

Beach Closures, Pollution Sources, and Federal Government Response

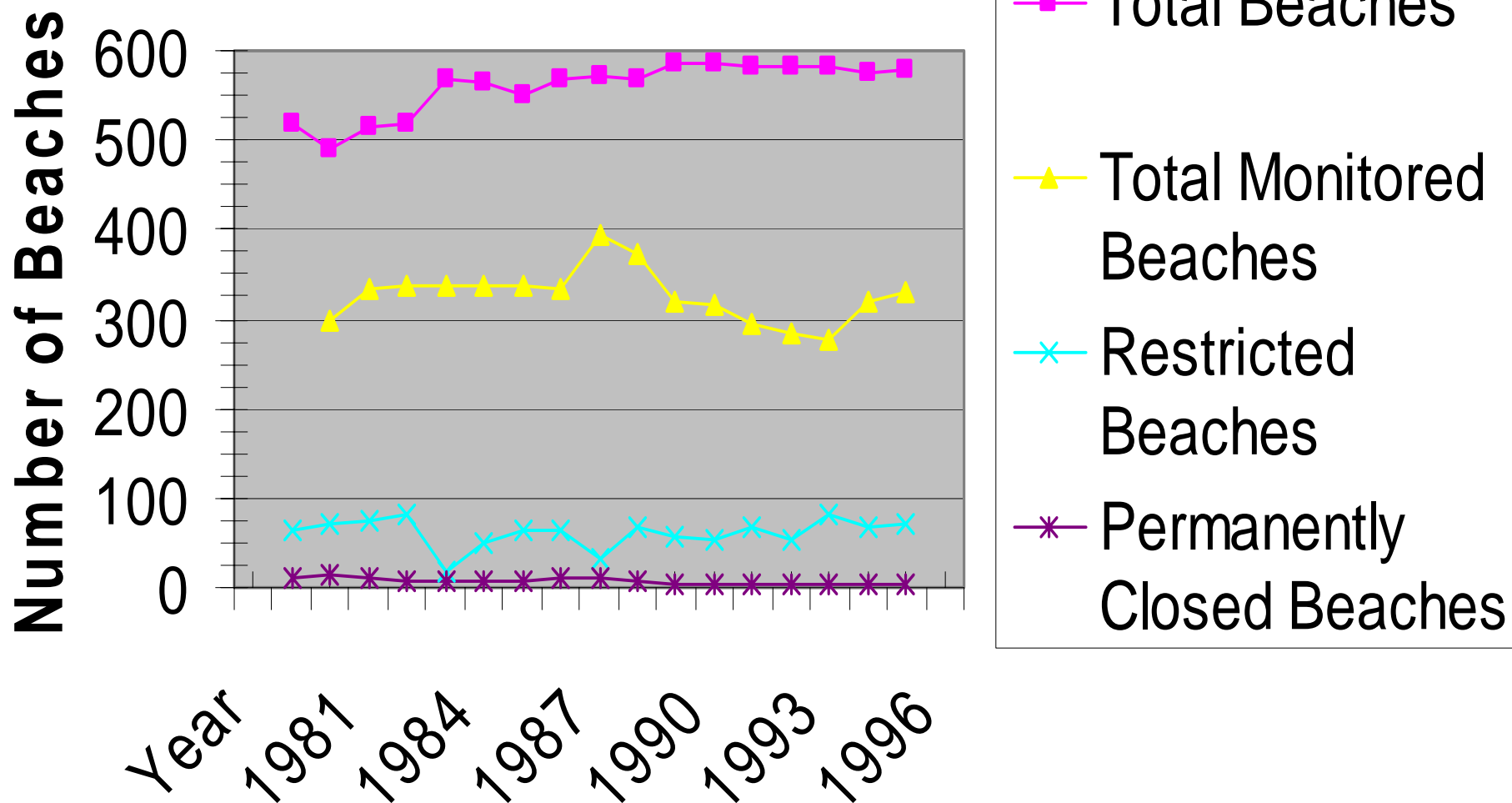
Presented by: **David C. Rockwell**

U.S. EPA

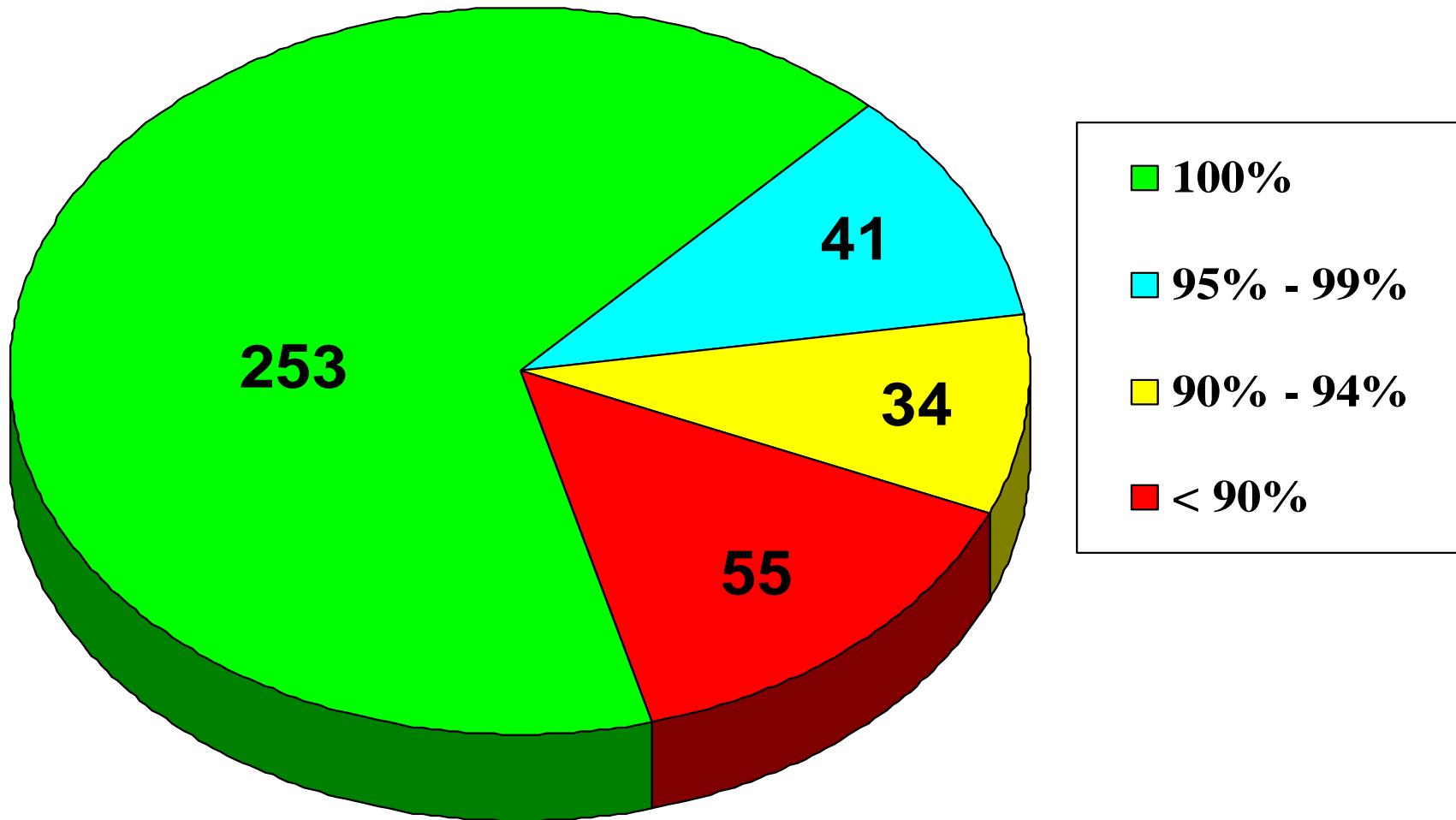
Great Lakes National Program Office

October 22, 2003

Status of U.S. Great Lakes Bathing Beaches, 1980-1996



**U.S. Great Lakes Beaches Open
for % of Season (June, July, August 2002)
total number of beaches = 383**



U.S. Great Lakes Beach Advisories and Closings

2002

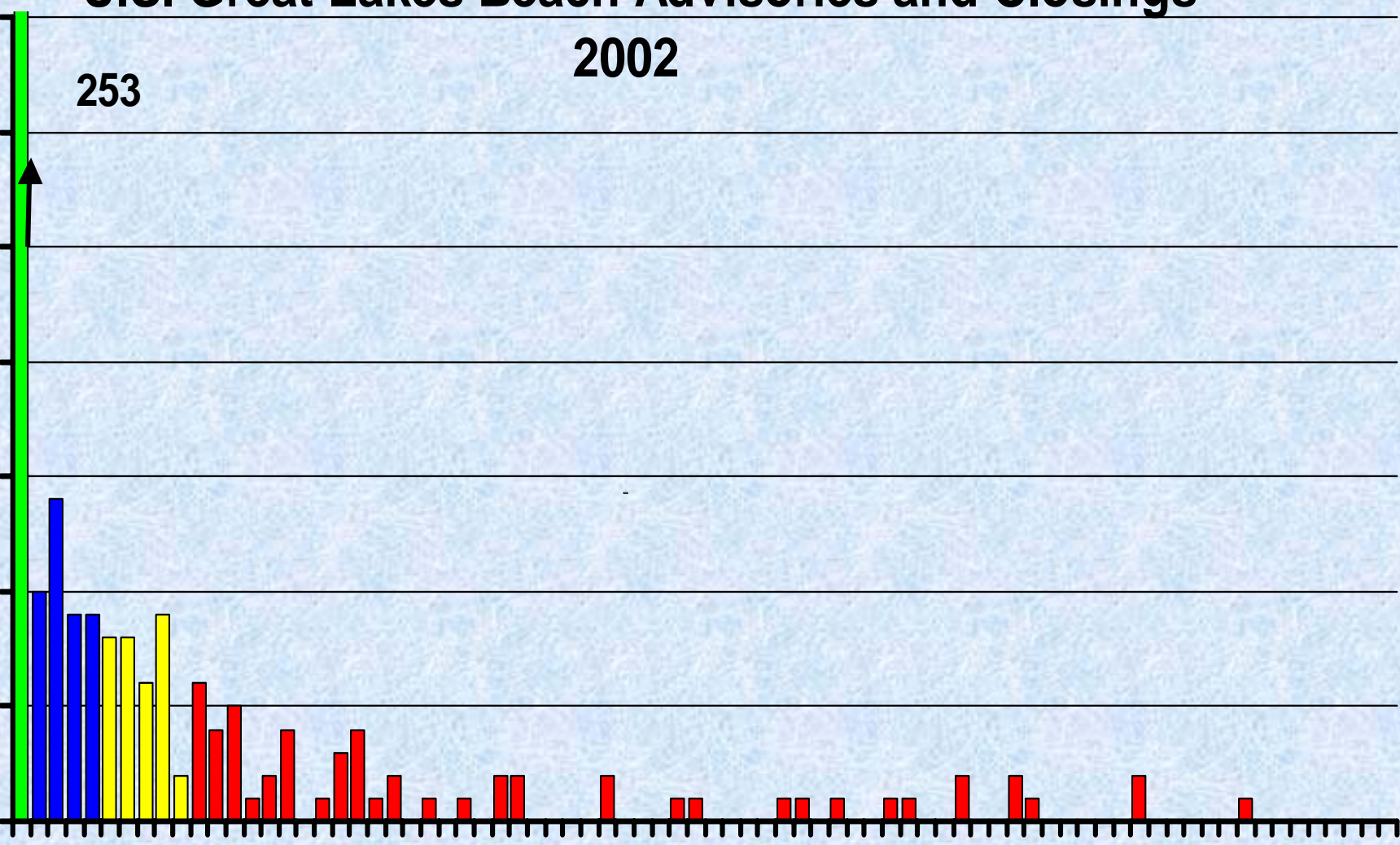
253

Number of Beaches

35
30
25
20
15
10
5
0

0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 .. 80 .. 92

Advisory and Closed Days



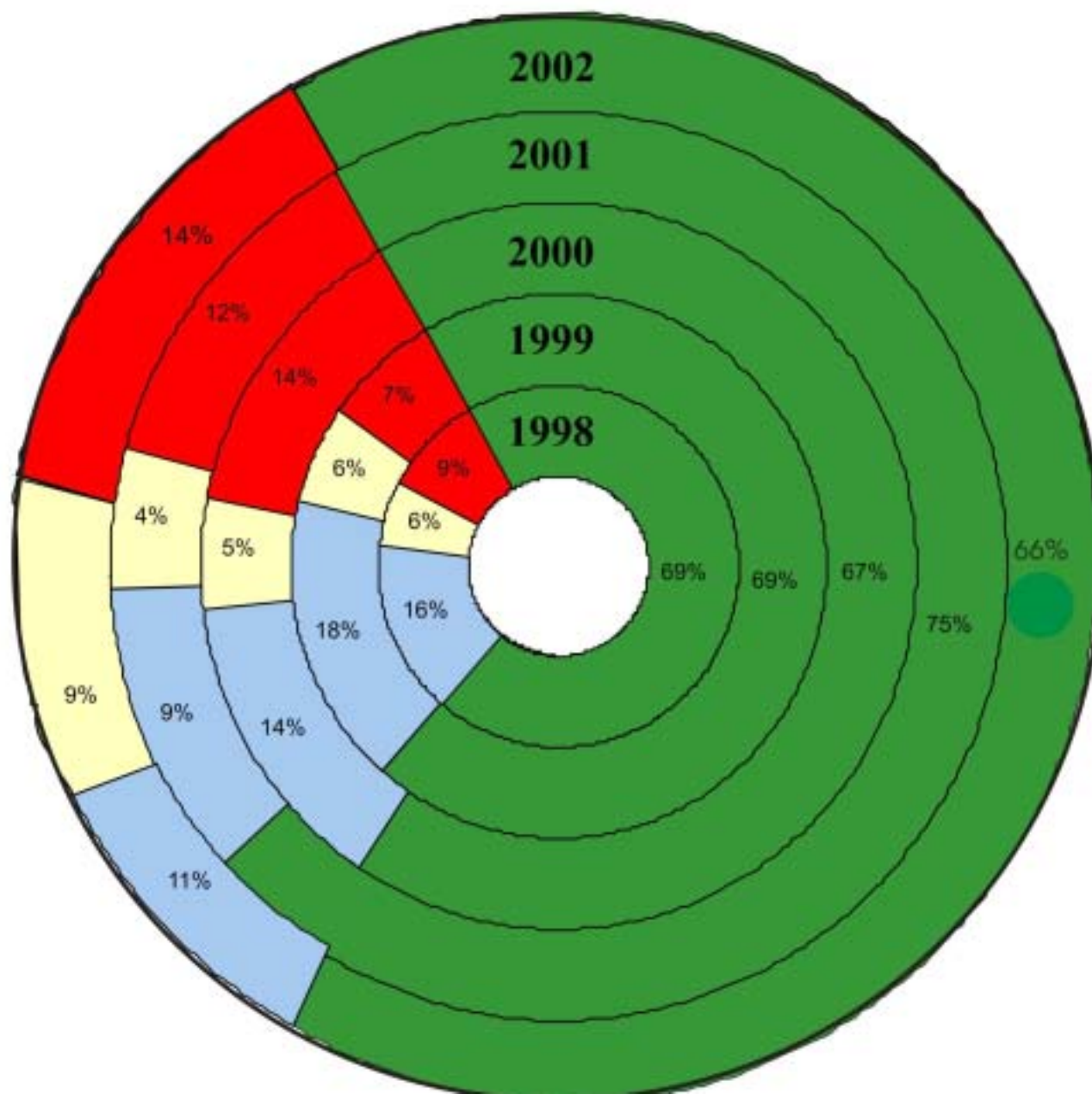
MONITORING PRACTICE VS PERCENT OF SEASON OPEN 2002

Percent of season open	Monitored on a regular basis	Not monitored	Totals
100	176	77	253
96-99	39	2	41
90-95	33	1	34
< 90	53	2*	55
Totals	301	82	383

* Bay Beach, Brown County WI - not reported in the 2002 survey but included in this report summary for comparison with previous Beach surveys.

Proportion of U.S. Great Lakes Beaches with Beach Advisories

For the 1998 – 2002 Bathing Seasons



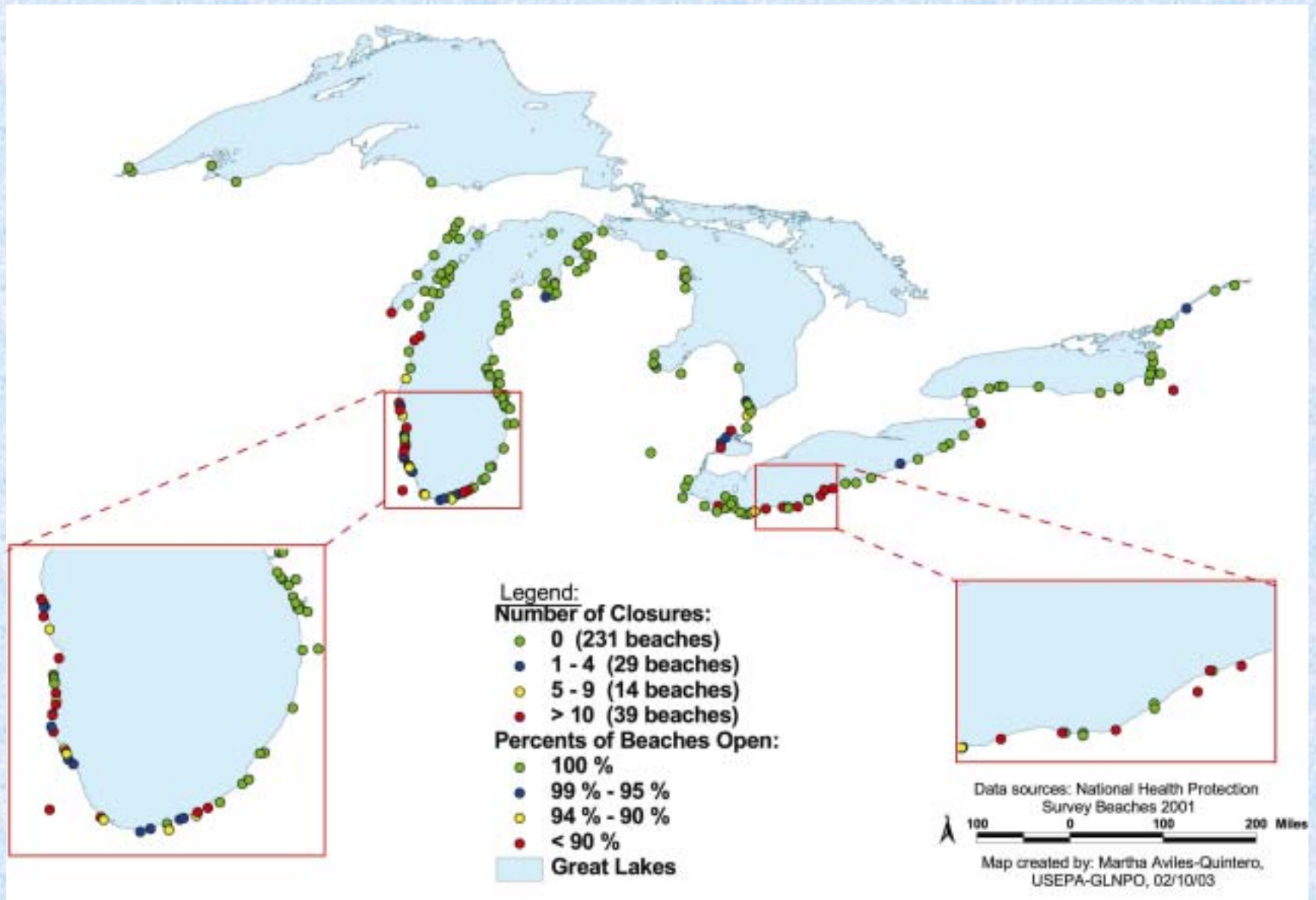
% Time With Beach
Advisories and Closures

- 0% Closed
- 1% - 4% Closed
- 5% - 9% Closed
- >10% Closed

**Number of Great Lakes Beaches
reported each year:**

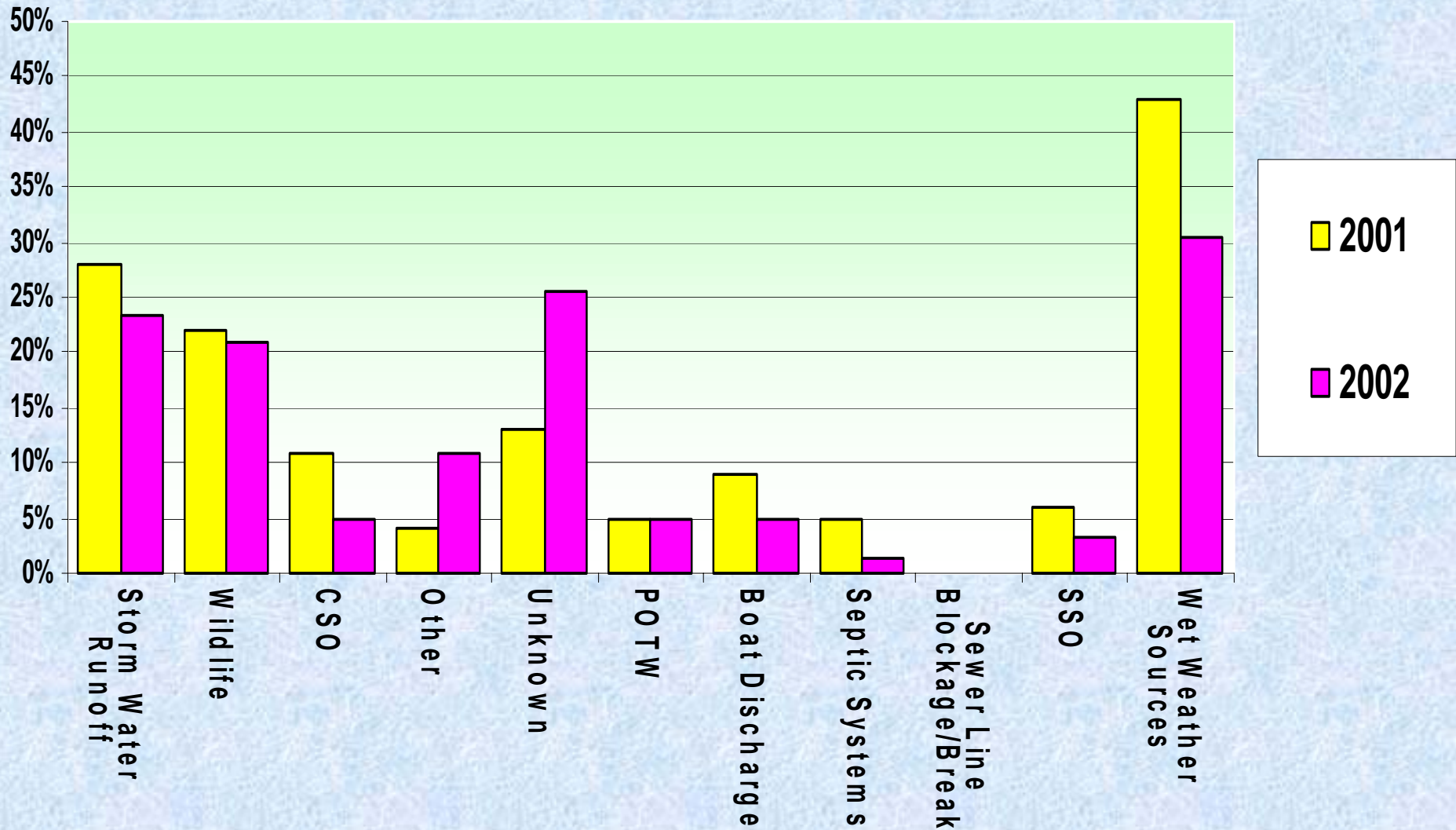
- 2002 - 383 beaches**
- 2001 - 313 beaches**
- 2000 - 329 beaches**
- 1999 - 316 beaches**
- 1998 - 298 beaches**

U.S. Great Lakes Coastal Beaches Open during Swimming Season 2001

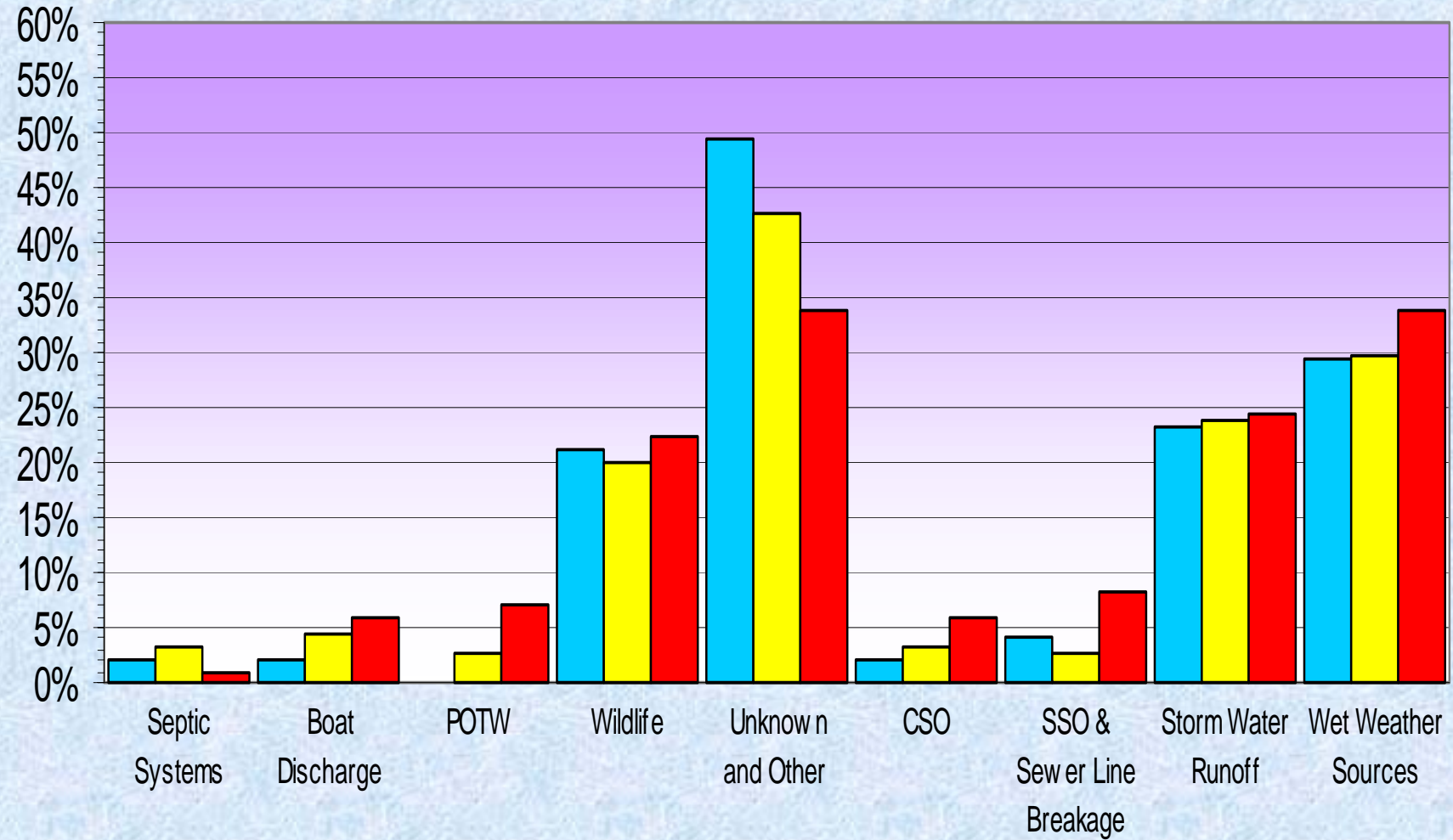


2001-2002 Great Lakes Coastal Beaches

Sources that resulted in Beach closures/Advisories



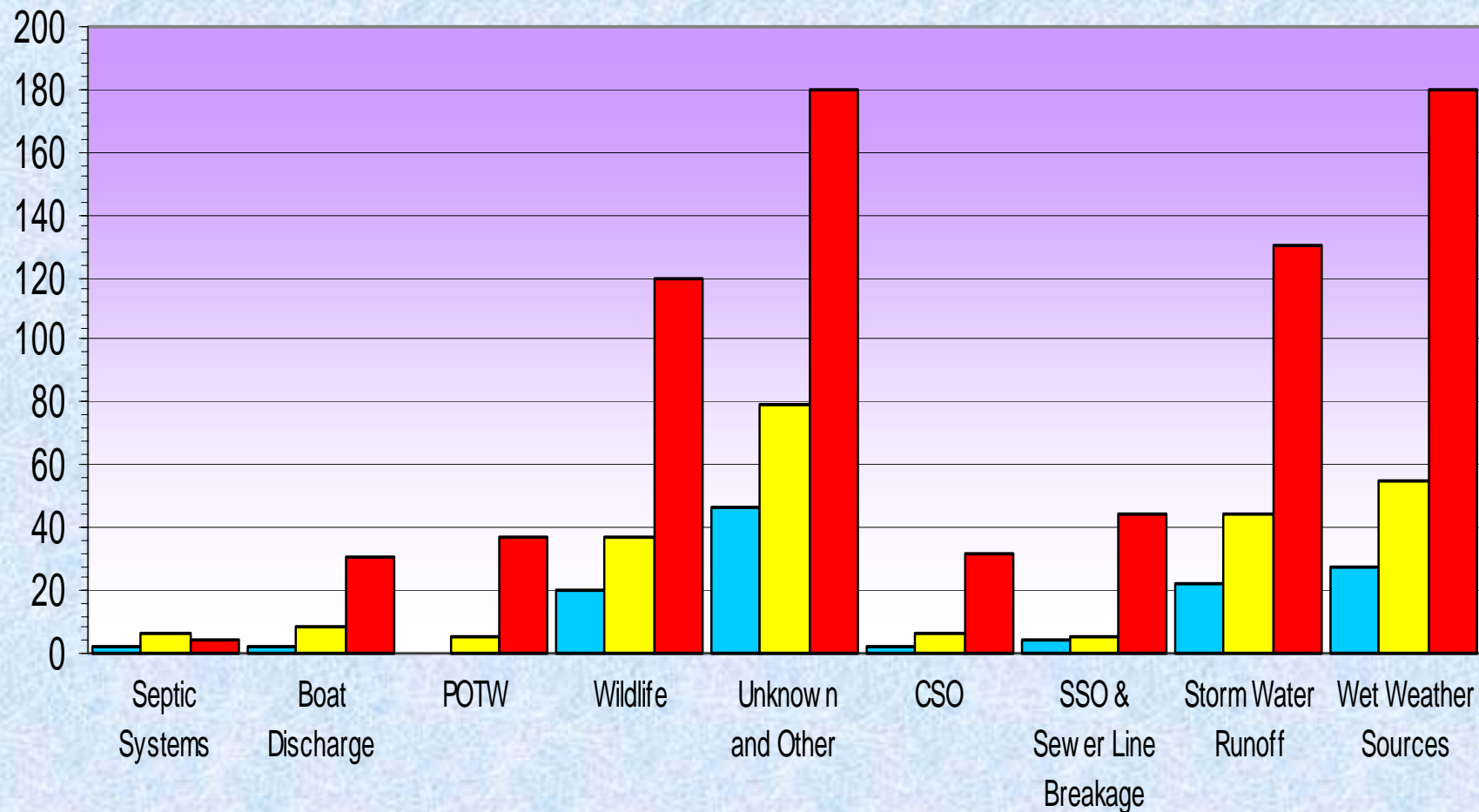
2002 Great Lakes Coastal Beaches Sources that Resulted in Beach Advisories/Closures (Percentage)



■ Blue Beaches (1-4 days)
 ■ Yellow Beaches (5-9 days)
 ■ Red Beaches (>10 days)

Total Occurances : Blue = 95 Yellow = 185 Red = 534

2002 Great Lakes Coastal Beaches Sources that Resulted in Beach Advisories/Closures (Occurrences)



■ Blue Beaches (1-4 days)
 ■ Yellow Beaches (5-9 days)
 ■ Red Beaches (>10 days)

Total Occurances : Blue = 95 Yellow = 185 Red = 534

Great Lakes BeachCast: A Regional Beach Reporting System

2nd Key Theme BEACH Program: Inform the Public about Water Quality

Multi-state development effort

- Ongoing collaboration between beach program managers and the Great Lakes Commission to meet three goals:
 - real-time monitoring data collection and storage on the state level
 - a regional, public reporting system
 - streamlined data transfer to meet EPA's BEACH Program requirements
- Current prototype is being developed for Illinois, Indiana and Ohio
- Great Lakes states have partnered on this cost-effective solution, which should result in a more “robust” system for all
- Data will be housed on individual state “nodes” but mirrored for broad public access on the Great Lakes Information Network (GLIN): www.great-lakes.net

New Approaches to Rapid Testing For Indicators of Fecal Contamination

R. Whitman¹, G. Anderson², and A. Dufour³. ¹USGS, ²US Navy, ³US EPA

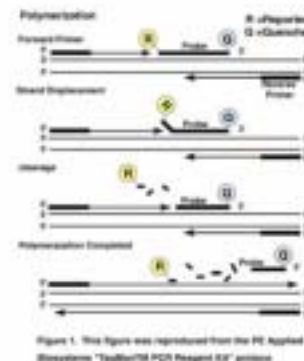
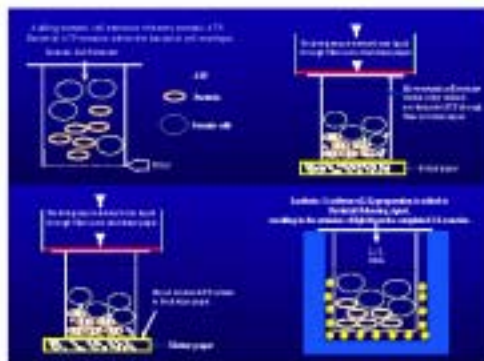
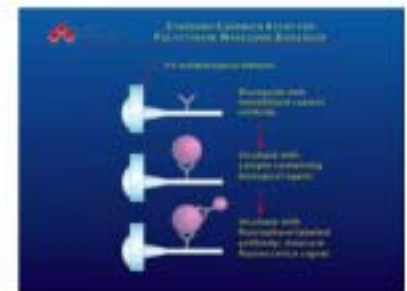
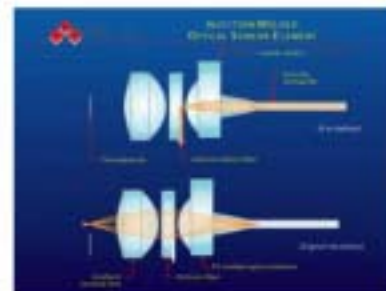
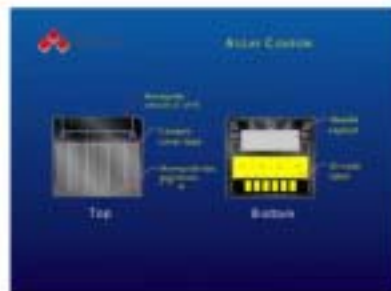
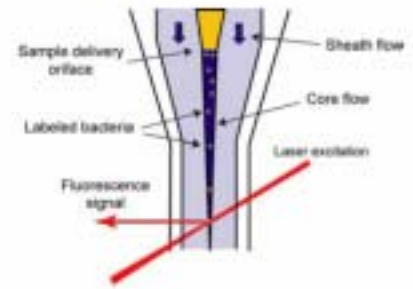
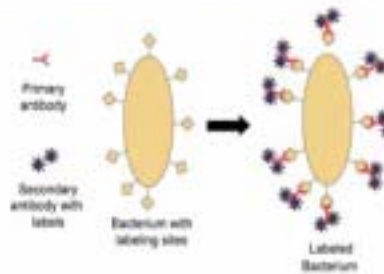


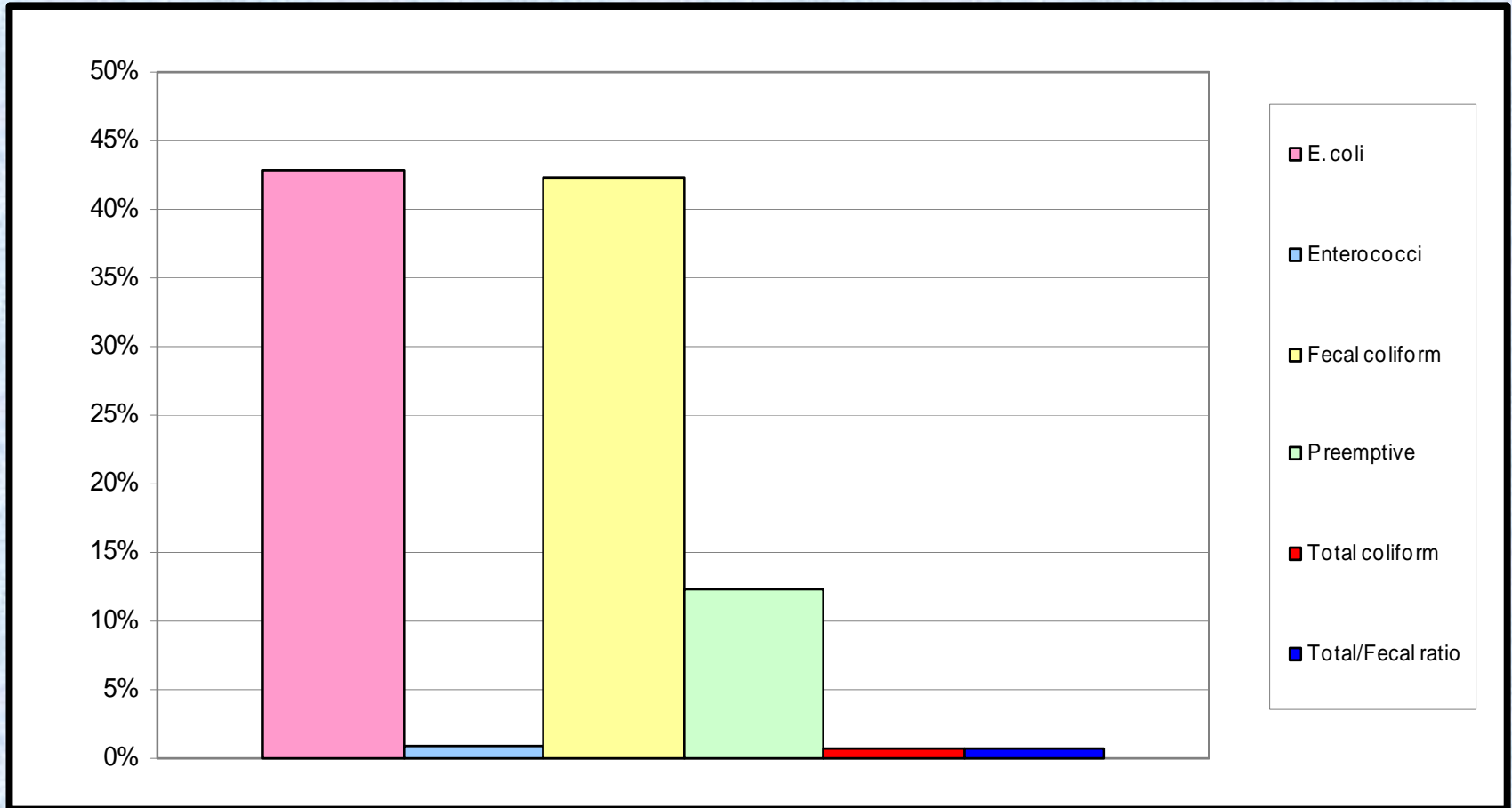
Figure 1. This figure was reproduced from the PE Applied Biosystems "TruBlue™ PCR Reagent Kit" protocol.

Advantages and Disadvantages of High-Tech Analytical Methods for Rapid Measurement of Water Quality

Technology	Approach	Level of Security	Stable	Cost
Flow Cytometry	Antibody	1	Mo	Medium
Bioluminescence	ATP	100 - 1000	Fw	Low
Filter Optics	Antibody	1000	Mo	Medium
Tagging	Molecular	1	Mo	Medium
CCD camera	ATP	1	Fw	High

2001 Great Lakes Coastal Beaches **Indicators** Types Used to Issued Beach Advisories/Closures

Each Indicators reported per days – 81 Beaches



Key Theme of BEACH Program: Conduct Research to Improve Science for Beach Programs

US EPA Beaches Program to Develop Risk-based Guidelines for Recreational Waters

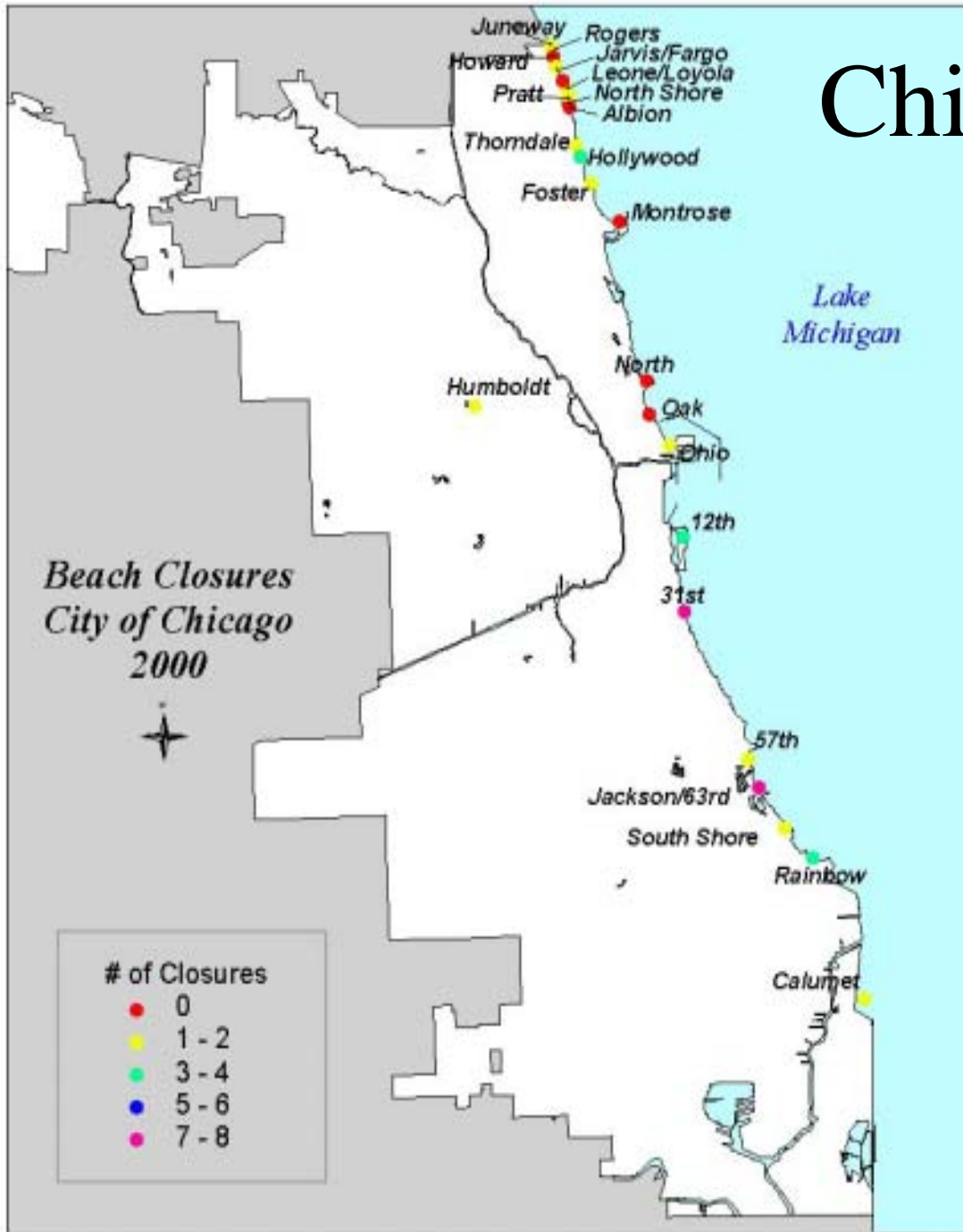
Health Studies

- Freshwater beaches (4), marine beaches (5)
- Swimmers/non-swimmers contacted at beach on week-end days.
- 10-14 days follow-up to determine health status
- Water quality measured at time of swimming activity
- Swimming-associated illness rates related to water quality measurements

Water Quality Measurements

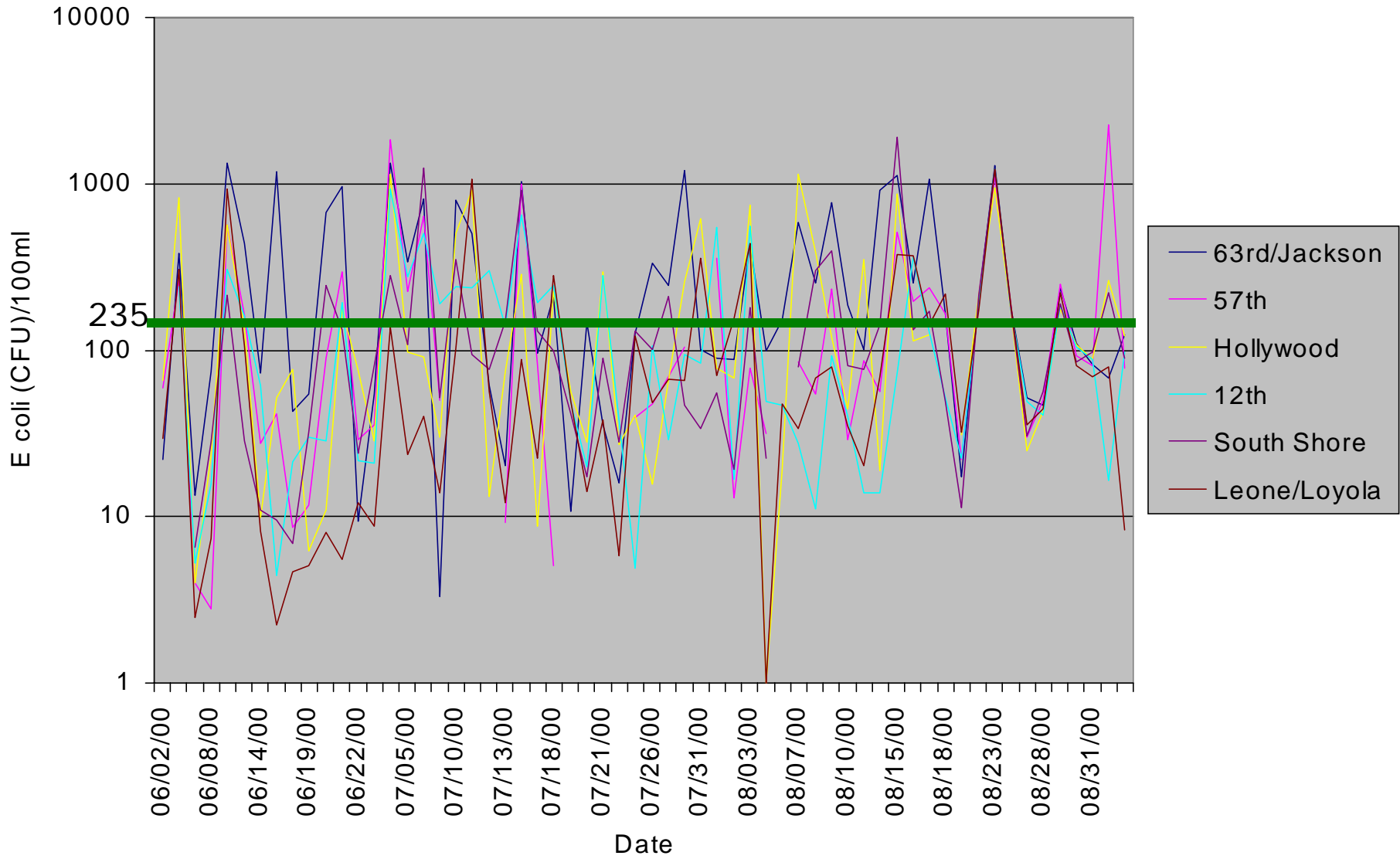
- Cultural Method (enterococci) 24 hours
- Quantitative PCR (enterococci, Bacteriodes) 2 hours
- Fiber Optic, fluoroimmunoassay (enterococci, Bacteriodes) 30 minutes
- Flowcytometry (enterococci) 30 minutes

Chicago Lakefront

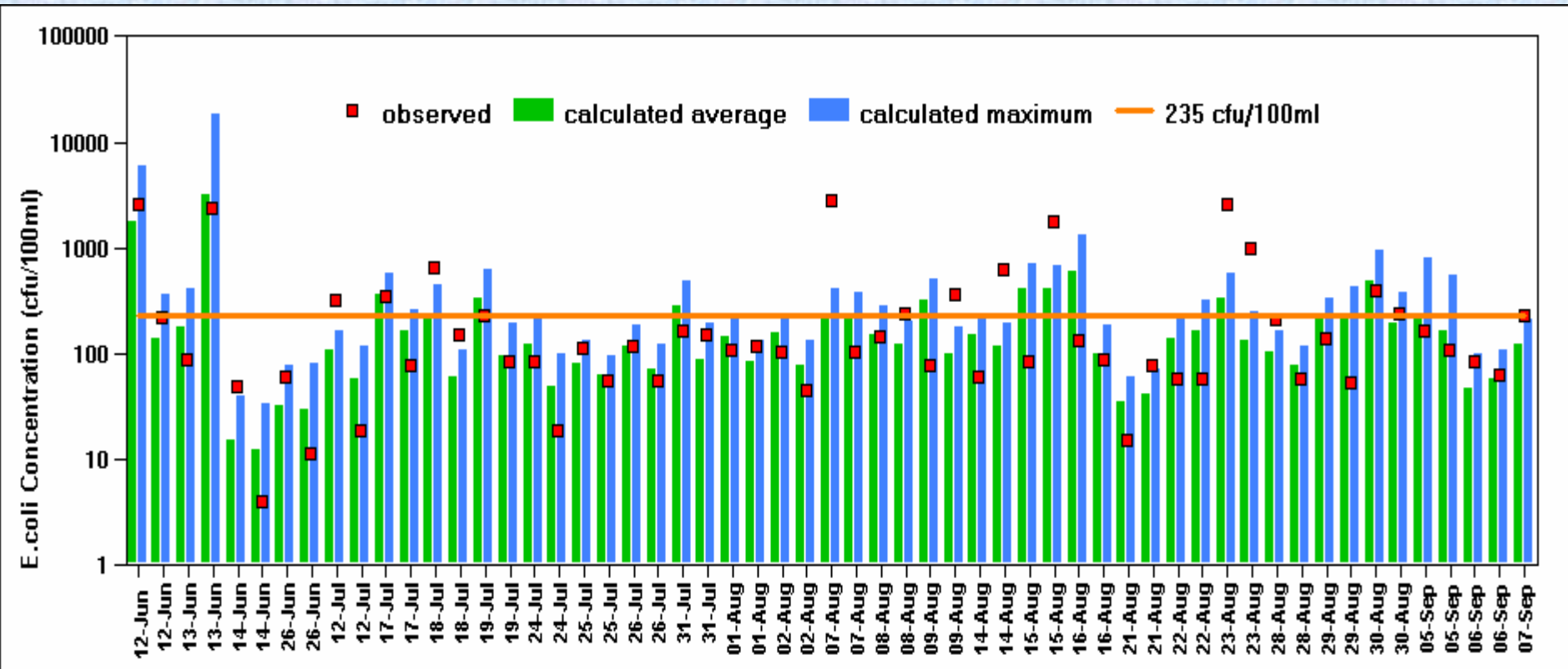


- 28 Miles of Lakefront
- 32 Public beaches
- 4 Lakefront designs
- Millions of Users
- \$5 Billion in Annual Revenue

Summer 2000 *E. coli* Concentrations, Chicago Beaches



Predictive Model

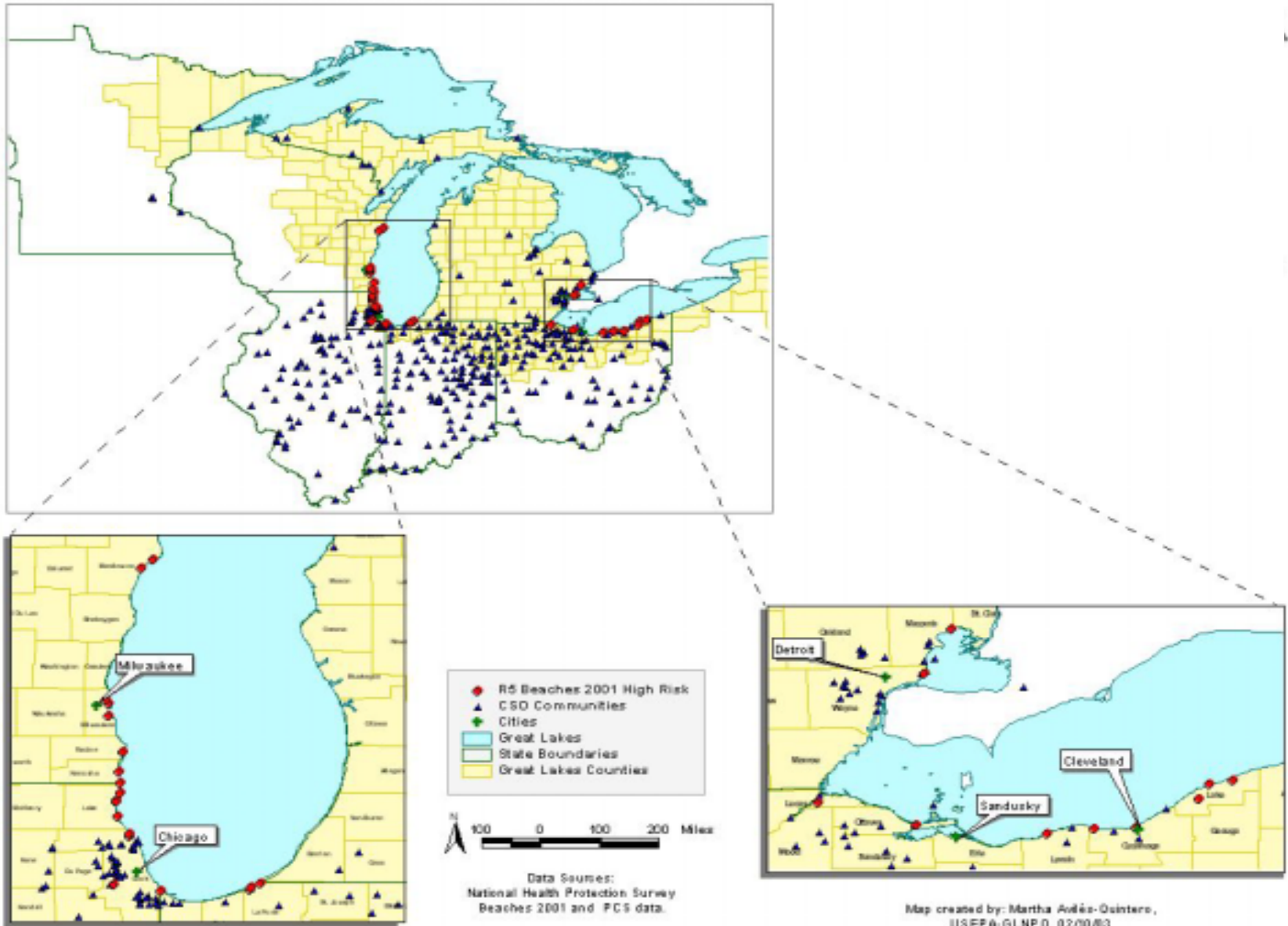


Best Prediction variable

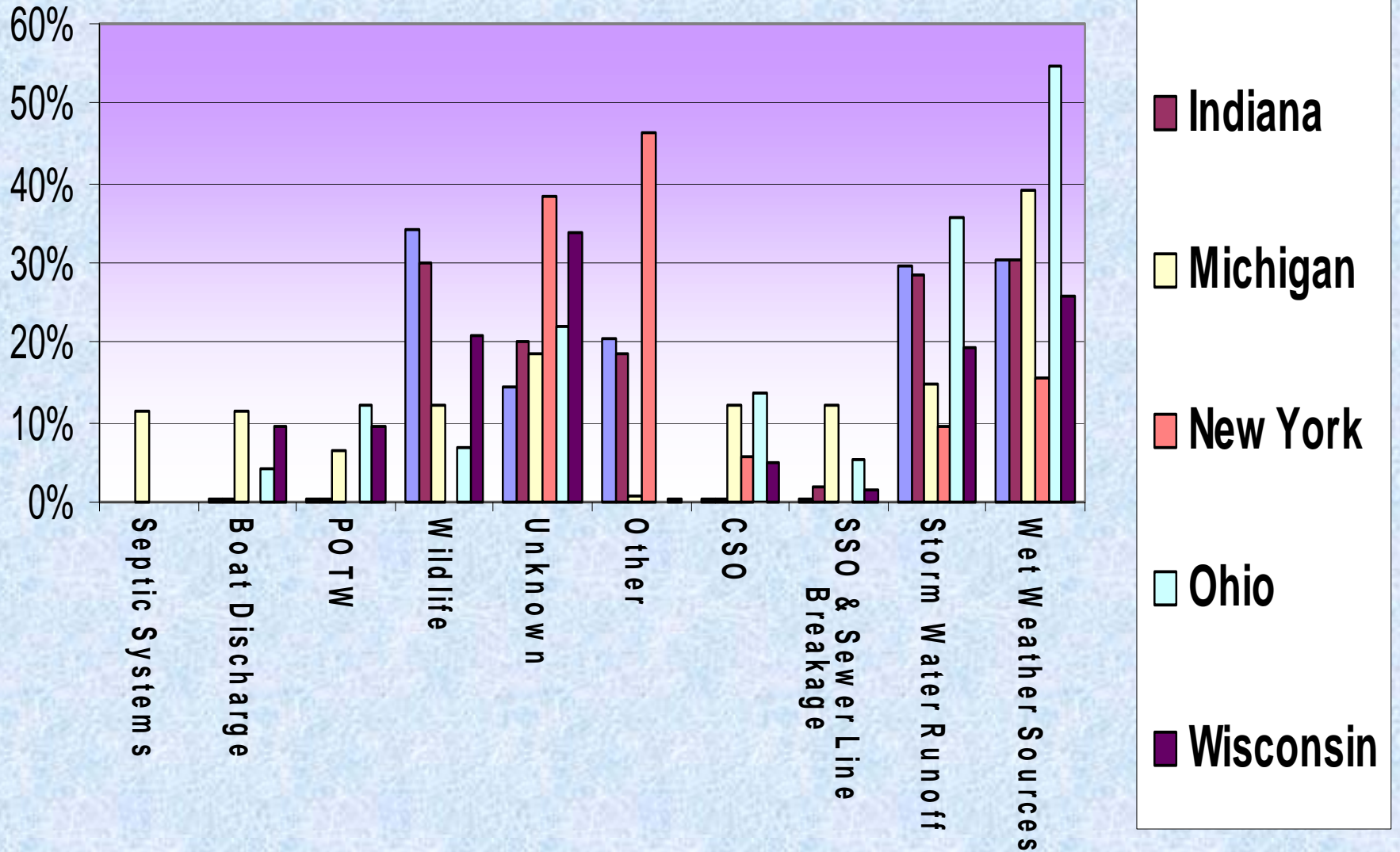
- 1) North Wind Speed
- 2) Rainfall
- 3) Air Temperature

- 4) Solar Radiation
- 5) Lake Stage
- 6) Turbidity

Region 5 Beaches 2001 High Risk and CSO Communities



2002 Great Lakes Coastal Beaches Sources that Resulted in Beach Advisories/Closures in each State

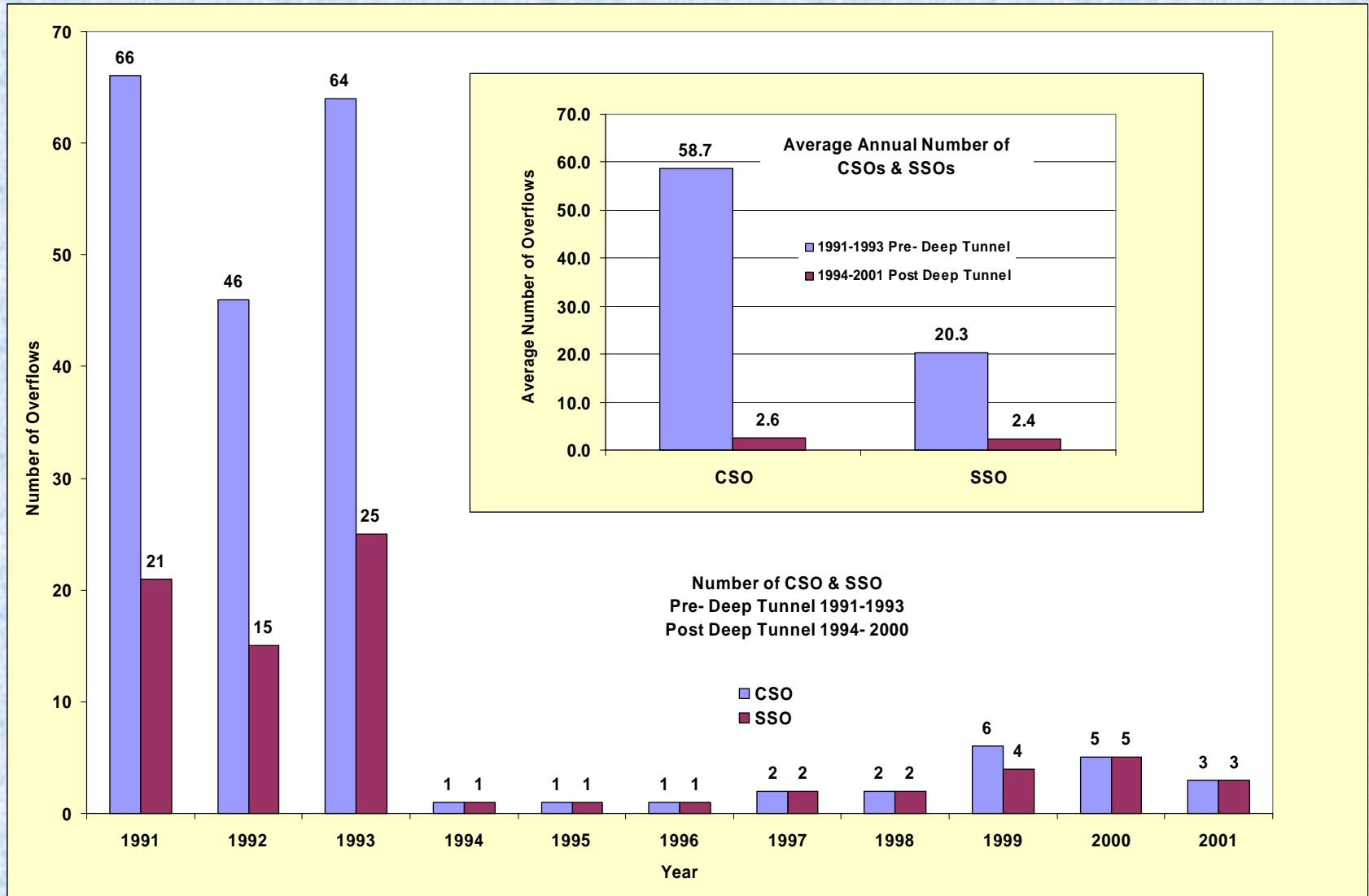


Milwaukee Deep Tunnel System

- 405 Million Gallons
- 300 feet below ground
- 19.4 miles long
- 12 to 32 foot diameter
- 24 Dropshafts
- 3 ~ 50 MGD dewatering pumps
- Design to overflow ~ 2 times/year



Reductions in Number of CSO's and SSO's



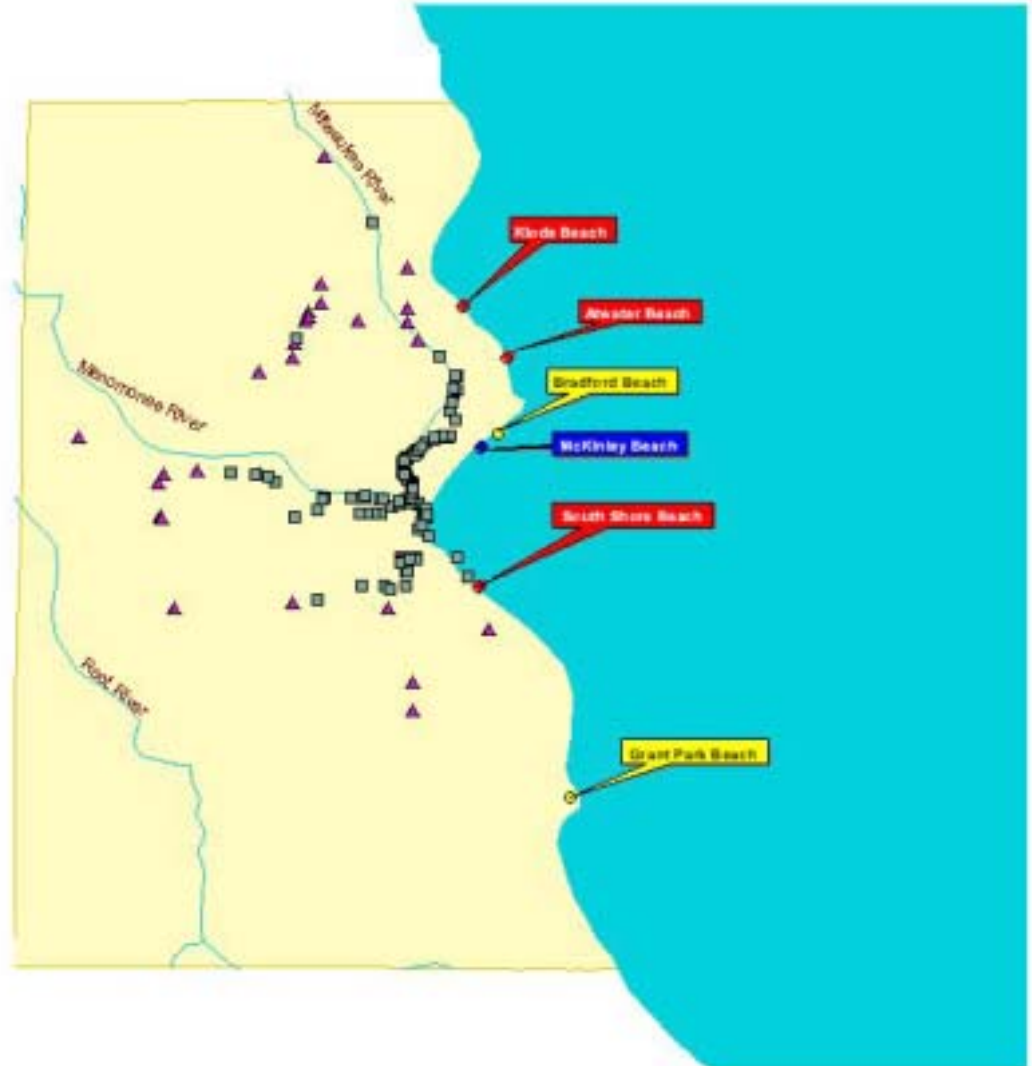
Milwaukee Metropolitan Sewer District's CSO, SSO and 2001 Beaches

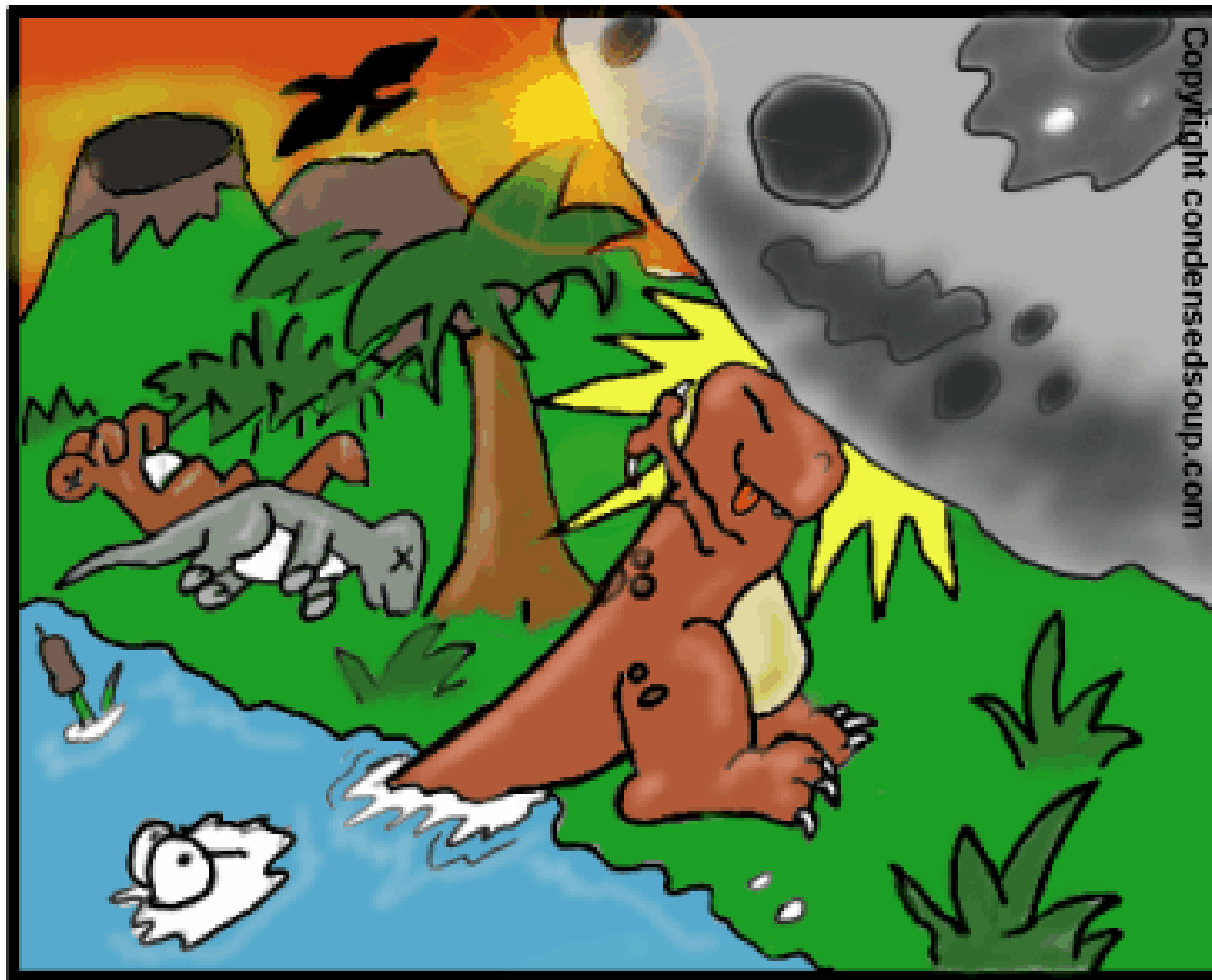


Data sources: Milwaukee Metropolitan Sewerage District's and 2001 National Health Protection Survey of Beaches 2001 for Swimming season.



Map created by: Martha Aviles-Quintero, ORISE Researcher, USEPA-GLNPD, 02/11/03





Scientists have discovered that the moon is moving away from the earth at a tiny yet measurable distance every year. If you do the math, you can calculate that 85 million years ago the moon was orbiting the earth at a distance of about 35 feet from the earth's surface. This would explain the death of the dinosaurs. The tallest ones, anyway....

There's
Science
and
There's
Sound
Science...

An aerial photograph of a lush green forest with a winding stream. The text "Keep 'Em Great!" is overlaid in a colorful, 3D-style font. The letters are multi-colored, with shades of red, orange, yellow, and blue, and have a dark blue shadow effect. The stream flows from the top left towards the bottom right, surrounded by dense green trees and some white patches of snow or light-colored ground.

Keep 'Em Great!