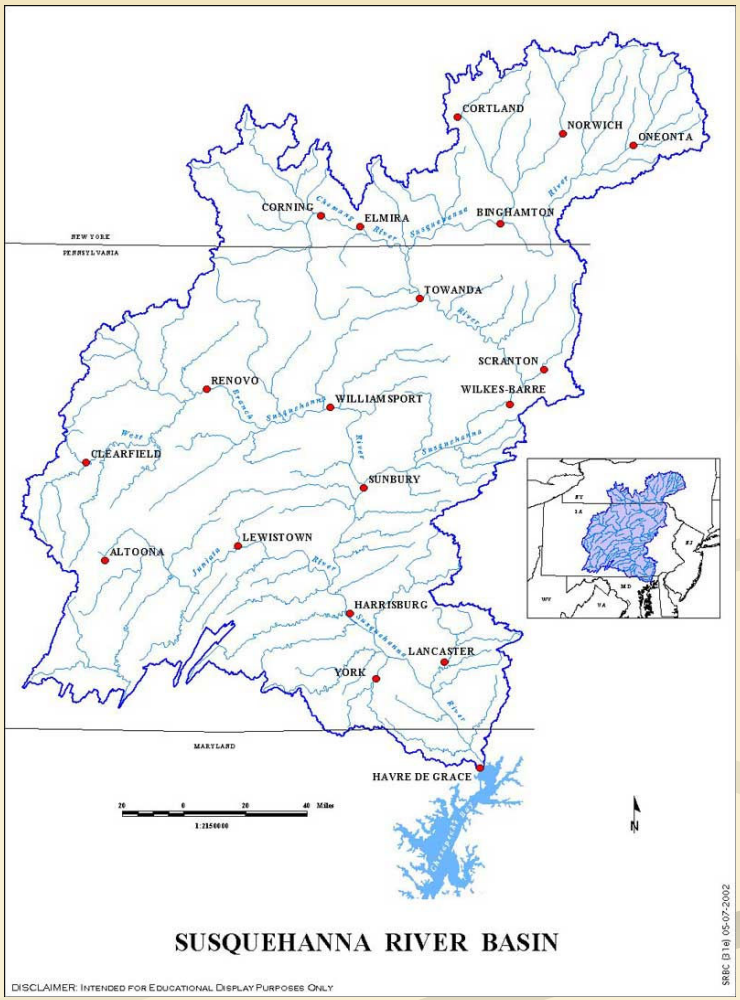
Sediment Behind the Dams

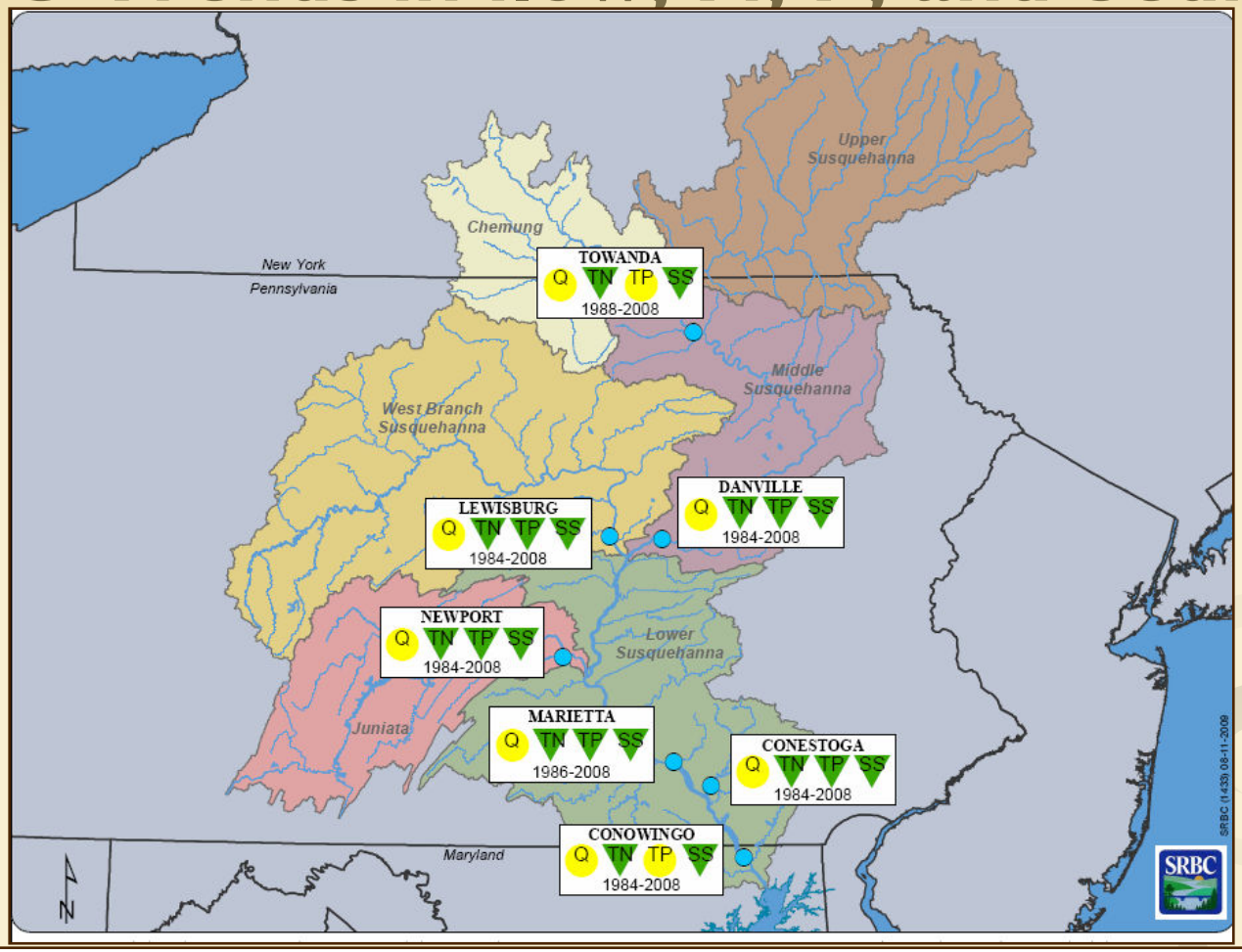


Anna Compton
USACE Baltimore District
2009

How the Corps Got Involved

- SRBC formed Sediment Task Force – July 1999
  - Symposium held – December 2000
  - Recommendations released – June 2002
- Corps given authority to study "shoreline erosion and related sediment management measures which could be undertaken to protect the water quality and land resources of the Chesapeake bay watershed" – May 2001
- Funding from Congress provided to "examine management measures that could be undertaken to address the sediment behind the dams on the Lower Susquehanna" – 2002

SRBC Trends in flow, N, P, and Sediment



STATION LOCATION

TREND CHANGE

- No change over Dated Time Period
- Decreasing Concentration over Dated Time Period

30 0 30 60 Miles

TREND EXPLANATION

Q - Flow

TN - Total Nitrogen

TP - Total Phosphorus

SS - Suspended Sediment

MAJOR RIVER

WATER BODY

STATE BOUNDARY

SUSQUEHANNA RIVER BASIN

Source: Susquehanna River Basin Commission and Conowingo results from USGS Baltimore, Maryland; DISCLAIMER: Intended for Educational Display Purposes Only.

Original Reconnaissance Phase

- Part I - Sediment Behind the Dams on the Lower Susquehanna River
  - Reservoir Sediment Management
    - Dredging/Beneficial use alternatives
  - Susquehanna River Basin Sediment Transport
    - Sediment Budget/basin-wide sediment management recommendations
  - ✓ Chesapeake Bay Sediment Budget, Modeling, and Regional Sediment Management
    - ✓ Updated sediment components of model to increase knowledge and capabilities surrounding sediment resuspension and shoreline erosion
- Part II – Chesapeake Bay Shoreline Erosion
  - ✓ Chesapeake Bay Shoreline Management Guide
  - ✓ Technical guide for shoreline protection

USACE Process 101

- Reconnaissance Phase
  - Generate a small report to determine Federal Interest
  - Scope and Execute an Agreement
- Feasibility Phase
  - Detailed Analysis
  - Feasibility Report
- Plans and Specification Phase
  - Designs
- Construction Phase*
  - Construct Project

*Traditional Study

Original Reconnaissance Phase
Reservoir Sediment Management

- Fall 2003, SRBC and the Corps had scoped a cost-shared study estimated at $2 million
- Primarily a dredging feasibility study
- Options for use or disposal of dredged material would have been studied and compared
- No Feasibility Cost Sharing Agreement (FCSA) was signed, study was not initiated

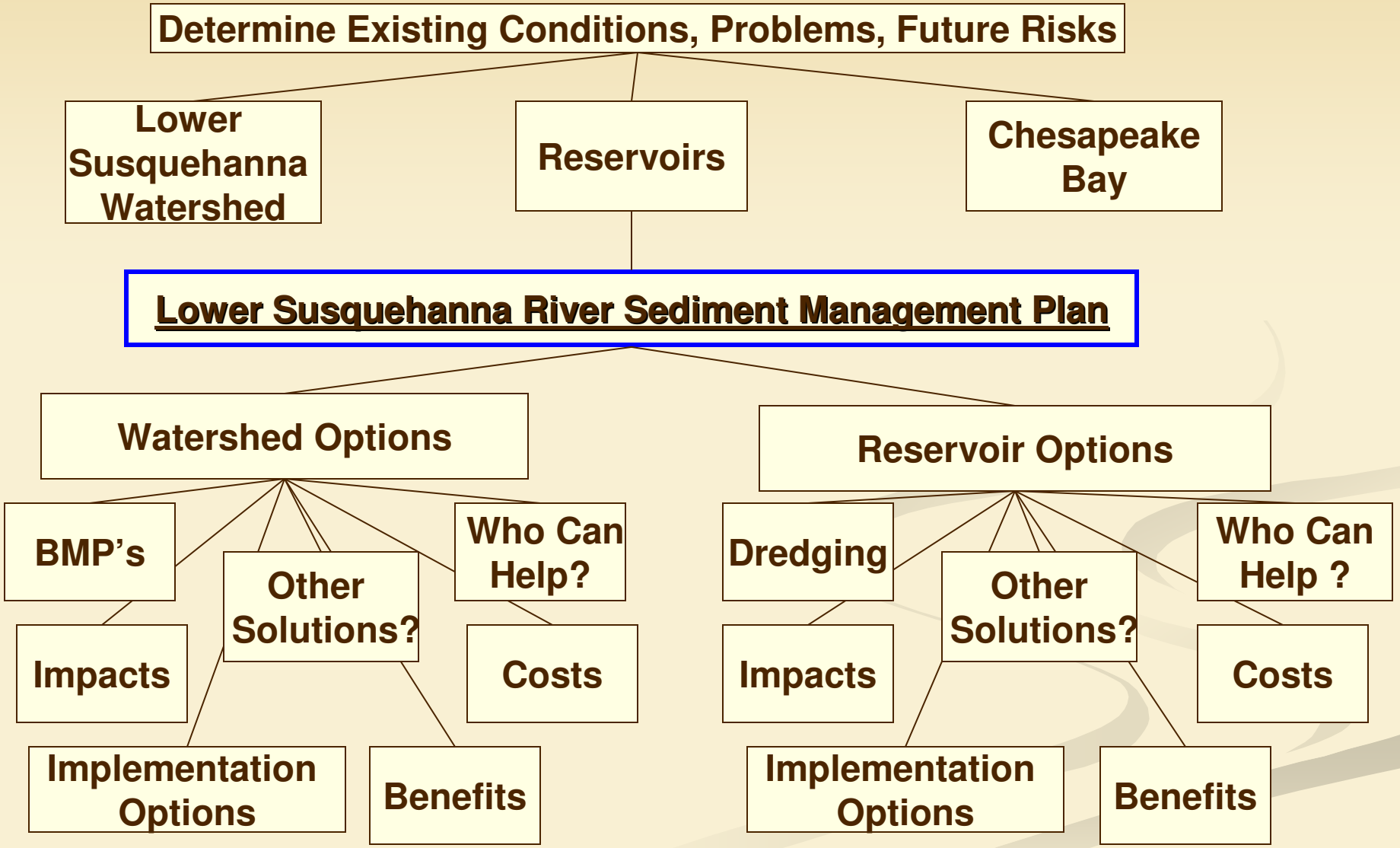
USACE Feasibility Phase 101

- Traditional Feasibility Study (2003 Reservoir study)
  - 50 Federal/ 50 Non-Federal cost share
  - USACE recommendation for Implementation
  - Detailed Designs for Construction
- River Basin Assessment
  - 75 Federal/25 Non-Federal
  - Basin System Analyses
  - Conceptual-level designs
  - Master Plan

Feasibility Phase Brainstorming

- SRBC published Sediment Task Force Recommendations, June 2002
  - "First, a feasibility study is recommended to determine if dredging the reservoirs is a viable option to maintain or reduce the volume of sediment currently trapped behind the dams.
  - Concluded that reducing sediment loading throughout the basin is critical."

Feasibility Phase Approach-Concept



Why a Sediment Management Plan?

- STAC Workshop *The Impact of Susquehanna Sediments on the Chesapeake Bay*, May 2000

  "Detailed predictions are therefore not possible but the consequences that can be predicted with the most confidence are:

  - Increased Phosphorus in Middle Bay
  - Increased need for dredging navigation channels in Upper Bay
  - Higher turbidity and faster sedimentation everywhere, but especially in the navigation channels
  - Adverse effects on recovery of SAV
  - Impacts to benthic organisms
  - Impacts to fish"

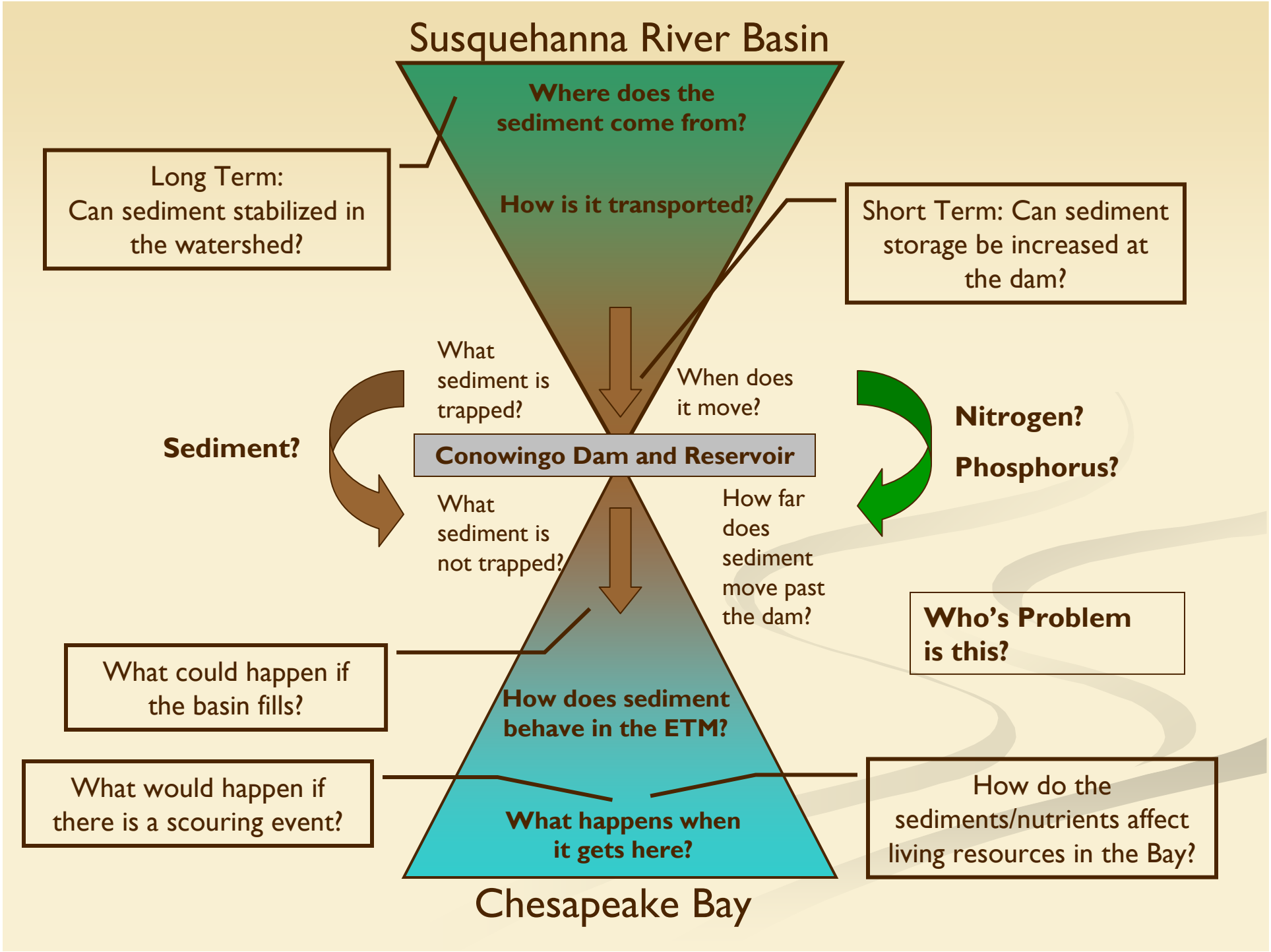
Why a Sediment Management Plan?

- Conowingo stores nutrients
  - 670,000 tons of total nitrogen (9x annual load)
  - 130,000 tons of total phosphorus (50x annual load)

- Conowingo currently traps:
  - 60%-70% of suspended sediment load
  - 2% of total-nitrogen load
  - 40% of total-phosphorus load
- If dam reaches steady state it is estimated that there will be average annual increases of:
  - 250% in suspended sediment load
  - 2% in total-nitrogen load
  - 70% in total-phosphorus load

  Langland and Hainly, 1997
- Current (2009) USGS estimates have the dam reaching steady state in 15-20 years (not including scour events)

  Langland 2009


Susquehanna River Basin
Where does the sediment come from?
How is it transported?
Long Term: Can sediment stabilized in the watershed?
Short Term: Can sediment storage be increased at the dam?
What sediment is trapped?
When does it move?
Sediment?
Conowingo Dam and Reservoir
Nitrogen?
Phosphorus?
What sediment is not trapped?
How far does sediment move past the dam?
Who's Problem is this?
What could happen if the basin fills?
How does sediment behave in the ETM?
What would happen if there is a scouring event?
What happens when it gets here?
How do the sediments/nutrients affect living resources in the Bay?
Chesapeake Bay

Current Corps Activities

- Sediment Management Plan
  - Looking for Cost-Sharing Partners (75/25)
  - Reconvene Sediment Task Force – **OCT 29TH**
  - Outreach Discussions
    - Engineering Research Development Center (ERDC)
      - Sediment Impact Analysis Methods (SIAM) Model
        - Application to Watershed Sediment Management Options
        - Can evaluate sediment management alternatives on a watershed scale
      - 2D Adaptive Hydraulics Model (ADH)
        - Application to Reservoir Sediment Management Options
        - Sediment transport/deposition

Timeline

- October 29th - Sediment Task Force Meeting
- Oct-Dec 2009 - Secure Sponsor
- Jan-May 2010 - Scope Study/Sign Agreement*
- August 2010 – Start Feasibility Phase

*June 2010 latest date for signed agreement or risk project becoming a restart, delays, or loss of funding.

Questions?