

Conowingo Pond Management Plan

Executive Summary

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This executive summary is based on a draft Commission report that is undergoing public review until mid-May 2006. The report is expected to be complete and available for final approval by the commissioners in June 2006.

In 2002, the Susquehanna River Basin Commission (the Commission) convened the Conowingo Pond Workgroup (the Workgroup) to develop a management plan for the Conowingo pond. The primary purpose of this four-year planning effort was for the Workgroup to evaluate operational alternatives for the pond and to recommend to the Commission a selected management plan that best meets the

management needs identified by the Workgroup. Additionally, the Workgroup was tasked with identifying management actions that the Commission should incorporate into its regulatory and water resource management programs. The Workgroup completed its report in March 2006 and it has served as the basis for the Commission's report on the Conowingo Pond Management Plan.

The Workgroup, which was chaired by the Maryland Department of the Environment, was intended to represent the interests of key stakeholders in the operation and use of the pond. The membership was comprised of representatives from federal and state agencies, local jurisdictions, operators of the lower Susquehanna hydroelectric

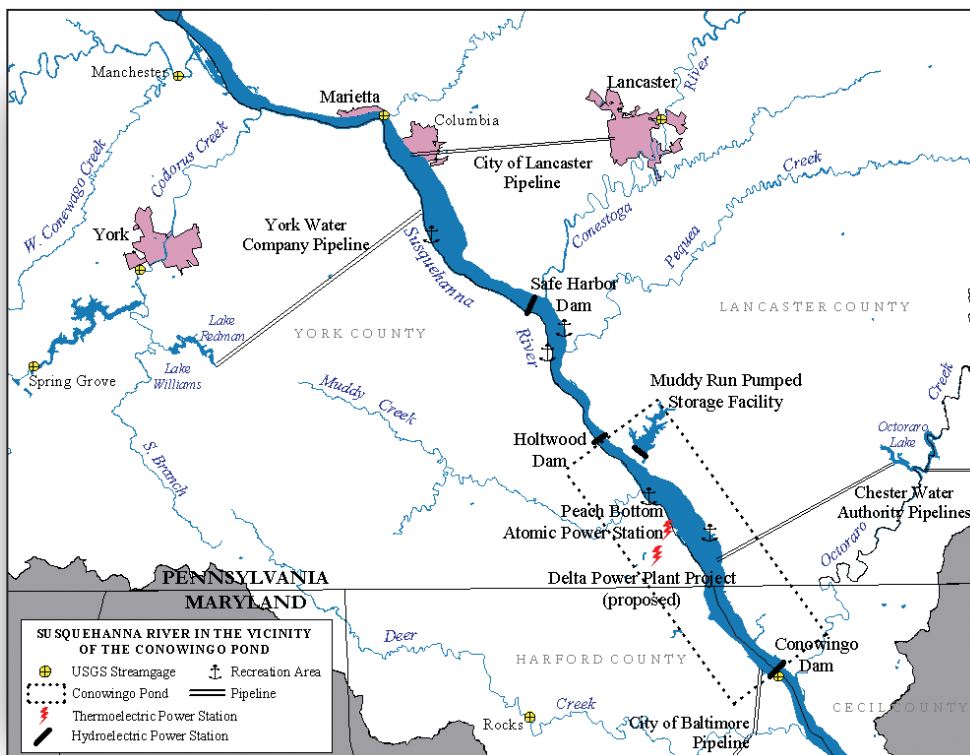
facilities and Peach Bottom Atomic Power Station, local water utilities, and the Commission. The Workgroup met several times a year and provided direction, oversight, input, and review for the planning effort and its results.

There is a wide range of interests, problems, and potential conflicts related to the resources, uses, and operation of the Conowingo pond. Effective management of the Conowingo pond during low flow conditions is critical for economic, environmental, and human welfare needs in the area. During low flow conditions on the Susquehanna River, there is the potential for conflicts in management objectives to arise to the point where difficult economic and environmental decisions need to be made.

The Conowingo pond, created by the construction of the Conowingo dam, is an interstate body of water with approximately 8 miles of the pond in Pennsylvania and 6 miles in Maryland. The dam was completed in 1928 to provide hydroelectric power generation for the Conowingo Hydroelectric Station. Operation of the dam by Exelon Generation, Inc. (Exelon) is subject to the requirements of the Federal Energy Regulatory Commission (FERC). Those requirements include provisions related to minimum flow releases and maintenance of recreational pond levels. Current minimum flows, which vary by season, were established to provide protection for fishery resources, with highest minimum flows required during the anadromous fish migratory period in spring, and intermittent flows permitted only during the winter, when fish populations are limited. By virtue of the pond, a stable source of water storage for other purposes was also provided. The Muddy Run Pumped Storage Hydroelectric Facility, built in 1968,



Looking north at the Conowingo dam with the pond in the upper portion.



Facilities in the vicinity of the Conowingo pond.

cycles water back and forth from the pond for additional power generation. The water in the Conowingo pond is also used for public water supply by the City of Baltimore and Chester Water Authority, and for industrial cooling by the Peach Bottom Atomic Power Station. Finally, the pond provides a valuable recreational, fish, and wildlife resource.

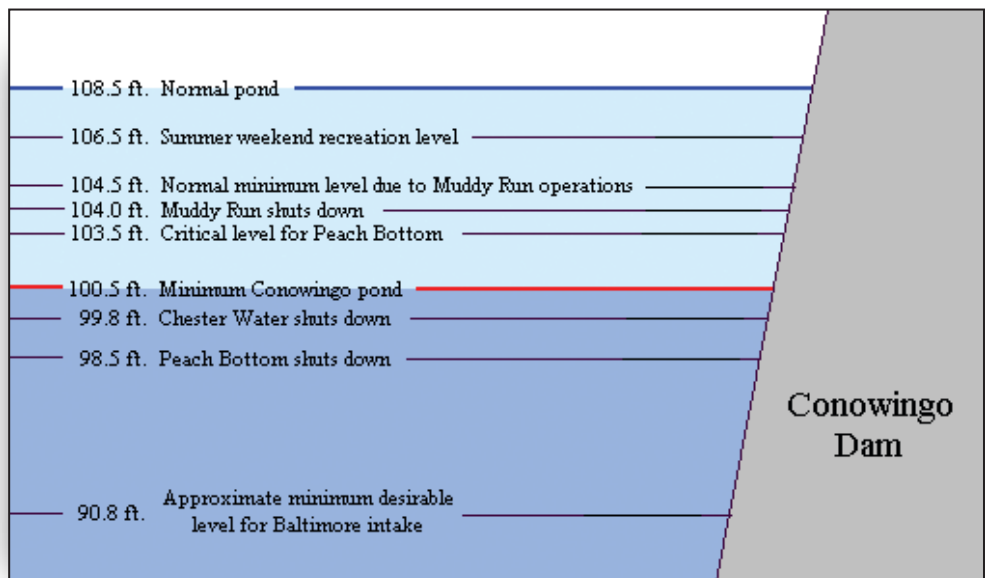
Under normal and slightly below average flow conditions, there is generally ample water in the lower Susquehanna River to maintain hydroelectric operations; support water supply demands; sustain recreational, fish, and wildlife activities; and meet required flows to downstream river reaches and the upper Chesapeake Bay. However, during more severe low flow conditions, the available water becomes insufficient to meet all prescribed uses and required needs. During such periods, as Exelon operates the Conowingo dam in accordance with its FERC license requirements, storage levels in the Conowingo and Muddy Run facilities begin to decline. Declining pond levels pose a threat to Peach Bottom's cooling water intake, Muddy Run's intake, the use of recreation facilities, shore habitat, and maintenance of downstream flows. In response to declining pond levels and worsening conditions, FERC has authorized Exelon on four occasions to temporarily include water leaking through closed wicket gates toward meeting the dam's daily minimum flow release requirement. A 1988 settlement agreement specifically excludes that water from the minimum release calculation, but FERC has overridden the exclusion during the four events.

In order to investigate and recommend a management plan for the Conowingo pond, it was important that the members of the Workgroup provide insights to the diversified interests related to the pond's resources. These interests include hydroelectric power generation, public water supply, water use upstream of the Conowingo pond, minimum flow release requirements, minimum dissolved oxygen requirements, summertime minimum recreational pond levels, multipurpose

benefits, anadromous fish migration, upstream reservoir storage, environmental resources, and cooperative management. The Workgroup collectively assessed the interests and identified problems and conflicts that needed to be addressed. They were:

- Maintaining FERC mandated minimum flow releases from the Conowingo pond can lead to disruption in power production, water supply withdrawal limitations and diminished recreational opportunities during significant low flow events, and depletes storage that might otherwise be available for release during low flow events of extended duration.
- Temporary waivers to allow inclusion of gate leakage towards meeting minimum flow releases have been authorized by FERC four times (1999, 2001, 2002, and 2005) during recent droughts, but only under emergency or near-emergency conditions when time is critical and serious impacts are developing with no projected improvement.
- Increased salinity levels in the Susquehanna River downstream of the Conowingo dam during low flow conditions can negatively impact the water supply for Havre de Grace.

- Consumptive water use in the Susquehanna River Basin, from and upstream of the Conowingo pond, is increasing and could eventually impact negatively on the pond and those who rely on its water.
- Commission-owned water supply storage at two federal reservoirs in the upper basin is managed under operating rules that were developed for water supply users elsewhere in the Susquehanna River Basin. Releases from these reservoirs are not mandated by FERC license requirements and may not provide optimum and timely benefits to the Conowingo pond during low flow conditions.
- Increasing public water supply needs for Baltimore City, Harford County, Chester Water Authority, and the areas of Pennsylvania and Maryland surrounding the Conowingo pond are expected to lead to requests for greater withdrawals from the pond or the Susquehanna River just upstream.
- Increased consumptive water use needs (i.e., cooling water for a new thermoelectric power plant) could require additional withdrawals from the pond.



Operation levels of the Conowingo pond.

A valuable tool used during the planning study was the Commission's OASIS computer model. This daily flow model incorporated more than 70 years of hydrologic record throughout the basin and was used to measure the impacts of various operation parameters on the pond and flow conditions downstream. In addition to hydrologic flow records, the model included representations of the operation of large public water supply withdrawals, power plants, and reservoirs in the Susquehanna River Basin, and incorporated basinwide estimates of existing and future consumptive water uses. Comparative output displays of Conowingo pond levels and dam releases allowed the Workgroup to evaluate numerous operation alternatives and make recommendations for the management of the pond.

Using the hydrologic model, baseline conditions (i.e., existing operations) were established and a series of 32 initial alternatives was evaluated. Key parameters identified for the evaluation included minimum downstream flow requirements, credit for leakage of water at the dam, water supply withdrawals under normal and low flow conditions, consumptive water use in the basin above the Conowingo pond, and the use of Commission-owned storage at two upstream reservoirs to augment low flows. Details on these alternatives are included in Appendix 3 of the main report. Computer-aided negotiations (CAN) were used to perform efficient evaluations of the long-term implications of changes in operating policies and facility configurations. The iterative process embodied in the CAN sessions served to inform the Workgroup members about the pros and cons of many alternatives on a consistent and balanced basis.

After review of the initial 32 alternatives, the Workgroup developed 6 final alternatives for closer analysis leading up to the selection of a preferred operating plan. The alternatives differed mainly in operating rules for release requirements from the Conowingo dam during times of low flow. Parameters such as demand for water supply, water



OASIS schematic of the Susquehanna basin.

withdrawal operations, and upstream consumptive use were kept constant to allow for direct comparison between alternatives. The alternatives were: (1) Baseline; (2) Automatic Credit; (3) Critical Level; (4) System Deficit; (5) Stepped Waiver; and (6) Minimum Flow.

Based on results of the modeled scenarios, the Workgroup identified the leakage and the minimum release requirement as the most critical parameters in managing low flows and enabling the Conowingo pond to remain viable during droughts.

Details on these alternatives are included in Section V of the main report. A thorough evaluation of the six preferred alternatives led to the selected plan, which contains favorable elements of several of the final alternatives.

Based on results of the modeled scenarios, the Workgroup identified the leakage and the minimum release requirement as the most critical parameters in managing low flows and enabling the Conowingo pond to remain viable during droughts. While water conservation measures and the release of augmenting flow from upstream reservoir storage were deemed reasonable measures worthy of consideration, the supplemental volume of water they provide was found to be small relative to the daily fluctuations of the pond, and simply did not offer substantial drought mitigation. Therefore, the selected Conowingo Pond Management Plan was based on establishing a formal protocol to implement a credit for leakage, and to specifying the hydrologic conditions under which the credit is warranted.

The selected plan, “Automatic Q-FERC + 1000,” includes initiation of an automatic credit for leakage of up to 800 cubic feet per second (cfs), when the flow conditions at the Marietta gage decline to a flow of 1,000 cfs greater than the seasonal flow thresholds (“QFERC”) established by FERC. The Marietta flow threshold is 5,000 cfs between June 1 and September 14, and decreases to 3,500 cfs on September 15 through the end of November.

Modeled simulation runs of operating the resource under the recommended guideline produced favorable results. They demonstrated the most favorable balance for preserving adequate levels in the pond, ensuring reliable multipurpose use of the pond, and meeting the requirements for the quantity of water released to the downstream reaches of the Susquehanna River and the Chesapeake Bay. To further avoid potential negative impacts, the Workgroup conditioned the recommendation of “Automatic Q-FERC + 1000” with restrictions that prohibit Exelon from automatically taking a credit for leakage during the spring spawning season (April 1 - June 30) and limit the credit to only the portion of the 800 cfs that is absolutely necessary to maintain viable pond levels.

Implementation of the selected plan will require that Exelon successfully petition FERC for an amendment to the existing license to include the altered disposition of the gate leakage during drought conditions. The thorough planning effort of the Workgroup over the past four years and formal support of the proposed license amendment by the agencies involved are expected to be positive input to the approval process.

The Workgroup will convene annually to review project operations, assess the potential for hydrologic conditions to develop into drought, and conduct a drought operations exercise. The hydrologic model used to develop the management plan is to be kept up to date by the Commission for the Workgroup’s use, and will accurately reflect current water withdrawals in both the pond and the Susquehanna River Basin, as well as current policies and operation protocols. The Workgroup will also be responsible for reviewing and updating, as necessary, the selected management plan on a periodic basis not to exceed five years.

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The planning study also identified three related actions beneficial to managing the Conowingo pond that the Commission supports including in its regulatory and water resource management programs. They are:

1. Consideration of the impacts of increasing consumptive water use in the basin on the Conowingo pond

and determination of what measures, if any, are necessary to mitigate the impacts.

2. Investigation of the water supply storage owned by the Commission at the federal Cowanesque and Curwensville Lakes projects for alternative operational strategies to provide more effective low flow augmentation, including benefits to the Conowingo pond and instream resources below the dam.
3. Incorporation of key management principles and tools described in the Commission’s report, including the use of the annually updated hydrologic model, into the Commission’s regulatory and water resource management programs.

The report on the Conowingo Pond Management Plan, with its documented thorough analysis, provides valuable information for the Commission, public water suppliers, power companies, and environmental resource agencies in making regulatory and management decisions involving the resources of the lower Susquehanna River. Given the potential for increased water use and future withdrawals in the upstream basin and from the Conowingo pond, the adoption of the Conowingo Pond Management Plan and related actions is intended to ensure sustainable operations and a reliable water source for all needs, from public water supply and power generation to recreation and aquatic habitat, for many years to come. The full report is accessible by the public via the Commission’s website at www.srbc.net.

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