

## MEMORANDUM FOR THE RECORD

**SUBJECT:** Lower Susquehanna River Watershed Assessment  
Quarterly Meeting, February 11, 2013

1. On February 11 2013 agency team members met to discuss ongoing and completed activities for the Lower Susquehanna River Watershed Assessment (LSRWA). The meeting was hosted by the Chesapeake Bay Program, in their Fish Shack, Conference Room in Annapolis, Maryland. The meeting started at 10:00 am and continued through 1:00 pm. The meeting attendees are listed in the table below.

2.

**Lower Susquehanna River Watershed Assessment  
Team Meeting Sign-In Sheet**

**February 11, 2013**

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The meeting agenda is provided as enclosure 1 to this memorandum.

Status of Action Items from November Quarterly Meeting:

A. Michael Helfrich will coordinate with MD, Chesapeake Bay Program (CBP) and the MD county coalition to set up a meeting to present dam implications to total maximum daily loads (TMDL) to MD counties. *Status: Ongoing. Michael Helfrich coordinated this task with Bruce Michael; Bruce has reported LSRWA activities to multiple groups and counties over the last 6 weeks. His message to counties was to keep in perspective that they still need to do their work regarding sedimentation from the watershed (meeting TMDLs) while the issue of sediments and nutrients trapped behind the dams and how to manage them are still being dealt with. Bruce noted that Bob Summers, MDE Secretary, has made presentations to the MD legislative committees as well.*

B. Mike Langland will let Claire know if his final report will be a stand-alone document or if it will be written collaboratively with Steve Scott to be included with the ADH modeling report. *Status: Complete. There will be one report with results from both models; USACE will include the report as an appendix to the LSRWA report.*

C. Carl Cerco will have CBP WSM modeling runs of existing/baseline conditions completed by mid-December. *Status: Complete. The following scenarios have been run: (1) What is the system's current condition? (2) What is the system's condition if the WIPs are in full effect? and (3) What is the system's condition if a large scour event occurs?*

#### Ongoing Action Items from Previous Meetings:

A. The MDE FTP website will be utilized to share internal draft documents within the team; Matt will be the point of contact for this FTP site. *Status: Ongoing. Sharing of future documents will go through the MDE ftp website.*

B. Shawn will notify team when most recent Exelon study reports are released. *Status: Ongoing. Tom Sullivan, a contractor of Exelon noted that the Exelon has filed the license for Conowingo Dam with FERC.*

C. Anna will update PowerPoint slides after each quarterly meeting to be utilized by anyone on the team providing updates to other Chesapeake Bay groups. *Status: Ongoing.*

D. Anna will send out an update via the large email distribution list that started with the original Sediment Task Force (includes academia, general public, federal, non-government organization (NGO), and state and counties representatives) notifying the group of updates from the quarterly meeting. *Status: Ongoing.*

E. Matt will keep team informed on innovative re-use committee findings to potentially incorporate ideas/innovative techniques into LSRWA strategies. *Status: Ongoing.*

#### Action Items from this (February 11) Quarterly meeting –

- a. Claire will coordinate the next quarterly meeting for May.
- b. Anna will send out the spreadsheet tracking all stakeholder coordination to the group. Anyone making a presentation on LSRWA should let her know so the spreadsheet can be kept up to date; if any specific comments/concerns are raised, this should be noted as well.

- c. John Nichols will submit written comments on behalf of NMFS addressing his agency's concerns over sediment bypassing management strategy.
- d. Danielle will add Blackwater Wildlife Refuge as a potential placement option to evaluate.
- e. Bruce will work with Gary on potential "no-till" acres available in the watershed and evaluate impacts to sediment loads if all no-till acres were implemented in the watershed via modeling.
- f. Carl will complete runs for the following scenarios: What happens when the reservoir fills? What happens when the reservoir fills and WIPs are in full effect? What is the system's condition if a large scour event occurs in spring, summer or fall? These are the final existing and future without project conditions scenarios.
- g. Carl, Steve and Lewis will work together to determine where nutrients are scoured from in the reservoir (at what depths) and will conduct a sensitivity analysis looking at bioavailability of nutrients in various forms (species) by Berner activity class or other means).
- h. Michael and Carl will have a follow-up phone call to discuss the estimated loads that Carl is using for his modeling efforts that will be entering the Bay once Conowingo is full and will report back to the group if these estimated loads will be revised at all.
- i. Modeling efforts cannot predict impacts to SAV from physical burial by sediments. These impacts should be considered and described by other means, perhaps qualitatively, by the LSRWA agency group.
- j. Matt will check in with MDE to see how sediment bypassing (for open water placement or allowing sediments to relocate to sediment-starved areas) would be permitted and the stance of his agency on permitting for such activities.
- k. Pat will determine and report back to the group what the PA department of Environmental Protection (DEP) stance is on sediment criteria for landfills ("clean" vs. "waste"). More specifically, we have data from 2000, is this too old? If so, what are expectations of the agency regarding data to determine appropriateness of sediment at a landfill?
- l. The concept of a permanent pipeline should be investigated further and examples around the country should be looked at by the LSRWA agency group.
- m. Michael will forward info to Danielle on Funkhauser Quarry.
- n. Michael will forward Danielle the questions he had about some of the reservoir sediment management options that were presented but could not be addressed at the meeting due to time limitations.

- o. The LSRWA agency group needs to determine next steps for developing reservoir sediment management options.
  - p. John Balay will look further into agitation dredging (coupled with electric generation releases) of fine material; it is expected this would be done outside of ecologically critical time periods.
  - q. The LSRWA agency group should quantify any habitat restored or enhanced downstream in Bay or elsewhere (e.g. terrestrial) as a project benefit; considerations should be given on how to do this.
3. Welcome – After a brief introduction of the meeting attendees, Claire O’Neill welcomed the LSRWA agency group and noted that the purpose of the meeting was to provide updates on recent activities within the LSRWA.
4. Review of Modeling Scenarios and Schedule –

Claire went over the modeling run scenarios. The focus of modeling up to this point has been to forecast existing/baseline conditions, as well as future-without-project conditions. Getting an understanding of the conditions of the system if no action is taken will be used to compare sediment management strategies developed by the group.

Enclosure 2 provides a summary of modeling scenarios.

The following scenarios have been run:

- What is the system’s current condition? (2010 land uses with 1991-2000 flow values and 1991-2000 Conowingo capacity);
- What is the system’s condition if the WIPs are in full effect? (Watershed implementation plans (WIPs) in place with 1991-2000 flow values and 1991-2000 Conowingo capacity); and
- What is the system’s condition if a large scour event occurs? WIPs in place with Jan 1996 scour event flow values and Conowingo storage full.

The following scenarios are projected to be completed by the end of February in time for a smaller team meeting in March:

- What happens when the reservoir fills? (2010 land uses with 1991-2000 flow values and Conowingo storage full)
- What happens when the reservoir fills and WIPs are in full effect? (WIPs in place with 1991-2000 flow values and Conowingo storage full)

- What is the system's condition if a large scour event occurs in spring, summer or fall? (WIPs in place with Jan 96 scour event flow values in spring summer and fall and Conowingo storage full.

These scenarios represent all of the existing/baseline conditions and future-without-project conditions that were planned for the LSRWA effort.

#### 5. CBEMP Modeling update–

Carl Cerco provided a presentation on the estimated effects of scouring event on the Chesapeake Bay. Carl's presentation is included as enclosure 3 to this memorandum. It is important to note that at this time all modeling results are considered Draft/Preliminary and may be revised in future runs.

Carl noted that his previous efforts involved running modeling scenarios that removed Conowingo from the system to understand what it would look like with all sediments flowing into the bay and no longer being trapped by Conowingo. With this latest simulation, Carl looked at what the system would look like (i.e., impacts on water quality) if there were a scouring event. More specifically, he took the system's current condition (Conowingo still trapping) with WIPs in place, using bathymetry from after the 1996 scour event.

His modeling predicted that after storm event nutrients continue to have effects on the Bay for years. Conversely, solids (not including nutrients they contain) from scour events are inert after deposition. Solids are materials like sand, silt, and clay. Although they are subject to some resuspension, once they are deposited on the bottom, the effect on mineral sediments (solids) on the Bay essentially ceases. After deposition, biological processes transform particulate nutrients, and nutrients adsorbed to sediments into dissolved forms which diffuse into the overlying water and are bioavailable and affect Bay water quality. Nutrients take years to undergo burial to a depth where they are no longer an influence on surface waters. His modeling predicts that as the years go by, the impacts to water quality decrease after a scouring event. Carl explained that when comparing predicted changes to water quality it appears that a full dam (no longer trapping sediments and most sediments/nutrients going over dam) is WORSE than a storm-scouring event.

Draft/Preliminary Modeling predictions show that:

- Scour contributes substantial quantities of solids, nitrogen, and phosphorus relative to storm loads descending through the watershed.
- The effects of solids scoured during a winter storm pass quickly and are barely visible by the following summer.
- The effects of scoured nutrients persist for years due to deposition in bottom sediments and subsequent recycling. The effects diminish over time.
- Maximum summer-average effects of a winter scour event on TMDL conditions are  $\approx 0.3$   $\mu\text{g/L}$ . Chlorophyll a, 0.05 mg/L Dissolved oxygen, 0.01 /m.
- A winter scour event has no computed impact on SAV (Effects such as burial or physical damage are not computable with Carl's model). These findings are consistent with studies of impacts of previous large-storm events obtained by CBP.

Carl described two potential patterns for the future. One is a filled reservoir in the absence of scour events. Deposition is minimized, and solids and nutrients flow continuously to the bay causing chronic environmental problems. A second pattern involves one or more scour events. The impact of the scour event diminishes with time. Scour events are self-mitigating. Scour from a subsequent storm is diminished following a major event which scours the reservoir and increases volume. However, the increased volume has little effect on solids retention during non-storm periods.

Upcoming modeling activities include 2D ADH runs by Steve Scott to predict loads from a full reservoir. These predicted loads will tell us about overflow from a filled reservoir and about scour of a filled reservoir. Concurrently, CBP has modified HSPF to produce storm scour consistent with the latest USGS estimates. Also, CBP has produced hydrodynamics and watershed model (WSM) runs that move the 1996 storm to different months (spring and summer). The following runs are planned in addition to a run with scour from the January 1996 storm: (1) no winter storm; (2) storm moved to June; and (3) storm moved to October.

Bill Dennison noted that Carl's findings resonate with his findings and observations. He asked if there have been any efforts to evaluate the legacy of nutrients coming across the dams and their impacts. There was discussion on particulate nitrogen and phosphorus. Carl noted that particulate nitrogen is all organic (labeled inert and slow refractory). If nutrients are scoured off the bottom of the reservoir, they are labeled as either refractory or inert; this is done empirically. If CBP has time, it would be beneficial to have a sensitivity analysis looking at assumed ratios of nutrients (refractory, labile, or inert). Bill Dennison asked if these assigned ratios could change over time as the reservoir fills. Lewis Linker noted that greater than 10-cm (centimeter) depth of sediment is assumed to be inert. We can extrapolate at what depth we scour and where. Carl noted that Steve Scott's 2D ADH modeling could give us this information by telling us at what depth sediments are scouring.

Michael Helfrich asked if Carl's model has been re-run using 1.5-2 million tons per year of current sediment trapping per the latest USGS and Exelon estimates (from 2008 and 2011 bathymetry surveys) vs. 260,000 tons per year that Carl presented last time. His concern was that we are underestimating water quality impacts. Carl noted that he has not adjusted his model using these higher loads estimated from bathymetry surveys. He and Michael will have a follow-up phone call to discuss this in more detail, so as to come to an understanding of the most appropriate loads to use for modeling purposes.

Carl noted that his modeling efforts predict impacts to water quality parameters; it cannot predict impacts to SAV from physical burial by sediments. He noted that these impacts should be considered and described but cannot be determined quantitatively.

#### 6. Conowingo and Hurricane Sandy Rapid Assessment –

Bill Dennison provided a presentation entitled “Responding to Major Storm Impacts: Ecological Impacts of Hurricane Sandy on Chesapeake & Delmarva Coastal Bays”. Bill's presentation is included as enclosure 4 to this memorandum.

Bill noted that the National Fish and Wildlife Foundation established a Hurricane Sandy Wildlife Response Fund, and that UMCES and MDNR partnered to conduct a rapid assessment of impacts of Sandy on the Chesapeake and Delmarva coastal bays. A report was developed and finalized; it can be found at the following link:  
[http://www.mdcoastalbays.org/files/pdfs\\_pdf/HurricaneSandyAssessment-Final-1.pdf](http://www.mdcoastalbays.org/files/pdfs_pdf/HurricaneSandyAssessment-Final-1.pdf)

A link to the report will also be provided on the LSRWA website. Bill noted that Hurricane Sandy (October 2012), unlike Tropical Storm Lee (September 2011), was essentially a non-event due to the position, duration and timing of the storm. There was less wind with Sandy so less storm surge. Sandy occurred later in the “eco-calendar,” so there were less ecological impacts. During Hurricane Sandy, the intense precipitation was limited to the Maryland portion of the Susquehanna watershed, while nearly the entire Susquehanna watershed experienced high levels of rainfall during the Lee event. As a result, the sediment plume from Lee was quite extensive; with Sandy, this was not the case. The Sandy plume appears to have been restricted to the mainstem of Chesapeake Bay (based on photographs and collected data) versus extending into tributaries. Bill noted that in light of this evidence, the opinion of UMCES is that counties still need to do their work with TMDLs and reduce the sediment impacts from the watershed to the tributaries. Bill noted that the timing of storm impacts affects phosphorus deposits downstream of dams; phosphorus is released back into the system, thus impacting water quality. Also, in light of the USGS report (Hirsch report) which indicates that the dam is getting closer to filling, there will be higher suspended sediment input and new scour thresholds for storm events. The Susquehanna flats act as a filter or trap. Sandy legacy sediments (including trapped fines and silts in the flats) were observed to be resuspended from subsequent wind events after Sandy. After Sandy, there were some observed barren areas in the SAV bed.

Bill observed that because of climate change, there will be more frequent and larger storm events. The LSRWA group should incorporate climate changes into its analysis of sediment management strategies. Bill also recommended that because of additional scouring from future storm events due to the Conowingo becoming full, the LSRWA group should investigate sediment bypassing and dredging options to maintain capacity of Conowingo Dam.

#### 7. Update on Reservoir Sediment Management Scenarios –

Danielle Aloisio provided a presentation on USACE analysis of reservoir sediment management scenarios. Additionally, she provided a handout which lays out placement options for dredged material that were evaluated. Danielle’s presentation is included as enclosure 5, and the handout is included as enclosure 6 to this memorandum.

Danielle explained that her team was the lead at looking specifically at “in-reservoir” sediment management strategies (versus watershed strategies). Recent activities included conducting an initial investigation to identify sediment removal and placement options for sediments behind the three dams on the lower Susquehanna River and providing recommendations based on this initial investigation.

She and her team conducted a desktop analysis of the study area (approximately a 100-mile radius); this analysis included calling potential placement site owners and conducting site visits. As far as dredging options, there are two options: (1) mechanical and (2) hydraulic. The pros of mechanical dredging are lessening the need for dewatering and the ability to access tight spots. The cons are double-handling of material which would incur extra costs. Once material is removed from behind the reservoirs, it would need to be placed somewhere. Options for placement include: (1) beneficial re-use (construction materials, island creation, fringe wetland creation, etc.); (2) open water (release downstream, pump downstream, ocean placement, etc.); and (3) upland placement (quarries, landfills, purchased land).



Pumping downstream or bypassing along with ocean water placement could have regulatory (i.e. permitting) issues. One option for island restoration is teardrop islands within the Susquehanna River and upper bay. Regarding placement sites, most places want the material dry. For the landfill placement option, Pennsylvania DEP has limits on what sediment can be placed in landfills. Sediment is either clean or waste based on certain criteria; if material is considered waste, there is special handling which adds more cost.

Fringe wetlands can accept non-sandy material (i.e., silts and clays) and sandy materials. If sandy materials were to be used containment would be minimal. If silts or clays were used then materials such as coir logs, hay bales, etc would need to be implemented as well to ensure the wetlands would be contained. IF the non-sandy materials were not contained they would erode away due to flow. .

Costs for removal and placement of sediment are based on the quantity of sediment you are looking to move and the distance you are looking to go for placement. Very rough costs for mechanical dredging with trucking is (\$40 to \$70/cubic yard (cy)); hydraulic pumping downstream, \$6-\$18/cy; hydraulic pumping up to 5 miles, \$15-\$25/cy; and tipping fee, \$4-\$35/cy.

Danielle noted that based on their preliminary findings, quarries appear to be the best option due to: (1) the fact that they can accept wet or dry material; (2) large quantities could be placed; and (3) there are several quarries nearby that can have material pumped in directly from Conowingo Reservoir. Landfills are still an acceptable option; however, they have many qualifiers including cost, transportation, quantity limitations, and environmental regulations. Island restoration has many environmental regulations that could add costs; transportation costs to purchased land could be high.

Before any of these concepts are implemented, the following would need to be considered: (1) more up-to-date chemical analysis; (2) state environmental standards that need to be met and approved; (3) grain size of the material; (4) accessibility and distance to placement sites; and (5) tipping fees.

Danielle noted there are several questions that need to be answered by the LSRWA agency group in order to further consider reservoir placement options:

- How much material is planned to be removed?
- How often will material be removed?
- When would removal begin?

The handout of “placement” options provides details on placement capacity, pumping distance, tipping fees and limitations. A pumping distance of 5 miles or less is considered “acceptable.” Longer distances than that require electric boosters, etc, which would add costs.

There was discussion on the idea of a permanent pipeline. Is there data around the country about a permanent pipeline, safety, costs, etc? Mississippi has permanent pipelines that move sediments into river deltas; this should be investigated. *Some research after the meeting was done and there is a Louisiana state funded dredging project that is pumping sand long distance (22 miles) to Scofield Island, west of the Mississippi River's mouth, so the technology is there. The dredge pipe runs six miles upriver from the dredge before crossing the levee, cutting under two roadways and a small canal. The project is estimated to cost around 100 million dollars.*

Bob noted that there is no permanent pipeline anywhere in Chesapeake Bay. He estimated that you could move 2,000 cubic yards per day with a 16- top 18-inch pipe. Factors like the size of the pump, time of year restrictions and type of sediments you are pumping affect how much sediment you can remove. Dave Ladd asked about dredges and floating pipelines in the reservoir and where access would be? Bob explained that you could get a dredge in there and you could move it; however, the farther you go from placement site, the more costly these activities become.

There was discussion on Blackwater Wildlife Refuge as a potential placement site. Bill Dennison noted that Blackwater is really losing area and needs material. Bob said that there would be many issues to deal with (costs, regulatory, etc). Chris noted that while this would be expensive and challenging, it could provide great ecological benefits. Preliminary studies looking into this were conducted under the DMMP and Chesapeake Marshlands studies. However, it was agreed that Blackwater should be added to the list to be investigated. Bruce noted that there most likely will be multiple solutions, and the key will be finding partners to pay for options.

Michael asked about Funkhauser quarry as a potential placement site. Danielle noted that they could not find information on this quarry perhaps ownership has changed or they have the wrong address. Michael agreed to provide the contact information as a follow-up to the meeting.

#### 8. Update on Reservoir Operational Strategies –

John Balay provided the group an update on reservoir operational strategies. More specifically, these are sediment management strategies that would alter the way the reservoirs are operated to manage sediment. For example, opening crest gates and sluicing sediment to allow it to flow past the dam could be one strategy. The handout John provided is included as enclosure 7 to this memorandum.

John's analysis focused only on Conowingo Dam. It also only focused on altering the operations of the dam, not the structure. He provided data on the existing operations and infrastructure of the dam. He noted that because of the various user groups (hydroelectric, nuclear, public water supply and recreational), the reservoir elevation is maintained within a specified range throughout the year so as not to conflict with minimum elevation requirements to meet the needs of these user groups. Maintaining the reservoir above these minimum elevations to meet user group needs is a constraint on altering the operations of the reservoir to management sediment.

The sediment task force (original group that met in 1999-2001) recommendations dropped modifying dam operations as an alternative noting that it would impact the primary purpose of electric generation and the potential benefits would be limited. Also there is limited hydraulic and storage capacity associated with the dam. There is no intermediate setting on the crest gates; they are either open or closed (using a gate will only impact a bit more than a 38-foot section of the channel, which is the gate width, but will use up to 4,000 cfs (cubic feet per second) of flow). You cannot use all the gates to pass sediment unless flows are extremely high. The bottom line is that there are very limited options for sediment management through altering the dam operations since it is a run-of-river facility at flows greater than 86,000 cfs. John concluded that they will look further into agitation dredging (coupled with electric generation releases) of fine material outside of ecologically critical time periods. Chris asked whether physical modification of the dam should be

considered because we'd be seeking to have the dam do something it wasn't designed/constructed for.

There was discussion of the effects of passing sediments downstream. Michael Helfrich noted that bypassing in winter (i.e., non-ecologically critical months) would impact TMDL loads. Would bypassing be considered open water placement? Are dam releases considered releases of pollutants? Mark Bryer noted that we should quantify the habitat being provided downstream along with terrestrial benefits of land use. John Nichols said it was important to think about impacts to the already existing habitat such as the SAV beds, etc. We want to reduce impacts to existing habitat such as spawning fish habitat. John will provide written comments on today's proceedings about creating habitat downstream. He has migratory fish concerns. We want to restore and enhance spawning habitat in the upper bay. Chris Spaur noted that the status and trends of existing habitat should impact our decisions; at its simplest it's important to remember that the Bay is growing by hundreds of acres per year. As far as Chris knows, there is no trend information on shallow water habitat, but presumably it's increasing in area as Bay grows. Bill Dennison noted that impacts to SAV species are nuanced; freshwater species are resilient to temperature while saltwater species are not. SAV is doing well wetland marshes are not.

#### 9. Update on Watershed Sediment Management Strategies-

Bruce Michael provided the group an update on watershed sediment management strategies. He provided a handout which compares best management practices (BMP) and efficiencies developed by CBP; this handout is included as enclosure 8 to this memorandum.

Bruce noted that when it comes to watershed sediment management strategies, the most cost-effective BMP according to CBP is "no till" agriculture. More emphasis should be placed on the counties doing this option. Chris Spaur asked if herbicide-resistant weeds had been considered at all in the analysis thus far; herbicide resistant pigweed is a growing problem in the southeast. Bruce said they had not. Pat Buckley noted that the PA WIPs already rely heavily on agricultural BMPs. Bruce noted that what we are investigating BMPs for is to go above and beyond what states are doing with WIPs to meet TMDL. Exelon relicensing could add funding to implement agricultural BMPs in the watershed. There was discussion on how much acreage was available to implement no-till BMPs and with varying funding scenarios what amount of nutrient reduction that would get us (CBP modeling runs would need to be done to get an understanding of this).

#### 10. Budget Update and Wrap Up –

Claire noted that there is no FY13 federal budget yet. USACE was able to reprogram some funding to the study and MD also provided some direct cash funds. At this time we have enough funds to get us through approximately April-May to complete modeling scenarios 1-5:

1. What is the system's current condition?
2. What is the system's condition if the WIPs are in full effect?
3. What happens when the reservoir fills?
4. What happens when the reservoir fills and WIPs are in full effect?
5. What is the system's condition if a large scour event occurs in spring, summer, or fall?

Anna will draft up notes for the group's review. Following this, the notes and presentations will be posted to the project website. Claire will set up a doodle poll to determine the date for next quarterly meeting which will sometime in May.

Anna Compton,  
Study Manager

Enclosures:   1. Meeting Agenda  
                  2. Modeling scenario summary  
                  3. Carl Cerco Presentation  
                  4. Bill Dennison Presentation  
                  5. Danielle Aloisio Presentation  
                  6. Lower Susquehanna Placement Options Handout  
                  7. Update on Reservoir Operational Strategies Handout  
                  8. Non-Point Source Best Management Practices and Efficiencies Handout