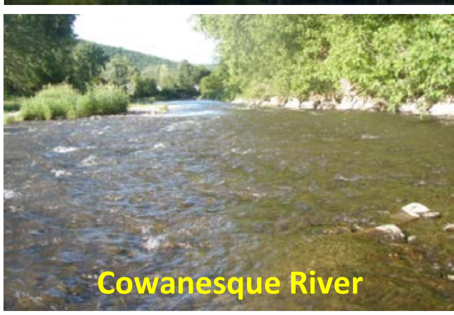
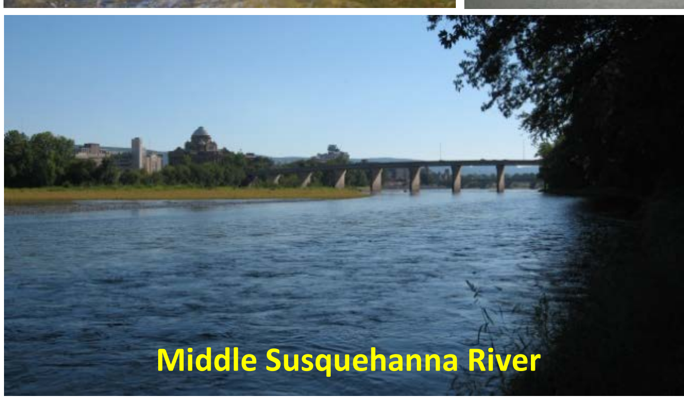
DRAFT ENVIRONMENTAL ASSESSMENT

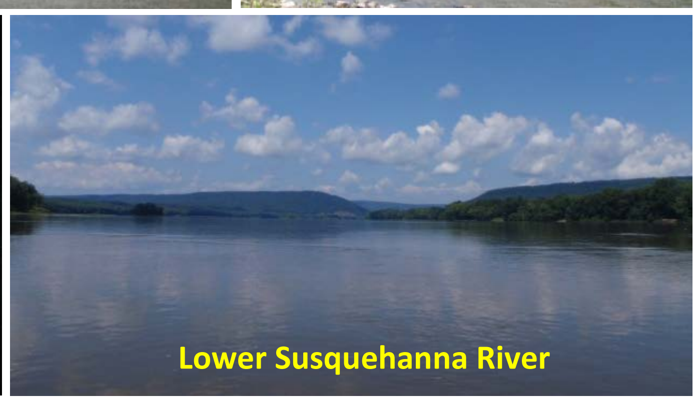
COWANESQUE LAKE WATER SUPPLY RELEASES TO COWANESQUE, TIOGA, CHEMUNG AND SUSQUEHANNA RIVERS

PENNSYLVANIA AND NEW YORK

JUNE 2013







US Army Corps of Engineers
Baltimore District

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June 2013

Cover Photo Sources: Cowanesque Lake – USACE and Other Photos – SRBC

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ADDITIONAL APPENDIX AVAILABLE BY REQUEST

Worksheets containing calculations used to determine approximate future percent chance of Cowanesque Lake drawdowns.

ADDITIONAL REPORTS AVAILABLE

Two additional documents prepared by others were of particular importance in preparing this EA. SRBC (2012) is the source of much of the information presented on Cowanesque Lake. TNC (2010) is the source of much of the information presented on the Cowanesque, Tioga, Chemung, and Susquehanna Rivers. These documents and websites from which they can be downloaded are presented below:

1) SRBC 2012 report titled *Optimizing use of Commission-owned Water Storage at Cowanesque Lake, Pennsylvania*, available at http://www.srbc.net/planning/cowanlakewaterstorage.htm

2) 2010 TNC report titled *Ecosystem Flow Recommendations for the Susquehanna River Basin*, available at http://www.srbc.net/policies/docs/TNCFinalSusquehannaRiverEcosystemFlowsStudyReport_Nov10_20120327_fs135148v1.PDF

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1.0 INTRODUCTION

1.1 Purpose and Need

Pursuant to the National Environmental Policy Act (NEPA) of 1969, the U.S. Army Corps of Engineers, Baltimore District (USACE) has prepared this Environmental Assessment (EA) to address the potential environmental and socioeconomic impacts associated with a modification of the water control plan for USACE Cowanesque Lake in Tioga County, PA. The proposed action would be a modification of project operations to alter the frequency and duration of water supply releases made to mitigate for impacts of downstream consumptive use. The proposed action would require a modification of the water control plan for Cowanesque Lake[1]. Modifications to the plan would occur after finalization of this EA.

The proposed action is evaluated at the request of the Susquehanna River Basin Commission (SRBC) with the objective of establishing a new low flow, water supply release trigger[2] for the Cowanesque Lake Project to more effectively utilize stored water to address downstream low flow conditions. This proposed trigger, known as "P95" is the flow that is exceeded 95 percent of the time at certain gages on the Susquehanna River.[3] The 1994 Cowanesque Lake operating plan by which low flow, water supply releases from the Cowanesque project are currently made, utilizes a different low flow trigger, known as "Q7-10"[4], as recorded at Harrisburg and/or Wilkes-Barre, PA, streamflow monitoring gages.

Adoption of the P95 trigger, also as recorded at Harrisburg and/or Wilkes-Barre, and the attendant revision of the Cowanesque Lake water control plan would allow the SRBC to use the water supply storage it owns there to more effectively mitigate for downstream consumptive water use in the Susquehanna River Basin. SRBC would then be able to make water supply releases that are compatible with current low flow management practices developed for the basin. Consumptive water use is the use of water in such a way that it is not returned to the Susquehanna River system. SRBC is the primary agency regulating consumptive uses of water in the Susquehanna River Basin. SRBC mitigates manmade impacts caused by consumptive use during low flows through a variety of actions: by making water releases from upstream reservoirs (including Cowanesque Lake), by releasing water from underground mine pools, and by implementing regulatory and programmatic actions aimed at reducing water demand. The proposed plan could offset human consumptive use more effectively during critical low flow events and provide potential benefit to downstream ecosystems of the Cowanesque, Tioga, Chemung, and Susquehanna Rivers. The proposed plan would also indirectly assist the Conowingo Hydroelectric Station in maintaining minimum flow releases to the lowest reaches of the Susquehanna River just above Chesapeake Bay.

The proposed action is needed because the current Q7-10 low flow trigger value for releasing water from Cowanesque Lake is insufficient to meet ecosystem flow needs during low flow

[1] Said modifications require approval from USACE North Atlantic Division.
[2] Trigger value is the flow within a river of interest at a stream gaging (flow measurement) station determined to be the lowest threshold below which streamflow will be allowed to drop without implementing low-flow management measures.
[3] Stated another way, river flow would drop below P95 five percent of the time, on average.
[4] Q is stream discharge, the volume rate of water flow. The Q7-10 flow is the 7-day average low flow expected to occur at a 1-in-10-year frequency and has a 10 percent chance of occurring in any year, on average.

conditions and does not comply with current SRBC consumptive use mitigation standards. Also, the Q7-10 flow inadequately supports minimum flow releases required at the Conowingo Hydroelectric Station, Maryland, for protecting the lowest reach of the Susquehanna River just above Chesapeake Bay. The Q7-10 standard was developed in the 1970s to ensure the assimilation of wastewater discharges to protect water quality; it does not address the protection of aquatic habitat or other riparian needs. The Q7-10 statistic failed to trigger releases during significant droughts since 1990, with the consequence that instream flows were reduced by consumptive uses to levels potentially harmful to the Susquehanna River aquatic ecosystem. Q7-10 was deemed inadequate and was removed from SRBC regulations in 2006. The Nature Conservancy (TNC) recommends for mainstem rivers that there be no human-induced reduction to low flow when streamflow falls below the long-term monthly 95th percent exceedence (P95) flow. Consistent with TNC's ecosystem flow recommendations, new SRBC consumptive use policy specifies monthly P95 as the standard threshold for low flow protection in large rivers.

This EA borrows text liberally from several documents and websites of the SRBC, Pennsylvania Fish and Boat Commission (PFBC), USACE, and TNC. Section 8 provides bibliographies for these documents and other documents used in preparation of this EA, and provides links on the world wide web where many of the documents can be accessed.

1.2 Background Information

1.2.1 Existing Cowanesque Lake Project

Cowanesque Lake is located in Tioga County, PA, on the Cowanesque River approximately 2 miles upstream of its confluence with the Tioga River at the Borough of Lawrenceville, PA (Figure 1-1). Cowanesque Lake lies in the Chemung sub-basin of the Susquehanna River Basin (Figure 1-2). Cowanesque Lake is a multi-purpose project owned and operated by USACE. Cowanesque Lake was constructed from 1973 - 1980 by damming the Cowanesque River for the purpose of providing flood protection for downstream communities. The original cost of constructing the project was paid for by USACE. Flood-risk management remains the project's primary purpose. In 1986, USACE and SRBC entered into a Contract for Water Storage Space at Cowanesque Lake. SRBC paid for the modifications which were constructed in the late 1980s, and pays a portion of the annual operations and maintenance expenses for the facility. The modifications expanded lake recreational facilities, with the lake now providing expanded boating, fishing, and swimming opportunities, in addition to providing storage space for water supply to satisfy downstream consumptive use makeup requirements. The modifications enabled controlled water releases to manage in-lake and downstream river water quality (temperature, dissolved oxygen, pH) and warmwater fishery habitat. Following completion of construction of these modifications, the conservation (normal) pool level was raised 35 feet (from elevation 1045 to 1080 feet[5]) in 1990.

Filling of the lake is dependent upon inflow from the Cowanesque River. Water levels in the lake are manipulated via releases from the dam. A conservation lake is presently maintained at elevation 1080 feet with the lake having a surface area of 1050 acres, and a length of about 5

[5] Elevation 1929 National Geodetic Vertical Datum (NGVD)

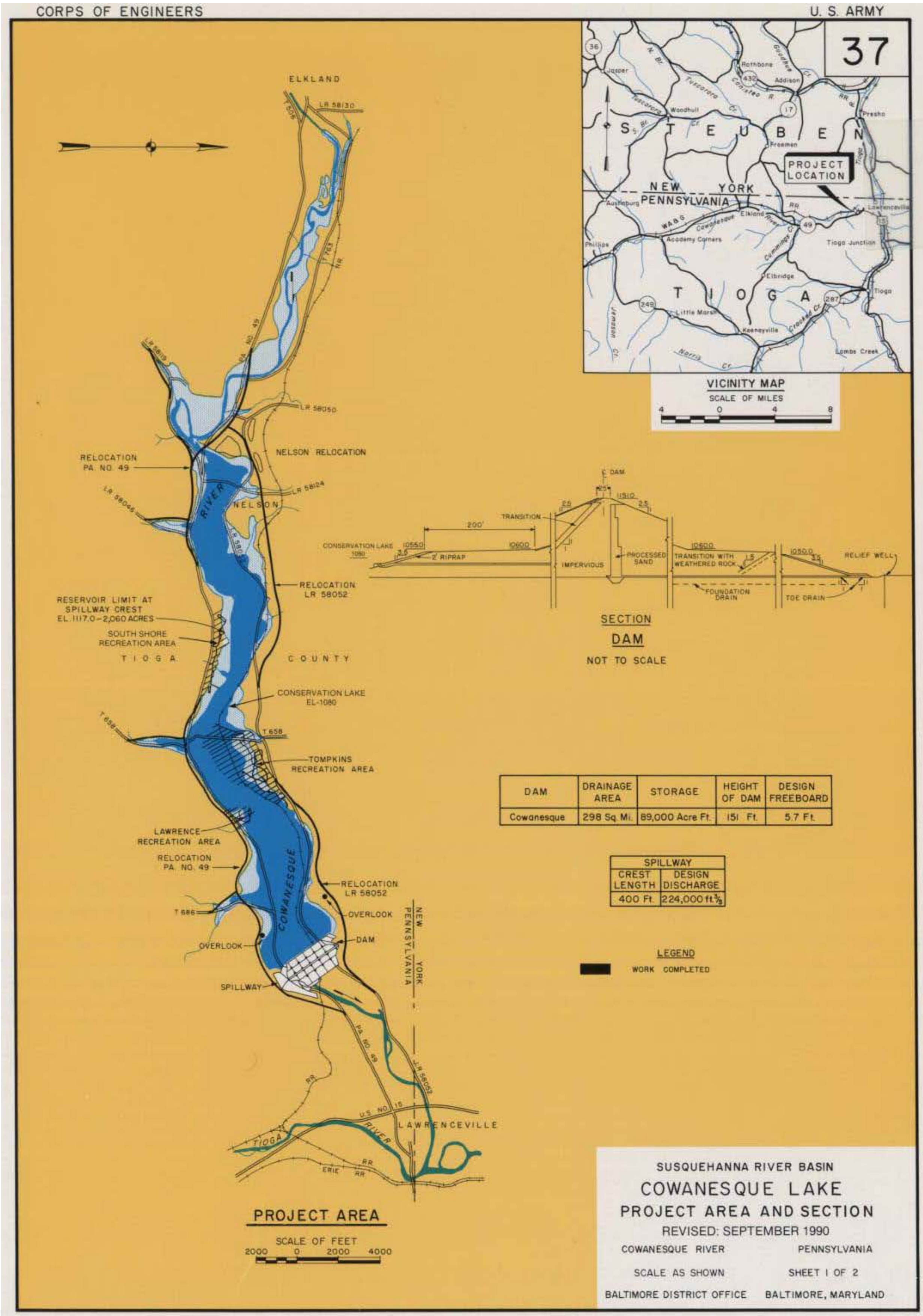

Figure 1-1: Cowanesque Lake vicinity map, project map, and dam cross-section.

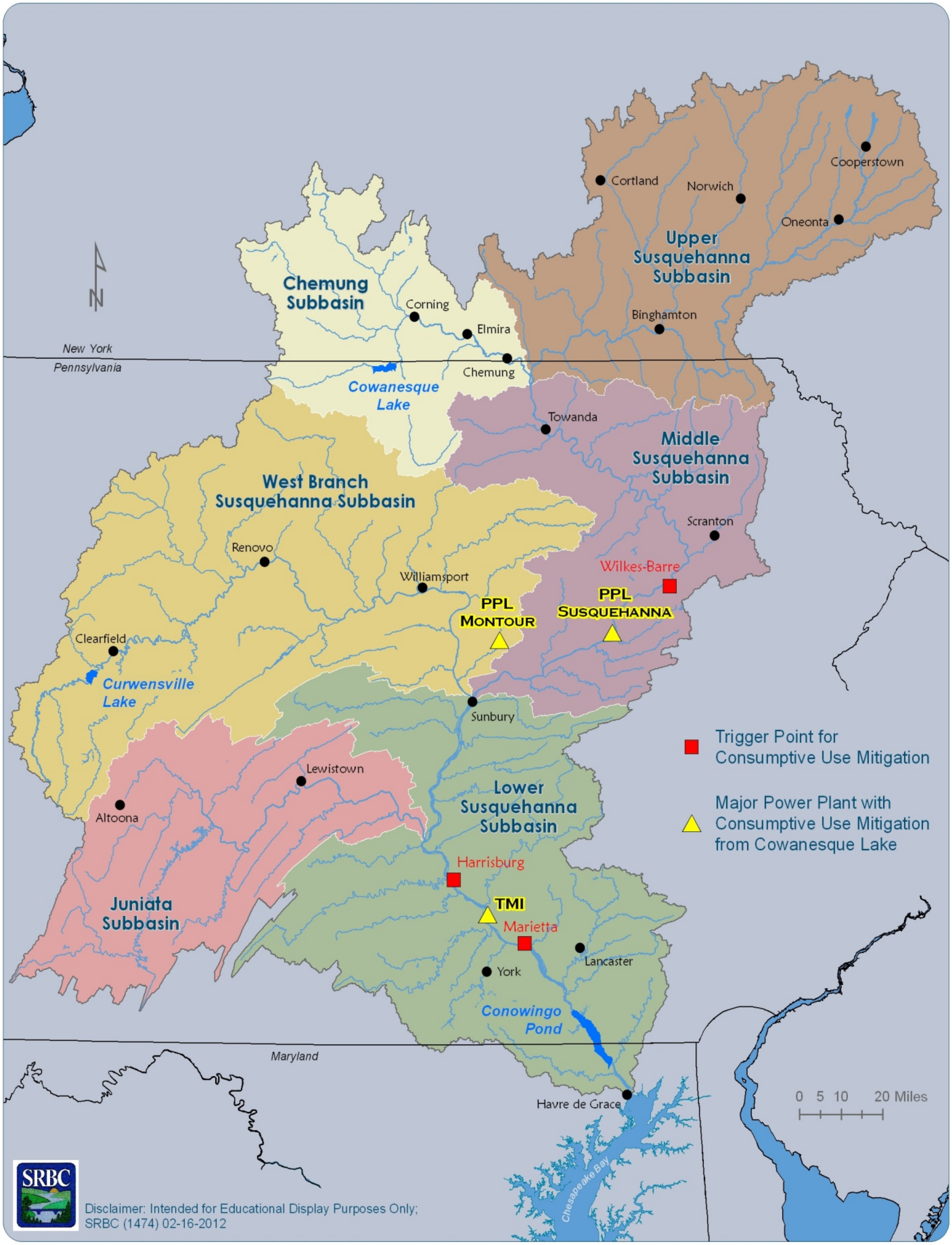

Figure 1-2: Location map of Cowanesque Lake in Susquehanna River Basin. Map shows subbasins of rivers that receive water from Cowanesque Lake, major towns, trigger gage locations, and major consumptive users of Susquehanna River water.

miles. The Cowanesque Lake Project provides flood storage above 1080 feet that is normally not occupied by water, except briefly following major runoff events when water from upstream is captured to reduce downstream flooding along the Cowanesque River. This flood storage water is then gradually released into the Cowanesque River until the 1080 foot water surface elevation is reestablished. The regulating objective for recreation is to maintain the pool within plus or minus 1 foot of 1080 feet. Assuming normal hydrologic conditions, outflow is adjusted to maintain the lake surface elevation as close as possible to this normal pool. Over the period 1991-2010, the lake was at elevation 1079 or higher approximately 94 percent of the time. Occasionally, however, the lake level has been drawn down by anywhere from 1 to 10 feet to provide extra flood control storage[6], undertake needed maintenance, or offset downstream consumptive use. Normal conservation flow releases from the dam also cause lake drawdown (water levels to drop) during drought conditions when inflow from the Cowanesque River is insufficient to maintain the minimum desired outflow of 15 cubic feet per second (cfs).

The present criteria for making water supply releases from Cowanesque Lake are keyed to river flows as measured at stream gages located near Wilkes-Barre and Harrisburg, PA (Figure 1-2). Based on low flow statistics, the Q7-10 flow at Wilkes-Barre is 826 cfs and the Q7-10 flow at Harrisburg is 2,631 cfs. Whenever the observed river flow at the Wilkes-Barre gage falls below 826 cfs, a water supply release of 58 cfs from Cowanesque Lake begins and continues until the observed flow at Wilkes-Barre subsequently rises above 826 cfs. Likewise, whenever the observed river flow at the Harrisburg gage falls below 2,631 cfs, a water supply release of 22 cfs from Cowanesque Lake begins and continues until the observed flow at Harrisburg subsequently rises above 2,631 cfs. If both the Wilkes-Barre and Harrisburg gages show flows below the Q7-10 flow, a water supply release of 80 cfs is made from Cowanesque Lake.

Cowanesque Lake has a multi-level outlet tower with two sets of hydraulically operated gates through which water releases occur. A set of large service gates (two gates, 6' x 14' each) are located at the bottom of the tower. To make large releases (greater than about 1,000 cfs), the service gates are opened and water is withdrawn from the bottom of the reservoir. The second set of gates are small quality control gates (two gates, 2' x 6.25' each) that are connected to intake ports at different levels in the tower. To make smaller releases (such as during the summer), the quality control system gates are typically used because this allows water withdrawal from any of several reservoir levels, depending on the quality and temperature in the stratified lake. Flow is measured at a river gage just downstream of Cowanesque dam. Outflow is also estimated using a gate rating table/curve that calculates outflow as a function of gate opening and hydraulic head (depth of water in reservoir). Both the measured outflow and the calculated outflow are usually in good agreement.

USACE, Baltimore District, is responsible for directing operations of all reservoir projects under its control in the Susquehanna River Basin, directly and indirectly regulating flow in downstream rivers.

[6] Once in March 1994 and once in March 2003, both at the end of winters with large snowpack.

1.2.2 Susquehanna River Basin Commission

SRBC is an interstate commission charged with coordinating water resources efforts of Pennsylvania, New York, and Maryland, as well as the federal government in the Susquehanna River Basin. The proposed action is consistent with a suite of SRBC policies and actions being undertaken to reduce effects of consumptive water use on stream ecosystems.

SRBC has been developing water supply storage capacity at key reservoirs in the Susquehanna River Basin to make releases to compensate for consumptive use by downstream industrial and municipal users during low flow periods. A legal contract for the use of the Cowanesque water supply storage space was negotiated and signed by SRBC and USACE in 1986. SRBC, in turn, also negotiated and signed a separate contract with electric utility companies in 1986 for repayment of the costs associated with the water supply storage space in Cowanesque Lake. Under the terms of these contracts, SRBC can request releases from its water supply storage space during low flow periods for the purpose of satisfying established consumptive use mitigation needs, such as those consumptive uses associated with electric power generation. SRBC currently owns approximately 27,700 acre-feet of water supply storage in two USACE projects: Cowanesque Lake and Curwensville Lake (Figure 1-3). (There is a separate water supply contract between USACE and SRBC for Curwensville Lake). Since completion of the Cowanesque Lake storage reallocation project in 1990, water supply releases have been made only two times: 1,280 acre-feet in 1991 and 2,630 acre-feet in 1995. The amount of water released constituted about 5 and 11 percent, respectively, of the total SRBC water supply storage at the lake. In addition, Whitney Point Lake in New York (Figure 1-3) was recently modified by a cooperative USACE-SRBC project to provide low flow augmentation for downstream environmental benefits.

SRBC policies established in the 1970s identified the Q7-10 flow as measured at U.S. Geological Survey (USGS) stream gages located on the mainstem Susquehanna River as the flow level (i.e., trigger) at which compensation releases should begin. SRBC policy also required that the compensatory water was to be available at the place of withdrawal at the time the observed river flow fell below the Q7-10 trigger and in an amount at least equal to the consumptive use. To help ensure that the compensatory water would offset the consumptive use, the trigger values were increased by a quantity equal to the consumptive use at the appropriate industrial operations. In 2008, SRBC adopted its Consumptive Use Mitigation Plan that identified low flow mitigation needs, presented various mitigation trigger thresholds, and set forth recommendations for mitigating existing and projected consumptive use. The Consumptive Use Mitigation Plan confirmed that the Q7-10 threshold was inadequate and recommended that a basinwide assessment of instream flow needs be conducted. This recommendation led to initiation of a Low Flow Management Study by USACE and SRBC in 2008.

Phase I of the USACE/SRBC low-flow study included an Ecosystem Flow Study led by TNC in cooperation with USACE, SRBC and federal/state resource agencies. The study (described below under TNC Study) culminated in the preparation of the *Ecosystem Flow Recommendations for the Susquehanna River Basin* report in 2010. In the report, TNC presented a set of recommended flows to protect the species, natural communities, and key ecological processes within the various stream and river types in the basin. One of the most critical findings of the study is that seasonal flow recommendations are preferred to year-round flow

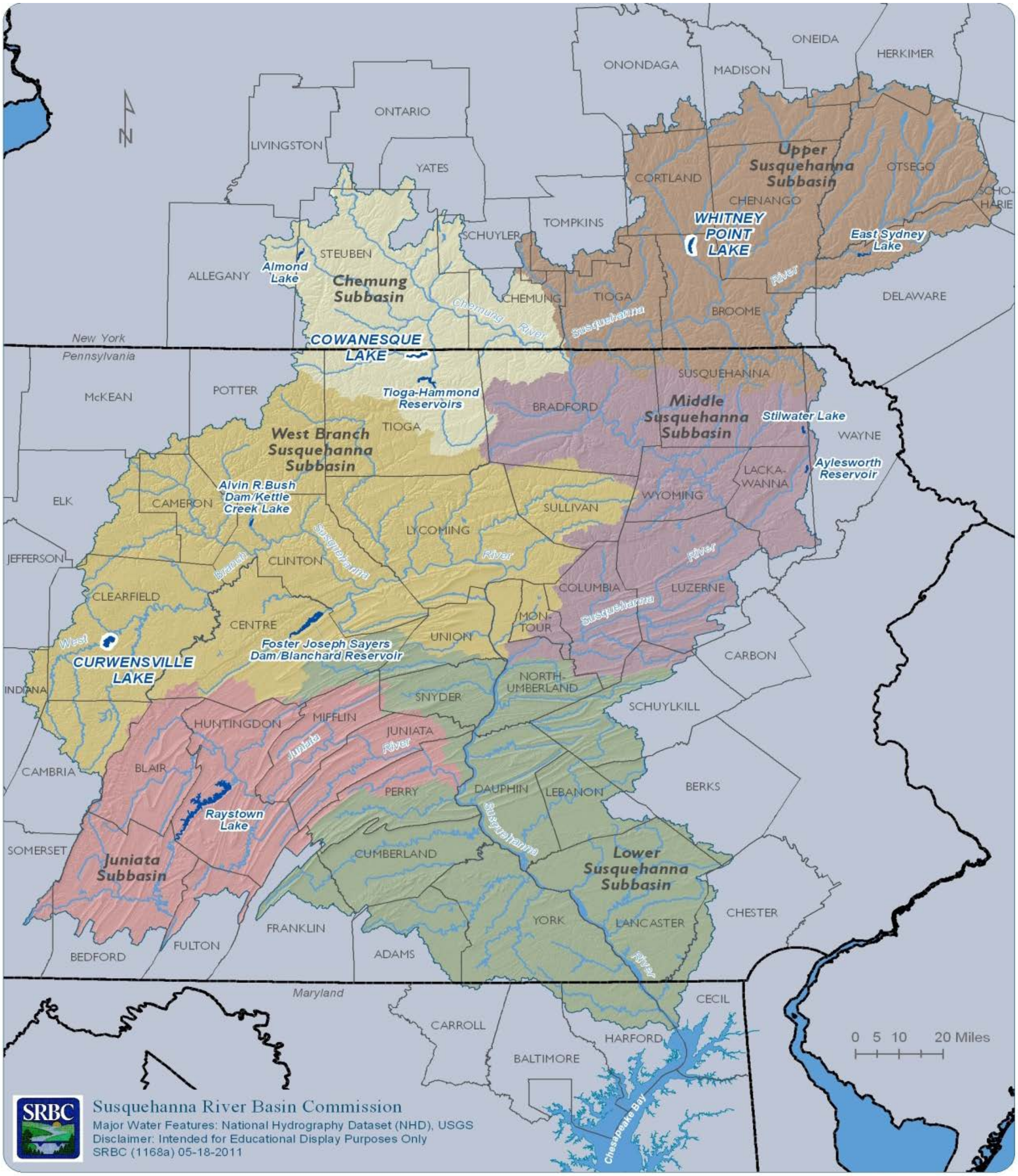

Figure 1-3: Major federal reservoirs in Susquehanna River Basin.

recommendations as ecosystem flow needs are naturally seasonal. These recommendations were also contained in the USACE and SRBC *Susquehanna River Basin Ecological Flow Management Study Phase I* report in 2012. The flow recommendations, based on the Susquehanna River Basin ecosystem, are one of the original motivations that triggered revisions to SRBC's existing policies related to instream flow protection.

The critical low flow recommendation cited in the TNC report for mainstem rivers is that there be no change to the long-term monthly P95 flow. Based on technical studies to optimize use of SRBC-owned water supply storage at Cowanesque and Curwensville Reservoirs, SRBC made application to USACE in May 2012 for revised low flow operations. The preferred alternative identified in the application entails monthly P95 consumptive use mitigation release triggers, consistent with the TNC flow recommendations, at mainstem USGS gages during the low flow months of July through November. Other recent SRBC consumptive use mitigation project efforts have also focused on implementing monthly P95 triggers. These include Lancashire 15 Acid-Mine Drainage Treatment Plant in Cambria County, PA, planning/feasibility studies of other mine pool storage projects, and agreements with Pennsylvania Department of Conservation and Natural Resources and PFBC to optimize proposed releases from state-owned impoundments.

Though distinct, consumptive use mitigation and low flow protection standards should be consistent. In 2011, SRBC and its Water Resources Management Advisory Committee (WRMAC) set out to revise SRBC's passby[7] flow/conservation release policy (Policy 2003-01). In December 2012, SRBC adopted a Low Flow Protection Policy containing specifications for determining passby flows and conservation releases associated with approved withdrawals. This policy contains specifications for determining passby flow thresholds. These thresholds are designed to ensure that withdrawals exceeding the SRBC's *de minimis* withdrawal threshold are not operating during critical low flow conditions at which low flow augmentation releases would be made for consumptive use mitigation. Only relatively small water withdrawals considered by SRBC to be *de minimus* in magnitude are excluded from passby flow requirements. The Low Flow Protection Policy passby flow and conservation release thresholds are better aligned with SRBC's contemporary consumptive use mitigation thresholds, particularly for mainstem rivers where consumptive use mitigation is most applicable. Consistency between consumptive use mitigation and low flow protection thresholds ensures that conditions will not occur whereby (1) certain projects are not required to suspend withdrawals on a mainstem river at a certain low flow threshold while (2) another project located nearby can continue to withdraw and consumptively use water, unmitigated, until flows decline to a far lower flow threshold. SRBC ensures that approved withdrawals that exceed SRBC's de minimis withdrawal threshold, thereby conditioned with passby flow requirements, are required to cease withdrawal operations at specific flow triggers which typically occur prior to initiation of consumptive use mitigation releases elsewhere in the basin.

Limiting future increases in consumptive use in the Susquehanna Basin is an important objective of SRBC's water resource management and regulatory programs. Water availability is generally not a concern during most flow conditions, but becomes an issue during certain low flow

[7] Passby flows assure that a minimum amount of water is available in a stream for protection of aquatic life. When the passby flow is reached, withdrawals cannot occur until additional flow is restored.

periods. Built into SRBC's water use approvals are safeguards, applied applicant by applicant, to limit the effects of consumptive use during critical low flow periods. The suite of safeguards include: (1) cumulative water use assessments, (2) withdrawal limits, (3) passby flow requirements which necessitate users cease water withdrawals when an identified low flow threshold is reached, (4) conservation release requirements that specify a prescribed quantity of flow from an impoundment structure that must be continuously maintained downstream, (5) the cessation of water dependent operations during critical low flow periods, (6) the provision of low flow augmentation by water users from their own storage facilities, and (7) water conservation measures.

Unlike other withdrawal and consumptive use activities regulated by SRBC, the withdrawal of water by the natural gas industry requires approval in any amount, beginning with "gallon one." As is the case for all water use sectors, natural gas industry approvals issued by the Commission are conditioned with protective requirements to safeguard existing uses and instream flows. As of March 2013, 122 of the 170 (72 percent) approved withdrawal sources for the natural gas industry are conditioned with passby flows, and the remaining 28 percent of withdrawals are conditioned with other protective requirements.

1.2.3 The Nature Conservancy Studies

TNC worked collaboratively with numerous representatives of federal and state resource agencies, as well as academic scientists and private consultants, to develop flow recommendations for the Susquehanna River based on published literature, existing studies, hydrologic analyses, and expert consultation. TNC was paid by SRBC under the contract provisions and did not cost-share or provide funds. These recommendations were published in 2010 in the report *Ecosystem Flow Recommendations for the Susquehanna River Basin*. TNC flow recommendations for low flow conditions for large streams and rivers are to limit changes to the monthly low flow range to less than 10 percent and to maintain the long-term monthly flow that is exceeded 95 percent of the time. Aquatic systems can be sustained by preserving the long-term natural hydrologic variability of streams through ecosystem-based flow goals. The TNC set of recommended flows would protect the species, natural communities, and key ecological processes within the various stream and river types in the Susquehanna River Basin. One of the most critical findings of the TNC is that seasonal (monthly) flow recommendations are preferred to year-round flow recommendations (such as Q7-10) as ecosystem flow needs are naturally seasonal.

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2.0 ALTERNATIVES CONSIDERED

Reducing or limiting consumptive use was considered by SRBC as an alternative to use of Cowanesque Lake storage, but was found to be (1) ineffective in meeting key existing consumptive use mitigation needs at two major downstream nuclear power plants and (2) incompatible with long standing legal agreements for authorized use of the water supply storage. The Cowanesque Lake storage owned by SRBC serves to mitigate consumptive use at two large nuclear power plants located near Wilkes-Barre and Harrisburg, Pennsylvania, respectively. The power plants can thus continue operations using required cooling water when high electrical demands and critical low Susquehanna River flows coincide, typically occurring in late summer and early fall. It is not reasonable to expect the electric utility companies could or would significantly reduce their consumptive use during high electrical demand periods when public health and safety concerns exist.

Instead, more effectively mitigating consumptive use focused on use of the water supply storage at Cowanesque Lake. This section of the EA provides a summary of low flow, water supply release alternatives formulation and analysis. The 2012 SRBC technical report *Optimizing Use of Commission-Owned Water Storage at Cowanesque Lake, Pennsylvania* referenced in the table of contents should be sought for details.

2.1 FORMULATION OF ALTERNATIVES

SRBC evaluated a wide range of preliminary alternative trigger values and locations based on both historical annual and monthly streamflow statistics. Trigger values based on annual streamflow data would be constant year round, whereas seasonal trigger values would vary by month. Additionally, a variety of trigger locations were evaluated as well. Due to the proximity of large consumptive users (electric generating utilities) near Wilkes-Barre and Harrisburg, PA, (Figure 1-1) flow measurements at the U.S. Geological Survey (USGS) stream gages at those locations have been used to serve as indicators for initiating compensation releases. Currently, the trigger gages for Cowanesque Lake water supply releases are located at Wilkes-Barre and Harrisburg and these sites were retained. Additionally, Marietta, PA (near York, PA), was identified as an alternative trigger location because it is downstream of both current trigger locations and most large consumptive users (principally the Susquehanna Steam Electric Station near Berwick, and Three Mile Island about 12 miles downstream of Harrisburg, PA) .

SRBC used an iterative process to model and screen potential alternatives based on consumptive use mitigation, experience with Q7-10 trigger values, and significant environmental or recreational impacts to Cowanesque Lake. To determine the hydrologic impact on Cowanesque Lake from the use of alternative trigger values and locations, SRBC used an Operational Analysis and Simulation of Integrated Systems (OASIS) model specifically calibrated for the Susquehanna River Basin. The primary data inputs into the model included daily time-series flow data, consumptive use data, and operational rules for Cowanesque Lake. The flow input data used were historical hydrologic records from 1930 through 2007 that allowed for analysis of a wider range of wet/dry year conditions than would otherwise be possible since the lake only reached its normal pool level in 1990.

The results for the no action alternative reflect lake conditions that would have occurred over the 78-year modeling period (1930 through 2007) if the lake had been in existence for that full period and if the current trigger components were used to guide operation of the lake. The results of the optional trigger alternatives showed how the lake would have been affected if the alternative trigger value and/or location had been in effect during the modeling period. The primary outputs from the model included daily water releases from Cowanesque Lake, lake elevations, and water supply and conservation storage volumes. Model output includes drawdowns due to normal conservation releases, water supply (from SRBC storage), and the combined effect of both. The model does not include consideration of lake drawdowns due to maintenance work needs.

After the SRBC screening process, four new water supply release plans plus the current operating procedure (the no action alternative) remained as viable alternatives (Table 2-1). For all of the Wilkes-Barre and Harrisburg alternatives, the triggers would be independent, meaning there may be situations where only the Wilkes-Barre (WB) gage triggers a release (58 cfs), only the Harrisburg (H) gage would trigger a release (22 cfs), or both gages would simultaneously trigger a release (58 + 22 = 80 cfs). The releases go "on" and "off" independently, depending on river flow at the trigger gage. Cowanesque Lake reservoir storage for each alternative includes water supply storage of 23,495 acre-feet[8] and 6,377 acre-feet of USACE conservation storage. All alternatives would maintain the 15 cfs conservation flow release described in Section 2.

The low flow, water supply release operations for the four new alternatives are based on monthly trigger flows of P95 or P97[9] derived from hydrologic analyses of monthly (seasonal), rather than annual, flow records at the trigger locations shown in Table 2-2. For example, Alternative WBH95 is set to release water when daily flow at the Wilkes-Barre and/or Harrisburg gages is below the corresponding monthly P95 value for August, September, and/or October. Table 2-2 presents river flows associated with these trigger value statistics.

2.2 Comparison of Alternatives

Effects on receiving river ecosystems produced by the low flow, water supply release alternatives (Table 2-1) would vary as a function of the trigger flow frequency and the location of the trigger gage. Those alternatives most closely matching the P95 flow frequency recommendation of TNC would best mitigate for impacts of consumptive use over this length of receiving rivers and produce the beneficial effects that TNC determined. Consumptive use occurs along the entire length of the receiving rivers, but the largest individual consumptive users are located on the middle and lower Susquehanna River (Table 2-3). The greatest reduction in adverse effects of consumptive use (greatest increase in flows) would occur in the Cowanesque, Tioga, Chemung, and Middle Susquehanna Rivers, with effects dissipating to negligible along the Lower Susquehanna River. The Cowanesque, Tioga, and Chemung Rivers all lie entirely upstream of the alternative trigger gage locations, but some consumptive use occurs along these rivers.

[8] An acre-foot is a volume of water that would cover an acre to a depth of one foot.
[9] P97 is the flow exceeded 97 percent of the time, on average; river flow would drop below P97 three percent of the time, on average.

Table 2-1: Alternatives passing preliminary SRBC screening. These alternatives are evaluated in this EA. Modified from Table 3-4 of SRBC (2012).

Parameter	No Action (Baseline)	WBH97	WBH95	M97	M95
Trigger locations	Wilkes-Barre and/or Harrisburg	Wilkes-Barre and/or Harrisburg	Wilkes-Barre and/or Harrisburg	Marietta	Marietta
Trigger flows (see Table 2 for values)	Q7-10 value as yearround constant	P97 value for the current month	P95 value for the current month	P97 value for the current month	P95 value for the current month
Months considered for water supply releases	Year-round	July through November	July through November	July through November	July through November
Amount of water supply release	58 cfs if triggered by Wilkes-Barre; 22 cfs if triggered by Harrisburg; 80 cfs if triggered by both(1)	Same as No Action (2)	Same as No Action (2)	80 cfs	80 cfs
Surcharge release	First 3 days - 20 cfs if triggered at Wilkes-Barre or 35 cfs if triggered at Harrisburg(1)	None(2)	None(2)	None(2)	None(2)
Transit loss release	5 cfs continuously(1)	None(2)	None(2)	None(2)	None(2)
Water supply release starts when stream flow is:	Below Q7-10+58 cfs at Wilkes-Barre and/or Q7-10+22 cfs at Harrisburg	Below P97+58 cfs at Wilkes-Barre and/or P97+22 cfs at Harrisburg	Below P95+58 cfs at Wilkes-Barre and/or P95+22 cfs at Harrisburg	Below P97+80 cfs at Marietta	Below P95+80 cfs at Marietta
Water supply release stops when stream flow is: (unless storage is depleted first)	Above Q7-10+58 cfs at Wilkes-Barre and/or Q7-10+22 cfs at Harrisburg for 3 consecutive days or is more than twice Q7-10 on any day.	Above P97+58 cfs at Wilkes-Barre and/or P97+22 cfs at Harrisburg for 3 consecutive days or is more than twice P97 on any day.	Above P95+58 cfs at Wilkes-Barre and/or P95+22 cfs at Harrisburg for 3 consecutive days or is more than twice P95 on any day.	Above P97+80 cfs for 3 consecutive days or is more than twice P97 on any day.	Above P95+80 cfs at Marietta for 3 consecutive days or is more than twice P95 on any day.

Notes:

(1) For No Action, if the sum of the amount of water supply release, surcharge, and transit loss is greater than 125 cfs when triggered by both locations, the release shall be a maximum of 125 cfs.

(2) Water supply release rates do not include surcharge or transit flow losses and shall be a maximum of 80 cfs.

Table 2-2: Alternative trigger flows in cubic feet per second (cfs) in the Susquehanna River by alternative trigger gage location and flow statistic alternatives.[10]

Gage	Flow Period		Flow Statistic		
			Q7-10	P97	P95
Wilkes-Barre	Annual		826	1,100	1,280
	Seasonal	August	NA	892	970
		September	NA	795	860
		October	NA	885	970
Harrisburg	Annual		2,631	3,600	4,150
	Seasonal	August	NA	3,320	3,620
		September	NA	2,760	3,100
		October	NA	2,820	3,240
Marietta	Annual		2,718	4,070	4,730
	Seasonal	August	NA	3,550	3,870
		September	NA	2,770	3,100
		October	NA	3,240	3,750

The SRBC modeling described in the alternatives formulation section (Section 2.1) above determined change in water elevations at Cowanesque Lake that would have resulted over the modeling period from implementation of the water supply release alternatives presented in Table 2-1. SRBC did detailed technical investigations that considered lake-drawdown frequency, depth, duration, and seasonality and compared impacts of the alternatives to the in-lake environment and recreation.

Impacts on lake recreation could result from drawdowns during the 118 day recreation season which runs from May 20th – September 14th. Environmental effects could occur from drawdowns occurring any time of the year.

This EA focuses upon drawdowns greater than one foot in its assessment of effects on the environment and recreation of the alternatives at Cowanesque Lake. Lake drawdowns of 0 to 1 foot occur fairly routinely under normal lake operations. Environmental conditions at the lake are already affected by this range of water levels. And water levels maintained over this range meet recreation needs at the lake as specified in the operations plan.

The number of days per year that drawdowns would have occurred during the recreation season would have been consistently, but only slightly, less than what would have occurred during the whole year. This is because drawdowns typically begin late in the recreation season and extend beyond the recreation season in most cases. Generally, the lower the flow statistic percent (i.e., the greater the flow), the more the volume of water that would be released from the reservoir, and the greater the frequency of days that the lake would be drawn down from no action conditions.

[10] Modified from Table 3-3 from SRBC (2012), with additional information provided by SRBC in 2013.

Table 2-3: Receiving river lengths divided into segments to include the two major consumptive use withdrawal points and trigger gage locations.

River	Segment		Segment Length (Miles)	Total Distance (Miles)
	Start Point	End Point		
Cowanesque River	Cowanesque Lake Dam, PA	Confluence with Tioga River, Lawrenceville PA	2	2
Tioga River	Lawrenceville PA	Confluence with Cohocton River, Corning NY	13	15
Chemung River	Corning, NY	Confluence with Susquehanna River, Athens PA	45	60
Middle Susquehanna River	Athens, PA	Wilkes-Barre, PA (trigger gage)	95	155
Middle Susquehanna River	Wilkes-Barre, PA (trigger gage)	Susquehanna Steam Electric Station near Berwick PA	21	176
Middle Susquehanna River	Berwick, PA (major consumptive use point)	Susquehanna River, Sunbury PA	43	219
Lower Susquehanna River	Sunbury, PA	Harrisburg, PA (trigger gage)	55	274
Lower Susquehanna River	Harrisburg, PA (trigger gage)	Three Mile Island, PA	12	286
Lower Susquehanna River	Three Mile Island, PA (major consumptive use point)	Marietta, PA (trigger gage)	14	300

Drawdown events typically begin in July, August, and September and end in October, November, and December. Extreme drawdown events typically begin in late-July and end in early-March of the following year. Drawdown depths among the alternatives were found to differ by less than one foot during a median event (Table 2-4). The median event year is the event year where the minimum annual lake elevation was the median drawdown for the entire modeling period (a "normal" drawdown event year). For maximum drawdown conditions, drawdown depth could differ by as much as about 9 feet among the five alternatives (with M97 having the least magnitude drawdowns). An extreme event year is the event year in which the minimum annual lake elevation was the lowest during the entire modeling period. The extreme event represents severely dry conditions (a "worst-case scenario"). Average duration of how long water would be drawn down for in Cowanesque Lake during drawdown events was determined to differ between the alternatives over the 78 year period modeled depending on drawdown range considered (Table 2-4). For all drawdowns greater than one foot, duration of drawdown would differ by as much as 18 days among the alternatives.

Table 2-4: Depth and duration of drawdown events.[11]

Lake Level Drawdown Factors	Alternatives: No Action	WBH97	WBH95	M97	M95
1. Depth of Drawdowns					
a. Median drawdown	5.6 feet	5.9 feet	5.2 feet	6.5 feet	5.5 feet
b. Maximum drawdown	44.7 feet	44.9 feet	44.8 feet	36.1 feet	44.8 feet
2. Duration of Drawdowns					
a. Duration of drawdown > 1 ft for median event	83 days	65 days	82 days	80.5 days	88.5 days
b. Duration of drawdown > 1 ft for extreme event	218 days	226 days	235 days	212 days	228 days
c. Duration of drawdown > 3 ft for median event	54.5 days	51 days	46 days	68 days	64.5 days
d. Duration of drawdowns > 3 ft for extreme event	204 days	207 days	214 days	190 days	212 days

The period simulated covers a lengthy period of time – 78 years, and captures a broad range of climate and streamflow conditions. Based on the assumption that future conditions would be similar to the period of time simulated by modeling, results of the modeling were utilized to characterize future effects of the alternatives at Cowanesque Lake. Percent chance of future years having drawdowns over depth intervals that could affect environmental and recreational conditions of interest were assumed to be represented by the percentage of past years with those drawdown intervals occurring over the simulation period. Data/information available from the simulation was not adequate for the purpose of determining formal percent annual chance according to standard engineering practices. Accordingly, the model simulations instead provide an approximate percent chance that drawdown events could occur each year into the future. It should be noted that these drawdowns could occur in repeated future years. Because future climate change would likely have increasing effects the further into the future that is considered, the forecast presented in this EA is most valid for years in the near future.

Based on the simulations, drawdowns under no action or any of the four viable alternatives being considered would occur only during dry years when outflow and evaporative loss exceeds inflow. In wetter years, no drawdowns would occur at all under either no action or any of the four viable alternatives (Table 2-5).

The approximate percent chance each year of drawdowns greater than one foot occurring would be less than 50 percent under either no action or the WBH97, WBH95, or M97 alternative water supply release plans (Table 2-5) because of hydrologic similarities among these alternatives. Under alternative M95, drawdowns would occur somewhat more frequently, with approximately a 51 percent chance of this occurring each future year. Drawdowns would be more likely under most depth intervals considered for the four viable alternatives than under no action. However, in some depth intervals, the number of future years with drawdowns would be less than under no action due to the variability of trigger flows, timing, and duration of flow releases.

[11] Modified from Table 6-1 of SRBC (2012).

Table 2-5: Approximate percent chance each year with maximum drawdown by depth intervals.[12]

Alternative	Drawdown Interval				
	1-3 ft	3-5 ft	5-10 ft	>10 ft	Any Drawdown > 1 ft (a)
No Action	14%	3%	12%	8%	36%
WBH97	12%	5%	10%	9%	36%
WBH95	12%	9%	10%	13%	44%
M97	13%	6%	9%	13%	41%
M95	14%	10%	9%	18%	51%

(a) Note that totals differ from simple sums of individual row entries in some cases because of rounding errors.

Three of the four viable alternative new water supply release plans (WBH95, M97, and M95) would increase the approximate percent chance each year that drawdowns greater than one foot would occur during the recreation season (Table 2-6). Alternative WBH97 would be similar to the no action alternative overall. Alternative WBH95 would increase the approximate percent chance each year that drawdowns greater than one foot would occur from 31 percent to 35 percent. Alternative M97 would increase the approximate percent chance each year that drawdowns greater than one foot would occur from 31 percent to 33 percent. Alternative M95 would produce the greatest increase in the approximate percent chance each year that drawdowns greater than one foot would occur during the recreation season, increasing this to approximately 40 percent chance each year in future years.

Table 2-6: Recreation season approximate percent chance with maximum drawdown by depth intervals each year[13]**.**

Alternative	Approximate % Chance Each Year by Depth Interval				
	1-3 ft	3-5 ft	5-10 ft	>10 ft	Total % Chance Drawdown > 1 ft (a)
No Action	13%	6%	9%	3%	31%
WBH97	10%	6%	10%	4%	31%
WBH95	10%	10%	8%	6%	35%
M97	9%	8%	10%	6%	33%
M95	13%	8%	12%	8%	40%

(a) Note that totals differ from simple sums of individual row entries in some cases because of rounding errors.

[12] Information derived from Tables 3-6 and 3-8 of SRBC (2012).
[13] Derived from Table 3-12 in SRBC (2012).

2.3 EVALUATION OF ALTERNATIVES

2.3.1 No-Action (Baseline)

The no Federal action condition represents the base from which changes discussed in this document are measured. The no action alternative would postpone the action until some future date or abandon the action altogether, and therefore avoid or postpone impacts that would be associated with changing the water release plan. The no action alternative would continue the practice of releasing water from Cowanesque Lake to compensate for downstream consumptive use whenever the Q7-10 flow trigger conditions are met at the Wilkes-Barre and/or Harrisburg gages. This alternative would maintain conditions in manmade Cowanesque Lake, including periodic lake drawdowns, which include minor and temporary environmental impacts to submerged aquatic vegetation (SAV), wetlands, and fish. In each future year, there would be approximately a 36 percent chance that a lake drawdown greater than about 1 foot would occur (Table 2-5). During the recreation season in each future year, there would be approximately a 31 percent chance that a drawdown greater than one foot would occur (Table 2-6). However, this alternative would fail to increase the frequency at which water supply releases to compensate for downstream consumptive use in the Susquehanna River occur. Aquatic life there would remain vulnerable to adverse effects of consumptive use during extreme low flow conditions. This alternative would also not provide water which could be used to support minimum flow releases at the Conowingo Hydroelectric Station to protect the lowest reaches of the Susquehanna River.

2.3.2 Wilkes-Barre and or Harrisburg P97 (WBH97)

Alternative WBH97 would essentially induce about the same approximate percent of future years with drawdown events in Cowanesque Lake greater than one foot as the no action alternative (Tables 2-5 and 2- 6). Average duration of drawdown would likely be about the same as drawdowns under the no action alternative. It is anticipated that this alternative would have comparable environmental and recreational impacts as the no action alternative, and thus not induce any change in environmental or recreational conditions. This alternative would compensate for consumptive use to a greater extent than the current Q7-10 policy (no action), other than for the month of September at Wilkes Barre (Table 2-3). Offset consumptive use would extend downstream for 155 to 274 miles, depending on whether the Wilkes-Barre or Harrisburg gage triggers releases from Cowanesque Lake (Table 2-3). However, alternative WBH97 would provide the smallest water supply releases of the four viable alternatives considered to help support P95 flows and compensate inadequately for consumptive uses in the receiving Cowanesque, Tioga, Chemung, and Susquehanna Rivers. This alternative would not meet the minimum recommendations of TNC.

2.3.3 Wilkes-Barre and or Harrisburg P95 (WBH95)

This alternative would cause the approximate percent chance each year that water level drawdowns would occur to increase to 44 percent, versus the approximately 36 percent chance each year that this would occur under the no action alternative (Table 2-5). This increase would cause increased minor environmental impacts to SAV, wetlands, and fish in Cowanesque Lake. This alternative would induce the approximate percent chance each year of drawdowns occurring during the recreation season to increase to 35 percent, versus the approximately 31 percent chance each future year under no action (Table 2-6). This alternative would compensate for consumptive use to a greater extent than the current Q7-10 policy (no action condition) or alternative WBH97. As with no action and alternative WBH97, offset consumptive use under alternative WBH95 would extend downstream for 155 to 274 miles, depending on whether the Wilkes-Barre or Harrisburg gage triggers releases from Cownesque Lake. Alternative WBH95 would provide water supply releases to offset consumptive use consistent with the recommendations of TNC.

2.3.4 Marietta P97 (M97)

This alternative would have somewhat greater effects on Cowanesque Lake water levels than would alternatives WBH97 while producing less impacts than WBH95. Alternative M97 would increase the approximate percent chance each year of lake drawdowns greater than one foot occurring to 41 percent (Table 2-5). The chance of this occurring during the recreation season would increase to approximately 33 percent (Table 2-6). This alternative would compensate for consumptive use to a greater extent than the current Q7-10 policy (no action) and the WBH97 alternative presented above. However, it would fail to meet the TNC recommendations for the receiving rivers.

2.3.5 Marietta P95 (M95)

Alternative M95 would provide water supply release to support the P95 flow determined by TNC to be the minimum acceptable flow in the Susquehanna River needed to maintain aquatic ecosystem health downstream to Marietta. However, this alternative would have the largest effects on Cowanesque Lake. The chance that drawdowns greater than one foot would occur sometime during the year would increase to approximately 40 percent chance each year (Table 2-5). The chance that drawdowns affecting recreation would occur would increase to approximately 51 percent each year (Table 2-6).

2.3.6 Preferred Alternative

Based on the above considerations, a modification of the water control plan at Cowanesque Lake using alternative WBH95 as the proposed low flow trigger for water supply releases is the preferred alternative. Although M95 would contribute more to offset consumptive use, alternative WBH95 has less impacts on drawdown parameters of concern at Cowanesque Lake. Alternatives WBH97 and M97 would fail to meet TNC recommendations. Because large consumptive water use facilities (power plants) are in close proximity to both Wilkes-Barre and Harrisburg that are currently designated trigger points for Cowanesque Lake water supply releases, it was determined to be prudent to keep these locations as designated trigger points. Alternative WBH95 provides for this; alternatives M95 and M97 would not. Accordingly, alternatives WBH97, M97, and M95 were eliminated from further consideration in this EA.

The proposed trigger flows associated with the WBH95 Alternative are based on findings of the recently completed study conducted jointly by TNC, SRBC, and USACE described earlier. This study concluded that, during a low flow condition, revised standards based on average monthly flows occurring 95 percent of the time would provide better in-stream protection than the annual Q7-10 flow that is currently employed.

Accordingly, SRBC is proposing the following trigger flows for activating Cowanesque Lake water supply releases: Wilkes-Barre July – 970 cfs, August – 970 cfs, September – 860 cfs, October – 970 cfs, and November – 970 cfs instead of the current annual Q7-10 value of 826 cfs, and Harrisburg July – 3,620 cfs, August – 3,620 cfs, September – 3,100 cfs, October – 3,240 cfs, and November – 3,240 cfs instead of the current annual Q7-10 value of 2,631 cfs. Although the trigger flows at either Wilkes-Barre or Harrisburg for activating Cowanesque Lake water supply releases would change from the current Q7-10, the water supply release rate from Cowanesque Lake would remain the same for the WBH95 Alternative as under no action (58 cfs if Wilkes-Barre triggers, 22 cfs if Harrisburg triggers, 80 cfs if both gages trigger).

The net effect of these proposed changes is that the frequency of future years in which water supply releases would occur with Alternative WBH95 would be slightly greater compared to the no action alternative. In either case, however, the rate of water supply release from Cowanesque Lake would be the same when releases are made. The proposed action would be implemented by modifying the timing of water releases through the existing gates at Cowanesque Lake. The proposed action would not require any physical construction.

3.0 AFFECTED ENVIRONMENT

This EA focuses on conditions in Cowanesque Lake and the instream and shoreline habitats of rivers whose low flow conditions would be substantially affected by releases from the lake: Cowanesque, Tioga, Chemung, and Susquehanna. These areas would be anticipated to experience the most notable effects from the proposed water supply releases. Where pertinent, this EA also considers conditions outside of these areas.

3.1 PHYSICAL ENVIRONMENT

3.1.1 Topography

The study area crosses several physiographic provinces: the Appalachian Plateau, Ridge and Valley, and Piedmont. The highest elevations occur in the Appalachian Plateau. The plateau is dissected by streams which in some cases form deep valleys. The Ridge and Valley province consists of a series of parallel ridges and valleys. The ridges contain steep slopes, while valley areas are more gently sloped. The Piedmont contains low rolling hills with generally more gentle slopes than the Ridge and Valley or Appalachian Plateau provinces.

The Cowanesque, Tioga, and Chemung Rivers flow entirely within the Appalachian Plateau. The Susquehanna River mainstem flows through the Appalachian Plateau in New York and northeastern Pennsylvania, but then crosses into the Ridge and Valley Physiographic Province near West Pittston, PA. The Susquehanna River crosses onto the Piedmont Province at Harrisburg, PA.

The elevation of the western portion of Cowanesque Lake project lands are about 2,200 feet elevation and the river valley falls approximately 10 feet per mile ending at an elevation of 1000 feet at Lawrenceville. Elevations along the receiving rivers descend from 980 feet at the mouth of the Cowanesque River near Lawrenceville, PA, to 722 feet the mouth of the Chemung River at Sayre, PA, to about 290 feet on the Susquehanna River at Harrisburg (USGS, 2013), to 200 feet at Marietta, PA (USGS, 2013).

3.1.2 Geology and Soils

The Appalachian Plateau contains flat layers (i.e., not folded) of sedimentary rock. The Ridge and Valley province contains folded sedimentary rock, with erosion-resistant rocks forming ridges (mountains). The Piedmont contains a complicated mix of igneous, metamorphic, and sedimentary rock types. Glaciers during the Ice Ages pushed southward from Canada into northern Pennsylvania, scouring out geologic materials, as well as depositing sediments. Glacial outwash deposits extend downstream southward of the glaciers' physical position along the Susquehanna River to about Columbia, PA.

Substrate on the Cowanesque Lake shoreline are rocky, largely comprised of native in place geologic materials, but also possessing rip-rapped areas where people have placed rock. Lake substrates consist primarily of old river and floodplain geologic materials and soils that were drowned in place when the lake was created. However, substantial areas of rip rap also occur, particularly in the vicinity of the dam. Substrates in the Cowanesque, Tioga, Chemung, and

Susquehanna Rivers range from woody debris to loose sediments (mud, sand, gravels) to boulders and bedrock. Large bedrock outcrops occur where the rivers cut through erosion-resistant geologic materials, such as in association with ridges on the adjacent landscape. Cobble and gravel are the predominant substrate types in the riffle and pool habitats throughout the rivers. Sand and silt are largely limited to backwaters, river margins, and other depositional areas of these rivers. Deep pools can contain soft river bed material.

Soils in the study area derive from glacial deposits (in the geographic regions described above), pre-glacial geologic materials, river deposits, and material from human cut and fill activities. Soils of environmental interest include those supporting wetlands (hydric) and farming.

Wetland soils occur naturally in the study area in valleys along rivers and streams, in depressions formed by glaciers (in New York and northern Pennsylvania), and in seepage areas at slope toes. Wetland soils developed locally along the current shoreline of Cowanesque Lake beginning in 1990 when the lake reached its current full managed pool level. Wetland soils developed on flat slopes where lake water level saturated the soils adequately for this to occur. Wetland soils also developed in parcels specifically created to form wetlands. Additional information on wetlands at Cowanesque Lake is available in Section 3.2.3 "Wetlands."

Several prime farmland soils occur adjacent to Cowanesque Lake (USDA, 2013). Prime farmland soils are designated by the U.S. Department of Agriculture on land that has combined physical and chemical characteristics best for producing crops and is also available for farming. Prime farmland soils are not excessively erodible and are not saturated with water for long periods of time. Slopes on prime farmland soils generally range from 0 to 6 percent. Philo and Pope series soils are concentrated at the east end of the lake (downstream of the dam) and all along the southwest and western sides of the lake, where the land is typically flatter. Additionally there are small pockets of Braceville loamy soils along the northern side of the lake, adjacent to the lake.

3.1.3 Hydrology

Cowanesque Lake

Cowanesque Lake is manmade with water retained by the dam and level managed by water control structures. At normal pool (1,080 feet), Cowanesque Lake has a surface area of 1,050 acres, extends about 5 miles upstream from the dam (Lake areas as a function of water surface elevation are discussed in Section 3.2.1). Cowanesque Lake stores 29,876 acre-feet of water at normal pool. The water stored at normal pool is designated conservation storage, and is allocated for USACE low flow regulation (federal conservation storage: 6,377 acre-feet) and for SRBC's consumptive use mitigation (water supply storage: 23,495 acre-feet). At normal pool, the lake also provides 54,871 acre-feet of vacant flood storage space. The lake is about 75 feet deep at its deepest in its eastern section (the dam end). An average conservation flow release of 15 cfs is continuously released to maintain flow in the receiving Cowanesque River. Lake water levels occasionally draw down when conservation releases exceed inflows or as a consequence of other large managed releases. Additional information on the lake and its management is provided in Section 1.2.1.

Lake water levels since 1990 have not shown the range of variation that is possible at the lake because few dry years have occurred. USACE data show that lake water levels reached recorded lows of 1,076.9 feet elevation on November 10, 1991 and 1,076.5 feet elevation on September 13, 1995. In those two cases, water supply releases accounted for 1.5 feet and 1.8 feet, respectively, of the drawdowns that occurred. Table 3-1 presents a summary of recorded water levels in the lake that includes the water supply release events in 1991 and 1995.

Table 3-1: Summary of recorded Cowanesque Lake drawdowns, 1991-2010[14]. (These are actual measurements, not simulations).

	Drawdown Range:				
	1-3 ft	3-5 ft	5-10 ft	>10 ft	Total
Number of Years with Drawdown of:	4	3	0	2	9
Number of Days with Drawdown of:	375	57	24	25	481

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

The Cowanesque River flows eastward in Pennsylvania, parallel to and south of the New York State line. Roughly 2.2 miles downstream of Cowanesque Lake, the Cowanesque River flows into the northward-flowing Tioga River at Lawrenceville, PA (Figure 1-3; Table 2-3). After passing through Lawrenceville flowing towards the north, the Tioga River enters into NY State. The Tioga River joins the Cohocton River to form the Chemung River at Painted Post, N.Y. The Chemung River flows southeastward into the Susquehanna River about 2 miles south of Sayre, PA. The Susquehanna River from this point flows in a southerly direction towards Chesapeake Bay.

The Cowanesque, Tioga, Chemung, and Susquehanna are large free-flowing rivers downstream to the York Haven Dam, although possessing several run-of-river dams. (Run of river dams have minimal water storage and don't create upstream reservoirs). Several major hydropower dams are located below the York Haven Dam which impound large segments of the Susquehanna River. The Cowanesque River downstream of Cowanesque Lake is a 5th order stream. At the Tioga River confluence, the order goes to 6. At the Canisteo River confluence, the order goes to 7. At the Susquehanna River confluence, the order goes to 8. The Susquehanna River then remains an 8th order river all the way to its mouth at the Chesapeake Bay.

Streamflow varies seasonally. Winter months have relatively high flows due to low evapotranspiration and snowmelt delivering water to streams in moderately high pulse events. Streamflows peak during spring months as snowmelt increases. High pulse events are highest in magnitude and frequency during this season. The magnitude of median daily streamflow is significantly higher (approximately 10 times) in spring than in the summer and fall when flows are at their lowest because of evapotranspiration. For all watershed sizes, the highest median

[14] From Table 4-1 of SRBC (2012).

flows occur in spring (April), followed by winter (December). The lowest median flows occur in late summer and early fall (represented by August and October, respectively) (TNC, 2010).

Although streamflow shows pronounced seasonality, flows can be highly variable from month to month; floods and droughts may occur in the same year. Major droughts occurred in the early 1930s and the early 1960s, with thirteen droughts occurring over the past century (SRBC, 2010). SRBC defines a water supply drought as a period when actual or expected supply is insufficient to meet demands. The lowest recorded daily discharge at Harrisburg during the drought of record (September 1964) was approximately 1,750 cfs. This event occurred only a few months after a March 1964 high flow event. Recent drought periods include 1980, 1991-1992, 1995 and 2002.

3.1.4 Water Quality

Cowanesque Lake

The Cowanesque River delivers a high nutrient load into Cowanesque Lake. The abundance of nutrients contributes to eutrophic conditions. In summer, Cowanesque Lake becomes stratified, possessing a warm surface layer and cooler deep water. A warm surface layer where water temperatures may reach 80°Fahrenheit (F) during the summer extends down to depths of 16 to 20 feet. Below this depth, cool water with temperatures ranging from 50 to 59°F occurs. As a consequence of algal blooms supported by high nutrient inputs and stratification that prevents mixing of deep waters with surface waters, dissolved oxygen in the deeper waters of the lake drops to very low levels. Surface waters possess healthy levels of dissolved oxygen all year. Limestone rock in Cowanesque's watershed makes the lake alkaline.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

The Tioga River Watershed is affected by pollution from acid mine drainage. This pollution has caused high levels of metals and low pH in the mainstem of Tioga River and in some of its tributaries. The SRBC large river assessment project has determined that most water quality parameters in the mainstem Susquehanna River and the mouths of its large tributaries have fairly good water quality, with measured parameters below established water quality standards or recommended tolerances of aquatic life. Total sodium and phosphorus species are the parameters that most often exceed standards. Sodium derives from geologic materials and application of road salt. Excess phosphorus derives from animal and human waste and fertilizer.

3.1.5 Climate

The Susquehanna River Basin possesses a subtemperate and humid climate. Continental weather conditions include cold winters with snow events and warm to hot summers. Within the basin, precipitation and temperature are largely influenced by latitude and elevation. Both precipitation and temperature increase from north to south and from west to east. Average annual air temperatures are approximately 44°F in the northern portion of the basin and 53°F in the southern portion (SRBC 2010).

Across the Susquehanna River Basin, precipitation events can be severe, ranging from localized thunderstorms to regional hurricanes. Average annual precipitation is approximately 40 inches, but has ranged from 33 to 49 inches. An estimated 52 percent of precipitation is lost to evapotranspiration, with the remaining 48 percent infiltrating to groundwater storage or resulting in overland flow and streamflow runoff (SRBC 2010).

Mean annual precipitation recorded in Williamsport (approximately 60 miles south of Cowanesque Lake) is 41 inches, with some variation between the winter and summer months. The mean monthly temperature varies from 76°F during the summer months to 28°F in the winter. In light of the low winter temperatures, winters in the Cowanesque area are relatively severe.

Climate trends in the last two decades have shown wetter conditions, on average, than in previous decades. Increased precipitation has produced higher annual minimum flows and slightly higher median flows during summer and fall. With forecast global warming, hydrologic simulations predict greater wintertime flows and depressed summer flows (Najjar and others, 2010).

3.1.6 Air Quality

Cowanesque Lake

The lake is located in a rural area of Pennsylvania that exhibits good air quality, when compared to the rest of the state. The lake is not a source of air contamination, and there are only minor sources of air contamination on the lakes properties, primarily associated with vehicles. Tioga County is in attainment for all criteria pollutants, as defined by guidance pursuant to the Clean Air Act Amendments.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

The PennEnvironment Research and Policy Center reports that air pollution levels in Pennsylvania meet health standards during much of the year, however smog and soot reach unhealthy levels regularly in many parts of the state and Susquehanna River Basin. On hot summer days, ozone levels routinely exceed U.S. Environmental Protection Agency health standards across most of Pennsylvania. The two largest sources of Pennsylvania’s air pollution are vehicles and coal-fired power plants.

3.1.7 Noise

The Cowanesque Lake area is rural and there are no apparent intrusive noise sources from around the lake. At the lake, noise sources include watercraft motors, vehicular traffic, and human voices at areas of concentrated use (for example, day use areas and campgrounds). Noises in the receiving rivers vary as a function of proximity to human noise sources. Portions of the rivers in urban areas and near railroad tracks or highways run can have substantial noise from those sources.

3.2 HABITATS AND LIVING THINGS

Scientific names for select living things are provided in Annex B. Rare species for all categories of living things are discussed in Section 3.2.7.

3.2.1 Open Water and Shorelines

<u>Cowanesque Lake</u>

The drowned river bed and floodplain is the dominant habitat type in waters of the lake deeper than 7 feet. Other habitat features in deep waters of Cowanesque Lake include rip rap (primarily in vicinity of the dam), drowned roads, drowned railroad beds, and manmade crib structures emplaced to enhance fish habitat. A band of shallow water 0-7 feet deep occurs around the perimeter of the lake at normal pool elevation (Table 3-2, Figure 3-1). Established shallow water area varies in area as a function of water surface elevation, with shallow areas becoming progressively less abundant as water levels drop because steeper slopes of the drowned valley are exposed and lake area decreases. Shallows contain submerged aquatic vegetation (discussed in Section 3.2.2 below), drowned river bed and floodplain, drowned dead trees, and drowned roads and railroads. At times of low water levels, exposed lake bottom forms a band of temporary shoreline barren of vegetation. The duration and seasonality of inundation and exposure prevents vegetation establishment. The shoreline is rocky, with some vegetated areas.

Table 3-2: Lake, shallow water, and exposed bottom surface area as function of elevation and drawdown.[15]

Lake Elevation (ft)	Draw-down (ft)	Lake Area (acres)	Area of Established Shallow Water Habitat[(a)] (acres)	Area of Exposed Lake Bottom (acres)
1,080	0	1,050	178	0
1,079	1	1,030	158	20
1,078	2	1,005	133	45
1,077	3	975	103	75
1,076	4	940	68	110
1,075	5	913	41	137
1,074	6	892	20	158
1,073	7	872	0	178

[(a)] 0-7-ft depth, not including new shallow water habitat created at lower elevations during temporary lake drawdowns.

[15] Modified/derived from Table 5-13 of SRBC (2012)

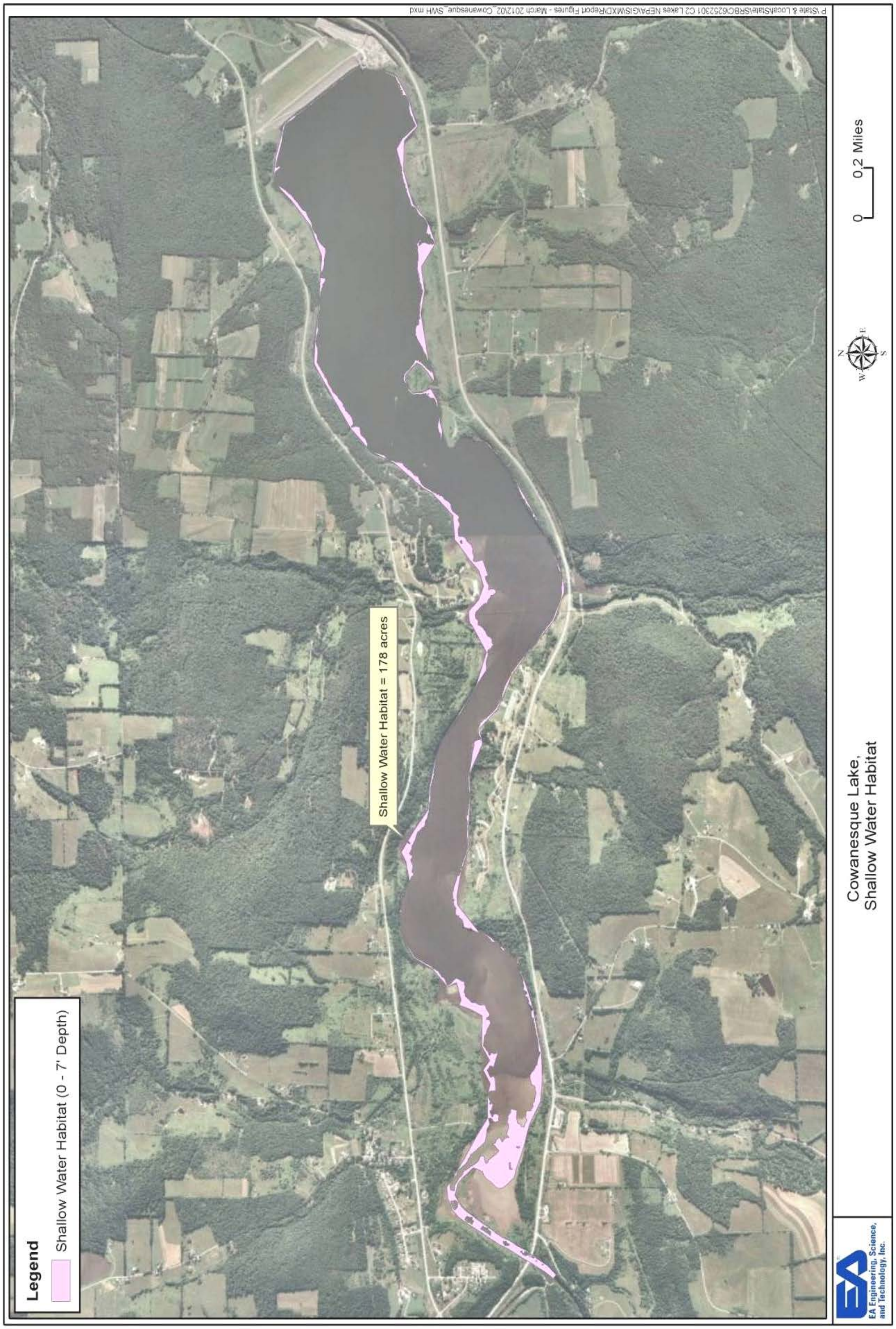

Figure 3-1: Cowanesque Lake shallow water habitat map. From SRBC (2012).

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

With the exception of the Sunbury, PA dam on the Susquehanna River, the majority of the rivers are free-flowing along most of their length until reaching the hydropower impoundments in the mainstem Susquehanna River downstream from the city of Harrisburg, PA. The Susquehanna River is dominated by riffle-pool habitat. The upstream sections of the rivers are dominated by riffle-run-pool-glide macrohabitat types and make up the bulk of the habitat variability. Riffles are shallow, high-gradient channel units with moderate current velocities and are characterized by some partially exposed substrate. Runs and glides are characterized by relatively shallow water that flows over a variety of substrates that lack turbulence. Runs are associated with downstream sections of riffles as they lose velocity. Glides are associated with the downstream section of pools as they gain velocity entering a riffle. Pools are deep, low gradient, low velocity stream units. The rivers possess streambanks and shorelines seasonally or perennially devoid of vegetation where vegetation is prevented from growing by ice and water scour, substrate instability, duration of exposure/inundation, or other factors. Where conditions are suitable, shoreline vegetation becomes established seasonally or perennially as discussed in Section 3.2.2.

3.2.2 Submerged Aquatic Vegetation (SAV)

Cowanesque Lake

SAV occurs in shallow water with depths of 0 to 7 feet located around the perimeter of the lake (also see Section 3.2.1) (Figure 3-2). USACE completed a survey of SAV in 2009 and found 88 acres present. In 2011, contractors working for SRBC determined that 73 acres of high density beds were present, with the likelihood that additional low density SAV beds were also present (total acreage was not determined). There is probably substantial yearly variation occurring as a consequence of variations in environmental conditions.

Although native species are likely present in small populations, the dominant species is Eurasian watermilfoil, which is a perennial invasive species that quickly colonizes suitable habitats. Although less desirable than native species, it does provide good habitat for macroinvertebrates and fish. In manmade water bodies elsewhere, Eurasian watermilfoil is managed with mixed success by purposeful drawdowns to dry out the plants and expose them to freezing weather.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

SAV occurs within portions of the active channel that are permanently inundated during the growing season. SAV requires flows that maintain inundation during the growing season, as growth rates are particularly sensitive to decreases in river stage that expose leaves and stems. One of the Susquehanna River basin’s most abundant SAV species is riverweed. Riverweed is a perennial found in moderate to high velocity riffles. Extensive populations have been documented in many tributaries and mainstem reaches within the Susquehanna. Riverweed is sensitive to drought because low flows can expose the plants above the water surface, drying out the plants.

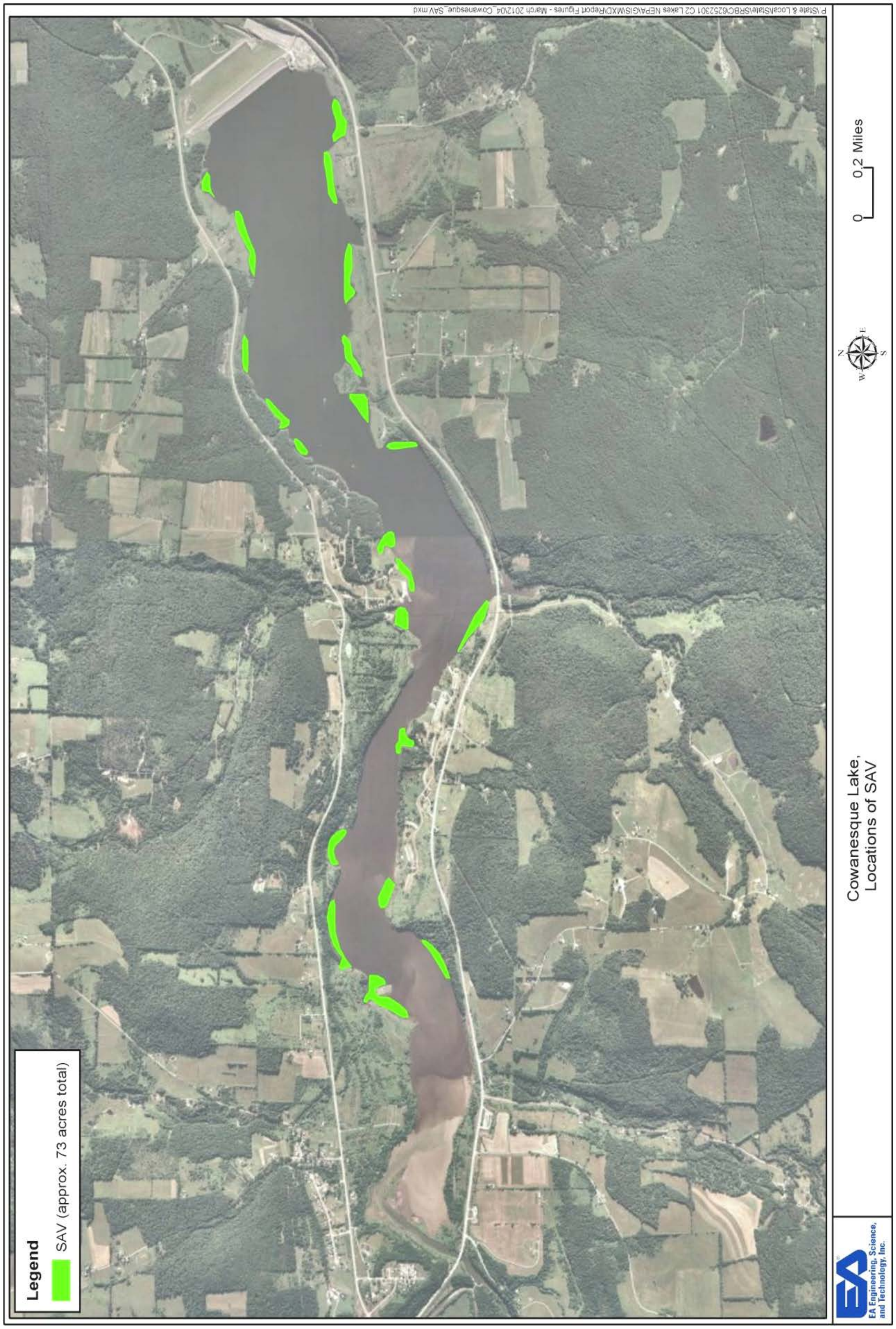

Figure 3-2: Cowanesque Lake SAV beds with high density , August 2011. From SRBC (2012).

3.2.3 Wetlands

Cowanesque Lake

Cowanesque Lake Project lands have wetlands hydrologically connected to the lake, and wetlands whose water levels are independent of the lake. Of interest to this EA are wetlands occurring at Cowanesque Lake that are dependent upon lake water levels. Emergent wetlands which have vegetation that grow upwards well above the water surface occur in Cowanesque Lake at elevation 1,079 feet and above, so at normal pool the emergent wetlands have water depths between 0 and 1 foot. The majority of the wetlands begin at elevation 1,080 feet and extend landward 15-50 feet; therefore, they have saturated soils and are supporting wetland vegetation but do not have standing water. Typical of emergent wetlands, these systems have colonized the shoreline right along the edge of the normal pool in areas where the slope is suitable for vegetation. The character of these wetlands along the lake shoreline is affected by normal water level manipulation management practices. Drawdowns greater than 1 foot dewater the lake edge wetlands.

In 2011, field investigations done by a contractor for SRBC documented about 11 acres of wetlands within 13 separate parcels occurring around the immediate margin of Cowanesque Lake (Figure 3-3) that are dependent upon water from the lake. Wetlands dependent upon water from lakes are classified as lacustrine by the U.S. Fish and Wildlife Service (USFWS). Several of these wetlands occur in parcels at the western end of the lake where sediment from the inflowing Cowanesque River forms delta deposits. Wetlands occurring on the lake shore include wetlands that developed naturally following flooding of the lake as well as wetlands purposefully constructed by USACE. Plant species occurring in these wetlands include a variety of emergent marsh species such as bulrush, woolgrass, rice cut grass, and cattail. Shrub and tree wetland species occurring on the parcels include silky dogwood, northern arrowwood, smooth alder, and black willow.

In addition to the lake wetlands described above, other wetland parcels occur further in from the lake shore that are maintained by groundwater and inflowing streams. These wetlands are not dependent upon regular water supplied by the lake, and are not further considered in this EA.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Wetlands occur within portions of the receiving river channels and floodplains with a semi-permanent inundation frequency including on islands, edges of bars, channels and terraces. A variety of plant communities occur within the river channels as a function of ice scour, inundation, and soil development. Where and when severe flood and ice scour occurs, inundation duration is seasonal to temporary flooding, and geologic deposits occur but soil development is minimal, then typically herbaceous (non-woody) plants occur during the growing season. These sites may appear unvegetated early in the growing season and in non-growing season months. A common plant community of this type within the basin are emergent beds of water willow and lizard's tail. During the growing season, emergent beds can tolerate inundation under high flow conditions and exposure under low flow conditions, but the frequency and duration of inundation and exposure can impact the condition of emergent vegetation. Water

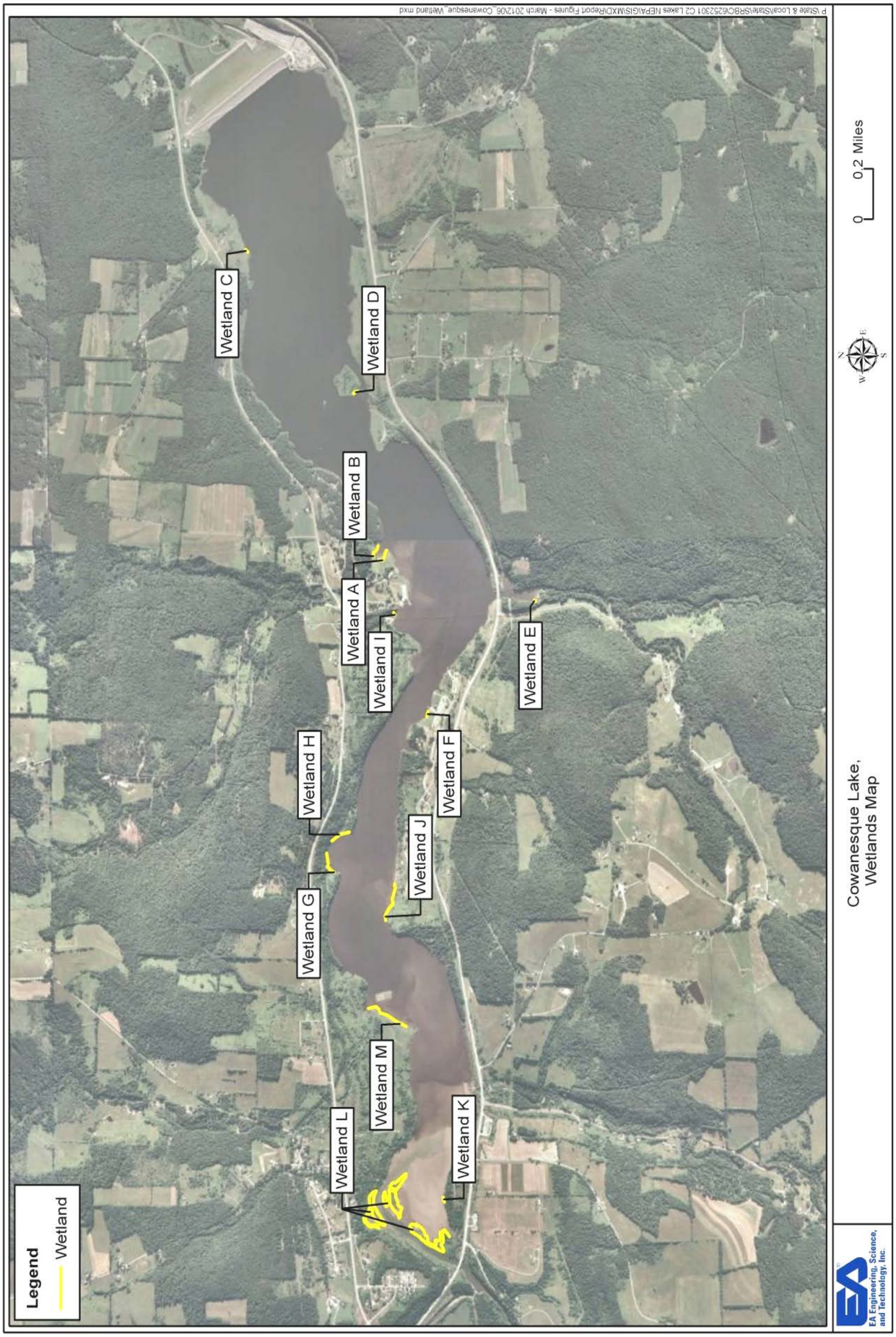

Figure 3-3: Map of lacustrine wetlands at Cowanesque Lake. From SRBC (2012).

willow has been shown to decline after eight weeks of desiccation, or exposure of the plant base. Where and when severity of ice scour is moderate, shrub communities often occur on flats, bars and low terraces of islands and banks. Where/when ice scour is low and inundation duration just temporary, floodplain forests occur.

3.2.4 Upland Vegetation

Cowanesque Lake

Lands surrounding Cowanesque Lake are comprised of areas of open field, hardwood shrubsand hardwood forest. Hedgerows planted to benefit wildlife occur bordering the lake and elsewhere on project lands. In addition, landscaped and maintained habitats also occur.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Uplands along the receiving rivers are largely rural in character and contain mixes of forest, old fields, and agricultural land. In urban areas, vegetation along the river often includes lawns and a variety of planted landscape shrubs and trees. Upland vegetation occurs along the river where soils rapidly drain and or saturation/inundation is brief during the growing season.

3.2.5 Macroinvertebrates and Finfish

Benthic macroinvertebrates are small spineless bottom-dwelling animals of aquatic habitats visible to the naked eye. These include aquatic insects, crayfish, clams, snails, and worms. They are often used as indicators of water quality and ecological health due to their abundance, known pollution tolerances, and limited mobility. Finfish include commonly fished species as well as species that are not commonly fished; the latter include species eaten by recreational species sometimes called forage fish, as well as large fish that are not sought recreationally sometimes called rough fish. The critical low flow period for aquatic life most commonly occurs in area streams in September.

Cowanesque Lake

Cowanesque Lake likely supports macroinvertebrates typical of natural lakes in the vicinity, except that any species sensitive to water level changes that occur there would presumably be reduced from those of natural lakes. U.S. Geological Survey investigators have located one native mussel in the lake: the eastern floater. Cowanesque Lake has a population of invasive zebra mussels, first detected in 2007.

A total of 21 warmwater fish species, representing five families, have been documented in Cowanesque Lake. High turbidity and large fluctuations in water levels can affect year classes. The primary game fish species within Cowanesque Lake include black crappie, smallmouth bass, largemouth bass, muskellunge, tiger muskellunge, and sunfish. Other game fish include yellow perch, brown bullhead, and yellow bullhead. Non-game species are dominated by common carp, shiners, suckers, and the forage fish alewife. A majority of the fish species present in

Cowanesque Lake spawn between April and July, although some species may spawn into August.

PFBC stocks various pan and game fish species to supplement the naturally occurring fish populations. Stocked species include tiger muskellunge, walleye, largemouth bass, black crappie, yellow perch and channel catfish. Walleye and black crappie are introduced species to the Atlantic Basins in eastern and central Pennsylvania.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Macroinvertebrate community health along the receiving rivers ranges from various degrees of impairment to healthy (Table 3-3).

Table 3-3: Macroinvertebrate biotic integrity of receiving rivers[16].

River	Range of macroinvertebrate biotic integrity conditions
Tioga	Slightly impaired at confluence with Cowanesque, then not impaired downstream to confluence with Cohocton
Chemung	Impaired to slightly impaired down to confluence with Susquehanna
Susquehanna	From Chemung confluence downstream to Wilkes Barre varies from not impaired to slightly impaired; downstream of Wilkes Barre biotic integrity is slightly to moderately impaired (i.e., worse than upstream of Wilkes Barre)

Groundwater flow through stream substrates provides refuge for aquatic insects. Summer baseflows provide thermal refuge for cold-water dependent taxa. Aquatic insects have a number of different feeding strategies, utilized by species as a function of the stream habitat they live in. In riffle habitats, collector/filterer, herbivore, and predators are common. Aquatic insects possess a range of life history traits. Some are able to reproduce more than once per year. Decreasing low flow magnitudes have been associated with changes to aquatic insect abundance and diversity.

TNC determined that at least a dozen species of native mussels occur within the Susquehanna River basin. In addition to these native species, several species of invasive exotic mussels occur, including zebra mussel. Crayfish are a prominent macroinvertebrate species that provide food for numerous other species and are involved in processing instream matter. Several crayfish species occur in the basin.

There are 117 fish species in 26 families within the Susquehanna River mainstem and tributaries (Snyder, 2005). Thirty three of these species have been introduced to the Susquehanna River basin by people. Of the 117 species occurring, three families, Cyprinidae (carps and minnows, 32 species), Centrarchidae (sunfishes, 14 species) and Percidae (darters and perches, 9 species) represent almost half of the species diversity. Sixty species mostly eat insects (insectivores); many of the insectivores are intolerant or sensitive to pollution and other human habitat alterations. The majority of introduced species eat other fish (piscivores) and few are sensitive

[16] From SRBC large river assessments listed in reference section.

or intolerant. Based on habitat use, several groups of fish species are sensitive to flows. Riffle-obligate species spend most of their lives in riffle habitats. Among these are margined madtom, longnose dace, central stoneroller, northern hog sucker, fantail darter. Riffle-associate species utilize riffles for one or more life history stage. These include: white sucker, shorthead redhorse, and walleye. During the summer months, central stoneroller, margined madtom, northern hog sucker, and fantail darter require flows that maintain swift to moderate current riffle/run habitats. If the magnitude of summer flows is reduced, available riffle habitat may be reduced limiting juvenile and adult growth. Many fish species build nests for spawning, including fallfish, creek chub, river chub, redbreast sunfish, and smallmouth bass. These nests are vulnerable to dessication and siltation under extreme low flow conditions.

The smallmouth bass population appears to be declining in the Susquehanna River because of disease and other factors. It has been speculated that recent disease outbreaks of smallmouth bass in the Susquehanna River are linked to water quality impairment exacerbated by severe low flow conditions, to which consumptive use is contributing (SRBC, 2009). High water temperatures are conducive to bacterial growth. Low dissolved oxygen levels cause respiratory stress. Both conditions are exacerbated by excessive low flow conditions.

Several species of herring, striped bass, and American eel migrate between ocean and river habitats (diadromous species) during their life history. Populations of these species are depleted in the Susquehanna River because of fish blockages formed by dams on the lower river. A variety of restoration measures are underway to attempt to restore populations of these species in the Susquehanna River, and individuals of these species occur in the lower mainstem of the river. Egg and larval survival is dependent upon stream velocities being neither too high nor too low during spring and summer.

3.2.6 Wildlife

Cowanesque Lake

Cowanesque Lake project lands support plentiful wildlife as a consequence of the availability of large areas of diverse natural and semi-natural habitats. Due to the large proportion of forest/wooded areas around the lake most of the wildlife species depend on or utilize wooded habitats. Based on range maps reviewed at the time of preparation of the 2002 master plan for the lake, it was determined that about 13 species of salamander, 8 species of frogs and toads, 5 species of turtle, one species of lizard, and 11 species of snakes occur on Lake Cowanesque Project lands. Those species associated with aquatic habitats would likely occur in the lake, shoreline riparian habitats, or streams flowing in the lake.

Upland areas provide habitat for numerous non-game bird species,including migratory passerine species and great blue heron. There are heron rookeries in the vicinity of Cowanesque Lake, with the closest rookery located several hundred feet downstream of the Cowanesque Dam.

Typical mammal species include white-tailed deer, black bear, raccoon, gray squirrel, and white-footed mouse. Open field and shrub communities provide habitat for many small mammals including eastern cottontail, woodchuck, meadow jumping mouse and meadow vole. Species such as beaver, muskrat, and mink may be found. Game species include squirrel, rabbit, groundhog, deer, bear, beaver, muskrat, fox, and bobcat.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

TNC reports that at least 35 species of reptiles and amphibians, including salamanders (12 species), toads (2 species), frogs (9 species), turtles (8 species) and snakes (4 species), use riverine and riparian habitats in the Susquehanna River during various life stages. Dozens of bird species use riparian habitats for nesting and breeding. Waterbirds such as herons and egrets forage in aquatic habitats. Several mammal species are dependent upon river and stream habitats, including shrew, muskrat, river otter, and several species of bats. These species typically nest and forage in or in close proximity to river habitats.

3.2.7 Rare, Threatened, and Endangered Species

Cowanesque Lake

The USFWS reported in a letter dated August 30, 2011 to SRBC that other than for transient individuals, there are no known Federally-listed or proposed species in the Cowanesque Lake area. (Coordination records are presented in Annex A). However, several species rare in Pennsylvania are present at Cowanesque Lake. Bald Eagle and Osprey nest at the lake and forage for prey in lake waters. These species are listed as state-threatened in Pennsylvania. The Pennsylvania Natural Diversity Inventory (PNDI) noted that the northern myotis, a declining bat species that is not currently state or Federally listed is potentially present. This species is currently listed in the state wildlife action plan as critically imperiled in Pennsylvania. This imperilment occurs because of disease. This species is generally associated with mature forests, and uses a variety of natural and manmade caves as hibernacula.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

No Federally listed resident aquatic animal species occur in the receiving river mainstems. However, numerous transient migratory and mobile Federally and state-listed vertebrates occasionally utilize aquatic habitats of the receiving rivers.

TNC, SRBC, and PFBC have compiled information on rare animal species occurring in the receiving rivers. A number of aquatic species that are state-listed as rare in Pennsylvania or New York inhabit the Susquehanna River (Table 3-4). In addition to the state listings, several species are recognized to be rare by Nature Serve.[17] Of these species, two are of particular interest because they are sensitive to low flow conditions. Green floater mussel and hellbender amphibian require good water quality and stronger flows. Green floater is not drought tolerant.

[17] NatureServe is a non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action. NatureServe and its network of natural heritage programs are the leading source for information about rare and endangered species and threatened ecosystems. USACE maintains a collaborative relationship with Nature Serve.

Table 3-4: State-rare resident aquatic animal species in the Susquehanna River.

Taxonomic Group	Common Name	General Occurrence	Status			
			NY – State List	NY – Nature Serve	PA – State List	PA – Nature Serve
Mussel	Yellow lamp-mussel	Streams, rivers, lakes	Unlisted	Vulnerable (S3)	Unlisted	Vulnerable / Secure (S3/S4)
	Green floater	Rivers	Threatened	Imperiled (S1/S2)	Unlisted	Imperiled (S2)
	Brook floater	Rivers	Threatened	Imperiled (S1)	Endangered	Imperiled (S2)
Amphibian	Hellbender	Rivers	Species of concern	Imperiled (S2)	Protected	Vulnerable (S3)

Hickory shad, a migratory fish species, occurs in the lower Susquehanna River. It is state-listed as endangered in Pennsylvania, and considered imperiled (S2) in New York by Nature Serve. Its distribution in the river is restricted by fish blockages formed by dams. Efforts are underway to provide fish passage to restore this species numbers.

3.3 Community Settings

3.3.1 Land Use

Cowanesque Lake

Open fields, farmlands, and small, rural residential communities dominate the land surrounding Cowanesque Lake. Agricultural land occurs along much of the southern and eastern sides of the lake, which is characterized by more gently sloping lands. The western and northern sides of the lake are generally comprised of forested and wetland areas. The relocated residential community of Nelson is located on the northwestern side of the lake. There are no areas of intense development around Cowanesque Lake; although, there are scattered rural populations around the lake. Lawrenceville, approximately 2 miles, and Elkland Borough, approximately 7 miles from Cowanesque Lake, are the only significant concentrations of residential or commercial development in the vicinity of Cowanesque Lake, with the exception of a few crossroad areas and some rural strip development along U.S. Business Route 15. The communities that surround Cowanesque Lake have a zoning ordinance, and this area is zoned for open space. Tioga County oversees the zoning for the south side of the lake along PA Route 49, and this area is zoned commercial recreation.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

The upper portions of the Susquehanna River Basin contain substantial areas of forest. Farmland occurs throughout the basin. Numerous towns and cities occur along the rivers, with a trend towards greatest urbanization in the downstream portions of the basin. Major towns and cities along the receiving rivers include Corning and Elmira in NY, and Wilkes-Barre and Harrisburg in PA (Figure 1-2).

3.3.2 Cultural and Historic Resources

Cowanesque Lake

Various archaeological investigations and predictive models for archaeological sensitivity were conducted at Cowanesque Lake by USACE during the 1980s in conjunction with the proposed reformulation that would raise the lake level. Raising the lake level had the potential to adversely affect historic properties such as archaeological sites. In 1988 a Memorandum of Agreement (MOA) was executed between the Baltimore District and the Pennsylvania State Historic Preservation Office. The MOA outlined procedures to be taken by the Baltimore District to mitigate adverse effects to historic properties (in this case, archaeological sites) that would result from the reformulation. Finalization of the MOA completed the Baltimore District's responsibilities under Section 106 of the National Historic Preservation Act for the reformulation project. Thus, there are no cultural or historic resources of concern at this time in the area of potential effect of Cowanesque Lake from altered water supply releases.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Altered low flow conditions in the receiving rivers would have no effect on cultural/historic resources. Thus, this topic is not given further consideration in this EA.

3.3.3 Hazardous, Toxic, and Radioactive Wastes (HTRW)

Cowanesque Lake

The U.S. Environmental Protection Agency (USEPA) website was searched for USEPA-regulated sites in the vicinity of Cowanesque Lakes during preparation of the USACE Master Plan. Specific databases searched were the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS), National Priorities List (NPL), Resource Conservation and Recovery Act (RCRA), and Leaking Underground Storage Tanks (LUST). The results indicated that there are no NPL or CERCLIS sites in Tioga County. The data within the RCRA and LUST lists are site specific, and were therefore not accessed. USEPA’s Envirofacts Database was also searched for additional USEPA-regulated sites. The query found four sites in Lawrenceville or Lawrence Township downstream from the Cowanesque Dam.

There are no existing facilities at the lake that are classified as a hazardous waste generator. There are no records or other indications that hazardous or radioactive substances may be present at the lake.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Altered low flow conditions in the receiving rivers would have no likelihood of exposing HTRW materials or affecting anyone's exposure to existing HTRW materials. Thus, this topic is not given further consideration in this EA.

3.3.4 Transportation and Navigation

Cowanesque Lake

Cowanesque Lake is accessible by US Route 15 (future Interstate 99) to PA Route 49 and to Bliss Road. PA Route 49 and Bliss Road provide access to the south and north sides of Cowanesque Lake, respectively, west of US Route 15. US Route 15 is the major road in the vicinity.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Historically, there were dredged channels providing for navigation on the Susquehanna River and a network of canals serving the area. No navigation channels are maintained today in the receiving rivers. The historic canals are largely filled in and no longer navigable. Today, because of limited water depths and natural navigation obstructions, the rivers are used primarily by small watercraft. At manmade impoundments where large, deeper water occurs, conditions are suitable for larger boats.

3.3.5 Water Supply and Use

Cowanesque Lake

All water that is used at the Cowanesque recreation areas is supplied from groundwater. There are water treatment plants located at Tompkins Campground and the South Shore Day Use Area at Cowanesque Lake. Groundwater is treated prior to human use. There are sanitary wastewater treatment plants at Tompkins Campground, and the South Shore Day Use Area. Sanitary wastewater is treated, then discharged and returned to the lake.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

People make use of water from the receiving rivers for public water supplies, industry, agriculture, energy development, recreation, and other uses. These human uses reduce base flows of the major rivers in the basin. These demands are managed by SRBC to prevent severe localized impacts such as dewatering, but the cumulative impact of thousands of uses is felt downstream by the aquatic resources, hydroelectric dams, and water supply intakes, among others, that rely on water.

When water is withdrawn from a surface water or groundwater source, the portion which is not returned is referred to as consumptive use. Based on SRBC data, consumptive use for electricity generation is the largest consumptive use in the Susquehanna River Basin at 92.7 million gallons per day. The unconventional natural gas industry ranks second, consuming 10.4 million gallons per day. Water supply (8.9 million gallons per day) and manufacturing (8.3 million gallons per day) rank third and fourth, respectively. Nearly half of the annual consumptive use occurs during the typical low flow period of July through November.

Corona Powers' Sunbury Steam Electric Station and Pennsylvania Power and Light's (PPL) Brunner Island facilities on the Susquehanna River utilize water from the Susquehanna rivers for cooling water in energy production. Nuclear-fueled power plants Susquehanna Steam, Three Mile Island (TMI), and Peach Bottom Atomic Power Station (PBAPS) also utilize Susquehanna River water for cooling. Hydropower generation is a significant industry on the Susquehanna. Oakland, York Haven, Safe Harbor, Holtwood, and Conowingo dams are all hydropower generating dams harnessing the Susquehanna River for electricity generation; however, the Oakland facility is currently off-line due to structural and financial issues. The Muddy Run Pumped Storage Project in Lancaster County, owned by Exelon, pulls water from the Susquehanna River for storage in Muddy Run Reservoir and later release to provide electricity during peak demand periods.

Extraction of natural gas using unconventional hydraulic fracturing or hydrofracturing techniques from shale bedrock that underlies much of the Susquehanna River Basin occurs. The hydrofracturing techniques involve the introduction of large volumes of water (4 to 5 million gallons per well) under very high pressures to stimulate the release of the natural gas contained within the bedrock. Rather than a continuous withdrawal, intermittent and short-term withdrawals are conducted to accumulate the water needed for a hydrofracturing job.

3.3.6 Parks and Wild and Scenic Rivers/ American Heritage River

Cowanesque Lake

Project lands are park-like in character, and managed as open space for multiple uses under USACE's flood damage reduction and environmental stewardship missions, as described in Section 1.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Federal and state designation of wild and or scenic is done for the purpose of protecting specific rivers from development that would substantially change their wild or scenic nature. Neither the Cowanesque, Tioga, Chemung, nor Susquehanna River are designated as wild nor scenic by the Federal government nor Pennsylvania.

American Heritage Rivers are designated by the USEPA to coordinate efforts of multiple governmental entities to further natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Upper Susquehanna River in Pennsylvania is designated as an American Heritage River. However, the portion of the

Susquehanna River within New York State is not designated, nor are the Cowanesque, Tioga, or Chemung Rivers.

The receiving rivers flow through numerous minor areas of public open space (Table 3-5). However, the receiving rivers do not flow through any major state or federal park or forest lands.

Table 3-5: Parks through which receiving rivers flow.

Park Name	River	City, State
Round Top Recreation Area	Chemung	Athens, PA
Hornbrook Park	Susquehanna	Towanda, PA
State Game Lands Number 237	Susquehanna	
Nesbitt Park	Susquehanna	Kingston, PA
Kirby Park	Susquehanna	Kingston, PA
State Game Lands Number 224	Susquehanna	
Bloomsburg Town Park	Susquehanna	Bloomsburg, PA
Shikellamy State Park	Susquehanna	Sunbury, PA
State Game Lands Number 233	Susquehanna	
State Game Lands Number 254	Susquehanna	
State Game Lands Number 290	Susquehanna	Duncannon, PA
Riverfront Park	Susquehanna	Harrisburg, PA

3.3.7 Recreation and Aesthetics

Cowanesque Lake

The Master Plan for Cowanesque Lake reported a total of 555,551 visits during the six-year span of 1995 to 2000. The rolling hills of the area surrounding Cowanesque Lake provide excellent aesthetic views from numerous viewpoints. Cowanesque Lake provides recreational opportunities for boating, speed boating, skiing, fishing, swimming, picnicking, and camping. The fields and forests around the lake are popular destinations for hunters. Hunting is permitted on Cowanesque Lake project lands except in posted public use areas.

Several of the Cowanesque Lake formal recreation areas are located along the lakeshore (Figure 3-4). Tompkins Campground is located on the north side of Cowanesque Lake between Bliss Road and the shoreline about 1.3 miles upstream from the dam. Tompkins Campground has a swimming beach, mooring docks, and boat launch. The South Shore Day-use Area is located on the south side of Cowanesque Lake about 2 miles upstream of the dam. The day-use area contains a beach and provides opportunities for boating, fishing, swimming, and picnicking. The

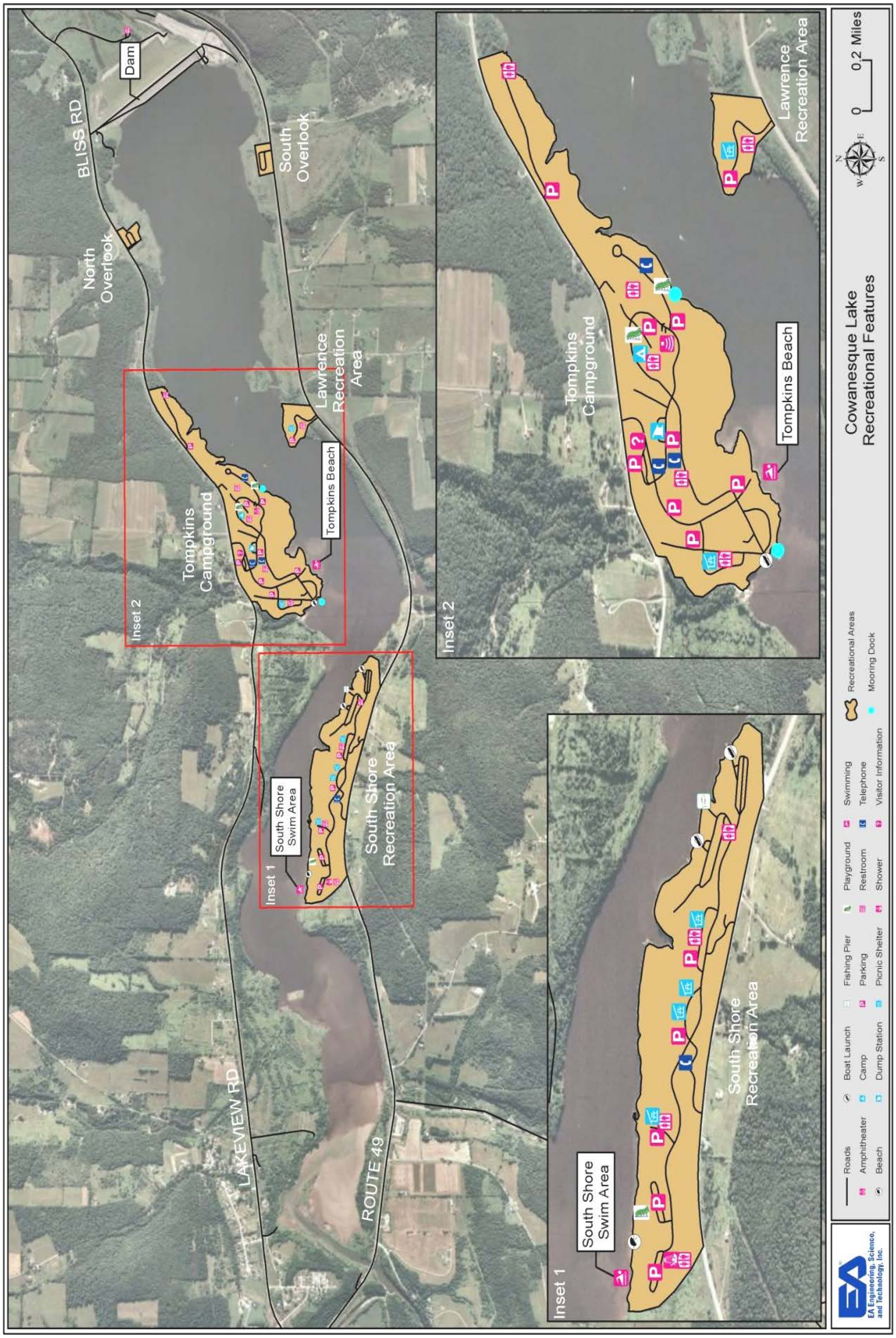

Figure 3-4: Recreational features along Cowanesque Lake shoreline map. From SRBC (2012).

South Shore area has a boat ramp. The Lawrence Picnic Area is located adjacent to PA Route 49 on the south side of Cowanesque Lake about one mile upstream from the dam. The picnic area provides a picnic pavilion. A formal trail "Moccasin Trail" follows the north shore of the lake.

Cowanesque Lake supports a moderately diverse, healthy fish community including a variety of sport species desirable to fishermen (see Section 3.2.5). The lake's most prevalent gamefish are large and smallmouth bass.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Fishing, hunting, power boating, paddling, and swimming are available in the receiving rivers, along with hiking and biking opportunities on nearby trail systems. There are numerous public and private access points for people along the receiving rivers.

Canoeing and kayaking are popular on organized water trails. The Tioga River is part of the Chemung River Basin Trail. The Susquehanna River water trail provides canoeists and kayakers with a route on that river. Impoundments created by York Haven Dam, Safe Harbor Dam, Holtwood Dam and Conowingo Dam hydroelectric generation facilities provide recreational boating opportunities for larger boats.

Main gamefish in the Tioga River include smallmouth bass, muskellunge, and walleye. Brown bullhead, common carp, rock bass, sunfish, and yellow perch can also be found in the river. The Susquehanna River in Pennsylvania is well known for its smallmouth bass fishing. Other popularly fished species include walleye, musky, flathead catfish, and carp. The Susquehanna River is widely considered one of the premier fisheries on the east coast. However, there appears to be a decline in smallmouth bass fish populations underway in some areas, and the future of the fishery has been the subject of several public meetings hosted by the PFBC between 2006 and 2010.

3.3.8 Population and Socioeconomic Conditions

Cowanesque Lake project lands have no permanent residents. The campgrounds are temporarily populated in the summer by campers; about 20 USACE staff typically work on project lands during the course of a year. According to the Wellsboro Chamber of Commerce, Tioga County is populated with descendants of early settlers. These included people from New England descended from immigrants from England, as well as Welsh and Polish immigrants, and Pennsylvania Germans. Table 3-6 presents information on population and socioeconomic conditions in the vicinity of Cowanesque Lake. Neither Tioga County nor Lawrenceville Boroughs are considered minority nor poverty areas.

Table 3-6: Population and socioeconomic statistics from 2000 U.S. census.

	Tioga County	Lawrenceville Borough
Total Population	41,373	627
Under Age 18	21%	24%
Over Age 65	17%	19%
White Caucasian	98%	99%
%Persons Below Poverty Level	12%	15%

Major employers in Tioga County include State Department for Higher Education, Soldiers and Sailors Memorial Hospital, Ward Manufacturing, Tioga School Districts, Wal-Mart, North Penn Comprehensive Health Services, Hitachi Metals Automotive Company, State Government, and Metamora Products Corporation.

The Master Plan for Cowanesque Lake summarized economic data on the project. Camping revenues totaled $86,210, during the six-year span of 1995 to 2000. Day users account for 86 percent of this total and campers account for 14 percent of total spending. Boaters accounted for 31 percent of the visits to Cowanesque Lake. Recreation visitors camping at Cowanesque Lake generated $1.65 million in sales per year in the local economy between 1995 to 2000. Visitors to the lake spent an average of $1.58 million per year, of which sixty-three percent ($1 million) is calculated to have been retained in the local economy (within 30 miles of the lake). These direct sales generated another $150,000 in indirect sales (expenditures by the businesses that sell to visitors), and $50,000 in induced sales (household expenditures resulting from the direct and indirect sales), for a total annual sales effect of $1.65 million in the local economy. In addition, visitor spending annually generated $540,000 in income and 37 jobs in sectors directly serving visitors, and $350,000 in income and 11 jobs in indirect and induced effects.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

River tourism and recreational use are major contributors to the economies of the local communities. There are no conventional commercial fisheries presently operating on these rivers. However, there is a substantial guided fishing industry. Numerous guides presently operate on the Susquehanna River and this practice has become a substantial part of the fishery and local economies. The PFBC (2009) estimated that recreational angling associated with the Susquehanna River between Sunbury, PA and Holtwood Dam had an annual estimated economic contribution of more than $2.4 million in 2007. Recreational angling in this section of the Susquehanna River also generated an economic impact of more than $975,000 annually, including creation of 16 fulltime jobs created specifically by this use.

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4.0 ENVIRONMENTAL CONSEQUENCES

The text below describes effects of alternative WBH95 compared to existing (no action) conditions. Effects of the non-recommended alternatives were evaluated in Section 2. The 2012 SRBC technical report *Optimizing Use of Commission-Owned Water Storage at Cowanesque Lake, Pennsylvania* referenced in the table of contents provides a detailed analysis of the effects of the recommended and non-recommended alternatives on Cowanesque Lake. The 2010 TNC report *Ecosystem Flow Recommendations for the Susquehanna River Basin* referenced in the table of contents provides an overview of benefits of maintaining instream flows.

Effects of the proposed water supply releases of alternative WBH95 would all be indirect, in that they would occur after and or at a different place from the release gates at Cowanesque Lake. Depending on the category, impacts would range from short-term, lasting for up to periods of months, to long-term, lasting for periods of years.

Impacts of the proposed action to non-living components of the physical environment are reported in the "A. Physical Environment" subsection below. Value judgments over whether these impacts are positive or negative are included for water quality and air quality based on how these impacts relate to established criteria to protect human beings and aquatic life, but are not included for the other physical environment topics considered. Value judgments over whether impacts of the proposed action are positive or negative to living things (other than people) and people are contained in subsections 4.2 (Living Things) and 4.3 (Community Setting) of Section 4.

4.1 PHYSICAL ENVIRONMENT

4.1.1 Topography

The WBH95 alternative would not involve any construction or earth disturbance at Cowanesque Lake, nor alter high water flows that cause erosion in receiving rivers. The offset in consumptive use and resultant increase in low flows would be minor enough to have no effect on bottom features within receiving rivers. Therefore, the proposed action would not have any topographic effects.

4.1.2 Geology and Soils

Cowanesque Lake

The WBH95 alternative would not involve any construction or earth disturbance. During drawdowns, the exposed lakebed would be vulnerable to erosion though. Materials eroded from the exposed lakebed would be deposited in deeper waters of the lake. Soils in the 11 acres of wetlands along Cowanesque Lake would dry out somewhat more than currently because of the increased frequency of years with drawdowns one foot or greater. This change would make the soils somewhat more upland in character and likely reduce the magnitude of soil processes dependent upon wet conditions during drawdown years. This would be a minor adverse impact.

There would be no impact to prime farmland soils because these lie above the elevation of the water surface of the lake. The proposed action would not affect these soils.

<u>Cowanesque, Tioga, Chemung, and Susquehanna Rivers</u>

The WBH95 alternative would not alter erosive water flows. Low flow conditions in receiving rivers in which deposition occurs would not be affected substantially enough to alter deposition patterns or rates.

There would be a minor increase in wetness of geologic materials and soils along the 155 to 274 miles of receiving rivers that would have offset consumptive use. Wetland character of those soils and wetland processes would increase. This would be a minor benefit.

There would be no impact to prime farmland soils because these lie above the elevation of the receiving rivers. The proposed action would not affect these soils.

4.1.3 Hydrology

<u>Cowanesque Lake</u>

Table 5 provides a summary of forecast Cowanesque Lake water level drawdowns over various depth ranges that would occur with the proposed action. The chance of drawdowns greater than or equal to 1 foot occurring in the future would likely increase from approximately 36 percent each year to 44 percent each year. Seasonality of median and extreme drawdown events would not change. Drawdown depths would show little difference between no action and the proposed alternative (Table 4). Duration of drawdowns under median events would actually be somewhat less under alternative WBH95 than under no action. However, under extreme events in severe drought years drawdowns would persist longer under WBH95 than under no action by tens of days.

<u>Cowanesque, Tioga, Chemung, and Susquehanna Rivers</u>

Releases from Cowanesque Lake would partially offset consumptive uses in the Cowanesque, Tioga, Chemung, and Middle Susquehanna Subbasins to the point of the trigger gage location. Benefits would extend downstream along 155 to 274 miles of receiving rivers, depending on gage location triggering the release. Offsets would diminish downstream because of the effects of consumptive use and increased volume of water in the rivers. Downstream of the trigger gage location, river flows would remain the same because consumptive use practices would remove and utilize the added flow.

There would be no increased flooding impacting the developed or natural floodplain.

4.1.4 Water Quality

Cowanesque Lake

USACE determined in 1982 that drawdowns greater than 22 feet could potentially impact lake water quality by disrupting stratification and decreasing the overall average lake temperature. In about 1 to 2 percent of future years, it is expected that both the no action scenario and alternative WBH95 would have a drawdown greater than 22 feet and cause adverse effects to lake water quality. However, this would likely occur at a date in the fall during the normal destratification time of the lake, thereby minimizing any effects of drawdown. Overall, the proposed action would have no to minimal effect on water quality in the lake compared to the no action alternative.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

The WBH95 alternative would have no incremental effect on downstream water temperature even under extreme drawdowns because USACE can apportion releases among the quality control system gates to best meet downstream water quality targets. Additionally, the additional drawdown would occur around the time the lake normally destratifies and temperature gradients are broken down.

Augmented low flow releases from Cowanesque would be expected to cause minor improvement effects on receiving stream water quality. Increased baseflows under low flow conditions would be expected to somewhat ameliorate stagnant conditions, dilute pollutants, and promote greater water oxygenation in the receiving water bodies.

4.1.5 Climate

The proposed action would have no effect on climate. Under forecast future climate change conditions, reduced summer flows in the receiving rivers would exacerbate effects of consumptive use. Consumption offset benefits of alternative WBH95 would thus be reduced. However, these conditions would increase the relative value to aquatic life of the proposed water supply releases.

4.1.6 Air Quality

Because no earth or soil disturbance would occur, no increased emission of any pollutants would occur that could affect air quality. Accordingly, no impacts to air quality are expected from the proposed action. Increased lakebed exposure could increase production of dust via wind blowing over the exposed lake shoreline. However, increased area of bottom exposure (Table 3-2) would be minimal and any increased dust production would also be expected to be minimal.

4.1.7 Noise

The WBH95 alternative would involve no physical construction. There would be minor changes in timing of operating dam gates, but this would produce no difference in noise produced. Increased flows downstream during dry conditions would produce only a very minor increase in water flow noises. Thus there would be essentially no effects to humans or wildlife from noise produced from low flow water releases.

4.2 HABITATS AND LIVING THINGS

4.2.1 Open Water and Shorelines

Cowanesque Lake

Lakebed would be exposed when the lake is drawn down by 1 foot or greater. Under the no action alternative there would be approximately a 36 percent chance of this occurring in each future year. Under alternative WBH95, the chance of lakebed exposure would increase to approximately 44 percent each year. Impacts to quality of lakebed habitat would be minor (independent of SAV which is covered separately below).

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Alternative WBH95 would partially offset consumptive use of water degrading stream habitats along 155 to 274 miles of river, depending on trigger gage location. Shallow, swift-moving riffle habitats are among the first to change velocity and depth in response to changing stream stage. Riffle habitats would be benefitted by increased flows, with reduced adverse effects of consumptive use being most notable in the Cowanesque, Tioga, and Chemung Rivers. Benefits to instream habitat would extend into the Middle Susquehanna River but dissipate to negligible within the Lower Susquehanna River.

4.2.2 Submerged Aquatic Vegetation

Cowanesque Lake

Reduction in shallow water lake habitat up to 7 feet deep could impact SAV. Drawdowns below 7 feet would have no additional effect because it is absent from these depths. Under the no action scenario, the chance of drawdowns occurring that could affect SAV would be approximately 36 percent each year. Under alternative WBH95, the chance that lake drawdown greater than 1 foot would occur that could impact SAV would increase to approximately 44 percent. Thus, the proposed WBH95 alternative would produce an increase in future years with drawdowns greater than 1 foot that could cause a minor adverse effect on lake SAV (Table 2-5).

Drawdowns in the 3 to 5 foot range would likely have a short-term minor adverse impact on SAV in Cowanesque Lake because a portion of the lakebed SAV would dry up. However, the SAV would be expected to recolonize in the following year assuming normal precipitation, so there would be no long-term effect from these events. The chance of drawdowns in this depth interval occurring each year would increase from approximately 3 percent under no action to approximately 9 percent under alternative WBH95

Drawdowns of more than 7 feet would likely adversely impact all SAV beds in the lake. There would be approximately a 19 percent chance each year that this event would occur under alternative WBH95 versus approximately a 14 percent chance each year under no action (Table 4-1). Based on observations of effects of drawdowns at USACE Hammond Lake, severe drawdowns would likely cause losses of substantial portions of SAV at the lake for up to several years. However, SAV would be expected to recover in several years, barring repeat severe drought events.

Table 4-1: Severe impact events to SAV of WBH95 alternative compared to no action resulting from drawdowns of 7 feet or more.[18]

Alternative	Approximate % Chance Each Future Year With Event	Maximum Days per Event	Median Days per Event	Minimum Days per Event
No Action	14	148	78	35
WBH95	19	159	91	11

Overall, alternative WBH95 would cause increased adverse impacts to SAV over no action. However, these impacts would generally be minor and temporary. However, there would likely be an increase in which impacts would be severe and greatly reduce SAV for periods of up to several years (Table 4-1).

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

SAV occurring in the low flow channels along 155 to 274 miles, depending on trigger gage location, of the receiving rivers would be less vulnerable to desiccation and exposure during low flow conditions, promoting greater health and survival of SAV. Perennial SAV species, such as river weed, would survive drought periods better, and remain in place following return to higher flows rather than being reduced in area by drought stress and needing to reestablish itself from propagule material. Thus, the proposed action would produce a minor beneficial effect to receiving river SAV.

[18] Prepared from chart of simulation results for individual years of record from 1930-2007 and days per year over model period provided by SRBC to USACE, February 2013.

4.2.3 Wetlands

Cowanesque Lake

Wetlands dependent upon Cowanesque Lake for water are already affected by lake water level management practices that cause them to be occasionally dewatered when water levels draw down more than one foot. There would be no difference between no action and alternative WBH95 in non event years. Lake level drawdowns greater than 1 foot would differ between no action and WBH95. Under no action, there would be approximately a 36 percent chance that lake drawdowns greater than 1 foot would occur that could affect wetlands. Under alternative WBH95, the risk of drawdowns greater than one foot would increase to approximately 44 percent chance each year. Duration of drawdowns affecting wetlands would be similar during event years between no action and WBH95 other than in severe drought years. In the latter, drawdowns would persist longer under WBH95 than no action (Table 4-2).

Table 4-2: Impacts to wetlands of WBH95 alternative compared to no action during event years[19].

Alternative	Minimum Days per Drawdown Event	Median Days per Drawdown Event	Maximum Days per Drawdown Event
No Action	3	94	216
WBH95	3	94	232

The maximum days per year of drawdown events greater than one foot would be greater under the WBH95 than no action (Table 4-2). However, the minimum and median duration of drawdown in days per event would be about the same under both the no action and WBH95 alternative. Time of year when drawdowns occur would be the same between the no action alternative and alternative WBH95.

It is expected that the forecast increase in percent chance of drawdowns greater than one foot occurring could result in minor adverse impacts on the 11 acres of wetlands on the lake margin. Wetland vegetation and character at the landward edge could convert to somewhat drier wetlands, favoring shrubs and trees over current marsh vegetation. Water quality improvement functions of the wetlands would be lessened in the extra years when drawdowns greater than 1 foot occur because of reduced wetness.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

In-river wetlands along 155 to 274 miles, depending on trigger gage location, of the receiving rivers would be provided with a greater supply of water during periods when water supply releases offset consumptive use. This would reduce adverse effects of low flows on wetland

[19] Prepared from chart of simulation results for individual years of record from 1930-2007 and days per year over model period provided by SRBC to USACE, February 2013.

character and functions which are founded on the presence of water. Thus, the proposed action would produce a minor beneficial effect to receiving river wetlands.

4.2.4 Upland Vegetation

There would be no effects to upland vegetation at Cowanesque Lake or in receiving rivers because all changes in water levels would occur at elevations lower than that at which upland vegetation occurs.

4.2.5 Macroinvertebrates and Finfish

Cowanesque Lake

Water level fluctuation is one of the most important disturbances affecting aquatic ecosystems in surface waters (Turner and Mason, 2002). The effects of water level fluctuations on aquatic ecosystems are dependent on species, magnitude, duration, and time of year. For fish communities, fluctuating water levels can affect water quality, food availability, spawning success, predator-prey dynamics, and habitat. In particular, drawdown of water level affects fish communities primarily from the reduction in overall surface area and volume of a reservoir. A reduction in shallow water habitat could force littoral zone fish, including forage species, into the deeper channels and pools of the lake. Concentration of fish species within a smaller reservoir area could result in increased predation by piscivorous fish. Additionally, juvenile fish could be more vulnerable to predation during drawdown because of a higher density of predators and lack of cover from dewatered SAV and other shallow water habitat features. With the exception of a few fish species, drawdown during spring and early summer months could affect overall spawning success of fish and result in a reduction in recruitment and food availability. Drawdown during these times could reduce reproductive success of fish species that have nests exposed as water level drops and or that utilize newly established shallow water habitat that may be less suitable for nesting. Prolonged drawdown during warmer months can result in substantially higher water temperatures and depressed dissolved oxygen concentrations. Indirectly, these degraded water quality conditions can also affect fish communities in the lake and tailwaters downstream of the lake.

Alternative WBH95 would increase the likelihood each year that drawdown events greater than one foot occur, causing minor adverse impacts to fish in event years as described above. The chance each year of this occurring would increase from approximately 36 percent under no action to 44 percent under Alternative WBH95.

The seasonal timing of modeled drawdown events were similar for both the no action and WBH95 alternatives; therefore, no additional impacts to fish spawning of implementing over WBH95 versus no action would be expected in drawdown years. The duration and magnitude of drawdown events would not change for median drawdown events under Alternative WBH95 compared to no action (Table 5). An extreme drawdown event under Alternative WBH95 would be expected to result in greater magnitude and longer duration drawdown, however. This would likely produce greater short-term minor adverse impacts on the fish community in Cowanesque Lake in the infrequent years that occurs than would occur under no action.

Conversely, there could be some benefits to recreational fish if the loss of established shallow water habitat caused by infrequent, moderate drawdowns is followed by several years of stable water levels. This can occur via reinundation increasing spawning sites, reducing SAV, and improving access of predatory game fish to forage fish.

Overall impacts to macroinvertebrates and finfish would be minor and temporary.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Water supply releases during low flow conditions would partially offset consumptive use along 155 to 274 miles of the receiving rivers, depending on trigger gage location. This would likely reduce impacts of consumptive use to macroinvertebrate density and richness, including taxa sensitive to low flows such as filter feeding and grazing insect taxa. Flow augmentation would reduce exposure and predation of mussel beds, contributing to bed maintenance and individual growth. Natural flow regimes can reduce risk of establishment of non-native mussel species. Crayfish would benefit by increased growth and reduced susceptibility to predation.

Downstream fish likely to benefit from water supply releases during low flow conditions include those dependent upon riffles, nest-builders, migratory fishes, and walleye. Nest builder fish species are sensitive to reduced flows in nesting season that can promote siltation, dessication of eggs, and stranding of larvae. Riffle-obligate and associated fish species depend on this habitat type's presence and persistence and are vulnerable to loss of riffle habitat for spawning and foraging. It is possible that better offset of consumptive use during low flow conditions could reduce disease of smallmouth bass.

4.2.6 Wildlife

Cowanesque Lake

No wildlife are dependent upon the exact position of the shoreline or areas of bare exposed shoreline at Cowanesque Lake, or require a minimum lake surface area or minimum availability of any particular lake depth. Wildlife utilizing the lake and shoreline would be able to move up or down the exposed shoreline during the additional times when it is temporarily exposed. Wildlife at the lake would adjust their behavior to altered lake levels by moving up or down slope, and no negative effects are expected. Reduced area of the lake would reduce lake surface area by a minor amount at times when the lake level is down and alter availability of shallow water foraging habitat (Table 8). However, no impact to wildlife is expected because impacts to wildlife prey in the lake would be negligible.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Several amphibian and reptile species are particularly sensitive to increased frequency and duration of low flow events, which can increase temperature and sediment concentrations, and decrease dissolved oxygen (TNC 2010). These species of herptiles occurring along the 155 to 274 miles of the receiving rivers with increased flow would benefit from greater compensation for consumptive uses. Increase of aquatic habitat area could increase available foraging grounds for river-dependent birds and mammals. Thus, the proposed action would cause a minor beneficial impact to wildlife of the receiving rivers.

4.2.7 Rare, Threatened, and Endangered Species

Cowanesque Lake

The proposed action would require no construction or activities outside of normal dam operations, so there would be no disturbance near bald eagle or osprey nests or northern myotis nesting or roosting trees. Drawdown of the lake under drought conditions would reduce the surface area of the lake available for foraging by bald eagles and osprey during the additional drawdown years this occurs (Table 3-2). Lake surface foraging area would still be substantial however, and prey populations would be only minimally impacted if at all. Thus, there would be only negligible to minor adverse effects on bald eagle and osprey during the additional drawdown years, and no effect otherwise.

Cowanesque, Tioga, Chemung, and Susquehanna Rivers

Brook floater and green floater mussels would likely benefit from the WBH95 alternative via improved water quality and more stable streamflows. Increased low flows in receiving rivers would benefit hellbender if it is present, because this species prefers water movement and higher dissolved oxygen levels. Both of these latter conditions would be promoted by increased water flows that reduce stagnant conditions.

4.3 COMMUNITY SETTING

4.3.1 Land Use

The proposed WBH95 alternative would have no direct or indirect effects on land use at Cowanesque Lake or the receiving rivers because no physical construction would occur. Increased low flows would not change land uses along the receiving rivers because the lands with increased flow are at other times of year under water and river bottom anyway. Changes in flow would be imperceptible to most people and not induce desire to change land use or land cover.

4.3.2 Cultural and Historic Resources of Cowanesque Lake

Water levels in the lake associated with the proposed action fall within the levels of the late 1980s reformulation, which was reviewed under Section 106. Potential adverse effects to archaeological resources from raising and lowering the lake level have already been mitigated in the 1988 MOA. No new effects to historic properties are anticipated from implementing the WBH95 alternative, so no additional Section 106 review is needed.

4.3.3 Hazardous, Toxic, and Radioactive Wastes (HTRW) of Cowanesque Lake

There are no known HTRW materials within Cowanesque Lake project lands, including the lake shore and bottom. Therefore, no impact to or from HTRW are anticipated.

4.3.4 Transportation and Navigation

Alternative WBH95 would have no effect on transportation at Cowanesque Lake or Lawrenceville, PA. Water levels at the lake would be within the levels to which infrastructure was designed for and is routinely exposed. The altered water releases would produce increased flows in the receiving rivers that would be imperceptible to water craft and thus would have no effect on downstream navigation.

4.3.5 Water Supply

There would be no effects to water supplies at Cowanesque Lake. The proposed low flow releases would increase water quantity in the receiving rivers to the point of the trigger gage location. Any potential uses of this for water supply purposes by downstream users would need to be done consistent with regulations and policies of SRBC. This topic was discussed in Section 1.2 and is discussed further in cumulative effects.

4.3.6 Parks and Wild and Scenic Rivers/ American Heritage River

The altered low flow releases would affect Cowanesque Lake project waters and lands as described by individual impact topics throughout this EA. State game lands and other small parks along the receiving rivers would have a minor increase in low flows. The impacts of this condition are described elsewhere under specific subtopics of the Physical Environment and Habitats and Living Things subsections.

Neither Cowanesque Lake nor the receiving rivers are Federally designated as Wild and Scenic Rivers nor American Heritage Rivers. Therefore, there would be no impact to designated rivers.

4.3.7 Recreation and Aesthetics

<u>Cowanesque Lake</u>

Existing recreation facilities were designed for periodic drawdowns and would be physically unaffected by the proposed water supply releases under the WBH95 alternative. Drawdowns greater than 3 feet would reduce the area suitable for high-speed recreational boats and water skiing. Drawdowns greater than 4 feet (1076 ft elevation) would cause closure of the mooring docks. Drawdowns greater than 6 feet (1074 ft elevation) would cause closure of the Tompkins boat launch and beach. Drawdowns greater than 10 feet would affect all the beaches and the south boat launch, limiting or restricting their use and resulting in lost water recreational opportunities. The recreation season extends from May 20 - September 14; drawdowns during this period are of greatest concern to recreation.

Under both no action and the WBH95 alternative, most drawdowns would begin in August-September and extend until December. Thus, there would be no difference in timing of events between alternative WBH95 and no action. Drawdown events during the recreation season under Alternative WBH95 would be similar in duration to those that would occur under no action. The mean number of days for a drawdown event under Alternative WBH95 would be 3.2 days more than under no action and the duration of drawdowns within a given range would also be similar to no action.

The chance each year of drawdowns occurring in the 3-5-foot range during the recreation season would increase from approximately 6 to 10 percent under Alternative WBH95 versus no action (Table 2-6). The chance each year of drawdowns greater than 10 feet occurring during the recreation season would increase from approximately 3 to 6 percent under Alternative WBH95 versus no action (Table 2-6). During additional drawdown years, there would be adverse impacts to water-based recreation that wouldn't occur under the no action alternative.

As was summarized above, there would be a minor increase in area and duration at which exposed shoreline devoid of vegetation occurs. Seasonally exposed unvegetated shorelines at reservoirs are often considered unsightly, so this occurrence constitutes an adverse aesthetic effect. Because the lake already is managed in a manner that produces exposed unvegetated shoreline, this would constitute only a minor and short-term increased adverse aesthetic impact.

<u>Cowanesque, Tioga, Chemung, and Susquehanna Rivers</u>

Flow change would generally be imperceptible to watercraft navigation. Accordingly, no recreational effects of changed low flow releases would result. Improved water quality and habitat conditions of the proposed releases would increase carrying capacity of the rivers for recreational fish species, and thus improve fishing opportunities over the long-term. If better offset of consumptive use during low flow conditions reduces disease effects on smallmouth bass, it could cause a minor improvement in fishing opportunities for this fish species.

4.3.8 Population and Socioeconomic Conditions

<u>Cowanesque Lake</u>

Because changes in recreational use of Cowanesque Lake are expected to be minor, economic effects of the action are expected to be minor. Changes in temporary populations of people using the lake and staying at the campgrounds or visiting Lawrenceville would also be minor.

<u>Cowanesque, Tioga, Chemung, and Susquehanna Rivers</u>

No change in recreational watercraft use of receiving rivers would be expected because the increase in low flows would be generally undetectable by recreational watercraft users. Minor long-term economic effects would occur via improved fishing opportunities resulting from increased carrying capacity of the receiving rivers for recreational fish species, as described above. No adverse impacts to minority or low-income populations would result from the proposed action.

4.4 Cumulative Impacts

Cumulative impacts accrue incrementally with past, present, and future actions. The USACE operates the Cowanesque Project in tandem with the Tioga-Hammond Reservoirs Project. The latter project is also operated for the primary purpose of providing flood protection for downstream communities along the Tioga, Chemung, and Susquehanna Rivers in south-central New York and northeastern Pennsylvania. Additional USACE reservoirs in New York and Pennsylvania also drain into the Susquehanna River, including Curwensville Lake and Foster Joseph Sayers Dam, from which changes in releases could affect river low flows. No change in low flow releases are pending for Foster Joseph Sayers Lake at this time. However, SRBC applied to USACE for a change in water supply operations in Curwensville Lake in May 2012. An environmental assessment of low flow augmentation considering SRBC-owned storage at Curwensville Lake has not yet been funded. In addition, there will likely be a broad Susquehanna Basin watershed study started within the next few years (provisionally titled "The Susquehanna River Basin Phase II Low (Ecological) Flow Management Study") that would include consideration of altered low flow releases from Tioga-Hammond, Foster Joseph Sayers Dam, and other USACE reservoirs, as well as other state and privately owned reservoirs. Thus, it is likely that over the next decade or more, low flow augmentation releases from USACE and perhaps other reservoirs would be adjusted to compensate for consumptive uses downstream.

Altered consumptive water use by others in the receiving rivers could act cumulatively with the proposed water supply releases from Cowanesque Lake. Consumptive water withdrawals in the Susquehanna Basin are governed/regulated by SRBC. USACE has membership in SRBC and provides input to decisions made by SRBC, but SRBC commissioners also include other state and Federal constituents. Consumptive users must apply for an SRBC permit, and must also report their water usage. In its review of withdrawal application permits, SRBC establishes appropriate limitations, conditions, and mitigation to allow for reasonable water use, while minimizing impacts from regulated withdrawals on downstream uses, including instream uses for aquatic life. Permits typically require that during low flow situations large-scale consumptive users must either: (1) reduce or cease withdrawing water, (2) provide supplemental make-up water on their own in an amount equal to the consumptive use, or (3) pay a fee into an SRBC fund which SRBC uses to acquire supplemental sources of water (such as from Cowanesque Lake) for release during droughts. Through these mechanisms, SRBC has substantial capability to compensate for consumption impacts during minimal instream flow conditions. SRBC mandated safeguards, in conjunction with consumptive use mitigation flow releases from Cowanesque Lake and other water storage projects, ensure the effects of consumptive use will be limited in the future. However, SRBC is not able to ensure stable instream flows during naturally occurring drought conditions with ongoing consumptive use mitigation adequate to prevent ecological harm.

If the increased frequency of releases from Cowanesque Lake are utilized to offset additional consumptive use, mitigation from consumptive use impacts to the aquatic ecosystems of the Cowanesque, Tioga, Chemung, Middle Susquehanna, and Lower Susquehanna Rivers would be reduced (or eliminated). Of particular concern recently to citizens has been possible increased water withdrawal by the natural gas industry to be used for hydraulic fracturing (fracking). All water withdrawals from the Susquehanna River system by the natural gas industry are regulated by SRBC. Each natural gas extraction project must include water use plans that ensure withdrawals are not harmful to streams during low flow conditions.

SRBC consumptive use approvals are typically issued for a duration of 15 years. All SRBC approvals also contain a standard reopener clause. Over time, and with new SRBC instream flow policies and practices predicated on the findings documented in TNC's "Ecosystem Flow Recommendations for the Susquehanna River Basin" report, SRBC intends to achieve more consistent consumptive use mitigation and low flow protection. Consistent with recommendations in the Consumptive Use Mitigation Plan, SRBC has committed to identifying and securing additional sources of consumptive use mitigation for existing and projected consumptive use in the basin. Those projects will afford the opportunity for SRBC to implement consumptive use mitigation measures based on contemporary thresholds rooted in TNC's ecosystem flow recommendations.

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5.0 COMPLIANCE WITH ENVIRONMENTAL STATUTES

Normal water releases from dams have been determined not to constitute discharges of pollutants in U.S. Supreme Court cases. Because there is no proposed discharge of dredged or fill material into waters of the United States, no 404(b)(1) Analysis was prepared for this EA. The effect altered Cowanesque Lake pool levels would have, including to SAV and wetlands, are not Clean Water Act regulated impacts. No Water Quality Certificate pursuant to Section 401 of the Clean Water Act would be required from Pennsylvania because no withdrawals of water or direct releases of pollutants are proposed. No Clean Air Act conformity analysis is necessary because no physical construction work would occur and changes in operations of the dam would be de minimis in nature with regard to energy consumption/ air pollution. While Pennsylvania does regulate the operations of dams in the state under 25 Pennsylvania Code 105.131, the Federal government would take the view that there is no waiver of sovereign immunity for that statute for a dam that is owned and operated by the Federal government.

In addition to the environmental impacts discussed in this EA, a review of the proposed action has been made with regard to other potential areas of concern. Table 5-1 presents a summary of pertinent Federal regulations and the proposed action's compliance status.

Table 5-1: Compliance of the Proposed Action With Potentially Pertinent Environmental Protection Statutes and Other Requirements.

Federal Statutes	Expected Level of Compliance[1]
Anadromous Fish Conservation Act	N/A
Archeological and Historic Preservation Act	Full
Clean Air Act	N/A
Clean Water Act	N/A
Comprehensive Environmental Response, Compensation and Liability Act	N/A
Endangered Species Act	Full
Estuary Protection Act	Full
Farmland Protection Policy Act	N/A
Federal Water Project Recreation Act	Full
Fish and Wildlife Coordination Act	Full
Land and Water Conservation Fund Act	Full
National Environmental Policy Act	Full
National Historic Preservation Act	Full
Resource Conservation and Recovery Act	N/A
Rivers and Harbors Act	Full
Submerged Land Act	Full
Water Resources Planning Act	Full
Watershed Protection and Flood Prevention Act	N/A
Wild and Scenic Rivers Act	N/A
Executive Orders (EO), Memoranda, etc.	
Protection and Enhancement of Environmental Quality (E.O. 11514, 1977)	Full
Protection and Enhancement of Cultural Environment (E.O. 11593)	Full
Floodplain Management (E.O. 11988)	Full
Protection of Wetlands (E.O. 11990)	Full
Environmental Justice (E.O. 12898)	Full
Recreational Fisheries (E.O. 12962)	Full
Protection of Children from Environmental Health Risks and Safety Risks (E.O.13045)	Full
Chesapeake Bay Protection and Restoration (E.O. 13508)	Full
Stormwater Discharges 40 CFR 122.26 (B)(14), 19 Nov 1990	N/A

1 Levels of Compliance

a. Full Compliance: having met all requirements of the statute, E.O., or other environmental requirements for the current stage of planning.

b. Partial Compliance: not having met some of the requirements that normally are met in the current stage of planning.

c. Non-Compliance: violation of a requirement of the Statute, E.O., or other environmental requirement.

d. Not-Applicable: no requirements for the statute, E.O., or other environmental requirement for the current stage of planning.

6.0 COORDINATION/PUBLIC INVOLVEMENT

In compliance with the National Environmental Policy Act (NEPA), the proposed action has been coordinated with concerned resource agencies and the public. The purpose of coordination is to ensure that environmental and social factors are considered while planning and executing a prudent and responsible action.

USACE and SRBC communicated throughout the action planning process. USACE is responsible for agency and public coordination for the proposed water supply releases. Previously, SRBC undertook limited external coordination in 2011 during their technical investigations. That coordination is also incorporated into this draft EA.

SRBC held a public workshop in June 2011 in Lawrenceville, PA, to present information on the alternative plans under consideration. SRBC sent out a letter on August 4, 2011 informing resource agencies of their proposed study and requested information. SRBC coordinated with the U.S. Fish and Wildlife Service (USFWS) as part of this effort. These coordination efforts were adopted by USACE for use in this draft EA to meet requirements of NEPA and the Fish and Wildlife Coordination Act. Written and email responses received by SRBC expressed general support for increased low flow augmentation, but expressed some concern over whether this could increase individual withdrawals from rivers, and withdrawals by gas companies.

USACE mailed out a public notice announcing preparation of the environmental assessment by first class mail on October 11, 2012. Subsequently, several study initiation public notices were re-mailed on November 14, 2012 that had come back undeliverable because of address errors. The public notice was submitted to Federal, state, and local agencies, requesting written comments concerning interests within the agency's area of responsibility. Copies of the notice were also sent to a mailing list of nearby residents. One first class mail and two e-mail response to the public notice were received that requested additional information be provided as details develop.

A Notice of Availability (NOA) announcing the public availability of the draft Finding of No Significant Impact (FONSI) and EA for review will be sent to the mailing list contained in Annex A. Copies of the draft FONSI and EA will be sent to Federal, State, and local resource agencies. In addition, copies of the draft EA will be sent to the public libraries in Elkland, Wilkes-Barre, and Harrisburg, PA, as well as Elmira, Corning, Waverly, and Binghamton, NY. The public comment period will be open for 30 days.

Annex A contains a summary of coordination efforts, a copy of the study initiation notice, a copy of the notice announcing the availability of the draft EA for public and agency review, and copies of written responses from resource agencies.

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7.0 CONCLUSION

The environmental consequences associated with optimizing use of Cowanesque Lake water for downstream consumptive mitigation and to support ecological low flows have been evaluated and assessed by USACE (Table 7-1). Alternatives to the proposed action have been described and evaluated in this EA. Alternative WBH95 was selected as the recommended plan. The proposed action would require a modification of the water control plan for Cowanesque Lake.

As compared to the no action alternative (current water supply release operations), the WBH95 alternative includes the same volume of available water supply storage and a slightly lower flow rate of low flow augmentation from the lake. The major difference is the frequency of Cowanesque releases tied to the trigger flow, Q7-10 versus P95, and the hydrologic analyses used to calculate these flows. Because the current Q7-10 trigger flow is based on an analysis of annual flow records, it is a constant year round value. The P95 trigger flows were developed from an analysis of monthly flow records which vary widely by time of the year. Thus, the P95 trigger flow values vary month to month. The numerical values of Q7-10 and P95 are not that much different in the critical low flow months (see Table 2), but differ more greatly in other months.

The proposed action is expected to make a net positive contribution to the Cowanesque, Tioga, Chemung, and Middle Susquehanna River mainstems by partially offsetting flow losses from human consumptive use during low flow conditions. Partial flow offsets would occur along 155 to 274 miles of mainstem river, depending on whether the Wilkes-Barre or Harrisburg gages, respectively, are utilized to trigger releases from Cowanesque Lake. The releases would reduce adverse impacts in the receiving rivers under low flow conditions from consumptive use to a wide array of aquatic plants and animals via improved water quality and increased quantity of water and instream habitat. Two state rare mussels that are vulnerable to low flow conditions would likely benefit. One state rare amphibian species may also benefit. Improved water quality and instream habitat quantity would provide a minor benefit to recreational fish species and to fishermen on these rivers. While releases would likely occur infrequently, benefits to the receiving rivers' aquatic ecosystem would be long-term because the offsets would reduce adverse effects to populations of aquatic plants and animals that would otherwise occur during stressful conditions that produce longer lasting impacts. Surviving organisms, and their offspring, would remain to maintain higher population levels in the receiving rivers.

Forecasting from results of simulation modeling, it would be expected that under no action there would be approximately a 36 percent chance each year that water supply releases that would cause drawdowns of greater than one foot would be made. With the WBH95 alternative, it would be expected that the chance each year of water supply releases that would cause drawdowns of greater than one foot would increase to approximately 44 percent. Thus, there would a minor increase in the frequency when water supply releases would be from Cowanesque Lake. Duration, magnitude, and timing of the releases would be very similar under no action versus alternative WBH95 for median drawdown events. In severe drought years, duration of drawdowns would increase by tens of days. As a consequence of these changes, minor adverse impacts would occur to SAV, wetlands, fish, and recreational use at Cownesque Lake during the increased years with lake drawdowns. No rare species would be adversely impacted at Cowanesque Lake.

Table 7-1: Summary Table of Environmental Consequences

		Cowanesque Lake			Receiving Rivers	
		Type of Impact (1)	Duration of Impact (2)		Type of Impact (1)	Duration of Impact (2)
Physical Environment						
1	Topography	*	N/A		*	N/A
2	Geology and Soils	A	M		B	W
3	Hydrology	A	M		B	W
4	Water Quality	*	N/A		B	W
5	Climate	*	N/A		*	N/A
6	Air Quality	*	N/A		*	N/A
7	Noise	*	N/A		*	N/A
Habitats and Living Things						
1	Open Water and Shorelines	A	M		B	W
2	Submerged Aquatic Vegetation	A	M		B	W
3	Wetlands	A	M		B	W
4	Upland Vegetation	N/A	N/A		N/A	N/A
5	Macroinvertebrates and Finfish	A	M		B	W, M
6	Wildlife	*	N/A		B	W, M
7	Rare, Threatened, and Endangered Species	*	N/A		B	W
Community and Socioeconomic Setting						
1	Land Use	*	N/A		*	N/A
2	Cultural and Historical Resources	*	N/A		*	N/A
3	Hazardous, Toxic, and Radioactive Wastes	*	N/A		*	N/A
4	Transportation and Navigation	*	N/A		*	N/A
5	Water Supply and Use	*	N/A		*	N/A
6	Parks and Wild and Scenic Rivers / American Heritage Rivers	A	M		B	W
7	Recreation and Aesthetics	A	M		B	W
8	Population and Socioeconomic Conditions	*	N/A		*	N/A

(1) A = Adverse
B = Beneficial
* = Negligible
C = Change that is neither + or -

(2) Y = Years
M = Months
W = Days/Weeks
N/A = Not Applicable

In light of the minor effects described above and inherently mitigational nature of the proposed action, it has been determined that the preparation of an Environmental Impact Statement is not warranted. A Finding of No Significant Impact (FONSI) was prepared, a copy of which is provided at the beginning of this EA. The water supply releases from Cowanesque Lake are meant to help offset, to the greatest extent possible, the downstream ecosystem impacts caused by human activities consumptively using water. These releases are intended to augment, but not maintain, natural stream flows which can continue to drop naturally during dry conditions. Accordingly, it will be incumbent upon SRBC to continue to be vigilant in implementing instream flow protection policies and plans, such as the Low Flow Protection Policy and Consumptive Use Mitigation Plan, to ensure that the revised Cowanesque Lake water supply releases meet their intended purpose over time. These increased releases, in combination with other instream flow protection requirements and measures, represent an integrated approach to protecting the aquatic ecosystems of the Cowanesque, Tioga, Chemung, and Susquehanna Rivers.

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8.0 REFERENCES

Friends of the Chemung River Watershed. 2013. Website. http://www.chemungriverfriends.org/index.php. Accessed January 2013.

Madsen, T., and N. Willcox. 2006. Air Pollution and Public Health in Pennsylvania. PennEnvironment Research & Policy Center. Philadelphia, PA. 48 pages.

Najjar, R., C. Pyke, M.B. Adams, D. Breitburg, C. Hershner, M. Kemp, R. Howarth, M. Mullholand, M. Paolisso, D. Secor, K. Sellner, D. Wardrop, R. Wood. 2010. Potential climate-change impacts on the Chesapeake Bay. Estuarine Coastal and Shelf Science. 86:1-20.

Nature Serve. 2012. Nature Serve Explorer; An Online Encyclopedia of Life. *Myotis septentrionalis*, Accessed Nov. 2012. http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Myotis+septentrionalis

New York State Deparment of Environmental Conservation. 2013. Outdoor activities, fishing, Tioga River. Website accessed January 2013. http://www.dec.ny.gov/outdoor/88219.html

Pennsylvania Department of Environmental Protection. 2002. Tioga River Watershed TMDL. Tioga County, 15 pages plus attachments. http://www.epa.gov/reg3wapd/tmdl/pa_tmdl/TiogaRiver/TiogaRiverReport.pdf

Pennsylvania Department of Environmental Protection. 2010. 2010 Pennsylvania Integrated Water Quality Monitoring and Assessment Report, Clean Water Act Section 305(b) and 303(d) List.

Pennsylvania Fish and Boat Commission. 2011. Susquehanna River Management Plan. Bureau of Fisheries. Harrisburg, PA. http://fishandboat.com/water/rivers/susquehanna/SusquehannaRiverMgmtPlan.pdf

Pennsylvania Fish and Boat Commission. 2009. Susquehanna Smallmouth Bass Public Meeting — January 31, 2009. Website http://fishandboat.com/susquehannabass.htm accessed January 2013.

Pennsylvania Natural Heritage Program[20]. 2012. Aquatic Community Classification. http://www.naturalheritage.state.pa.us/aquaticsUserMan.aspx

Snyder, B. 2005. The Susquehanna River Fish Assemblage: Surveys, Composition and Changes. American Fisheries Society Symposium 45:451-470.

[20] Pennsylvania Natural Heritage Program is a partnership between The Department of Conservation and Natural Resources, the Western Pennsylvania Conservancy, the Pennsylvania Game Commission, and the Pennsylvania Fish and Boat Commission

Susquehanna River Basin Commission. 2006. Chemung Subbasin Survey: A Water Quality and Biological Assessment, June - August 2006. Publication 251 19 pages. September 2007 http://www.srbc.net/pubinfo/techdocs/Publication_251/techreport251.pdf

Susquehanna River Basin Commission. 2008. The Susquehanna River Basin Water Quality Assessment Report. Publication No. 255. March 31, 2008. 20 pages plus appendices. http://www.srbc.net/pubinfo/techdocs/publication_255/305breport2008.pdf

Susquehanna River Basin Commission. 2008. Consumptive Use Mitigation Plan. SRBC Publication 253.

Susquehanna River Basin Commission. 2010. 2010 Susquehanna Large River Assessment Project. Publication 276. September 2011. 11 pages. http://www.srbc.net/pubinfo/techdocs/Publication_276/techreport276.htm#fullreport

Susquehanna River Basin Commission. 2012. Optimizing use of commission-owned water storage at Cowanesque Lake, Pennsylvania. May 2012. Report and appendices. Pagination by section. Prepared by EA Engineering, Science, and Technology. http://www.srbc.net/planning/cowanlakewaterstorage.htm

Susquehanna River Basin Commission and USACE. Susquehanna River Basin Ecological Flow Management Study Phase I. Section 729 Watershed Assessment. April 2012. 45 pages plus appendices. http://www.srbc.net/planning/assets/documents/Susquehanna%20River%20Basin%20Ecological%20Flow%20Management%20Phase%20I.pdf

Susquehanna River Basin Commission. 2013. State of the Susquehanna. http://www.srbc.net/stateofsusq/habitat.htm

The Nature Conservancy. 2010. Ecosystem Flow Recommendations for the Susquehanna River Basin. Report to the Susquehanna River Basin Commission and U.S. Army Corps of Engineers. November 2010. Harrisburg, PA. 96 pages plus appendices. http://www.srbc.net/policies/docs/TNCFinalSusquehannaRiverEcosystemFlowsStudyReport_Nov10_20120327_fs135148v1.PDF

The Nature Conservancy. 2012. Draft summary of information from Susquehanna Ecosystem Flow Study applicable to C2 study. Memorandum Prepared for SRBC. 7 pages.

USACE. 2002. Tioga, Hammond, and Cowanesque Lakes Master Plan: 2002 Update/Programmatic Environmental Assessment. Baltimore District.

USACE. 2005. Master Manual for Reservoir Regulation, Susquehanna River Basin, Volume I - Upper Basin, Appendix F - Cowanesque Lake. Baltimore.

USACE. 2007. Operational Management Plan Cowanesque Lake, Tioga-Hammond & Cowanesque Lakes Project.

USACE. 2009. Tioga-Hammond & Cowanesque Lakes Fish Stocking Report.

USACE. 2011. Cowanesque Lake. Retrieved August 3, 2011, http://www.nab.usace.army.mil/Recreation/cowanesque.htm and http://www.nab.usace.army.mil/EOC/Reservoirs/cowanesque.htm

U.S. Department of Agriculture. 2013. Natural Resources Conservation Service. Web Soil Survey. Accessed January 2013. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

U.S. Geological Survey. 2013. Current conditions for Pennsylvania - streamflow. http://waterdata.usgs.gov/pa/nwis/current/?type=flow

Wellsboro Chamber of Commerce. 2013. History of Wellsboro. http://www.wellsboropa.com/pages/welcome/history.php

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Annex A

PUBLIC AND AGENCY COORDINATION

Table of Contents

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Coordination for the proposed water supply release modifications was undertaken first by SRBC and then later by USACE. Tables A1 and A2 below provide a summary of these efforts.

Table A1: USACE Coordination Record Summary. Asterisk indicates copy of document provided in this EA.

Date	Persons Contacted/ Agencies or Organizations	Mode of Contact	Summary
Feb 25, 2013	Thomas Bell of NYDEC to Chris Spaur USACE	email	Thomas responding to request for information on hellbender distribution. Is potential for it to occur anywhere in Susquehanna main stem in NY .
Nov 21, 2012	Jennifer Siani of USFWS to Chris Spaur USACE	Phone conversation	Discussed level of USFWS involvement for preparation of FWCA report. Jennifer hasn't previously received funding transfers from USACE for this purpose. Is fine with preparing just a letter as USFWS response. Provide her additional information when available. Initial information has been generic.
Nov 14, 2012	John Metrick NRCS to Michele Gomez USACE	Letter*	John received public notice. Provided list of NRCS's concerning interests.
Nov 6, 2012	Chris Spaur USACE to Jennifer Siani and Clint Riley USFWS	email	Inquired about level of USFWS involvement in assessment.
Nov 6, 2012	James Miller PADEP to Dan Bierly USACE	Letter*	Response to USACE project notice. Contact Waterways and Wetlands Program if project would involve an acre of more of earth disturbance or if any work would take place within a NY wetland, stream, or the 100 year floodway.
Oct 26, 2012	John Booser PADEP to Michele Gomez	Phone message	John received public notice. Would like additional information. Has previously responded.
Oct 23, 2012	Gerrold MCormick Susquehanna Steam Electric Station to Michele Gomez USACE	Phone conversation	Gerrold is new contact for station. Received public notice. Provided contact information.
Oct 10, 2012	Dan Bierly USACE to mailing list of agencies, organizations, and citizens	Public notice*	Announced preparation of EA for water supply release plan modification.

Table A2: Summary of Previous SRBC Coordination

Date	Persons Contacted/ Agencies or Organizations	Mode of Contact	Summary
Aug 30, 2011	Clint Riley USFWS to John Balay SRBC	Letter	Response to letter of Aug 4, 2011. Except for transients, no federally listed or proposed threatened or endangered species known to occur within project area. Three bald eagle nests located at Cowanesque Lake. Is protected under Bald and Golden Eagle Protection Act. Recommends protecting low flows and mimicing natural seasonal water fluctuations.
Aug. 29, 2011	Dave Garg PADEP to Matthew Shank SRBC	email	Dave offered comments on SRBC letter proposing optimizing use of water supply. There are a number of dischargers below Cowanesque Lake. Increasing summer lowflows would dilute these discharges, provided releases aren't consumed by gas companies. Unclear whether lowering lake level would have any effect on upstream discharges. Recommended determining impact on downstream public water supply agencies.
Aug 24, 2011	Tom Randis PADEP to Matthew Shank SRBC	Phone conversation	Tom expressed concerns over any decrease in flows from Q7-10 during drought periods because of inadequate downstream dilution. Any increase in baseflow during lowflow conditions would be a win-win. Tom expressed concern over SRBC allowing other additional withdrawals.
Aug 8, 2011	Jason Deter PA to Matthew Shank SRBC	email	Jason expressed concerns of effects of altered reservoir pool levels at Curwensville Lake to recreational fish populations, fishing, and boating.
Aug 4, 2011	John Balay SRBC to resource agencies on mailing list.	Letter	Informed agencies of SRBC's investigations to optimize use of water supply storage at Cowanesque and Curwensville Lakes and requesting initial input.

US Army Corps of Engineers
Baltimore District

Planning Division

Public Notice

Cowanesque Lake Project
Tioga County, Pennsylvania

The U.S. Army Corps of Engineers, Baltimore District (USACE), is investigating a revised plan of operation for the water supply storage owned by the Susquehanna River Basin Commission (SRBC) at Cowanesque Lake, Pennsylvania (Enclosure).

At the request of SRBC, the USACE will examine ways to more effectively use SRBC-owned water storage at Cowanesque Lake through modifications to the current water release operations plan. The purpose of the proposed change is to help offset downstream consumptive water use and to help support ecosystem flow needs recently identified by The Nature Conservancy.

An environmental assessment (EA) will be developed and will examine alternate operations to the baseline (existing) operation. The current investigations for Cowanesque Lake focused on the impact of alternative operations to key resource considerations such as water quality, submerged aquatic vegetation, wetlands, terrestrial resources, fish, and recreation. Other factors to be investigated are lake drawdown (magnitude, frequency, and duration) and seasonality of water supply releases. The no action alternative will be the current plan of operation (i.e., the baseline alternative) and its current impacts will be compared to the impacts of other alternatives considered.

USACE is in the process of examining alternative operations at the lake and preparing an environmental assessment. The purpose of this notice is to request information concerning interests within your organization's area of responsibility and to help identify issues that may affect the implementation of future projects.

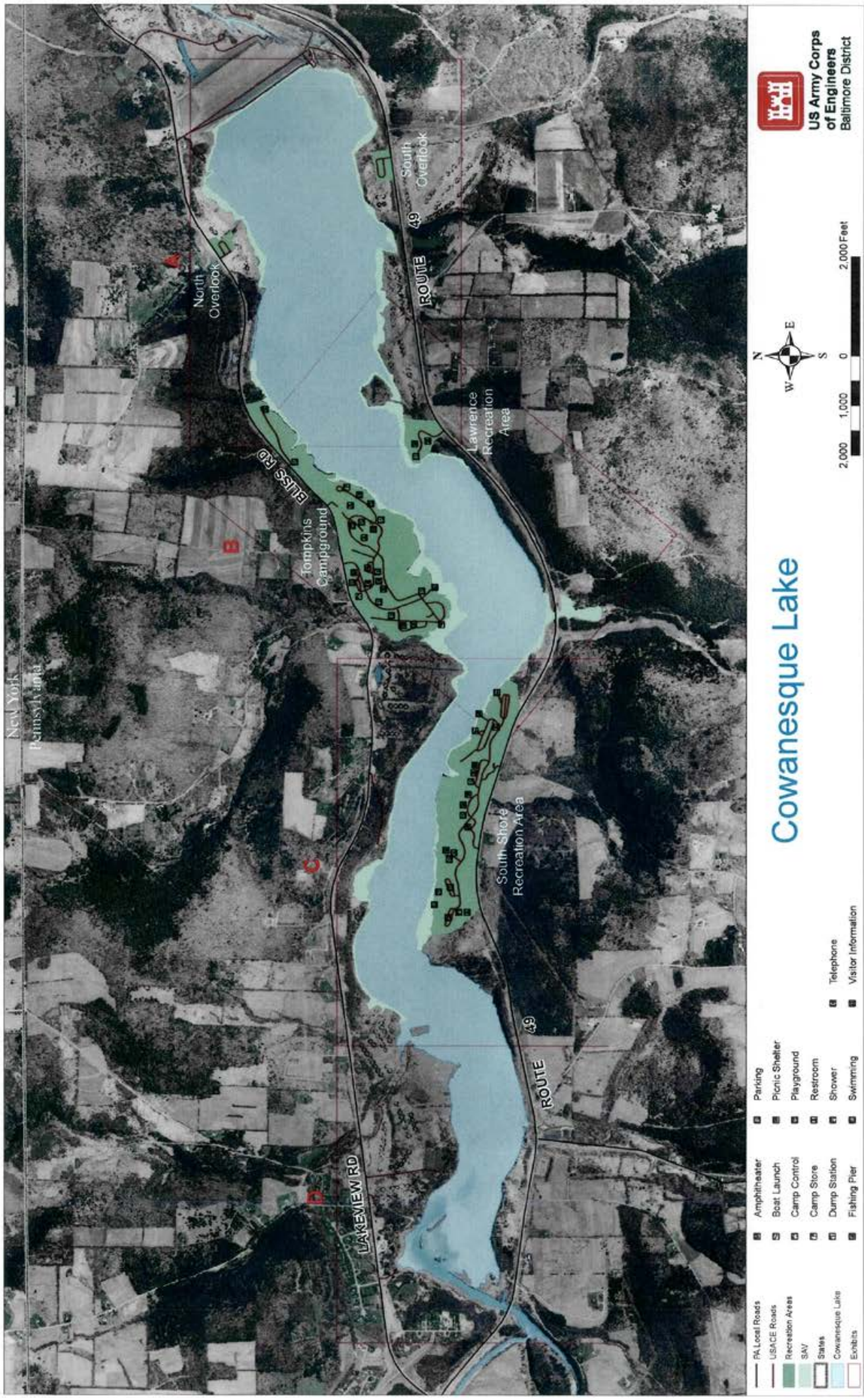
For Federal and state resource agencies receiving a copy of this letter, we request that you provide information concerning interests within your organization's area of responsibility or expertise within 30 days from the date of this notice. Please send correspondence to the address below. Some agencies will also receive specific requests for information from our office in the near future.

U.S. Army Corps of Engineers, Baltimore District
ATTN: CENAB-PL-P (Gomez)
P.O. Box 1715
Baltimore, Maryland 21203-1715

If you have any questions regarding this project, please contact Ms. Michele Gomez of our Civil Project Development Branch at (410) 962-5175 or by e-mail at michele.gomez@usace.army.mil

Sincerely,

Dan Bierly
Acting Chief, Civil Project Development Branch


Cowanesque Lake
US Army Corps of Engineers
Baltimore District
North Overlook
South Overlook
Lawrence Recreation Area
Tompkins Campground
South Shore Recreation Area
ROUTE 49
LAKEVIEW RD
New York
Pennsylvania
PA Local Roads
USACE Roads
Recreation Areas
SAV
States
Cowanesque Lake
Exhibits
Amphitheater
Boat Launch
Camp Control
Camp Store
Dump Station
Fishing Pier
Parking
Picnic Shelter
Playground
Restroom
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Swimming
Telephone
Visitor Information
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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHCENTRAL REGIONAL OFFICE

November 6, 2012

Dan Bierly, Acting Chief
Civil Project Development Branch
US Army Corps of Engineers, Baltimore District
Attn: CENAB-PL-P (Gomez)
PO Box 1715
Baltimore, MD 21204-1715

Re: Cowanesque Lake Project
Tioga County

Dear Mr. Bierly:

I am writing in regards to the above referenced project proposal. Regional staff has completed a preliminary review of your submittal and offer the following comments:

- Please contact this office's Waterways and Wetlands Program if the proposed project will involve an acre of more of earth disturbance or if any work will take place within any wetland, stream or the 100 year floodway.

Sincerely,

James E. Miller
Assistant Regional Director

cc: Dave Garg
ARD File
File

208 West Third Street, Suite 101 | Williamsport, PA 17701-6448
Phone 570.327.3695 | Fax 570.327.3565 www.depweb.state.pa.us

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United States Department of Agriculture

NRCS
Natural Resources Conservation Service
One Credit Union Place, Suite 340
Harrisburg, PA 17110-2993

Phone: 717-237-2214
Fax: 717-238-2239
Email: john.metrick@pa.usda.gov

November 14, 2012

U.S. Army Corps of Engineers, Baltimore District
ATTN: CENAB-PL-P (Gomez)
P.O. Box 1715
Baltimore, MD 21203-1715

Re: Cowanesque Lake, Tioga County, Pennsylvania

Dear Ms. Gomez:

The Pennsylvania State Office of the USDA Natural Resources Conservation Service (NRCS) has received a letter about the development of a revised plan of operation for the water supply storage by the Susquehanna River Basin Commission (SRBC) at Cowanesque Lake, Pennsylvania.

Below are NRCS's concerning interests

- Soil suitability and limitations
- Provisions for erosion, sediment, and dust control
- Water discharges
- Effects of disruption to the natural drainage patterns and severance of private land units
- Impact on previously installed soil and water conservation management systems
- Impacts on prime and unique farmland
- Impacts on ecosystems
- Impact on other NRCS-related projects

Respectfully,

John J. Metrick
Natural Resource Specialist

Helping People Help the Land

An Equal Opportunity Provider and Employer

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Mailing List

Citizens, Private Organizations, and Companies

Mr. Matt Benesh, Asst. Director
Bath Electric Gas and Waters Systems
P.O. Box 310
Bath, NY 14810

Mr. Scott R. Cogley
Three Mile Island, Unit 1
Chemistry/Environmental Dept.
Middletown, PA 17057

Mr. Gerrold McCormick, Sr. Env. Scientist
Susquehanna Steam Electrical Station
769 Salem Boulevard (NUCSA3)
Berwick, PA 18603

Mr. Curtis H. Saxton, Sr. Env. Scientist
Susquehanna Steam Electrical Station
76 Salem Boulevard
Berwick, PA 18603

Mr. Jan Phillips
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Allentown, PA 18104

Dr. Robert Hoffman
Director
Ducks Unlimited
1220 Eisenhower Place
Ann Arbor, MI 48108

Scott R. Cogley
Exelon Energy
Chemistry / Environmental Department
Post Office Box 480
Middletown, PA 17057

Patrick Renshaw
PPL Susquehanna LLC
NUCWH2
769 Salem Road
Berwick, PA 18603

Mr. Jeff Elseroad
EA Engineering, Science and Technology, Inc.
225 Schilling Circle, Suite 400
Hunt Valley, MD 21031

New York Elected Officials

Senator Kristen Gillibrand
Hanley Federal Building
100 S. Clinton Street, RM 1470
Syracuse, NY 13261

Congressman Thomas Reed
U.S. House of Representatives
District Office
105 E. Steuben St
Bath, NY 14810

Senator Charles Schumer
District Office
15 Henry Street, Room M103
Binghamton, NY 13901

Honorable Thomas W. Libous
1607 State Ofice Building
44 Hawley St
Binghamton, NY 13901

Honorable Philip J. Palmesano, Assemblyman
105 E. Steuben St
Bath, NY 14810

Honorable Thomas F. O'Mara

105 E. Steuben St
Bath, NY 14810

Mr. Philip J. Roche, Chairman
Steuben County Legislature
5 Fox Lane East
Painted Post, NY 14870

Mr. Dale Weston, Chair
Tioga County
County Office Building
56 Main St.
Owego, NY 13827

Pennsylvania Elected Officials

Senator Robert Casey, Jr.
393 Russell Senate Building
Washington, DC 20510

Senator Patrick J. Toomey
248 Russell Senate Building
Washington, DC 20510

Congressman Tom Marino
U.S. House of Representatives
1020 Commerce Park Drive, Suite 1A
Williamsport, PA 17701

Congressman Glenn Thompson
U.S. House of Representatives
Bellefonte Office
3555 Benner Pike, Suite 101
Bellefonte, PA 16823

Mr. Erick J. Coolidge, Chairman
Tioga County Commissioners
118 Main St.
Wellsboro, PA 16901

Diana Barnes, Mayor
Lawrenceville Borough
6 Mechanic Street
PO Box 287
Lawrenceville, PA 16929

Federal Government

Ms. Denise Coleman, State Conservationist
US. Dept. Of Agriculture,
Natural Resource Conservation Service
One Credit Place, Suite 340
Harrisburg, PA 17110

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Regional Administrator
Environmental Protection Agency - Region II
290 Broadway
New York, NY 10007

Ms. Marilyn Jones, Operations Manager
USACE/Cowanesque Lake
Box 65, RD 1
Tioga, PA 16946

Field Supervisor
U.S. Fish And Wildlife Service - New York Field Office
3817 Luker Rd.
Cortland, NY 13045

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US EPA, Region 3
1650 Arch St.
Philadelphia, PA 19103

Field Supervisor
USFWS
PA Field Office
315 S. Allen St, Suite 322
State College, PA 16801

Mr. David Dropkin
USGS
176 Straight Run Rd.
Wellsboro, PA 16901

Mr. Bill Lellis
USGS
176 Straight Run Rd
Wellsboro, PA 16901

Mr. Rocky Ward
USGS
176 Straight Run Rd
Wellsboro, PA 16901

Astor Boozer
State Conservationist
USDA Natural Resources Conservation Service – New York
441 South Salina Street
Syracuse, NY 13202

David Lange
National Park Service
200 Chestnut Street
Philadelphia, PA 19106

Paul O. Swartz
Executive Director
Susquehanna River Basin Commission
1721 N. Front Street
Harrisburg, PA 17102

Laura Quinn-Willingham, Project Manager
U.S. Nuclear Regulatory Commission
Office of New Reactors
Mail Stop T6-C32
11555 Rockville Pike
Rockville, MD 20852

State Government

Ms. Jean Cutler
Bureau for Historic Preservation
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

Community Conservation Partnerships Program, Advisor
Pennsylvania Dept of Conservation and Natural Resources
330 Pine Street, Suite 300
Williamsport, PA 17701

NYSDEC Region 8 Offices
Avon Office
6274 Avon-Lima Rd. (Rtes. 5 and 20)
Avon, NY 14414-9516

NYSDEC
Region 7 Office
615 Erie Blvd. West
Syracuse, NY 13204-2400

Ms. Brenda Barrett, Director
Pennsylvania Dept of Conservation and Natural Resources
400 Market Street
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Mr. Wes Fahringer, Advisor
Pennsylvania Dept of Conservation and Natural Resources
Recreation and Parks
330 Pine Street, Suite 300
Williamsport, PA 17701

Chris Abruzzo, Acting Secretary
PADEP
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400 Market Street
Harrisburg, PA 17101

Mr. Joseph Silikoski
PADEP
Mansfield Office
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Mansfield, PA 16933

Mr. John A. Arway, Executive Director
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Mr. Greg Podneisinski
Pennsylvania/Natural Heritage Program
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Harrisburg, PA 17105

NYSDEC
Bureau of Fisheries
625 Broadway
Albany, NY 12233

Michael Latham
Director
New York State Soil & Water Conservation Committee
10B Airline Drive
Albany, NY 12235

Kenneth P. Lynch, Reg. Dir.
Region 7
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615 Erie Blvd. West
Syracuse, NY 13204-2400

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16th Floor, P.O. Box 2063
Harrisburg, PA 17105-2063

Dr. Robert M. Summers, Secretary
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Montgomery Park Business Center
1800 Washington Blvd.
Baltimore, MD 21230-1708

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Mr. Doug Barton, Director
Tioga County Economic Development and Planning
Tioga County Office Building
56 Main St.
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Diane Fiorentino
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Chemung County Soil and Water Conservation District
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Horseheads, NY 14845

Mr. Josh Browsn, Associate Planner
Tioga County Economic Development and Planning
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Owego, PA 13827

Libraries

Elkland Area Community Library
110 E Parkway Ave
Elkland, PA 16920-1311

Southeast Steuben County Library
300 Civic Center Plaza
Corning, NY 14830

Chemung County Library District
West Elmira Branch
1231 W. Water St.
Elmira, NY 14905

Waverly Free Library - Central Library
18 Elizabeth Street
Waverly, NY 14892-1311

Osterhout Free Library
71 South Franklin Street,
Wilkes-Barre, PA

Harrisburg Downtown Library
101 Walnut St
Harrisburg, PA 17101

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Annex B

SUPPLEMENTAL INFORMATION

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SRBC (2012) Percent of Days Over Simulation Period.

SRBC (2012) simulated lake elevations over a 1930-2007 modeling period as described in Section 2 of the EA. SRBC (2012) presents percent of days over the total modeling period that various drawdown levels would occur. Implications of percent of days over the total modeling period that various drawdown levels would produce is difficult to interpret, because this statistic averages together non-event and drawdown event years. Accordingly, consideration of conditions during drawdown event years and non-event years are not averaged together in the main body of this EA. These modeling data though do provide an additional means to evaluate impacts of the alternatives on the lake, and support the determination of minimal adverse affects. Table B1 below presents a summary of change in days out of the total simulation period of the four viable water supply release alternatives compared to no action.

Table B1: Simulated Cowanesque Lake drawdown frequency of % change in days compared to no action for drawdown intervals.[21] Whole year and recreation season (only) considered.

	Maximum Drawdown Within Range:							
	1-3 ft		3-5 ft		5-10 ft		>10 ft	
Alternative	All Year	Recreation Season	All Year	Recreation Season	All Year	Recreation Season	All Year	Recreation Season
WBH97	0.4%	0.7%	0.6%	0.9%	0.3%	0.1%	0.2%	0.1%
WBH95	2.3%	1.8%	1.3%	1.3%	1.5%	0.6%	0.8%	0.3%
M97	1.6%	1.7%	1.5%	1.3%	1.1%	0.3%	0.5%	0.2%
M95	3.5%	3.3%	2.4%	2.1%	2.4%	0.9%	1.2%	0.4%

Figures B1 and B2 provide a graphical depiction of changes in lake water levels comparing the no action alternative to alternative WBH95 over the whole 78 historical year period simulated (as described in Section 2). Generally, alternative WBH95 would have caused minimal change in lake water levels.

[21] Information summarized from Tables 3-10 and 3-14 of SRBC (2012).

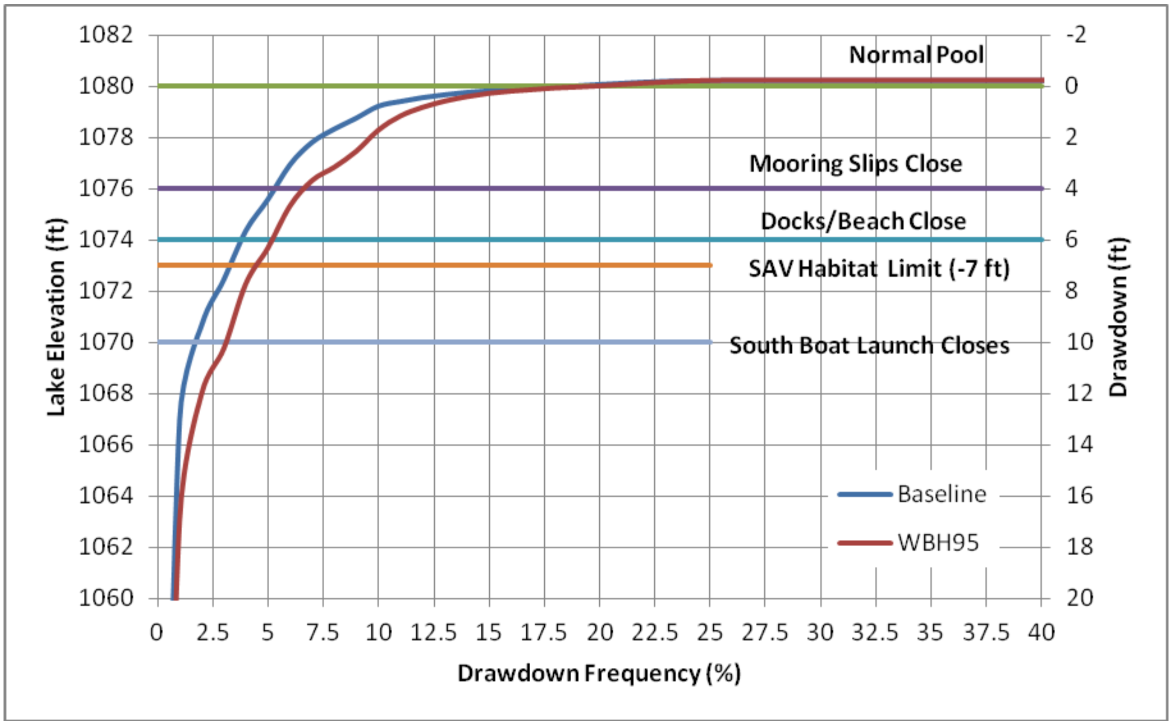

Figure B1: Simulated drawdown frequency curve for Cowanesque Lake over the whole year. Covers entire 78 year modeling period for baseline (no action) and WBH95 alternatives. Lake elevations and drawdowns at which key recreational resources impacted indicated. SAV lowest elevation of occurrence also indicated.

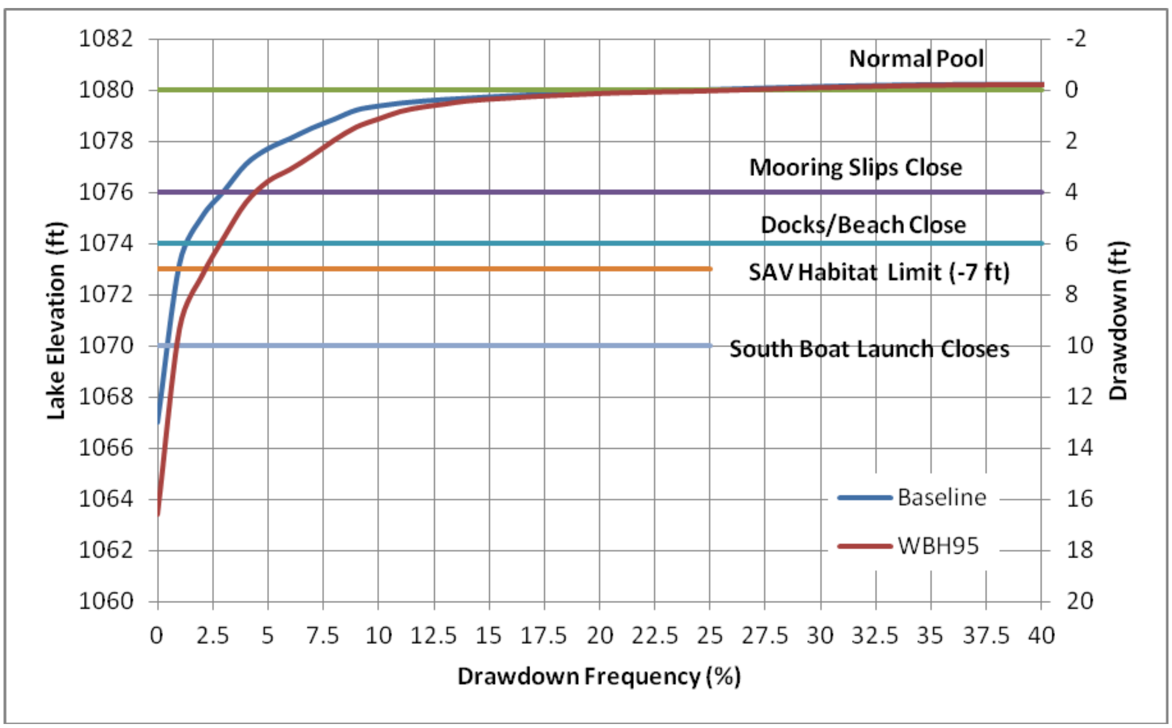

Figure B2: Simulated drawdown frequency curve for Cowanesque Lake during recreation season. Covers 78 year modeling period for baseline (no action) and WBH95 alternatives. Lake elevations and drawdowns at which key recreational resources impacted indicated. SAV lowest elevation of occurrence also indicated.

Select Scientific Names of Plants and Animals.

Plants

COMMON NAME	SCIENTIFIC NAMES
EURASIAN WATERMILFOIL	**(*MYRIOPHYLLUM SPICATUM)***
RIVERWEED	**(*PODOSTEMUM CERATOPHYLLUM*)**
WATER WILLOW	**(*JUSTICIA AMERICANA*)**
LIZARD'S TAIL	**(*SARURUS CERNUUS*)**

Benthic Macroinvertebrates

COMMON NAME	*(SCIENTIFIC NAME)*
EASTERN FLOATER	**(*PYGANODON CATARACTA*)**
ZEBRA MUSSELS	**(*DREISSENA POLYMORPHA*)**

Finfish

COMMON NAME	*(SCIENTIFIC NAME)*
BLACK CRAPPIE	**(*POMOXIS NIGROMACULATUS*)**
SMALLMOUTH BASS	**(*MICROPTERUS DOLOMIEU*)**
LARGEMOUTH BASS	**(*MICROPTERUS SALMOIDES*)**
MUSKELLUNGE	**(*ESOX MASQUINONGY*)**
TIGER MUSKELLUNGE	**(*ESOX MASQUINONGY X LUCIUS*)**
SUNFISH	**(*LEPOMIS SPP.*)**
YELLOW PERCH	**(*PERCA FLAVESCENS*)**
BROWN BULLHEAD	**(*AMEIURUS NEBULOSUS*)**
YELLOW BULLHEAD	**(*AMEIURUS NATALIS*)**
COMMON CARP	**(*CYPRINUS CARPIO*)**
ALEWIFE	**(*ALOSA PSEUDOHARENGUS*)**

Mammals

COMMON NAME	*(SCIENTIFIC NAME)*
NORTHERN MYOTIS	**(*MYOTIS SEPTENTRIONALIS*)**

Rare Species

YELLOW LAMP-MUSSEL	***LAMPSILIS CARIOSA***
GREEN FLOATER	***LASMIGONA SUBVIRIDIS***
BROOK FLOATER	***ALASMIDONTA VARICOSA***
HELLBENDER	***CRYPTO-BRANCHUS ALLEGANIENSIS***

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