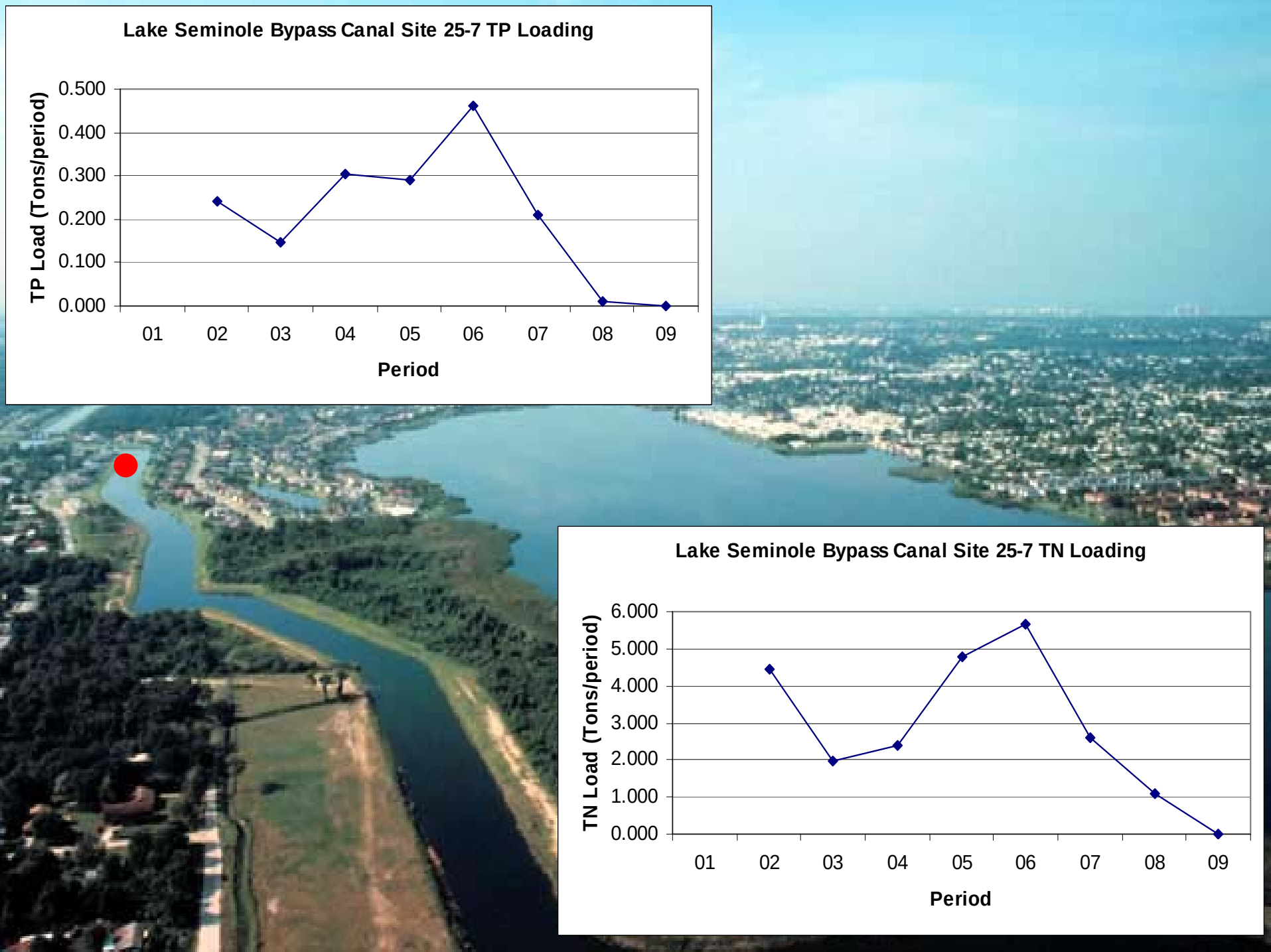
- Annual summaries;
- East vs. West, grouped or individual strata and TBEP bay segments;
- Wet and dry season statistics;
- Cumulative frequency distributions;
- Impaired waters rule;
- Problem areas; and
- Adjustments to program.



Fixed Monitoring Program

- 47 fixed stream sites located in 22 basins;
- Water quality samples, Hydrolab® parameters, and flow measurements;
- Loading estimates




Lake Seminole Bypass Canal Site 25-7 TP Loading
TP Load (Tons/period)
0.500
0.400
0.300
0.200
0.100
0.000
01
02
03
04
05
06
07
08
09
Period
Lake Seminole Bypass Canal Site 25-7 TN Loading
TN Load (Tons/period)
6.000
5.000
4.000
3.000
2.000
1.000
0.000
01
02
03
04
05
06
07
08
09
Period

EMC Development

Evaluating stormwater treatment efficiency; Lake Seminole Watershed, Seminole, FL.

EMC Efficiency

EMC Efficiency(%) = ((conc. in – conc. out) / conc. in) * 100

Rushton (2001)

	All Events			
	5/24/03 to 3/18/04			
Site	Avg	Avg	Avg	
Date	West Pond	East Pond	West Pond	EMC Efficiency
Time				
TKN	1.294	0.763	1.294	41.04
NH3	0.154	0.017	0.154	89.29
NOX	0.867	0.031	0.867	96.42
TN	2.160	0.785	2.160	63.66
TP	0.410	0.109	0.410	73.41
OP	0.193	0.035	0.193	81.82
TSS	49.750	12.350	49.750	75.18
BOD5	6.583	5.917	6.583	10.13
TURB	6.389	3.700	6.389	42.09
Cd	0.0005	0.0005	0.0005	0.00
Fe	0.3436	0.0690	0.3436	79.93
Pb	0.0086	0.0032	0.0086	63.16
Zn	0.0823	0.0117	0.0823	85.78

Pinellas County Program

- Statistically defensible open water monitoring program;
- Stream loading estimates; and
- Basin and land use specific EMC data and BMP evaluations.

Questions ?

For additional information contact:
The Pinellas County Department of Environmental Management
Water Resources Management Section
300 South Garden Avenue
Clearwater, FL 33756
(727) 464-4425
klevy@co.pinellas.fl.us
http://www.pinellascounty.org/Environment/

Janicki Environmental, Inc.

Pinellas County
ENVIRONMENTAL MANAGEMENT
Water Resources