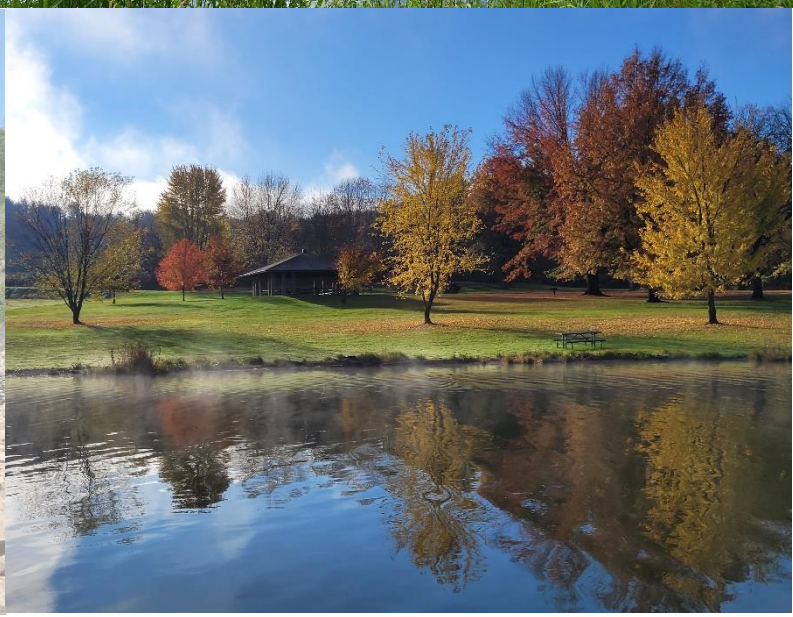
Tioga-Hammond & Cowanesque Lakes

Master Plan

Draft Submittal
April 2025



Tioga-Hammond and Cowanesque Lakes Master Plan
Tioga County, Pennsylvania

Draft Submittal
April 2025

For:
Tioga-Hammond Lake
710 Ives Run Lane
Tioga, PA 16946

and Cowanesque Lake
Lawrenceville, PA 16929

Prepared by:
U.S. Army Corps of Engineers—Baltimore District
2 Hopkins Plaza
Baltimore, Maryland 21201

TIOGA-HAMMOND AND COWANESQUE LAKES MASTER PLAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

FINDING OF NO SIGNIFICANT IMPACT

Environmental Assessment for the Tioga-Hammond and Cowanesque Lakes 2025 Master Plan

Tioga County, Pennsylvania

In accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and 33 Code of Federal Regulations (CFR), Part 230 (U.S. Army Corps of Engineers (USACE) Procedures for Implementing NEPA), the USACE, Baltimore District has assessed the potential environmental, cultural, and social effects of updating the Tioga-Hammond and Cowanesque Lakes Master Plan. The Tioga-Hammond Lakes project was authorized by the Flood Control Act of 1958 and constructed for the primary purpose of flood risk management. Secondary uses of the project lands and waters include recreation and environmental stewardship of natural and cultural resources. The Cowanesque Dam project was authorized by the Flood Control Act of 1958 and similarly constructed for the primary purpose of flood risk management. Secondary uses of the project lands and waters include water supply, recreation and environmental stewardship of natural and cultural resources. Implementation of the 2025 Tioga-Hammond and Cowanesque Lakes Master Plan (hereafter, "2025 Master Plan" or "Master Plan") and proposed land use changes must recognize and be compatible with the primary project purpose of flood risk management and the secondary purposes of recreation, water supply, and environmental stewardship of natural and cultural resources. The original Master Plan for the Tioga-Hammond Lakes was developed in 1974. The original Master Plan for Cowanesque Lake was developed in 1975. Those original Master Plan documents were updated in the 2002 Tioga, Hammond & Cowanesque Lakes Master Plan.

The 2025 Master Plan provides guidance for stewardship of natural resources and management for long-term public access to, and use of, the natural resources at the Tioga-Hammond Lakes and Cowanesque Lake, as well as changes to land classifications and uses of the USACE-managed lands. Land classifications are fundamental to project land management. Land classifications (Table 0-1; Table 0-2) provide for development and resource management consistent with authorized purposes and other federal laws. The Master Plan provides a comprehensive description of the Tioga-Hammond and Cowanesque Lakes projects (also, "the projects"), a discussion of factors influencing resource management and development, new resource management objectives, a synopsis of public involvement and input into the planning process, descriptions of existing development, and considerations of future development activities.

Under the No Action Alternative, USACE would take no action and continue the operation and management of the projects as outlined in the 2002 Master Plan. No new resource analysis or land reclassifications would occur.

The Proposed Action is to adopt the 2025 Master Plan to reflect changes in land management classifications, land and water uses, and USACE regulations and guidance that have occurred since the 2002 Master Plan. The Proposed Action includes coordinating with the public to encourage public understanding and participation. The 2025 Master Plan refines land and water use classifications to meet authorized project purposes and current resource objectives. This includes a mix of natural resource and recreation management objectives

that are compatible with regional goals established by stakeholders and USACE during the master planning process, that recognize outdoor recreation trends and are responsive to public comment. The Proposed Action is an administrative update and does not involve the construction of any physical projects. All future projects would be subject to further NEPA analysis once funding is available and detailed project planning and design occur. The 2025 Master Plan is intended to serve as a comprehensive land and recreation management plan for the next 15 to 25 years. The Proposed Action is needed as required by Engineer Regulation 1130-2-550, Recreation Operations and Maintenance Policies, and Engineer Pamphlet 1130-2-550, Recreation Operations and Maintenance Guidance and Procedures.

Table 0-1 and 0-2 identifies the land and water surface classification changes associated with the Proposed Action for the Tioga-Hammond and Cowanesque Lakes projects, respectively.

Table 0-1 Proposed Changes to Land Classifications at the Tioga-Hammond Lakes Project

Classification	2025 Master Plan (acres)	Description*
Project Operations	419.7	Lands are associated with the dam and spillway structures that are operated and maintained for fulfilling the flood risk management mission of the project.
High Density Recreation	194.0	Lands are currently developed for High Density recreation activities and include boat launches, day-use areas, and campgrounds. The new criteria for this land classification includes areas developed specifically to support intensive recreation activities. This land classification has been developed to support concentrated visitation and use of the recreation facilities they host.
Multiple Resource Management Land		
Low Density Recreation	73.7	Management of this land classification calls for maintaining a healthy, ecologically adapted vegetative cover to reduce erosion and improve aesthetics, while also supporting low-impact recreation opportunities such as bank fishing, hunting, hiking, wildlife viewing, and for access to the shoreline. Hunting is allowed in select areas that are a reasonable and safe distance from High Density Recreation areas, dam operations, and adjacent residential properties. The new land classification criteria include areas where vegetation and wildlife management may be a secondary use, but where recreation is considered the predominant use.
Wildlife Management	3593.0	Wildlife management areas are managed for generalized wildlife in consideration of the threatened and endangered species identified as potentially occurring at the Project sites. Many of these areas are also managed for vegetation to ensure quality of the habitat including removing invasive plant species to support biodiversity.
Vegetative Management	1389.9	This classification includes lands designated for stewardship of forest, prairie, or other native vegetative cover.

Classification	2025 Master Plan (acres)	Description*
Water Surface (Tioga)		
Restricted	1.1	Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, and security purposes.
Open Recreation Area	356.3	Open Recreation area includes all water surface areas available for year-round or seasonal water-based recreation use. This change reflects new classification criteria and no actual change in water use. This area includes all water surface area other than "Restricted" or "Designated No-Wake."
Designated No-Wake	135.5	Designated No-Wake classifies all water use areas that do not allow motorized boats to produce wakes. No-Wake areas are set for public safety at facilities or if lake areas are unsafe to operate at a higher speed. This includes areas such as boat launches and shallow areas. Additionally, the Pennsylvania Fish and Boat Commission (PFBC) does not allow wakes within 100-feet of the shoreline.
Water Surface (Hammond)		
Restricted	3.5	Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, and security purposes.
Open Recreation Area	535.4	Open Recreation area includes all water surface areas available for year-round or seasonal water-based recreation use. This change reflects new classification criteria and no actual change in water use. This area includes all water surface area other than "Restricted" or "Designated No-Wake."
Designated No-Wake	140.1	Designated No-Wake classifies all water use areas that do not allow motorized boats to produce wakes. No-Wake areas are set for public safety at facilities or if lake areas are unsafe to operate at a higher speed. This includes areas such as boat launches and shallow areas. Additionally, the PFBC does not allow wakes within 100-feet of the shoreline.
Total	6,842.3*	

** Mapping for the Master Plan update has been compiled using the best information available and is believed to be accurate. No land classifications were found within the 2002 Master Plan document and therefore are not included in this Master Plan.*

Table 0-2: Proposed Changes to Land Classifications at the Cowanesque Lake Project

Classification	2025 Master Plan (acres)	Description*
Project Operations	4.9	Lands are associated with the dam and spillway structures that are operated and maintained for fulfilling the flood risk management mission of the project.
Mitigation	263.3	Lands associated with mitigation projects within the project area.
High Density Recreation	224.6	Lands are currently developed for High Density recreation activities and include boat launches, day-use areas, and campgrounds. The new criteria for this land classification includes areas developed specifically to support intensive recreation activities. This land classification has been developed to support concentrated visitation and use of the recreation facilities they host.
Multiple Resource Management Land		
Low Density Recreation	1.2	Management of this land classification calls for maintaining a healthy, ecologically adapted vegetative cover to reduce erosion and improve aesthetics, while also supporting low-impact recreation opportunities such as bank fishing, hunting, hiking, wildlife viewing, and for access to the shoreline. Hunting is allowed in select areas that are a reasonable and safe distance from High Density Recreation areas, dam operations, and adjacent residential properties. The new land classification criteria include areas where vegetation and wildlife management may be a secondary use, but where recreation is considered the predominant use.
Wildlife Management	338.8	Wildlife management areas are managed for generalized wildlife in consideration of the threatened and endangered species identified as potentially occurring at the Project sites. Many of these areas are also managed for vegetation to ensure quality of the habitat including removing invasive plant species to support biodiversity.
Vegetative Management	234.5	This classification includes lands designated for stewardship of forest, prairie, or other native vegetative cover.
Water Surface (Cowanesque)		
Restricted	1.3	Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, and security purposes.
Open Recreation Area	766.2	Open Recreation area includes all water surface areas available for year-round or seasonal water-based recreation use. This change reflects new classification criteria and no actual change in water use. This area includes all water surface area other than "Restricted" or "Designated No-Wake."

Classification	2025 Master Plan (acres)	Description*
Designated No-Wake	282.5	Designated No-Wake classifies all water use areas that do not allow motorized boats to produce wakes. No-Wake areas are set for public safety at facilities or if lake areas are unsafe to operate at a higher speed. This includes areas such as boat launches and shallow areas. Additionally, the PFBC does not allow wakes within 100-feet of the shoreline.
Total	2,117.3*	

** Mapping for the Master Plan update has been compiled using the best information available and is believed to be accurate. No land classifications were found within the 2002 Master Plan document and therefore are not included in this Master Plan.*

USACE selected the Proposed Action because it meets regional goals associated with good stewardship of land and water resources, meets regional recreation goals, and allows for continued use and development of project lands without violating national policies or public laws.

USACE used the effects analysis from the Environmental Assessment (EA) and comments received from other agencies to determine whether the Proposed Action requires the preparation of an Environmental Impact Statement (EIS). This included assessment of environmental, social, and economic factors that are relevant to the recommended alternative. The Master Plan update is considered an administrative action and does not evaluate effects from project construction. Therefore, it was determined that no defects would occur to all relevant resources including water and biological resources, soils, air quality, noise, cultural resources, groundwater, utilities, recreation and land use, socioeconomics, and traffic and transportation (Section 3.6 of the EA). Future projects at Tioga-Hammond and Cowanesque Lakes could result in minor effects and/or beneficial effects, which would be analyzed in future NEPA documentation associated with those individual actions.

Conclusion

All applicable laws, executive orders, regulations, and local government plans were considered in the evaluation of alternatives. Based on this report, the reviews by other federal, state and local agencies, Tribes, input of the public, and the review of my staff, it is my determination that the Proposed Action alternative would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an EIS is not required.

_____ _____

Date

Francis B. Pera
Colonel, U.S. Army
Commander and District Engineer

This page intentionally left blank.

1 INTRODUCTION

1.1 PROJECT AUTHORIZATION

The Tioga-Hammond and Cowanesque Lake Projects were authorized by the Flood Control Act (FCA) of July 3, 1958, in accordance with House Document 394, 84th Congress. Construction of the Tioga-Hammond and Cowanesque projects were initiated in 1971 and 1973, respectively. Tioga-Hammond was operationally complete in 1978 and Cowanesque was completed in 1990.

House Document 394, 84th Congress included two reports constituting the project document. The first, containing recommendations for flood control and other beneficial uses included in the 1958 FCA, was a report of the Chief of Engineers entitled the "North Branch of the Susquehanna River and Tributaries, New York and Pennsylvania," dated February 24, 1955. The second was the District Engineer's "Review Report on the North Branch of the Susquehanna River and Tributaries, New York and Pennsylvania," dated December 30, 1950 (revised March 1, 1954).

In 1979, a reformulation study was initiated for Cowanesque Lake under the original authority and in accordance with the provisions of the Water Supply Act of 1958, as amended in 1961 (Public Law 87-88). The Water Supply Act permits the consideration of municipal and industrial water-supply storage in any U.S. Army Corps of Engineers (USACE) lake in the planning, design, construction, or operational stage. The reformulation plan provided for a year-round pool and raised the lake level from 1045 Project Construction Datum (PCD) to 1080 feet PCD. The height of the dam and spillway was not raised from their original constructed elevations. In a Record of Decision, dated March 1, 1983, the office of the Chief of Engineers approved construction of modifications necessary to provide water supply storage for usage by the Susquehanna River Basin Commission (SRBC) at Cowanesque Lake (USACE 1983).

The Tioga-Hammond Lakes Project is unique in that it consists of two separate dams, one on the Tioga River and the other on Crooked Creek, joined by a gated connecting channel. Cowanesque Lake was constructed on the Cowanesque River and is located approximately 6 miles north of Tioga-Hammond Lake and 2.5 miles upstream of the confluence with the Tioga River. The two projects are operated under one management structure.

1.2 PROJECT PURPOSE

1.2.1 Tioga-Hammond and Cowanesque Lakes

The primary purpose of the Tioga-Hammond and Cowanesque Lake projects are to provide flood risk management to communities downstream along Tioga River (Tioga-Hammond), Cowanesque River (Cowanesque), as well as the Chemung and Susquehanna Rivers, to the maximum extent possible.

Secondary project purposes associated with Tioga-Hammond (Figure 1-1) and Cowanesque Lakes, which are formed by their respective dam structures, are recreation and environmental stewardship. A recreation lake is maintained behind each dam to provide 1,067 (Tioga-Hammond) and 1,050 (Cowanesque) acres for boating, fishing, swimming, picnicking, and camping. USACE operates recreation facilities at both sites.

Figure 1-1 Hammond Lake at the Connecting Channel

Cowanesque Lake has the additional project purpose of water supply. In 1990, the conservation pool elevation for Cowanesque Lake was raised to a year-round pool of 1080 NGVD to provide for additional storage for water supply. The SRBC has a contract for about 25,600 acre-feet of storage in the lake for water supply. Releases from this storage are requested by SRBC when conditions warrant. The government reserves the right to maintain a minimum release to meet downstream requirements considered necessary to protect, control, and enhance the downstream environment (Susquehanna River Basin Commission, 1986).

Although water quality is not one of the projects' specifically authorized purposes, water quality is considered in the operation of both projects. At the Tioga-Hammond Lakes project, the objectives for water quality regulation are to maintain the best possible long-term, in-lake and downstream water quality. Regulation must take maximum advantage of the natural averaging effects of the lakes, blending by the selective withdrawal system, and the addition of Hammond water to Tioga Lake to effectively neutralize the acidic Tioga inflow. Since the construction of the lakes, the water quality in the Tioga River has improved sufficiently to support a recreation fishery in Tioga Lake.

At Cowanesque Lake, USACE is required to release a minimum flow for downstream water supply and environmental purposes. The objective for water quality regulation is to reduce any remaining acidity problems present in the Tioga River at Lawrenceville, Pennsylvania (PA) and for downstream temperature control to promote a downstream warm water fishery.

1.3 PURPOSE AND SCOPE OF MASTER PLAN

The purpose of this document is to update the Tioga-Hammond and Cowanesque Lakes Master Plan ("Master Plan" or "MP") written in 2002. The Master Plan is the strategic land use management document that guides the comprehensive management and development of the recreation, natural, and cultural resources throughout the life of the project. It is the basic document guiding USACE responsibilities pursuant to federal laws to preserve,

conserve, restore, maintain, and develop the project lands, waters, and associated resources.

This update to the Master Plan is required per Engineer Regulation (ER) 1130-2-550 "Recreation Operations and Maintenance Policies," and Engineering Pamphlet (EP) 1130-2-550 "Recreation Operations and Maintenance Guidance and Procedures." USACE is also required to prepare the appropriate National Environmental Policy Act (NEPA), documentation to support the Master Plan.

This document presents an evaluation of the assets, needs, and potential uses of the Tioga-Hammond and Cowanesque Lake Projects ("Lake Projects"). This Master Plan reflects changes that have occurred to the project site, in the region, in recreation trends, and in USACE policy in the 20 years since the previous master plan was published. It provides a management framework that balances the stewardship of natural resources, provision of high-quality recreation activities, and, for Cowanesque Lake, consideration of water supply needs with the primary project purpose of flood risk management. This Plan addresses expressed public interest in the overall stewardship and management of all project resources and includes graphics showing the most desirable and feasible enhancements to existing facilities, as well as locations and types of new facilities needed to meet the identified needs.

Implementation of the Master Plan must recognize and be compatible with the primary project mission of flood risk management and secondary project purposes of recreation, environmental stewardship, and, at Cowanesque Lake, water supply.

The Master Plan update is a working document that will guide the use and development of the natural and constructed resources on USACE fee-owned lands for an estimated 15 to 25-year period (2024-2048). It is a dynamic and flexible tool designed to address changing conditions. The Master Plan focuses on carefully crafted, resource-specific goals and objectives.

It is important to note what the Master Plan does not address. Details of design, management and administration, and program implementation are not intended to be addressed within the scope of a master plan. Additionally, MPs are not intended to address the specifics of regional water quality, shoreline management, or water level management.

The master planning process encompassed a series of interrelated and overlapping tasks involving the examination and analysis of past, present, and future environmental, recreation, and socioeconomic conditions and trends. The master planning process uses a generalized conceptual framework, focused on four primary components as follows:

- Regional and ecosystem needs,
- Project resource capabilities and suitability,
- Expressed public interests that are compatible with the Lake Project's authorized purposes, and
- Environmental sustainability elements.

The MP includes an environmental assessment (EA) and Finding of No Significant Impact (FONSI), which have been prepared in accordance with NEPA; NEPA implementing regulations of the Council on Environmental Quality; and USACE regulations, including Engineer Regulation 200-2-2: Procedures for Implementing NEPA. The EA and FONSI are

separate documents that provide an analysis of possible impacts associated with the Master Plan and can be found in Appendix G. The FONSI is also included at the front of this Master Plan.

1.4 DESCRIPTION OF PROJECT AND WATERSHED

The USACE manages the Tioga-Hammond and Cowanesque Lakes as one project. Although the three lakes are managed collectively, they are uniquely different in terms of their recreation and natural resources management opportunities and the needs of their visitors. All three Lake Projects are located in Tioga County, within the Commonwealth of PA (Figure 1-4).

All elevations cited in this plan, unless otherwise noted, are referenced to the original NGVD. In 2009, USACE began a Comprehensive Evaluation of Project Datums (CEPD). The CEPD effort was specifically intended to ensure that project elevations and datums are properly and accurately referenced to nationwide spatial reference systems used by other USACE Districts as well as federal, state, and local agencies. To that end, a new project benchmark was established and linked to the 1988 North American Vertical Datum (NAVD 88). To convert the Project Construction Datum (PCD) elevation for the Tioga-Hammond Dam and its physical components to NAVD 88, 0.61 feet is added to the NGVD elevation. To convert PCD elevation for Cowanesque Dam and its physical components to NAVD 88, 0.70 feet is added to the NGVD elevation.

Tioga and Hammond Lakes

The Tioga and Hammond Lakes are located within Tioga, Richmond, and Middlebury Townships in Tioga County, PA (Figure 1-4). The Tioga damsite is located on the Tioga River about 1.7 miles above the mouth of Crooked Creek and approximately 0.75 miles upstream from the Tioga Borough. The Hammond damsite is located on Crooked Creek about 3.3 miles above its mouth, opposite the Tioga damsite (Figure 1-5). The damsites are located approximately 7.5 miles north of and downstream from the borough of Mansfield. A total of 6,843 acres of land were acquired for the Tioga and Hammond Dam project, including 6,594 acres acquired in fee simple. The remaining 249 acres were acquired for flowage easements.

Figure 1-2 Tioga Reservoir Overlook

A gated connecting channel joins the lakes in a saddle of the ridge separating the two lakes (Figure 1-1). A recreation lake is maintained behind each dam to provide a total of 1,150 acres for boating, fishing, swimming, picnicking, and camping (Figure 1-2). The lakes are maintained at conservation pool elevations of 1081.0 feet NGVD in Tioga and 1086.0 feet NGVD in Hammond year-round. Under normal conditions, outflow is kept approximately equal to inflow to maintain the normal conservation levels. The five-foot difference in pool levels prevents the frequent reversals of flow that would occur if the pool levels were maintained near the same elevation.

A gated outlet conduit is provided in the left abutment of the Tioga Dam for the control of flows for both reservoirs. The Tioga Dam controls a 280-square-mile drainage basin, and the Hammond Dam controls a 122-square-mile drainage basin. Additional information on the dam and the appurtenance structures is located in Section 1.5.

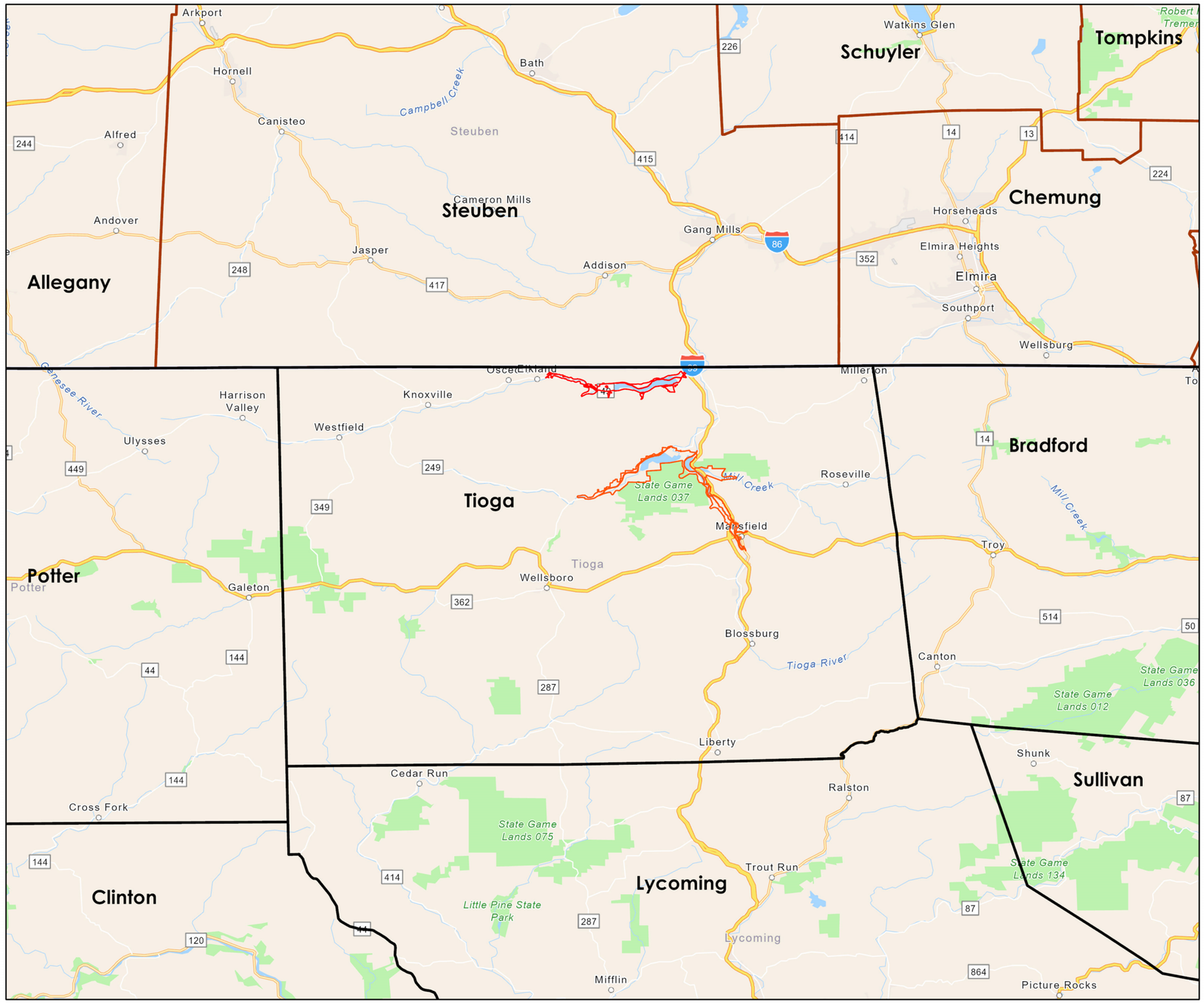
Cowanesque Lake

Cowanesque Lake is located in Lawrence and Nelson Townships in Tioga County, PA. The damsite is located on the Cowanesque River approximately 2 miles upstream of the confluence with the Tioga River at Lawrenceville, PA (Figure 1-6). The Dam controls a 298-square-mile drainage basin. Additional information on the dam and the appurtenance structures is located in Section 1.5.

A recreation lake is maintained behind the Cowanesque Dam to provide a 1,040-acre lake for boating, fishing, swimming, picnicking, and camping (Figure 1-3). Normally, outflow is kept approximately equal to inflow to maintain a year-round conservation pool near elevation 1080.0 feet NGVD. A total of 3,367 acres of land were acquired for the Cowanesque Dam project, including 2,878 acres acquired in fee simple. The remaining 489 acres were acquired for flowage easements. Figure 1-6 shows a site map of the Cowanesque Dam project area.

Figure 1-3 Cowanesque Lake at Tompkins Campground Bench Loop

Figure 1-4 Regional Vicinity Map

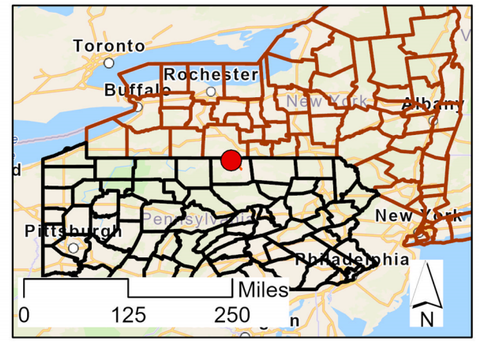


Tioga, Hammond, and Cowanesque Master Plan Update

Regional Vicinity

Legend

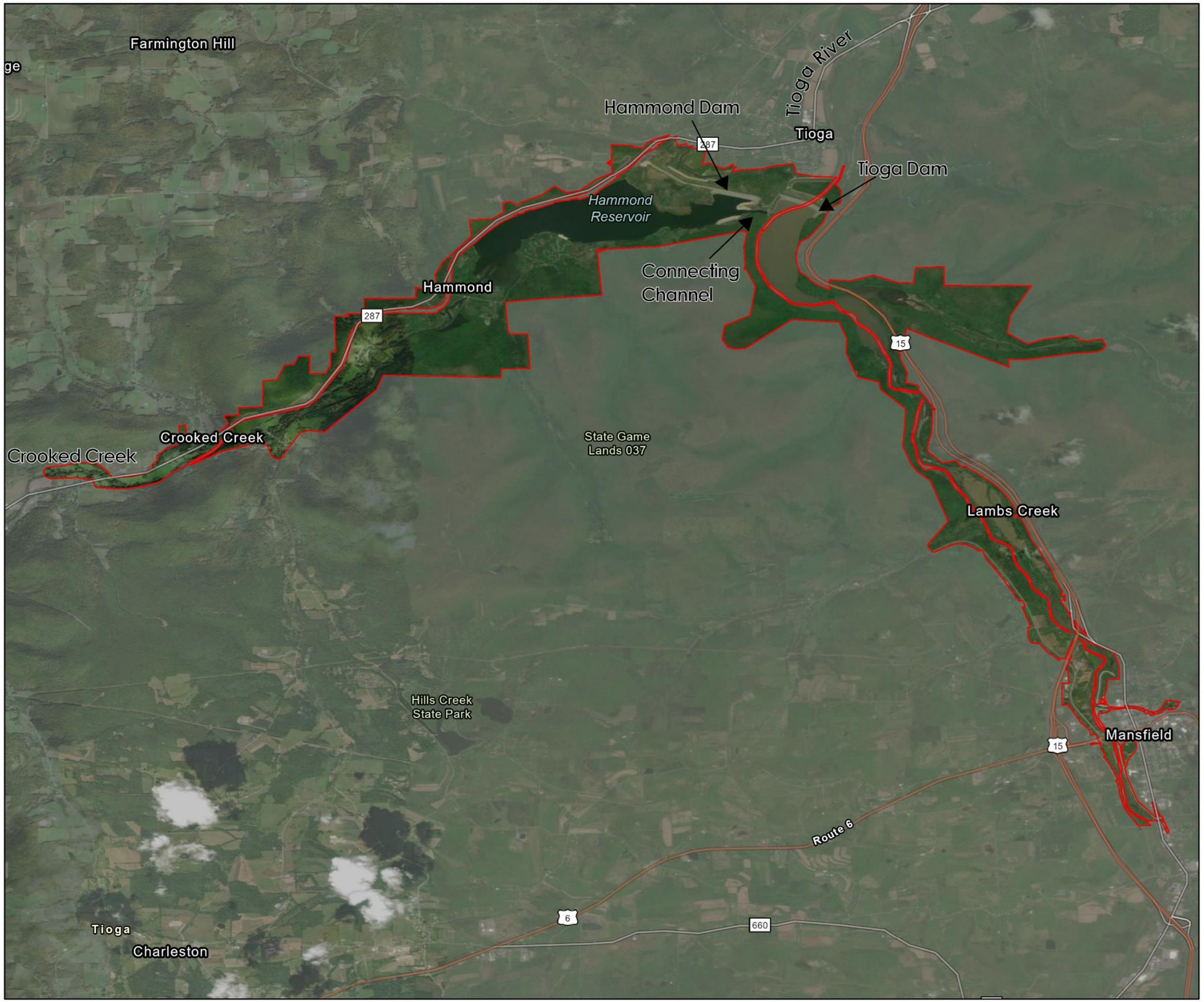
- Tioga-Hammond Study Area
- Cowanesque Study Area
- PA Counties
- NY Counties



PSU Office of Physical Plant, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, PSU Office of Physical Plant, data.pa.gov, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Tioga, Hammond, Cowanesque 2024 Master Plan

Figure 1-5 Tioga-Hammond Site Vicinity Map



Tioga and Hammond Lake Master Plan Update

Site Vicinity Map

Legend

Tioga and Hammond Study Area

PSU Office of Physical Plant, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, Earthstar Geographics, PSU Office of Physical Plant, data.pa.gov, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

Feet
0
5,000
10,000

N

Tioga, Hammond, Cowanesque 2024 Master Plan

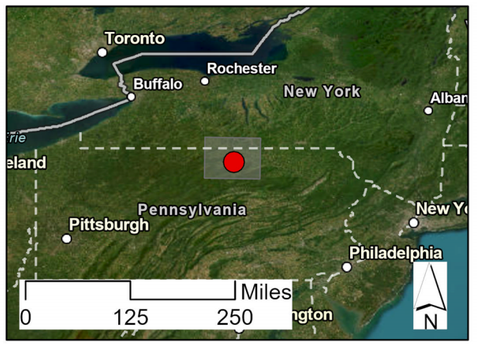
Figure 1-6 Cowanesque Site Map

Cowanesque Lake
Master Plan Update

Regional Vicinity

Legend

Cowanesque Study Area



PSU Office of Physical Plant, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, Earthstar Geographics, PSU Office of Physical Plant, data.pa.gov, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

Feet
0 5,000 10,000

N

Tioga, Hammond, Cowanesque 2024 Master Plan

1.5 DESCRIPTION OF THE RESERVOIR AND PROJECT STRUCTURES

Tioga-Hammond Dams

The Tioga-Hammond Lakes project includes two reservoirs located near Tioga, PA, just upstream from the confluence of Crooked Creek with the Tioga River. The Tioga damsite is located on the Tioga River about 1.7 miles upstream from the mouth of Crooked Creek and about 0.8 miles upstream from Tioga Borough. The Hammond damsite is located on Crooked Creek about 3.3 miles upstream from its mouth, and just west of the Tioga damsite. The two reservoirs are joined via a man-made connecting channel cut through a ridge separating the two lakes. This unique feature allows surplus storage capacity in one reservoir to be used when floodwaters begin to fill the other reservoir (See Section 2.2.7 for additional information). The reservoirs are both located in Tioga County, PA, about eight miles south of the PA/New York (NY) border. Tioga Lake has a maximum pool storage capacity of 143,383 acre-feet, and Hammond Lake has a maximum pool storage capacity of 136,936 acre-feet. The spillway crest elevation is 1131.0 feet NGVD. See Section 1.8 Tables 1-1 and 1-2 for additional water storage capacity data and related pertinent data at Tioga Dam and Hammond Dam respectively.

Cowanesque Dam

The Cowanesque Lake project is located on the Cowanesque River approximately 2.2 miles upstream from the confluence with the Tioga River at Lawrenceville, PA and about 12 miles south of Corning, NY. At the spillway crest elevation 1117.0 feet NGVD, the lake has a surface area of approximately 2,020 acres. The reservoir has a maximum pool storage capacity of 161,817 acre-feet. See Section 1.8 Table, 1-3 for additional water storage capacity and related pertinent data at Cowanesque Dam.

Figure 1-7 Cowanesque Lake near Tompkins Boat Ramp

1.5.1 Embankment/Dam

Tioga and Hammond Dams

The Tioga Dam embankment consists of a rolled earth and rockfill and crosses the Tioga River. The embankment is 2,710 feet in length, has a top width of 25 feet, and has a maximum height of 140 feet above the streambed. The top of the dam is at an elevation of 1170 feet NGVD.

The Hammond Dam embankment is built across Crooked Creek and consists of rolled earth and rockfill. The embankment is 6,450 feet in length, has a top width of 25 feet, and has a maximum height of 122 feet above the streambed. The top of the dam is at an elevation of 1169 feet NGVD. There is a small outlet works through the dam that maintains a continuous discharge to Crooked Creek below the dam.

Cowanesque Dam

The Cowanesque Lake embankment consists of rolled earth and rockfill and is 3,100 feet in length with a maximum height of approximately 151 feet above the streambed with a top width of 25 feet. The top of the embankment is at an elevation of 1151 feet NGVD.

1.5.2. Spillway

Tioga and Hammond Spillway

The uncontrolled spillway is an overflow concrete chute located in the west abutment of the Hammond Dam. This spillway serves both reservoirs. The spillway crest is 312 feet long with a crest elevation of 1131 feet NGVD. The approach channel to the spillway is cut primarily through rock; however, the right wall of the approach channel is constructed of reinforced concrete to retain the dam embankment. A concrete chute extends for about 300 feet downstream of the spillway crest. Beyond this point, the spillway chute is cut in firm rock for about 500 feet and then through weathered rock and earth for the remaining distance to the original streambed of Crooked Creek. The design discharge capacity of the spillway is 218,000 cubic feet per second (CFS); the estimated frequency of reaching spillway elevation is about once every 70 years.

An additional feature of the Tioga-Hammond project is the Mansfield Local Flood Protection Project which consists of channel improvements, levees, and pumping stations that provide protection to the borough of Mansfield, PA during high water events.

Cowanesque Spillway

The Cowanesque principal spillway consists of an approach channel, a concrete weir and apron, and a discharge channel. The converging chute-type spillway has an uncontrolled crest that is 400-feet-long and has a design discharge capacity of 215,000 CFS under a total surcharge of 27.2 feet. The spillway crest elevation is 1117.0 feet NGVD.

1.5.3. Flood Control Outlet Works

Tioga and Hammond Lakes

The objective for flood control is to reduce flood crests downstream along Crooked Creek, and the Tioga, Chemung, and Susquehanna Rivers to the maximum extent possible. This is accomplished by storing additional water in the lakes during high inflow periods, rather than releasing it, if the reservoir release would likely contribute to downstream flooding. During a

major flood event, the lakes levels could be allowed to temporarily rise up to elevation 1131.8 feet NGVD to control downstream flooding. A gated outlet conduit is provided in the left abutment of the Tioga Dam for the control of flows for both reservoirs.

Tioga Outlet Works: The Tioga outlet works along the west abutment of the Tioga Dam consists of the following structures: an approach channel, a gate structure, a transition, a conduit, a stilling basin, and an exit channel. The outlet tower contains two service (flood) gates and two low flow (water quality control) gates. Each service gate is a 7-foot by 21-foot hydraulically operated fixed wheel-type unit. Service gate releases pass through a 52-foot-long transition before entering a cut-and-cover oblong concrete conduit, 525 feet long, 21-foot high with 14-foot, 6-inch diameter top and bottom semicircles. The conduit passes underneath the west end of Tioga Dam, entering a stilling basin just downstream (north) of the dam where discharge energy is dissipated. An exit channel leads from the stilling basin back to the original channel of the Tioga River. Low-flow releases are made through any of four ports located on the upstream face of the outlet tower. Two ports are located to the right of center and two to the left of center. Each port is at a different elevation, enabling selective withdrawal of different quality waters when Tioga Lake stratifies.

Hammond Outlet Works: The Hammond outlet works is located on the eastern end of the connecting channel adjacent to Tioga Lake. The Hammond outlet works includes an overflow weir/gate structure located between a plunge pool on the Hammond side and a stilling basin on the Tioga side. The purpose of the Hammond outlet works is to control the flow of water in the connecting channel between Hammond and Tioga Lakes. There are two service gates and one emergency gate bulkhead. Under normal conditions, the outlet works are operated to keep Hammond Lake at a higher elevation than Tioga Lake, and to permit Hammond water to drain by gravity into Tioga Lake. The arrangement also keeps degraded water in Tioga Lake from entering Hammond Lake, at least until the water elevation in Tioga Lake exceeds the weir crest. The concrete gate structure contains intake trash racks, two rectangular conduits measuring 8 feet four inches by 11 feet, 6 inches, and hydraulically operated service gates of the same dimensions. Bulkhead slots are provided in each conduit on each side of the service gates.

Crooked Creek Outlet Works: The Crooked Creek outlet works located on the Hammond Dam embankment includes a concrete approach channel; a gate structure; a three-foot diameter, 802-foot-long conduit; a stilling basin; and an exit channel. The purpose of Crooked Creek outlet works is to release a small volume of water through Hammond Dam to maintain a continuous flow in Crooked Creek downstream of the dam. The gate structure consists of one manually operated, vented, 3-foot by 3-foot discharge-type service gate with trash racks and bulkheads.

Cowanesque Lake

The objective for flood control is to reduce flood crests downstream along the Cowanesque, Tioga, Chemung, Susquehanna Rivers, to the maximum extent possible. This is accomplished by storing additional water in the lakes during high inflow periods, rather than releasing it, if the reservoir release would likely contribute to downstream flooding. During a major flood event, the lake level could be allowed to temporarily rise up to elevation 1117 feet NGVD to control downstream flooding.

Cowanesque Outlet Works: The outlet works consist of an entrance channel, intake structure, tunnel transition, tunnel, stilling basin and exit channel. The outlet tunnel is a single 12-foot by 14-foot tunnel, driven through rock and lined with concrete. Flow through the tunnel is regulated by two 6-foot by 14-foot hydraulic sluice gates. Low flow releases are made through two 2-foot by 6-feet and 3 inch hydraulic sluice gates. These gates are restricted to a 5-foot gate opening. Selective withdraw is made through six inlet portals.

Figure 1-8 Cowanesque Intake Structure

1.5.4. Flood Control Outlet Works Plunge Pool and Stilling Basins

The purpose of the plunge pool and stilling basins is to dissipate discharge energy at the end of conduits and tunnels.

Tioga and Hammond Lakes

A concrete-lined plunge pool is located on the Hammond side of the weir and is 268 feet long and 179 feet, 6 inches wide. Its purpose is to dissipate energy when Tioga Lake spills over the weir into Hammond Lake. A stilling basin is located on the Tioga side of the weir and is 75 feet long and 43 feet wide. Its purpose is to dissipate energy from discharges through the two Hammond gates during dam construction prior to impounding Tioga Lake. In the Crooked Creek outlet works, an impact-type stilling basin is located at the end of the conduit and dissipates discharge energy.

Cowanesque Lake

To dissipate energy from the outlet tunnel mentioned in Section 1.5.3, Cowanesque Lake includes a conventional hydraulic jump type stilling basin where the overflow is returned to the Cowanesque River via an exit channel partially excavated in rock.

1.6 PROJECT ACCESS

Tioga and Hammond: Project access to Tioga and Hammond Lakes is provided from the north and west by Pennsylvania Route 287 which runs from Williamsport, PA to the NY state line. Additional eastern and southern access to the Tioga Dam is provided by U.S. Route 15. Ives Run Lane, which intersects PA Route 287 southwest of Hammond Lake, provides access to the southern portions of the Hammond Lake.

Cowanesque:

Access to the north side of Cowanesque Lake is provided by Bliss Road which connects to NY Route 287 to the northeast where it crosses the Tioga River. Access to the south side of Cowanesque Lake is via PA Route 49, which runs from Lawrenceville, PA to Knoxville, PA.

1.7 PERTINENT PRIOR REPORTS AND RELATED STUDIES

Listed below are the primary design documents and reports associated with the initial construction and land acquisition, as well as relevant related studies and reports to the Master

Plan update. The references list found in Appendix B contains the full annotation for each report or study.

- Tioga-Hammond Reservoir Regulation Manual (USACE), Dated 1988
- Cowanesque Reservoir Regulation Manual (USACE), Dated 1990
- Tioga, Hammond & Cowanesque Lakes Master Plan (USACE), Dated 2002
- Tioga-Hammond Lakes Master Manual for Reservoir Regulation (USACE), Dated 2005
- Cowanesque Lake Master Manual for Reservoir Regulation (USACE), Dated 2005
- Field Management Plan Cowanesque Lake (Wildlife Specialists), Dated June 2022
- Tioga-Hammond and Cowanesque USACE Annual Reports, Dated 2018 to 2022

1.8 PERTINENT PROJECT INFORMATION

The information for the reservoir operation and project data was taken directly from the *Tioga-Hammond Reservoir Regulation Manual* (COE, 1988), the *Cowanesque Reservoir Regulation Manual* (COE, 1990), Tioga-Hammond Lakes Master Manual for Reservoir Regulation (COE, 2005), and Cowanesque Lake Master Manual for Reservoir Regulation (COE, 2005). Additional details regarding the operation of the reservoirs and may be found in these manuals. Table 1-1 below shows pertinent information regarding existing storage capacity at Tioga Lake. Tables 1-2 and 1-3 below show pertinent information regarding Hammond Lake and Cowanesque Lake respectively. Tables 1-1, 1-2, and 1-3 are based on data for the proposed land classifications. Section 4.2 discusses the prior land classifications and associated acreages.

Table 1-1 Water Storage Capacity and Related Pertinent Data at Tioga Dam.

	Elevation (Feet NGVD*)	**Storage (Acre-feet)**	**Acres**
Top of Dam	1170.0	154,913	3,295
Maximum Pool (Design Surcharge)	1165.8	143,383	3,043
Full Flood Control (Spillway Crest)	1131.0	62,307	1,594
Conservation Pool	1081.0	9,945	498
Inactive Pool (Dead Storage)	1035.0	0.3	0.4

Source: Data based on 2005 Tioga-Hammond Lakes Master Manual for Reservoir Regulation

Table 1-2 Water Storage Capacity and Related Pertinent Data at Hammond Dam

	Elevation (Feet NGVD*)	Storage (Acre-feet)	Acres
Top of Dam	1169.0	153,576	2,936
Maximum Pool (Design Surcharge)	1163.2	136,936	2,791
Full Flood Control (Spillway Crest)	1131.0	63,511	1,755
Conservation Pool	1086.0	8,625	685
Inactive Pool (Dead Storage)	1058.0	0.0	0.0

Source: Data based on 2005 Tioga-Hammond Lakes Master Manual for Reservoir Regulation

Table 1-3 Water Storage Capacity and Related Pertinent Data at Cowanesque Dam

	Elevation (Feet NGVD*)	Storage (Acre-feet)	Acres
Top of Dam	1151.0	187,900	4,030
Maximum Pool (Design Surcharge)	1144.2	161,817	3,642
Full Flood Control (Spillway Crest)	1144.0	84,930	2,020
Conservation Pool	1080.0	30,059	1,040
Inactive Pool (Dead Storage)	1010.96	12	6

Source: Data based on 2005 Cowanesque Lake Master Manual for Reservoir Regulation

Tables 1-4, 1-5, and 1-6 provide pertinent information regarding acreages by land classifications at the Tioga-Hammond and Cowanesque Lakes respectively. Acreages were calculated by GIS data.

Table 1-4 Proposed Land Classifications at Tioga and Hammond Project.

Land Classifications	Acres
Project Operations	419.7
High Density Recreation	194.0
Multiple Resource Management	
Wildlife Management	3593.0
Vegetative Management	1389.9
Low Density Recreation	73.7
Water Surface	
Restricted	4.6*
Designated No-Wake	891.7*
Open Recreation	275.4*
Total	**6,842.3**

Source: GIS analysis based on 2002 Master Plan maps and CENAB, Real Estate Division Documentation with Water Surface information from CENAB.
**For additional breakout numbers, see Section 4.2.6.*

Table 1-5 Proposed Land Classifications at Cowanesque Project.

Land Classifications	**Acres**
Project Operations	4.9
Mitigation	263.3
High Density Recreation	224.6
Multiple Resource Management	
Wildlife Management	338.8
Vegetative Management	234.5
Low Density Recreation	1.2
Water Surface	
Restricted	1.3
Designated No-Wake	282.5
Open Recreation	766.2
Total	**2,117.3**

Source: GIS analysis based on 2002 Master Plan maps and CENAB, Real Estate Division Documentation with Water Surface information from CENAB.

This page intentionally left blank.

2 EXISTING CONDITIONS & ANALYSIS

2.1 PHYSIOGRAPHIC SETTING/ECOLOGICAL SETTING

Tioga Lake is in the U.S. Environmental Protection Agency's (USEPA) Glaciated Allegheny High Plateau level IV ecoregion within the North Central Appalachian level III ecoregion. Hamond and Cowanesque Lakes are located within the Glaciated Low Plateau level IV ecoregion within the Northern Appalachian Plateau level III ecoregion (Woods, Omernik, and Brown 2003).

The Glaciated Allegheny High Plateau ecoregion is deeply dissected with low to high relief, but with topography that has been smoothed by glaciation. The Glaciated Low Plateau similarly originated with fluvial and glacial erosion and glacial deposition but is lower in relief than the high plateau regions.

2.1.1 Climate

Tioga-Hammond and Cowanesque lakes fall within the National Oceanic and Atmospheric Administration (NOAA) Climate Division 36-6 (NOAA NECI, 2023). Climate data for the Tioga-Hammond and Cowanesque projects has been recorded over an extended period from points located both within and outside the lakes' drainage basins. Mean annual precipitation in Williamsport, PA (located 70 miles south of Cowanesque Lake) is 43.52 inches, with the greatest monthly precipitation occurring from June through September (NOAA ACR, 2023). Most snowfall in the area occurs between December and February, with the area receiving on average 35.8 inches of snowfall a year. The mean monthly high temperatures vary from 61.1°Farenheit (F) (16.2°Celsius (C)) during the summer months to 41.4°F (5.2°C) in the winter. (NOAA ACR, 2023).

The PA Department of Environmental Protection's 2021 Impacts Assessment and Climate Action Report predicts that by 2050, 2 years after the maximum intended lifespan of this master plan, the average annual temperature will increase by 5.9°F (3.3°C) compared to a 1971 to 2000 baseline. Precipitation is expected to occur less frequently, but with heavier rain events resulting in a higher total average rainfall. Frequency of extreme rain events is also expected to increase, as is the frequency of drought conditions.

2.1.2 Topography, geology, and soils

2.1.2.1 *Geology*

Tioga and Hammond Lakes

Tioga and Hammond Lakes are situated in the northern part of the Allegheny Mountain section of the Appalachian Plateau physiographic province. This portion of the province is essentially a stream-eroded plateau composed of relatively flat upland areas interspersed with stream valleys that are often one thousand feet deep or more. The underlying rock stratum is essentially horizontal and has broad open folds. The bedrock of the area is sedimentary in origin and consists of shales, sandstones and some thin limestones. This portion of the Appalachian Plateau has been extensively altered by successive cycles of glaciation during the Pleistocene Epoch. It was during this period of geologic history that the hills of the area were smoothed and rounded and thick layers of glacial till were deposited within the

stream valleys. This area of Pennsylvania is seismically inactive. Most seismic activity occurs to the southeast of the lake area.

Cowanesque Lake

Cowanesque Lake is located in the Northern Pennsylvania Section of the Appalachia Plateau Province. The plateau-like topography exists on shale and siltstone bedrock of the Devonian and Carboniferous Ages. This topography features low amplitude folds oriented in a northeast-southwest direction.

This region was glaciated during the Wisconsin Ice Age, and the topography has been greatly altered by erosion and deposition of ice, glacial streams, and lakes during advances and retreats of the ice margin. Results of this glaciation appear as rounded hills with irregular summits. Most of the current river valleys are preglacial; however, they are filled by thick deposits of glacial till (ice-borne) material.

2.1.2.2 *Topography*

Tioga and Hammond Lakes

The Topography of the Tioga and Hammond Lakes area is a product of past geologic activity. The formation of the Appalachian Plateau and its subsequent modifications through glaciation and weathering were events in the ongoing geologic process that gave form and character to this area's terrain. This portion of Pennsylvania is characterized by relatively flat upland ridges that are separated from rather wide stream valleys by extremely steep slopes. The vertical distances from ridge tops to valleys are often more than one thousand feet. Lateral stream valleys are still being formed and main valley walls are broken periodically by sharp, V-shaped stream cuts.

Crooked Creek Valley is considerably broader than that of the Tioga River. Due to unstable soils and extreme erosion, several areas of Crooked Creek have very steeply sloping stream banks. The Tioga Valley floor is quite narrow and only thin strips of developable land are present adjacent to the lake. The valley walls constrict streamside views along the Tioga Valley.

Cowanesque Lake

The elevation of the western portion of Cowanesque Lake is approximately 2200 feet mean sea level (MSL) and the river valley falls approximately 10 feet per mile ending at an elevation of 1000 feet MSL at Lawrenceville. Valley widths range from 1300 feet MSL to a maximum of 4000 feet MSL and Elkland. The western portion of the valley is rugged, with elevations greater than 2500 feet MSL and slopes greater than 20 percent. The eastern side of the valley is characterized by elevations of 2000 feet MSL and slopes averaging 15 percent.

2.1.2.3 *Soils*

Because the entire northern portion of PA has been glaciated, soil types in the project area are numerous and varied. The river valleys consist of unconsolidated deposits that vary both vertically and laterally in thickness and composition. In the floodplain, thin deposits of recent alluvium (mud and sand) exist, underlain by stratified coarser river-related deposits of sand, gravel and boulders. Finer sands, silts, and clays found in the stratum were deposited in localized ponds and low areas during glacial movement.

Glacial-lacustrine (glacial lake) deposits found in the project area are stratified, very fine, still-water-laid clays or silts with inter-bedded coarser sediments indicating the former lake margins. The lower slopes and uphill locations of the lake property are almost completely covered by till (glacial drift consisting of an unsorted mixture of clay, sand, gravel and boulders), which is usually thicker on the south-facing slopes.

The Tioga County Natural Resources Conservation Service (NRCS) mapped the soils in Tioga County in the late 1970s and early 1980s. Tables 2-1 to Table 2-3 (Tioga-Hammond) and Table 2-4 to Table 2-5 (Cowanesque) list the soils identified in the NRCS Soil Survey as being present in the project area, and a soils map is provided in Figures 2-1 and 2-2.

2.1.2.4 *Prime and Unique Farmlands*

Under the Farmland Protection Policy Act (FPPA), if Federal funds are being used for a project on Federal lands and that proposed project may impact prime farmland soils, other alternatives must be considered, and feasibility determined. The FPPA is intended to minimize the extent to which Federal activities contribute to the conversion of agricultural land to nonagricultural uses. It also seeks to ensure that Federal policies are administered in a manner that will be compatible with state, local and private policies that protect farmland. A prime farmland soil is considered prime until the soil no longer exists. If prime farmland soils are disturbed or paved over, the soil is still considered prime.

The prime farmland soils found in the Tioga-Hammond and Cowanesque Lake are noted in Tables 2-1 through 2-5 and shown in Figure 2-1 and 2-2. 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. 19.3 and 23.7 percent of soils at the Tioga-Hammond and Cowanesque Projects, respectively, are considered Pennsylvania Farmland of Statewide Importance. Additionally, 21.4 (Tioga-Hammond) and 15.3 (Cowanesque) percent of soils are considered Prime Farmland.

Tioga Lake

The far southern reaches of Tioga River and Lambs Creek are dominated by Philo and Pope soils. These soils dominate areas that are adjacent to the river and the creek. There are small pockets along the Tioga River where Chenango and Wyoming series soils are found, and these areas are typically flatter than the surrounding hillside areas. The land adjacent to Mill Creek on the north side is dominated by Chenango soils.

Hammond Lake

At Hammond Lake, Braceville and Chenango soils are found in abundance all along the western side of the dam and along the connecting channel, where the land is very gently sloping and relatively flat. The Braceville, Chenango, Pope and Philo soils dominate the entire west end of Hammond Lake, and Crooked Creek, where the land is relatively flat.

Cowanesque Lake

At Cowanesque Lake, Philo and Pope 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.

Table 2-1 Soils at Tioga-Hammond *(United States Department of Agriculture, Natural Resources Conservation Service (NRCS), n.d.)*

Map Unit Symbol	Map Unit Name	Acres in Area of Interest (AOI)	Percent of AOI	Prime/Unique Farmland Status
Ab	Alluvial land	225.0	3.5%	Not prime farmland
BvB	Braceville gravelly loam, 3 to 8 percent slopes	35.1	0.5%	All areas are prime farmland
ChB	Chenango gravelly loam, 2 to 12 percent slopes	594.4	9.2%	All areas are prime farmland
ChC	Chenango gravelly loam, 12 to 20 percent slopes	122.6	1.9%	Farmland of statewide importance
ChD	Chenango gravelly loam, 20 to 30 percent slopes	76.5	1.2%	Not prime farmland
DAM	Dams and impoundment structures	109.4	1.7%	Not prime farmland
GP	Gravel pit	2.3	0.0%	Not prime farmland
LoB	Lordstown channery loam, 3 to 12 percent slopes	30.6	0.5%	Farmland of statewide importance
LoC	Lordstown channery loam, 12 to 20 percent slopes	2.5	0.0%	Farmland of statewide importance
LoD	Lordstown channery loam, 20 to 30 percent slopes	0.8	0.0%	Not prime farmland
LsD	Lordstown channery loam, 12 to 30 percent slopes, extremely stony	28.0	0.4%	Farmland of statewide importance
MaB	Mardin channery silt loam, 3 to 8 percent slopes	0.5	0.0%	Farmland of statewide importance
MaC	Mardin channery silt loam, 8 to 15 percent slopes	5.0	0.1%	Farmland of statewide importance
MaD	Mardin channery silt loam, 15 to 25 percent slopes	18.9	0.3%	Not prime farmland
MoB	Morris gravelly silt loam, 3 to 8 percent slopes	32.3	0.5%	Farmland of statewide importance
MoC	Morris gravelly silt loam, 8 to 15 percent slopes	93.3	1.4%	Farmland of statewide importance
MoD	Morris gravelly silt loam, 15 to 25 percent slopes	71.5	1.1%	Not prime farmland

Table 2-2 Soils at Tioga-Hammond Cont.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	Prime/Unique Farmland Status
MsD	Morris gravelly silt loam, 8 to 25 percent slopes, extremely stony	18.3	0.3%	Not prime farmland
OgB	Oquaga channery loam, 3 to 12 percent slopes	19.5	0.3%	Farmland of statewide importance
OgC	Oquaga channery loam, 12 to 20 percent slopes	148.9	2.3%	Farmland of statewide importance
OgD	Oquaga channery loam, 20 to 30 percent slopes	310.6	4.8%	Not prime farmland
OsD	Oquaga channery loam, 12 to 30 percent slopes, extremely stony	143.7	2.2%	Not prime farmland
OTF	Oquaga and Lordstown channery loams, 25 to 70 percent slopes, extremely stony	1,066.7	16.5%	Not prime farmland
Ow	Orrville silt loam	219.2	3.4%	Farmland of statewide importance
Ph	Philo silt loam	114.0	1.8%	All areas are prime farmland
Po	Pope soils	719.1	11.1%	All areas are prime farmland
Pp	Pope fine sandy loam, high bottom	92.9	1.4%	All areas are prime farmland
RxA	Rexford silt loam, 0 to 3 percent slopes	5.2	0.1%	Farmland of statewide importance
RxB	Rexford silt loam, 3 to 10 percent slopes	27.0	0.4%	Farmland of statewide importance
VoB	Volusia channery silt loam, 3 to 8 percent slopes	92.2	1.4%	Farmland of statewide importance
VoC	Volusia channery silt loam, 8 to 15 percent slopes	169.4	2.6%	Farmland of statewide importance
VoD	Volusia channery silt loam, 15 to 25 percent slopes	56.0	0.9%	Not Prime Farmland
VoD3	Volusia channery silt loam, 15 to 25 percent slopes, eroded	2.8	0.0%	Not Prime Farmland
VoE3	Volusia channery silt loam, 25 to 35 percent slopes, eroded	3.4	0.1%	Not Prime Farmland
VvB	Volusia channery silt loam, silty substratum, 3 to 8 percent slopes	102.7	1.6%	Farmland of statewide importance

Table 2-3 Soils at Tioga-Hammond Cont.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	Prime/Unique Farmland Status
VvC	Volusia channery silt loam, silty substratum, 8 to 15 percent slopes	20.1	0.3%	Farmland of statewide importance
VvD3	Volusia channery silt loam, silty substratum, 15 to 25 percent slopes, eroded	25.0	0.4%	Not Prime Farmland
W	Water	1,297.1	20.0%	Not Prime Farmland
Wa	Wayland silty clay loam	25.7	0.4%	Farmland of statewide importance
WeB	Wellsboro channery loam, 3 to 8 percent slopes	9.6	0.1%	All areas are prime farmland
WeD	Wellsboro channery loam, 15 to 25 percent slopes	12.5	0.2%	Not Prime Farmland
WyC	Wyoming gravelly sandy loam, 12 to 20 percent slopes	53.7	0.8%	Farmland of statewide importance
WyD	Wyoming gravelly sandy loam, 20 to 30 percent slopes	81.5	1.3%	Not Prime Farmland
WyF	Wyoming gravelly sandy loam, 30 to 50 percent slopes	131.6	2.0%	Not Prime Farmland
Wz	Wyoming gravelly loam, flooded	60.0	0.9%	Farmland of statewide importance
Totals for Area of Interest		**6,477.3**	**100.0%**	**-**

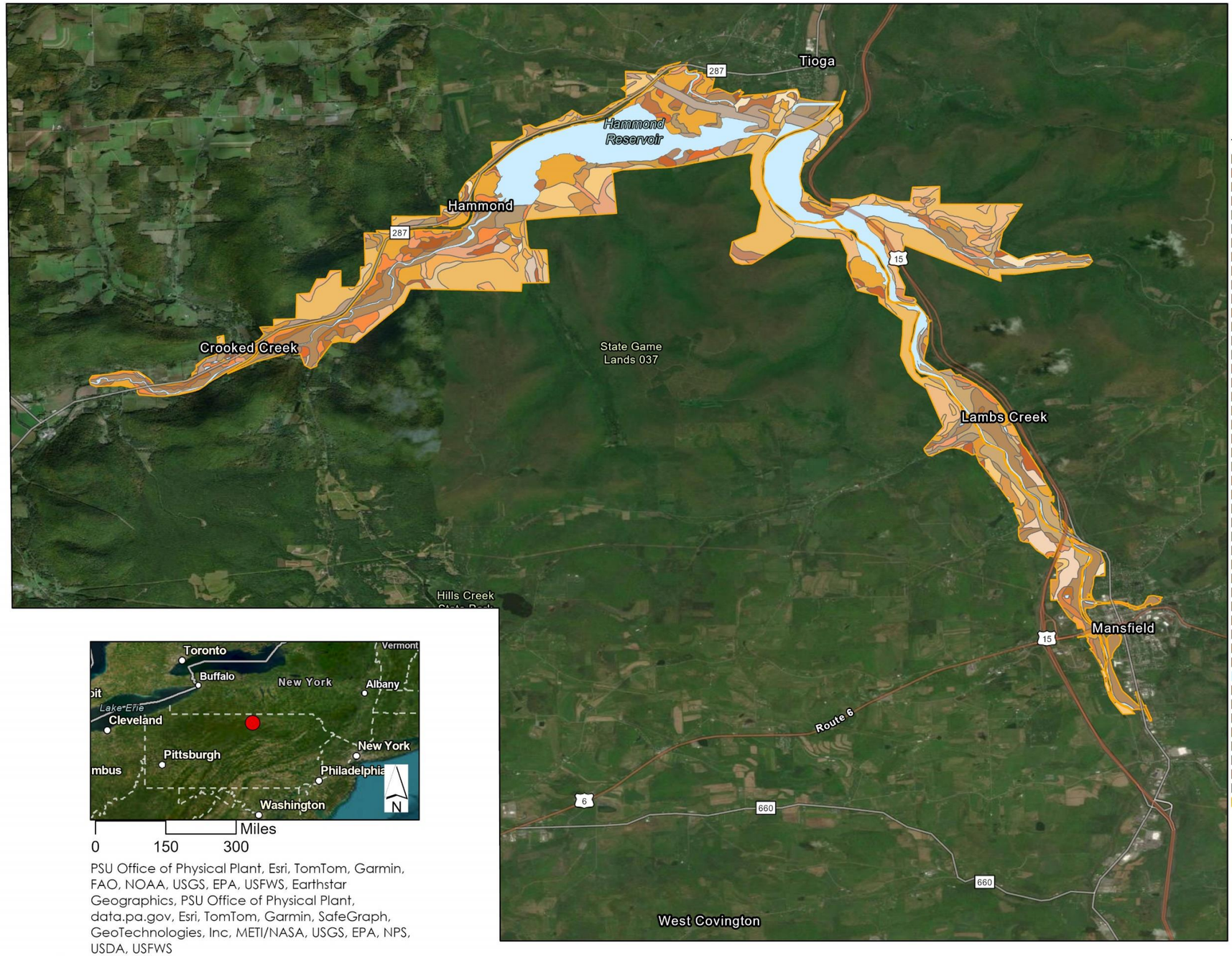
Table 2-4 Soils at Cowanesque Lake

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	Prime/Unique Farmland Status
Ab	Alluvial land	95.9	3.6%	Not Prime Farmland
BvB	Braceville gravelly loam, 3 to 8 percent slopes	23.0	0.9%	All areas are prime farmland
ChB	Chenango gravelly loam, 2 to 12 percent slopes	139.1	5.2%	All areas are prime farmland
ChC	Chenango gravelly loam, 12 to 20 percent slopes	21.5	0.8%	Farmland of statewide importance
ChD	Chenango gravelly loam, 20 to 30 percent slopes	6.4	0.2%	Not Prime Farmland
CkA	Chippewa silt loam, 0 to 3 percent slopes	8.9	0.3%	Not Prime Farmland
CkB	Chippewa silt loam, 3 to 8 percent slopes	0.1	0.0%	Not Prime Farmland
DAM	Dams and impoundment structures	76.1	2.9%	Not Prime Farmland
LoB	Lordstown channery loam, 3 to 12 percent slopes	16.0	0.6%	Farmland of statewide importance
LoC	Lordstown channery loam, 12 to 20 percent slopes	0.9	0.0%	Farmland of statewide importance
LoD	Lordstown channery loam, 20 to 30 percent slopes	19.8	0.7%	Not Prime Farmland
LsB	Lordstown channery loam, 3 to 12 percent slopes, extremely stony	13.0	0.5%	Not Prime Farmland
MaC	Mardin channery silt loam, 8 to 15 percent slopes	9.3	0.3%	Farmland of statewide importance
MaD	Mardin channery silt loam, 15 to 25 percent slopes	32.3	1.2%	Not Prime Farmland
OTF	Oquaga and Lordstown channery loams, 25 to 70 percent slopes, extremely stony	51.1	1.9%	Not Prime Farmland
Ow	Orrville silt loam	67.2	2.5%	Farmland of statewide importance
Ph	Philo silt loam	26.6	1.0%	All areas are prime farmland
Po	Pope soils	180.4	6.8%	All areas are prime farmland
Pp	Pope fine sandy loam, high bottom	36.9	1.4%	All areas are prime farmland
RxA	Rexford silt loam, 0 to 3 percent slopes	13.1	0.5%	Farmland of statewide importance
RxB	Rexford silt loam, 3 to 10 percent slopes	20.2	0.8%	Farmland of statewide importance

Table 2-5 Soils at Cowanesque Continued

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	Prime/Unique Farmland Status
TW	Tannery waste	41.4	1.6%	Not Prime Farmland
VoA	Volusia channery silt loam, 0 to 3 percent slopes	15.9	0.6%	Farmland of statewide importance
VoB	Volusia channery silt loam, 3 to 8 percent slopes	155.8	5.9%	Farmland of statewide importance
VoC	Volusia channery silt loam, 8 to 15 percent slopes	218.4	8.2%	Farmland of statewide importance
VoD	Volusia channery silt loam, 15 to 25 percent slopes	80.4	3.0%	Not Prime Farmland
VoD3	Volusia channery silt loam, 15 to 25 percent slopes, eroded	8.8	0.3%	Not Prime Farmland
VoE3	Volusia channery silt loam, 25 to 35 percent slopes, eroded	8.8	0.3%	Not Prime Farmland
VvB	Volusia channery silt loam, silty substratum, 3 to 8 percent slopes	24.7	0.9%	Farmland of statewide importance
VvC	Volusia channery silt loam, silty substratum, 8 to 15 percent slopes	17.1	0.6%	Farmland of statewide importance
VvD3	Volusia channery silt loam, silty substratum, 15 to 25 percent slopes, eroded	10.0	0.4%	Not Prime Farmland
W	Water	1,102.5	41.5%	Not Prime Farmland
Wa	Wayland silty clay loam	17.2	0.6%	Farmland of statewide importance
WyC	Wyoming gravelly sandy loam, 12 to 20 percent slopes	6.8	0.3%	Not Prime Farmland
WyD	Wyoming gravelly sandy loam, 20 to 30 percent slopes	26.5	1.0%	Not Prime Farmland
WyF	Wyoming gravelly sandy loam, 30 to 50 percent slopes	31.2	1.2%	Not Prime Farmland
Wz	Wyoming gravelly loam, flooded	36.3	1.4%	Farmland of statewide importance
Totals for Area of Interest		**2,659.8**	**100.0%**	**-**

Figure 2-1 Tioga-Hammond Soils Analysis



PSU Office of Physical Plant, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, Earthstar Geographics, PSU Office of Physical Plant, data.pa.gov, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

Tioga-Hammond Lake Master Plan Update

Soils Analysis

Legend

Tioga-Hammond Soil Types

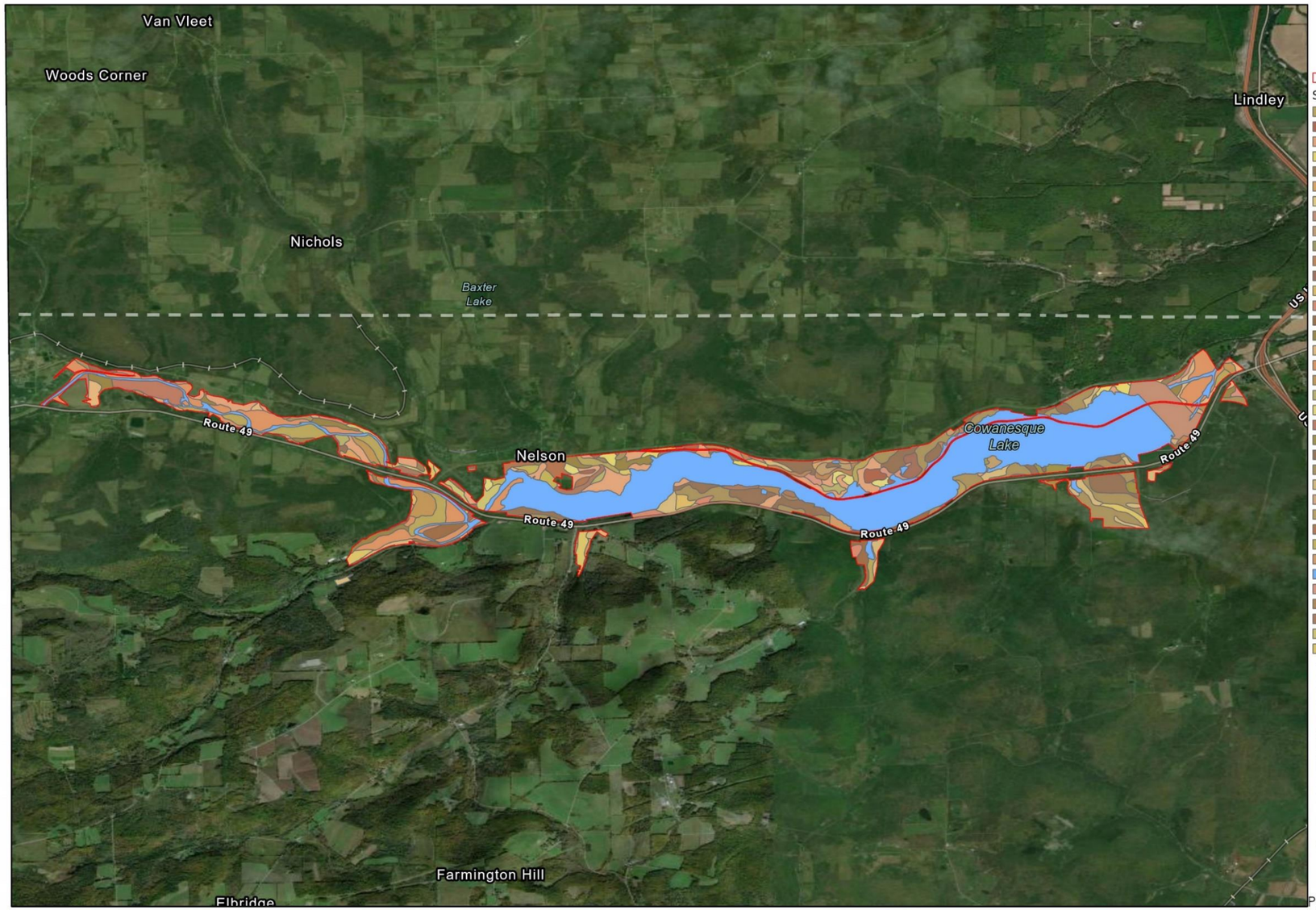
- Ab - Alluvial Land
- BvB - Braceville gravelly loam, 3 to 8 percent slopes
- ChB - Chenango gravelly loam, 2 to 12 percent slopes
- ChC - Chenango gravelly loam, 12 to 20 percent slopes
- ChD - Chenango gravelly loam, 20 to 30 percent slopes
- DAM - Dams and Impoundment Structures
- GP - Gravel pit
- LoB - Lordstown channery loam, 3 to 12 percent slopes
- LoC - Lordstown channery loam, 12 to 20 percent slopes
- LoD - Lordstown channery loam, 20 to 30 percent slopes
- LsD - Lordstown channery loam, 12 to 30 percent slopes, extremely stony
- MaB - Mardin channery silt loam, 3 to 8 percent slopes
- MaC - Mardin channery silt loam, 8 to 15 percent slopes
- MaD - Mardin channery silt loam, 15 to 25 percent slopes
- MoB - Morris gravelly silt loam, 3 to 8 percent slopes
- MoC - Morris gravelly silt loam, 8 to 15 percent slopes
- MoD - Morris gravelly silt loam, 15 to 25 percent slopes
- MsD - Morris gravelly silt loam, 8 to 25 percent slopes, extremely stony
- OTF - Oquaga and Lordstown channery loams, 25 to 70 percent slopes, extremely stony
- OgB - Oquaga channery loam, 3 to 12 percent slopes
- OgC - Oquaga channery loam, 12 to 20 percent slopes
- OgD - Oquaga channery loam, 20 to 30 percent slopes
- OsD - Oquaga channery loam, 12 to 30 percent slopes, extremely stony
- Ow - Orrville silt loam
- Ph - Philo silt loam
- Po - Pope soils
- Pp - Pope fine sandy loam, high bottom
- RxA - Rexford silt loam, 0 to 3 percent slopes
- RxB - Rexford silt loam, 3 to 10 percent slopes
- VoB - Volusia channery silt loam, 3 to 8 percent slopes
- VoC - Volusia channery silt loam, 8 to 15 percent slopes
- VoD - Volusia channery silt loam, 15 to 25 percent slopes
- VoD3 - Volusia channery silt loam, 15 to 25 percent slopes, eroded
- VoE3 - Volusia channery silt loam, 25 to 35 percent slopes, eroded
- VvB - Volusia channery silt loam, silty substratum, 3 to 8 percent slopes
- VvC - Volusia channery silt loam, silty substratum, 8 to 15 percent slopes
- VvD3 - Volusia channery silt loam, silty substratum, 15 to 25 percent slopes, eroded
- W - Water
- Wa - Wayland silty clay loam
- WeB - Wellsboro channery loam, 3 to 8 percent slopes
- WeD - Wellsboro channery loam, 15 to 25 percent slopes
- WyC - Wyoming gravelly sandy loam, 12 to 20 percent slopes
- WyD - Wyoming gravelly sandy loam, 20 to 30 percent slopes
- WyF - Wyoming gravelly sandy loam, 30 to 50 percent slopes
- Wz - Wyoming gravelly loam, flooded
- <all other values>
- Tioga_Hammond_Site

0 5,000 10,000 Feet

N

Tioga-Hammond, Cowanesque 2024 Master Plan

Figure 2-2 Cowanesque Soils Analysis



Cowanesque Lake Master Plan Update

Soils Analysis

Legend

- Cowanesque_Site

Soil Survey

- Ab - Alluvial Land
- BvB - Braceville gravelly loam, 3 to 8 percent slopes
- ChB - Chenango gravelly loam, 2 to 12 percent slopes
- ChC - Chenango gravelly loam, 12 to 20 percent slopes
- ChD - Chenango gravelly loam, 20 to 30 percent slopes
- CkA - Chippewa silt loam, 0 to 3 percent slopes
- CkB - Chippewa silt loam, 3 to 8 percent slopes
- DAM - Dams and impoundment structures
- LoB - Lordstown channery loam, 3 to 12 percent slopes
- LoC - Lordstown channery loam, 12 to 20 percent slopes
- LoD - Lordstown channery loam, 20 to 30 percent slopes
- LsB - Lordstown channery loam, 3 to 12 percent slopes, extremely stony
- MaC - Mardin channery silt loam, 8 to 15 percent slopes
- MaD - Mardin channery silt loam, 15 to 25 percent slopes
- OTF - Oquaga and Lordstown channery loams, 25 to 70 percent slopes, extremely stony
- Ow - Orrville silt loam
- Ph - Philo silt loam
- Po - Pope Soils
- Pp - Pope fine sandy loam, high bottom
- RxA - Rexford silt loam, 0 to 3 percent slopes
- RxB - Rexford silt loam, 3 to 10 percent slopes
- TW - Tannery waste
- VoA - Volusia channery silt loam, 0 to 3 percent slopes
- VoB - Volusia channery silt loam, 3 to 8 percent slopes
- VoC - Volusia channery silt loam, 8 to 15 percent slopes
- VoD - Volusia channery silt loam, 15 to 25 percent slopes
- VoD3 - Volusia channery silt loam, 15 to 25 percent slopes, eroded
- VoE3 - Volusia channery silt loam, 25 to 35 percent slopes, eroded
- VvB - Volusia channery silt loam, silty substratum, 3 to 8 percent slopes
- VvC - Volusia channery silt loam, silty substratum, 8 to 15 percent slopes
- VvD3 - Volusia channery silt loam, silty substratum, 15 to 25 percent slopes, eroded
- W - Water
- Wa - Wayland silty clay loam
- WyC - Wyoming gravelly sandy loam, 12 to 20 percent slopes
- WyD - Wyoming gravelly sandy loam, 20 to 30 percent slopes
- WyF - Wyoming gravelly sandy loam, 30 to 50 percent slopes
- Wz - Wyoming gravelly loam, flooded

Miles
0 165 330

N

Feet
0 5,000 10,000

PSU Office of Physical Plant, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, Earthstar Geographics, PSU Office of Physical Plant, data.pa.gov, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

Tioga-Hammond, Cowanesque 2024 Master Plan

2.1.3 Hydrology and Groundwater

The upper Tioga River Watershed is part of the Chemung Subbasin and drains an area about 1,391 square miles including PA (690 square miles) and NY (701 square miles). The Tioga River, which is the main tributary in this watershed, flows 58 miles from Armenia Township, Bradford County, PA, through Tioga County, PA, into NY, where it flows into the Chemung River.

Tioga Lake

Tioga Dam controls a drainage area of 280 square miles within the Tioga River Watershed. Tributaries to the Tioga Dam in the vicinity include Lambs Creek, Phoenix Run, Cabin Run, and Mill Creek. Downstream of the dam, the primary tributaries to the Tioga River in the Tioga Lake vicinity include Mitchell Creek, Bear Creek, Mutton Lane Creek, Smith Creek, and Harts Creek,

Hammond Lake

Hammond Dam controls a drainage area of 122 square miles. Tributaries to the Hammond Dam include Ives Run and Crooked Creek. Primary tributaries to Crooked Creek in the vicinity of Hammond Lake include Stephenhouse Run, Hills Creek, and North Run.

Cowanesque Lake

Cowanesque Dam controls a drainage area of 298 square miles. Tributaries to the Cowanesque Dam include Cummings Creek, Baldwin Creek, Cook Creek, Strait Creek, and Cowanesque River. Primary tributaries to Cowanesque River in the vicinity of Cowanesque Lake include Bill Hess Creek, Thornbottom Creek, and Camp Brook.

2.1.3.1 *Groundwater*

Groundwater in the PA Northern Tier region provides most of the domestic water supplies for both rural and municipal areas, including Tioga-Hammond and Cowanesque Lakes. These groundwaters occur in moderately large quantities from either the Chemung, Pocono or Catskill formations. These three formations are the most productive water bearing rock stratum in Tioga County.

The Chemung Formation is composed of alternate beds of sandstone and shale and is generally a good water bearing formation. It underlies most of the valley areas in the northern PA counties and supplies more wells than any of the other rock formations. The Chemung Formation generally yields adequate supplies for domestic use, and where sandstones are encountered it yields from 50 to as much as 200 gallons per minute (GPM) to industrial and public supply wells. Average depths to water in this formation is 40 feet below ground surface.

The Pocono Formation is considered one of the most productive consolidated rock formations, where it is below drainage level. The rocks of the formation are mainly comprised of coarse sandstone. Some of the wells in the Pocono Formation yield from 300 to 600 GPM. IN places where these rocks cap the plateaus, they generally yield enough water for domestic use, but probably would not yield large supplies of water. The waters from the Pocono Formation contain objectionable amounts of dissolved iron. Except for the iron, the Pocono Formation water is generally of very good quality and is quite soft. Average depth to water in this formation is 20 feet below ground surface.

The Catskill Formation generally yields adequate supplies of good water for domestic needs and yields moderately large supplies to some of the industrial and public supply wells. Some of the wells are reported to yield from 50 to 300 GPM. This formation is similar in its water-bearing capacity to the underlying Chemung, but the Catskill waters are generally of better quality than those of the Chemung in that they are softer and much less likely to contain appreciable amounts of sodium chloride. Average depth to water in this formation is 32 feet below ground surface.

2.1.4 Sedimentation

Since Tioga-Hammond and Cowanesque reservoirs are primarily flood control structures, the reservoirs may store sediment-rich floodwaters for a considerable time, allowing much of the sediment to settle in the lakes.

Tioga and Hammond Lakes

At Tioga and Hammond lakes, serious sedimentation problems have not been observed to date, but sediment is believed to be accumulating at a faster rate than was originally estimated. Areas of deposition have been observed, especially adjacent to the Ives Run old day use boat launch near the head of Hammond Lake and at the Lambs Creek Recreation Area near the head of Tioga Lake. The deposition at Ives Run has caused some difficulty for boat operators as they access the main body through a no-wake zone.

Cowanesque Lake

Although serious sedimentation problems have not been observed to date, sediment is believed to be accumulating at a faster rate than was originally estimated. The results of the most recent survey indicates that about 4.6 percent of the reservoirs original capacity has been lost to sedimentation since construction.

2.1.5 Shoreline Erosion

Hammond Lake

Figure 2-3 Bend Way Weirs at Crooked Creek

In 2009, work began along Crooked Creek and has resulted in multiple maintenance projects. Due to these efforts, the PFBC began stocking trout in 2020. In August and September of 2022, the USACE maintenance and park ranger staff partnered with FirstEnergy and the Pennsylvania Game Commission (PGC) to repair a 500-foot section an eroding streambank where Crooked Creek flows into Hammond Lake at the lake's western boundary. This area was chosen for stabilization since Crooked Creek flows into Hammond Lake at high velocity, which causes severe erosion. The area was stabilized by placing large stone bend way weirs and re-sloping the streambank (Figure 2-3). A riparian buffer with 300 native tree saplings was also installed. Efforts are scheduled to continue.

Cowanesque Lake

In addition to the repaired area at Hammond Lake, two areas along Tioga, Hammond and Cowanesque Lakes show visible signs of active erosion: the Nelson Falls area at the east end of Cowanesque Lake and the western side of Lambs Creek. At Cowanesque Lake, there have been three major stabilization projects: two at Tompkins Campground (2010 and 2023) and one at South Shore Recreation Area (2022). At Tompkins Campground in 2010, 200-feet of shoreline was stabilized with sawtooth design with PA FBC. Second project 2022, at the South Shore Recreation Area (350 feet of shoreline with sawtooth design with PFBC. In 2023, another 250 feet of the Tompkins Campground shoreline was stabilized with a sawtooth design. There are multiple upcoming shoreline stabilization projects over the next few years including one at Lawrence Recreation Area.

2.2 ECOREGION AND NATURAL RESOURCES ANALYSIS

2.2.1 Vegetation

According to the U.S. Forest Service (USFS), North Central Pennsylvania is characterized by more forest than any other cover type. The primary forest type is deciduous forests, with significant amounts of mixed and evergreen forests. Other major cover types include pasture/hay and cultivated crops. Nearly 50 percent of the forests in North Central Pennsylvania belong to the maple/beech/birch group. The primary species within this group include red maple (*Acer rubrum*), sugar maple (*A. saccharum*), and black cherry (*Prunus serotina*). Other forest groups present in North Central Pennsylvania are oak/hickory, white pine/red pine/hemlock, and aspen/birch groups.

Between 2009 and 2014, North Central Pennsylvania gained approximately 40,000 acres of forest, but lost approximately 70,000 acres, primarily due to development and conversion to agriculture, for a net decrease in forest acres of 0.6 percent. While most of Pennsylvania's forests are privately owned, North Central Pennsylvania has more federal and state-owned forests than any other Pennsylvania Region as well as a high degree of forest connectivity. This is primarily due to the presence of the Allegheny National Forest, which covers approximately 513,000 acres of land (USFS 2017).

2.2.2 Wetlands

Most of the wetlands are directly associated with the lakes, but numerous wetland systems are scattered along the river systems flowing into the three lakes. Excluding the lake and river systems, the USFWS National Wetland Inventory (NWI) indicates 107.73 acres of wetlands associated with the Tioga-Hammond project area (Table 2-6) and approximately 87.6 acres of wetlands associated with the Cowanesque project area (Table 2-7) (USFWS NWI, 2024).

Table 2-6 Wetland areas within Tioga-Hammond Project Area (USFWS NWI, 2024)

Wetland Type	Acres
Freshwater Emergent Wetland	48.13
Freshwater Forested/Shrub Wetland	44.91
Freshwater Pond	14.69
Total	**107.73**

Table 2-7 Wetland areas within Cowanesque Project Area (USFWS NWI, 2024)

Wetland Type	Acres
Freshwater Emergent Wetland	58.82
Freshwater Forested/Shrub Wetland	21.00
Freshwater Pond	7.78
Total	**87.60**

2.2.3 Fish and Wildlife Resources

Wildlife

Wildlife resources within the vicinity of Tioga-Hammond and Cowanesque Lakes are diverse and plentiful. There are a mixture of habitats including forests, scrub/shrub areas, and open fields that support a variety of game and non-game species. Typical mammalian species that rely on the forest community include white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus)*, raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), and white-footed mouse (*Peromyscus leucopus*). Open field and shrub communities support additional small mammals including eastern cottontail (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), meadow jumping mouse (*Zapus hudsonius*), and meadow vole (*Microtus pennsylvanicus*). Species such as beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and mink (*Mustela vison*) may be found along the lakes and rivers. The main game species include squirrel, rabbit, groundhog, deer, bear, beaver, muskrat, fox, and bobcat.

Figure 2-4 Pictures of White-Tailed Deer, Black Bear, and Bald Eagle

Currently a partnership with the PGC is cultivating food plots on Corps land to encourage deer and game species. These plots are located near Mill Creek (Tioga Lake) and in the Bryant Hollow Wildlife Management Area (Hammond Lake). Within the Bryant Hollow Wildlife Management Area, areas are strip-mowed with a brush hog to provide additional open/edge habitats for various wildlife species.

Common avian species include a variety of waterfowl and wading birds such as Canada goose, wood duck, and mallard as well as common game species including wild turkey (*Meleagris gallopavo*), ruffed grouse (*Bonasa umbellus*), and woodcock (*Scolopax minor*). The area also provides habitat for numerous migratory bird species in addition to bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), and great blue heron (*Ardea Herodias*). There have been several bald eagle nests, osprey nests, and heron rookeries within the vicinity of all three lakes.

Amphibian and reptile populations also inhabit the lake areas and are essential to natural community dynamics. Some of the amphibian and reptiles that may be found within the area include various salamander, newt, frog, toad, turtle, and snake species.

Fish

Tioga-Hammond Lakes

Both lakes were leveled prior to flooding and all tree stumps and debris were cleared. As a result, the flat basin of the lakes offers little cover for nesting and predator avoidance resulting in sub-optimal habitat for most fish populations. There is almost no submerged aquatic vegetation in either lake.

Hammond Lake is classified as a warm-water fisheries habitat by the PFBC. In 2023, the PFBC has planned stockings for Channel Catfish, Striped Bass hybrid, Tiger Muskellunge, and Walleye (PFBC WW/CW, 2023). In addition, other fish species such as black crappie, yellow perch, common carp, smallmouth bass, and largemouth bass have been found in the lake (PFBC WCF, 2023). Generally, the physical habitat is lacking in quantity and quality with several areas providing suitable habitat for adult and juvenile fish, but erosion, turbidity, and lack of aquatic vegetation are all limiting factors for the fish population at Hammond Lake.

Due to Hammond and Tioga Lakes becoming one lake during high water events through the connecting channel, the Tioga Lake is not stocked by the PFBC. Although the lake isn't stocked, there are a variety of fish species such as common carp, yellow perch, black crappie, smallmouth bass, pumpkinseed, and bluegill (PFBC WCF). According to the 2022 Tioga-Hammond and Cowanesque Lakes Project Fiscal Year 2022 Annual Report, a night electrofishing survey at Tioga Lake in June 2022, targeting Largemouth and Smallmouth bass, found over 50 Largemouth and 40 Smallmouth bass in the lake.

Cowanesque Lake

Unlike Tioga and Hammond Lakes, the bottom of Cowanesque Lake was not cleared and leveled prior to flooding. As a result, there is a larger and more sustained fish population due to structures and trees that remain on the bottom of the lake. Cowanesque Lake has a rich fish habitat including extensive areas of submerged aquatic vegetation, inundated timber and brush, as well as artificial fish habitat structures. The PFBC has conducted stocking programs for various fish species to supplement the naturally occurring fish population. Historically, stocked species include tiger muskellunge, muskellunge, walleye, striped bass, and channel catfish (PFBC WW/CW, 2023). Overall, Cowanesque lake supports a moderately diverse and healthy fish community.

2.2.4 Threatened and Endangered Species

2.2.4.1 Federally listed species

As of 2024, four federally listed threatened, endangered, proposed endangered or candidate species are known to exist within the project areas. The Northern long-eared bat (*Myotis septentironalis*) and Northeastern bulrush (*Scirpus ancistrochaetus)* are listed as endangered. The Tricolored Bat (*Perimyotis subflavus*) is listed as a proposed endangered species while the Monarch Butterfly (*Danaus plexippus*) is listed as a candidate species (Appendix E).

Figure 2-5 Northern long-eared bat (*Myotis septentironalis*)

Northern long-eared bats are medium sized bats (about 3-4 inches in length) associated with mature, interior forest environments. Unlike most other bats, Northern long-eared bats forage along wooded hillsides and ridgelines instead of above valley-bottom streams and riparian forest edges. Populations at northern long-eared bat hibernation sites (e.g, caves and mines) have declined by 99 percent since the discovery of white-nose syndrome, and it is now listed as endangered throughout all of its range. Forest fragmentation and conversion are also major threats to the species due to its association with large blocks of mature forest (USFWS n.d.)

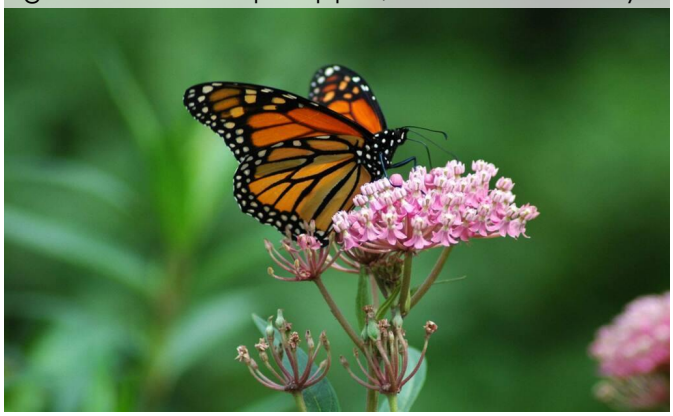
Figure 2-6 Tricolored bat (*Perimyotis subflavus*)

Like the Northern long-eared bat, the Tricolored bat is facing extinction due to white-nose syndrome. Mature Tricolored bats are medium sized bats (about 3-4 inches in length) and have unique appearance with three variations of yellowish fur along their back (USFWS Tricolored Bat, 2023). They may also appear as silvery-gray, chocolate brown, or black (USFWS Tricolored Bat, 2023). Tricolored bats primarily roost among live and dead leaf clusters in deciduous hard trees and their mating season is between mid-August and mid-October (USFWS Tricolored Bat, 2023). They hibernate during the winter and produce young between May and July. The Fish and Wildlife Service has identified Tricolored bats throughout the western half of the United States ranging from Florida to Maine, Colorado to Maryland, and from Texas to South Dakota. White-Nose Syndrome has led to 90 to 100% declines in winter colony abundance at impacted sites (USFWS Tricolored Bat, 2023).

In 2021, a Bat Acoustic Survey Report was completed at Tioga-Hammond and Cowanesque Lakes focusing on confirming presence of federal and state listed species. Automated acoustic analysis determined the likely presence of bat species expected to occur within the geographic area of the project area. Eight bat species were recorded at Tioga-Hammond Lake and six at Cowanesque Lake. Specifically, the northern long-eared bat was recorded at both lakes while the tricolored bat was recorded at Tioga-Hammond Lake. Suitable bat habitat is found throughout both Project areas.

Northeastern bulrush is a leafy, perennial herb of the sedge family (Cyperaceae) approximately 80 to 120 centimeters in height. When flowering, it bears an inflorescence with distinctly arching rays and clusters of brown spikelets. Northeastern bulrush is found at the edge of natural ponds, wet depressions, or shallow sinkholes less than one acre in size. These wetlands primarily occur in low-lying areas within areas with hilly topography, and have seasonally variable water levels ranging from inundation to desiccation (USFWS n.d.)

Figure 2-7 Danaus plexippus, Monarch butterfly



The Monarch Butterfly is a candidate species and is not yet listed or proposed for listing. Consultation with USFWS under Section 7 of the Endangered Species Act is not required for candidate species. Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant and larvae emerge after two to five days. Larvae develop over a period of 9 to 18 days and then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter reproductive suspension and live six to nine months. In many regions where monarchs are present, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 km and last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again. (USFWS n.d.).

2.2.4.2 Pennsylvania State Threatened & Endangered Species

According to the Pennsylvania Natural Heritage Program screening tool, the state threatened Allegheny woodrat (*Neotoma magister*) is known to occur in the project area (Appendix E).

The Allegheny woodrat is listed as threatened in Pennsylvania and vulnerable nationally. They are related to packrats found in the Western United States and can be distinguished from common Norway rats (also "brown rat"; *Rattus norvegicus*) based on their furred tail, larger ears and eyes, heavier head, and longer whiskers. Their preferred habitat includes extensive expanses of abundant, closely spaced surface rock surrounded by unfragmented forest. While they may be found in deciduous, coniferous, or mixed forests, mast-producing trees are important as a food source. Rocky areas are important habitat for Allegheny woodrats as they nest deep within rock outcrops, use rock crevices and protected ledges for storing food, and establish latrines on flat rock surfaces protected by an overhang. Several factors are thought to have contributed to the population's decline including the decline of the mast-producing trees, such as the American chestnut due to chestnut blight and oak trees due to

gypsy moth infestations and infection by the racoon roundworm parasite (*Baylissacaris procyonis*). Other factors include predation pressure from increasing Great Horned Owl populations; competition with growing North American porcupine (*Erethizon dorsatum*) populations for habitat; and forest fragmentation. Populations in some of the Allegheny woodrat's range, including North Central Pennsylvania, are thought to be relatively healthy (Butchkowski 2014).

2.2.5 Other Protected Species

Bald eagles (*Haliaeetus leucocephalus*), a previously federally and state-listed endangered species, were removed from the federal list in August 2007 and Pennsylvania's list in 2013. Although this species is not listed as an endangered or threatened species, it is protected under the Bald and Golden Eagle Protection Act, as noted by the United States Fish and Wildlife Service (USFWS) in Appendix E. According to the Tioga-Hammond and Cowanesque Lakes Project Fiscal Year 2021 Annual Report, both immature and adult bald eagles were sighted in the Project area.

The timber rattlesnake (*Crotalus horridus*) is a state protected species in Pennsylvania. Killing of timber rattlesnakes is prohibited by the PFBC. Timber rattlesnakes are large snakes of the pit viper family that can be identified by their "V"-shaped dark bands on a grey, yellow, black, or brown body. In Pennsylvania, timber rattlesnakes are typically found at elevations greater than 1,800 feet. They prefer southern-facing upland forested areas with talus slopes, rocky ledges and outcrops, and boulder fields, which are used for basking (thermoregulation), and dens. Threats to timber rattlesnake populations include human activities related to habitat alteration, overhunting and poaching (Urban, 2014). Timber rattlesnakes have been found in the vicinity of Tioga-Hammond Lakes.

2.2.6 Invasive Species

Invasive species are defined as non-native species whose introduction into an ecosystem is likely to cause environmental, human, or economic harm. Non-native species may not be affected by existing predators, disease, or other limiting factors in their introduced range and therefore may thrive and outcompete native species. Non-native invasive species are therefore often difficult and expensive to control. Tioga Lake, Hammond Lake, Cowanesque Lake, and associated lands are experiencing several terrestrial invasive species, some of which are actively managed by USACE Park Ranger staff. For Cowanesque Lake and the surrounding area, a Field Management Plan was adopted in June 2022 to address invasive species and to increase local species abundance and diversity. Section 6.3 discusses the Cowanesque Lake Field Management Plan in more detail. At all three Lake, Eurasian milfoil, an aquatic invasive species, has been found. In Cowanesque Lake, zebra mussel, an aquatic invasive species, has also been found and an upcoming study with the USACE and USGS will be performed on how to address the invasive species in the next few years. Some of the invasive and nuisance species found at the project area are described in the paragraphs below.

2.2.6.1 Vegetation

<u>Tioga-Hammond Lakes</u>

The vegetation communities found around Tioga and Hammond Lakes are very similar and are discussed within the same section. Cowanesque Lake, located north of Tioga and Hammond Lakes, has a different make up of vegetation types and is discussed separately. The terrestrial habitat surrounding Tioga and Hammond Lakes is primarily comprised of forest. Tioga and Hammond Lakes are located within the Appalachian Oak Forest Type of the

Laurentian Mixed Forest Province Ecoregion of the northeastern United States. Approximately two thirds of the forest resources are oak-hickory type. The second most prevalent forest type is northern hardwood forest. The remaining forested areas are comprised of small areas of willow-sycamore, white pine, aspen-birch, plantation, oak-hard pine, white pine-hemlock, black locust, hemlock, and hickory forest types.

Oak-Hickory forests are primarily comprised of red oak, white oak, chestnut oak, and shagbark hickory. Secondary species associated with oak-hickory forests include red maple, sweet birch, white pine, bigtooth aspen, and hemlock. Generally, chestnut oaks are found on higher elevations with poorer soils while large red oaks, white ash, and yellow poplars are more typically found along streams and gullies. Understory species include striped maple, witchhazel, gray birch, paper birch, eastern hop-hornbeam, red maple, wild grapes, and mountain laurel. Northern hardwood forests are dominated by sugar maple, sweet birch, basswood, white ash, black cherry, and red oak. These forest types are typically found on the cooler northeast slopes. Secondary tree species include hemlock, shagbark hickory, white pine, and bigtooth aspen. Eastern hop-hornbeam, striped maple, and black birch are generally found in the understory of this forest type.

Oak-hickory stands and northern hardwood areas that are suitable for timber cutting were designated with diameter at breast height (DBH) of 14 inches or greater during the qualitative inventory conducted in February 1986. The forested areas formerly designated as 8-14 inches DBH during the February 1986 inventory may also be large enough for timber cutting. The areas suitable for timber cutting are located near Mill Creek, along Crooked Creek south of Hammond Lake, east of Ives Run Recreation Area, west of the connecting channel between Tioga and Hammond Lake, west of Tioga Lake, and near Lambs Creek. Currently there is an active annual gypsy moth monitoring program within the forested areas of the lake grounds. There is no other active management of the forest areas around the lakes.

Slightly less than 20 percent of the area around Tioga and Hammond Lakes is comprised of natural and managed open field communities. Natural and managed open field areas were observed south of Hammond Lake, Crooked Creek, and Lambs Creek. Natural open field communities are dominated by herbaceous species with minimal areas covered with woody species. Typical plants found in natural open fields include various grasses, asters, and goldenrods, strawberry, hawkweed, and milkweed. Managed/reclaimed open field areas include roadsides, reclaimed borrow areas, and roadside slopes. These areas are in various successional stages ranging from nearly bare with little pioneer vegetation through more advanced early old field stages.

Upland shrub communities cover an estimated ten percent of the land area. These communities are mostly found within the Mill Creek, Crooked Creek, and Tioga River areas but small patches are also scattered throughout the perimeter of both lakes. Shrub communities are the intermediate phase of the natural succession of land from open field to forest. These areas are typically dominated by shrubs and young trees but also include a mixture of herbaceous species common to open fields. Mixed shrub and hawthorn shrubs are the two types of shrub communities common to Tioga and Hammond Lakes.

Hawthorn shrub communities are typically found in former pastureland within upland areas exhibiting dry, well-drained soils. The community is layered with pioneer trees, shrubs, and herbaceous plants. Typically, pioneer trees include white ash, white pine, red oak, red maple, and quaking aspen. Hawthorn, witchhazel, and dogwood species make up the shrub layer and herbaceous species typically include various grasses, goldenrod, aster, and crown vetch. The species composition of mixed shrub communities can be highly variable. Some

species that may occur within these areas can include white pine, staghorn sumac, autumn olive, dogwood, alders, grapes, box elders, and sycamores.

Most areas along Crooked Creek and Lambs Creek are infested with Japanese knotweed, a noxious and invasive species. This species is extremely prolific, especially around water, and shades out other vegetation resulting in a reduction of native plant species and habitat degradation. Multiflora rose, another invasive noxious species, was observed throughout the properties.

Cowanesque Lake

Lands surrounding Cowanesque Lake are comprised of grassland/open field, grass and hardwood shrub areas and hardwood forest areas. Historically, the majority of the area around Cowanesque Lake was used for agricultural purposes. Former pastures and croplands have reverted to old fields and typically include various grass species, aster, goldenrod, strawberry, and milkweed. These areas are primarily located within flat bottomlands and moderately sloped hillsides along the entire perimeter of the lake.

Forested areas are scattered in the Cowanesque Lake area. In general, forests are limited to the areas northeast of and within the Tompkins Campground, midway between the Tompkins Campground and the town of Nelson, surrounding the Nelson waterfalls, along the dry loop of the riverbed and the Baldwin Creek ravine, and along the south side of the lake from Baldwin Creek to the Lawrence Recreation Area. Cowanesque Lake is within the Appalachian Oak Forest type of the Laurentian Mixed Forest Province Ecoregion of the northeastern United States. Approximately 500 acres surrounding Cowanesque Lake are covered by forests and are characterized as Northern Hardwood forests. Northern Hardwood forests are dominated by sugar maple, sweet birch, basswood, white ash, black cherry, and red oak. Secondary tree species include hemlock, shagbark hickory, white pine, and bigtooth aspen. Eastern hophornbeam, striped maple, and black birch are generally found in the understory of this forest type. The forested areas around Cowanesque Lake are second growth and were previously timbered; at present there are no plans for additional commercial timber cutting.

Significant habitat mitigation was conducted after 1990 to compensate for vegetation and habitat lost by reallocation and the increase in the conservation pool. The main mitigation areas include fields adjacent to the South Overlook on the south side of PA Route 49, west of the South Overlook on the eastern portion of the lake and shoreline, and the area northwest of the lake in the vicinity of the Moccasin Trail, south of Bliss Road. A total of 96.5 acres was planted with hedgerows as part of the wildlife habitat mitigation program. The 60-acre field is a successional old field that is starting to support various shrub species and tree seedlings. A complex system of serpentine hedgerows was planted on the northern side of the lake within the vicinity of the Moccasin Trail. These hedgerows are not maintained. There are also hedgerow areas on either side of Nelson Cemetery along Bliss Road, on the northern side of the lake. Hedgerow species include Siberian crabapple, sweet honeysuckle, Washington hawthorn, sergeant crabapple, red panicle dogwood, silky dogwood, red honeysuckle, forsythia, Japanese red barberry, Scotch pine, Norway spruce, and Austrian pine.

2.2.6.2 Insects

The PA Department of Agriculture is tracking 18 species throughout Pennsylvania that are either potential threats, emerging threats, or established pests. The emerald ash borer (*Agrilus planipennis Fairmarie*), for example, was destructive for many years at the Project area before the host species' (Fraxinus spp.) populations became too low to support emerald ash borer

populations. Spotted Lanternfly (*Lycorma delicatula*) is another invasive insect. The species was found in Pennsylvania in 2014 and has since spread to 51 counties, all of which are under a state-imposed quarantine. Tioga County is not one of the counties that are affected yet; however, neighboring counties to the south are showing large numbers of the invasive pest and are under quarantine (USDA SL, 2023).

Figure 2-8 Spongy Moth

The spongy moth (*Lymantria dispar*) is an invasive pest of North American forests that can defoliate hundreds of tree and shrub species (USDA SM, 2023). According to the Tioga-Hammond and Cowanesque Lakes Project Fiscal Year 2022 Annual Report, the spongy moth damaged portions of the Ives Run Campground and Day-Use area near Tioga-Hammond Lakes and interfered with camping and general park recreation and maintenance. The spongy moth also damaged portions of the Tompkins Campground in 2022 and 2023. This species is native to Europe, Asia, and North Africa, and it was introduced in Massachusetts in the 1800s and is now widespread. A primary way the spongy moth spreads is via egg masses when transported on firewood, outdoor equipment, and vehicles. Public awareness of the egg mass, which can contain 600 to 1,000 eggs, and its sponge-like appearance is important in controlling the pest. The insect spends most of its life cycle (10 months) in the egg stage. Spongy moths awake for a 7-week period, where it feeds on leaves and is responsible for killing millions of oak and other tree species.

2.2.6.3 Birds

Currently, the USACE does not manage any invasive or nuisance bird species at Tioga-Hammond and Cowanesque. However, both invasive and native nuisance bird species are present in the project area. The European starling (*Sturnus vulgaris*) was introduced to Central Park, New York City in 1890 and is now a common resident of both urban and rural areas in the United States. European starlings outcompete native cavity nesting species by evicting birds occupying a cavity and using it for their own nests (USDA APHIS 2017).

2.2.7 Water Quality

Tioga and Hammond Lakes

The drainage basin of the Tioga River, as measured from the site of the dam, is approximately 280 square miles in area. The Tioga River has a yearly average temperature of 12° C (53.6°F). Above Blossburg, PA (approximately 23 miles south of the lake area), the pH of the stream is near neutral; however, acid discharges from areas of past coal mining activity along Morris Run, Coal Run, and Bear Creek greatly affect the Tioga River downstream. Acidity, while still quite high in the vicinity of the dam, is lower than these upstream conditions. Acidity in the Tioga River in the vicinity of the dam ranges of a pH about 4.5 to about 7.5. The connecting channel between Tioga and Hammond lakes allows the Corps to mix water from the two lakes to regulate acidity levels. The target pH for the lakes is 6.5.

Hammond Lake is stratified from mid-May through early October. Nutrients in Hammond Lake are abundant enough to produce algal blooms, and dissolved oxygen is gradually depleted

as the water gets deeper below the surface layer. Crooked Creek, which is the primary source of inflow to Hammond Lake, is an alkaline stream with a pH that generally ranges between 7.6 and 7.8. Crooked Creek is classified as a warm water stream and has an average yearly temperature of 11.4° C (52.5°F). Summer surface water temperatures are frequently well in excess of 20° C (68°F), and subsurface water temperatures can be 18° C (64.4°F) or higher.

Downstream of the Tioga and Hammond Reservoirs, the PA Department of Environmental Protection (PADEP) lists the Tioga River as "Impaired" for "Aquatic Life" due to siltation, while the Tioga and Hammond Reservoirs themselves are supporting of aquatic life (PADEP IWQR, 2024). Upstream of the reservoirs, the Tioga River is classified "impaired" for "Aquatic Life" due to siltation, for "Fish Consumption" due to mercury from atmospheric deposition, and metals due to acid mine drainage. For additional information about sedimentation within the reservoir, see Section 2.1.4.

Cowanesque Lake

The Cowanesque Lake is thermally stratified, with the surface temperature zone (epilimnion) of 5 to 10 feet below the surface having a temperature range between 23.8 and 26.6°C (75 and 80° F) in the summer. Dissolved oxygen consumption in the lake resulting from biological and chemical demand is expected to exceed the assimilative capacity of the lake. Therefore, a lack of dissolved oxygen is expected to occur below the epilimnion in the summer as decaying organic matter consumes available dissolved oxygen and there is very little mixing with the oxygen-rich surface.

The PADEP lists the Cowanesque Reservoir as "Supporting" for "Aquatic Life" while the upstream portion of the Cowanesque River is impaired for the same due to siltation. (PADEP IWQR, 2024).

2.3 CULTURAL RESOURCES

Cultural resources are locations of human activity, use, or occupation. They can be defined by expressions of human culture and history in the physical environment such as prehistoric or historic archaeological sites, buildings, structures, objects, districts, and sacred sites, among others. Cultural resources may also include natural features, plants, and animals that are deemed important or significant to a group or community. It is important to note that historic properties, as defined by 36 CFR Part 800, the implementing regulations of Section 106 of the National Historic Preservation Act (NHPA), as amended, are cultural resources that are eligible for or listed in the National Register of Historic Places (NRHP). Additionally, to be considered a historic property, the resource must possess at least one of the following significance criteria:

- Criterion A: association with events that have made a substantial contribution to the broad patterns of our history; or,
- Criterion B: association with the lives of persons substantial in our past; or,
- Criterion C: embodiment of the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic value, or that represents a substantial or distinguishable entity whose components may lack individual distinction; or,
- Criterion D: have yielded, or may be likely to yield, information important in prehistory or history.

A historic property must also possess enough integrity to portray its significance. A resource that retains integrity will embody several, and usually most, of the seven aspects of integrity:

- Location: the place where the historic property was constructed or the place where the historic event occurred.
- Design: the combination of elements that create the form, plan, space, structure, and style of a property.
- Setting: the physical environment of a historic property.
- Materials: the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- Workmanship: the physical evidence of the crafts of a particular culture or people during a given period in prehistory or history.
- Feeling: the property's expression of aesthetic or historic sense of a particular period of time.
- Association: the direct link between an important historic event or person and a historic property.

Several laws, regulations, and Executive Orders direct the cultural resources program at Cowanesque Lake. These include, but are not limited to:

- Section 106 of the NHPA
- Section 110 of the NHPA
- Archaeological Resources Protection Act
- American Indian Religious Freedom Act
- Native American Graves Protection and Repatriation Act
- Executive Order 13007 Indian Sacred Sites Act
- Executive Order 13175 Consultation and Coordination with Indian Tribal Governments
- Presidential Memorandum on Tribal Consultation
- USACE Tribal Policy Principles
- USACE Tribal Consultation Policy
- Department of Defense American Indian and Alaska Native Policy
- Engineering Regulation 1130-2-540 Environmental Stewardship and Operations and Maintenance Policies
- Engineering Pamphlet 1130-2-540 Environmental Stewardship and Maintenance Guidance and Procedures

Cultural Resources Objectives

The objectives below are listed to provide goals for complying with NHPA Sections 106 and 110, Engineering Regulation 1130-2-540, and Engineering Pamphlet 1130-2-540. These regulations and guidance documents establish and help guide stewardship and preservation programs for USACE operations projects such as Cowanesque Lake.

- Identify and inventory historic properties within the project area as funds permit; and,
- Increase public awareness and education of the history of the Cowanesque Lake, regional histories, archaeological studies, etc. through interpretive displays, pamphlets, presentations, or other methods as appropriate; and,
- Draft and finalize a Cultural Resources Management Plan that would provide a comprehensive program to direct historic preservation activities and objectives, as appropriate; and,
- Prevent unauthorized or illegal excavation of sites and removal of artifacts from project lands; and,

- Maintain compliance with Sections 106 and 110 of the NHPA, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act.

2.3.1 Prehistoric

Precontact history in Pennsylvania can generally be divided into three periods: the Paleoindian Period (14,000 to 8,000 Before Common Era (BCE)), the Archaic Period (8,000 to 1,500 BCE), and the Woodland Period (1,000 BCE to CE 1600). Both the Archaic and Woodland Periods are sub-divided into Early, Middle, and Late sub-periods.

The Paleoindian Period is typically characterized by the presence of fluted spear points. Population groups during this time generally practiced less sedentary subsistence patterns by moving around to areas with predictable food resources. Some evidence also points to Paleoindians preferring high quality stone to make their tools. Archaeologists tracing sources of this stone have documented a range of over 200 miles per year in movement (Pennsylvania Historical and Museum Commission 2015).

The Archaic Period is further divided into three sub-periods: the Early Archaic Period (8,000 to 6,000 BCE), the Middle Archaic Period (6,000 to 3,000 BCE), and the Late Archaic Period (3,000 to 1,500 BCE). The Archaic Period is also characterized by mobile hunter-gatherer groups practicing seasonal migrations and foraging patterns; however, there is an increased use of uplands and terraces by the end of the Archaic Period. After the Archaic Period there is what is referred to as the Transitional Period (1,500 to 1,000 BCE) that is characterized by the use of soapstone bowls, the precursors to fired ceramics used during the subsequent Woodland Period.

The Woodland Period is marked by the presence of pottery and can be divided into the Early Woodland Period (1,000 BCE to 100 CE), the Middle Woodland Period (100 CE to CE 900), and the Late Woodland Period (CE 900 to 1600) Periods. The frequency of upland sites increases during this time, as groups became increasingly more sedentary. Settlement continued to rely on more permanent base camps, with specialized camps for hunting or lithic collection and reduction. By the Late Woodland, there is an increased use and development of agricultural resources such as maize, squash, and beans.

2.3.2 Historic

This section synopsizes previous research conducted by the USACE and cultural resources management firms as part of the reformulation investigations of the 1980s. Vendel 1987 (pp. 67-69) (Vendel Enviro-Industrial Consultants, Inc. 1987) expands on this section with a more detailed summary.

Between 1662 and 1784, the Haudenosaunee, Connecticut, and Pennsylvania all claimed the Cowanesque River Valley. The 1662 Province of Connecticut Grant placed the area within the jurisdiction of Connecticut, while, just twenty years later, William Penn's charter placed it within Pennsylvania's jurisdiction. The land dispute was mostly settled in Pennsylvania's favor by a Continental Congress commission in the Trenton Decree of 1782; however, the conflict was not completely stifled until the Haudenosaunee ceded northwestern and north-central Pennsylvania under the 1784 Treaty of Fort Stanwix.

Tioga County was formed by 1804 with settlement along the Cowanesque and Tioga Rivers. By 1816, the towns of Elkland, Nelson, and Lawrenceville were established and featured an assortment of industries such as farming, lumbering, and milling. A review of historic maps shows the advantageous settlement along the river and adjacent roadways as indicated by

an abundance of dwellings, mills, and other community developments (Walling and Way 1862; Beers 1875). An inset of Nelson in the 1862 Map of Tioga County, for example, shows merchants, manufacturers, and a hotel keeper were once located in this area (Walling and Way 1862). By the twentieth century, the lumbering and milling industries mostly collapsed due to deforestation and economic activities reverted primarily back to agriculture until construction of the Cowanesque Dam (Vendel Enviro-Industrial Consultants, Inc. 1987, p. 69).

Tioga-Hammond Dam

Congress included dam authorizations in the Flood Control Act of 1958 (Public Law 85-500). The specific local purpose of the project authorization was to construct flood risk management measures for protection on the North Branch of the Susquehanna River and tributaries. The Tioga-Hammond Dam was operationally complete in 1979 at a federal cost of $186,000,000 (USACE 2022).

Cowanesque Dam

Congress included dam authorizations in the Flood Control Act of 1958 (Public Law 85-500). The specific local purpose of the project authorization was to construct flood risk management measures for protection on the North Branch of the Susquehanna River and tributaries. The Cowanesque Dam was operationally complete in 1980 at a federal cost of $106,030,000 (USACE 2022).

2.3.3 Previous Cultural Resources Surveys

Tioga-Hammond Dam

Fourteen cultural resources surveys have been conducted within the Tioga-Hammond Lake project area. The majority of these were archaeological investigations; however, one of those had a combined archaeological and architectural survey component and another was a standalone historic building documentation report. Another investigation was conducted as part of the Tioga-Hammond Lake's CRMP to test the viability of a drafted archaeological predictive model. The surveys and brief descriptions are provided in Table 2.3.

Table 2-8 Tioga-Hammond Dam CRMP Investigation

Survey Title	Author-Date	Survey Number	Description
Phase II Investigations at 36TI31 and 36TI47, Tioga County, Pennsylvania	Thomas Neumann (R. Christopher Goodwin & Associates, Inc.), 1989	N/A	Phase II investigations for sites 36TI31 and 36TI47. Both sites represented disturbed contexts and neither were recommended eligible for the NRHP.
Cultural Resource Investigations, Ives Run Streambank and Channel Stabilization, Ives Run Recreation Area, Tioga County, Pennsylvania	USACE Baltimore District, 1995	N/A	Phase I investigation for a streambank and channel stabilization project. No historic properties were identified during the investigation.
Phase I Archaeological Survey of NE HUB Partners, L.P.'s Natural Gas Storage Facility, Tioga County	K.A. Russel et al. (3D Environmental), 1996	1996SR00248	Phase I investigation for a natural gas storage facility for the Federal Energy Regulatory Commission. No cultural resources were documented within the Cowanesque Lake project area.
Addendum Report of Phase I Archaeological Survey of NE Hub Partners, LPs, Tioga County, Pennsylvania	K.A. Russel et al. (3D Environmental), 1996	1996SR00250	No information included in PA-SHARE.
Phase I Archaeological Survey of United Salts Brine Evaporation Plant & Railroad Loading Facility, Tioga County, Pennsylvania	M. Striker (3D Environmental Group), 1997	1997SR00224	Phase I investigation for an evaporation plant and railroad loading facility. No historic properties were identified.
Phase IA and IB Archaeological Survey, S.R. 6015, Section E61, Northern and Southern Bridge Crossings, Tioga County, Pennsylvania	T. Lewis et al. (CHRS), 1999	1999SR00096	No information included in PA-SHARE.
Phase I Cultural Resource Investigation Mill Cove Research Facility, Tioga Lake, Tioga County, Pennsylvania	USACE Baltimore District, 2002	2002SR00265	Phase I archaeological and architectural investigation for a proposed outdoor classroom and aquatic research facility. No historic properties were identified.

Survey Title	Author-Date	Survey Number	Description
Tioga-Hammond and Cowanesque Lakes Cultural Resources Management Plan	R. Christopher Goodwin & Associates, Inc., 2003	N/A	A general management plan for the stewardship of cultural resources at Tioga-Hammond and Cowanesque Lakes. The plan integrates cultural resources management into the existing framework of lake operations and Federal laws and regulations.
Phase I/II Archaeological Summary and Phase III Work Plan, Webster Site 36TI132, SR 6015 Section G20, U.S. Route 15 Improvements Project, Tioga County, Pennsylvania	T. East et al. (Skelly and Loy), 2004	2004SR00050	Presents a summary of previous Phase I and II investigations for the Route 15 Improvements Project and provides a work plan for additional testing at the Webster Site (36TI132). The Webster Site is not within the boundaries of Tioga-Hammond Lake.
Byways to the Past Technical Series: Phase I, II, and III Archaeological Investigations, SR 6015, Section G20 and G22, U.S. Route 15 Improvements Project, Lawrence and Tioga Townships, Tioga County, Pennsylvania	T. East (Skelly and Loy), 2006	2006SR00033	Presents the results of Phase I, II, and III investigations for the Route 15 Improvements Project. Results were not available in PA-SHARE.
Phase I Cultural Resource Investigation, Stephenhouse Run Comfort Station Utility Upgrade Project, Tioga-Hammond Lakes, Tioga County, Pennsylvania	USACE Baltimore District, 2007	2007SR00226	Phase I investigation for a proposed utility line upgrade. No historic properties were identified.
Final Historic Resource Documentation Form for the Hammond Barn, Tioga-Hammond Lakes, Tioga County, Pennsylvania	USACE Baltimore District, 2008	N/A	Documents the condition of the Hammond Barn and briefly discusses its historic context. The barn was determined not eligible for the NRHP.

Survey Title	Author-Date	Survey Number	Description
Phase I Archaeological Survey, Dominion Transmission, Inc. Storage Factory Project, Tioga County, Pennsylvania	M. Penny (Berger), 2008	2008SR00033	Phase I investigation for a proposed storage factory. No historic properties were identified.
Phase I/II Archaeological Survey, SR 15-144 Slide Remediation Project, Tioga Township, Tioga County, Pennsylvania	J. Martin (Gannett Fleming), 2012	2012SR00570	Phase I investigation for a lake remediation project. Additional Phase II testing of the NRHP eligible Mantor Farmstead (36TI0162)

Cowanesque Dam

Fourteen cultural resources surveys have been conducted within the Cowanesque Lake project area. These were all archaeological investigations, the majority of which were conducted for the Cowanesque Lake Project in the last quarter of the twentieth century. The surveys and brief descriptions are provided in Table 2.4.

Table 2-9 Cowanesque Lake Cultural Surveys

Survey Title	Author-Date	Survey Number	Description
Flood Control Project, Cowanesque Dam, Archaeological Salvage of the Antonio Site 36-Ti-30: A Preliminary Location Report of Archaeological Salvage Carried Out Under the Auspices of the U.S. Department of the Interior, National Park Service, Northeast Region	Jacob W. Gruber (Temple University), 1972	N/A	Summary report providing the location of the Antonio Site (36TI30) and a status update on its excavation.
Cowanesque Dam Flood Control Project: Preliminary Archaeological Investigation of the Antonio Site (36-Ti-30)	Daniel G. Crozier (Temple University), 1972	N/A	Report detailing Temple University's salvage excavations and analysis of the Antonio Site (36TI30) prior to implementation of the Cowanesque Dam project.
Cultural Resources Reconnaissance for the Cowanesque Lake Reformulation Study, Tioga County, Pennsylvania	Daniel G. Crozier (Resources Preservation Associates, Inc.), 1981	N/A	Phase I reconnaissance study for the Cowanesque Lake Reformulation Study. While no resources would be adversely impacted by drawdowns, the study recommended the preservation of the historic Close Site through infilling and the additional study and/or preservation of the precontact Bockus, Merritt, and Antonio Sites.
Phase I Archaeological Investigation of the Cowanesque Lake Reformulation Project, Tioga County, Pennsylvania	Frank Vento et al. (Vendel), 1981	1981SR00006	Phase I investigation for reformulation of Cowanesque Lake. The survey investigated and/or documented five archaeological sites (36TI0031, 36TI0032, 36TI0033, 36TI0034, and 36TI0037).
A Cultural Reconnaissance of	C. Hay, C. Stevenson (AHCI), 1984	1984SR00002	Phase IA survey reconnaissance for

Survey Title	Author-Date	Survey Number	Description
the Cowanesque Lake Reformulation Study Area, Tioga County, Pennsylvania			reformulation of Cowanesque Lake. The survey investigated and/or documented six archaeological sites (36TI0032, 36TI0033, 36TI0034, 36TI0035, 36TI0036, and 36TI0037).
A Cultural Resources Reconnaissance of the Old Nelson Vicinity, Cowanesque Lake Reformulation Study Area	Conran A. Hay (Archaeological & Historical Consultants, Inc.), 1984	N/A	A targeted field investigation of the Old Nelson area subject to bank stabilization and river rechannelization. The survey identified the precontact Site #10 and recommended additional testing west of Old Nelson.
Cowanesque Valley Historical Resource and Disturbance Assessment in Nelson and Lawrence Townships, Tioga County, Pennsylvania	Robert D. Wall and Stephen S. Israel (USACE), 1987	N/A	A study to provide context for historical resources and trends within the project area, particularly those between the 1045 and 1080 foot contours of proposed pool raising.
Phase I Archaeological Inventory Investigations of the Cowanesque Lake Reformulation Project, Tioga County, Pennsylvania	Frank Vento et al. (Vendel Enviro-Industrial Consultants, Inc.), 1987	N/A	Phase I archaeological investigation to relocate and more clearly define the location and extent of the previously recorded precontact sites 36TI31, 36TI32, 36TI33, 36TI34, and 36TI37. The investigation also targeted alluvial soils for any unidentified archaeological sites. Two sites, 36TI31 and VD 12, were recommended as potentially significant and four sites, 36TI32, 36TI33, 36TI34, and 36TI37 were recommended as significant.
Step 1 of the Mitigation Procedures (Phase III), Cowanesque Lake Modifications, Tioga County, Pennsylvania	Thomas Neumann et al. (R. Christopher Goodwin & Associates, Inc.), 1988	N/A	An assessment and management treatment study of four precontact sites and two historic sites to develop a research design and recommend resource and funding allocations for the overall Cowanesque Lake Reformulation Project.
Phase I Historical Archaeological Investigation at the Cowanesque Lake Reformulation	K. Robinson et al. (Goodwin), 1989	1988SR00002	Phase I investigation for reformulation of Cowanesque Lake. The survey investigated and/or documented ten archaeological sites (36TI0048,

Survey Title	Author-Date	Survey Number	Description
Project, Tioga County, Pennsylvania			36TI0049, 36TI0050, 36TI0051, 36TI0052, 36TI0053, 36TI0054, 36TI0055, 36TI0056, and 36TI0057).
Phase III Archaeological Data Recovery from 36TI33, 36TI34, and 36TI37, Cowanesque Lake Reformulation Project, Tioga County, Pennsylvania	Thomas Neumann et al. (R. Christopher Goodwin & Associates, Inc.), 1990	N/A	Phase III data recovery excavations of three precontact sites. The excavations mitigated adverse effects resulting from the Cowanesque Lake Reformulation Project.
The Merritt Site (36TI32), Mansfield University 1989 Excavation	Ann Mabe (Mansfield University), 1992	N/A	Final report detailing 1989 salvage excavations of the Merritt Site.
Phase I Archaeological Survey of NE HUB Partners, L.P.'s Natural Gas Storage Facility, Tioga County	K.A. Russel et al. (3D Environmental), 1996	1996SR00248	Phase I investigation for a natural gas storage facility for the Federal Energy Regulatory Commission. No cultural resources were documented within the Cowanesque Lake project area.
Phase I Archaeological Survey, Nelson Sewer Project, Act 537 Update, Nelson Township, Tioga County	M. Young (Richard Grubb & Associates), 2003	2003SR00132	Phase I investigation for a proposed sewer project. The survey documented one archaeological site, the Cowanesque Bridge Site (36TI0131).

2.3.4 Previously Identified Cultural Resources

Tioga-Hammond Dam

Twenty cultural resources have been previously identified within the Tioga-Hammond Lake project area, consisting of nine archaeological sites, ten above-ground resources, and one historical marker. One has been listed in the NRHP; two have been determined eligible for the NRHP; four have been determined not eligible for the NRHP; and thirteen have not been evaluated for listing in the NRHP. Information about these resources is included in Table 2.5.

Table 2-10 Tioga-Hammond Dam Cultural Resources

Resource Name	Identification No.	Resource Type	NRHP Eligibility	Description
Lamb Creek (36TI0002)	1976RE01271	archaeology	undetermined	precontact open habitation site
Corning & Blossburg Railroad Historical Marker	1983HM00010	historical marker	undetermined	Historical marker detailing how the Corning & Blossburg

Resource Name	Identification No.	Resource Type	NRHP Eligibility	Description
				Railroad connected the Chemung Canal and Erie Railroad with local coal fields.
36TI0073	1983RE03461	archaeology	undetermined	precontact open habitation site
Mansfield Armory	1989RE00324	above-ground	Listed	1938 defense armory building
36TI0076	1990RE01219	archaeology	undetermined	precontact open habitation site
36TI0074	1990RE01524	archaeology	undetermined	precontact open habitation site
36TI0075	1990RE01597	archaeology	undetermined	precontact open habitation site
H. Peck House	1995RE42044	above-ground	undetermined	19th century domestic dwelling
Tioga Borough Historic District	1995RE48591	above-ground	eligible	N/A
Tioga-Hammond L-1 (36TI0121)	2002RE02936	archaeology	undetermined	precontact and historic site
Tioga-Hammond H-1 (36TI0119)	2002RE03011	archaeology	undetermined	precontact and historic site
Tioga-Hammond I-1 (36TI0120)	2002RE03267	archaeology	undetermined	historic domestic site
SR 287 Bridge	2004RE03202	above-ground	not eligible	1935 bridge
SR 15 Bridge	2004RE09376	above-ground	not eligible	1942 bridge
Hammond Barn	2008RE01078	above-ground	not eligible	1922 barn; demolished
Unnamed District	2010RE03426	above-ground	undetermined	NE, NW, and SW corners of Main St./SR 0015 and Wellsboro St./SR 0006
Mantor Farmstead (36TI0162)	2012RE00914	archaeology	eligible	historic farmstead
Ross Street Bridge	2018RE02509	above-ground	not eligible	demolished
Tioga Path	2019RE02999	above-ground	undetermined	18th century transportation route
LR 22 Bridge	2019RE05662	above-ground	undetermined	1935 bridge

Cowanesque Dam

Twenty-six cultural resources have been previously identified within the Cowanesque Lake project area, consisting of twenty-three archaeological sites and three above-ground resources. These include, but are not limited to, precontact open habitation sites to historic domestic sites and cemeteries. Two have been determined eligible for the NRHP; eighteen have been determined not eligible for the NRHP; and six have not been evaluated for listing in the NRHP. Information about these resources is included in Table 2.6.

Table 2-11 Cowanesque Cultural Resources

Resource Name	Identification No.	Resource Type	NRHP Eligibility	Description
Antonio Site (36TI0030)	1970RE00123	archaeology	Not Eligible	precontact open habitation site
Beechers Island Presbyterian Church	1979RE00268	above-ground	Eligible	Greek Revival church construction in 1845
Merritt Site (36TI0032)	1980RE01027	archaeology	Undetermined	precontact open habitation site
Bockus Site (36TI0031)	1980RE01518	archaeology	Not Eligible	lithic reduction site
Tubbs Farm (36TI0026)	1984RE03199	archaeology	Undetermined	precontact open habitation site
Cowanesque Reservoir #2 (36TI0034)	1984RE03418	archaeology	Not Eligible	multi-component site featuring precontact open habitation and historic domestic sites
Cowanesque Reservoir #5 (36TI0036)	1984RE03440	archaeology	Undetermined	precontact open habitation site
Cowanesque Reservoir #1 (36TI0033)	1984RE03714	archaeology	Not Eligible	precontact open habitation site
Cowanesque Reservoir #6 (36TI0037)	1984RE03742	archaeology	Not Eligible	precontact open habitation site
Cowanesque Reservoir #3 (36TI0035)	1984RE03811	archaeology	Not Eligible	precontact open habitation site
Cowanesque Reservoir #10 (36TI0038)	1985RE01126	archaeology	Not Eligible	isolated find
Vendel #12 (36TI0047)	1987RE00996	archaeology	Not Eligible	precontact open habitation site

Resource Name	Identification No.	Resource Type	NRHP Eligibility	Description
36TI0052	1987RE01010	archaeology	Not Eligible	historic domestic site
36TI0051	1987RE01013	archaeology	Not Eligible	historic domestic site
36TI0053	1987RE01021	archaeology	Undetermined	historic domestic site
36TI0054	1987RE01035	archaeology	Not Eligible	historic domestic site
36TI0049	1987RE01169	archaeology	Not Eligible	historic domestic site
36TI0057	1987RE01188	archaeology	Not Eligible	historic domestic site
36TI0050	1987RE01230	archaeology	Not Eligible	historic domestic site
36TI0055	1987RE01239	archaeology	Not Eligible	historic domestic site
36TI0048	1987RE01246	archaeology	Not Eligible	historic domestic site
36TI0056	1987RE01253	archaeology	Not Eligible	historic domestic site
Losey (3) Site (36TI0028)	1990RE01396	archaeology	Eligible	village site
Cemetery	1999RE01663	above-ground	Not Eligible	cemetery constructed in 1880
Cowanesque Bridge Site (36TI0131)	2003RE03787	archaeology	Undetermined	precontact open habitation site
N/A	2010RE03166	above-ground	Undetermined	unknown historic wooden building

2.3.5 Potential for Unidentified Cultural Resources

Tioga-Hammond Dam

The potential for unidentified cultural resources within the project area remains moderate to high in undisturbed, low to moderately sloped areas within the Tioga River and Crooked Creek floodplains and upland areas. Tioga-Hammond Lake's location and previously identified resources suggests the possibility for a variety of unidentified precontact and historic sites such as habitation sites, resource processing areas, and procurement areas, domestic sites, among others.

Cowanesque Dam

The potential for unidentified cultural resources within the project area remains moderate to high in undisturbed, low to moderately sloped areas within the Cowanesque River floodplain and upland areas. Cowanesque Lake's location and previously identified resources suggests the possibility for a variety of unidentified precontact and historic sites such as habitation sites, resource processing areas, and procurement areas, domestic sites, among others.

2.3.6 Long-Term Objectives for Cultural Resources

- Identify and inventory any historic properties within the project area as funds permit.
- Create and maintain a Cultural Resources Management Plan as needed and as funds permit.
- Maintain compliance with federal cultural resources laws, including but not limited to, Sections 106 and 110 of the NHPA and the Archaeological Resources Protection Act (ARPA) within project area lands.
- Prevent unauthorized or illegal excavation and removal of cultural resources within project area lands.
- Increase public awareness and education of regional history.

2.4 DEMOGRAPHIC AND ECONOMIC RESOURCES

2.4.1 Current Demographics, Economics, Trends and Analysis

The zone of interest (ZOI) for the socio-economic analysis of the Tioga-Hammond and Cowanesque Master Plan area consists of Tioga County, PA and Steuben and Chemung Counties, NY. Both lakes lie within Tioga County, which itself borders Chemung and Steuben Counties in New York State.

2.4.2 Population

According to the 2021 American Community Survey (ACS) 5-year population estimate, the total population for the ZOI that year was 217,082, down from 218,777 in 2020 and 229,801 in 2010. The population of Tioga County comprises approximately 0.3 percent of the total Pennsylvania population (13,002,700 people in 2020), while Chemung and Steuben Counties together comprise approximately 0.9 percent of the total New York State population (20,201,249 people in 2020). The Center for Rural Pennsylvania supplied population projections for Tioga County, using 1980-2010 as a base period, and estimated an increase of 2,127 persons (approx. 5.1 percent increase) between 2010 and 2030, though the growth rate for Tioga County since 2010 has remained negative (CRP, 2023). The Cornell Program on Applied Demographics supplied population projections for Chemung and Steuben Counties using ACS records and estimated a loss of 6,908 and 7,358 persons (7.8 percent and 7.4 percent decrease) between 2010 and 2030, respectively (CPAD, 2023). Table 2.12 shows the population estimates and projections for the ZOI. All three counties in the ZOI have experienced negative growth rates from 2010, and while this trend is expected to continue in Chemung and Steuben Counties, positive growth is projected for Tioga County through 2030.

Table 2-12 Population Estimates and 2030 Projections.

County	2010 Estimate		2020 Estimate		2030 Estimate		Growth rate (2010-2030)
	Population	% of ZOI	Population	% of ZOI	Population	% of ZOI	
Pennsylvania	12,702,379	-	12,801,989	-	13,759,594	-	8.3%
New York	19,378,102	-	20,201,249	-	20,604,030	-	6.3%
Tioga	41,981	18.2%	41,045	18.8%	44,136	20.3%	5.1%
Chemung	88,830	38.7%	84,148	38.4%	81,922	37.6%	-7.7%
Steuben	98,990	43.1%	93,584	42.8%	91,632	42.11%	-7.4%
ZOI Total	**229,801**	**-**	**218,777**	**-**	**217,690**	**-**	**-5.3%**

Sources: US Census Bureau (2010 Census and 2020 Census); The Center for Rural Pennsylvania (2030 Estimates); Cornell Program on Applied Demographics (2030 Estimates)

Tioga-Hammond Dam

The 2020 census figures for the population of the three boroughs and five townships surrounding Tioga and Hammond Lakes are as follows: Tioga Borough, 611; Wellsboro Borough, 3,472; Mansfield Borough, 2,852; Middlebury Township, 1,308; Tioga Township, 941; Richmond Township, 2,164; Charleston Township, 3,562; Delmar Township, 2,796. The total for the three boroughs and five townships in 2020 was 17,706 persons, down slightly from 18,442 persons enumerated in the 2010 census for these areas immediately adjacent to the project and correlating to a total population decrease of approximately 3.9 percent.

Cowanesque Dam

The 2020 census figures for the population of the two boroughs and three townships surrounding Cowanesque Lake are as follows: Elkland Borough, 1,827; Nelson Township, 545; Lawrenceville Borough, 690; Lawrence Township, 1,613; Osceola Township, 586. The total for the three townships and two boroughs in 2020 was 5,261 persons, down slightly from 5,350 persons enumerated in the 2010 census for these areas immediately adjacent to the project and correlating to a total population decrease of approximately 1.6 percent.

Population Structure for Tioga-Hammond and Cowanesque

The distribution of the population among gender, as shown in Table 2.13, is approximately 49.8 percent female and 50.2 percent male within the ZOI, compared to 50.6 percent female and 49.4 percent male across all of Pennsylvania and 51.1 percent female and 48.9 percent male across all of New York. All three counties in the ZOI have roughly equal male and female populations (+/- 1%).

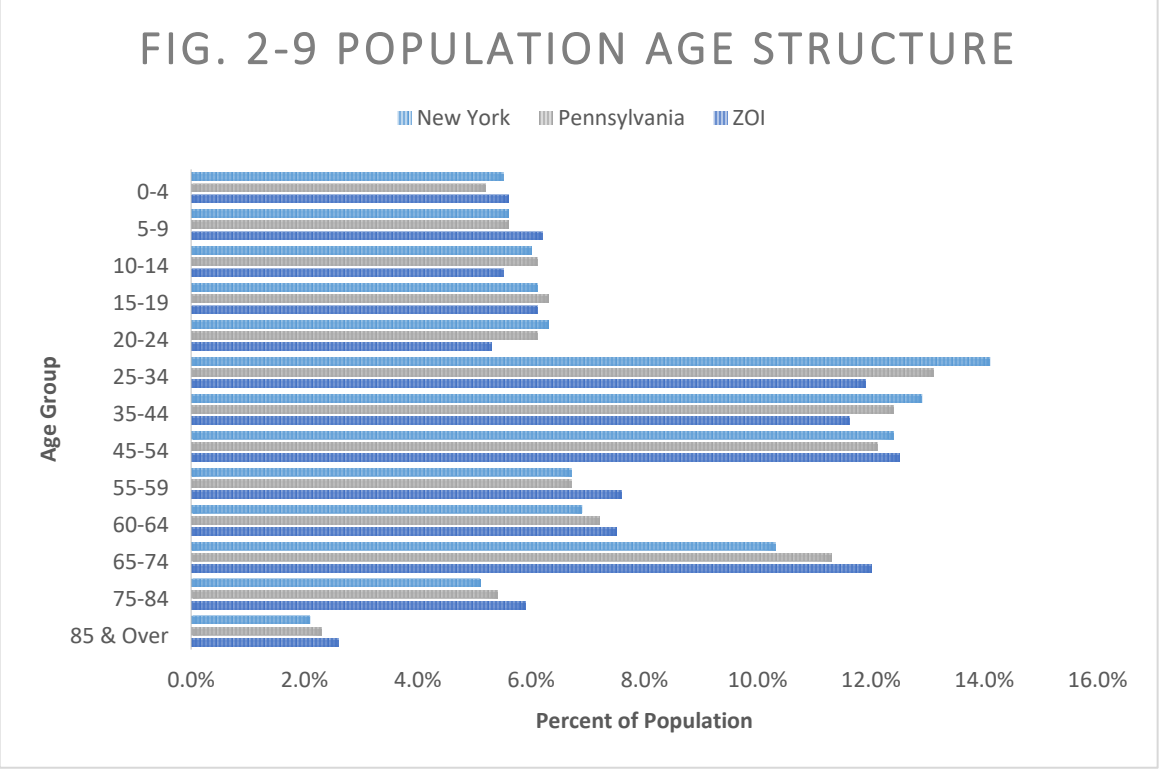
Table 2-13 Population Estimates by Gender.

County	Population (K)	
	Female	**Male**
Pennsylvania	6,564.4	6,399.6
New York	10,139.3	9,696.6
Tioga	20.5	20.6
Chemung	41.2	41.8
Steuben	46.4	46.6
ZOI Total	**108.1**	**109**

Source: US Census Bureau (2021)

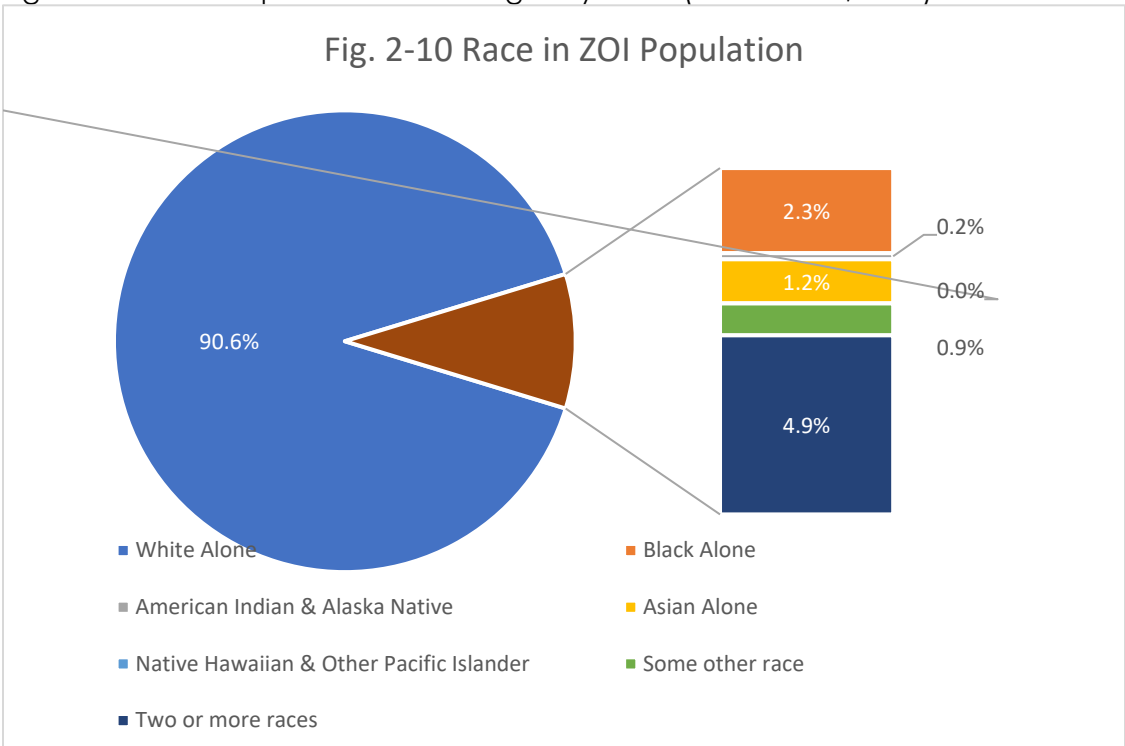
Figure 2-9 shows the population age structure in the ZOI, compared to Pennsylvania and New York. The median ages in Pennsylvania and New York are 40.9 years and 39.8 years, respectively, with the ZOI median age falling above these figures at 43.5 years. This number corresponds to an overrepresentation of older age groups in the ZOI, relative to the two state totals, as well as an underrepresentation of younger adults.

Figure 2-9 2021 Percent of Population by Age Group in Clinton County, Zone of Interest, and State (U.S. Census, 2021)



As shown in Figure 2-10, the majority of the ZOI population is white, with minority races making up 9.4 percent of the total population. Approximately 2.2 percent of the ZOI population identified as Hispanic or Latino (of any race), and 0.2 percent identified as American Indian of the Cherokee, Chippewa, Navajo, or Sioux tribal groupings (U.S. Census Bureau 2021).

Figure 2-10 2021 Population Percentages by Race (U.S. Census, 2021)



2.4.3 Education and Employment

As of 2021, approximately 90.5 percent of the population within the ZOI aged 25 and older has obtained at least a high school diploma or equivalent. Approximately 16.1 percent have some college education but no degree, 12.5 percent have an Associate's degree, 13.5 percent have a Bachelor's degree, 11.4 percent have a Graduate degree or professional certification, 7.0 percent have a 9 to 12 grade education, and 2.5 percent have less than a 9th grade education.

The largest employment sector in the ZOI is the educational services, health care and social assistance industry, comprising approximately 28.5 percent of local employment, followed by manufacturing at 18.7 percent, retail trade at 7.3 percent, and professional services at 7.2 percent. All other industries make up 38.3 percent of employment. The civilian labor force unemployment rate within the ZOI is 6.3 percent, which is similar to the 6.4 percent unemployment rate for all of Pennsylvania and significantly lower than New York state's unemployment rate, at 8.7 percent (U.S. Census Bureau 2021).

2.4.4 Households and Income

There were approximately 91,247 households in the ZOI in 2021, compared to 5,228,956 across Pennsylvania and 7,652,666 across New York. The median household income in the ZOI ($57,423) is lower than both Pennsylvania ($68,957) and New York ($74,314). Of the ZOI counties, Tioga County has the lowest household income at $54,671, and Chemung County has the highest household income at $60,219. Approximately 13.8 percent of persons living within the ZOI live below the poverty level, compared to 12.1 percent across Pennsylvania and 13.9 percent across New York. Chemung and Steuben Counties have the highest

percentage of persons below the poverty level at 15.1 and 13.9 percent, respectively, while Tioga County's poverty rate for 2021 was only 12.5 percent.

2.5 RECREATION FACILITIES, ACTIVITIES, AND NEEDS

2.5.1 Zone of Influence

The zone of interest (ZOI) for the recreation use analysis of the Tioga-Hammond and Cowanesque Dam areas consists of Tioga County, PA and Steuben and Chemung Counties, NY. Both lakes lie within Tioga County, which itself borders Chemung and Steuben Counties in New York State (USACE 2002).

2.5.2 Visitation Profile

Tioga-Hammond Lakes

Tioga and Hammond Lakes provide a variety of facilities for visitors to use. These areas include 10 recreation areas, 27 picnic sites, 187 campground sites, 2 playgrounds, 1 swimming area, 4 trails, 27 miles of trail, 1 handicap accessible fishing pier, and 5 boat ramps. At Cowanesque Lake, facilities include 10 recreation areas, 30 picnic sites, 125 campground sites, 3 playgrounds, 2 swimming areas, 2 trails, 3 miles of trail, 1 handicap accessible fishing pier, and 3 boat ramps. Table 2-14 shows the types of visitors to Tioga-Hammond and Cowanesque Lakes. The two most popular activities in 2019 at Tioga-Hammond Lake were camping and sightseeing. The two most popular activities at Cowanesque in 2019 were sightseeing and picnicking.

Table 2-14 FY2019 Data of Visitors to Tioga Hammond and Cowanesque Lakes

Type of Visitor	Tioga-Hammond	Cowanesque	Total
Picnickers	38,200	40,835	79,035
Campers/Overnight Visitors	48,956	20,168	69,124
Swimmers	46,324	62,138	108,462
Walkers/Hikers/Joggers	43,847	29,329	73,176
Boaters	30,891	23,975	54,866
Sightseers	48,573	44,022	92,595
Anglers	24,525	19,018	43,543
Special Event Attendees	9,225	9,245	18,470
Other	10,169	7,864	18,033
Total Visitors (Persons-Days/Nights)	300,710	185,762	411,199

**Source: USACE 2019a, b. The Total Visitors shown account for double-counting that occurs when visitors stay overnight and also participate in another activity on-site such as hiking, boating, or sightseeing.*

Visitation Over Time

Table 2-15 shows visitors through the most recent 6 years as of this Master Plan. Visitation has remained steady to Tioga-Hammond and Cowanesque from 2016 to 2021.

Table 2-15 Visitors to Tioga-Hammond and Cowanesque Lakes (USACE 2022, Annual Report)

Fiscal Year	Tioga-Hammond	Cowanesque	Total
2021	266,132	121,815	387,947
2020	235,925	134,500	370,425
2019	300,710	185,762	411,199
2018	225,686	139,559	365,245
2017	260,584	125,721	386,305
2016	283,966	146,728	430,694

2.5.3 Recreation Facilities

Tioga-Hammond and Cowanesque lakes provide outdoor recreation opportunities for north-central PA and south-central NY, in addition to other project purposes. Recreation resources are available throughout the properties and consist of opportunities for active and passive recreation. Corps staff at the Ives Run Administration Area and the South Shore Recreation Area Ranger Station manage the facilities at Tioga-Hammond and Cowanesque Lakes.

Tioga and Hammond Lakes adjoin Pennsylvania state Game Lands No. 37 and are eight miles east of Hills Creek State Park. When viewed as a whole, the federal and state lands and facilities create a public land complex consisting of two major recreation areas and are connected by 13,400 acres of semi-wilderness land.

2.5.3.1 Tioga Lake

Lambs Creek

Figure 2-11 Lambs Creek Boat Launch

Lambs Creek Recreation Area is located at the south end of Tioga Lake. This day-use area is reached by an access road that passes through agriculture-leased land and old farm fields in early stages of succession. This recreation area is surrounded by very rugged topography, consisting of steep slopes and open agricultural fields of high scenic value (Figure 2-11). Elevated terraces along the bends in the waterway enable visitors to see several miles up and down the creek.

On the flat, narrow valley floor, is the Lambs Creek boat launch and associated parking area. The picnic pavilion, comfort station, picnic tables, and associated parking area are located up on top of a terrace that is covered mainly by mixed hardwoods.

There is an ongoing severe siltation issue at Lambs Creek. The loose soils atop the steeply sloping walls that border the creek are eroding into the creek and during high water events,

the silt is deposited on the access road, boat launch, and lake bottom at the launch. There is active farmland throughout the valley leading down to Lambs Creek which is suspected to lead to the siltation. On December 16th and 17th 2021, Tioga Lake experienced a high-water event which deposited a significant amount of sediment into the boat launch. This continual depositing is building up and making it more difficult for visitors to launch their boats properly.

Mill Creek

Figure 2-12 Mill Creek Environmental Area

Mill Creek is located on Tioga Lake on the north side of Mill Creek, which enters the lake from the east under PA Route 549 (Figure 2-12). This area is managed by Mill Cove, Inc (MCI), more commonly known as Mill Cove Environmental Education Area, and is leased from the US Army Corps of Engineers (USACE). The agreement with USACE started in 1999 and was extended to 2052 (Mill Cove, 2022). The property is managed for wildlife propagation and observation, hunting, fishing, habitat enhancements and conservation. MCI makes the area available to individuals, groups and organizations in particular to prioritize education, environmental activities, and research. MCI has a memorandum of understanding with the Mansfield University of Pennsylvania to utilize the area for education and research purposes (Mill Cove, 2022). The creek is a source of good quality water that buffers the low pH water of the Tioga River. MCI has completed several improvements including one large and eight small pavilions, hiking trails, a large storage building, development of a water well, a shooting range and access road, comfort stations, 20 picnic tables, a streambank stabilization project, invasive species elimination and primitive group camping areas (Mill Cove, 2022). This area is available for use to the public for hiking, fishing, bicycling, hunting, and other outdoor activities. Additionally, in 2024, construction was completed on an environmental education center which is used for special events. Like Lambs Creek, Mill Creek has severe siltation problems.

Connecting Channel Overlook

The Connecting Channel Overlook is located on the rock outcrop that separates the Tioga and Hammond Dams. The connecting channel is a unique feature of the Tioga-Hammond Lake Project. This connection allows water with a lower pH from Hammond Lake to flow into Tioga Lake, creating a more neutral pH. The water with a neutral pH then enters the dam intake structure and flows downstream. The Connecting Channel Overlook provides a view of both Tioga and Hammond Lakes as well as the connecting channel. In addition to the viewing area, there is a comfort station, picnic area, and parking area. There is an overlook with a bench along the road leading to the Connecting Channel Overlook that provides a view of Hammond Lake.

Trails at Tioga and Hammond Lake

The Lambs Creek Hike and Bike Trail is located at Tioga Lake. The trail head is located in Mansfield and the trail provides access to the Lamb's Creek Recreation Area. It currently runs parallel to US Route 15 (future I-99). The trail is approximately 3 miles long and hiking and biking are permitted. The trail was originally completed in 1979 and opened in 1980. In 1996, much of the Hike and Bike Trail was diverted from its original trailway onto a new trailway that was formerly part of the previous US Route 15. The original trailway was modified because it was located within the Tioga River floodplain. The higher elevation successfully eliminated closures and costs associated with clearing and cleaning the trail after flood events.

2.5.3.2 Hammond Lake

Ives Run Recreation Area

The Ives Run Recreation Area is a 150-acre multi-use recreation area on the southeast shore of Hammond Lake. Ives Run Campground accommodates both tents and recreation vehicles (RVs).

There are 163 campsites (81 campsites have electric, sewer, and water hookups; 50 sites have water and electric hookups; and 32 campsites are primitive sites with no hookups). The campground is divided into 6 loops (Hawthorn, Aspen, Beech, Birch, Hickory and Pine), and an overflow campground area is in the Ives Run Old Day Use Area. All campsites in the Ives Run Campground and overflow area have a gravel pad adjacent to the parking area. The gravel pad includes a lantern holder, a fire ring, and a picnic table. The campground has 4 comfort stations.

The campground has two boat launches (in Pine Camp and adjacent to Beech Loop). Boat mooring is also provided in the form of boat slips and mooring posts.

A map of the facilities provided within the loop and day use area is provided in Appendix F.

The Ives Run Day Use Area is located adjacent to the Ives Run Campground, along the southern shore of Hammond Lake. The Ives Run Day Use Area provides visitors with a wide variety of day use recreation activities, such as field sports, fishing, swimming, hiking, and picnicking.

Ives Run Administration Area

The Ives Run Administration Area is located within the Ives Run Recreation Area. A small parking area separates the administration building from the maintenance compound. The Ives Run Administration Area is comprised of the Visitor Information Center, administration building, a parking lot, the maintenance compound, and an interpretive garden. The maintenance compound is located on the other side of the parking lot, across from the administration building. The facilities at the maintenance area include a four-bay garage and connected office building; a storage building; a gravel parking area; and an asphalt parking area. The entire maintenance compound is fenced in for security.

The facilities at the Stephenhouse Run picnic area include a picnic pavilion, a comfort station, a parking area, cornhole boards, and an entrance to the Stephenhouse and Archery Trail.

Improvements and expansions at the existing administration building was completed in Summer 2002. The expansion included the placement of all park offices in the same

centralized area at the Ives Run Administration Area. There is a Visitor Information Center where visitors can obtain park and campground information and an area that displays replicas of the wildlife species that are native to the region.

Hammond Lake Overlook

There is an overlook at Hammond Lake (also known as the Connecting Channel Overlook trail) on the north side of PA Route 287 that provides visitors with spectacular views of Hammond Lake, Hammond Dam and the surrounding region.

Trails at Hammond Lake

There are four trails located within the vicinity of Hammond Lake. These trails are the Railroad Grade Trail, the Archery Trail, the Stephenhouse Trail, and the C. Lynn Keller Trail.

The Railroad Grade Trail is approximately 2.6 miles long one way with two trailheads. One trailhead is located at the Ives Run Recreation Area and the other is located at the Hills Creek Road Railroad Grade Road Intersection. The trail generally follows Crooked Creek. Both hiking and biking are permitted on the trail. Points of interest along the trail include two constructed wetlands areas.

The Archery Trail consists of a one-mile loop. The trailhead is located at the Stephenhouse Picnic Shelter. Archery and hiking are permitted along the trail.

The Stephenhouse Trail is 1.25 miles long. The trailhead is located at the Stephenhouse Picnic Shelter and provides access to comfort stations.

The C. Lynn Keller Trail has several different routes with varying difficulty and lengths. The longest loop is nine miles and has three trailheads. There are also shorter loops that are around 4-5 miles long. The first trailhead is near the junction of Stephenhouse Run Road and Ives Run Access Road. The second trailhead is in the Ives Run Campground adjacent to the amphitheater. The third is approximately ½ mile up Stephenhouse Run Road. The looping trails along C. Lynn Keller Trail extend beyond USACE's boundary.

2.5.3.3 Cowanesque Lake

Tompkins Campground

Figure 2-13 Mooring Docks at Tompkins Campground

The Tompkins Campground, consisting of 223.5 acres, is located on the north side of the lake between Bliss Road and the shoreline of the lake, and is approximately 1.3 miles upstream from the dam. The campground accommodates both tents and recreation vehicles. At the entrance to the campground, there is a Camp Control building, where campers can acquire any necessary information about the campground and the associated facilities. The campground is divided into 5 loops (Knoll, Bench, Cove, Meadow, and Hike-In Loops). All campsite pads within Tompkins Campground have a gravel area adjacent to the parking area. The gravel pad includes a lantern holder, a fire ring and a picnic table. The campsites in Knoll, Bench,

and Cove Loops have a utility pedestal within their camping area that provides potable water and electricity. Campsites in Knoll and Bench Loops have sewer hookups installed at the individual campsites. The campground also hosts a boat launch, mooring docks, beach area, and two playgrounds for campers.

There are 125 campsites (52 of these have water, sewer, and electric hookups, 34 of these have water and electric hookups, and 39 are primitive campsites). The hike-in sites are located east of the entrance to the Tompkins Campground. A map of the facilities provided within the loop and day use area is provided in Appendix F.

South Shore Recreation Area

The South Shore Recreation Area is a multi-use day use area located on the south side of Cowanesque Lake, approximately one mile upstream from the Lawrence Recreation Area. The west side of this Day Use Area has a designated swimming beach area, playground, and concessions stand. The east side has two boating ramps, picnic areas, assorted yard games, and an ADA accessible fishing pier. The area between the swimming and boating access is mainly used for picnicking. There are four comfort stations, three picnic shelters, and an 18-hole disc golf course provided in the recreation area.

Figure 2-14 South Shore East Boat Launch

The Ranger Station is located on the access road at the entrance of the Recreation Area. The Concession Stand is near the swimming area and playground.

Lawrence Recreation Area

This passive recreation area is located on the south side of Cowanesque Lake, adjacent to PA Route 49, approximately one mile upstream from the dam. The Cayuga Shelter for picnicking is located at the Lawrence Recreation Area.

North and South Tailrace Recreation Areas

The tailraces at Cowanesque Lake provides visitors with an area for fishing. The water downstream of the dam is generally rich in oxygen and nutrients and supports healthy and diverse populations of fish. Public parking, picnic tables, and a comfort station are provided at the North Tailrace access area.

Overlooks at Cowanesque Lake

There are two overlooks provided at Cowanesque Lake: one on the north side of the lake and one on the south side of the lake. Both overlooks provide scenic views of Cowanesque Dam, as well as the lake.

Trails at Cowanesque Lake

There are two trails within the vicinity of Cowanesque Lake, The Moccasin Trail and the Mid-State Trail. The Moccasin Trail is approximately 4 miles long. There are four trailheads associated with Moccasin Trail. They are located at the Tompkins Campground and the Nelson Falls trailhead located on Route 49 about 0.2 miles northwest of Thornbottom Road. No facilities are located along the trail, but to see more about the facilities located at the end of the trail at Tompkins Campground, see the section above.

Figure 2-15 Moccasin Trail, Cowanesque Lake

2.5.4 Recreation Analysis

The Tioga-Hammond and Cowanesque Lake projects are beneficial to the local economy through indirect job creation and local spending by visitors. Visitor spending represents a sizable component of the economy in many communities around USACE lakes. Recreation activities at Tioga-Hammond and Cowanesque Lakes draw over 400,000 visitors annually (USACE 2019a, b). Table 2-16 summarizes economic benefits data from the USACE Recreation 2019 Lake Report for Tioga-Hammond and Cowanesque Lakes.

Table 2-16 2019 Economic Benefits of Tioga Hammond and Cowanesque Lakes

Economic Benefit	Tioga-Hammond	Cowanesque	Total
Within 30 miles of project:			
Total Visitor Spending	$7.2 mil	$6.6 mil	$13.8 mil
Sales	$3.6 mil	$3.2 mil	$6.8 mil
Jobs	59	53	112
Labor Income	$1.5 mil	$1.3 mil	$2.8 mil
Value Added*	$2.0 mil	$1.8 mil	$3.8 mil
National Economic Development Benefits	$2.5 mil	$1.9 mil	$4.4 mil
With multiplier effects:			
Total Sales	$5.6 mil	$4.9 mil	$10.5 mil
Jobs	74	66	140
Labor Income	$2.1 mil	$1.8 mil	$3.9 mil
Value Added*	$3.0 mil	$2.7 mil	$5.7 mil

**Source: USACE 2019a, b. Value Added includes wages & salaries, payroll benefits, profits, rents, and indirect business taxes.*

2.5.5 Recreational Carrying Capacity

Recreational carrying capacity generally refers to the maximum level of use of a recreation resource that does not exceed either the resource capacity or social capacity of that resource. Resource capacity refers to the level of use beyond which deterioration and degradation of natural resources and/or the physical environment occurs, while social capacity refers to overcrowding to the level of visitor dissatisfaction (URDC 1980).

Recreational carrying capacity is considered by USACE to ensure that visitors have a high quality and safe recreation experience, and that natural resources are not compromised at the lake projects.

Use of the reservoir and adjacent USACE-lands is limited by recreational resource capacity. At Hammond Lake, for example, overnight use is limited at Ives Run Campground by the number of campsites available which includes 187 camping sites. Campsite use is regulated either by an online reservation system or permit requirement with associated fees. Day use is limited by the number of parking facilities and in some cases require permits or reservations at the pavilions.

At this time there are no plans of actively limiting uses, and there is no evidence of facilities or natural resources being negatively impacted by overuse or overcrowding. Presently, USACE manages recreation areas using historic visitation data combined with best professional judgement to address recreation areas considered to be overcrowded, overused, or underused. USACE will continue to identify possible causes and effects to prevent overcrowding and overuse and apply appropriate best management practices including site management, regulating visitor behavior, and modifying visitor behavior.

2.5.6 Volunteer Program

Tioga-Hammond and Cowanesque Lakes run a volunteer program in which resident volunteers are provided a free campsite in exchange for 24 hours of work per week. Volunteers fill positions such as maintenance, campground hosts, interpretation, Visitor Information Center staffing, and other various tasks. Volunteers also assist maintenance and Park Rangers with park maintenance and administrative tasks such as mowing, weed trimming, campsite rehab, trail restoration, assisting camping guests, sign installation, cleaning of fire rings, and many related duties. Table 2-17 contains volunteer numbers and hours served over the last 10 years. Volunteers are a critical part of the maintenance and function of the Lakes.

Table 2-17 Volunteer Information for Tioga-Hammond and Cowanesque Project.

Year	Number of Volunteers	Hours of Service	Yearly Value of Service
2023	54	10,017	$318,859
2022	39	10,415	$311,929
2021	75	8,511	$254,904
2020	32	3,976	$113,475
2019	61	7,364	$187,267
2018	109	10,937	$270,035
2017	169	7,963	$192,227
2016	133	6,755	$159,148
2015	157	4,930	$111,172
2014	314	7,424	$167,411
2013	131	8,066	$181,888

2.6 REAL ESTATE AND ACQUISITION POLICY

Real Estate acquisition at Tioga and Hammond Lakes includes a total of 6,842.7 acres of land with 6,594.2 acres of Fee simple acquisitions and 248.5 acres of Permanent Land Easements. There is also a Use Permit for 0.01 acres of land to the northeast of the property. The fee and easement lands are inclusive of the dam, operations and maintenance areas, recreation areas, and natural areas. The permanent easements are primarily located to the east of the Tioga Reservoir. In addition to the USACE-owned and leased parcels, USACE also manages 24,080 square feet of forest reserve.

At Cowanesque Lake, the real estate acquisition includes 3,367.4 total acres of land with 2,878.1 acres of fee simple acquisitions and 489.3 acres of permanent easements. The permanent easements at Cowanesque Lake are primarily focused around the location of flowage easements to the west of the lake. The fee and easement lands are inclusive of all project lands including those for the dam, recreation areas, natural areas, and operations and maintenance areas.

2.7 PERTINENT PUBLIC LAWS

Public Law 59-209, Antiquities Act, 1906. The first federal law established to protect what are now known as "cultural resources" on public lands. It provides a permit procedure for investigating "antiquities" and consists of two parts: An act for the Preservation of American Antiquities and Uniform Rules and Regulations.

Public Law 74-292 Historic Sites Act, 1935. Declares it to be a national policy to preserve for (in contrast to protecting from) the public, historic (including prehistoric) sites, buildings, and objects of national significance. This act provides both authorization and a directive for the Secretary of the Interior, through the National Park Service, to assume a position of national leadership in the field of protection, recovery, and interpretation of national archeological historic resources. It also establishes an "Advisory Board on National Parks; Historic Sites, Buildings, and Monuments, a committee of eleven experts appointed by the Secretary to recommend policies to the Department of the Interior".

Public Law 78-534, Flood Control Act, 1944. Section 4 of the act as last amended in 1962 by Section 207 of Public Law 87-874 authorizes USACE to construct, maintain, and operate public parks and recreation facilities in reservoir areas and to grant leases and licenses for lands, including facilities, preferably to federal, state or local governmental agencies.

Public Law 85-624, Fish and Wildlife Coordination Act, 1958. This act as amended in 1965 sets down the general policy that fish and wildlife conservation shall receive equal consideration with other project purposes and be coordinated with other features of water resource development programs. Opportunities for improving fish and wildlife resources and adverse effects on these resources shall be examined along with other purposes which might be served by water resources development.

Public Law 86-717, Forest Conservation, 1960. This act provides for the protection of forest and other vegetative cover for reservoir areas under the jurisdiction of the Secretary of the Army and the Chief of Engineers.

Public Law 87-874, Rivers and Harbors Act, 1962. This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.

Public Law 88-578, Land and Water Conservation Fund Act, 1965. This act established a fund from which Congress can make appropriations for outdoor recreation. Section 2(a) makes entrance and user fees at reservoirs possible by deleting the words "without charge" from Section 4 of the 1944 Flood Control Act as amended.

Public Law 89-272, Solid Waste Disposal Act, as amended by PL 94-580, dated October 1976. This act authorized a research and development program with respect to solid waste disposal.

Public Law 89-665, Historic Preservation Act of 1966. This act provides for: (1) an expanded National Register of significant sites and objects: (2) matching grants to states undertaking historic and archeological resource inventories; and (3) a program of grants-in aid to the National Trust for Historic Preservation; and (4) the establishment of an Advisory Council on Historic Preservation. Section 106 requires that the President's Advisory Council on Historic Preservation have an opportunity to comment on any undertaking which adversely affects properties listed, nominated, or considered important enough to be included on the National Register of Historic Places.

Public Law 89-80, Water Resources Planning Act, 1965. This act established the Water Resources Council and gives it the responsibility to encourage the development, conservation, and use of the Nation's water and related land resources on a coordinated and comprehensive basis. Title II of this act established the River Basin Commissions and stipulated their duties and authorities. The President of the United States signed the Susquehanna River Basin Compact into law on December 24, 1970, subsequent to its approval by Congress and the prior approval of the involved states. The Compact provided for the creation of a single administrative agency to coordinate water resources efforts and programs of federal, state, local and private interests in the basin.

Public Law 90-480, Architectural Barriers Act of 1969. This act ensures that certain buildings financed or leased by Federal agencies are constructed (or renovated) so that they will be accessible to the physically disabled.

Public Law 90-483, River and Harbor and Flood Control Act, Mitigation of Shore Damages, 1968. Section 210 restricted collection of entrance fees at USACE lakes and reservoirs to users of highly developed facilities requiring continuous presence of personnel.

Public Law 91-190, National Environmental Policy Act (NEPA), 1969. NEPA declared it a national policy to encourage productive and enjoyable harmony between man and his environment, and for other purposes. Specifically, it declared a "continuing policy of the Federal Government... to use all practicable means and measures...to foster and promote the general welfare, to create conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." Section 102 authorized and directed that, to the fullest extent possible, the policies, regulations and public law of the United States shall be interpreted and administered in accordance with the policies of the Act.

Public Law 91-611, River and Harbor and Flood Control Act, 1970. Section 234 provides that persons designated by the Chief of Engineers shall have authority to issue a citation for violations of regulations and rules of the Secretary of the Army, published in the Code of Federal Regulations.

Public Law 92-347, Golden Eagle Passbook and Special Recreation User Fees. This act revises Public Law 88-578, the Public Land and Water Conservation Act of 1965, to require federal agencies to collect special recreation user fees from the use of specialized sites developed at federal expense and to prohibit the Corps of Engineers from collecting entrance fees to projects.

Public Law 92-463, Federal Advisory Committee Act. The Federal Advisory Committee Act became law in 1972 and is the legal foundation defining how federal advisory committees operate. The law has special emphasis on open meetings, chartering, public involvement, and reporting.

Public Law 92-500, Federal Water Pollution Control Act Amendments, 1972. The Federal Water Pollution Control Act of 1948 (PL 845, 80th Congress), as amended in 1956, 1961, 1965 and 1970 (PL 91 - 224), established the basic tenet of uniform State standards for water quality. Public Law 92-500 strongly affirms the federal interest in this area. "The objective of this act is to restore and maintain the chemical, physical and biological integrity of the Nation's waters."

Public Law 92-516, Federal Environmental Pesticide Control Act, 1972. This act completely revises the Federal Insecticide, Fungicide and Rodenticide Act. It provides for complete regulation of pesticides to include regulation, restrictions on use, actions within a single State, and strengthened enforcement.

Public Law 93-81, Collection of Fees for Use of Certain Outdoor Recreation Facilities, 1978. This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended to require each federal agency to collect special recreation use fees for the use of sites, facilities, equipment, or services furnished at federal expense.

Public Law 93-112, Rehabilitation Act of 1973, as amended. The USACE responsibility to provide access to programs and activities for persons with disabilities is identified in the Rehabilitation Act of 1973 and its subsequent amendments, entitled the "Rehabilitation, Comprehensive Services and Development Disabilities Amendment of 1978."

Public Law 93-291, Archeological Conservation Act, 1974. The Secretary of the Interior shall coordinate all federal survey and recovery activities authorized under this expansion of the 1960 act. The Federal construction agency may transfer up to one percent of project funds to the Secretary with such transferred funds considered non-reimbursable project costs.

Public Law 93-303, Recreation Use Fees, 1974. This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended, to establish less restricted criteria under which federal agencies may charge fees for the use of campgrounds developed and operated at federal areas under their control.

Public Law 93-523, Safe Drinking Water Act, 1974. The act assures that water supply systems serving the public meet minimum national standards for protection of public health. The act (1) authorizes the Environmental Protection Agency to establish federal standards for

protection from all harmful contaminants, which standards would be applicable to all public water systems, and (2) establishes a joint federal-state system for assuring compliance with these standards and for protecting underground sources of drinking water.

Public Law 94-422, Amendment of the Land and Water Conservation Fund Act, 1965. Expands the role of the Advisory Council on Historic Preservation. Title 2 - Section 102a amends Section 106 of the Historical Preservation Act of 1966 to say that the Council can comment on activities which will have an adverse effect on sites either included in or eligible for inclusion in the NRHP.

Public Law 99-662, The Water Resources Development Act, 1986. Provides the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

Public Law 101-336, Americans With Disabilities Act of 1990 (42 U.S. C 12, 101- 12, 213). The purpose of the Act was to extend the rights, privileges, and protection that had been made available to the disabled on federal projects for many years prior to the ADA, to the private sector.

Public Law 103-66, Section 500. Omnibus Budget Reconciliation Act of 1993. This act authorizes USACE to expand its recreation user fee program.

2.7.1 Executive Orders

Executive Order (EO) 11514, Protection and Enhancement of Environmental Quality – EO 11514 requires federal agencies to provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life.

EO 11593, Protection and Enhancement of Cultural Environment – EO 11593 requires federal agencies to administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations.

EO 11990, Protection of Wetlands – EO 11990 requires federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in executing federal projects.

EO 11988, Floodplain Management – This EO directs federal agencies to evaluate the potential impacts of proposed actions in floodplains. The operation and management of the existing project complies with EO 11988.

EO 13045, Protection of Children from Health Risks & Safety Risks – This EO directs federal agencies to evaluate environmental health or safety risks that may disproportionately affect children.

EO 13112, Invasive Species – This EO directs federal agencies to evaluate the occurrence of invasive species, the prevention for the introduction of invasive species, and measures of their control to minimize the economic, ecological, and human health impacts.

EO 13175, Consultation and Coordination with Indian Tribal Governments – This EO reaffirms the federal government's commitment to tribal sovereignty, self-determination, and self-government by ensuring agencies consult with Indian tribes and respect tribal sovereignty as they develop policy on issues that impact Indian communities.

EO 13186, Migratory Bird Habitat Protection – Sections 3a and 3e of EO 13186 direct federal agencies to evaluate the impacts of their actions on migratory birds, with emphasis on species of concern, and inform the USFWS of potential negative impacts on migratory birds.

EO 13508, Chesapeake Bay Protection and Restoration – This EO directs federal agencies to implement best management practices to restore and maintain the health of the Chesapeake Bay.

2.7.2 State Laws

Commonwealth of Pennsylvania, Act 170 Wild Resource Conservation Act, 1982. This law was passed to protect endangered plants and animals.

Commonwealth of Pennsylvania, Environmental Stewardship and Watershed Protection Act, 1999. This law provides money to protect open space and critical habitat, conserve river resources, create greenways, build community parks, and enhance tourism.

Commonwealth of Pennsylvania, Clean Streams Law, 1937. This law provided Pennsylvania with the authority to protect streams from pollution. It prohibits littering or dumping that effects the waters and can fine up to $10,000 for offenses.

Commonwealth of Pennsylvania, Article 1 Section 27 Environmental Rights Amendment, 1969. This article provides two rights to a clean environment for Pennsylvania's citizens: a right to clean air, pure water, and the preservation of the natural, scenic, historic, and aesthetic values of the environment; and a right to have public natural resources conserved and maintained by the Commonwealth for the benefit of present and future generations.

2.7.3 Management Plans

Pennsylvania Statewide Comprehensive Outdoor Recreation Plan (SCORP), 2020-2024. The 2020 – 2024 outdoor recreation plan is Pennsylvania's strategic plan for how outdoor recreation should meet the needs of the state's residents and visitors. A State's outdoor recreation plan must be updated every five years for states to remain eligible for the Federal Land and Water Conservation Fund. The 2020 – 2024 plan includes several goals, all of which center around a framework of five priorities, including health and wellness, recreation for all, sustainable systems, funding and economic development, and technology.

The Cowanesque Field Management Plan was developed for the US Army Corps of Engineers to implement at Cowanesque Lake in order to increase local species abundance and diversity. Additional information can be found in Section 6.4.

This page intentionally left blank.

3 RESOURCE OBJECTIVES

3.1 INTRODUCTION

The purpose of the plan is to establish the guideline for sustainable stewardship of natural and recreation resources managed directly and indirectly on USACE owned lands. The resource objectives and goals are consistent with the authorized project purposes, federal laws and directives, regional needs, and resource capabilities, and take public input into consideration. The Pennsylvania SCORP was considered as well. The goals presented in the plan express the overall desired end state of the cumulative land and recreation management programs at Tioga-Hamond and Cowanesque Lakes. The resource objectives specify task-oriented actions necessary to achieve the plan goals.

Overarching USACE management goals and environmental operating principles are presented in the following sections. Specific project wide resource objectives are presented in Section 3.3.

3.2 MANAGEMENT GOALS

The following goals are the priorities for consideration when determining management objectives and development activities. Implementation of these goals is based upon time, workload, and budget. The objectives provided in this chapter are established to provide high levels of stewardship to USACE managed lands and resources, while still providing a high level of public service. These goals will be pursued using a variety of mechanisms such as: assistance from volunteer efforts, hired labor, contract labor, permit conditions, remediation, and special lease conditions. It is the intention of Tioga-Hammond and Cowanesque Lakes' staff to provide a realistic approach to the management of all resources.

Project Management Goals:

- **Goal A** Provide the best management practices to respond to regional needs, resource capabilities and capacities, and expressed public interests consistent with authorized project purposes.

- **Goal B** Protect and manage project natural and cultural resources through sustainable environmental stewardship programs.

- **Goal C** Provide public outdoor recreation opportunities that support project purposes and public interests while sustaining project natural resources.

- **Goal D** Recognize the unique qualities, characteristics, and potentials of the project.

- **Goal E** Provide consistency and compatibility with national objectives and other state and regional goals and programs.

In addition to the goals, USACE management activities are guided by USACE-wide Environmental Operating Principles (EOPs) as follows:

- Strive to achieve environmental sustainability. An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.
- Proactively consider environmental consequences of USACE programs and act accordingly in all appropriate circumstances.
- Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.
- Continue to meet corporate responsibility and accountability under the law for activities and decisions under our control, which may impact human health and welfare and the continued viability of natural systems.
- Seek ways and means to assess and mitigate impacts to the environment. Consider the environment in employing a risk management and systems approach to the full life cycle of our projects and processes.
- Build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and impacts of our work in a collaborative manner.
- Employ an open, transparent process that respects the views of individuals and groups interested in USACE activities; listen to them actively and learn from their perspective in the search to find innovative win-win solutions to the nations' problems, that also protect and enhance the environment.

3.3 RESOURCE OBJECTIVES

Resource objectives are defined as clearly written statements that respond to identified issues and that specify measurable and attainable activities for resource development and management of the lands and waters under USACE jurisdiction. The objectives stated in this master plan support the Plan's goals, USACE EOPs, and applicable national performance measures.

The objectives in this master plan are intended to provide project benefits, meet public needs, and foster environmental sustainability for Tioga-Hammond and Cowanesque Lakes to the greatest extent possible.

3.3.1 Project-Wide Objectives

- Water quality objectives include low flow augmentation and compliance with the Commonwealth of Pennsylvania's water quality standards. Support downstream fisheries during the summer by using selective port gates to release water. Maintain a healthy downstream environment during low flow periods through the prescribed regulation for low flow augmentation.
- Maintain a stable lake level throughout the prime recreation season to support both in-lake and shoreline use.

3.3.2 Recreation Area Objectives

There are two categories of recreation uses within Tioga-Hammond and Cowanesque Project: land-based and water-based recreation. The resource management objectives below were developed in coordination with the USACE Tioga-Hammond and Cowanesque Park Rangers and the Tioga-Hammond and Cowanesque Lakes Project Annual Reports:

- Continue natural resource and educational efforts such as the Visitor Information Center kiosk exhibits, interpretive panels, and wildlife viewing locations.
- Protect sensitive species as well as federally and state listed wildlife species such as osprey, bald eagles, and multiple species of bats through habitat management practices.
- Manage all rights-of-ways in a manner that maintains aesthetics and safety considerations using techniques that minimize disturbance to maintain as natural a setting as possible.
- Protect and enhance a diverse natural wildlife and plant population through appropriate habitat management practices.
- Fishery Habitat Management, continue supporting PFBC with the placement of fish structures in all three lakes, continue partnership with PFBC for fish stocking program, continue support of studies with Mansfield University
- Healthy Forest Management, rotational mowing, support early successional habitat, promote rotational prescribed burns with partners.
- Implement Handshake Partnership with partners, Friends of Tioga-Hammond, PA Game Commission (PGC) for implementation of 4-acre enclosed pollinator/viewing plot with interpretive educational features along the Railroad Grade Trail
- Maintain the integrity and ensure protection of wetland areas.
- Manage invasive species, both aquatic and terrestrial, with a removal and maintenance program.
- Continue to implement open field and forest field management for the Cowanesque Mitigation Plan into environmental stewardship activities that promote wildlife biodiversity.
- Reduce streambank and shoreline erosion control by implementing streambank stabilization efforts.
- Maintain relationships with Memorandums of Understandings, Endless Mountains, Department of Natural Resources' Bureau of Forestry, PGC, and PFBC.
- Continue to update infrastructure to align with sustainable efforts.
- Manage forest and aquatic invasive species such as Eurasian watermill foil, zebra mussels, emerald ash borer, hemlock wooly adelgid, and spongy moth in cooperation with the Department of Natural Resources' Bureau of Forestry and the PGC.

Figure 3-1 View of Tioga Lake

This page intentionally left blank.

4 LAND CLASSIFICATION

4.1 LAND ALLOCATION

All project lands, for USACE water resource development projects, are allocated by USACE into one of four categories, in accordance with the congressionally authorized purpose for which the project lands were acquired. There are four possible categories of allocation identified in USACE regulations, including Operations, Recreation, Fish and Wildlife, and Mitigation.

At the Cowanesque Lake Project there are 263.3 acres of Mitigation area managed by the USACE. There are no Mitigation areas located in the Tioga-Hammond project area.

4.2 LAND CLASSIFICATION

The objective of classifying project lands is to identify how a given parcel of land shall be used now and in the foreseeable future. Land classification is a central component of this plan, and once a particular classification is established, any significant change to that classification would require a formal process including public review and comment. According to the 2002 Master Plan, all federal lands in the project area, excepting those required for operation of the dam, are designated for recreation and priority one public use in accordance with the provisions in ER 1130-2-550.

Land classifications were designated for any project parcel owned in fee by USACE. Figure 4-1 shows the total land acreages, either in fee or under easement, for the site. Lands held in easements are described in Section 4.3. Ongoing and planned management practices for each classification are outlined in Chapter 5 – Resource Plan.

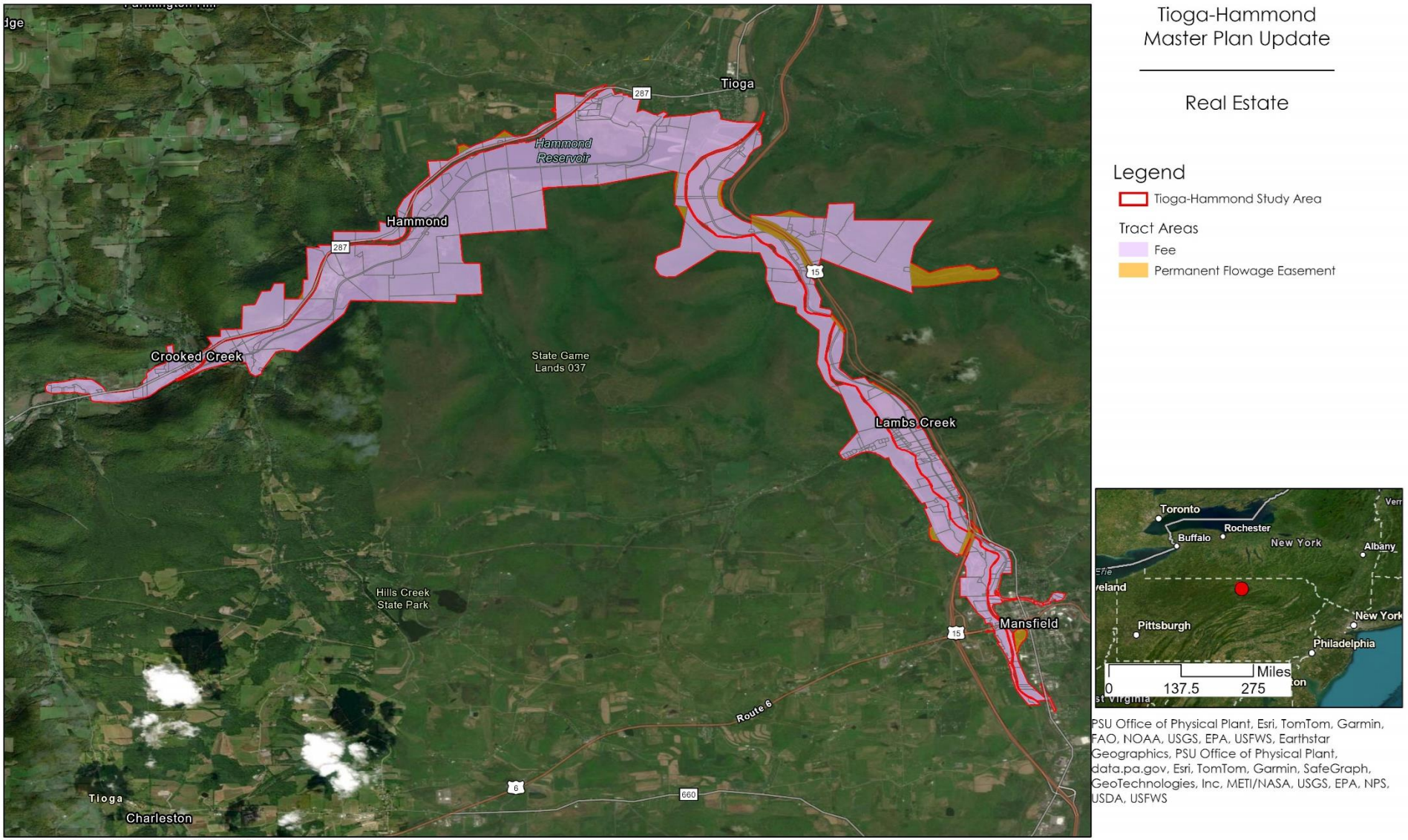
4.2.1 Prior Land Classification

Land classification was completed as part of the 2002 Master Plan. The classification process refines the land allocations to fully utilize project lands and must consider public desires, legislative authority, regional and project specific resource requirements, and suitability.

The 2002 Tioga-Hammond and Cowanesque Master Plan Update (2002 Master Plan) superseded the 1964 Master Plan. In the 2002 Master Plan, three land classifications were utilized: project operations lands, recreation lands, and lands available for lease. Project operation lands were described as those lands acquired and specifically allocated to provide safe, efficient operation of the project for its primary authorized purpose of flood risk management. Those lands included the area around the dam and its appurtenances, the dam operator's residence, and the maintenance complex. The recreation lands included the areas acquired for project operations but developed for public recreation activities.

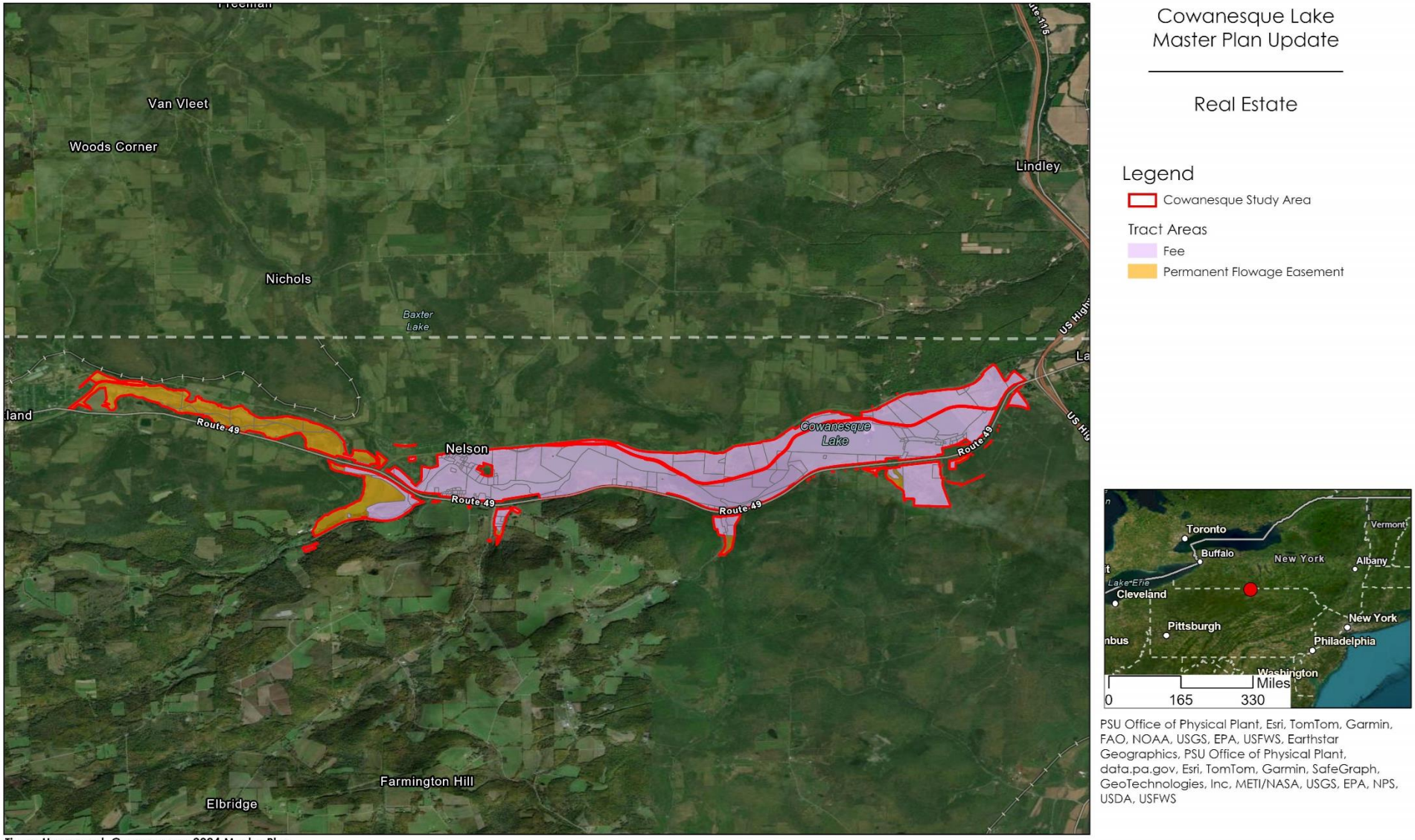
Despite the available descriptions of prior land classifications, due to digitization errors, the land classification maps and any related calculations from the 2002 Master Plan are not available. Therefore, it is impossible to determine the boundaries of prior land classifications and no further discussion of prior land classifications will be included in this updated Master Plan document. A map of Development Intensity from the 2002 Master Plan has been included for Tioga Lake in Figure 4-3.

Figure 4-1 Tioga-Hammond Project Real Estate Map



Tioga-Hammond, Cowanesque 2024 Master Plan
This map is for visualization (or illustrative) purposes; it is not based on actual property surveys; and should not be used for determination of legal property limits.

Figure 4-2 Cowanesque Project Real Estate Map



Tioga-Hammond, Cowanesque 2024 Master Plan
This map is for visualization (or illustrative) purposes; it is not based on actual property surveys; and should not be used for determination of legal property limits.

Figure 4-3 Tioga-Hammond Project Prior Development Intensity Map

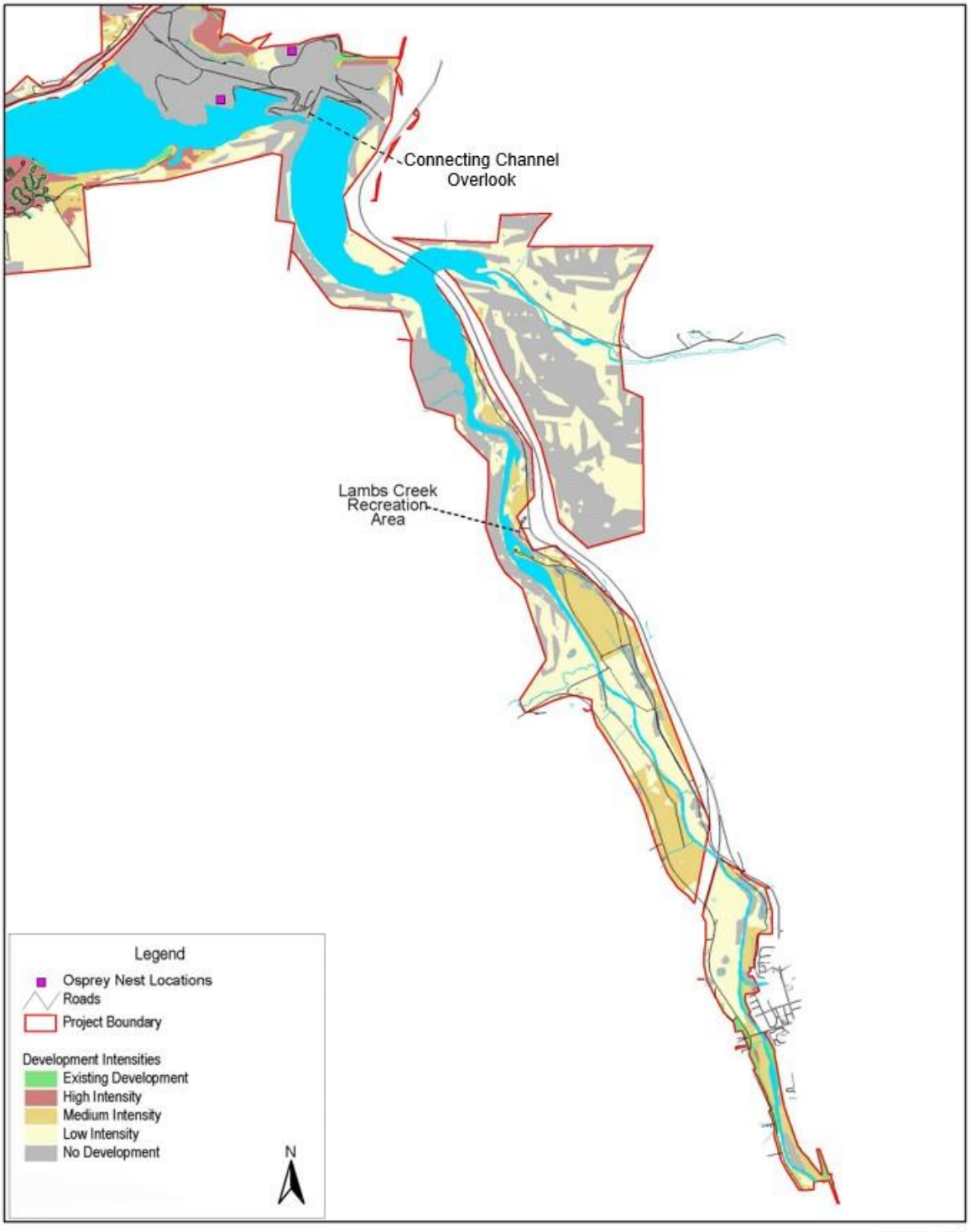


Figure 4-1
Tioga Lake Development Suitability
2002 Master Plan Update

Table 4-1 Summary of Acreages for Proposed Land Classifications for Tioga-Hammond Lakes

Proposed Land Classifications	Acres
Project Operations	419.7
High Density Recreation	194.0
Multiple Resource Management	
Wildlife Management	3593.0
Vegetative Management	1389.9
Low Density Recreation	73.7
Total	**5,670***

Table 4-2 Summary of Acreages for Current or Proposed Water Surface Classifications for Tioga and Hammond Lakes

Tioga Lake Classifications	Acres
Water Surface	
Restricted	1.1
Designated No-Wake	135.5
Open Recreation	356.3
Total	**493.0***

Hammond Lake Classifications	Acres
Water Surface	
Restricted	3.5
Designated No-Wake	140.1
Open Recreation	535.4
Total	**679.0***

Table 4-3 Summary of Acreages for Proposed Land Classifications for Cowanesque Lake

Proposed Land Classifications	Acres
Project Operations	4.9
Mitigation	263.3
High Density Recreation	224.6
Multiple Resource Management	
Wildlife Management	338.8
Vegetative Management	234.5
Low Density Recreation	1.2
Total	**1,067***

Table 4-4 Summary of Acreages for Current or Proposed Water Surface Classifications for Cowanesque Lake

Cowanesque Lake Classifications	Acres
Water Surface	
Restricted	1.3
Designated No-Wake	282.5
Open Recreation	766.2
Total	**1,050.0***

**Mapping for the Master Plan update has been compiled using the best information available and is believed to be accurate.*

4.2.2 Proposed Land Classifications

Land classification indicates the primary use for which project lands are managed. There are 6 categories of classification identified in USACE regulation EP 1130-2-550, Chapter 3: Project Operations, High Density Recreation, Mitigation, Environmentally Sensitive Areas, Multiple Resource Management Lands (MRML), and Water Surface. Figure 4-5 shows the proposed land classifications at the Tioga-Hammond Project and Figure 4-6 shows the proposed land classifications for the Cowanesque Project. The Cowanesque Project has 263.3 acres of lands classified as Mitigation.

Proposed land classifications were determined by identifying the prior land classifications in the 2002 Master Plan, evaluating the primary use the lands are managed for, and identifying the land classification that would apply to those areas.

4.2.2.1 Project Operations

This classification category includes all project land required for the structure, operation, administration, or maintenance of the project and must be maintained to carry out the authorized purposes of flood risk management, water supply, and water quality.

4.2.2.1.1 Tioga and Hammond Lakes

At Tioga and Hammond Lakes, there are 419.7 acres of lands under this classification, all of which are managed by USACE. This area covers the operation of the Tioga and Hammond Dams, the connecting channel, and the surrounding area.

4.2.2.1.2 Cowanesque Lake

At the Cowanesque Dam, there are 4.9 acres of project operations. This area covers the operation of the Cowanesque Dam and the surrounding area.

4.2.2.2 *High Density Recreation*

Lands classified for High Density Recreation are currently developed for intensive recreation activities. Depending on available space, funding, and public demand, lands classified for High Density Recreation may support additional outdoor recreation development. These areas include boat launches, day use areas, multi-use trails, and recreation fields. These areas have been developed to support concentrated visitation and use of the recreation facilities they host.

4.2.2.2.1 Tioga and Hammond Lakes

There are 194.0 acres of High Density Recreation area within Tioga-Hammond Project lands. At Tioga Lake, there is one primary area of High Density Recreation, Lambs Creek Boat Ramp area. This facility is a day-use area located at the south end of Tioga Lake. For additional information about these areas, please see Section 2.5.3.1 "Tioga Lake."

At Hammond Lake, there are two primary areas of High Density Recreation: Ives Run (including the Day Use facility, Boat Launch, and Campground) and the Administrative / Visitor Information Center. For additional information at these areas, see Section 2.5.3.2 "Hammond Lake".

4.2.2.2.2 Cowanesque Lake

There are 224.6 acres of High Density Recreation at the Cowanesque Lake project. There are three primary areas of High Density Recreation including Lawrence Recreation Area (and Picnic Shelter), Tompkins Campground (including Knoll, Bench, Cove, Meadow, and Hike-In Loops), the South Shore Recreation Area, Cowanesque North Overlook, North Tailrace, and South Tailrace.

4.2.3 Multiple Resource Management

This classification category identifies the predominant use of an area with the understanding that other compatible uses can occur within the area. This classification is divided into four sub-classifications identified as: Low Density Recreation, Vegetative Management, Wildlife Management, and Future or Inactive Recreation. There are currently no areas classified as Future or Inactive recreation. A given tract of land may be classified using one or more of these sub-classifications. The following identifies the amount contained in each sub-classification of Multiple Resource Management Lands. The land classification maps (Figure 4-5 and Figure 4-6) reflect the predominant sub-classification.

4.2.3.1 Low Density Recreation

The Low Density Recreation sub-classification covers lands with minimal development or infrastructure that support passive public recreation use, like fishing, hunting, wildlife viewing, or hiking. All federally-owned lands except those required for Project Operations are designated for recreation use. Future management of these lands calls for maintaining a healthy, ecologically adapted vegetative cover to reduce erosion and improve aesthetics while also supporting low impact recreation opportunities. The public may use these lands for bank fishing, hiking, wildlife viewing, and for access to the shoreline.

4.2.3.1.1 Tioga-Hammond Lake

There are 73.7 acres of MRML – Low Density Recreation within the Tioga-Hammond Project. These areas include the Lambs Creek Recreation Area and the Stephenhouse Trail area (Hammond). For more information on these areas, see Section 2.5.3.1 and 2.5.3.2.

4.2.3.1.2 Cowanesque Lake

Cowanesque Lake has 1.2 acres of MRML – Low Density Recreation within the project area. The two of the four trailheads are low density recreation areas located along Bliss Road.

4.2.3.2 Vegetative Management

These are lands designed for stewardship of forest, prairie, and other native vegetative cover. There may be overlap with low density recreation areas and wildlife management areas, especially in some of the hiking trail areas.

4.2.3.2.1 Tioga-Hammond Lake

At Tioga-Hammond Lake, there are 1,389.9 acres identified for vegetative management. These are primarily areas of managed forest with some areas including adjacent to the Tioga River and to the north and south of Hammond Lake.

4.2.3.2.2 Cowanesque Lake

At Cowanesque Lake, there are 234.5 acres identified for vegetative management. The majority of the area is located on the west end of the project area with some areas on the southeast side of the lake. Additionally, a 2022 Field Management Plan was created to manage areas of grassland and old field habitat, and a 2025 Forest Management Plan was created to manage forested areas. For more information about the Field Management Plan and Forest Management Plan please see Section 6.3.

4.2.3.3 Wildlife Management

Wildlife management areas overlap with multiple land classifications throughout the Project site. These areas are managed for generalized wildlife in consideration of threatened and endangered species identified in Section 2.2.4. Many of these areas are also managed for vegetation to ensure quality of the habitat including removing terrestrial species of plants to support biodiversity.

4.2.3.3.1 Tioga-Hammond Lake

At Tioga-Hammond Lake, there are 3,593.0 acres identified for Wildlife Management. These areas are identified in Figure 4-5.

4.2.3.3.2 Cowanesque Lake

At Cowanesque Lake, there are 338.8 acres identified for Wildlife Management. There are three main areas of Wildlife Management: one area is located to the northwest of the lake, one area is located on the southeast, and one area is located along the northeast of the project area. These areas are also identified in Figure 4-6.

4.2.4 Water Surface

In accordance with national USACE guidance set forth in EP 1130-2-550, the water surface of the lake at the conservation pool elevation may be classified using the following 4 classifications: Restricted, Designated No-Wake, Fish and Wildlife Sanctuary, or Open Recreation. The Tioga-Hammond and Cowanesque Project has 1,658 acres of open recreation, 558 acres of designated slow No-Wake, and 6 acres of restricted water surface classifications.

4.2.4.1 Restricted

Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, and security purposes. These areas are marked with standard United States Coast Guard (USCG) regulatory buoys stating that boats are excluded from the area. In some instances, physical barriers may be in place on the water. Restricted

areas at the project are marked by restricted signage on a cable and buoy at the intake and physical barriers and signage at the outlet structure.

The Restricted water surface at Tioga Lake includes area adjacent to the Dam and inclusive of the Connecting Channel between Tioga and Hammond. The total acreage of Restricted water surface is approximately 1.1 acres.

The Restricted water surface at Hammond Lake includes the area adjacent to the dam and part of the Connecting Channel between Tioga and Hammond. The total acreage of Restricted water surface is approximately 3.5 acres.

The Restricted water surface at Cowanesque Lake includes the area adjacent to the dam and a small area around the stilling basin and drainage channel at the outlet structure. The total acreage of Restricted water surface is approximately 1.3 acres.

4.2.4.2 Designated No-Wake

No-Wake areas are intended to protect environmentally sensitive shorelines and improve boating safety near key recreation water access areas such as boat ramps.

The No-Wake water surface at Tioga Lake includes area adjacent to the boat launch, areas within the smaller river channels, and areas near the Mill Cove Environmental area. The total acreage of No-Wake water surface is approximately 135.5 acres.

The No-Wake water surface at Hammond Lake includes the area adjacent to the Ives Run boat launch area, beach areas, and areas within smaller river channels. The total acreage of No-Wake water surface is approximately 140.1 acres.

The No-Wake water surface at Cowanesque Lake includes the western part of the Lake and the area surrounding the boat launches. The total acreage of No-Wake water surface is approximately 282.5 acres.

4.2.4.3 Open Recreation

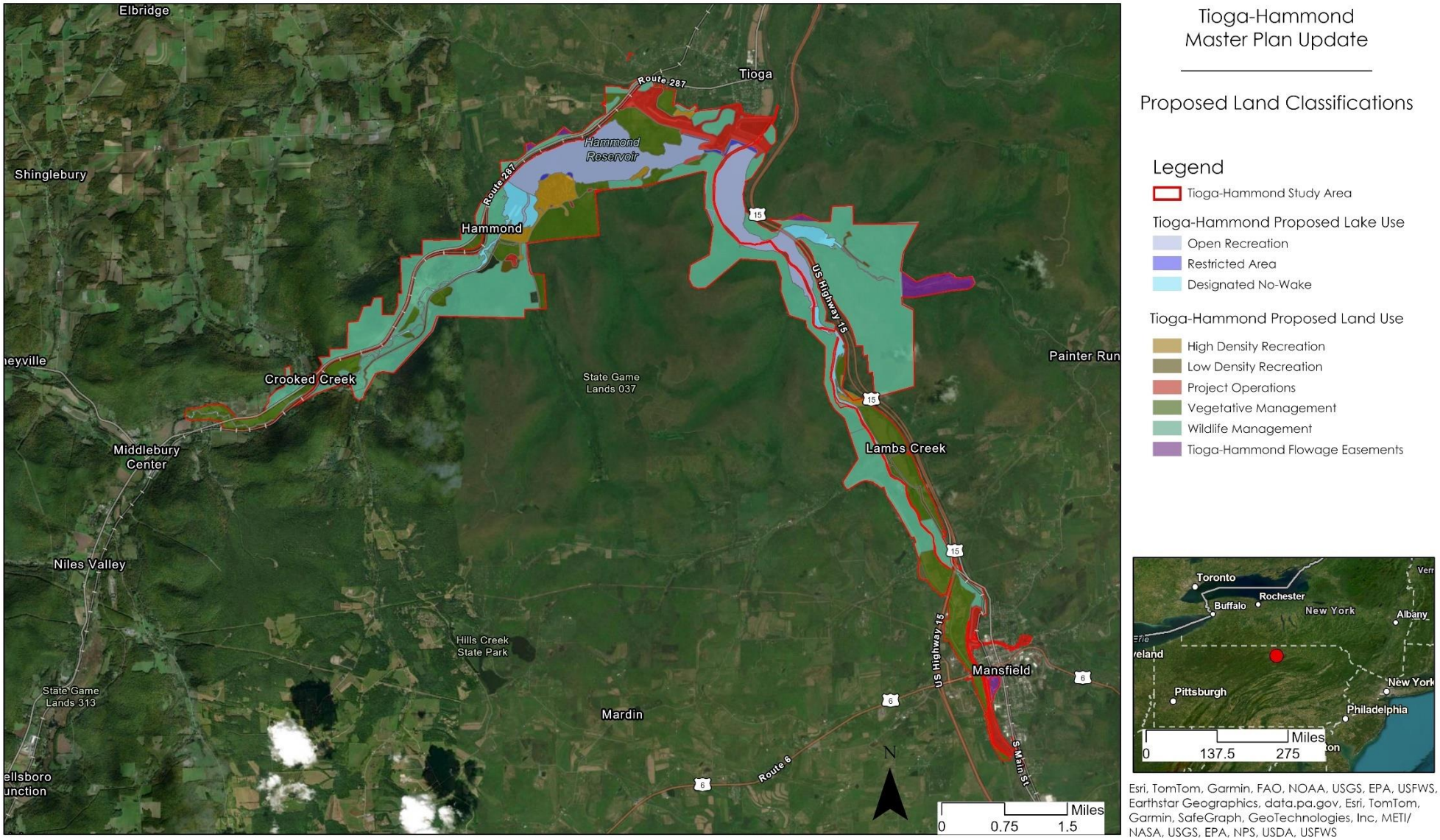
Open Recreation includes all water surface areas available for year-round or seasonal water-based recreation use.

Apart from the Restricted area and No-Wake areas described above, the remaining water surface of approximately 356.3 acres at Tioga are designated as Open Recreation.

Apart from the Restricted area and No-Wake areas described above, the remaining water surface of approximately 535.4 acres at Hammond are designated as Open Recreation.

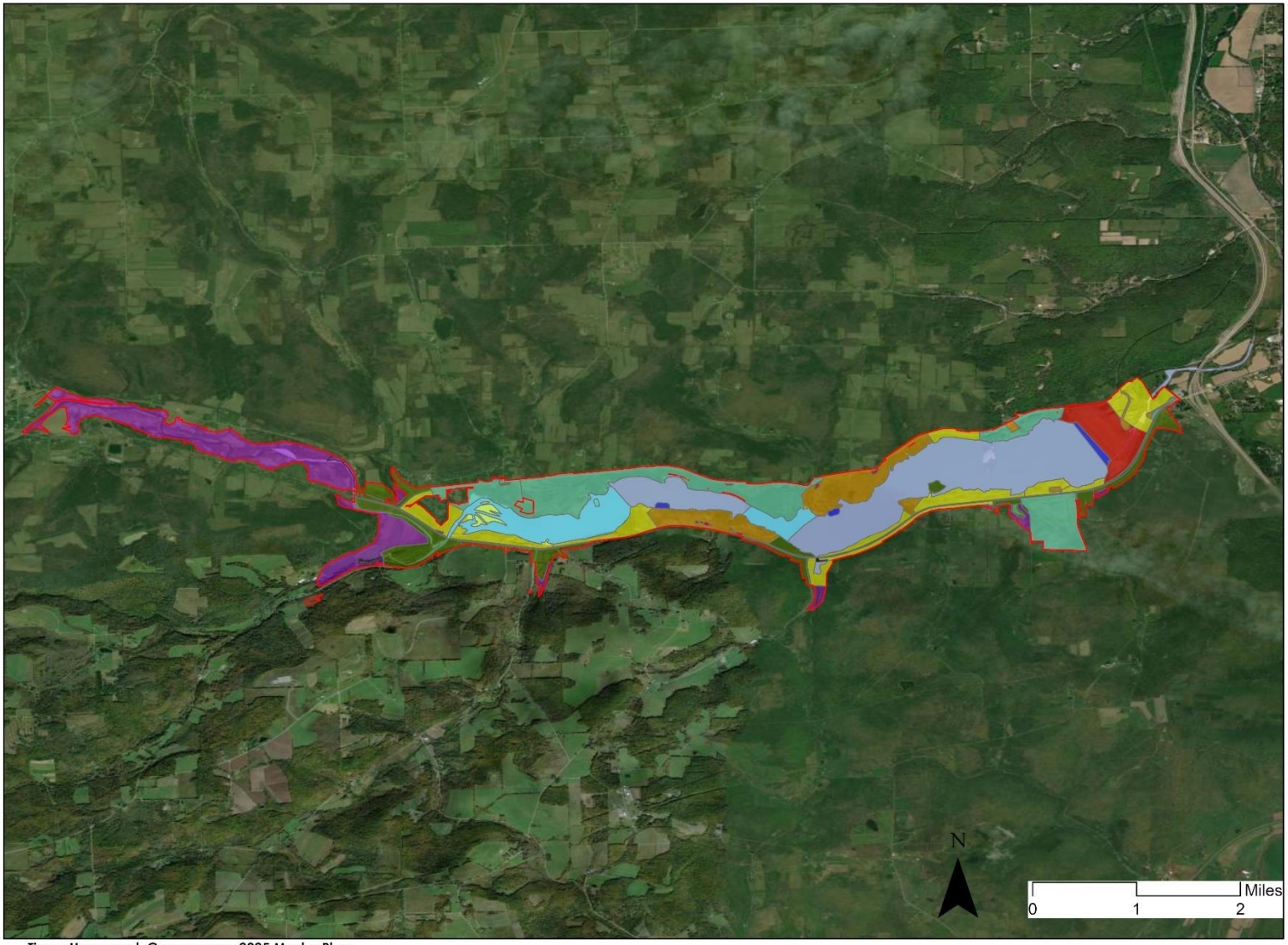
Apart from the Restricted area and No-Wake areas described above, the remaining water surface of approximately 766.2 acres at Cowanesque are designated as Open Recreation.

Figure 4-4 Tioga-Hammond Proposed Land Classifications



Tioga-Hammond, Cowanesque 2025 Master Plan
This map is for visualization (or illustrative) purposes; it is not based on actual property surveys; and should not be used for determination of legal property limits.

Figure 4-5 Cowanesque Proposed Land Classifications



Cowanesque Lake
Master Plan Update

Proposed Land Classifications

Legend

Cowanesque Study Area

Cowanesque Proposed Lake Use

Open Recreation
Restricted Area
Designated No-Wake

Cowanesque Proposed Land Use

High Density Recreation
Low Density Recreation
Project Operations
Mitigation
Vegetative Management
Wildlife Management
Cowanesque Flowage Easements

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, Earthstar Geographics, data.pa.gov, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/ NASA, USGS, EPA, NPS, USDA, USFWS

Tioga-Hammond, Cowanesque 2025 Master Plan
This map is for visualization (or illustrative) purposes; it is not based on actual property surveys; and should not be used for determination of legal property limits.

4.3 PROJECT EASEMENT LANDS

Easement lands include all lands for which USACE holds an easement interest but not fee title. Flowage easements are easements purchased by USACE to allow temporary flooding of private land during flood risk management operations. See Figure 4-1 for the locations of the flowage easements at the Tioga-Hammond Dam and see Figure 4-2 for flowage easements at the Cowanesque Project. No Operation or Conservation Easement classifications are designated in the project area. See section 2.6 for additional information about Project Easement Lands.

5 RESOURCE PLAN

5.1 RESOURCE PLAN OVERVIEW

This chapter sets forth a resource plan describing, in broad terms, how each land classification within the Master Plan will be managed. The management goals are included below and described in Section 3.2.

Project management goals:

- **Goal A** – Provide the best management practices to respond to regional needs, resource capabilities and capacities, and expressed public interests consistent with authorized project purposes.
- **Goal B** - Protect and manage project natural and cultural resources through sustainable environmental stewardship programs.
- **Goal C** – Provide public outdoor recreation opportunities that support project purposes and public interests while sustaining project natural resources.
- **Goal D** – Recognize the unique qualities, characteristics, and potentials of the Project.
- **Goal E** – Provide consistency and compatibility with national objectives and other state and regional goals and programs.

Management of lands, recreation facilities and related infrastructure must take into consideration the effects of pool fluctuations associated with the authorized flood risk management mission. Management actions are dependent on congressional appropriations, the financial capability of lessees and other key stakeholders, and the contributions of labor and other resources by volunteers. Table 5-1 lists the land classifications and applicable goals for each land classification at Tioga-Hammond Dam. Table 5-2 lists the land classifications and applicable goals for each land classification at Cowanesque Dam.

Table 5-1 Tioga-Hammond Land Classification & Applicable Management Goals

Land Classification	**Goals**
Project Operations	A, E
High Density Recreation	A, B, C, D, E
Multiple Resource Management Lands for:	
• Low Density Recreation	A, B, C, E
• Vegetative Management	B, E
• Wildlife Management	B, D, E
Water Surface:	
• Restricted Area	A, E
• Designated No-Wake	A, C, E
• Open Recreation	A, C, E

Table 5-2 Cowanesque Land Classification & Applicable Management Goals

Land Classification	Goals
Project Operations	A, E
High Density Recreation	A, B, C, D, E
Multiple Resource Management Lands for:	
• Low Density Recreation	A, B, C, E
• Vegetative Management	B, E
• Wildlife Management	B, D, E
Water Surface:	
• Restricted Area	A, E
• Designated No-Wake	A, C, E
• Open Recreation	A, C, E

5.2 PROJECT OPERATIONS

This land is associated with the dam and spillway structures that are operated and maintained for the purpose of the flood risk management mission of Tioga-Hammond, and Cowanesque Project. There are currently several planned improvements in Project Operation lands that are part of routine operation and maintenance of a flood risk management dam. Additionally, feasibility investigations are planned to be performed for multiple areas of interest.

5.3 HIGH DENSITY RECREATION

Lands classified for High Density Recreation are currently developed for intensive recreation activities. Depending on available space, funding, and public demand, lands classified for High Density Recreation may support additional outdoor recreation development in the future. These areas include boat launches, day use areas, multi-use trails, and recreation fields. These areas have been developed to support concentrated visitation and use of the recreation facilities. For additional information about those areas included in this classification, see Sections 4.2.2.2.

5.4 MULTIPLE RESOURCE MANAGEMENT LANDS

Multiple Resource Management Lands (MRML) are, as the name implies, lands that serve multiple purposes, but that are sub-classified and managed for a predominant use. For additional information about those areas included in this classification, see Section 4.2.3.

5.4.1 Low Density Recreation

Future management of low density lands calls for maintaining a healthy, ecologically adapted vegetative cover to reduce erosion and improve aesthetics while also supporting low impact recreation opportunities. The public may use these lands for bank fishing, hiking, wildlife viewing, and for access to the shoreline. Hunting is allowed in select areas that are a reasonable and safe distance from high density recreation areas, dam operations, and adjacent residential properties.

5.4.2 Vegetation Management

These are lands designated for stewardship of forest, prairie, and other native vegetative cover. There is overlap in low density recreation areas and vegetation management areas,

especially in some of the hiking trail areas. In general, vegetative resources on USACE lands are managed for multiple purposes including wildlife habitat, recreation activities, landscape aesthetics, and timber. Management of forest on USACE lands nationwide is guided, in part, by policy set forth in Public Law 86-717, the Forest Cover Act, which states that "…project lands shall be developed and maintained to assure a future supply of timber through sustained yield programs to the extent that such management is practicable and compatible with other uses of the project." Additional forest management guidance is set forth in USACE regulations ER & EP 1130-2-540, which specifies that stewardship of project land shall be ecosystem based.

5.4.3 Wildlife Management

Wildlife management areas overlap with multiple land classifications throughout the Tioga-Hammond and Cowanesque Projects. For more information on wildlife management activities, see Section 4.2.3.3.

5.5 WATER SURFACE

Per USACE policy set forth in EP 1130-2-550, the water surface of the lake at the conservation pool elevation may be classified as Restricted, Designated No-Wake, Fish and Wildlife Sanctuary, or Open Recreation. At the conservation pool elevation of 1,081 feet PCD, Tioga Lake has a water surface area of 423 acres. At the pool elevation of 1,186 feet PCD, Hammond Lake has a water surface area of 679 acres. At the pool elevation of 1,080 feet PCD at Cowanesque Lake, the water surface area is 1,050 acres. The following water surface classifications are designated at Tioga-Hammond and Cowanesque Lakes.

5.5.1 Restricted

Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, security purposes, and swimming areas.

The Restricted water surface at Tioga Lake, 1.1 acres, includes a small area around the dam, the intake and outlet works, and the connecting channel through to Hammond Lake.

The Restricted area for Hammond Lake, 3.5 acres, includes the area around the dam, the connecting channel to Tioga Lake, and the intake and outlet works.

At Cowanesque Lake, the restricted area is 1.3 acres and includes the area around the dam, intake channel, and outlet works.

5.5.2 No-Wake Zones

A "No Wake" designation is available under the guidelines in EP 1130-2-550; and is intended to protect environmentally sensitive shorelines and improve boating safety near key recreation water access areas such as boat ramps. In Tioga-Hammond and Cowanesque Lakes, the no-wake areas include the boat launch areas, areas near the connecting channel, and boat mooring docks.

No Wake areas on Tioga Lake include those listed above as well as the shallow area near Mill Creek and the small channel leading from the Lambs Creek boat launch to the main portion of Tioga Lake. The No Wake zone in Tioga Lake is 135.5 acres.

In Hammond Lake, in addition to the areas listed above, the No Wake area encompasses a significant portion of the southern portion of the lake where Crooked Creek flows into Hammond Lake. The area of the No Wake zone at Hammond Lake is 140.1 acres.

In Cowanesque Lake, the No Wake areas listed above as well as a significant portion of the west side of the lake from where it meets Cowanesque River. Additionally, it includes a portion of the lake from the areas surrounding the South Shore East and West Boat Ramp to the area surrounding Tompkins Campground Boat Ramp and mooring docks. The No Wake zone in Cowanesque Lake consists of 282.5 acres.

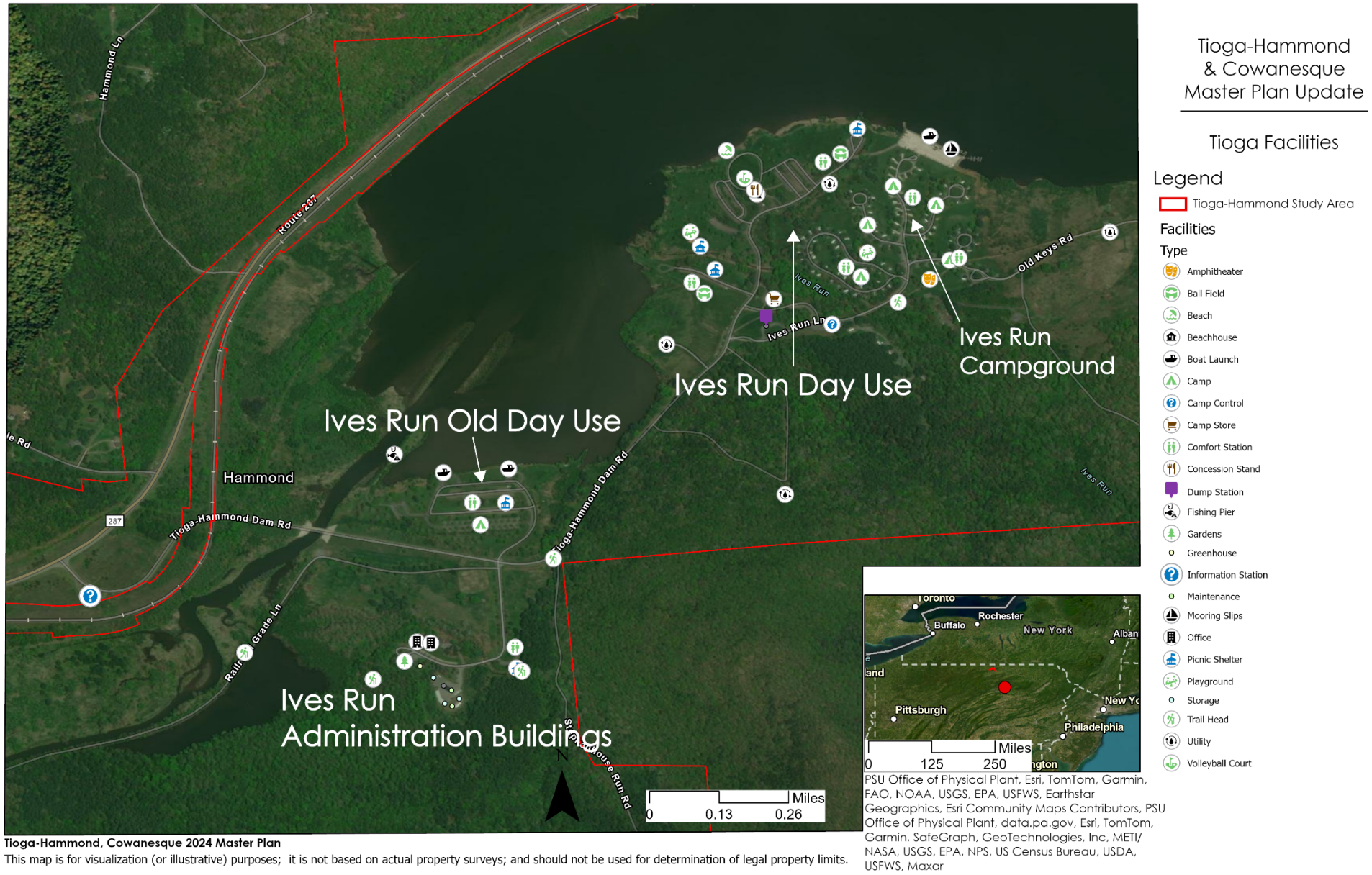
5.5.3 Open Recreation

Open Recreation includes all water surface areas available for year-round or seasonal water-based recreation use. Except for the areas designated as Restricted, described in Section 5.5.1, the remaining water surface areas of approximately 356.3 acres at Tioga Lake, 535.4 acres at Hammond Lake, and 766.2 acres at Cowanesque Lake are designated as Open Recreation.

5.6 PROJECT EASEMENT LANDS

Future management of flowage easement lands includes routine inspection of these areas to ensure that the Government's rights specified in the easement deeds are protected. Placement of any structure that may interfere with the USACE flood risk management mission may be prohibited. At Tioga-Hammond, there are 248.5 acres of flowage easement. At Cowanesque, there are 489.3 acres of flowage easement.

Figure 5-1 Tioga Facilities Map

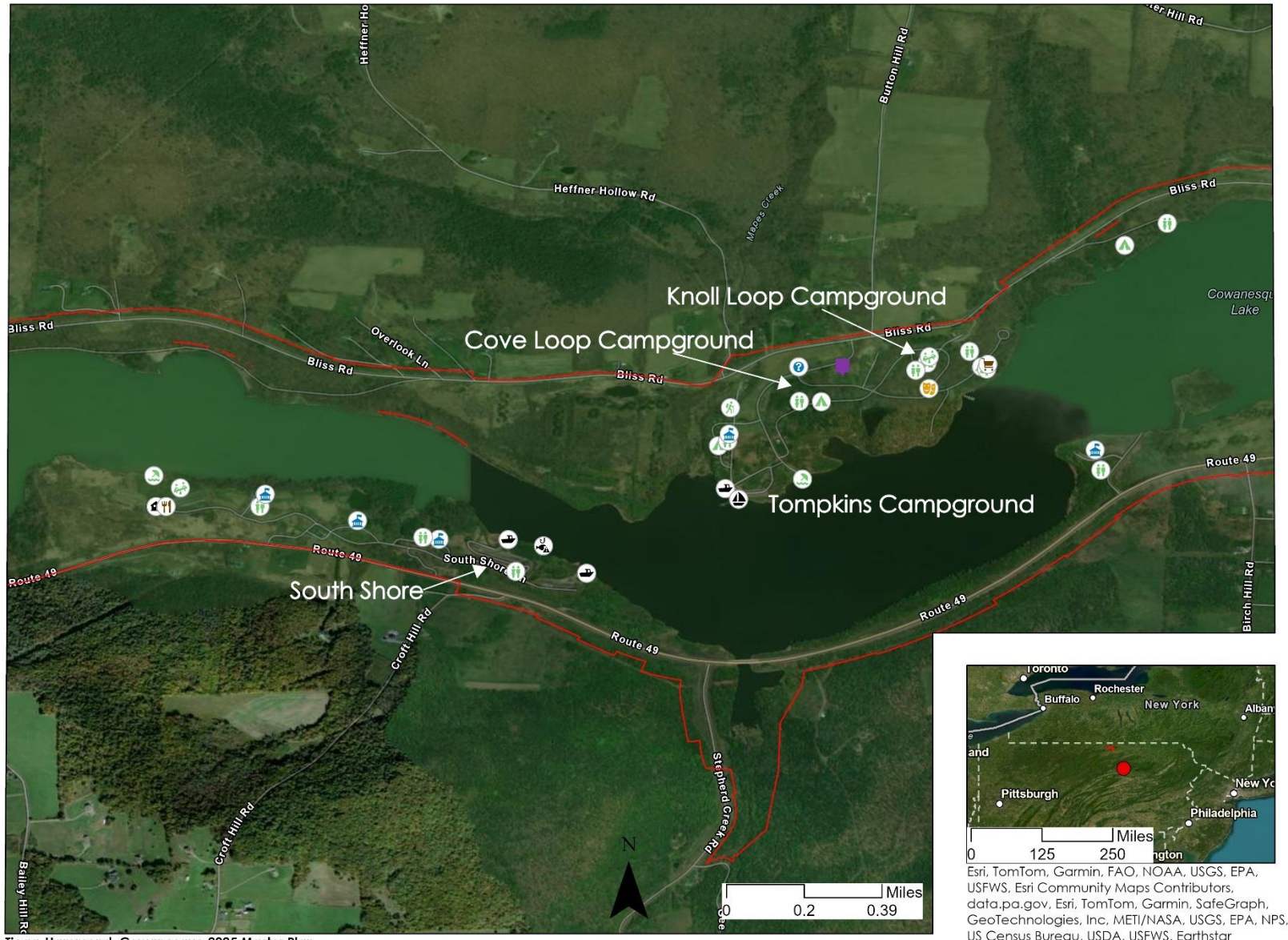


Tioga-Hammond, Cowanesque 2024 Master Plan

This map is for visualization (or illustrative) purposes; it is not based on actual property surveys; and should not be used for determination of legal property limits.

Figure 5-2 Ives Run Camper Assistance Sheet

Figure 5-3 Cowanesque Facilities Map



Tioga-Hammond & Cowanesque Master Plan Update

Cowanesque Facilities

Legend

Cowanesque Study Area

Facilities

Type

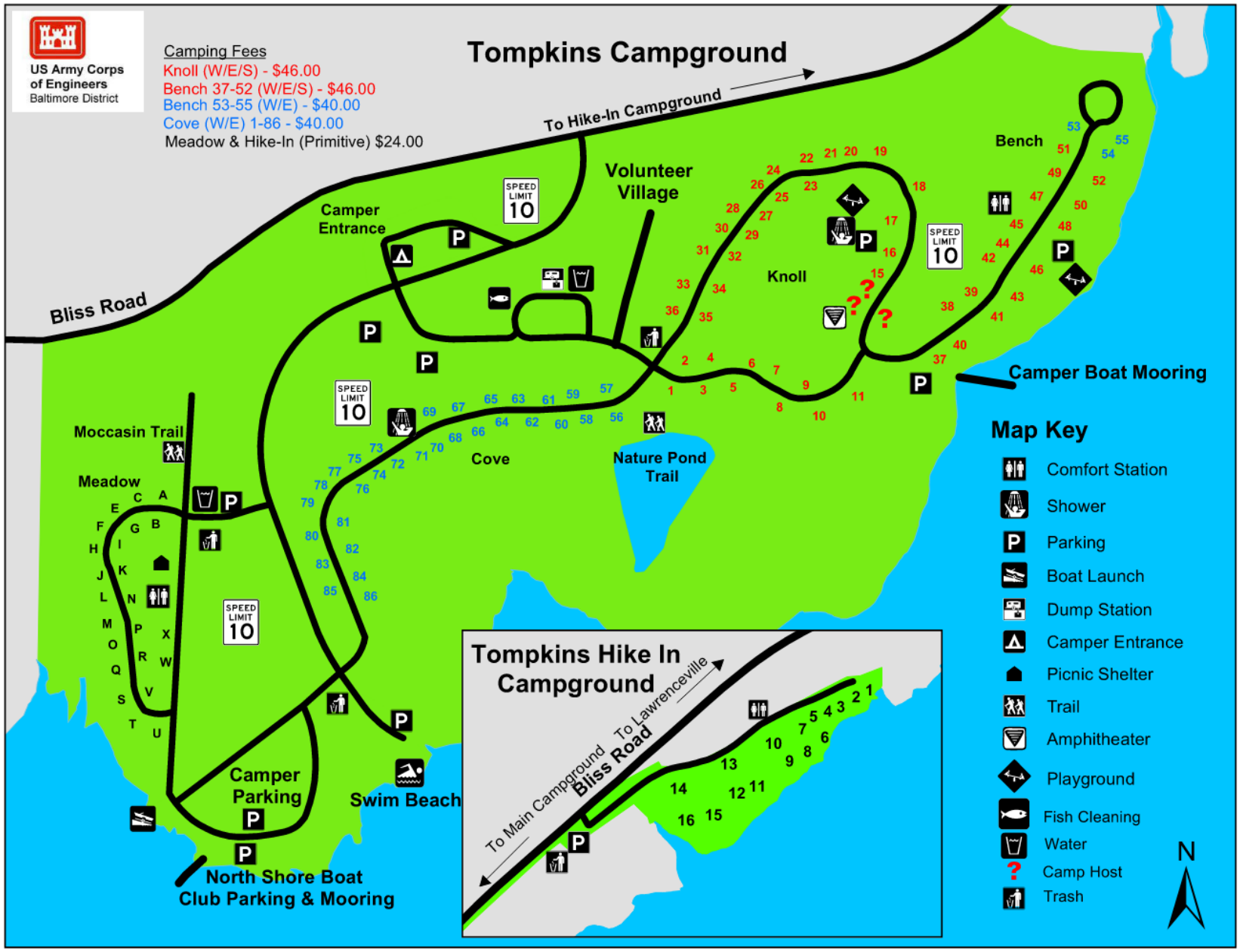
- Amphitheater
- Ball Field
- Beach
- Beachhouse
- Boat Launch
- Camp
- Camp Control
- Camp Store
- Comfort Station
- Concession Stand
- Dump Station
- Fishing Pier
- Gardens
- Greenhouse
- Information Station
- Maintenance
- Mooring Slips
- Office
- Picnic Shelter
- Playground
- Storage
- Trail Head
- Utility
- Volleyball Court

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS, Esri Community Maps Contributors, data.pa.gov, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, Earthstar Geographics, Maxar

Tioga-Hammond, Cowanesque 2025 Master Plan

This map is for visualization (or illustrative) purposes; it is not based on actual property surveys; and should not be used for determination of legal property limits.

Figure 5-4 Tompkins Campground Camper Assistance Sheet



6 SPECIAL TOPICS, ISSUES, CONSIDERATIONS

6.1 COMPETING INTERESTS ON NATURAL RESOURCES

Tioga-Hammond and Cowanesque Projects' authorized purposes of flood risk management and recreation accommodate the needs of federal, state, and municipal users that have developed over time. The benefits provided by the project are critical to the local and regional economies and are of great interest to the public. Aside from operating the lake to meet the needs of those entities with contractual rights, there are many competing interests for the utilization of federal lands including recreation users, adjacent landowners, utility providers, and entities that provide and maintain public roads. A major challenge is balancing the interests of each of these groups to ensure that valid needs are met while simultaneously protecting natural and cultural resources. The purpose of this plan is to guide management into the foreseeable future to ensure the responsible stewardship and sustainability of the project's resources for the benefit of present and future generations.

6.2 FIELD MANAGEMENT PLAN - COWANESQUE LAKE

In June 2022, a field management plan was developed for the US Army Corps of Engineers to implement at Cowanesque Lake in order to increase local species abundance and diversity (Wildlife Specialists, 2022). According to the Natural Resources Conservation Service (NRCS), early successional habitats are open habitats that include a mixture of grassland, old fields, young forests, and shrubland (NRCS, 2007). Early successional habitats require disturbances such as mowing, brush hogging, burning, cutting, or grazing to continue to provide habitat to native species instead of progressing to the next phase of growth (NRCS, 2007). Early successional habitat now occupies less than 1% of its original distribution in the northeast which has negatively impacted grassland-dependent species of birds, the Northern long-eared and little brown bat species, and pollinators such as the monarch butterfly (Wildlife Specialists, 2022).

The June 2022 plan focuses on maintaining ecosystem function of the existing grassland and old field habitat, controlling invasive plant species, improving field habitats for native plant pollinators, and maintaining biodiversity (Wildlife Specialists, 2022). A few of the management practices presented in the plan includes the removal of undesirable woody vegetation; rotational mowing; integrating invasive species management practices into regular maintenance; planting desirable wildflowers and warm season grasses; constructing artificial housing for bats to provide additional roosting habitat; and utilizing best management practices for the 22 Field Management Units (FMU) located at Cowanesque Lake (Wildlife Specialists, 2022). This plan will be implemented by the USACE starting in 2024.

6.3 FOREST MANAGEMENT PLAN

The purpose of the Forest Management Plan is to provide a summary of the 2024 assessment of the managed forest mitigation blocks and establish a 10-year management plan that meets the mitigation requirements of the forest mitigation blocks established at Cowanesque Lake in 1985. The forest mitigation blocks were established to compensate for the loss of terrestrial wildlife habitat when the water level of the lake was increased which resulted in the

surface acreage of the lake increasing from 410 acres to 1,085 acres. This water surface increase resulted in a loss or degradation of 740 acres of land at Cowanesque Lake.

The original mitigation techniques that were proposed due to the increase in water level are open field habitat, fencerow habitat, unmanaged forest habitat, and managed deciduous forest habitat. The management plan for the open field and fencerow habitat are discussed in Section 6.2, and the forest management plan only covers the managed deciduous forest habitat. The stated habitat mitigation from the original documentation of need for managed deciduous forest habitat is to create openings in the forest canopy so increased sunlight in the understory would lead to increased growth of herbaceous plants and woody shrubs. By removing 10 percent of the trees over a ten-year repeated cycle, the understory would provide habitat for red fox, raccoon, ruffled grouse, and other species.

The management recommendations for the seven forest mitigation sites include the following:

- Maintain and improve the health of the forested stands to provide suitable wildlife habitat conditions (including reducing the impact of non-native invasive plants).
- Cut ten percent of the overstory trees on a repeating ten-year cycle to create forest canopy openings that result in an increase of sunlight levels and herbaceous growth in the forest understory.
- Preserve large dead trees in the stands to serve as potential sources of den trees for various species of wildlife.
- Annually conduct field inspections, utilize herbicide treatment for invasive species as needed, and monitor for evidence of spongy moth infestations.

6.4 SPECIAL EVENTS

6.4.1 Annual Events Hosted at the Lakes

Each year, Tioga-Hammond and Cowanesque Lakes host events at the lake sponsored by the USACE and the local community. "National Night Out" is frequently celebrated at Ives Run and includes many activities including a bouncy house and slide, black bear tagging, life flight helicopter landing, swimming at Ives Run, and search and rescue dog demonstrations. This event, which hosts approximately 4,000 children and their families is sponsored by the Tioga County Sheriff's Department and coordinated with the Tioga-Hammond and Cowanesque Lakes Park Ranger Team. The Youth Field Day program hosts a free annual event for kids 8 to 12 years old designed to introduce them to outdoor activities such as fishing, archery, trapping, turkey hunting, identifying wildlife (including reptiles and amphibians), and shooting sports.

Figure 6-1 Youth Field Day in 2022

In 2022, the Youth Field Day Program held its 27th annual event. Ives Run Recreation Area also jointly hosts an annual Every Kid Outdoors program with Friends of Tioga-Hammond & Cowanesque Lakes that hosts approximately 400 4th-grade students from Tioga County. Students received instruction on topics such as stream ecology, sailing, bird watching, water safety, and how dams work.

6.4.2 Fishing Tournaments and Hunting Areas

Figure 6-2 Anglers in 2022

Tioga-Hammond and Cowanesque Lakes host around 50 fishing tournaments every year for bass fishermen that host as many as 720 participants. Youth Fishing Derby Day, which started in 2000, is also a popular event for children that is held annually at Lawrence Recreation Area on Cowanesque Lake with over 70 participants each year.

From 2017 to 2022, Tioga County Bass Anglers, a prominent host of fishing competitions at the lakes; the PFBC, Tackle Shack, and Project staff placed 106 fish habitat structures in Tioga Lake.

Hunting is also prevalent in both the Tioga-Hammond and Cowanesque project areas. The maps located in Figure 6-2 and 6-3 show the 2024 areas of No Trespassing and Restricted Hunting areas.

6.4.3 Park Rangers and Volunteer Attendance at Events Outside of the Lakes

The Park Rangers, water safety volunteers, and "Bobber the Water Safety Dog" regularly attend events in the local jurisdictions to spread awareness of water safety. During the month of May, Bobber, Park Rangers, and volunteers attend the Mansfield University Special Olympics and the Millerton Memorial Day Parade. In June, Park Rangers and volunteers attend the Wellsboro Children's Health Fair and the Laurel Festival Parade. On the first Friday of each month, volunteers travel to the town of Wellsboro to bring information about water safety to the local community. At these events, the volunteers and park rangers make over 1000 water safety contacts per year. Additionally, Park Rangers and volunteers host events for and travel to local schools including Blossburg Elementary School, Cowanesque Valley High School, Don Gill Elementary School, and others for water safety, career days, and wildlife education.

Figure 6-3 Tioga-Hammond Lakes No Trespassing and Restricted Hunting Areas

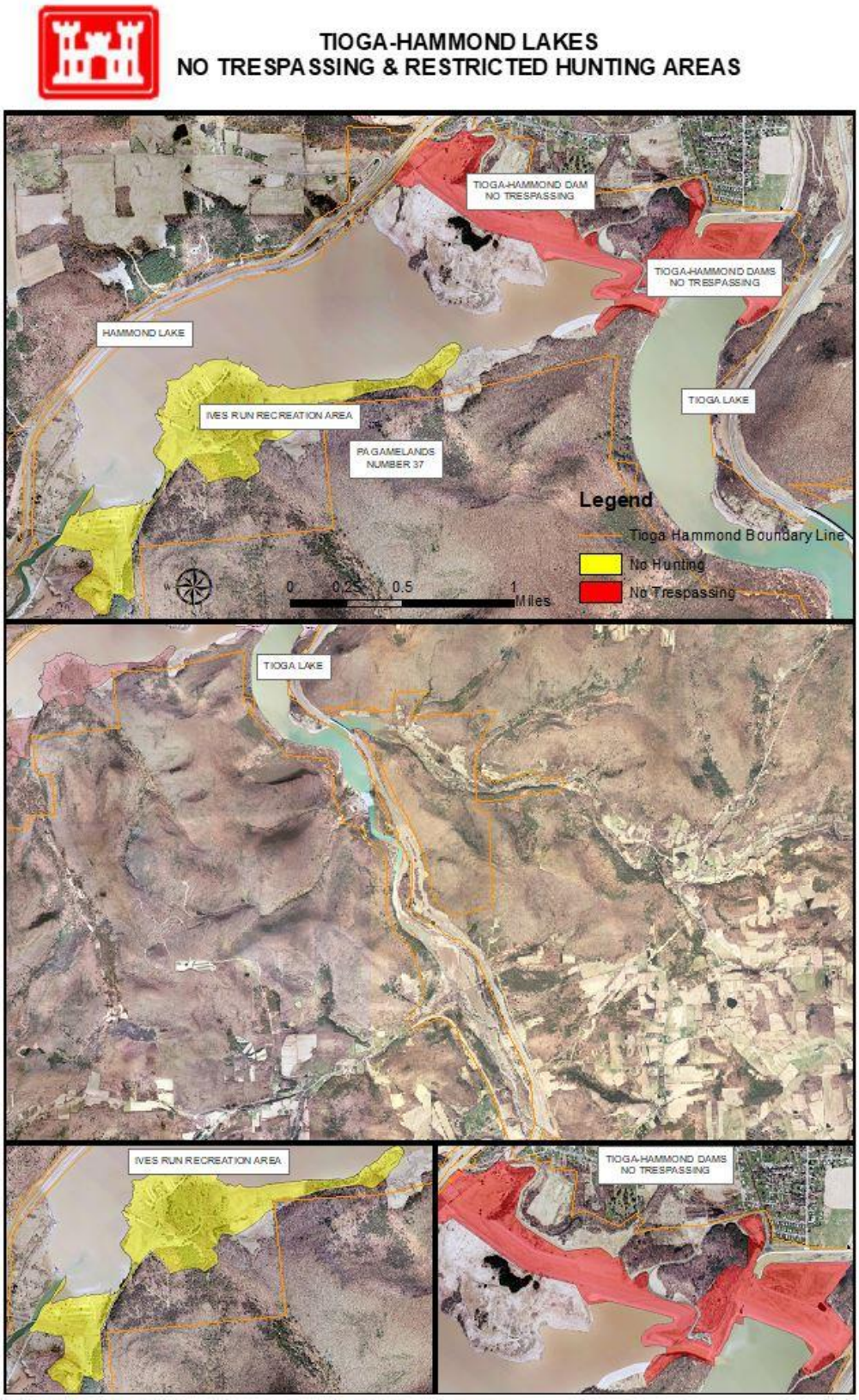
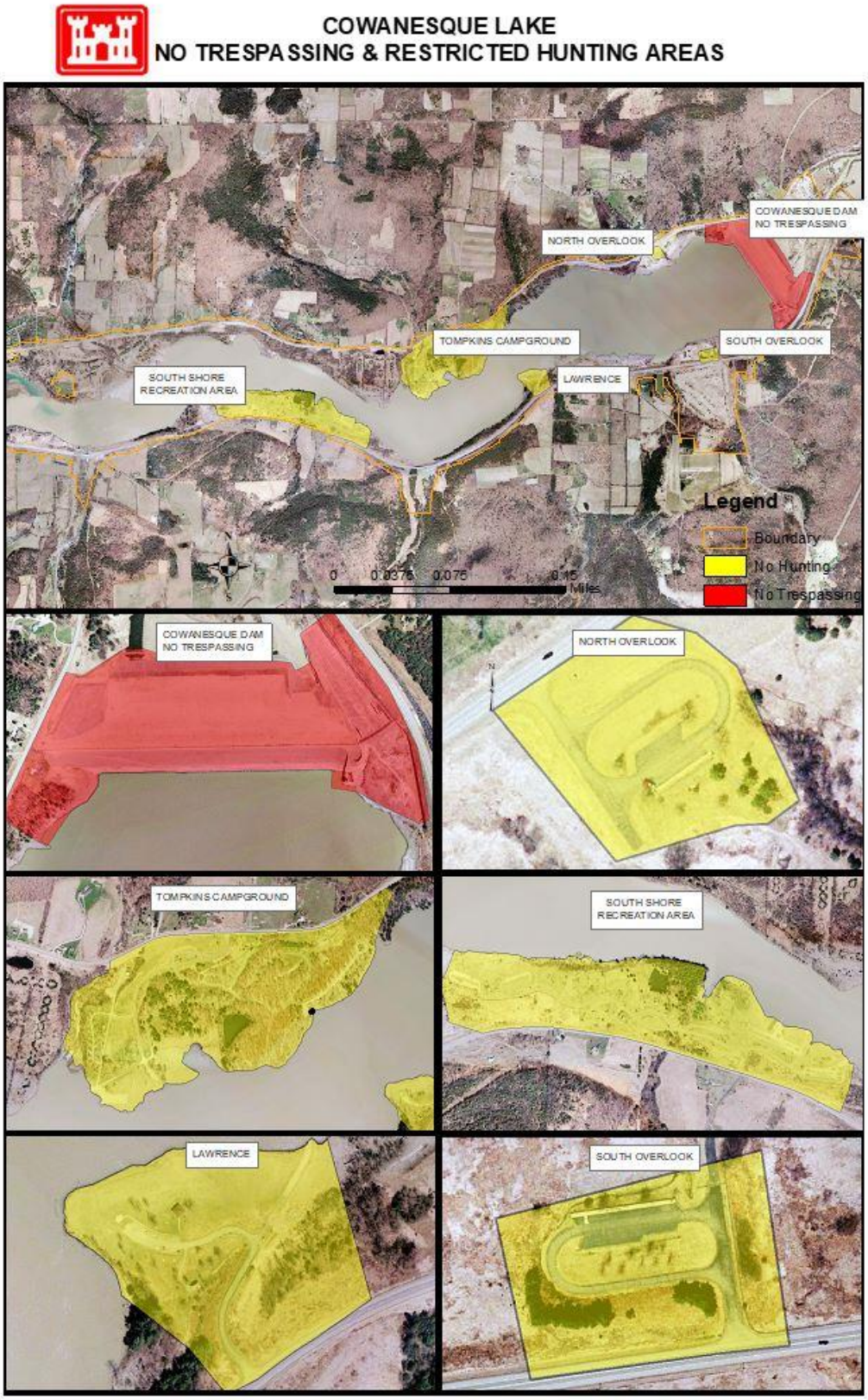


Figure 6-4 Cowanesque Lake No Trespassing and Restricted Hunting Areas



7 PUBLIC AND AGENCY COORDINATION

USACE policy guidance in ER 1120-2-550, Change 7, January 30, 2013 and EP 1130-2-550, Change 5, January 30, 2013 requires thorough public involvement and agency coordination throughout the master plan revision process including any associated environmental assessment process. The following milestones provide a brief look at the overall process of revising the Tioga-Hammond Cowanesque Master Plan:

- February 20, 2024 – Government-to-Government Letters sent to the Delaware Nation, Delaware Tribe of Indians, Seneca Nations, and the Seneca-Cayuga Nation.
- February 20, 2024 – Letter sent to Pennsylvania Historical and Museum Commission (PHMC).

Agency coordination was conducted by USACE with the USFWS through the Information, Planning, and Consultation online system to ensure compliance with Section 7 of the Endangered Species Act. Coordination was also conducted with PGC, PFBC, DCNR, PADEP, Pennsylvania Department of Topographic and Geologic Survey, and USFWS through the Pennsylvania Natural Diversity Index website on August 24, 2023.

[This section will be updated in subsequent submittals to provide an accurate description of all review milestones and public engagement initiatives]

8 SUMMARY OF RECOMMENDATIONS

8.1 SUMMARY OVERVIEW

The preparation of the Tioga, Hammond and Cowanesque Master Plan follows the USACE master planning guidance in ER 1130-2-550 and EP 1130-2-550, both updated 30 January 2013. Three major requirements set forth in the regulation and guidance include (1) the preparation of contemporary Resource Objectives, (2) Classification of project lands using the newly approved classification standards, and (3) the preparation of a Resource Plan describing in broad terms how the land in each of the land classifications will be managed into the foreseeable future. Additional important requirements include public involvement throughout the process, and consideration of regional recreation and natural resource management priorities identified by other federal, state, and municipal authorities. The study team followed this guidance to prepare a master plan that will meet the project's primary purpose of flood control and support Tioga-Hammond's secondary purposes of recreation and environmental stewardship and Cowanesque's secondary purposes of recreation, environmental stewardship, and water supply. Factors considered in the plan were identified through coordination with project representatives, USACE, federal and state agencies, and the general public. This Master Plan will ensure the long-term sustainability of natural resources associated with Tioga-Hammond and Cowanesque Project lands and waters.

8.2 LAND RECLASSIFICATION

While changes in land classification at the project are presented in Section 4, it should be noted that the majority of land classification changes at Tioga-Hammond and Cowanesque Lakes reflect classification criteria changes more than any planned development. A summary of proposed land classification changes is provided in Table 8-1 and 8-2.

Table 8-1 Summary of Proposed Land Classification at Tioga-Hammond

Land Classifications	**Acres**
Project Operations	419.7
High Density Recreation	194.0
Multiple Resource Management	
Wildlife Management	3593.0
Vegetative Management	1389.9
Low Density Recreation	73.7
Water Surface	
Restricted	4.6
Designated No-Wake	275.6
Open Recreation	891.7
Total	**6,842.3***

**Mapping for the Master Plan update has been compiled using the best information available and is believed to be accurate. No land classifications were found within the 2002 Master Plan document and therefore are not included in this Master Plan.*

Table 8-2 Summary of Proposed Land Classification at Cowanesque Lake

Land Classifications	**Acres**
Project Operations	4.9
Mitigation	263.3
High Density Recreation	224.6
Multiple Resource Management	
Wildlife Management	338.8
Vegetative Management	234.5
Low Density Recreation	1.2
Water Surface	
Restricted	1.3
Designated No-Wake	282.5
Open Recreation	766.2
Total	**2,117.3***

* *Mapping for the Master Plan update has been compiled using the best information available and is believed to be accurate. No land classifications were found within the 2002 Master Plan document and therefore are not included in this Master Plan.*

Land classification criteria is now more specific and conservative than previous versions of the Master Planning guidance. The new land classifications represent changes to descriptive language, rather than modification of land use at the site. For example, lands that would previously be classified as Wildlife and Forest Management may now be considered Multiple Resource Management: Future Recreation, Low Density Recreation, or Vegetative Management. The revised language does not indicate a reduction in areas actually managed for wildlife and forests; rather it recognizes that many areas on project lands may have multiple uses that encompass wildlife and forest management, as well as low density recreation and other uses. This nuance allows for the reclassification of undeveloped open space in the vegetative management category while identifying key areas to support low density recreation activities.

A key change in land classifications from the 2002 Master Plan to the 2025 Master plan is the identification of the Future Recreation subclassification under the Multiple Resource Management Land classification. The Future or Inactive Recreation subclassification refers to areas with site characteristics compatible with potential future recreation development or recreation areas that are closed. Until there is an opportunity to develop or reopen these areas, they are managed for multiple resources. Any future recreation opportunities would be proposed and implemented by Tioga-Hammond or Cowanesque under the facility's management plan. There are currently no specific areas identified for Future Recreation at the project, but there are areas under the Multiple Resource Management Land classification that may be targeted as opportunities in the mid- to long- range future management of the site.

A summary of land classification changes and is provided in Table 8-3 and 8-4.

Table 8-3 Summary of Land Classification Changes Tioga-Hammond Projects

Classification	2025 Master Plan (acres)	Description*
Project Operations	419.7	Lands are associated with the dam and spillway structures that are operated and maintained for fulfilling the flood risk management mission of the project.
High Density Recreation	194.0	Lands are currently developed for High Density recreation activities and include boat launches, day-use areas, and campgrounds. The new criteria for this land classification includes areas developed specifically to support intensive recreation activities. This land classification has been developed to support concentrated visitation and use of the recreation facilities they host.
Multiple Resource Management Land		
Low Density Recreation	73.7	Management of this land classification calls for maintaining a healthy, ecologically adapted vegetative cover to reduce erosion and improve aesthetics, while also supporting low-impact recreation opportunities such as bank fishing, hunting, hiking, wildlife viewing, and for access to the shoreline. Hunting is allowed in select areas that are a reasonable and safe distance from High Density Recreation areas, dam operations, and adjacent residential properties. The new land classification criteria include areas where vegetation and wildlife management may be a secondary use, but where recreation is considered the predominant use.
Wildlife Management	3593.0	Wildlife management areas are managed for generalized wildlife in consideration of the threatened and endangered species identified as potentially occurring at the Project sites. Many of these areas are also managed for vegetation to ensure quality of the habitat including removing invasive plant species to support biodiversity.
Vegetative Management	1389.9	This classification includes lands designated for stewardship of forest, prairie, or other native vegetative cover.
Water Surface (Tioga)		
Restricted	1.1	Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, and security purposes.
Open Recreation Area	356.3	Open Recreation area includes all water surface areas available for year-round or seasonal water-based recreation use. This change reflects new classification criteria and no actual change in water use. This area includes all water surface area other than "Restricted" or "Designated No-Wake."

Classification	2025 Master Plan (acres)	Description*
Designated No-Wake	135.5	Designated No-Wake classifies all water use areas that do not allow motorized boats to produce wakes. No-Wake areas are set for public safety at facilities or if lake areas are unsafe to operate at a higher speed. This includes areas such as boat launches and shallow areas. Additionally, the Pennsylvania Fish and Boat Commission (PFBC) does not allow wakes within 100-feet of the shoreline.
Water Surface (Hammond)		
Restricted	3.5	Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, and security purposes.
Open Recreation Area	535.4	Open Recreation area includes all water surface areas available for year-round or seasonal water-based recreation use. This change reflects new classification criteria and no actual change in water use. This area includes all water surface area other than "Restricted" or "Designated No-Wake."
Designated No-Wake	140.1	Designated No-Wake classifies all water use areas that do not allow motorized boats to produce wakes. No-Wake areas are set for public safety at facilities or if lake areas are unsafe to operate at a higher speed. This includes areas such as boat launches and shallow areas. Additionally, the PFBC does not allow wakes within 100-feet of the shoreline.
Total	6,842.3*	

** Mapping for the Master Plan update has been compiled using the best information available and is believed to be accurate. No land classifications were found within the 2002 Master Plan document and therefore are not included in this Master Plan.*

Table 8-4: Proposed Changes to Land Classifications at the Cowanesque Lake Project

Classification	2025 Master Plan (acres)	Description*
Project Operations	4.9	Lands are associated with the dam and spillway structures that are operated and maintained for fulfilling the flood risk management mission of the project.
Mitigation	263.3	Lands associated with mitigation projects within the project area.
High Density Recreation	224.6	Lands are currently developed for High Density recreation activities and include boat launches, day-use areas, and campgrounds. The new criteria for this land classification includes areas developed specifically to support intensive recreation activities. This land classification has been developed to support concentrated visitation and use of the recreation facilities they host.
Multiple Resource Management Land		
Low Density Recreation	1.2	Management of this land classification calls for maintaining a healthy, ecologically adapted vegetative cover to reduce erosion and improve aesthetics, while also supporting low-impact recreation opportunities such as bank fishing, hunting, hiking, wildlife viewing, and for access to the shoreline. Hunting is allowed in select areas that are a reasonable and safe distance from High Density Recreation areas, dam operations, and adjacent residential properties. The new land classification criteria include areas where vegetation and wildlife management may be a secondary use, but where recreation is considered the predominant use.
Wildlife Management	338.8	Wildlife management areas are managed for generalized wildlife in consideration of the threatened and endangered species identified as potentially occurring at the Project sites. Many of these areas are also managed for vegetation to ensure quality of the habitat including removing invasive plant species to support biodiversity.
Vegetative Management	234.5	This classification includes lands designated for stewardship of forest, prairie, or other native vegetative cover.
Water Surface (Cowanesque)		
Restricted	1.3	Restricted water surface includes those areas where recreation boating is prohibited or restricted for project operations, safety, and security purposes.
Open Recreation Area	766.2	Open Recreation area includes all water surface areas available for year-round or seasonal water-based recreation use. This change reflects new classification criteria and no actual change in water use. This area includes all water surface area other than "Restricted" or "Designated No-Wake."

Classification	2025 Master Plan (acres)	Description*
Designated No-Wake	282.5	Designated No-Wake classifies all water use areas that do not allow motorized boats to produce wakes. No-Wake areas are set for public safety at facilities or if lake areas are unsafe to operate at a higher speed. This includes areas such as boat launches and shallow areas. Additionally, the PFBC does not allow wakes within 100-feet of the shoreline.
Total	2,117.3*	

** Mapping for the Master Plan update has been compiled using the best information available and is believed to be accurate. No land classifications were found within the 2002 Master Plan document and therefore are not included in this Master Plan.*

9 APPENDIX

APPENDIX A: ACRONYMS AND ABBREVIATIONS

ACS	American Community Service
ARPA	Archaeological Resources Protection Act
BP	Before Present
CEPD	Comprehensive Evaluation of Project Datums
CFS	Cubic Feet Per Second
DCNR	Pennsylvania Department of Conservation and Natural Resources
EA	Environmental Assessment
EOP	Environmental Operating Principles
EP	Engineering Pamphlet
ER	Engineering Regulation
EO	Executive Order
FY	Fiscal Year
GIS	Geographic Information Systems
MP	Master Plan
MRML	Multiple Resource Management Lands
NAVD 88	1988 North American Vertical Datum
NEPA	National Environmental Policy Act
NGVD 29	National Geodetic Vertical Datum of 1929
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
PADEP	Pennsylvania Department of Environmental Protection
PCD	Project Construction Datum
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
SCORP	Pennsylvania State Comprehensive Outdoor Recreation Plan

TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Coast Guard
VUM	Visitor Use Monitoring
ZOI	Zone of Interest

APPENDIX B: REFERENCES

Beers, F.W. Tioga 1 within County Atlas of Tioga Pennsylvania From Recent and Actual Surveys and Records. New York: 1875. Map. https://www.historicmapworks.com/Map/US/12409/Tioga+1/Tioga+County+1875/Pennsylvania/.

Beers, F.W. Tioga, Niles Valley, Mitchells Creek, West of Tioga Borough within County Atlas of Tioga Pennsylvania From Recent and Actual Surveys and Records. New York: 1875. Map. https://www.historicmapworks.com/Map/US/12411/Tioga++Niles+Valley++Mitchells+Creek++West+of+Tioga+Borough/Tioga+County+1875/Pennsylvania/.

Center for Rural PA. Tioga County population projections. Accessed June 2023. https://www.rural.pa.gov/data/county-profiles.cfm

Cornell Program on Applied Demographics. Chemung and Steuben Counties. Accessed June 2023. https://pad.human.cornell.edu/counties/projections.cfm

Mill Cove, Inc. 2022 Annual Report. Provided by USACE Park Rangers. 2022.

National Resource Conservation Service. 2007. Field Office Technical Guide. Early successional habitat
management – Grassland management. https://efotg.sc.egov.usda.gov/api/CPSFile/21745/647_VT_IR_Early_Successional_Habitat_Development_Management-Grassland_Management_2007 . Accessed 03 March 2023.

National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), (n.d.). U.S. Climate Divisions. *https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php*. Accessed 14 March 2023.

National Oceanic and Atmospheric Administration (NOAA) Annual Climatological Report (ACR) for Williamsport, PA, 2023. https://forecast.weather.gov/product.php?site=CTP&product=CLA&issuedby=IPT Accessed 14 March 2023.

Pennsylvania Department of Environmental Protection (PADEP). (2024). *Integrated Water Quality Report* [IWQR] -- 2024. Retrieved October 21, 2024. Integrated Water Quality Report-2024

Pennsylvania Fish and Boat Commission (PFBC WW/CW). Warm Water Cold Water Species stocking by county. Accessed July 2023. https://fbweb.pa.gov/stocking/WWCWStockingDetailsCurrent_RFP.aspx

Pennsylvania Fish and Boat Commission Warmwater Coolwater Fisheries (PFBC WCF). https://pfbc.maps.arcgis.com/apps/webappviewer/index.html?id=bd4e40226dd949a2b1bbf9a2a38c3314

Pennsylvania Historical and Museum Commission. Paleo Indian Period: Settling of the New World. September 10, 2015. http://www.phmc.state.pa.us/portal/communities/archaeology/native-american/paleoindian-period.html.

Susquehanna River Basin Commission. "Contract between the Department of the Army and Susquehanna River Basin Commission for Water Storage Space in Cowanesque Lake, Pennsylvania." June 1986.

US Army Corps of Engineers. Cowanesque Lake, PA: Fact Sheet. April 2022.

US Army Corps of Engineers Recreation Lake Report. Value to the Nation Fast Facts. Cowanesque Lake. 2019 (a).

US Army Corps of Engineers. Recreation Lake Report. Value to the Nation Fast Facts. Tioga-Hammond Lake. 2019 (b).

US Army Corps of Engineers. Tioga-Hammond Lakes, PA: Fact Sheet. April 2022.

US Army Corps of Engineers. Master Manual for Reservoir Regulation Cowanesque Lake. Susquehanna River Basin. Cowanesque River Upper Basin. July 2005.

US Army Corps of Engineers. Master Manual for Reservoir Regulation Cowanesque Lake. Susquehanna River Basin. Tioga-Hammond Lakes Pennsylvania. May 2005.

US Army Corps of Engineers and R. Christopher Goodwin & Associates. Tioga, Hammond, and Cowanesque Lakes Cultural Resources Management Plan. Frederick, MD: 2003.

United States Department of Agriculture, Spongy Moth (USDA SM). Accessed August 2023. https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/the-threat/spongy-moth/hp-spongy-moth

United States Department of Agriculture, Spotted Lanternfly (USDA SL). Accessed August 2023. https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/slf/spotted-lanternfly

United States Fish and Wildlife Service National Wetlands Inventory (NWI), 2024. HU8_02050105_Wetlands. Shapefile. Retrieved from https://www.fws.gov/wetlands/Data/Mapper.html. *Accessed March 2024.*

United States Department of Agriculture, Animal & Plan Health Inspection Service Wildlife Services (USDA APHIS), 2017. European Starlings. Wildlife Damage Management Technical Series. Retrieved from https://www.aphis.usda.gov/wildlife_damage/reports/Wildlife%20Damage%20Management%20Technical%20Series/European-Starlings-WDM-Technical-Series.pdf. *Accessed 23 NOV 2020*.

United States Fish and Wildlife Service (USFWS), 2019. Endangered Species Tricolored Bat (Perimyotis subflavus) (*Myotis sodalis*).

https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus. *Accessed Aug 2023.*

Vendel Enviro-Industrial Consultants, Inc. Phase I Archaeological Inventory Investigations of the Cowanesque Lake Reformulation Project, Tioga County, Pennsylvania. Pittsburgh, PA: 1987.

Walling, Henry Francis, and Palmer & Co Way. Map of Tioga County, Pennsylvania. New York: Way, Palmer & Co, 1862. Map. https://www.loc.gov/item/2012592021/.

Wildlife Specialists, LLC. Field Management Plan Cowanesque Lake. June 2022.

APPENDIX C: PUBLIC NOTICES AND PERTINENT NEWSPAPER ARTICLES

APPENDIX D: PUBLIC COMMENTS AND USACE RESPONSE

APPENDIX E: NEPA DOCUMENT

APPENDIX F: NEPA SUPPORTING DOCUMENTATION

APPENDIX G: NEPA ENVIRONMENTAL COORDINATION