

**TIOGA, HAMMOND & COWANESQUE LAKES
MASTER PLAN**

**2001 UPDATE/PROGRAMMATIC
ENVIRONMENTAL ASSESSMENT**



Draft

Prepared by:

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P.O. Box 1715
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February 2002

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

INTRODUCTION

The Tioga, Hammond, and Cowanesque Lakes are located in Tioga County, Pennsylvania. The lakes are multi-purpose projects authorized for flood protection, water quality, recreation, and water supply. The lakes were authorized by Congress in the Flood Control Act of July 3, 1958 (Public Law 85-500), and the Master Plans for these lakes were developed thereafter in accordance with the appropriate regulations of that time.

The Corps' fiscal year 2001 budget included additional funding to update the 1974 Tioga and Hammond Lakes and the 1975 Cowanesque Lake master plans. This Master Plan Update reflects changes that have occurred at the lakes, in the region, in recreation trends, and in Corps policy since the original master plans were completed. The updated master plan and integrated programmatic environmental assessment (EA) will provide a re-evaluation of the assets, needs, and potentials of the three lakes, and will serve as a guiding document for the Corps in its responsibilities to preserve, conserve, restore, maintain, manage and develop the lakes' lands, waters, and associated resources.

ACTIONS CONSIDERED

Many potential development actions were considered as part of the Recommended Plan for the Master Plan Update. The list of possible actions was created from New York and Pennsylvania State recreation plans, from interviews with lake users and resource agencies, and from comments made by interested parties either through the mail or at the public workshops.

During the plan formulation process, each of these potential development actions was evaluated for the severity of environmental impacts that might result from its implementation. The potential actions were grouped into "high," "medium," and "low" impact groups. Independent of this process, the lands were evaluated for sensitivity to environmental impacts and were appropriately mapped. Factors such as the presence of threatened or endangered species, the topographic slope, and proximity to existing development were used in this evaluation. In the next phase, potential actions were matched with suitable development areas: highly sensitive areas were avoided, or matched with activities with the lowest impact potential, whereas low sensitivity areas were matched with a broader scope of potential activities. The "best" blends of activities for particular areas – those that would not cause undue environmental impacts or conflict with existing uses – were then proposed for inclusion in the Recommended Plan. The Recommended Plan includes new recreation areas, new facilities within existing recreation areas, improvements to existing facilities, and new natural resource management enhancement activities.

ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

Analysis of the Recommended Plan was completed in a manner to ensure that the construction of the features and the associated impacts would be consistent with those anticipated and analyzed during plan formulation.

In addition, the cumulative impacts of implementing the suite of actions proposed in the Recommended Plan were assessed. Generally, the cumulative impacts of the proposed project will be positive and will result in positive economic growth within the Tioga, Hammond, and Cowanesque Lakes region. The US Route 15 Road Expansion Project is currently underway adjacent to Tioga Lake. This significant project in Tioga County will likely bring more visitors to the Tioga County area. Upgrades and improvements at the Tioga, Hammond, and Cowanesque Lakes will provide a place for visitors to stay and participate in recreational activities, thus keeping them and associated expenditures in the local region. The recommended plan proposes facility enhancements, new development areas, and new natural resource management enhancement activities. Impacts will be minimized through sensitive design and field siting, adherence to Best Management Practices, and compliance with appropriate laws and regulations. Site-specific impacts to the land use, soils, topography, vegetation, wildlife, fishery, and recreational facilities will not be significant due to the locations selected for development, and assuming the sensitive design of the proposed facilities and adherence to Federal and state laws, and local ordinances. Additionally, the amount of Corps land, topography and sensitivity of the lands surrounding the lakes severely limit any significant amount of development.

REGULATORY REQUIREMENTS

The integrated EA is a programmatic document that is designed to address the current operation of the lake and its facilities and evaluate to the proposed level of future development and management. The integrated EA addresses potential impacts of the alternatives and the Recommended Plan in a programmatic fashion, which is consistent with the conceptual level of design. As described in Section 5 of the master plan update, the recommended plan will not have significant individual or cumulative impacts on the human environment. Individual projects proposed for construction will be judged against this master plan and its assumed impacts. Those projects found to be incompatible with the plan, or outside the range of evaluated impacts will not be considered further for construction without separate, additional NEPA analysis.

CONCLUSIONS

Based on an analysis of site constraints and recreational needs, a recommended plan for development was formulated for Tioga, Hammond and Cowanesque Lakes. The recommended plan is comprised of six recreation areas, including two new areas and a number of new facilities at the existing recreation facilities, and nine natural resource management enhancement activities.

The current action was evaluated in an integrated EA. The EA was prepared in accordance with the provisions of the National Environmental Policy Act of 1969, as amended. Potential impacts were assessed with regard to the physical, chemical, and biological characteristics of the aquatic and terrestrial ecosystem, endangered and threatened species, hazardous, toxic and radioactive waste materials, aesthetics and recreation, cultural resources, and the general needs and welfare of the public. This assessment determined that there will be no significant impact to the natural or human environment as a result of the proposed action.

Upon reviewing the integrated EA, I find that updating the Master Plan and implementing the suite of proposed actions therein will not have significant individual or cumulative impacts on the quality of the human environment. Appropriate siting and planning will minimize any adverse impacts. Based upon this finding, preparation of an Environmental Impact Statement is not required.

Date

Charles J. Fiala, Jr.
Colonel, Corps of Engineers
District Engineer

Table of Contents
Tioga, Hammond & Cowanesque Lakes Master Plan
2001 Update/Programmatic EA

SECTION	TITLE	PAGE
*	FONSI	
*	COVER SHEET	
*	EXECUTIVE SUMMARY	
 SECTION 1: INTRODUCTION		
* 1.1	Master Plan Purpose	1-1
* 1.2	Master Plan Authority	1-2
* 1.3	Scope of Study	1-2
* 1.4	Study Area	1-2
1.5	Integration of NEPA Documentation into the Master Plan	1-3
1.6	Pertinent Prior Reports and Related Studies	1-3
1.7	Public Involvement Program	1-3
 SECTION 2: EXISTING FEDERAL PROJECT DESCRIPTION		
2.1	Authorization	2-1
2.1.1	Project Authorization	2-1
2.1.2	Other Applicable Laws and Regulations	2-2
2.1.3	Partnerships and Other Agreements	2-4
2.2	Project Data	2-4
2.3	Reservoir Operation	2-4
2.3.1	Tioga and Hammond Lakes	2-4
2.3.2	Cowanesque Lake	2-5
 *SECTION 3: EXISTING RESOURCES		
3.1	Watershed Characteristics	3-1
3.2	Physical Description	3-1
3.2.1	Geology	3-1
3.2.2	Topography	3-2
3.2.3	Soils	3-2
3.2.4	Prime And Unique Farmlands	3-3
3.3	Land Use and Zoning	3-4
3.3.1	Tioga and Hammond Lakes	3-4
3.3.2	Cowanesque Lake	3-4
3.4	Climate	3-5
3.5	Water Resources	3-5
3.5.1	Surface Water	3-5
3.5.2	Groundwater	3-6
3.6	Natural Resources	3-7
3.6.1	Wildlife Resources	3-7

Table of Contents
Tioga, Hammond & Cowanesque Lakes Master Plan
2001 Update/Programmatic EA

SECTION	TITLE	PAGE
*	FONSI	
*	COVER SHEET	
*	EXECUTIVE SUMMARY	
 SECTION 1: INTRODUCTION		
* 1.1	Master Plan Purpose	1-1
* 1.2	Master Plan Authority	1-2
* 1.3	Scope of Study	1-2
* 1.4	Study Area	1-2
1.5	Integration of NEPA Documentation into the Master Plan	1-3
1.6	Pertinent Prior Reports and Related Studies	1-3
1.7	Public Involvement Program	1-3
 SECTION 2: EXISTING FEDERAL PROJECT DESCRIPTION		
2.1	Authorization	2-1
2.1.1	Project Authorization	2-1
2.1.2	Other Applicable Laws and Regulations	2-2
2.1.3	Partnerships and Other Agreements	2-4
2.2	Project Data	2-4
2.3	Reservoir Operation	2-4
2.3.1	Tioga and Hammond Lakes	2-4
2.3.2	Cowanesque Lake	2-5
 *SECTION 3: EXISTING RESOURCES		
3.1	Watershed Characteristics	3-1
3.2	Physical Description	3-1
3.2.1	Geology	3-1
3.2.2	Topography	3-2
3.2.3	Soils	3-2
3.2.4	Prime And Unique Farmlands	3-3
3.3	Land Use and Zoning	3-4
3.3.1	Tioga and Hammond Lakes	3-4
3.3.2	Cowanesque Lake	3-4
3.4	Climate	3-5
3.5	Water Resources	3-5
3.5.1	Surface Water	3-5
3.5.2	Groundwater	3-6
3.6	Natural Resources	3-7
3.6.1	Wildlife Resources	3-7

3.6.2	Fisheries Resources	3-8
3.6.3	Wetlands.....	3-11
3.6.4	Vegetation	3-12
3.6.5	Threatened and Endangered Species	3-15
3.7	Air Quality	3-16
3.8	Hazardous, Toxic, And Radioactive Substances	3-16
3.9	Recreation Resources	3-17
3.9.1	Tioga Lake.....	3-25
3.9.2	Hammond Lake	3-26
3.9.3	Cowanesque Lake.....	3-28
3.10	Aesthetics and Noise.....	3-30
3.11	Cultural Resources.....	3-30
3.12	Social and Economic Setting	3-31
3.12.1	Population	3-31
3.12.2	Employment	3-32
3.12.3	Households and Income	3-32
3.12.4	Regional Economics.....	3-32
3.13	Public Health and Safety	3-33
3.14	Infrastructure	3-34
3.14.1	Project Access Roads	3-34
3.14.2	Solid Waste	3-34
3.14.3	Potable Water	3-34
3.14.4	Sanitary Facilities	3-34
3.14.5	Electricity.....	3-35
3.14.6	Natural Gas.....	3-35
3.15	Real Estate	3-35
3.15.1	Land Use & Acquisition.....	3-35
3.15.2	Outgrants	3-36
3.16	Community Facilities	3-37
3.17	Environmental Justice	3-38
3.17.1	Minorities	3-38
3.17.2	Low Income Populations.....	3-38
3.18	Children's Safety.....	3-39

***SECTION 4: FACTORS INFLUENCING AND CONSTRAINING RESOURCE USE, DEVELOPMENT, AND MANAGEMENT (Opportunities and Constraints)**

4.1	Project Vision Statement	4-1
4.2	Recreation Demand Analysis	4-1
4.2.1	State Comprehensive Outdoor Recreation Plan Analysis	4-1
4.2.2	Workshops/Public Meetings	4-3
4.2.3	Visitor Needs Assessment	4-3
4.2.4	Composite Results of Recreation Demand Analysis.....	4-5
4.3	Potential Development Intensity Definitions	4-5
4.3.1	Low Intensity	4-5
4.3.2	Medium Intensity	4-5

4.3.3	High Intensity	4-7
4.4	Potential Uses Classified by Intensity	4-7
4.5	Site Suitability	4-7
4.6	Potential Development Areas	4-7
4.7	Potential Impacts and Design Measures	4-19

***SECTION 5: PLAN FORMULATION AND EVALUATION**

5.1	Plan Formulation	5-1
5.2	Description of Recommended Plan	5-1
5.2.1	Tioga Lake	5-2
5.2.2	Hammond Lake	5-6
5.2.3	Cowanesque Lake	5-8
5.3	Most Probable Future Without Project Conditions (No Action)	5-18
5.4	Economic Benefits	5-19
5.5	Analysis of Recommended Plan	5-19
5.5.1	Cumulative Effects	5-19
5.5.2	Compliance with Environmental Protection Statutes	5-20

SECTION 6: CONCLUSION

6.1	Implementation Requirements	6-2
6.1.1	Administrative Requirements	6-2
6.1.2	NEPA & 106 Requirements	6-2
6.2	Conclusion	6-2

ANNEXES

- A Tioga Lake
- B Hammond Lake
- C Cowanesque Lake

APPENDICES

- A Master Plan Tables
- B Public Involvement
- C Correspondence
- D Cost Estimates
- E Bibliography
- F List of Preparers
- G Acronyms and Abbreviations

List of Tables
Tioga-Hammond & Cowanesque Lakes Master Plan
2001 Update/Programmatic EA

TABLE	PAGE
4-1: Index of Need – New York SCORP.....	4-2
4-2: Recreational Facility Need – Northern Tier, Pennsylvania.....	4-4
4-3: Composite Recreation Analysis	4-6
4-4: Potential Uses.....	4-8
4-5: Mapping Criteria	4-11
4-6: Potential Development Impacts.....	4-21
5-1: Recommended Plan Analysis.....	5-21
5-2: Compliance with Federal Environmental Statutes	5-24
5-3: Compliance with Federal Environmental Executive Orders.....	5-25

List of Figures
Tioga-Hammond & Cowanesque Lakes Master Plan
2001 Update/Programmatic EA

FIGURE	PAGE
1-1: Tioga, Hammond, and Cowanesque Lake Location/Vicinity Map	1-1
3-1: Recreation Areas – Tioga Lake	3-19
3-2: Recreation Areas – Hammond Lake.....	3-21
3-3: Recreation Areas – Cowanesque Lake	3-23
4-1: Potential Development – Tioga Lake	4-13
4-2: Potential Development– Hammond Lake	4-15
4-3: Potential Development– Cowanesque Lake.....	4-17
5-1: Recommended Recreation Plan – Tioga Lake	5-3
5-2: Recommended Natural Resource Management Plan – Tioga Lake	5-5
5-3: Recommended Recreation Plan – Hammond Lake.....	5-9
5-4: Recommended Natural Resource Management Plan – Hammond Lake	5-11
5-5: Recommended Recreation Plan – Cowanesque Lake	5-13
5-6: Recommended Natural Resource Management Plan – Cowanesque Lake.....	5-17

SECTION 3: RECOMMENDED PLAN

3.1 Description of the Recommended Plan

The vision for the Tioga, Hammond and Cowanesque Lakes (as written in Section 4.1 of the Master Plan) includes support of regional tourism and local communities by providing integrated, environmentally sustainable, balanced, multi-use recreation, and natural resource management opportunities.

Consistent with this vision, the following recommended plan has been developed for Cowanesque Lake. The recommended plan includes the development of one recreation area and three natural resource management enhancement activities that are described below.

3.1.1 Recreational Features

Cowanesque Lake is the largest of the three lakes, and will be developed with an emphasis on water-based recreation while maintaining the existing rustic character that is valued by current lake users, and without compromising pre-existing land use commitments. Future development will be clustered around existing developed areas. Figure C-A-2 shows proposed recreation features for Cowanesque Lake.

At Cowanesque Lake, the proposed facilities would be located in the existing Tompkins Campground and South Shore Day Use Areas. These locations were selected because of their proximity to existing development and their ability to support medium or high intensity development with minimal environmental impacts.

Figure C-A-2: Recreational Features at Cowanesque Lake

The facilities recommended for development at the existing Tompkins Campground include:

- Cabins
- Upgrade Campsites
- Additional boat slips
- Universally Accessible Fishing Pier

The facilities recommended for development in the South Shore Day Use Area include:

- Universally Accessible Fishing Pier
- Fish cleaning station
- Water Spigots at the Vault Restrooms

3.1.2 Natural Resource Management Enhancements

Tioga, Hammond, and Cowanesque Lakes were also evaluated for locations suitable for natural resource enhancement. Interviews with the lake staff as well as observations made during site

visits were used as the basis for determining appropriate natural resource enhancement areas. Figure C-A-3 shows proposed natural resource enhancement areas for Cowanesque Lake.

Natural resource enhancement areas proposed for Cowanesque Lake include a waterfowl habitat enhancement area within the mitigation wetland at the southwestern corner of the lake. This is a cleared area in close proximity to the lake. Further wildlife enhancement projects are proposed for the Moccasin Trail area along the northern shore where wildlife habitat mitigation has already been established. Bird watching facilities are also proposed for the Moccasin Trail area due to its high potential for wildlife viewing.

3.2 Economic Benefits

Implementation of the proposed development plan at the lakes will generate economic benefits for surrounding communities. During construction, economic benefits will occur in the form of jobs and the purchase of construction materials and services. Additional benefits will result as money spent on wages and purchases is subsequently spent on other purchases; thus creating revenues for non-construction related businesses.

Following construction, economic benefits in surrounding communities will occur as well. Some benefits will result in the form of additional contractor or staff hired to operate and maintain new facilities, although the number required will depend on the specifics of new construction (magnitude and timing). Additional economic benefits will result as an increased number of visitors to the lakes spend money on food, services, and other items during their visits. The wages and income from visitor expenditures will generate additional benefits as the money is spent elsewhere in the economy.

3.3 Analysis of Recommended Plan

Analysis of the Recommended Plan was completed in a manner to ensure construction and operation of the features and associated impacts would be consistent with those anticipated and discussed in the Master Plan, Section 4. These considerations included:

- Determination that the development areas can support the designated intensity use (high, medium, low).
- Determination that the proposed facilities or amenities are consistent with those that are allowed in the designated intensity use.
- Determination that implementation of the plan at the proposed location presents impacts consistent with those presented in Section 4.7 of the Master Plan document.

Determination if any special design measures should be considered or implemented during construction of the proposed plan.

- Determination of any other special items necessary for implementation of the proposed plan. A review of compliance with applicable Federal statutes, executive orders, and executive memoranda has been conducted for the proposed action. Implementation of the recommended plan will comply with all applicable Federal, state, and local statutes. Development of any of the facilities may require additional review and action for continued compliance with NEPA, the Clean Water Act, and the National Historic Preservation Act. State and local statutes and

permits, including wetlands and soil and erosion control, also will require review and submittal during development of the recommended plan. All appropriate permits will be obtained before construction activity begins.

3.4 Implementation Requirements

3.4.1 Administrative Requirements

Implementation of the proposed plan could be funded through a variety of sources such as O&M funds, cost-sharing partnerships, congressional appropriations, private funding (concessions), and/or other Federal and state agency funding. This document does not provide the authority to fund new facilities, to design and construct new facilities, or to enhance existing facilities. Although the document does recommend areas for potential recreation development, it does not guarantee the success of any facilities. Prior to construction, the proponents for the proposed facilities should complete further market analyses to determine their economic viability.

Implementation of the plan would occur in phases over a period of approximately 10-15 years. It should be recognized that the lake is dynamic and that continual updating of the Master Plan will be necessary to respond to changing conditions. The development sequence for the facilities will be determined by a number of factors which includes the availability of funding; public interest or demand; and the availability, improvement, or construction of supporting infrastructure.

3.4.2 NEPA & 106 Requirements

The integrated EA is a programmatic document that is designed to address the current operation of the lake and its facilities and evaluate the proposed level of future development. The integrated EA addresses potential impacts of the alternatives and the Recommended Plan in a programmatic fashion, which is consistent with the conceptual level of design. As described in the Master Plan Section 5, the Recommended Plan will not have significant individual or cumulative impacts on the quality of the human environment. Individual projects proposed for construction will be judged against this master plan and its assumed impacts. Those projects found to be incompatible with the plan, or outside the range of evaluated impacts will not be considered further for construction without separate, additional NEPA analysis.



Legend

- Nest Locations (Red square)
- Roads (Blue line)
- Mitigation Areas (Green hatched)
- Project Boundary (Red outline)
- Development Areas (Purple outline)

Development Intensities

- Existing Development (Green)
- High Intensity (Red)
- Medium Intensity (Yellow)
- Low Intensity (Light Yellow)
- No Development (Grey hatched)

North Arrow (N)



Figure CA-2
 Cowanesque Lake Future Development Plan
 2001 Master Plan Update

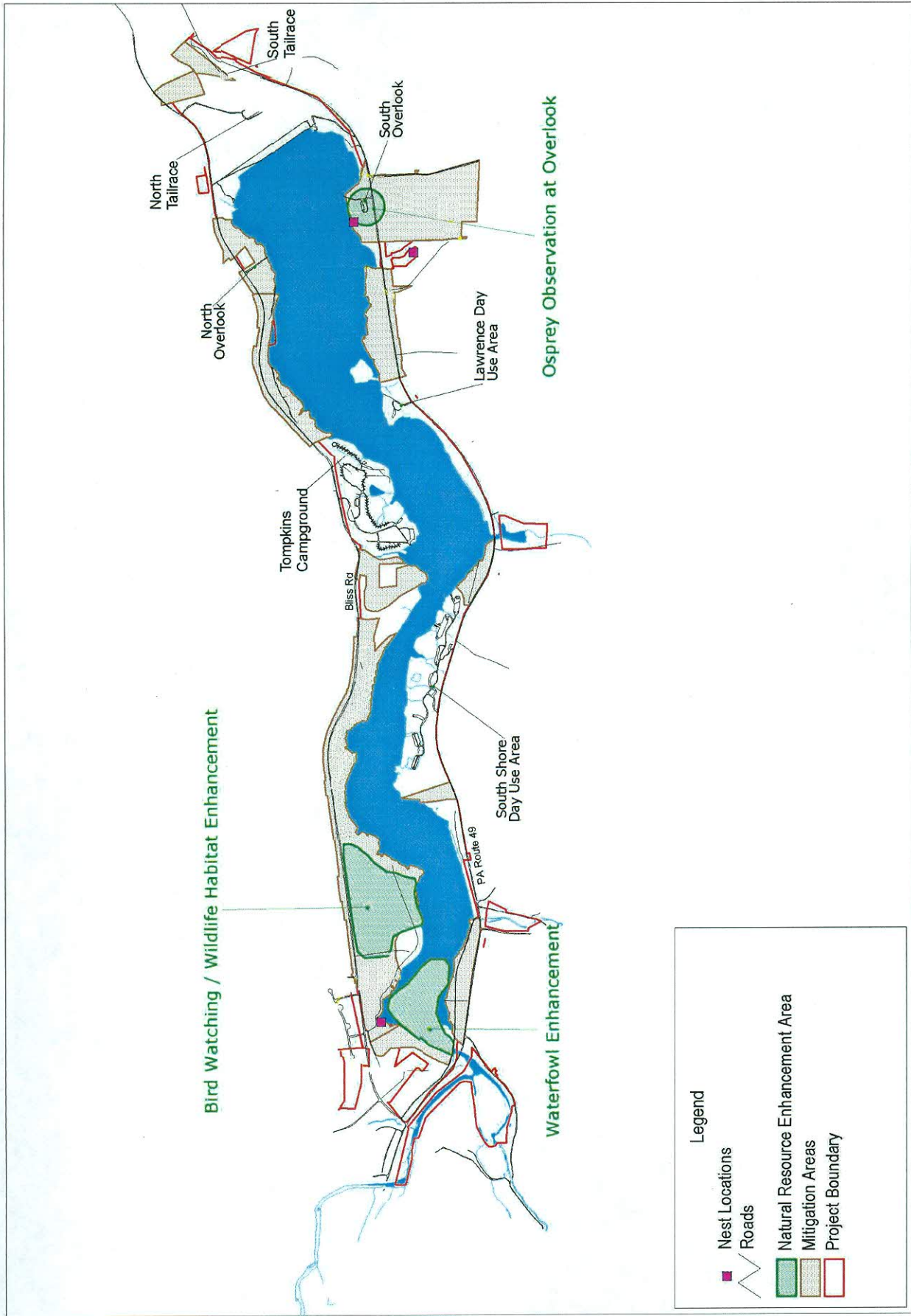


Figure CA-3
 Cowanesque Lake Natural Resource Enhancement Locations
 2001 Master Plan Update

**TABLE A-3:
COWANESQUE LAKE PERTINENT INFORMATION**

General

Project Name	Cowanesque Lake
Location:	
Basin	Susquehanna River Basin
Stream	Cowanesque River
River Mile	Cowanesque Dam is located 2.2 miles upstream of the confluence
with the Tioga River at Lawrenceville, PA.	
County:	Tioga
State:	Pennsylvania
Type of Project:	Dam and Reservoir
Regulation Objective:	
Primary	Flood Control
Secondary	Water Supply
Others	Recreation and Water Quality Enhancement
Project Owner:	U.S. Army Corps of Engineers
Operating Agency:	Baltimore District, U.S. Army Corps of Engineers
Project Cost:	\$160,030,700
Completion Date:	Operationally completed, November 1980 Modifications completed, May 1990

Hydrology

Drainage Area (square miles)	298 sq. mi.
Floods and Flood Seasons	
Winter and Spring	Snowmelt and ice runoff combined with basin-wide rainfall causes flooding; example: March 1964
Summer and Fall	Heavy showers and thunderstorms cause flash floods and can cause major floods if they are of a long duration. Tropical storms or their remnants can cause flooding by dumping heavy amounts of rain over entire basin; example: June 1972 (Agnes) and September 1975 (Eloise)
Low Flow Season	Late Summer and Fall

Lake Information

Elevation, storage, and areas:

	Feet NGVD	Acre Feet	Acres
Top of Dam	1,151.00	192,000	4,030
Max Design Pool	1,144.20	166,000	3,642
Full Flood Control Pool	1,117.00	89,000	2,060
Recreation Pool	1,080.00	32,600	1,085
Dead Storage	1,010.96	54	21

Real Estate Taking Line for Fee Acquisition: Elevation 1,122.00 or to a line measured 300 feet horizontally from the 1,117.00 contour; whichever provides the greater area. This elevation encloses approximately 2,734 acres.

Embankment

Location	Cowanesque River, 2.2 miles upstream from confluence with Tioga River
Purpose	Water impoundment
Type	Rolled earth and rockfill
Height	151 feet
Length	3,100 feet
Top Width	25 feet
Top Elevation	1,151.0 feet NGVD

Spillway (Uncontrolled)

Location	Right abutment
Type	Converging chute with uncontrolled concrete weir
Crest Elevation	1,117.0 feet NGVD
Crest Length	400 feet
Design Discharge (max)	205,000 cfs (spillway flow has not occurred)

Outlet Works

Location	Right side embankment
Purpose	Flood control and low flow regulation
Type	Two hydraulically-operated slide gates. Low-flow releases are made through six ports located on the upstream face of the tower.
Length of Outlet Works ³	1,247 feet

³ Information not contained in Reservoir Regulation Manual

**Table A-6:
Terrestrial Mammals Within the Cowanesque Lake Vicinity**

Common Name	Scientific Name
Virginia opossum	<i>Didelphis virginiana</i>
Masked shrew	<i>Sorex cinereus</i>
Water shrew	<i>Sorex palustris</i>
Smoky shrew	<i>Sorex fumeus</i>
Long-tailed shrew	<i>Sorex dispar</i>
Pygmy shrew	<i>Sorex hoyi</i>
Short-tailed shrew	<i>Blarina brevicauda</i>
Least Shrew	<i>Cryptotis</i>
Hairy-tailed mole	<i>Parascalops breweri</i>
Star-nosed mole	<i>Condylura cristata</i>
Little brown myotis	<i>Myotis lucifugus</i>
Keen's myotis	<i>Myotis keenii</i>
Indiana myotis	<i>Myotis sodalis</i>
Small-footed myotis	<i>Myotis leibii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Eastern pipistrelle	<i>Pipistrellus subflavus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Red bat	<i>Lasiurus borealis</i>
Hoary bat	<i>Lasiurus cinereus</i>
Meadow jumping mouse	<i>Zapus hudsonius</i>
Woodland jumping mouse	<i>Napaeozapus insignis</i>
Porcupine	<i>Erethizon dorsatum</i>
Coyote	<i>Canis latrans</i>
Red fox	<i>Vulpes vulpes</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
New England cottontail	<i>Sylvilagus transitionalis</i>
Showshoe hare	<i>Lepus americanus</i>
Eastern chipmunk	<i>Tamias striatus</i>
Woodchuck	<i>Marmota monax</i>
Gray squirrel	<i>Sciurus carolinensis</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Southern flying squirrel	<i>Glaucomys volans</i>
Northern flying squirrel	<i>Glaucomys sabrinus</i>
Beaver	<i>Castor canadensis</i>
Deer mouse	<i>Peromyscus maniculatus</i>
White-footed mouse	<i>Peromyscus leucopus</i>
Southern red-backed vole	<i>Clethrionomys gapperi</i>
Meadow vole	<i>Microtus pennsylvanicus</i>
Woodland vole	<i>Microtus pinetorum</i>
Muskrat	<i>Ondatra zibethicus</i>
Southern bog lemming	<i>Synaptomys cooperi</i>
Black bear	<i>Ursus americanus</i>
Bobcat	<i>Felis rufus</i>
River otter	<i>Lutra canadensis</i>
Raccoon	<i>Procyon lotor</i>
Ermine	<i>Mustela erminea</i>
Long-tailed weasel	<i>Mustela frenata</i>
Mink	<i>Mustela vison</i>
Striped skunk	<i>Mephitis mephitis</i>
White-tailed deer	<i>Odocoileus virginianus</i>

**Table A-8:
Bird Species Within the Cowanesque Lake Vicinity**

Common Name	Scientific Name
Acadian flycatcher	<i>Empidonax virescens</i>
Alder flycatcher	<i>Empidonax alnorum</i>
American black duck	<i>Anas rubripes</i>
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Carduelis tristis</i>
American kestrel	<i>Falco sparverius</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
American tree sparrow	<i>Spizella arborea</i>
Bank swallow	<i>Riparia riparia</i>
Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
Black-capped chickadee	<i>Parus atricapillus</i>
Black-throated green warbler	<i>Dendroica virens</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-winged warbler	<i>Vermivora pinus</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Broad-winged hawk	<i>Buteo platypterus</i>
Brown creeper	<i>Certhia americana</i>
Brown thrasher	<i>Toxostoma rufum</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Canada goose	<i>Branta canadensis</i>
Canada warbler	<i>Wilsonia canadensis</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>
Chimney swift	<i>Chaetura pelagica</i>
Chipping sparrow	<i>Spizella passerina</i>
Cliff swallow	<i>Petrochelidon pyrrhonota</i>
Common grackle	<i>Quiscalus quiscula</i>
Common raven	<i>Corvus corax</i>
Common redpoll	<i>Carduelis flammea</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Dark-eyed junco	<i>Junco hyemalis</i>
Dickcissel	<i>Spiza americana</i>
Downy woodpecker	<i>Picoides pubescens</i>
Eastern bluebird	<i>Sialia sialis</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Eastern meadowlark	<i>Sturnella magna</i>
Eastern wood-pewee	<i>Contopus virens</i>
European starling	<i>Sturnus vulgaris</i>
Evening grosbeak	<i>Hesperiphona vespertina</i>
Field sparrow	<i>Spizella pusilla</i>

**Table A-8:
Bird Species Within the Cowanesque Lake Vicinity**

Grasshopper sparrow	<i>Ammodramus savannarum</i>
Gray catbird	<i>Dumetella carolinensis</i>
Great blue heron	<i>Ardea herodias</i>
Great crested flycatcher	<i>Myiarchus crinitus</i>
Great horned owl	<i>Bubo virginianus</i>
Green-backed heron	<i>Butorides striatus</i>
Hairy woodpecker	<i>Picoides villosus</i>
Hermit thrush	<i>Catharus glutata</i>
Horned lark	<i>Eremophila alpestris</i>
House finch	<i>Carpodacus mexicanus</i>
House sparrow	<i>Passer domesticus</i>
House wren	<i>Troglodytes aedon</i>
Indigo bunting	<i>Passerina cyanea</i>
Killdeer	<i>Charadrius vociferus</i>
Least flycatcher	<i>Empidonax minimus</i>
Magnolia warbler	<i>Dendroica magnolia</i>
Mallard	<i>Anas platyrhynchos</i>
Mourning dove	<i>Zenaida macroura</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern flicker	<i>Colaptes auratus</i>
Northern harrier	<i>Circus cyaneus</i>
Northern mockingbird	<i>Mimus polyglottis</i>
Northern oriole	<i>Icterus galbula</i>
Northern shrike	<i>Lanius excubitor</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Pine grosbeak	<i>Pinicola enucleator</i>
Prairie warbler	<i>Dendroica discolor</i>
Purple finch	<i>Carpodacus purpureus</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-breasted nuthatch	<i>Sitta canadensis</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Red-headed woodpecker	<i>Melanerpes.erythrocephalus</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ring-billed gull	<i>Larus delawarensis</i>
Rock dove	<i>Columba livia</i>
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Rough-legged hawk	<i>Buteo lagopus</i>
Ruffed grouse	<i>Bonasa umbellus</i>
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Scarlet tanager	<i>Piranga olivacea</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Snow bunting	<i>Plectrophenax nivalis</i>
Solitary vireo	<i>Vireo solitarius</i>
Song sparrow	<i>Melospiza melodia</i>
Swamp sparrow	<i>Melospiza georgiana</i>

**Table A-8:
Bird Species Within the Cowanesque Lake Vicinity**

Tree swallow	<i>Tachycineta bicolor</i>
Tufted titmouse	<i>Parus bicolor</i>
Turkey	<i>Meleagris gallopavo</i>
Turkey vulture	<i>Cathartes aura</i>
Veery	<i>Catharus fuscescens</i>
Warbling vireo	<i>Vireo gilvus</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
Willow flycatcher	<i>Empidonax traillii</i>
Wood thrush	<i>Hylocichla mustelina</i>
Yellow warbler	<i>Dendroica petechia</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-rumped warbler	<i>Dendroica coronata</i>
Yellow-throated vireo	<i>Vireo flavifrons</i>

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**Table A-10:
Amphibians and Reptiles Potentially Occurring Within the Cowanesque
Lake Vicinity**

Common Name	Scientific Name
Jefferson salamander	<i>Ambystoma jeffersonianum</i>
Spotted salamander	<i>Ambystoma maculatum</i>
Red-spotted newt	<i>Notophthalmus v. viridescens</i>
Northern dusky salamander	<i>Desmognathus f. fuscus</i>
Mountain dusky salamander	<i>Desmognathus ochrophaeus</i>
Redback salamander	<i>Plethodon cinereus</i>
Slimy salamander	<i>Plethodon g. glutinosus</i>
Wehrle's salamander	<i>Plethodon wehrlei</i>
Four-toed salamander	<i>Hemidactylium scutatum</i>
Northern spring salamander	<i>Gyrinophilus p. porphyriticus</i>
Northern red salamander	<i>Pseudotriton r. ruber</i>
Northern two-lined salamander	<i>Eurycea b. bislineata</i>
Longtail salamander	<i>Eurycea l. longicauda</i>
Eastern American toad	<i>Bufo a. americanus</i>
Northern spring peeper	<i>Hyla c. crucifer</i>
Gray treefrog	<i>Hyla versicolor</i>
Bullfrog	<i>Rana catesbeiana</i>
Green frog	<i>Rana clamitans melanota</i>
Wood frog	<i>Rana sylvatica</i>
Northern leopard frog	<i>Rana pipiens</i>
Pickerel frog	<i>Rana palustris</i>
Common snapping turtle	<i>Chelydra s. serpentina</i>
Stinkpot	<i>Sternotherus odoratus</i>
Spotted turtle	<i>Clemmys guttata</i>
Wood turtle	<i>Clemmys insculpta</i>
Midland painted turtle	<i>Chrysemys picta marginata</i>
Northern coal skink	<i>Eumeces a. anthracinus</i>
Northern water snake	<i>Nerodia s. sipedon</i>
Northern brown snake	<i>Storeria d. dekayi</i>
Northern redbelly snake	<i>Storeria o. occipitomaculata</i>
Eastern garter snake	<i>Thamnophis s. sirtalis</i>
Northern ribbon snake	<i>Thamnophis sauritus septentrionalis</i>
Northern ringneck snake	<i>Diadophis punctatus edwardsi</i>
Northern black racer	<i>Coluber c. constrictor</i>
Eastern smooth green snake	<i>Opheodrys v. vernalis</i>
Black rat snake	<i>Elaphe o. obsoleta</i>
Eastern milk snake	<i>Lampropeltis t. triangulum</i>
Timber rattlesnake	<i>Crotalus horridus</i>

**Table A-12:
Fish Species In the Hammond Lake Vicinity, continued**

Yellow perch	<i>Perca flavescens</i>
Shield darter	<i>Perca peltata</i>
Walleye	<i>Stizostedion vitreum</i>
Mottled sculpin	<i>Cottus bairdi</i>
Slimy sculpin	<i>Cottus cognatus</i>
Gizzard shad	<i>Dorosoma cepedianum</i>

**Table A-13:
Fish Species In the Cowanesque Lake Vicinity**

Common Name	Scientific Name
Rainbow trout	<i>Salmo gairdneri</i>
Muskellunge	<i>Esox masquinongy</i>
Golden shiner	<i>Notemigonus crysoleucas</i>
Bluntnose minnow	<i>Pimephales notatus</i>
White sucker	<i>Catostomus commersoni</i>
Yellow bullhead	<i>Ictalurus natalis</i>
Rock bass	<i>Ambloplites rupestris</i>
Pumpkinseed	<i>Lepomis gibbosus</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
White crappie	<i>Pomoxis annularis</i>
Yellow perch	<i>Perca flavescens</i>
Chain pickerel	<i>Esox niger</i>
Common carp	<i>Cyprinus carpio</i>
Spottail shiner	<i>Notropis cornutus</i>
Creek chub	<i>Semotilus atromaculatus</i>
Satinfin shiner	<i>Notropis analostanus</i>
Black crappie	<i>Pomoxis nigromaculatus</i>
Quillback	<i>Carpoides cyprinus</i>
Spotfin shiner	<i>Notropis spilopterus</i>
Walleye	<i>Stizostedion vitreum</i>
"Tiger" musky	<i>Esox masquinongy x E. lucius</i>
Goldfish	<i>Carassius auratus auratus</i>
Northern hog sucker	<i>Hypentelium nigricans</i>
Brown bullhead	<i>Ictalurus nebulosus</i>
Green sunfish	<i>Lepomis cyanellus</i>
Bluegill	<i>Lepomis macrochirus</i>
Largemouth bass	<i>Micropterus salmoides</i>
Tessellated darter	<i>Etheostoma olmstedti</i>

3.6 NATURAL RESOURCES

3.6.1 Wildlife Resources

Wildlife resources within the vicinity of Tioga, Hammond, and Cowanesque Lakes are diverse and plentiful. The high proportion of natural and semi-natural habitats include forests, scrub/shrub areas, and open fields. The habitat mosaic includes mixtures of habitats and ecotones (edges) that support large numbers of game and non-game species.

Due to the large proportion of forest/wooded areas around the lakes most of the wildlife species depend on or utilize wooded habitats. Tables A-5 and A-6, in Appendix A, provide lists of terrestrial mammal species that potentially occur within the various habitats around each lake. Typical species include white-tailed deer, black bear, raccoon, gray squirrel, and white-footed mouse. Open field and shrub communities provide habitat for many small mammals including eastern cottontail, woodchuck, meadow jumping mouse and meadow vole. Species such as beaver, muskrat, and mink may be found along watercourses, including the lakes, Tioga River, Crooked Creek, Mill Creek, Cowanesque River, and various tributaries. Game species include squirrel, rabbit, groundhog, deer, bear, beaver, muskrat, fox, and bobcat. Currently the Pennsylvania Game Commission 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.

Waterfowl such as Canada goose, wood duck, and mallard, and upland game birds such as turkey, rough grouse, and woodcock are present in the lake vicinity. Currently the alder and aspen population along Crooked Creek (Hammond Lake) is being lost due to natural succession, which reduces habitat for grouse and woodcock.

Upland areas also provide habitat for numerous non-game bird species including migratory passerine species, bald eagles, osprey, and great blue heron. Tables A-7 and A-8, in Appendix A, provide lists of bird species that may occur on the lakes and in surrounding areas.

There are six active osprey nests currently in use on the property associated with Tioga, Hammond, and Cowanesque Lakes. There are two additional active nests located outside of Corps property near Cowanesque Lake. An osprey survey conducted by the Corps on July 31, 2001 indicated that young were observed at four of the six nests located within Corps property. Three young were observed around Cowanesque Lake and three were observed around the Hammond Area. Since the survey, one of the off-site nests located near Cowanesque Lake was destroyed during a storm. Arrangements are currently underway to reconstruct an osprey pole closer to the lake.

There are also two bald eagles' nests within the vicinity of Cowanesque and Hammond Lakes. Only the nest located across from the Lawrence Recreational Area on the north side of Cowanesque Lake is active. The immature eagle had already fledged at the time of the July 2001

Corps Survey and only the male was observed near the nest. The other nest, located just outside of Corps property on the northwestern side of Hammond Lake, is abandoned. The Pennsylvania Game Commission last documented this nest as active in 1998.

There were two heron rookeries identified within the vicinity of Cowanesque and Hammond Lakes. One rookery is located downstream of the Cowanesque Dam approximately 600 to 700 feet from the boundary of the Corps fee title land. This is an active rookery and is occupied by great blue heron. The other rookery was located on the southeastern corner of Hammond Lake. The rookery was abandoned and the birds relocated closer to Wellsboro when the Hammond Overlook Estates were developed in that area.

Habitats around the lakes are important for amphibian and reptile populations that 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. Only the taking of snapping turtles is unregulated; all other species of amphibians and reptiles have daily and possession limits, some may also have designated seasons. Lists of reptile and amphibian species that potentially occur within the lake property boundaries are provided in Tables A-9 and A-10, in Appendix A.

3.6.2 Fisheries Resources

Information regarding fishery resources was based on four main sources:

- ◆ U.S. Army Corps of Engineers *Aquatic Biological Monitoring Reports* for Cowanesque Lake and Tioga Lake (1992)
- ◆ two Pennsylvania Fish and Boat Commission reports: the *Tioga Lake 404A Management Report* (1995), *Hammond Lake 404A Management Report* (1999), and *Cowanesque Lake 404A Management Report* (1998)
- ◆ the *Forest, Fish and Wildlife Management Plan for Tioga and Hammond Lakes* (1986); and
- ◆ information provided by the lake staff at Tioga, Hammond, and Cowanesque Lakes.

Tioga Lake

Previous mining activity within the watershed has resulted in acid mine drainage entering the Tioga River and eventually affecting Tioga Lake. According to the 1995 Pennsylvania Fish and Boat Commission report, poor water quality from the Tioga River is effectively being buffered by input from Mill Creek and Hammond Lake, which are both unaffected by acid mine drainage. Wind action on the lake is also mixing lake water, providing buffering capacity throughout most of the lake.

Shallow water habitat is limited along the western shore of Tioga Lake due to basin morphometry but is present in the vicinity of the Mill Creek confluence and upstream portions of the lake. When Tioga Lake was created, the lake bottom was leveled prior to flooding and all tree stumps and debris were cleared. As a result, the flat, level basin offers little cover for nesting and predator avoidance, resulting in sub-optimal habitat for most fish populations. According to the 1995 Pennsylvania Fish and Boat Commission report, fish communities are

affected by the complete lack of submerged vegetation, although the abundance of woody debris may provide some refuge cover.

The 1992 U.S. Army Corps of Engineers monitoring report, based on 1991 sampling, identified numerous sport, forage, and rough fish species in the more viable areas of Tioga Lake. This report ranks yellow perch, bluegill, small mouth bass, and largemouth bass as the most prevalent species. Game fish species identified in the 1995 Pennsylvania Fish and Boat Commission report included three species of trout, chain pickerel, muskellunge, channel catfish, black bass, and walleye.

The 1995 report also indicated that a large number of trout are migrating from Mill Creek to Tioga Lake. However, because the lake is not conducive to long term trout survival, anglers do not expect trout to be present and are not attempting to fish for trout. The full list of fish species identified in Tioga Lake is presented in Table A-11, in Appendix A. Tioga Lake is not currently stocked to supplement fish populations.

The 1992 Corps study indicated that, overall, diversity values calculated from collected data are low and indicative of a fish community comprised of few species. The 1995 Pennsylvania Fish and Boat Commission report indicated an increase in species diversity from the 1992 Corps study, but indicated that the lake is unproductive in terms of gamefish production. This is attributed to strong, steady winds and acute episodes of poor water quality. The fish community is supplemented by immigration that may artificially boost the diversity but desirable-size fish of almost all species are few. This is further supported by the 1992 findings that fish populations are more prevalent within the Mill Creek Area relative to the remaining areas of Tioga Lake. Due to limitations within the lake, the Pennsylvania Fish and Boat Commission does not recommend stocking of any species into Tioga Lake itself. Therefore, no stocking program has been initiated or proposed for the lake.

In the 1992 Corps study, Mill Creek and the Mill Creek arm of Tioga Lake were found to have the highest fish community diversity among stations within Mill Creek and Tioga River. Overall however, composite scores for Mill Creek and Tioga River calculated for the 1992 study lie below the scores for reference sites, which suggests some loss of biological integrity within these waters.

Hammond Lake

The Pennsylvania Fish and Boat Commission has classified Hammond Lake as a warm-water fisheries habitat. Overall, forty-nine fish species have been identified in Hammond Lake including various minnow, shiner, dace, bullhead, sucker, bass, and trout species. Table A-12, in Appendix A, lists the fish species present in Hammond Lake. The Pennsylvania Fish and Boat Commission has conducted stocking programs for various pan and game fish species to supplement the natural fish populations since 1980. Historically stocked species include Channel Catfish, Largemouth Bass, Muskellunge, Walleye, and Black Crappie.

In the past Hammond Lake has had an abundance of under utilized species such as carp and suckers and a lack of desirable game and forage species. The abundance of carp and poor

condition of the sport fishery has been documented by studies done in 1986 and 1992. Repeated stocking of gamefish over the years has not effectively improved the fishery until the introduction of the gizzard shad in 1992. Since then, they have become the most abundant species in the lake and carp and sucker populations have declined. Black crappie populations have also improved and channel catfish are expected to improve since the introduction of the gizzard shad. The Pennsylvania Fish and Boat Commission indicated that the thriving gizzard shad populations may provide a good opportunity for successful introduction of the white crappie, providing for additional opportunity to improve fishery utilization. In the 1999 *404A Report for Hammond Lake*, results indicated that the black crappie is the most abundant panfish found in the lake. According to this report, maintenance and establishment of game species within Hammond Lake have continuously been a challenge. Walleye, muskellunge, and largemouth and smallmouth bass were intended as the primary game species in Hammond Lake. The largemouth bass population has shown chronic problems and is most likely significantly impacted by the elevated turbidity of the waters of Hammond Lake. Channel catfish appeared to be benefiting from the successful gizzard shad populations and striped bass hybrid.

Although several areas of Hammond Lake provide suitable habitat for adult and juvenile fish, generally the physical habitat is lacking in both quantity and quality. The shoreline of Hammond Lake is predominantly grass-covered and does not provide near shore cover for fish. The near complete absence of aquatic vegetation has been a matter of concern since the construction of Hammond Lake. Efforts to establish aquatic vegetation have been unsuccessful to date. The lack of vegetation and repeated failures to establish aquatic plants may be due to high carp populations, increased turbidity resulting from carp activity and runoff, ice scouring, and fluctuating ice levels. Similar to Tioga Lake, the bottom was cleared and leveled prior to flooding. This resulted in a similar reduction in quantity and quality of fish habitat within the lake. There are areas that provide sufficient near-shore cover habitat including boulder and rubble rip-rap at the dam embankment, sunken logs and toppled trees near the northern shore and the 8-acre Ives Run Propagation Area. The Ives Run Propagation Area contains inundated trees and shrubby cover. At the eastern end of Hammond Lake, near the mouth of the Crooked Creek channel, there is good bank cover and fish habitat due to the presence of logs, trees, and tall grass. Crooked Creek supports a diverse fish fauna above Hammond Lake including largemouth bass, pumpkinseed, green sunfish, yellow perch, channel catfish, and brown bullhead. Unfortunately, due to severe erosion along the banks of Crooked Creek, there is a siltation and associated turbidity problem where Crooked Creek empties into Hammond Lake, reducing the suitability of fish habitat in this area.

At present, rangers have completed approximately 80 percent of a five-year Hammond Lake fisheries habitat management program. This program is a joint venture between the Corps and the Pennsylvania Fish and Boat Commission. In years past, thirty catfish spawning structures were installed near the boat launch located on the eastern tip of Hammond Lake, twenty-five black bass nesting structures were installed along the northwestern shoreline of Hammond Lake, and twenty Porcupine Crib structures were installed just east of the black bass nesting structures along the northern shoreline. In September 2001, the Corps, Pennsylvania Fish and Boat Commission, and local volunteer organizations installed twenty more Porcupine Crib structures in an area approximately 50 yards from the Hammond dam.

Cowanesque Lake

Cowanesque Lake supports a moderately diverse, healthy fish community (see Table A-13, in Appendix A), including a variety of sport, forage, and rough species. Unlike Tioga and Hammond Lakes, the bottom of Cowanesque was not cleared and leveled prior to flooding. As a result, there is adequate near-shore cover to sustain larger fish populations. The eastern portion of the lake directly adjacent to the dam is protected by riprap, which provides a stable rock habitat for fish. The southern shoreline has numerous small artificial fish habitat structures and several large ones, all made of automobile tires. These structures were constructed by Corps rangers and volunteers from sportsmen clubs and were placed at about the 1070 foot contour prior to the lake being raised in 1990. The northern shoreline varies with shallow and steep sloping banks. The west end of Cowanesque Lake contains the most extensive areas of submerged aquatic habitat as a result of mitigation from the reallocation of 1990. There are extensive areas of submerged aquatic macrophytes and inundated timber and brush, providing excellent fish habitat. The Pennsylvania Fish and Boat Commission has conducted stocking programs for various pan and game fish species to supplement the naturally occurring fish populations. Stocked species include tiger muskellunge, walleye, largemouth bass, black crappie, yellow perch and channel catfish.

The 1998 *Cowanesque Lake 404A Management Report* indicated that growth rates for pumpkin seed, bluegill, and yellow perch exceeded the state average. Although black crappie were the most abundant panfish caught during the sampling, its growth rate is below the state average across all year classes. The lake's most prevalent gamefish is the largemouth bass, which is growing at or above the state average. Growth rates and catch rates of largemouth bass have declined at a greater magnitude than anticipated. This is attributed to high turbidity and rapid fluctuations in water levels that can affect year classes. Analysis of the relationship between the largemouth bass population and the panfish community indicates imbalance and lack of forage or inability to utilize forage. Smallmouth bass and walleye populations were found to be depressed and it was recommended to abandon efforts to establish a walleye fishery in Cowanesque Lake. Muskellunge populations seem to be thriving with equal number of pure and tiger muskellunge, and some of the largest tiger muskellunge ever captured within Pennsylvania Fisheries Management Area 4 were caught at Cowanesque Lake.

3.6.3 Wetlands

There are few wetlands directly associated with the lakes, but numerous wetland systems are scattered along river systems flowing into the three lakes. Wetlands were located by using the National Wetland Inventory Maps and verified by site visits. Brief descriptions of each wetland system are provided in the following sections.

Tioga Lake

There are wetlands associated with Mill Creek and Tioga River, which feed Tioga Lake. There is an emergent wetland located along the eastern bank of Mill Creek, less than a mile above the confluence with the lake. There are riverine unconsolidated bottom wetlands along both banks of Mill Creek north of Tioga Lake. There are numerous small wetland areas east of the Tioga River

and north of the confluence of Tioga River and Lambs Creek. These wetlands are classified as palustrine emergent, palustrine broad-leaved deciduous scrub/shrub and palustrine broad-leaved deciduous forested wetlands. There are three larger wetland systems classified as palustrine broad-leaved deciduous scrub/shrub and unconsolidated bottom wetlands directly east of the confluence of Lambs Creek and the Tioga River. Most of these wetlands display seasonal saturation or inundation rather than year-round inundation.

Hammond Lake

There are no wetland areas directly adjacent to Hammond Lake. There are wetlands associated with Crooked Creek just west of Hammond Lake. There is a moderately sized wetland area east of Stephenhouse Run, just south of Crooked Creek, that is classified as a palustrine broad-leaved deciduous scrub/shrub wetland. There is another wetland system just west of Stephenhouse Run that was originally created as a fish hatchery. This wetland is classified as a palustrine emergent wetland. The wetland area located between Crooked Creek and PA Route 287, consists of palustrine broad-leaved deciduous scrub/shrub wetlands and palustrine emergent wetlands. The wetland area adjacent to PA Route 287 was enhanced through a joint effort by the United States Army Corps of Engineers, United States Fish and Wildlife Service, Natural Resource Conservation Service, Pennsylvania Game Commission, and Ducks Unlimited. Wetlands near Hammond Lake typically have seasonal saturation or inundation.

Cowanesque Lake

There are few areas of wetland systems within the vicinity of Cowanesque Lake. There is a moderately sized, impounded lacustrine wetland with many snags that was created when the lake was reformulated. This wetland, referred to by staff as the Baldwin Creek backwater, is located south of Route 49, west of the Red House Campground, across from the tailrace. There are wetland mitigation areas throughout the western portion of the lake, notably the 14-acre area surrounding the constructed Strait Creek Duck Island and a 22-acre area at Old Nelson. Alkali bulrush, arrowhead, duck potato, giant smartweed, sago pondweed, wild celery, and giant wild rice were among the wetland plant species planted. There is a lacustrine emergent wetland near the small peninsula located at the southwestern corner of the lake, and a palustrine emergent wetland near Nelson Falls southwest of Cowanesque Lake just south of PA Route 49.

3.6.4 Vegetation

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.

Tioga and Hammond Lakes

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, witch-hazel, 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.

In wildlife management areas, some open field areas contain hedgerows. These are particularly prevalent in the Bryant Hollow Wildlife Management Area located southwest of Hammond Lake, adjacent to Crooked Creek, and in the Mill Creek area on Tioga Lake. Most managed hedgerows were comprised primarily of autumn olive. There are food plots containing buckwheat within the Bryant Hollow Wildlife Management Area and Mill Creek Area to support game species.

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.

A few 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 hop-hornbeam, 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 are in the borrow area adjacent to the South Overlook on the south side of PA Route 49, west of the South Overlook the western portion of the lake and shoreline, and the area northwest of the lake in the vicinity of the Moccasin Trail, south of Bliss Road. Wetland mitigation within the western area of the lake is discussed in Section 3.6.3. A total of 96.5 acres was planted with hedgerows as part of the wildlife habitat mitigation program. The 60 acre borrow area near the southern overlook is a successional old field that is starting to support various shrub species and tree seedlings. Hedgerows were planted within the borrow area but are not currently being maintained. 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.

3.6.5 Threatened and Endangered Species

A review of the Pennsylvania Natural Diversity Inventory for Tioga, Hammond, and Cowanesque Lakes and their surrounding areas was conducted. The Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, did not identify any plant species of special concern including endangered, threatened or rare plant species within the lake areas. The Bureau of Forestry did indicate that there were animal species of special concern in the proximity of the lake areas. As a result, the Pennsylvania Fish and Boat Commission, Pennsylvania Game Commission, and United States Fish and Wildlife Service (USFWS) were contacted to identify the specific species of concern.

The USFWS indicated that the bald eagle (*Haliaeetus leucocephalus*) nests within the area of Hammond Lake. The bald eagle is classified as a federally threatened species and further classified as a state endangered species with a critically imperiled/imperiled status. Currently the bald eagle has been proposed for delisting from the federally threatened species list.

The Pennsylvania Game Commission identified a bald eagles' nest on the northern side of Hammond Lake, a heron rookery along the southeastern shore of Hammond Lake, and an osprey nest along the southern shore of Hammond Lake, across from the bald eagles' nest. They also identified two osprey nests at Cowanesque Lake. No species of concern were identified at Tioga Lake. The present activity of bald eagles, osprey, and heron nests is discussed in Section 3.6.1.

Osprey (*Pandion haliaetus*) are a state threatened species and are ranked as imperiled. Restrictions for activity and development within the vicinity of osprey nests are similar to those of the bald eagle. Between 1989 and 1994, the staff at Tioga, Hammond, and Cowanesque Lakes conducted a very successful hacking program. Under the guidance of hacking expert Dr. Larry Rymon, and with the cooperation of the wildlife agencies from Pennsylvania and Maryland and the USFWS, nearly 60 young osprey were transported from the Chesapeake Bay area to the Hammond Lake and successfully fledged. Since 1995, several birds have returned to the Tioga,

Hammond, and Cowanesque Lakes area and nested. In 2001, there were 8 active nests in the area and 10 young. Six of the active nests are located on Corps property and six of the young were from these nests. This program has been instrumental in the reintroduction of the osprey to Pennsylvania.

The great blue heron (*Ardea herodias*) is not a state or federally listed threatened or endangered species. It is considered a vulnerable, but apparently secure, species in Pennsylvania. As discussed in Section 3.6.1 there were two heron rookeries identified within the vicinity of Cowanesque and Hammond Lakes. The nearest rookery is approximately 600 to 700 feet from the downstream end of the Corps fee title land and therefore would not be impacted by development or other activities at the lakes.

The Pennsylvania Fish and Boat Commission has reported that the timber rattlesnake is a species of concern for the project area. Timber rattlesnakes (*Crotalus horridus*) are commonly observed within the vicinity of Tioga and Hammond Lakes. During the summer months they usually reside in heavily forested areas, rocky hillsides, and fields bordered by forests. In early fall they migrate towards their winter hibernation dens, typically located in rocky outcrops with deep crevices leading well below the frost line. Until winter when they hibernate underground, they often congregate near the den opening, sunning on the warm rocks by day.

Timber rattlesnakes are threatened by overhunting, poaching, and habitat alteration. They are considered a candidate at risk in Pennsylvania and could potentially become endangered or threatened in the future. As a result, they are still protected and construction activities near known dens are usually restricted during periods of use (near and during hibernation periods). Once construction activities are finished, dens and habitats are restored. The Pennsylvania Game Commission may also require an inspector onsite during construction who can relocate any timber rattlesnakes discovered during construction activities. There is no current knowledge of any dens located on Corps property.

3.7 AIR QUALITY

The lakes are located in a rural area of Pennsylvania that exhibits good air quality, when compared to the rest of the state. The lakes are not a source of air contamination, and there are only minor sources of air contamination on the lake properties, primarily associated with vehicles. Tioga County is in attainment for all criteria pollutants, as defined by guidance pursuant to the Clean Air Act Amendments (40 CFR 81.321). Since the lake property does not have any significant sources of air contamination, it conforms to the State Implementation Plan.

3.8 HAZARDOUS, TOXIC, AND RADIOACTIVE SUBSTANCES

The Environmental Protection Agency (EPA) website was searched for EPA-regulated sites in the vicinity of Tioga, Hammond, and Cowanesque Lakes. Specific databases searched were the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS), National Priorities List (NPL), Resource Conservation and Recovery Act (RCRA),

and Leaking Underground Storage Tanks (LUST). The results indicated that there are no NPL or CERCLIS sites in Tioga County. The data within the RCRA and LUST lists are site specific, and were therefore not accessed.

EPA's Envirofacts Database was also searched for additional EPA-regulated sites. The query found six sites within the vicinity of Tioga, Hammond, and Cowanesque Lakes. Of the six results returned, four of the sites are in Lawrenceville or Lawrence Township, immediately downstream from the Cowanesque Dam, and one facility is in Tioga, four miles from Hammond Lake and 18 miles from Cowanesque Lake, and one facility is 25 miles away from Hammond Lake.

The Corps environmental compliance mission is to assure that all Corps facilities and associated lands (including outgrants) meet all applicable and appropriate environmental standards contained in relevant Federal, State and local laws and regulations. The program that accomplishes this mission is the environmental compliance inspection program, generally known as the "ERGO" program, which is named after the Environmental Review Guide for Operations (ERGO) manual which contains protocols for appropriate environmental compliance categories. This manual is the basis for the program of internal and external environmental audits conducted at all Corps properties. Lake personnel conduct an annual internal audit, and every five years non-lake personnel (District staff or contractors) conduct an external audit. Tioga, Hammond, and Cowanesque Lakes completed the Cycle III external audits in July 2001. This is the third set of external audits to be conducted since the inception of the program. No major or significant findings were reported from the Cycle III inspection. A copy of the report is available at the lake office and at the Baltimore District office.

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

3.9 RECREATION RESOURCES

As previously stated, the Tioga, Hammond and Cowanesque lakes provide flood control, water quality improvements, outdoor recreation opportunities, and fish and wildlife enhancement for north central Pennsylvania. Cowanesque Lake also provides water supply storage for the Susquehanna River Basin Commission. Recreation resources are available throughout the properties and consist of opportunities for active and passive recreation. Corps staff at the Ives Run Recreation Area manage the facilities at Tioga, Hammond, and Cowanesque Lakes (Figures 3-1, 3-2, and 3-3).

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 recreation complex consisting of three major recreation areas connected by 13,400 acres of semi-wilderness land. In addition to controlling flooding, the Tioga and Hammond dams provide water quality enhancements, outdoor recreation opportunities, and fish and wildlife enhancement.

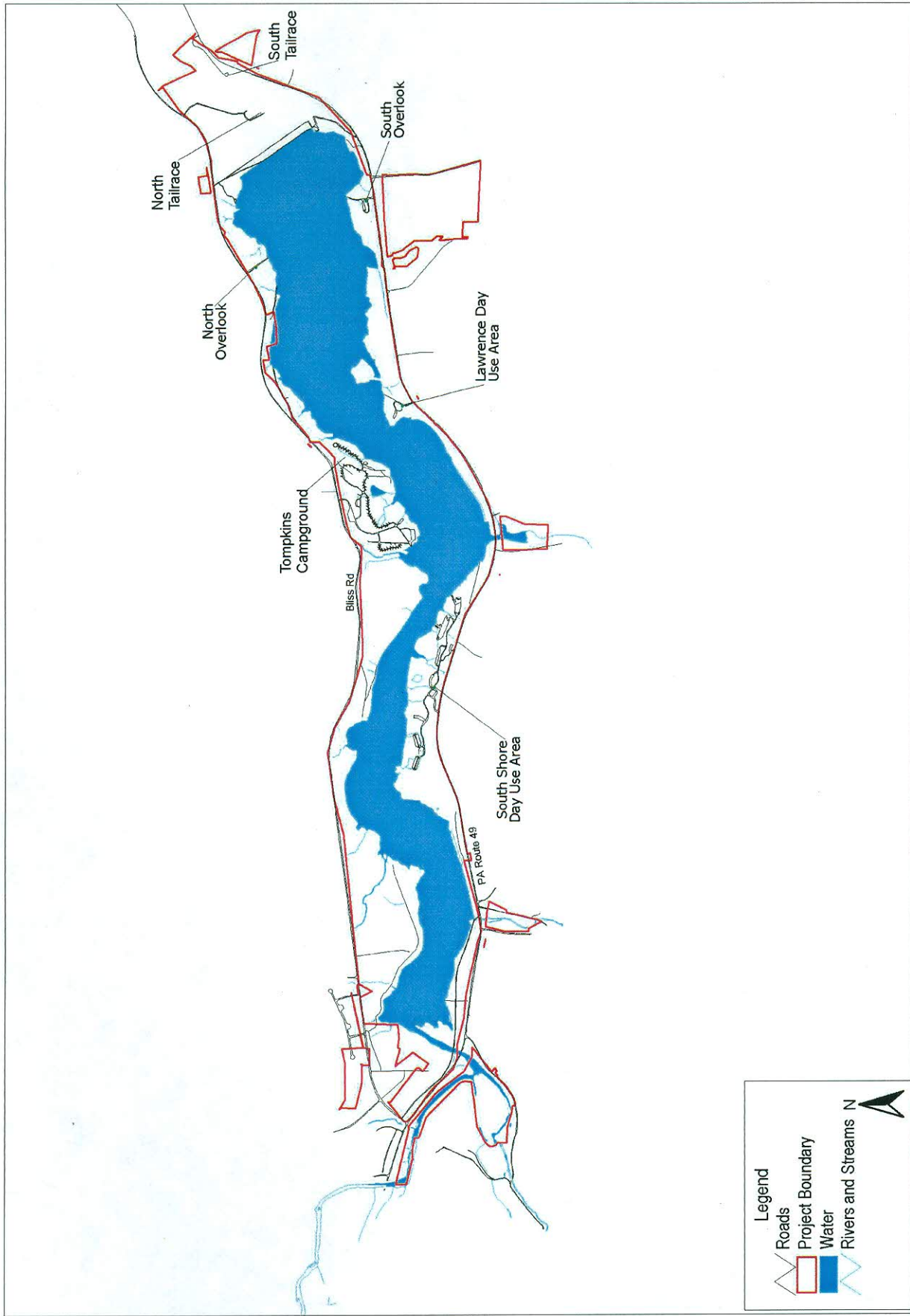


Figure 3-3
 Cowanesque Lake
 2001 Master Plan Update

ANNEX C TOC:

SECTION 1: LAND CLASSIFICATION

1.1	Operations	CA-1
1.2	Recreation	CA-2
1.3	Mitigation	CA-2
1.4	Environmentally Sensitive Areas	CA-2
1.5	Multiple Resource Management	CA-2
1.5.1	Recreation: Low Density.....	CA-5
1.5.2	Wildlife Management General	CA-5
1.5.3	Vegetation Management	CA-5
1.5.4	Inactive and/or Future Recreation Areas.....	CA-5
1.6	Easement Lands	CA-5

SECTION 2: MANAGEMENT GUIDELINES

2.1	Operational Management Plan Guidance	CA-7
2.2	Vegetation and Forest Management	CA-8
2.2.1	Existing Resources	CA-8
2.2.2	Management Objectives	CA-9
2.2.3	Management Practices.....	CA-10
2.3	Wildlife Management	CA-12
2.3.1	Existing Resources	CA-12
2.3.2	Management Objectives	CA-12
2.3.3	Management Practices.....	CA-13
2.4	Aquatic Habitat and Fisheries Management	CA-14
2.4.1	Existing Resources	CA-14
2.4.2	Management Objectives	CA-15
2.4.3	Management Practices.....	CA-15
2.5	Facility Maintenance and Management	CA-15
2.5.1	Existing Resources	CA-15
2.5.2	Management Objectives	CA-16
2.5.3	Management Practices.....	CA-16
2.6	Recreation	CA-16
2.6.1	Existing Resources	CA-16
2.6.2	Management Objectives	CA-16
2.6.3	Management Practices.....	CA-16

SECTION 3: RECOMMENDED PLAN

3.1	Description of Recommended Plan	CA-21
3.1.1	Recreational Features	CA-21
3.1.2	Natural Resource Management Enhancements	CA-21
3.2	Economic Benefits	CA-22
3.3	Analysis of Recommended Plan (NEPA/checklist)	CA-22
3.4	Implementation of Recommended Plan	CA-23
3.4.1	Administrative Requirements.....	CA-23
3.4.2	NEPA & 106 Requirements	CA-23

SECTION 1: LAND ALLOCATION AND CLASSIFICATION

COWANESQUE LAKE

The original authorization of Cowanesque Lake did not allocate specific acreage or specific areas of land for operations, recreation, fish and wildlife, or mitigation (EP 1130-2-550). However, the current allocation of all land uses is in accordance with the authorization (Section 2.1, Main Report), to include the reformulation study.

The lands of the Cowanesque Lake will continue to provide for sound development and resource management practices consistent with applicable laws and regulations. Accordingly, EP 1130-2-550, contains definitions for the six current land classifications, (1) project operations; (2) recreation; (3) mitigation; (4) environmental sensitive areas; (5) multiple resource management; and (6) easement lands. A description of each classification and the approximate acreage¹ are included in this section. The total project area equals approximately 2,734 acres, which includes approximately 1,085 acres of water and approximately 543 acres in relocations. The acreage for the lake and the relocations are not included in any of these land classification categories. The Cowanesque relocations include areas that are not actively managed for recreation or natural resources (i.e. the land for Bliss Road).

Figure C-A-1 is a representational map that depicts the visual relationship between the classifications. This map should only be used for planning purposes and should not be used for precise measurements. During update of the Cowanesque Lake Operational Management Plan (OMP), the staff should delineate these areas so that the coordinate and acreage information for each classification area can be established. The staff should maintain all future information within the Geographical Information System (GIS) database and layers, and should update this annex as appropriate. This task should be completed in close coordination with Real Estate Division since they are responsible for maintaining and reporting to higher authority on the acreage and utilization of Federal lands.

The lack of a precise delineation for these areas does not hinder implementation of the recommended plan (Section 3, Cowanesque Annex). All medium and high intensity future development will be contained within the existing recreation areas. However, the staff may want to update the acreage for the mitigation and multiple resource management areas prior to future low intensity recreation development (i.e. trails), and efforts to support natural resources management (i.e. vegetation management). This information can be used to support any future records of agreement between the Corps and partnering agencies.

1.1 Project Operations

This classification category includes land required for the operation, administration, or maintenance of the lake. Approximately 117 acres are allocated to Cowanesque Lake

¹ The acreage numbers are taken from the 1999 Report on Utilization of Civil Works Lands and Facilities (1999 Utilization Report).

operations. This acreage includes the dam and appurtenant structures, sewage treatment plants, the maintenance area at the campground, and the abandoned visitor's center and dam tender's residence.

1.2 Recreation

The recreation category includes land that is currently developed for intensive recreational activities by the visiting public. The existing recreation areas are utilized for medium and high intensive recreational uses, which range from picnicking and fishing to overnight camping. All areas are developed, at a minimum, with paved roads and parking areas. Approximately 276 acres are classified as recreation land at the Cowanesque Lake. These recreation areas include: Tompkins Campground, South Shore Day Use Area, Lawrence Recreation Area, South Tailrace Access Area, North Tailrace Access Area, South Overlook, and North Overlook.

1.3 Mitigation

This classification includes only lands acquired or designed specifically for mitigation. There are two reports that discuss the mitigation that was required due to the reformulation of the lake in the 1980s, (1) *An Evaluation of Fish and Wildlife Habitat, Project Effects and Mitigation Requirements for the Proposed Cowanesque Lake Reformulation Project* (USFWS, 1984); and (2) *GDM Phase II, Modification for Water Supply and Recreation* (COE, 1985). The 1985 GDM contains a map that conceptually depicts the land that should be maintained for mitigation. Neither report contains a precise acreage for the mitigation areas, or areas designated by coordinate information. According to the 1999 Utilization Report, there are approximately 713 acres of land maintained for terrestrial mitigation at Cowanesque Lake.

1.4 Environmental Sensitive Areas

Environmental Sensitive Areas are lands on which scientific, ecological, cultural or aesthetic features have been identified. The areas are typically located within one of the other classification categories and should be managed to insure that the sensitive areas are not adversely impacted by current and future actions. Agriculture and grazing areas are not permitted in these areas.

The only environmentally sensitive areas at Cowanesque Lake would be associated with the Osprey (*Pandion haliaetus*). These birds are a state threatened species and are ranked as imperiled in Pennsylvania. Restrictions for activity and development within the vicinity of osprey nests are similar to those of the bald eagle. Coordination to determine the details of these restrictions is ongoing between lake staff and the Pennsylvania Game Commission.

1.5 Multiple Resource Management

Lands classified as Multiple Resource Management areas are managed for one or more of, but are not limited to, the activities described in the following paragraphs. There is no land acreage in the Multiple Resource Management Category at Cowanesque Lake.

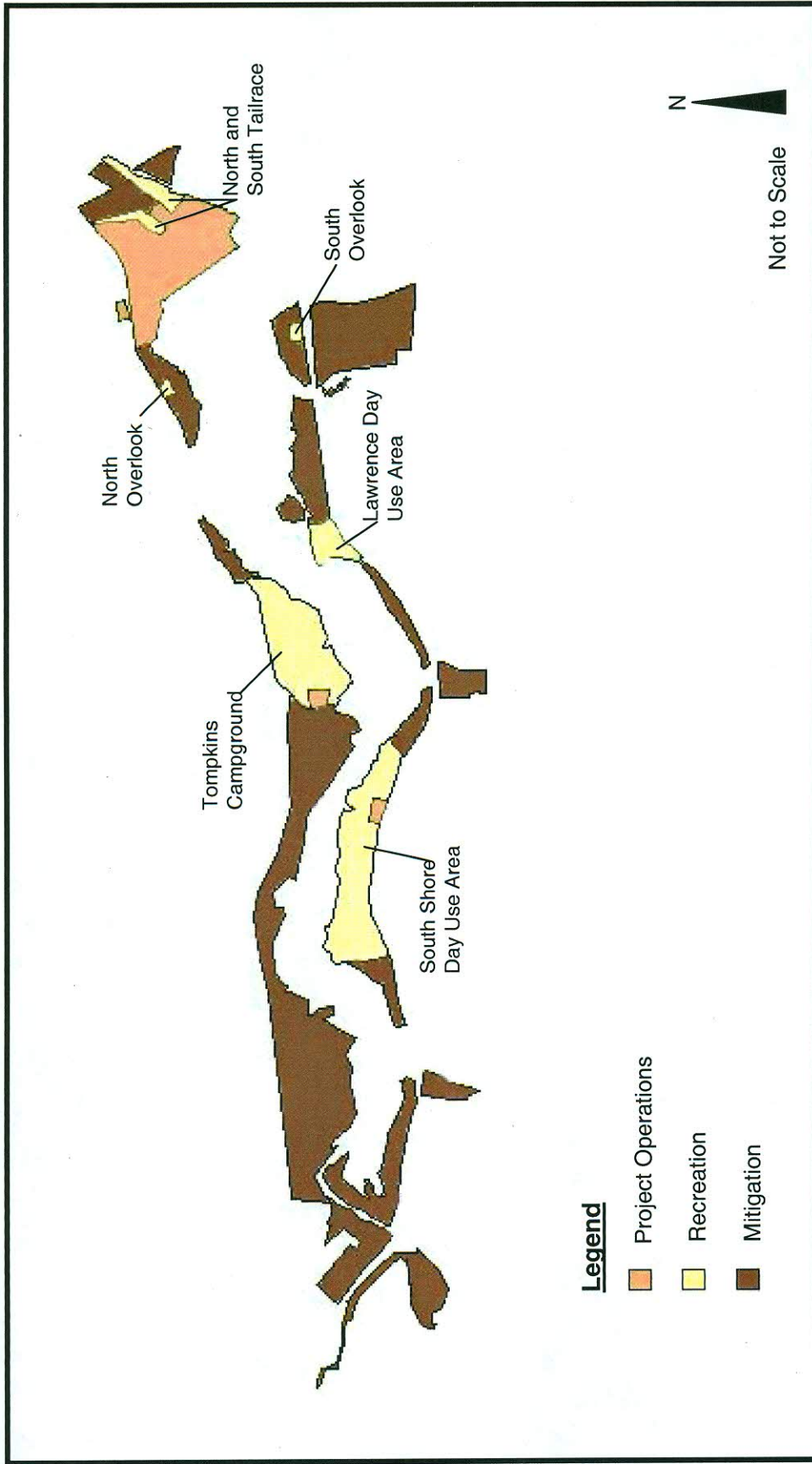


Figure CA-1
 Cowanesque Lake Land Use Classification
 2001 Master Plan Update

1.5.1 Recreation - Low Density

This sub-classification includes low-density recreation activities such as hiking, primitive camping, wildlife observation, hunting, or similar low-density recreation activities.

- Hiking – There is a three mile hiking trail (Moccasin Trail), located on the north side of the lake. The trail links the Tompkins Campground to Nelson, PA. The acreage for this area is included in the Mitigation and Recreation Category.
- Primitive Camping – There is one hike-in campground that is part of the Tompkins Campground system; the acreage is included in the Recreation Category. The hike-in campground has its own access road; both the main Tompkins and the hike-in campgrounds are accessed via Bliss Road. The distance between the two campground entrances is approximately 2,500 feet.
- Wildlife Observation – All lands, other than those posted “No Trespassing,” are open for wildlife observation activities.
- Hunting – Hunting is permitted on lake lands, except in posted, “No Hunting,” areas. Areas that are posted include all public use areas (i.e. designated recreation areas, and operations areas).

1.5.2 Wildlife Management General

This sub-classification includes lands classified for fish and wildlife management activities. Lands in this sub-category have been evaluated for consideration for lease or license to state wildlife management agencies.

1.5.3 Vegetation Management

This sub-classification includes lands, which are managed for the protection and development of forest and vegetative cover.

1.5.4 Inactive and/or Future Recreation Areas

Lands in this sub-classification include recreation areas planned for future development or that have been temporarily closed.

1.6 Easement Lands

This category includes lands for which the Corps holds an easement interest, but are not acquired in fee title. There are approximately 528 acres of easement land associated with Cowanesque Lake; this category is not shown on Figure C-A-1. Planned use and management of easement lands are in strict accordance with the terms and conditions of the easement estate acquired for the lake.

SECTION 2: NATIONAL MANAGEMENT GUIDELINES

The U.S. Army Corps of Engineers is the steward of nearly 12 million acres of land and water held in public trust at Corps civil works water resources projects nationwide. This acreage includes diverse natural resources such as fish, wildlife, forests, wetlands, rangelands, grasslands, soil, and water, all of which are components of larger communities and encompassing ecosystems. In accordance with ER/EP 1130-2-540 (COE, 1996), all programs and activities that are related to environmental stewardship and the management of natural resources shall be consistent with the following objectives and mission statement.

Objectives:

- To manage natural resources on Corps of Engineers administered land and water in accordance with ecosystem management principles, to ensure their continued availability.
- To provide a safe and healthful environment for visitors.

Mission Statement:

"The Army Corps of Engineers is the steward of the lands and waters at Corps water resources projects. Its Natural Resources Management Mission is to manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations.

In all aspects of natural and cultural resources management, the Corps promotes awareness of environmental values and adheres to sound environmental stewardship, protection, compliance and restoration practices.

The Corps manages for long-term public access to, and use of, the natural resources in cooperation with other Federal, State, and local agencies as well as the private sector.

The Corps integrates the management of diverse natural resource components such as fish, wildlife, forests, wetlands, grasslands, soil, air, and water with the provision of public recreation opportunities. The Corps conserves natural resources and provides public recreation opportunities that contribute to the quality of American life."

2.1 Project Operational Management Plan

In accordance with Corps policy, a number of management programs and plans have been developed to provide guidance for long- and short-range operations and management of the lake. The Operational Management Plan (OMP) establishes the management strategies, policies, guidelines, and procedures consistent with authorized purposes for the efficient and effective administration of the lake. The OMP contains detailed and inventory information of the resources, specific management practices and implementation plans.

The OMP is developed and implemented to achieve the objectives outlined in the master plan. Therefore, the OMP should be updated following completion of the current master plan update. The OMP is a separate document and will outline, in detail, the specific operation and administration requirements for the natural resources and park management, consistent with the attached master plan. The OMP is a working tool and will include funding needs, staffing needs, and time-frame requirements to implement these strategies. The existing *Cowanesque Lake Operational Management Plan* was completed in 1992.

The rest of this section summarizes the existing resources, and management objectives and practices for the natural resources and man-made facilities on fee-title land at Cowanesque Lake. Operation and management of the water control and water quality aspect of the lake is described in the *Master Manual for Reservoir Regulation Susquehanna River Basin, Volume 1-Upper Basin, Appendix F, Cowanesque Lake* (COE, 1990). This information is not included in this annex; a brief description of this information is included in Section 2.0 of the Master Plan document.

2.2 Vegetation and Forest Management

2.2.1 Existing Resources

The information in this section is taken from Section 3.6.4 of the Master Plan document.

Lands around Cowanesque Lake are comprised of grassland/open field, grass and hardwood shrub areas, and hardwood forests. 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 an area northeast of and within the Tompkins Recreation Area, an area midway between the Tompkins Recreation Area and the town of Nelson, surrounding the Nelson waterfalls and along the dry loop of the riverbed and the Baldwin Creek ravine. 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 for mitigation was set aside after 1990 to compensate for vegetation and habitat lost due to increasing the lake level from 1,045 to 1,080 NGVD (an increase in lake size of approximately 680 acres). The only lands that are not considered mitigation lands include those utilized for either recreation or operations. Approximately 97 acres were planted with

hedgerows as part of the wildlife habitat mitigation program. Areas that were developed with hedgerows include:

- an old borrow area, located across PA Route 49 from the South Overlook (currently not maintained),
- the northern side of the lake on either side of Nelson Cemetery along Bliss Road,
- an area on the south side of the lake between the Lawrence Recreation Area and Crooked Creek,
- the northern side of the lake in the vicinity of the Moccasin Trail (currently not maintained), and
- the land adjacent to the North Tailrace Fishing Access.

The wetlands information is taken from Section 3.6.3 of the Master Plan document. There are few areas of wetland systems within the vicinity of Cowanesque Lake. There is a moderately sized, impounded lacustrine wetland with many snags created when the lake was enlarged. This wetland is located along the southern shoreline of the lake, midway between the South Shore Day Use Area and the Lawrence Picnic Area. There are wetland mitigation areas throughout the western portion of the lake, notably the 14-acre area surrounding the constructed Strait Creek duck island and a 22-acre area at old Nelson. Alkali bulrush, arrowhead duck potato, giant smartweed, sago pondweed, wild celery, and giant wild rice were among the wetland plant species planted. There is a lacustrine emergent wetland near the small peninsula located at the southwestern corner of the lake, and a palustrine emergent wetland near Nelson Falls southwest of Cowanesque Lake just south of PA Route 49.

2.2.2 Management Objectives

General Natural Resources: In keeping with ER/EP 1130-2-540 and the authorized purposes, the lake's natural resources shall be managed through good stewardship and sound land management techniques to maintain and enhance the quality of the existing resources through an active management program designed to optimize their natural resource potential.

Vegetation: The general objectives for vegetation management are to preserve vegetation resources, while managing the vegetation for recreation, wildlife habitat, visual appeal, and diversity. Management objectives also include enhancement of the watershed to minimize runoff and silt deposits in the reservoir through soil erosion control, enhancement of the recreational use of the lake area, protection of the recreational areas, and control of pests and forest pathogens. Lands other than the areas designated for recreation and operations, will be classified as mitigation.

Forest: It is Corps policy that forest and woodland management will be applied to develop, maintain, protect, and/or improve vegetation conditions for timber, wildlife, soils, recreation, water quality, and other beneficial uses.

2.2.3 Management Practices and Recommendations

This section contains current management practices and recommendations for future management practices. Detailed information regarding inventories and annual work-plans will be addressed in the lake OMP.

Mitigation Land: According to the Modification for Water Supply and Recreation General Design Memorandum (GDM) (COE, 1995) the hedgerow plant species were to include forsythia, barberry, Asiatic crabapple, tatarian honeysuckle, Washington hawthorne, roselow Sargent crabapple, Grey dogwood, winterberry, amur honeysuckle, Austrian pine, scotch pine, and Norway spruce. The GDM also included a layout design for the hedgerows, which included spacing and specific plant placement. For unknown reasons, the exact plant species were not planted, and the layout as prescribed in the GDM was not followed. It is recommended that staff, in cooperation with the Pennsylvania Game Commission and the US Fish and Wildlife Service (USFWS), evaluate the existing mitigation areas against the GDM and formulate recommendations for the future management practices of these lands. This information should be updated and managed through the use of GIS layers and databases.

Timber Management: Timber harvesting has been authorized by Congress under Public Law 86-717, the Forest Cover Act. Federal policy in 16 USC 580m states:

"It is declared to be the policy of the United States to provide that reservoir areas of projects for flood control, navigation, hydroelectric power development, and other related purposes owned in fee and under the jurisdiction of the Secretary of the Army and the Chief of Engineers shall be developed and maintained so as to encourage, promote, and assure fully adequate and dependable future resources of readily available timber, through sustained yield programs, reforestation, and accepted conservation practices, and to increase the value of such areas for conservation, recreation, and other beneficial uses: Provided, that such development and management shall be accomplished to the extent practicable and compatible with other uses of the project."

ER 405-1-12 Chapter 11, Section XII (COE, 1980), also identifies the regulations permitting the sale of small lots of timber by installation commanders and project managers of civil works projects. This regulation, as updated by CERE-MM Memorandum (31 July 1995), permits the sell of small lots of standing timber with a value of not more than \$5,000.00. Such sales must be in conformance with the lake management plan and the total of such sales will not exceed \$30,000.00 in any one calendar year.

The existing OMP contains an ecological unit map that was updated after the reformulation in 1990. Timber management activities will likely be completed for the management of wildlife habitat in coordination with the mitigation plan.

Pest Management: The oak-hickory forest type is the dominant forest on lake lands. The primary pest species that affects these forest resources (especially oak species) is the gypsy moth (*Lymantria dispar*). The larvae of the gypsy moth starts feeding on tree leaves in late May and may continue into July. Defoliation, caused by the heavy feeding of gypsy moth caterpillars, is a

threat to vegetation, particularly trees. It weakens trees and increases their vulnerability to other insects and diseases that may kill them (USDA, 1995). Adverse changes, as a result of defoliation, could include increased water temperature, increased dissolved oxygen levels, and changes in pH levels. These changes could not only have an adverse effect on water quality in a stream, but also on the existing aquatic wildlife and vegetation (USDA, 1995b). The gypsy moth is a cyclic pest, which reaches population peaks anywhere between five to eight years. The gypsy moth population has been in decline in the area since 1992. Table C-A-1 lists the years and the treated areas at Cowanesque Lake (information in the table was taken from the current OMP and annual Pesticide Reports prepared by the lake). There has been no severe defoliation due to gypsy populations at the lake since 1992. However, because of the gypsy moth's potential impact on recreation and vegetation, the activity of the species should continue to be monitored annually. It is recommended that the updated OMP include a monitoring plan, and that a GIS layer and database be prepared to track the annual monitoring activities.

Year	Area and Acreage	Insecticide
1983 ²	Acreage and area not included in OMP	<i>Bacillus thuringiensis</i> (Bt)
1990 ³	102 Acres Tompkins Campground	Bt
1991 ²	555 Acres Throughout section areas – no distinguishing between lakes.	Bt Sevin 4L – on miscellaneous trees
1992 ²	583 Acres Throughout section areas – no distinguishing between lakes.	Bt Sevin 4L – on miscellaneous trees

Erosion Management: Because the entire area has been glaciated, soil types in the area are numerous and varied. The River valleys consist of unconsolidated deposits which vary both vertically and laterally in thickness and composition. In the floodplain area itself, thin deposits of recent alluvium (mud and sand) exist, underlain by stratified coarser river-related deposits of sand, gravel, and boulders. Interspersed between these are finer sands, silts and clays which generally were deposited in localized ponds. Table 3-1⁴ in the Master Plan document lists the soil types present at the lake and their erosion hazard. The Nelson Falls area at the east end of Cowanesque Lake shows visible signs of erosion.

Wetlands: The current OMP does not contain any management prescriptions for the existing wetlands. The Master Plan includes a recommendation to develop interpretive trails along the circumference of existing wetlands and enhance their waterfowl habitat. Specific locations will be addressed in the update of the OMP.

Wildland Fire Management: As directed by sections within ER 1130-2-540, OMPs must address all aspects of wildland fire management. This management includes both wildland fire

² Information from current OMP

³ Information from annual Pesticide Reports

⁴ Information from the June 1981 NRCS Soil Survey

management and controlled burns for management of lake lands. The Forest Cover Act provides the authority for the Corps to utilize fire management for the protection and enhancement of wildlife habitats. This section of the OMP should be updated to include any changes in Corps policy.

2.3 Wildlife Management

2.3.1 Existing Resources

The information in this section is taken from Section 3.6.1 of the Master Plan document. Due to the large proportion of forest/wooded areas around the lake most of the wildlife species will be those which depend on or utilize wooded habitats. Appendix A, Tables A-5 to A-8, provide a list of wildlife species that may occur within the various habitats at the lake. Wildlife management activities have been conducted by the Corps in coordination with the Pennsylvania Game Commission.

There is an active bald eagles' nest located across from the Lawrence Recreational Area on the north side of the lake. The immature eagle had already fledged at the time of the July Corps Survey and only the male was observed near the nest.

Lake areas also provide habitat for numerous non-game bird species including migratory passerine species, bald eagles, osprey, and great blue heron. There are six active osprey nests currently in use on the property associated with Hammond, Tioga, and Cowanesque Lake. There are two additional active nests located outside of Corps property near Cowanesque Lake. An osprey survey conducted by the Corps on July 31, 2001 indicated that young were observed at four of the six nests located within Corps property. Three young were observed around Cowanesque Lake and three were observed around the Hammond Area. Since the survey, one of the off-site nests located near Cowanesque Lake was destroyed during a storm and arrangements are underway to reconstruct an osprey pole nearer to the lake.

There is also a heron rookery located approximately 4000 feet downstream of Cowanesque Lake. This is an active rookery and is occupied by great blue heron.

2.3.2 Management Objectives

The Cowanesque Lake wildlife management objectives as identified in the current Cowanesque OMP are to:

1. provide wildlife for recreational purposes (hunting, observation, photography, and aesthetics);
2. propagate and enhance wildlife species and their habitats;
3. develop waterfowl habitat and encourage waterfowl within designated areas; and
4. restore the osprey (*Pandion haliaetus*) to a breeding status.

See the following section for a recommendation on the update of these objectives.

2.3.3 Management Practices and Recommendations

All four wildlife management objectives (previous section) should be included in the update of the lake OMP; however, some revisions are recommended. The second objective should be revised to read, (Objective 2) propagate and enhance wildlife species and their habitat in accordance with the mitigation plan and appropriate resource agencies. The fourth objective should be modified to read, (Objective 4) to maintain the osprey breeding populations in coordination with the U.S. Fish and Wildlife Service (USFWS) and the Pennsylvania Game Commission. Additionally, a fifth objective should be added to read, (Objective 5) to participate in the recovery of Federally listed species.

Objective 4 Information: Between 1989 and 1994, the lake staff conducted a very successful osprey (Pennsylvania threatened species) hacking program. Under the guidance of Dr. Larry Rymon and in cooperation with the USFWS and agencies from Pennsylvania and Maryland, nearly 60 young osprey were transported from the Chesapeake Bay area to the three lake area. In 2001, there were eight active nests (six on Corps property) in the area and ten young. It is recommended that the Corps continue the annual nest monitoring. It is also recommended that the Corps, in coordination with the Pennsylvania Game Commission, develop a management plan specifically for the osprey. As part of the plan, a GIS layer and database should be prepared to track the annual monitoring and management activities.

Objective 5 Information: The USFWS has documented that there is an abandoned bald eagle nest outside of Corps property on the northwestern side of Hammond Lake. This nest was last documented as active by the Pennsylvania Game Commission in 1998. The bald eagle is classified as a federally threatened species and as a state endangered species with a critically imperiled/imperiled status. Pennsylvania is included in two recovery plans, (1) the Northern States Bald Eagle Recovery Plan (DOI, 1983); and (2) the Chesapeake Bay Region Bald Eagle Recovery Plan (DOI, 1990). Each plan includes a table listing management actions and the responsible agency. The project should participate in the recovery of Federally listed species is by undertaking the designated actions for the Corps, as ascribed in the Fish and Wildlife Service/National Marine Fisheries Service Recovery Plans. Although the bald eagle has been proposed for removal from the Endangered Species Act protections, it is still considered a Federally threatened species and the bald eagle recovery plans are still valid. This objective is also a Civil Works Environment - Natural Resources Performance Measure.

On 19 October 1976, the Pennsylvania Game Commission and the Corps signed a MOU to cooperate in the management of wildlife at the Tioga, Hammond, and Cowanesque Lakes project. The MOU was amended in 1979 to specify Pennsylvania Game Commission management responsibilities at the Big Rift area (Tioga Lake). The 1976 Pennsylvania Game Commission and the Corps MOU identifies the responsibilities for the wildlife management and the enforcement of Pennsylvania game laws at Tioga, Hammond, and Cowanesque Lakes. This MOU should be reviewed and updated as necessary in coordination with the Pennsylvania Game Commission. For example, Section C, paragraph 7 states that the MOU is only an interim agreement, pending the implementation of the Fish and Wildlife Management Plan (Appendix D, 1974 Master Plan), and in the 1990's this appendix was replaced by current OMP sections. Once this master plan update is finalized, the current OMP will be updated with up-to-date resource

inventories, objectives, and site-specific projects. While the current OMP will be updated in coordination with the Pennsylvania Game Commission (and other resource agencies), it would be good management practice to review this MOU for update needs.

In general, wildlife management practices are closely tied to forest management practices; by managing the forest to create a greater diversity in forest types, a greater diversity in the allied wildlife communities will result. Areas designated as suitable for wildlife management by the updated ecological inventory, will be planted in food producing trees, shrubs and grasses, which would be utilized by various bird and mammal species. The specific vegetative species will depend on soil type, moisture content, aspect, slope, and other site specific characteristics.

The current OMP addresses management practices surrounding wild turkey, ruffed grouse, woodcock, osprey, morning dove, wood duck, mallard, eastern bluebird, deer, rabbit, and squirrels. All of these practices should be reviewed and updated as appropriate.

Nuisance Goose Control: In the last eight to ten years, the resident population of Canada Geese has dramatically increased at Cowanesque Lake. Numerous complaints have been received from the public regarding the problems of nuisance geese, mainly at the beaches and boat launches. Since the staff does not have the manpower to properly harass geese and prevent them returning to these areas, they have been working with the Pennsylvania Game Commission to develop plans to deter geese from specific lake areas. It is recommended that the lake staff continue to work closely with the Pennsylvania Game Commission, and that the staff investigate and possibly implement methods that have worked at other Corps and state projects.

2.4 Aquatic Habitat and Fisheries Management

2.4.1 Existing Resources

This information in this section is taken from section 3.6.2 of the Master Plan document. Cowanesque Lake supports a moderately diverse, healthy fish community (Table A-13 of Master Plan Appendix A) including a variety of sport, forage, and rough species. Unlike Hammond and Tioga Lakes, the bottom of the upstream end of Cowanesque Lake was not cleared and leveled prior to inundation from reformulation. As a result, there is adequate near shore cover to sustain many fish populations. The eastern portion of the lake directly adjacent to the dam is protected by rip rap which provides a stable rock habitat for fish. The southern shoreline generally lacks submerged structures except for isolated beds of submerged aquatic macrophytes and inundated brush. The northern shoreline varies with shallow and steep sloping banks. The west end of Cowanesque Lake contains the most extensive areas of submerged aquatic habitat as a result of prior mitigation. There are extensive areas of submerged aquatic macrophytes and inundated timber and brush, providing excellent fish habitat.

The Pennsylvania Fish and Boat Commission has conducted stocking programs for various pan and game fish species to supplement the naturally occurring fish populations. Stocked species include tiger muskellunge, walleye, largemouth bass, black crappie, yellow perch and channel catfish.

The 1998 404A Report for Cowanesque Lake indicated that growth rates for pumpkin seed, bluegill, and yellow perch exceeded the state average. Although black crappie were the most abundant panfish caught during the sampling, its growth rate is below the state average across all year classes. The lake's most prevalent gamefish is the largemouth bass which is growing at or above the state average. Growth rates and catch rates of largemouth bass have declined at a greater magnitude than anticipated. This is attributed to high turbidity and rapid fluctuations in water levels which can affect year classes. Analysis of the relationship between the largemouth bass population and the panfish community indicates imbalance and lack of forage or inability to utilize forage. Smallmouth bass and walleye populations were found to be depressed and it was recommended to abandon efforts to establish a walleye fishery in Cowanesque Lake. Muskellunge populations seem to be thriving with equal number of pure and tiger muskellunge.

2.4.2 Management Objectives

The objectives for the existing fish management plan (current OMP) are:

1. to create and maintain a lake fishery habitat that is favorable to both game and non-game fish species; and
2. to provide optimal fishing opportunities for visitors in the lakes and streams.

2.4.3 Management Practices and Recommendations

In addition to the existing management objectives, it is recommended that the following objectives be added during the update of the OMP:

- Regulate outflows, as directed by Water Control Management Section, for flood control purposes, to maintain and improve the warm-water fishery conditions in the Cowanesque and Tioga Rivers downstream of the dam, and to regulate the outflow for acid neutralization.
- Inform visitors about the management programs and their place within the overall resource management picture of the lake.

The Corps is ultimately responsible for the fisheries management; however, the Pennsylvania Fish and Boat Commission is recognized as the responsible state agency for the regulation of fishing and boating laws within the waters of the Commonwealth. On 28 February 1977, the Corps and the Pennsylvania Fish and Boat Commission signed a MOU for fish management and the enforcement of fishing and boating laws at the Tioga, Hammond, and Cowanesque Lakes. The Pennsylvania Fish and Boat Commission exclusively handles fish stocking, and the lake land and water are available for management activities.

2.5 Facility Maintenance and Management

2.5.1 Existing Resources

Facility management includes the operation and maintenance of the flood control and appurtenant structures, mechanical equipment, recreational facilities, and associated lands and roads. The maintenance program at all three lakes is accomplished by a combination of Corps employees (permanent and seasonal), contractor personnel, and volunteers. The combined work

force provides any necessary repairs and improvements to facilities, which results in a quality lake that functions without failure and one that the public can enjoy.

2.5.2 Management Objectives

In general, the current maintenance program objective is for the maintenance staff to work together to achieve a well planned routine of inspections and preventive maintenance that result in a quality lake that the public can enjoy at all times and that functions without failure during times of emergency.

2.5.3 Management Practices and Recommendations

The lake staff operates an efficient, timely, and aggressive program designed to carry out the goals of the Tioga, Hammond and Cowanesque Lakes. It is recommended that the following specific management objectives be included in the updated OMP:

- Maintain a safe working environment for lake staff.
- Maintain a safe recreating environment for the visiting public.
- Maintain the lake's physical structure, facilities, and equipment in good working order.
- Enhance the Corps' image through high maintenance standards.

Maintenance at Cowanesque Lake is performed in accordance with the Operations & Maintenance Manual, Dams and Appurtenances (COE, 1990)

It is recommended that the lake staff update the current OMP sections for maintenance, and incorporate applicable maintenance information and tasks into the GIS layers and database.

2.6 Recreation

2.6.1 Existing Resources

In addition to controlling flooding, the Cowanesque dam provides water quality enhancements, outdoor recreation opportunities, and fish and wildlife enhancement.

The existing recreation areas at the Cowanesque Lake includes the Tompkins Campground, South Shore Day Use Area, Lawrence Picnic Area, North and South Overlooks, and the North and South Tailrace Fishing Access Areas.

2.6.2 Management Objectives

It is the objective of the recreation management program at all three lakes to achieve continued enjoyment and maximum sustained use of the public lands, waters, forests, and associated recreation facilities, consistent with their carrying capacity and natural values.

2.6.3 Management Practices and Recommendations

Section 3 of this annex describes the plan for future development of recreation resources at Cowanesque Lake. Additionally, a Table C-A-2 is included that compares recreation facilities that were recommended in the original master plan, the reformulation GDM, that exist as of the 2001 recreation season, and that are recommended in this update of the master plan.

It is recommended that all of the existing recreation facilities be included in the GIS (point or vector information, as appropriate) and that an associated database be developed which includes a facilities inventory.

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