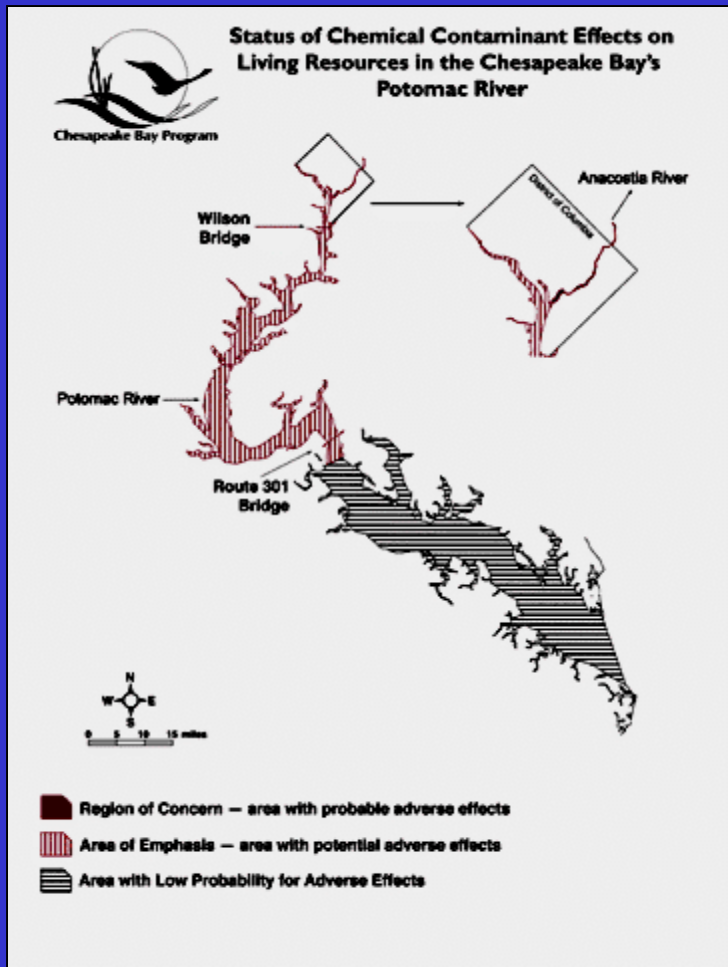
Anacostia Watershed Toxics Alliance

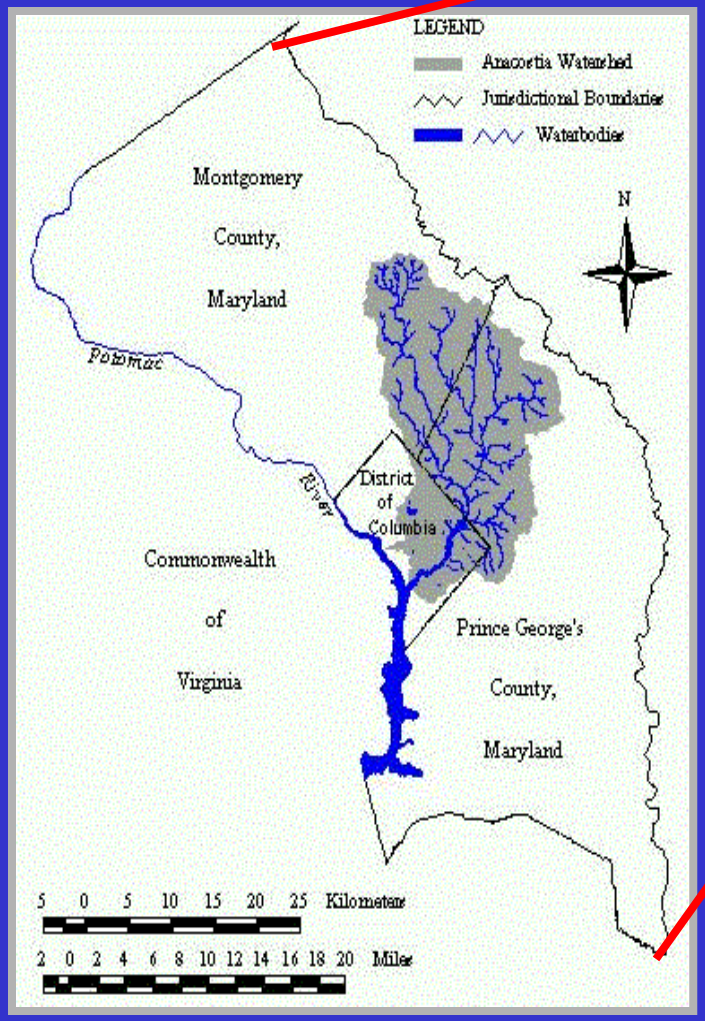
Public-Private Partnership / Urban Retrofit

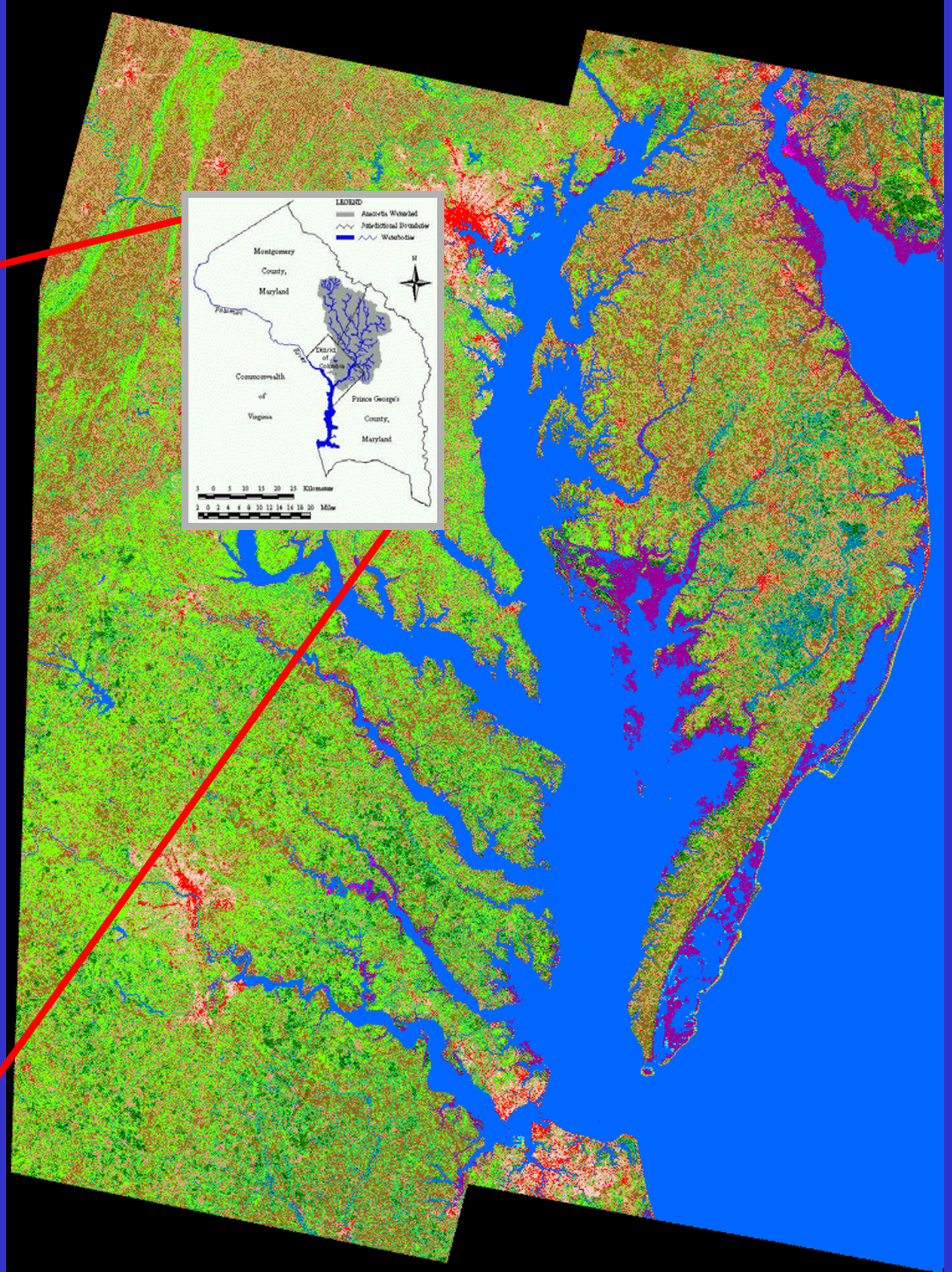
WATERSHED APPROACH TO MANAGE CONTAMINATED SEDIMENTS IN THE ANACOSTIA RIVER

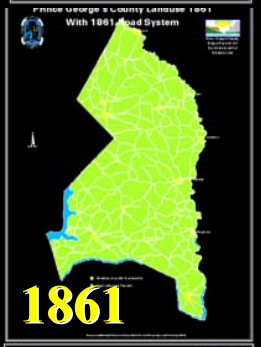
- Phase 1 Data Collection
- Phase 2 Alternative Evaluation
- Phase 3 Implementation
  - Demonstration Project for LID.

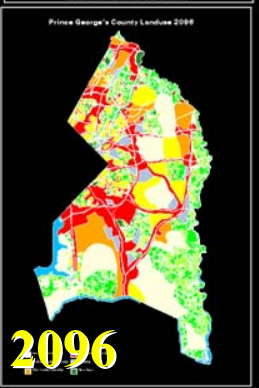


Anacostia Restoration

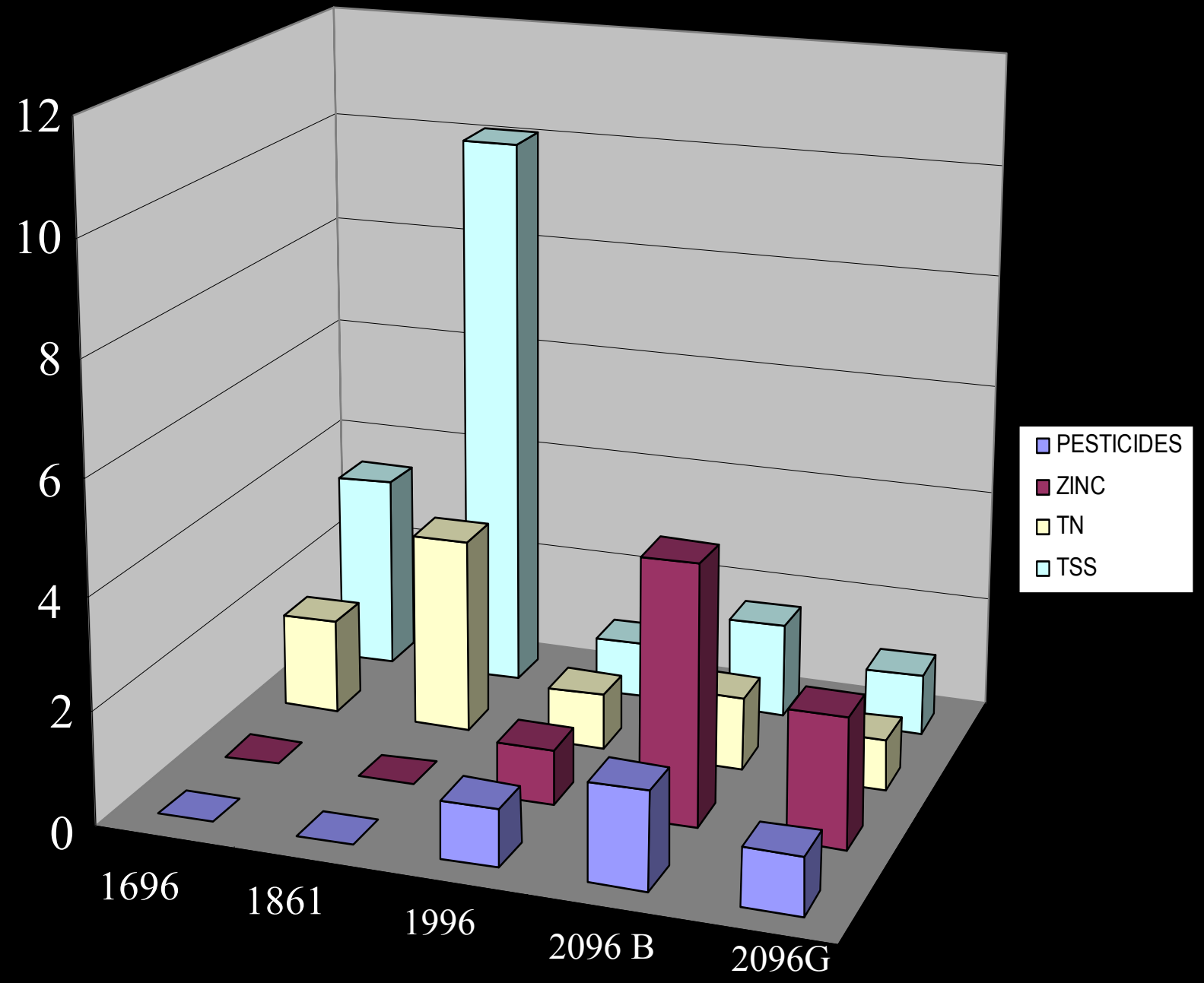




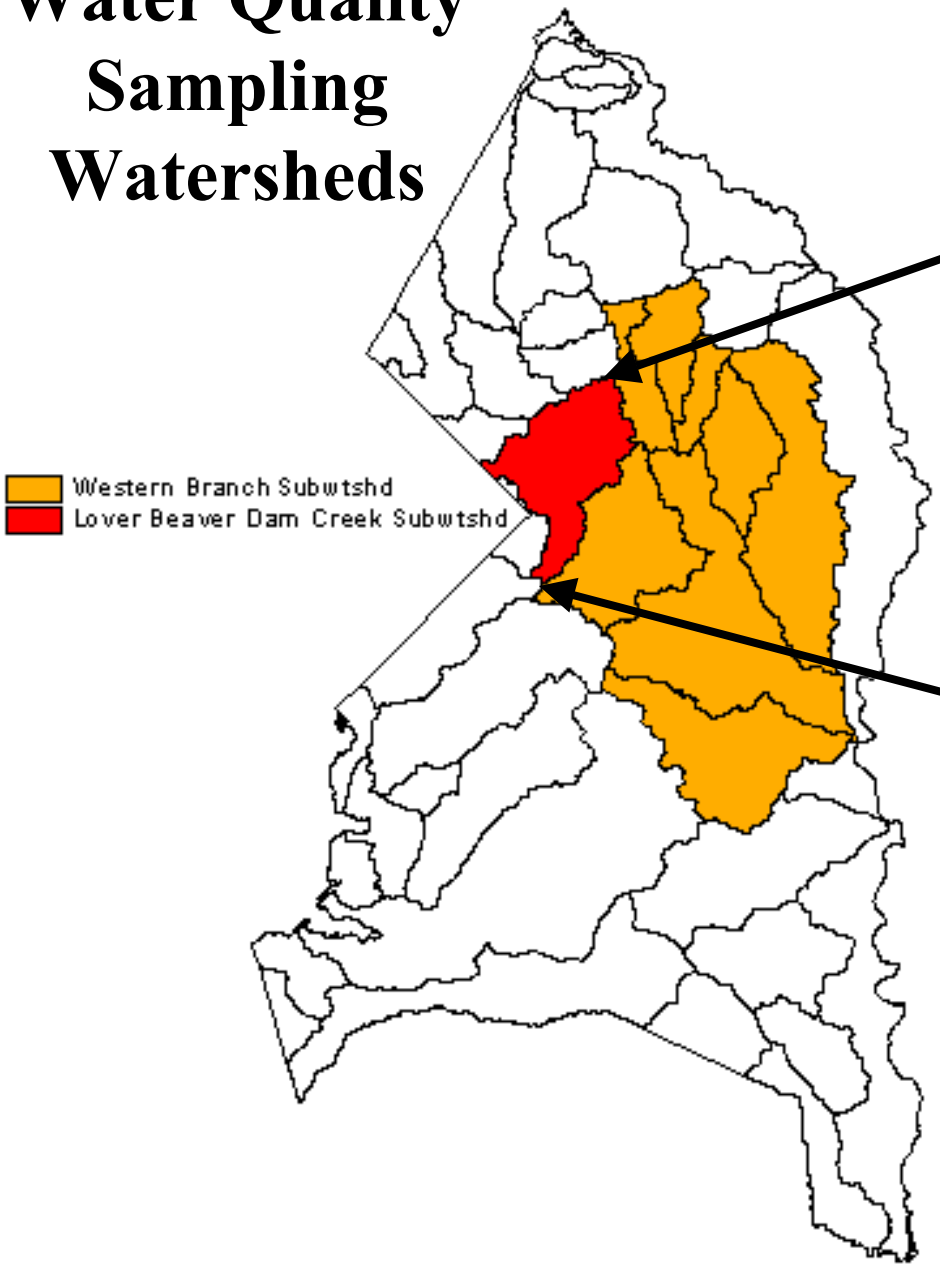


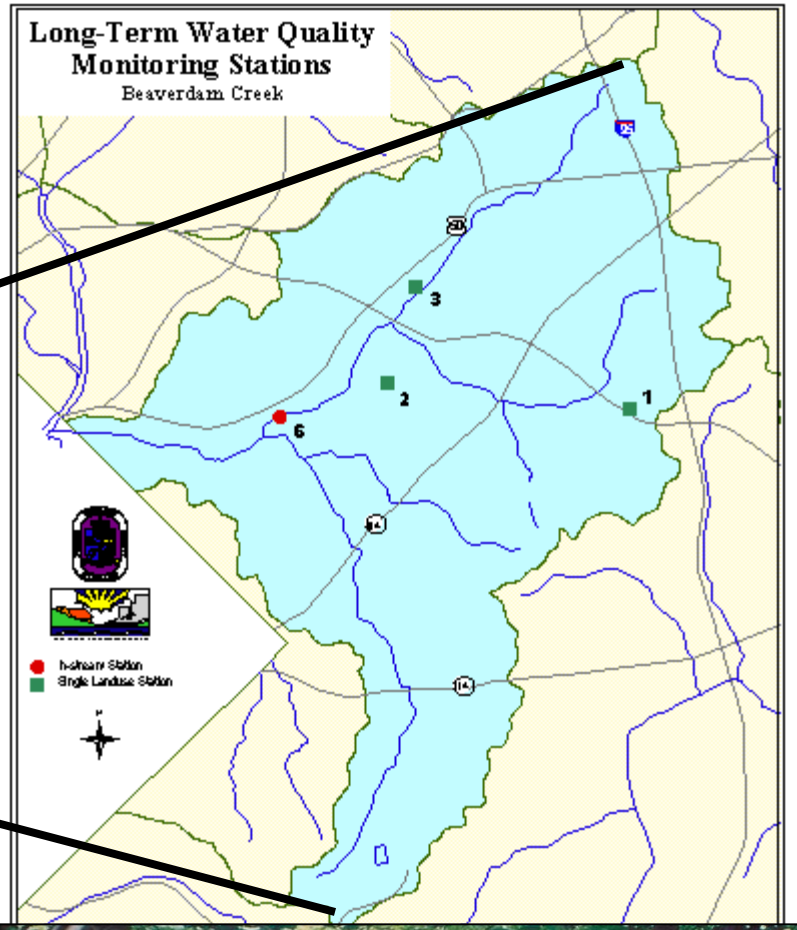


Land Use / Pollutant Loads



Water Quality Sampling Watersheds





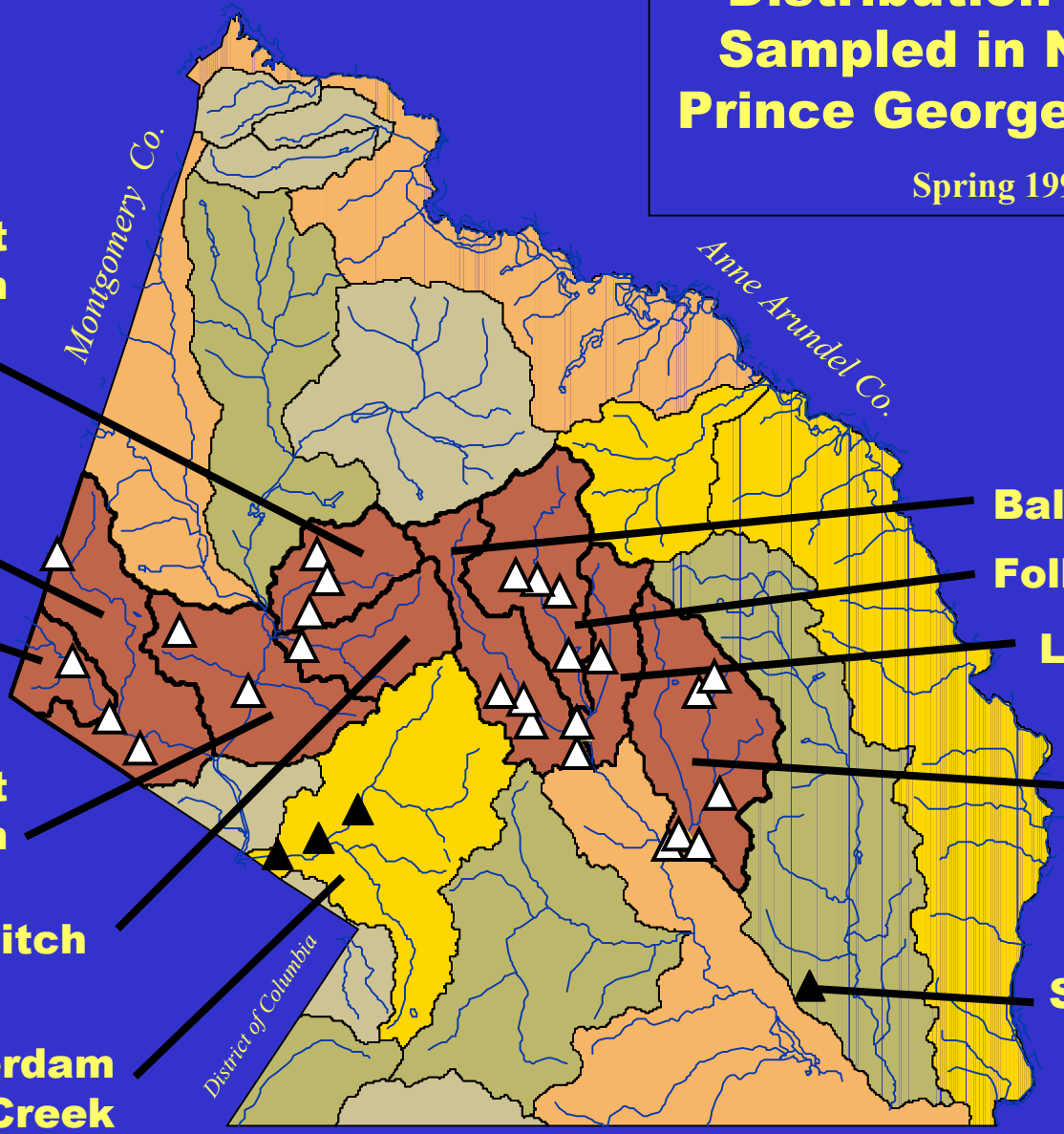
Wet Weather Monitoring

Maximum Concentrations at In-stream Stations

Parameter	EPA Criteria		L. Beaver-dam Cr.	Western Branch	Collington Branch
	chronic	acute			
Cadmium (*ug*/l)	1.1	3.9	40	1.0	10
Copper (*ug*/l)	12	18	470	30	57
Lead (*ug*/l)	3.2	83	1700	66	34
Zinc (*ug*/l)	110	120	5400	160	330
Total P (mg/l)	0.1		3.2	0.74	3.4
TKN (mg/l)	--		6.0	7.2	9.9
Nitrate (mg/l)	10		2.5	1.0	1.8
BOD (mg/l)	7		71	57	27
TSS (mg/l)	500		4800	910	2500
Fecal Coliform (org/100 ml)	200		220000	13000	17000
Oil/Grease (mg/l)	--		7	BDL	BDL

Distribution of Sites Sampled in Northern Prince George's County

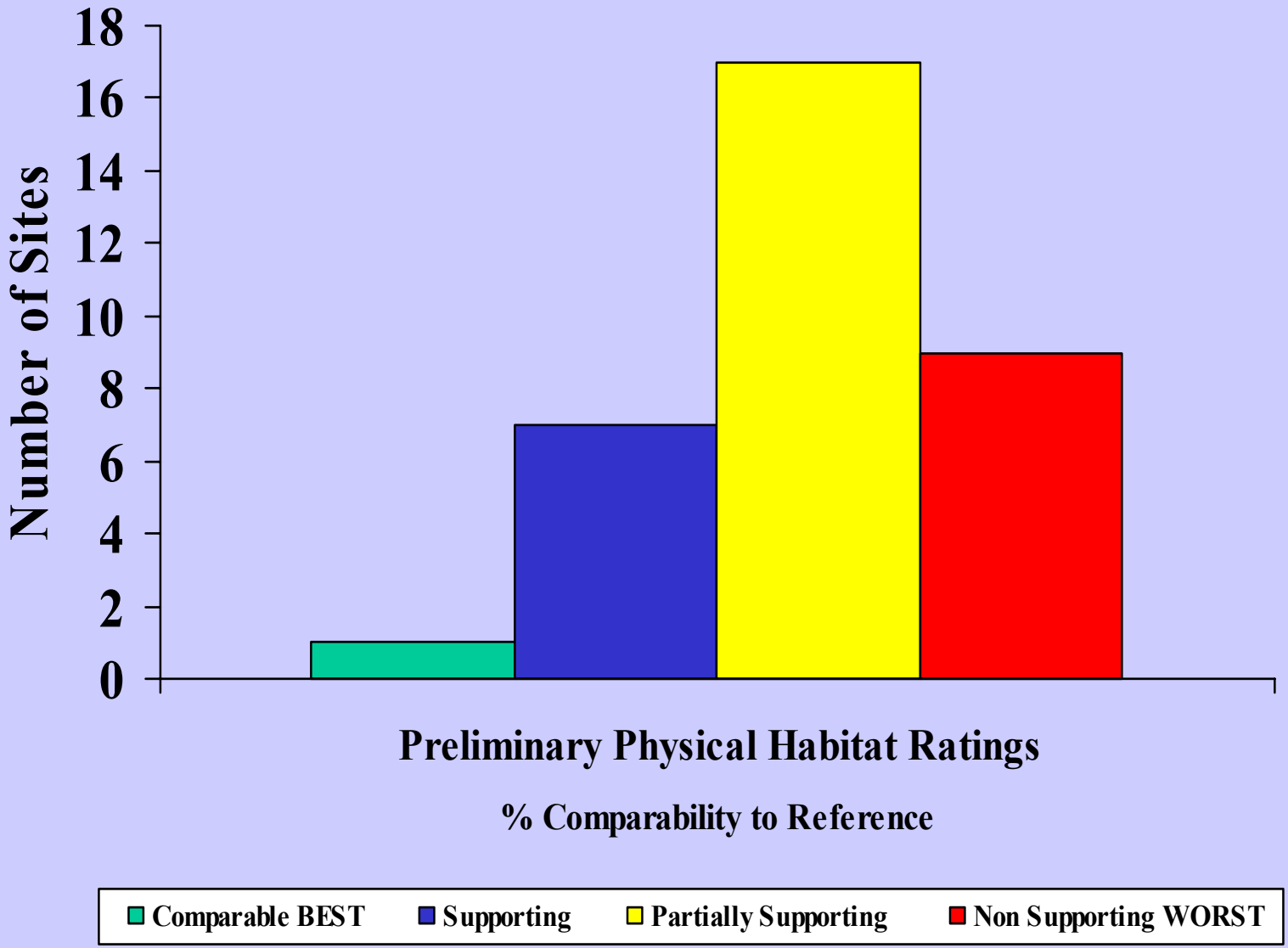
Spring 1999



southern Prince George's County (not shown)

△ Probability Sites
▲ Targeted Sites

Biological Sampling Sites in Northern Prince George's County Spring 1999



Anacostia Protection Restoration Programs / Costs 1987 to 2001

- Floodplain Studies …….$ 450,000 *
- Watershed Studies …….$ 1,225,000 *
- Chemical Monitoring…….$ 650,000 **
- Biological Monitoring…….$ 250,000 **
- Flood Control Projects…….$ 39,772,000 *
- Environmental Improvements……$ 42,229,000 *
- Non-Structural Programs…….$ 5,100,000 **
- Development Review……. $ 10,250,000 **
- Infrastructure Maintenance …… $ 42,000,000 **

Total Costs $ 145,826,000

* Capital / ** Operating

FOREST BUFFER

This forest buffer was established to enhance and protect the waters of the Chesapeake Bay and its tributaries.

NO MOW AREA

State and Federal Grants Subsidize Capital Costs

- MDE
- DNR
- MDOT
- MDP
- FEMA
- COE
- EPA

Total Grant Amount
Since 1987

$ 31,304,286

Out of

$42,229,000

What is the "Anacostia Watershed Toxics Alliance (AWTA)?"

- An innovative alliance of business, government, and public entities to address a common problem of sediment toxic contamination
- Term was coined by Admiral Weaver in a meeting with EPA

AWTA - A Watershed Approach

to a Very Difficult and Costly Challenge

- Years of Sediment Contamination Costs Millions to Address/Clean up
- Not a job for one entity alone – watershed spans multiple jurisdictions (DC and MD)
- Applying a mix of tools including traditional point source controls, voluntary P2 programs and novel ideas to deal with a legacy of pollution

AWTA Origins

- Underway for over 3 years (March 1999)
- EPA convened the group and now serves as facilitator and partners in the effort; each participant asked to commit their organization to some level of support
- US Navy was our first partner – now over 25 public and private sector stakeholders involved in shared management process – monthly meetings

Alliance Members

EPA

US Navy

DC DOH

MDE

Acad of Nat Sciences

ATSDR

Bolling AFB

FWS

GSA

ICPRB

Prince George's Co.

Montgomery Co.

NOAA

NPS

USGS

PEPCO

Wash Gas

DC Metro

Riverkeeper

Univ of DC

George Mason U

WASA

Wash. COG

Anac Wat Society

Mission Statement

To work together in good faith as partners to evaluate the presence, sources and impacts of toxic contaminants in the Anacostia River with all stakeholders, both public and private, and other interested parties and to evaluate and take actions to enhance the restoration of the Anacostia watershed to its beneficial use to the community and ecology as a whole.

Issues and Opportunities

Degraded Urban Rivers

- Unacceptable Public Health Risks
  - Fish Advisory for PCB's/Chlordane
  - Impaired Recreational Uses
- Unacceptable Ecological Risks
  - Cancerous Lesions on Fish (PAH's)
  - Impacted Benthic Community
- Watershed-wide Point/NonPoint Sources
- Superfund/Water Involvement

Issues and Opportunities

- Loss of Wetlands/Streams
- Loss of Forest Ecosystem
- CSO's
- TMDL's
- Trash and Aesthetics
- Link to Economic Revitalization Efforts

Three-Phased Approach

	Planned Start	Begin	Completed
Phase 1 -	**6/99**	**11/99**	**4/00**

(Phase 1 gathered all available data, identified data gaps, prepared site maps, developed a conceptual model, and performed preliminary risk assessments.)

Phase 2 -	**2/00**	**5/00**	**8/02**

(Phase 2 will fill in data gaps related to the conceptual model, assess fate and transport of contaminants, perform baseline risk assessment field work, & identify potential remedial actions.)

Phase 3 -	**1/01**	**11/01**	**2011 est.**

(Phase 3 will complete baseline risk assessments, identify, secure funding, and implement reasonable remedial actions necessary for the river.)

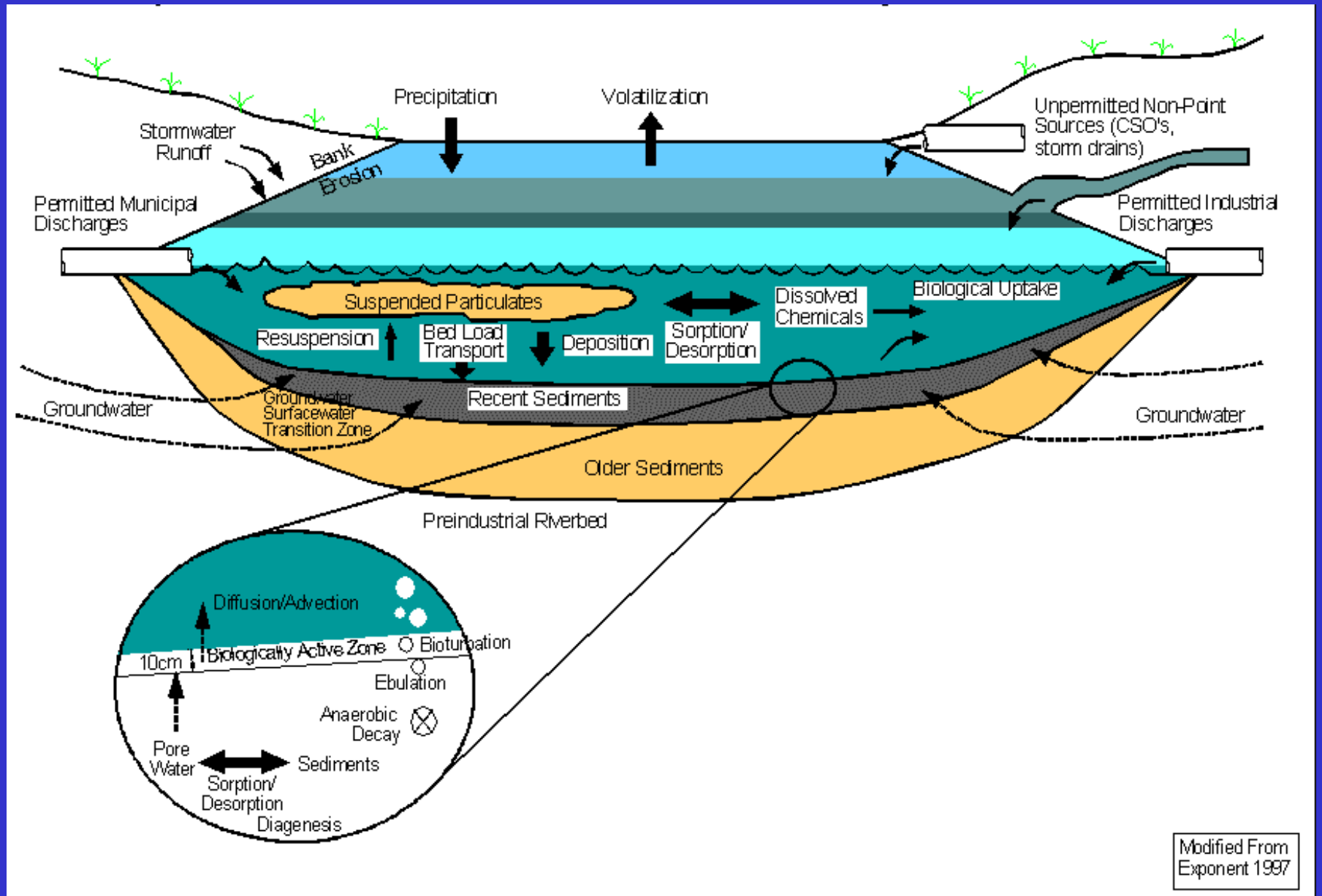
Major Benefit - Leveraging Resources

- Securing staff time, analytical work, matching funds from member organizations,
  - e.g. Navy co-funded the SPAWAR ECOS survey for sediment transport and hydrodynamics
- $13.5 million in project work:
  - Includes $9 million in supplemental federal budget assistance in 2002
  - New Wetlands, reactive capping project, Low Impact Development storm water management projects

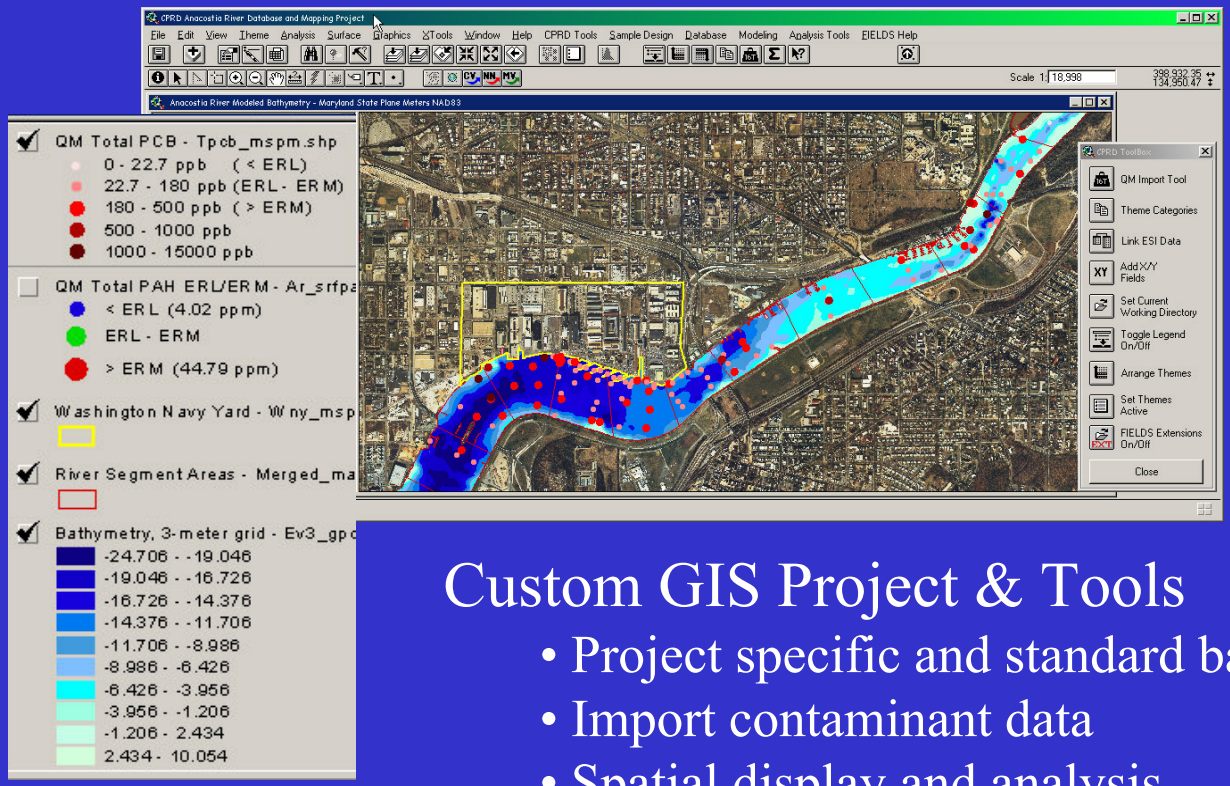
CONCEPTUAL SITE MODEL

Definition:

- A Conceptual Site Model (CSM) is a characterization of the key overall dynamics of the sediment site (e.g., sources, sinks, contaminant fate and transport, exposure pathways and receptors) which provides the necessary site understanding as a basis for remedial strategy development
- A valid CSM is critical to evaluation of any sediment site
- The CSM should incorporate risk management principles and be focused on practical resolution of the problem


Precipitation
Volatilization
Stormwater Runoff
Bank Erosion
Unpermitted Non-Point Sources (CSO's, storm drains)
Permitted Municipal Discharges
Permitted Industrial Discharges
Suspended Particulates
Dissolved Chemicals
Biological Uptake
Resuspension
Bed Load Transport
Deposition
Sorption/ Desorption
Recent Sediments
Groundwater
Groundwater Surfacewater Transition Zone
Groundwater
Older Sediments
Preindustrial Riverbed
Diffusion/Advection
10cm
Biologically Active Zone
Bioturbation
Ebulation
Anaerobic Decay
Pore Water
Sorption/ Desorption
Sediments
Diagenesis
Modified From Exponent 1997

Anacostia River Watershed Database & Mapping Project



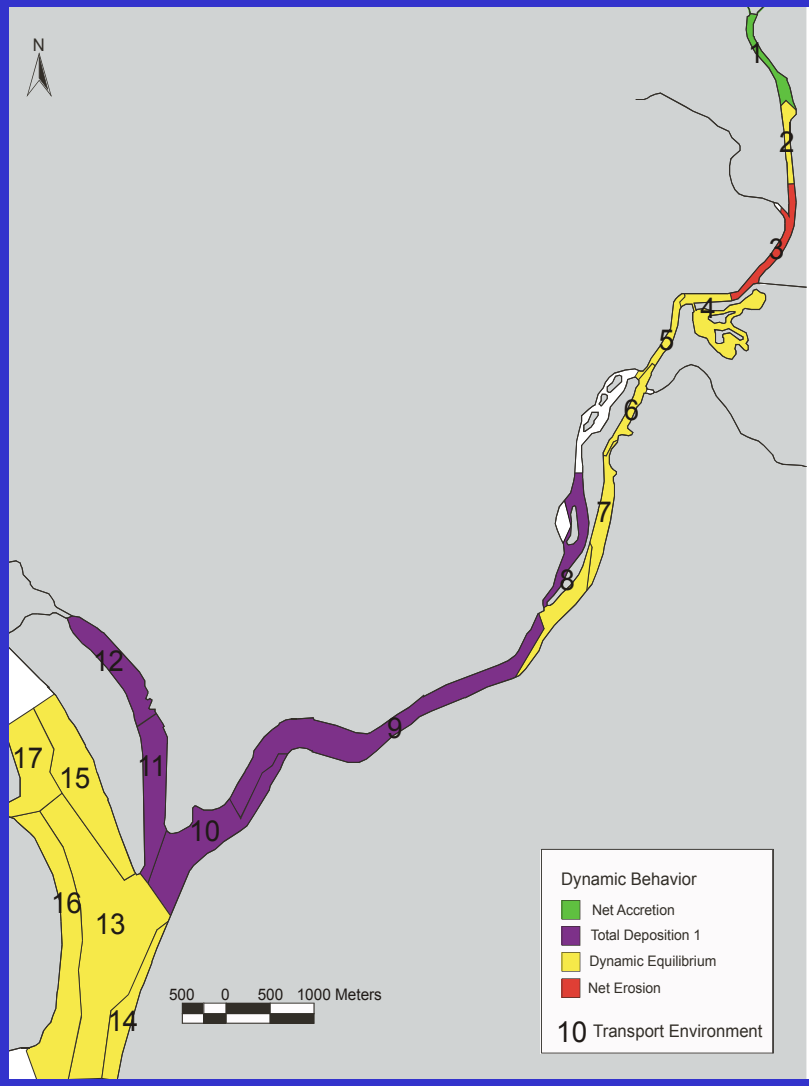
Custom GIS Project & Tools

- Project specific and standard basemap features
- Import contaminant data
- Spatial display and analysis
- Simplify routine tasks

Conceptual Model Overview

Fate and Transport-Sediment Transport

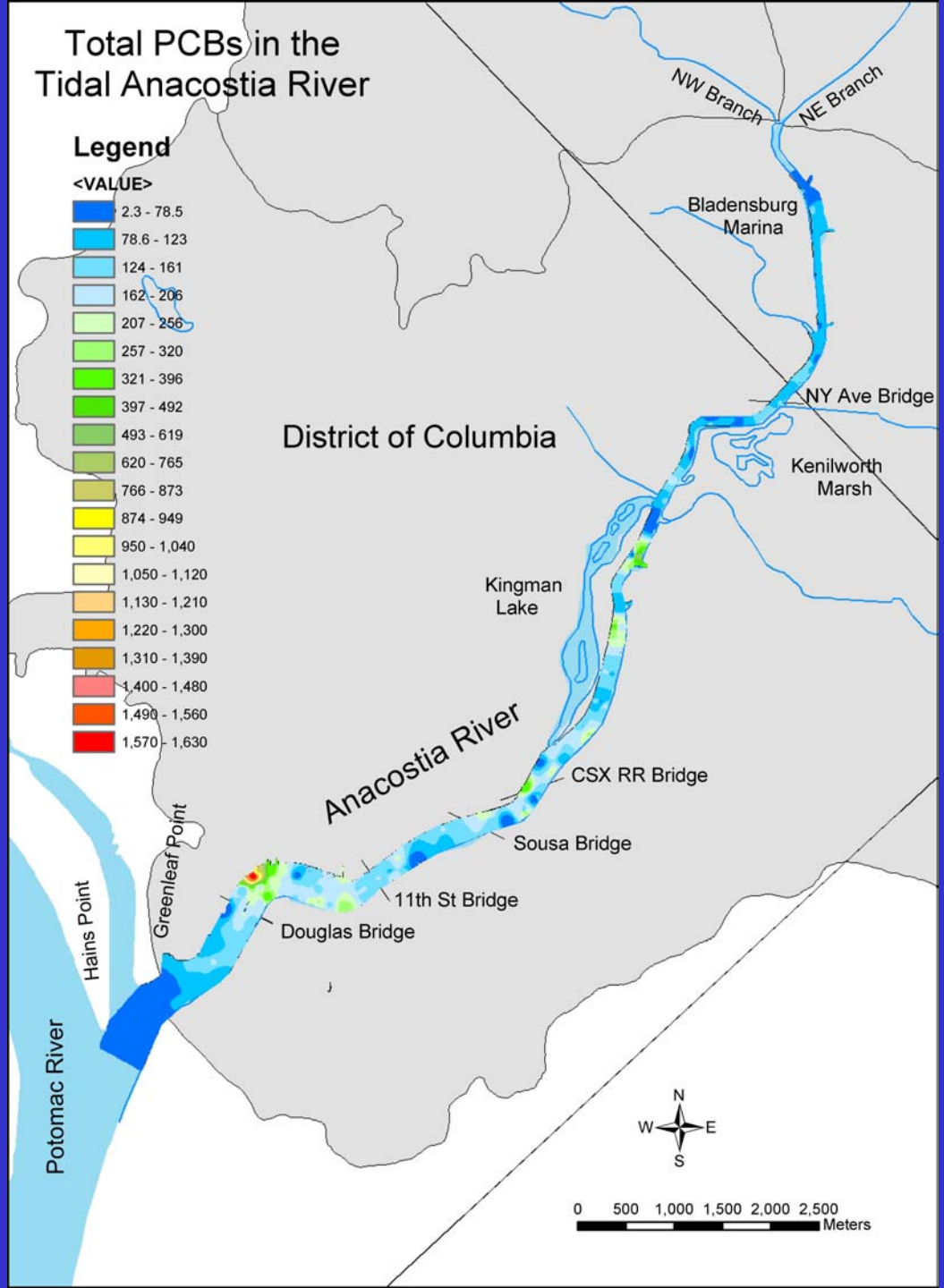
- Sediment Trend Analysis suggests NW and NE Branches are the primary sources bringing sediment into the tidal Anacostia with secondary sources having localized effects
- Courser material deposited in a zone of accretion from the confluence to Bladensburg Marina
- From Bladensburg to the Railway lift bridge there is dynamic equilibrium and occasional net erosion (conveyer belt)

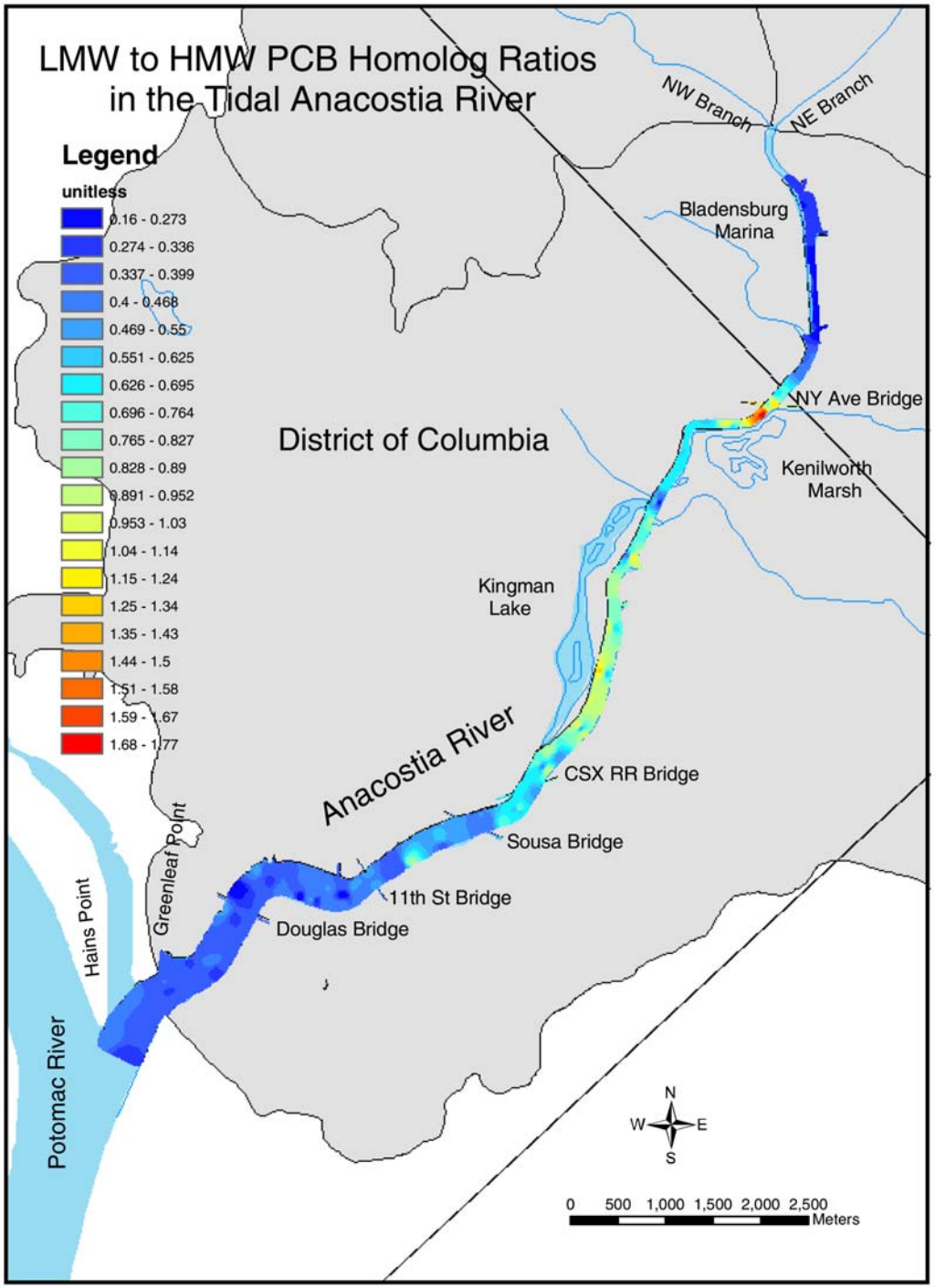


Conceptual Model Overview

Nature and Extent (Conclusion)

- Better understanding of general nature of contamination in lower River. A high density, systematic survey is necessary to fill in spatial data gaps
- Hot spots identified
- Some “signatures” or compositions identified


Total PCBs in the Tidal Anacostia River
Legend
<VALUE>
2.3 - 78.5
78.6 - 123
124 - 161
162 - 206
207 - 256
257 - 320
321 - 396
397 - 492
493 - 619
620 - 765
766 - 873
874 - 949
950 - 1,040
1,050 - 1,120
1,130 - 1,210
1,220 - 1,300
1,310 - 1,390
1,400 - 1,480
1,490 - 1,560
1,570 - 1,630
NW Branch
NE Branch
Bladensburg Marina
NY Ave Bridge
District of Columbia
Kenilworth Marsh
Kingman Lake
Anacostia River
CSX RR Bridge
Sousa Bridge
11th St Bridge
Douglas Bridge
Greenleaf Point
Hains Point
Potomac River
N
W
E
S
0 500 1,000 1,500 2,000 2,500
Meters


LMW to HMW PCB Homolog Ratios
in the Tidal Anacostia River
Legend
unitless
0.16 - 0.273
0.274 - 0.336
0.337 - 0.399
0.4 - 0.468
0.469 - 0.55
0.551 - 0.625
0.626 - 0.695
0.696 - 0.764
0.765 - 0.827
0.828 - 0.89
0.891 - 0.952
0.953 - 1.03
1.04 - 1.14
1.15 - 1.24
1.25 - 1.34
1.35 - 1.43
1.44 - 1.5
1.51 - 1.58
1.59 - 1.67
1.68 - 1.77
NW Branch
NE Branch
Bladensburg Marina
NY Ave Bridge
District of Columbia
Kenilworth Marsh
Kingman Lake
Anacostia River
CSX RR Bridge
Sousa Bridge
11th St Bridge
Douglas Bridge
Greenleaf Point
Hains Point
Potomac River
N
W
E
S
0 500 1,000 1,500 2,000 2,500
Meters

Components of The Sediment Management Plan

- Non-Point Source Reduction
- Point Source Identification/Reduction
  (using Superfund process)
- Sediment Remediation

Non-Point Source Reduction

Storm water Retrofit

- Retention/Detention Facilities
- Low Impact Development
- Water Quality Inlets
- Filtration Devices
- Building Code/Institutional Changes

Non-Point Source Reduction

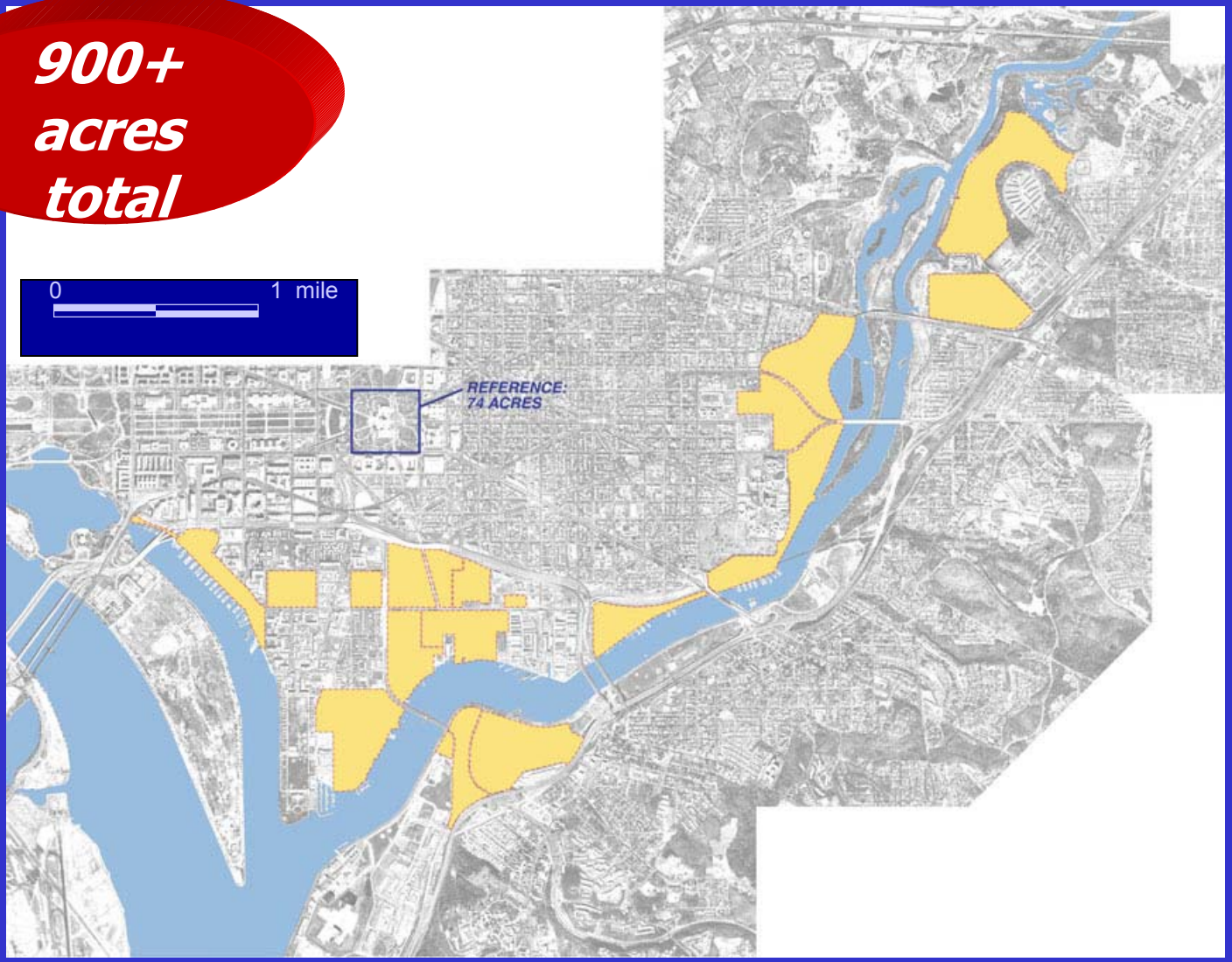
Non-Storm water Retrofit

- Stream Restoration
- Tidal Wetland Creation
- Non-Tidal Wetland Creation
- Street Sweeper Programs
- Trash Reduction Systems
- Pollution Prevention/Education

Projected Cost of the Anacostia Cleanup

- $206 million over 10 years
- Major Elements for:
  - Point/Non-Point Source Contaminant Reduction
  - Sediment Remediation
  - Wetlands and Stream Restoration
  - Identification of Loading Sources
  - Monitoring/Reporting and Tracking

The Opportunity:
Link to Smart Growth is essential;
Connection to Anacostia Waterfront Initiative




Urban Development
Washington D.C.
Potomac River
Anacostia River

Urban LID Lot Level Control Opportunities

- Roofs
- Buildings
- Down Spouts
- Yards
- Sidewalks
- Parking Lots
- Landscape Areas
- Open space
- Amended Soils

Multifunctional Infrastructure

Retention

Detention

Filtration

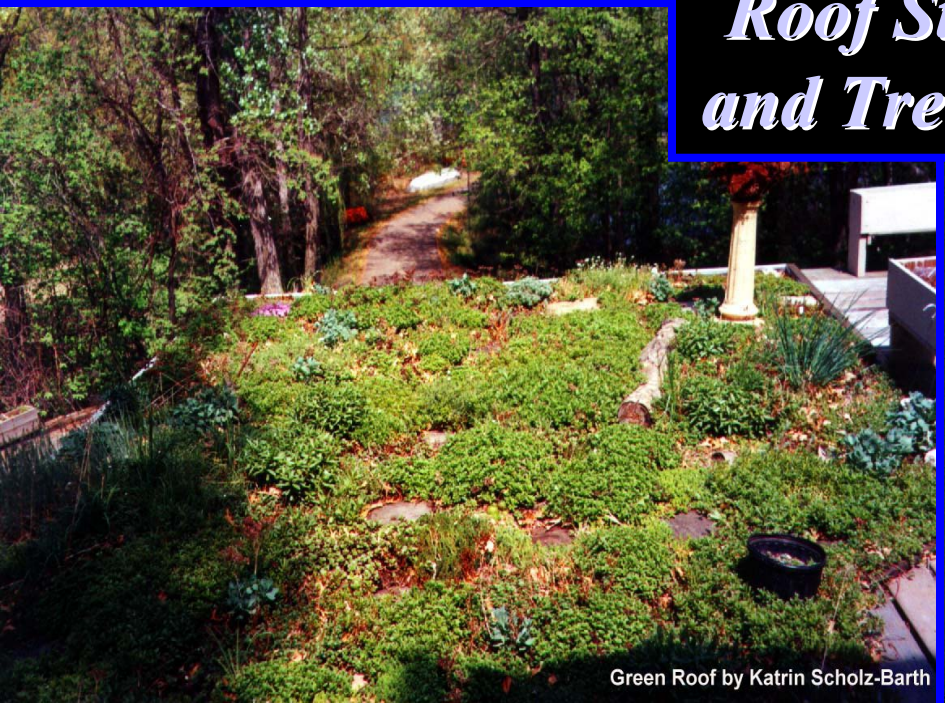
Infiltration

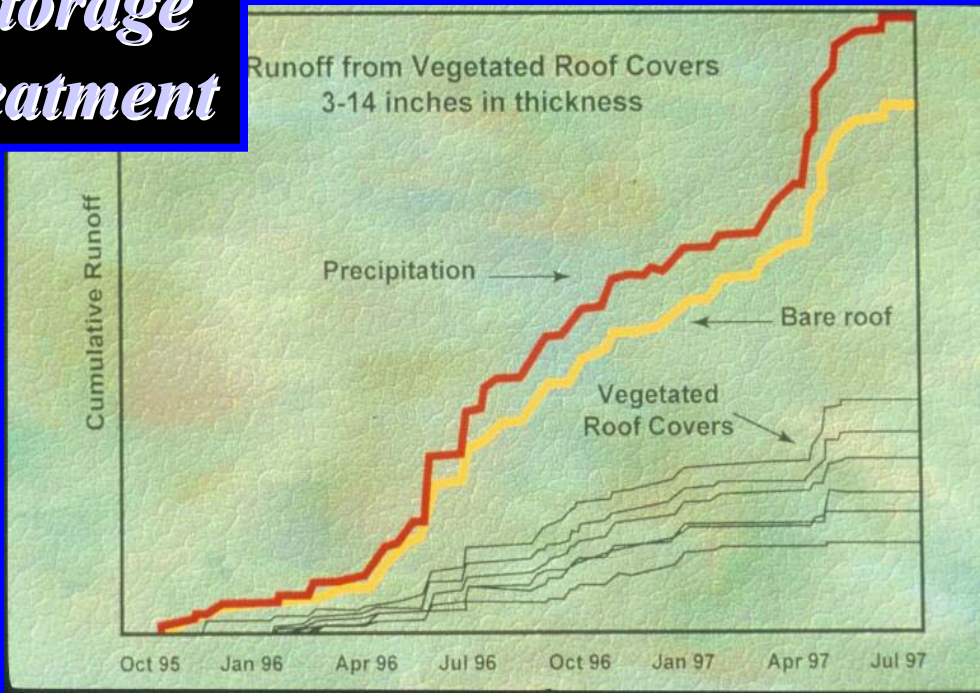
Timing

Water Use

Prevention

Roof Storage and Treatment






MAY 29 2001

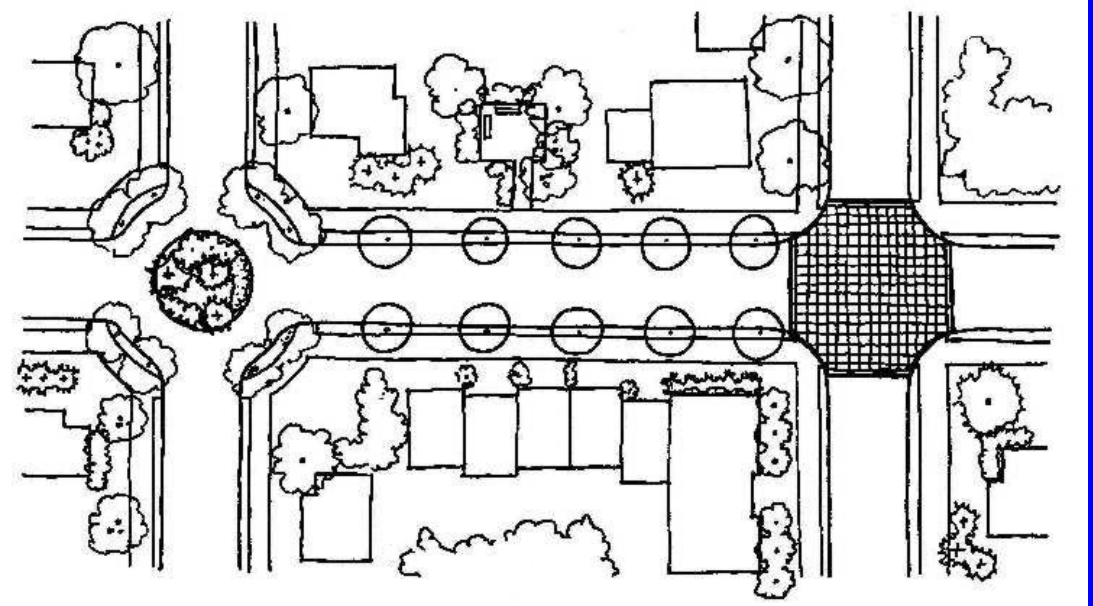
Buckman Heights courtyard with infiltration garden

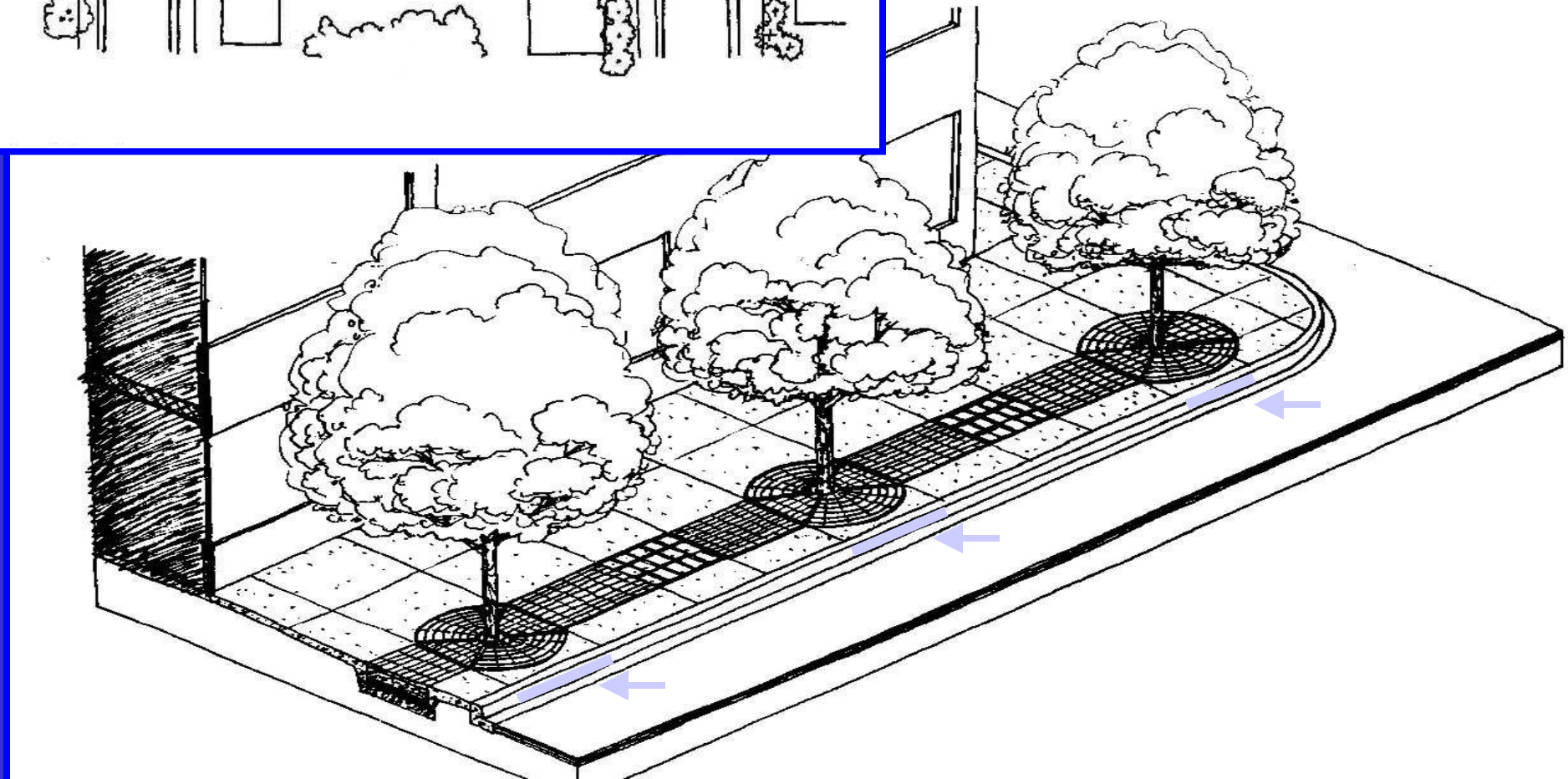
Buildings Design

Downspouts Disconnect / Water Use


Rain Gardens
MAY 21 2001

Street Tree / Shrub Filters





Infiltration Cells

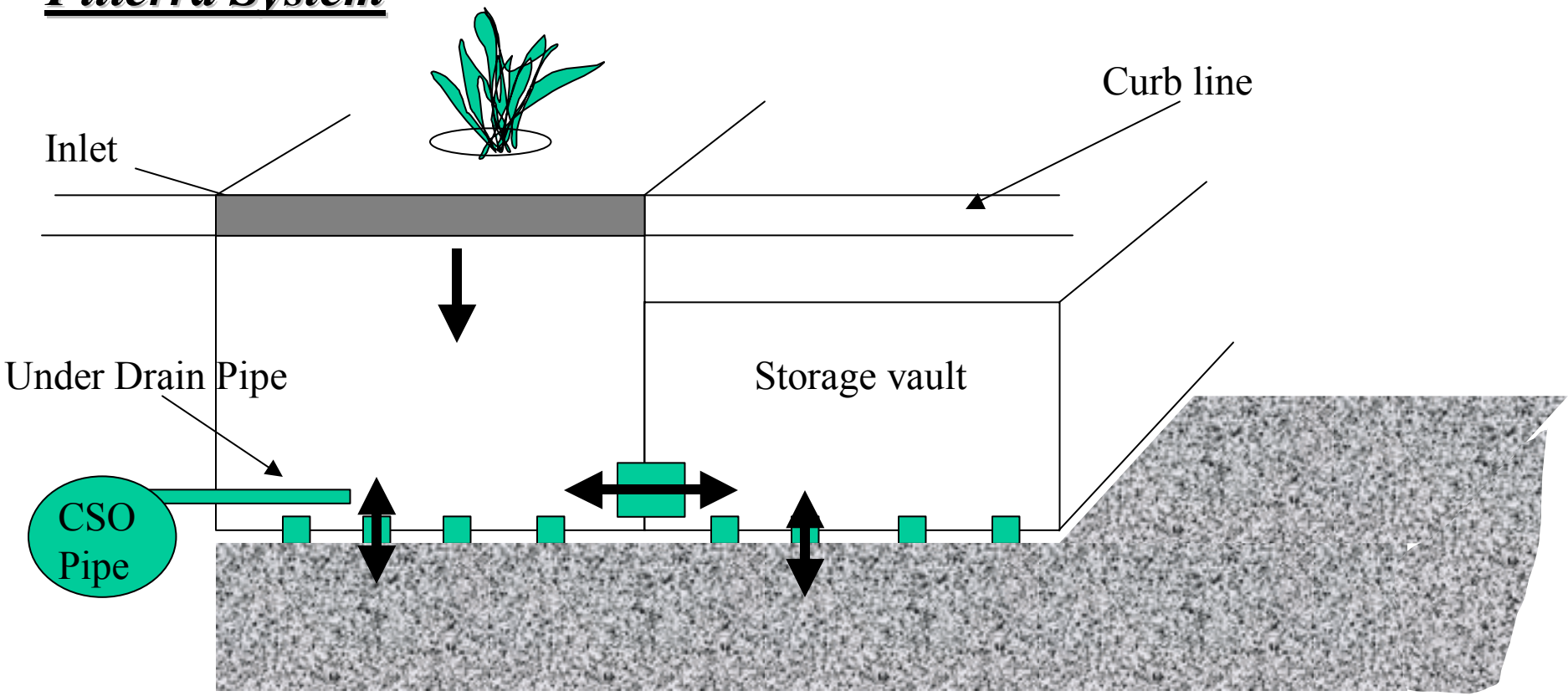
- **Maximize surface area available**
- **Achieved approx. 1900 CF volume**

Infiltration and Conveyance trench

Filtering by Vegetation

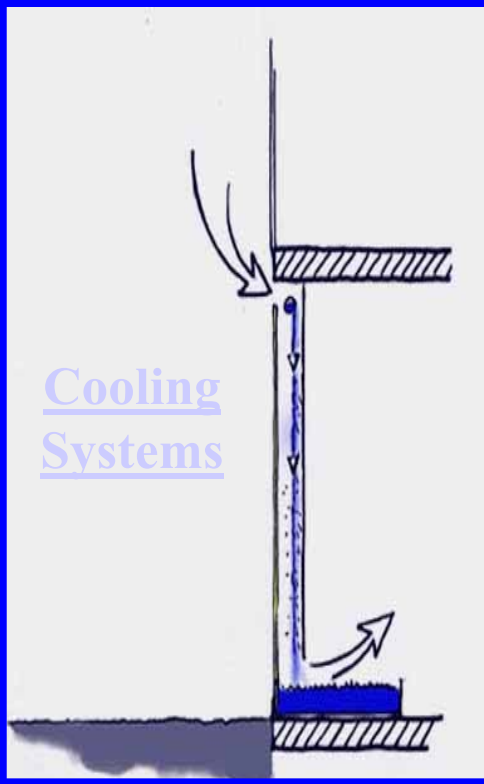

STOP

Profile of Combined CSO Control Storage / Detention / Infiltration Filterra System



As filtered water passes to the bottom of the box the under drain pipe constriction flows forcing water to go into the storage vault. Both the vault and the filter box have holes in the bottom to allow for infiltration. Additional infiltration / storage capacity can be obtained by placing the entire system on an extensive gravel bed. Eventually the entire system would drain via infiltration or through the under drain pipe.


© CherryBlossomGardens.com


Cooling
Systems


Berlin Potsdamer Platz Regenwassermanagement
Landwehrkanal
Sammlung
Urbanes Gewässer
Wsp
Überlauf
Retention mit Wasserspiegel-schwankung
Nutzung
Wsp
Wsp
Speicherung in Zisternen

LID IS NOT JUST

- Conservation Design
- Growth Management
- Cluster Design
- Impervious Reduction
- Minimization but rather functional restoration
- Bioretention

LID IS

- Comprehensive
- Complex
- Highly Engineered
- Holistic
- Multiple Objectives
  - volume / habitat / energy / aesthetics / quality / added values / water supply /

Research Needs

- Analytical Methodologies
- Hydrology and Ecology Connections
- Transfer of Technology
- Appropriate Application of Technology
- New Technology (not efficiency)
- Analyze Existing Data
- Management and Process Roadblocks
  - Marketing / Education / Motivation / Cooperation
- Coordination and Consistency Among Programs
  - Federal and State Regulations

LID Myths

- Costs more
- Onsite systems won't be maintained
- Can't enforce onsite systems
- No data on its effectiveness