**Conowingo Dam Relicensing: Need for a coordinated strategy.**

Charlie Stek

The relicensing of the Conowingo Hydroelectric Project represents a once in a 30 to 50 year opportunity to address three issues of great importance to continued Chesapeake restoration efforts: the sediment buildup behind the dam, protection and restoration of key Bay fish species and opening up of new opportunities for conservation/recreation.

**BACKGROUND:**

On August 30th, 2012 Exelon Generation Company submitted an application to the Federal Energy Regulatory Commission (FERC) for a new license for the existing Conowingo Hydroelectric Project located on the Susquehanna River in Harford and Cecil Counties, Maryland, and York and Lancaster Counties, Pennsylvania. The current license for the Conowingo was issued on August 14, 1980 and expires on September 1, 2014. FERC approves licenses for a period of 30 to 50 years.

The Conowingo is one of 5 dams on a 55 miles stretch of the Susquehanna River from its mouth at Havre de Grace, each with its own license, operating conditions, and expiration date. Three dams -- Muddy Run (Exelon), Holtwood (PPL) and York Haven (York Haven Power Co.) -- are on concurrent license schedules with the Conowingo. The fifth project, Safe Harbor (PPL and Constellation), has had its license extended to the year 2030.

The existing Conowingo Project facilities consist of: 1) a main dam (constructed in 1928) 2) a spillway, 3) a reservoir (Conowingo Pond), 4) an intake and powerhouse, and 5) two fish lifts. The project provides approximately 1.8 billion kilowatt hours annually to the electric grid and is used as a drinking water supply for Baltimore and the Chester Water Authority, as cooling water for the Peach Bottom Nuclear Generating Station and for recreation -- primarily boating and fishing. In 1989, a Settlement Agreement signed between Project owners and State and Federal resource agencies established water quality standards, minimum flows and fish restoration programs.

**KEY ISSUES:**

**SEDIMENT TRANSPORT:** For decades, the Conowingo served as a trap for sediment and nutrients that run off from the watershed, preventing them from reaching the Chesapeake Bay. However, recent studies by USGS indicate that the dam is rapidly losing its sediment storage capacity. The consequence is that large storms are already delivering more suspended sediment and nutrients to the Bay – which could severely impact restoration efforts. (See attached EPA study on sediment loads and TMDL impacts.) The Baltimore District US Army Corps of Engineers is currently conducting a study, in partnership with Maryland, to evaluate measures to maintain or increase Conowingo Dam sediment and nutrient storage capacity and to reduce sediment and nutrient transport from Conowingo Dam into Chesapeake Bay during river high flow events. That study is not expected to be completed until September 2014, contingent on funding being available. It is also only a first-phase study and would not lead to a project authorization.

**FISH PASSAGE AND MORTALITY:** Construction of the dam also severely impacted migratory fish species such as American shad and eel. Despite the two existing fish lifts, constructed in 1972 and 1991 respectively, and previous programs to capture and truck fish above the dam, fish passage and mortality rate impacts remain a serious concern of the U.S. Fish and Wildlife Service, MD DNR and anglers.

**CONSERVATION AND RECREATIONAL USE:** The Conowingo is a large component of recreation and conservation opportunities in the lower Susquehanna River Corridor. Its boundary contains 11,700 acres of land, and approximately 43 miles of shoreline: 40 miles above the dam and 3 miles below. Exelon currently maintains 14 public recreation facilities within the Project Boundary including a swimming pool, 2 marinas, several public boat ramps and picnic areas. There are also trails which run through the property including the Captain John Smith NHT and the Mason Dixon Trail. Conservation organizations are encouraging Exelon to transfer some of the lands inside and outside of its project boundaries to State or Federal governments for conservation/recreation purposes.

**FERC Authority:** The Federal Power Act (FPA) of 1920 gave FERC the exclusive power to license and regulate non-Federal hydropower projects and balance multiple water uses. Under the 1986 amendments to the Act, FERC must give “*equal consideration to energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality*.”

**FERC relicensing process:** FERC’s Integrated Licensing Process or (ILP) is a multi-step process which places the responsibility on the applicant to meet strict deadlines, consult with agencies and the public to decide which studies it needs to complete, and conduct NEPA scoping and outreach during the pre-application phase. In accordance with the ILP, Exelon filed its notice of intent to apply for a relicense in 2009, completed 32 FERC- approved studies, conducted public scoping and filed its formal application with FERC on August 31, 2012.

On September 13, FERC issued a public notice that the application has been received and noted that a preliminary procedural schedule will be filed subsequently. FERC is now in the process of determining whether the application is complete (decision expected in early December.) It will then issue a Notice of Acceptance of the application and a Notice of Ready for Environmental Analysis (REA). Comments on this REA notice, intervention requests, and preliminary terms and conditions must be filed with FERC within 60 days of the REA notice. Exelon must also file a Water Quality Certificate application within 60 days from the REA notice. FERC will then consider comments received and begin processing the NEPA document. Once this process has been completed and a Water Quality Certificate has been issued, FERC would then issue a new license for the Project.

**Exelon’s Application:** Exelon’s application proposes to continue operating Conowingo as it has historically and is not proposing any new or upgraded facilities or structural changes to the project. In response to sediment concerns: Exelon proposes to adopt BMPs for lands within the Project boundary and to monitor sediment transport and deposition patterns within Conowingo Pond every 5 years. In response to fisheries concerns: Exelon proposes to develop a trap and transport program for American eel migrating downstream and an eel ramp and collection facility on the west bank of the Conowingo tailrace. For recreation: Exelon proposes to amend the Project boundary to eliminate nearly 2000 acres of lands along Broad Creek and lands downstream from the Conowingo Dam from its boundary. Exelon would negotiate leases with existing recreation facility operators for the continued operation of those facilities located on lands owned by Exelon but no longer within the Project Boundary. It plans to negotiate a new lease with the Maryland DNR for the continued protection and use of the collocated Lower Susquehanna Greenway Trail and Mason Dixon Trail on Exelon owned lands outside of the Project Boundary. Exelon is also proposing to implement resource management plans and upgrade recreational facilities – primarily parking improvements at boat launches.

See table below for Excelon’s proposed measures and costs.

**TABLE 4.1.4-1: SUMMARY OF ANNUALIZED COSTS (2014 DOLLARS) FOR**

**ENVIRONMENTAL AND RECREATION MEASURES**

|  |  |  |  |
| --- | --- | --- | --- |
| **PME Measure** | **Total Capital Cost**  **over 50 Years (2014**  **dollars)** | **Total O&M Cost over**  **50 Years (2014 dollars)** | **Average Annual Cost**  **over 50 Years (2014**  **dollars)** |
| Fish Lift Maintenance  Plan | $0 | $9,200,000 | $200,000 |
| Upstream American Eel  Passage | $718,000 | $28,954,000 | $645,000 |
| Downstream American  Eel Passage | $227,000 | $13,165,000 | $291,000 |
| Bald Eagle Management | $0 | $123,000 | $3,000 |
| Historic Properties | $95,000 | $973,000 | $23,000 |
| Recreation Management | $4,373,000 | $2,102,000 | $141,000 |
| Shoreline Management | TBD | TBD | TBD |
| Sediment Management  Plan3 | $0 | $438,000 | $10,000 |
| Cost to Prepare  Application for a New  License | $14,989,000 | $0 | $326,000 |
| **Total** | **$20,402,000** | **$54,955,000** | **$1,639,000** |

Its filing with FERC notes that “*Exelon has engaged interested stakeholders to participate in the development of a comprehensive settlement agreement based on collaborative negotiation of specific terms and conditions for the new Conowingo license*.” Note: As a matter of policy, FERC encourages settlement as the basis of a license whenever there is a reasonable prospect of success in a timely manner.

**Other Federal and State Agency Authority and Leverage:** The FPA and the Clean Water Act gave federal resource agencies and States, respectively, strong roles to play in the licensing process. FERC is required to include in its license certain agency-established operating conditions such as fish passage or flow requirements and a Section 401 certification that the project complies with applicable state water quality standards. It must also include a certification that the project is consistent with the State’s coastal zone management program.

*{As a cautionary note: P.L. 109-58, enacted in August 2005, includes provisions for applicants to propose alternatives to license conditions and requires agencies to accept those alternatives as long as they meet certain environmental and economic requirements. And more recently, legislation has been introduced in the Congress to limit or repeal federal and state agency conditioning authority for hydropower projects.}*

**Need for a coordinated strategy:**

To date, stakeholder and other interested party participation in the relicensing process has been limited largely to Federal and state agencies and a few NGOs. Comments on FERC’s scoping document, Exelon’s pre-application, *or* draft license application were filed by only a dozen groups: SRBC, MD DNR, PA DEP, US FWS, NMFS, Lower Susquehanna Riverkeeper, American Rivers, TNC, Mason-Dixon Trail and a few others. This is due, in part, to the fact that only Counties, municipalities, and property owners, citizens, Indian Tribes within the project boundaries or in the general area, were notified of the process. It may also be due to the belief by State and federal agencies that their concerns will be addressed in the settlement or conditioning process. However, even some important agencies have not been engaged in this process such as the Army Corps of Engineers and EPA. Experience of other hydropower relicensing projects across the nation suggests that the best outcomes for the environment are achieved when there is a coordinated strategy that involves all the parties -- the State, the Congressional Delegation, the Federal agencies, the state legislators, the stakeholders, interested organizations and the public – all working toward the same goals.  To our knowledge, no such coordinating effort or strategy has been developed.

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**Appendix T. Sediments behind the Susquehanna Dams Technical Documentation**

**Assessment of the Susquehanna River Reservoir Trapping Capacity and the Potential Effect on the Chesapeake Bay**

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**Introduction**

In developing the Chesapeake Bay Total Maximum Daily Load (TMDL), EPA must account for a vast array of dynamics that affect the loadings to the Chesapeake Bay and how to appropriately assign load allocations to each state. A large influencing factor in sediment and nutrient loads to the Chesapeake Bay are the dams along the lower Susquehanna River, which retain large quantities of sediment in their reservoirs. The three major dams along the lower Susquehanna River are the Safe Harbor Dam, Holtwood Dam, and the Conowingo Dam. This document looks at the dams’ effects on the pollutant loads to the Chesapeake Bay and how those loads will change when the dams no longer function to trap sediment.

**Sediment Trapping and Storage Capacity**

Annually, the reservoir system traps approximately 70 percent of the sediment passing through the system (Langland and Hainly 1997). The trapping capacity is the ability of a reservoir to continue storing sediment before reaching an equilibrium, after which the amount of sediment flowing into the reservoir equals the amount leaving the reservoir, and the stored volume of sediment is relatively static. The sediment storage capacity is the actual maximum amount of sediment that can be stored in a reservoir when it is at equilibrium.

***Safe Harbor Dam (Lake Clarke) and Holtwood Dam (Lake Aldred)***

Lake Clarke and Lake Aldred have no remaining sediment trapping capacity. The two lakes have been in long-term equilibrium for 50 years or more.

***Conowingo Dam and Reservoir***

The Conowingo Reservoir is divided into three parts: upper, middle and lower. The upper and middle portions of the reservoir are in long-term equilibrium. Other than temporary increases in sediment storage due to scour events, there is no remaining storage capacity (Langland 2009a).

The lower part of the reservoir is the final 4 miles from just above Broad Creek to the Conowingo Dam. Between 1996 and 2008, 12,000,000 tons of sediment were deposited in the Conowingo Reservoir, primarily in the lower part (Langland 2009a). The total amount of sediment stored in the lower part of the reservoir was 103,000,000 tons by 2008 (Langland 2009a). The lower part of the Conowingo Reservoir is the only section of the entire three- reservoir system that has not reached long-term sediment storage equilibrium. Some trapping capacity remains in this portion of the reservoir.

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**Expected Time Remaining until Sediment Storage Capacity Is Reached**

The sediment storage capacity of Conowingo Reservoir has been decreasing since 1929, except during temporary scour events, such as the one during the *Big Melt* in January 2006 (Langland 2009a). The average reservoir sediment-deposition rate from 1959 to 2008 was 2,000,000 tons per year (Langland 2009). The long-term trapping efficiency of the Conowingo Reservoir has remained relatively stable at around 55 percent for the last 30 years (Michael Langland, USGS, personal communication, November 4, 2009).

According to the U.S. Geological Survey’s (USGS’s) most recent study, 20,000 acre-feet of sediment storage remain in the Conowingo Reservoir from Hennery Island to the dam; this translates to 30,000,000 tons of sediment (Langland 2009a). Given the rate of transport is 3,000,000 tons per year, and the rate of deposition is 2,000,000 tons per year, if there are no major scouring events in the Conowingo Reservoir and the sediment input does not change, the remaining capacity will be filled in 15–20 years (Langland 2009a). Once the sediment storage capacity is reached, sediment loads transported downstream past the reservoir will approach the loads transported from upstream (Langland 2009a).

However, because Langland notes that the time until the reservoir reaches capacity is affected by three factors—sediment transport into the reservoir, scour removal events, and sediment trapping efficiency—the time until steady state conditions are reached could be extended to 25–30 years (Langland 2009b). That assumes sediment transport decreases from 3.2 to 2.5 million tons/year, statistically expected scour events occur, and the long-term trapping efficiency remains at 55 percent (Langland 2009b).

It should be noted that the sediment trapping efficiency of the reservoir is highly variable, depending on rainfall. During drought conditions, the trapping efficiency can increase to 85 percent, and during wet periods, the trapping efficiency can fall to 40 percent (Michael Langland, USGS, personal communication January 15, 2010).

**Effects on Chesapeake Bay Once Sediment Storage Capacity is Reached**

As of 1997 the Susquehanna River contributed roughly 50 percent of the fresh water discharge to the Chesapeake Bay and about 66 percent of the annual nitrogen load, 40 percent of the phosphorus load, and 25 percent of the suspended sediment load from non-tidal parts of the Bay (Langland and Hainly 1997).

According to USGS water quality sampling in 1985–1989, pollutant loads in the Susquehanna River increase substantially below Harrisburg, Pennsylvania: total nitrogen increased 42 percent, total phosphorus increased 49 percent, and total suspended sediment increased 50 percent compared to loads at Harrisburg (Reed et al. 1997). The increased load is a result of more urbanized areas, agrochemical fertilizers and manure, and fewer forested areas (Reed et al. 1997).

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A significant percentage of those pollutant loads are captured by sediment deposition behind the dams, primarily the Conowingo Dam.

Once the Conowingo Reservoir reaches the sediment trapping capacity, the sediment and nutrient loads delivered to the Chesapeake Bay via the Susquehanna River will equal the load delivered into the reservoir system (Langland and Cronin 2003). Once storage capacity is reached, the nitrogen load will increase by 2 percent; the phosphorus load will increase by 40 percent; and the suspended sediment load will increase by at least 150 percent (Langland and Cronin 2003).

**Proposed Activities to Address Sediment Build up Behind the Dam**

***Dredging***

The Susquehanna River Basin Commission Sediment Task Force examined the issue of finding options to address the sediment accumulation behind the Conowingo Dam and concluded that dredging may provide the needed sediment storage capacity behind the dams (SRBC 2002).

In 2009 the U.S. Army Corps of Engineers (USACE) Baltimore District received funds to conduct a study of sediment management in the Conowingo Reservoir. The investigation could be developed as a Sediment Management Plan, to prioritize areas for work and make recommendations to implement sediment reduction options (Compton 2009). The study approach outlined by the USACE is conceptual, and the final components will be determined with input from the cost-share sponsor. The USACE has not yet found a cost-share partner for this feasibility study (Anna Compton, USACE Baltimore District, personal communication, December 22, 2009).

#### Conowingo Hydroelectric Project Relicensing Process

The Conowingo Hydroelectric Project is undergoing relicensing. On February 4, 2010 FERC (Federal Energy Regulatory Commission) accepted Exelon’s Revised Study Plan, including the requested study *Sediment Introduction and Transport (Sediment and Nutrient Loading)* which will address “the effects of the Conowingo Project and its operation on upstream sediment and nutrient accumulation, sediment transport past the project, and sediment deposition and distribution upstream and downstream of the projects” (Exelon Corporation 2009). Specific tasks include a review of existing information regarding sediment and nutrient storage capacity, accumulation rates, scouring events, and such, in the Conowingo Reservoir; an analysis of the effects of project operations on habitat and substrate below the dam; and a review of watershed-based management efforts and load reduction successes. Exelon noted that the “estimated cost in 1995 dollars of dredging to simply keep up with annual sediment inflow (estimated to be 2.3 million cubic yards per year at the time) was $28 million per year. Using Means Cost Indices the comparable 2009 cost would be $48.44 million.

**Cost Comparison of Dredging and Other Nutrient and Sediment Reduction Strategies**

Comparisons with cost estimates for dredging Baltimore Harbor and Channels from the *Dredged Material Management Plan and Final Tiered Environmental Impact Statement* (Weston Solutions 2005) reveal that dredging costs are highly variable, and, to a large extent, depend on

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the selected destination and use of the dredged materials. Costs can be as little as $12/yd3 for artificial island creation or beach nourishment and as much as $69/yd3 if dredged materials are taken to a confined disposal facility (Weston Solutions 2005). The sediment management feasibility study proposed by the USACE, and awaiting a cost-share sponsor, is likely the best mechanism to determine the true cost of dredging the Conowingo Reservoir.

*Cost-Effective Strategies for the Bay* (Chesapeake Bay Commission 2004) outlines the six most cost-effective practices to reduce nutrient and sediment loading to the Chesapeake Bay. Table T-1 summarizes the six selected practices and their estimated costs and compares them to the estimated costs of dredging the Conowingo Reservoir. Rough estimate calculations of dredging costs at Conowingo were based on the cost assumptions used by Exelon and SRBC and the assumption that 1 yd3 of sediment weighs 0.945 tons. It is not known, at this time, what is included in Exelon’s estimate of the cost to dredge; an assumption was made that the costs include disposal of the dredged materials, and any other associated costs.

**Proposal for Addressing the Sediment and Phosphorus Load in the Chesapeake Bay TMDL**

EPA’s intention is to assume the current trapping capacity will continue through the planning horizon for the TMDL (through 2025). The Conowingo Reservoir is anticipated to reach a steady state in 15 – 30 years, depending on future loading rates, scour events and trapping efficiency. The steady state condition is at the limits of the planning horizon for the TMDLs and, depending on conditions, could be well beyond the planning horizon.

Under these assumptions, the wasteload allocations (WLA) and load allocations (LA) would be based on the current conditions at the dam. This represents a business-as-usual scenario in which the future diminished trapping capacity behind the Conowingo Dam is not considered in developing of the wasteload WLA and LA.

If future monitoring shows the trapping capacity of the dam is reduced, then EPA would consider adjusting the Pennsylvania, Maryland and New York 2-year milestone loads based on the new delivered loads. The adjusted loads would be compared to the 2-year milestone commitments to determine if the states are meeting their target load obligations.

Future increases in sediment and phosphorus downstream of the dam can be minimized by making implementation activities above the dam a management priority. This will decrease the overall loads of sediment and phosphorus, and extend the time until trapping capacity is reached. The states should work together to develop an implementation strategy for the Conowingo Dam and take the opportunity to work with FERC during the relicensing process for Conowingo Dam.