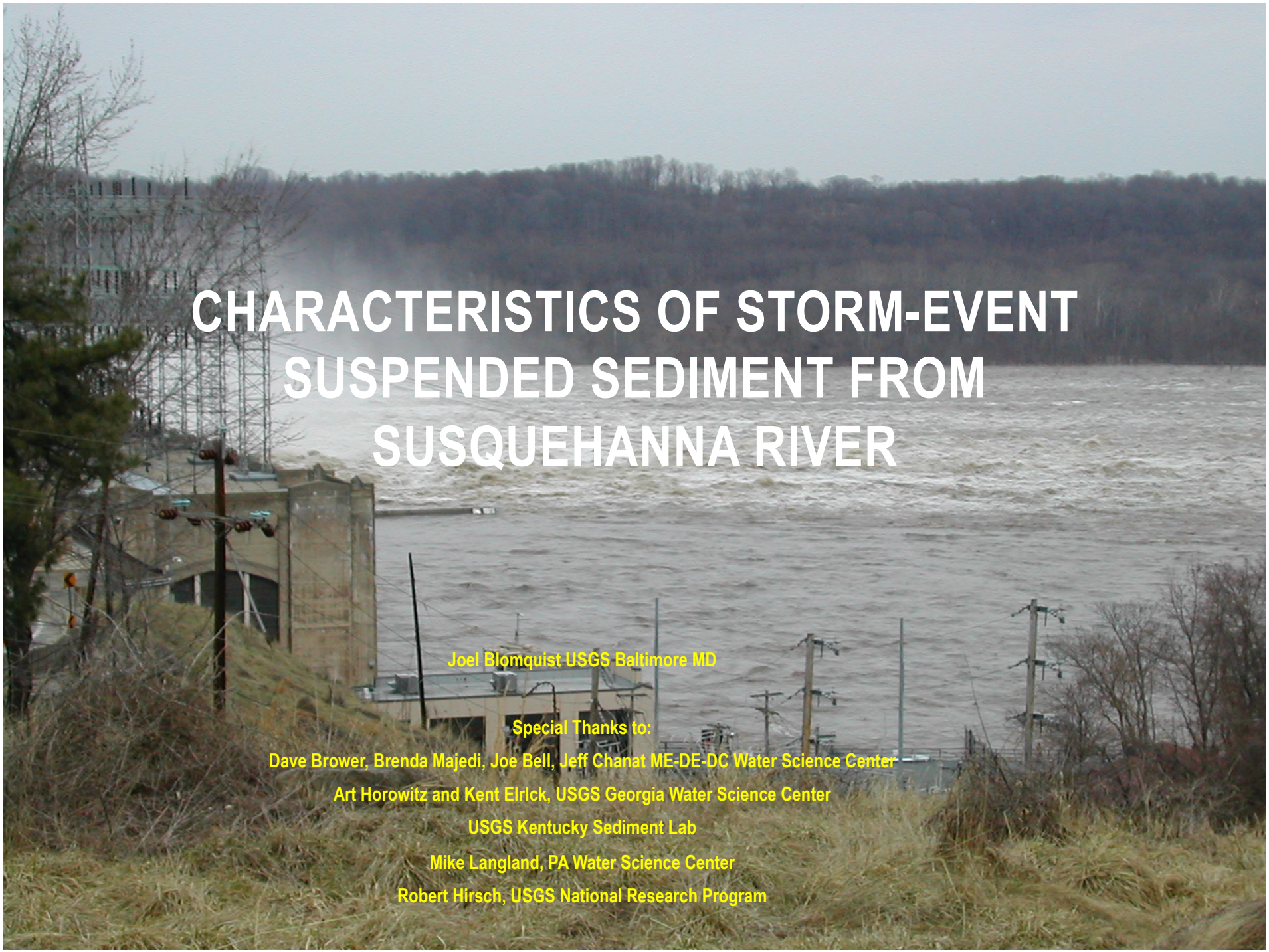


CHARACTERISTICS OF STORM-EVENT SUSPENDED SEDIMENT FROM SUSQUEHANNA RIVER

Joel Blomquist USGS Baltimore MD

Special Thanks to:

Dave Brower, Brenda Majedi, Joe Bell, Jeff Chanat ME-DE-DC Water Science Center

Art Horowitz and Kent Elrlck, USGS Georgia Water Science Center

USGS Kentucky Sediment Lab

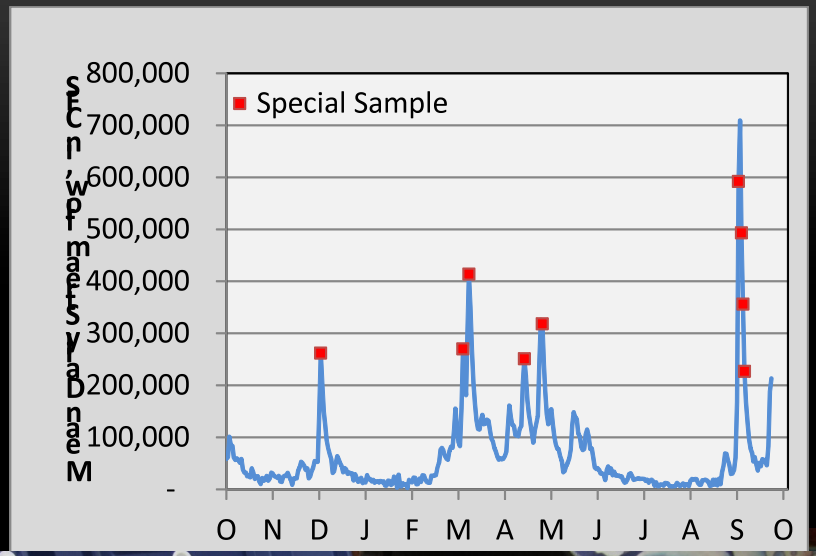
Mike Langland, PA Water Science Center

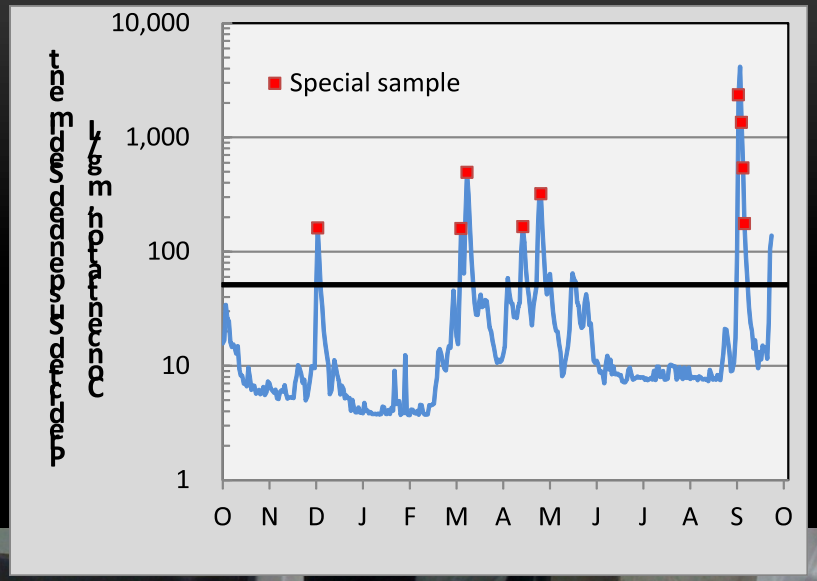
Robert Hirsch, USGS National Research Program

PURPOSE

- Present results from special monitoring of:
  - Suspended sediment size distribution
  - Suspended sediment chemical concentration
- Provide context for September 2011 flooding based on Water, Sediment, Nitrogen, and Phosphorus Flux estimates from Susquehanna River.
- Discuss implications of these results for potential impacts on
  - Chesapeake Bay
  - Susquehanna Flats

SAMPLE COLLECTION: SEDIMENT CHEMISTRY AND SIZE ANALYSIS





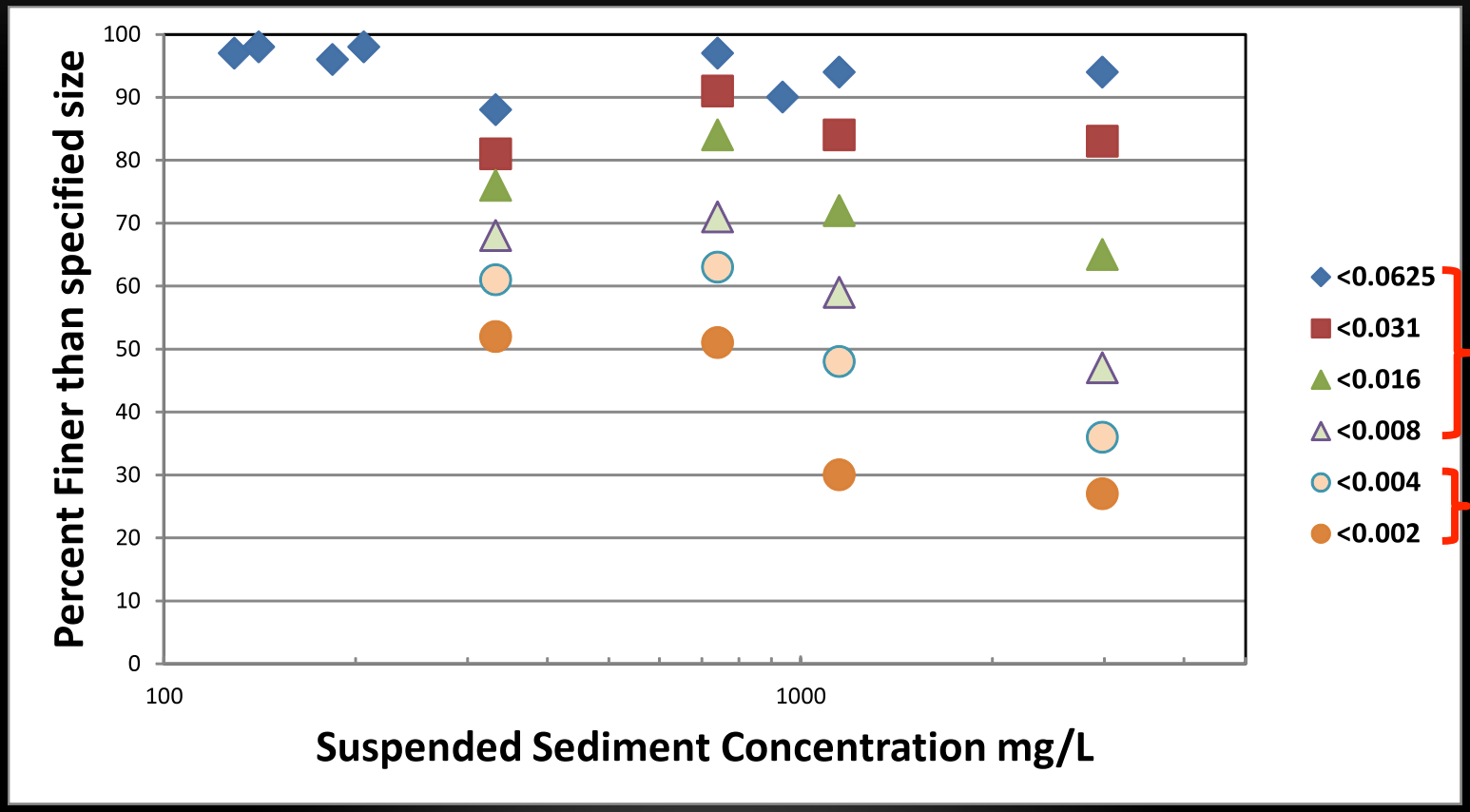
SUSPENDED SEDIMENT: PARTICLE SIZE ANALYSIS

			Percent of sample with sieve diameter less than indicated value in millimeters									
			SAND				SILT				CLAY	
DATE	Discharge CFS	Sediment Conc. mg/L	<1	<0.5	<0.25	<0.125	<0.0625	<0.031	<0.016	<0.008	<0.004	<0.002
12/3/10	276,000	141					98					
3/8/11	274,000	129					97					
3/12/11	453,000	937					90					
4/18/11	255,000	206					98					
4/30/11	316,000	184					96					
9/8/11	617,000	2980			100	99	94	83	65	47	36	27
9/10/11	481,000	741			100	99	97	91	84	71	63	51
9/11/11	388,000	1150			100	99	94	84	72	59	48	30
9/12/11	233,000	332	100	99	97	94	88	81	76	68	61	52

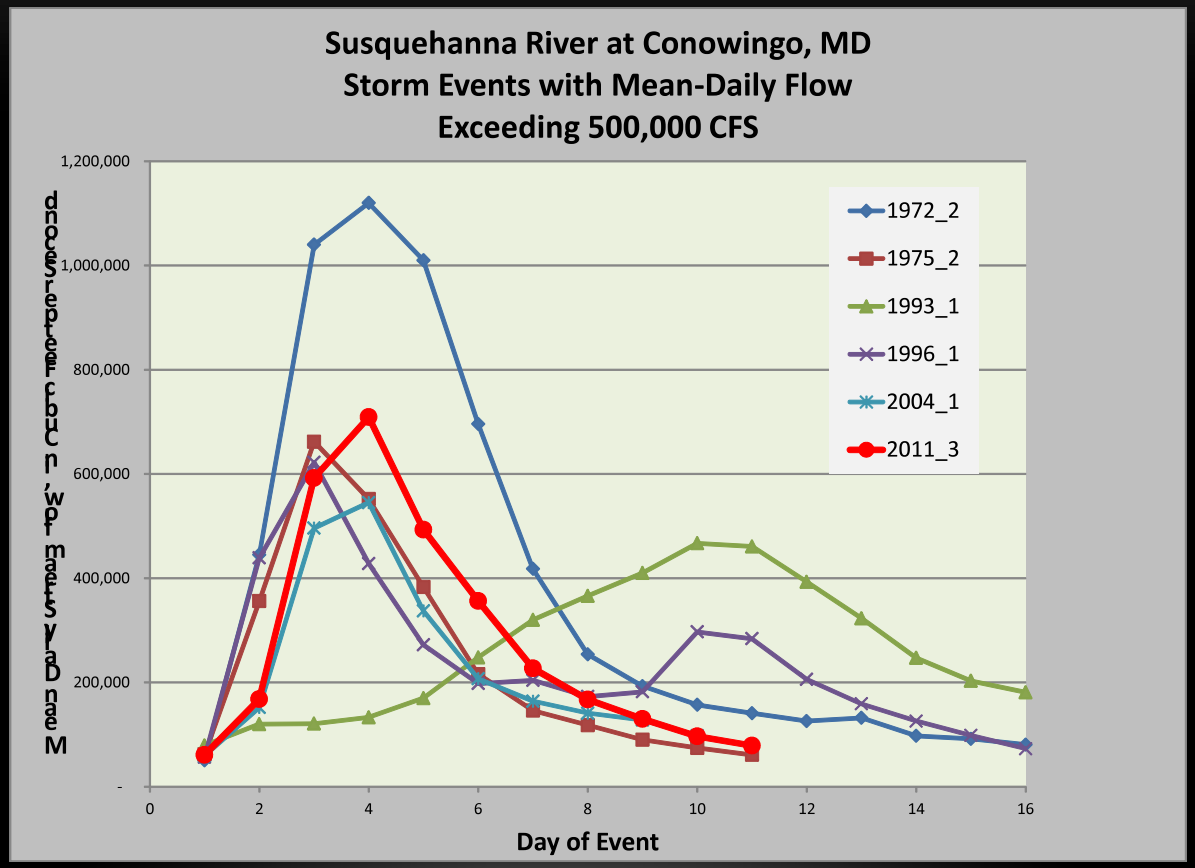
SUSPENDED SEDIMENT: NUTRIENT AND CARBON CONTENT

Date	Nitrogen %	Phosphorus %	Organic Carbon %	Total Carbon %
10/3/2010		0.15		
12/3/2011	0.47	0.14	3.8	4.1
3/8/2011	0.4	0.14	3.8	4.2
3/12/2011	0.36	0.12	4.7	5.1
9/8/2011	0.26	0.11	3.5	3.2
9/10/2011	0.18	0.09	2.4	2.2
9/11/2011	0.2	0.096	2.7	2.5
9/12/2011	0.19	0.094	1.8	1.9

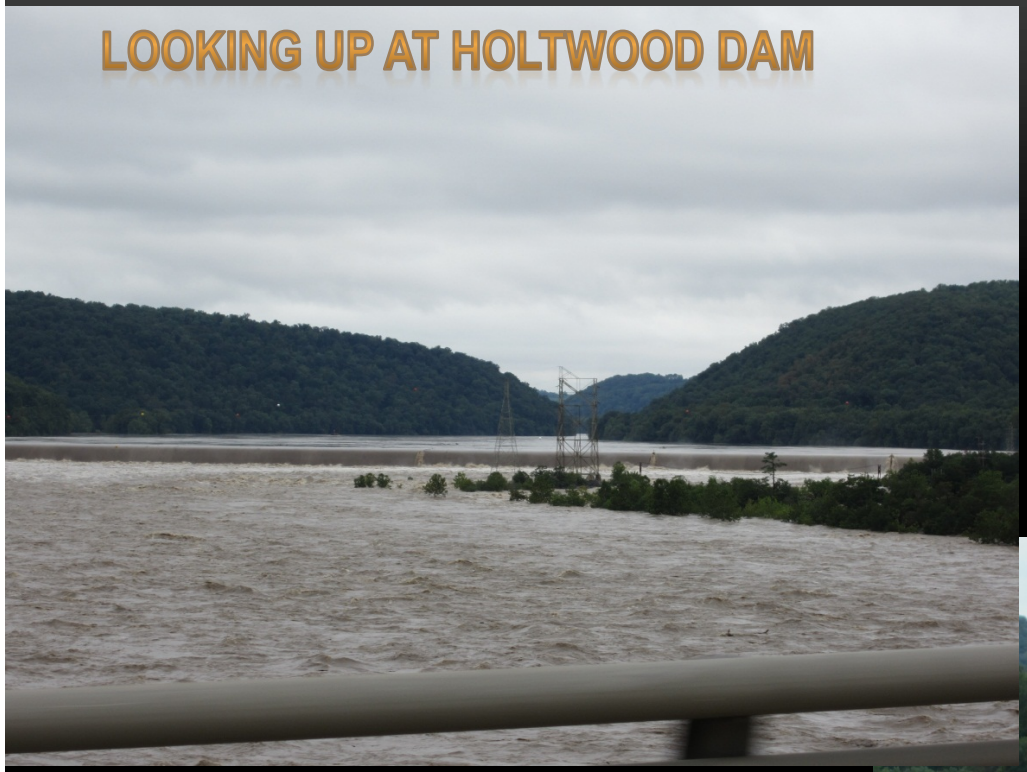
SUSPENDED SEDIMENT: PARTICLE SIZE DISTRIBUTION



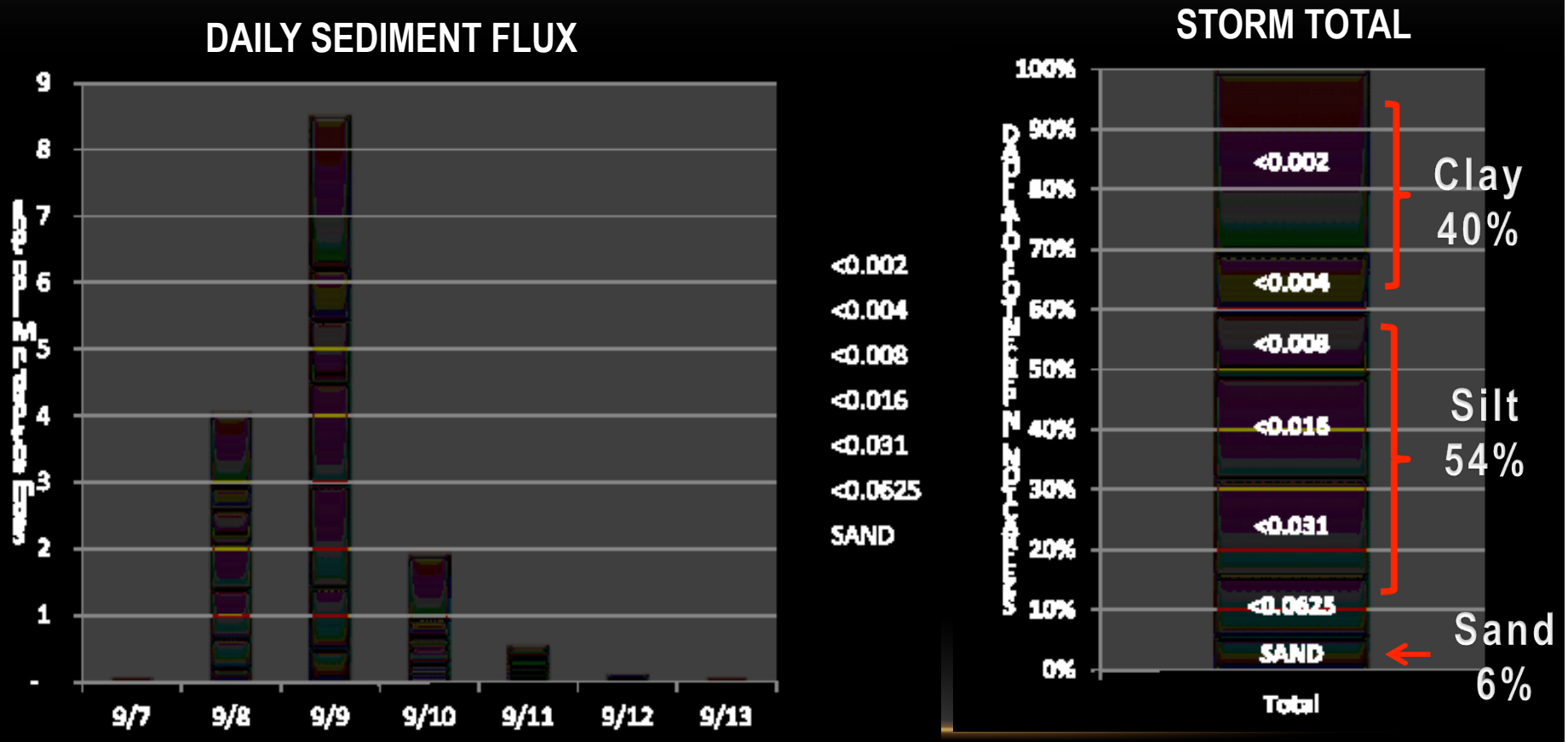
HISTORICAL CONTEXT FOR LARGE FLOWS

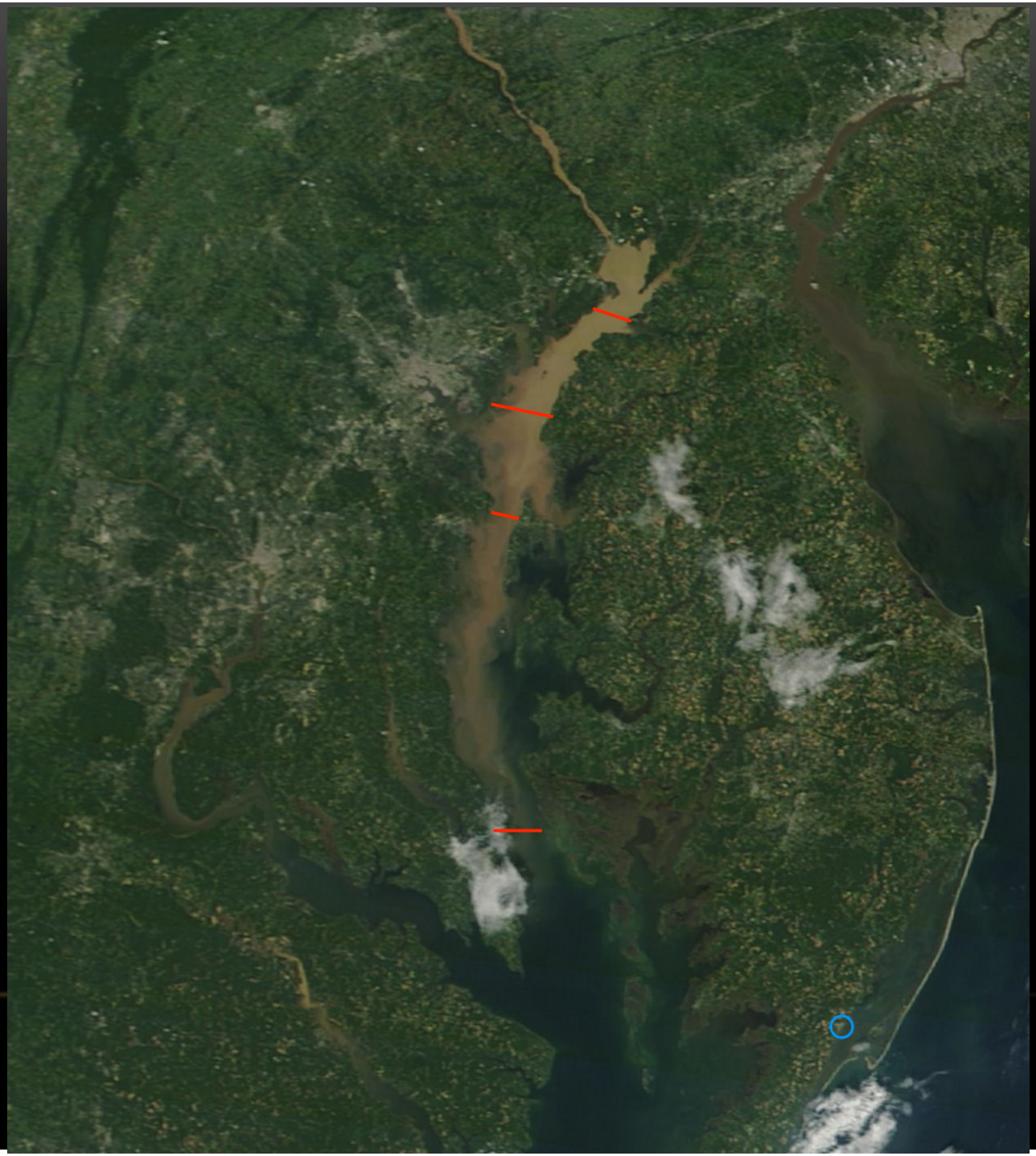


UPSTREAM END OF CONOWINGO RESERVOIR:

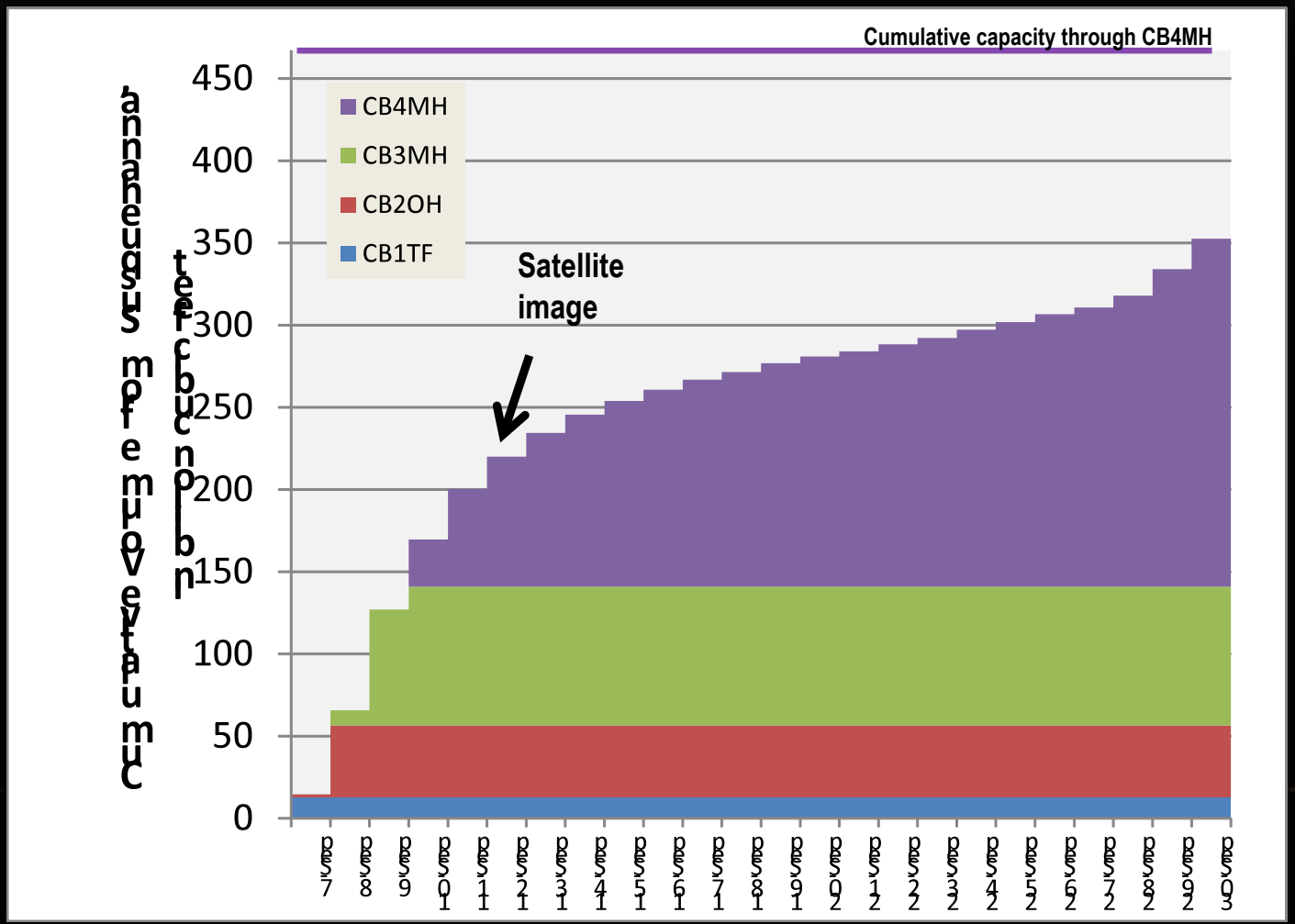


SEPTEMBER 2011 SUSPENDED SEDIMENT FLUX BY SIZE CLASS





CUMULATIVE STREAMFLOW TO CHESAPEAKE BAY SEGMENTS



PERSPECTIVES ON SEDIMENT VOLUME

Tons of sediment through Conowingo Dam	Volume of sediment (ft3)	# of Dallas Cowboy Stadiums filled	Inches of deposition, assuming sediment distributed across cumulative area			
			Segment			
			CB1TF	CB2OH	CB3MH	CB4MH
11,000,000	328,000,000	3.16	2.41	0.86	0.46	0.22
15,000,000	448,000,000	4.31	3.29	1.17	0.63	0.29
19,000,000	567,000,000	5.45	4.17	1.48	0.80	0.37

CONCLUSIONS / FINDINGS

- 11-19 Million tons of sediment were delivered to Chesapeake Bay during the flooding of September 2011
- Water flux volumes were greater than the upper three Chesapeake bay segment volume within the first 5 days of flooding.
  - After day 6 inflow volumes stabilized.
- Fine grained material, Silt (54%) and clay (40%), were the primary components of the sediment load.
- Nitrogen and Phosphorus concentrations indicate a significant fraction of total loads as particulate forms: Nitrogen greater than 75 percent, Phosphorus greater than 90 percent

HYPOTHESIS / DISCUSSION POINTS

- Widespread deposition of thin, sorted layer of sediment is likely the primary type of deposition in the upper Chesapeake system. This is due to:
  - Amount and timing of water flux relative to Chesapeake Bay structure and bathymetry.
  - Preponderance of fine material in sediment loads which are subject to slow setting rates even in placid waters
  - Satellite imagery that may support (1) advective and (2) dispersive mechanisms of transport for the first several days of the event– at least for fine grained sediments.
- High nutrient content in deposited sediments may drive benthic ecological processes and SAV production in areas.
- High carbon content may exaggerate Dissolved Oxygen problems in upper bay waters.


THANK YOU!