BRADDOCK LOCKS AND DAM HYDROELECTRIC PROJECT (FERC NO. P-13739)

PRE-APPLICATION DOCUMENT

Prepared by:

LOCK+ HYDRO FRIENDS FUND XLII

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For copies of this Pre-Application Document, please contact:

Mark R. Stover
Vice President of Corporate Affairs
Hydro Green Energy, LLC
Representative for Lock+ Hydro Friends Fund XLII
900 Oakmont Lane, Suite 310
Westmont, IL 60559
Phone: 877-556-6566 ext. 711
mark@hgenergy.com

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LIST OF ACRONYMS

°C .....degrees Celsius
°F.....degrees Fahrenheit
µg/g .....micrograms per gram
µS .....microsiemens
ACED.....Allegheny County Economic Development
ALCOSAN.....Allegheny County Sanitary Authority
AMRB .....Allegheny/Monongahela River Basin
APE .....area of potential effects
B.P.....before present
BHP .....Bureau for Historic Preservation
BOD .....biochemical oxygen demand
CEII.....Critical Energy Infrastructure Information
CFR.....Code of Federal Regulations
cfs.....cubic feet per second
CRGIS .....Cultural Resources Geographic Information System
DO .....dissolved oxygen
FEIS .....Final Environmental Impact Statement
FERC or Commission .....Federal Energy Regulatory Commission
FPA .....Federal Power Act
GIS .....geographic information systems
GISCP .....Governor's Invasive Species Council of Pennsylvania
HFF .....Hydro Friends Fund
HGE .....Hydro Green Energy, LLC
HUC .....Hydrologic Unit Code
Hydro Friends Fund .....Lock+ Hydro Friends Fund XLII, LLC
JAPM .....Joint Agency/Public Meeting
km .....kilometer
kV.....kilovolt
LFM .....Large Frame Module
mg/L.....milligrams per liter
MNC .....Monongahela Navigation Company

MW .....megawatt
MWh .....megawatt hour
National Register .....National Register of Historic Places
NGOs .....non-governmental organizations
NOAA .....National Oceanic and Atmospheric Administration
NOI .....Notice of Intent
NPDES .....National Pollutant Discharge Elimination System
NPS .....National Park Service
NWI .....National Wetlands Inventory
NWQA .....National Water-Quality Assessment
ORSANCO .....Ohio River Valley Water Sanitation Commission
PAD .....Pre-Application Document
PADCNR .....Pennsylvania Department of Conservation and Natural Resources
PADEP .....Pennsylvania Department of Environmental Protection
PE .....proposed endangered
PEL .....Probable Effects Level
PennDOT .....Pennsylvania Department of Transportation
PHMC .....Pennsylvania Historical and Museum Commission
PNDI .....Pennsylvania Natural Diversity Inventory
PNHP .....Pennsylvania Natural Heritage Program
PURPA.....Public Utility Regulatory Policies Act of 1978
RIDC .....Regional Industrial Development Corporation
RM .....river mile
RTE .....rare, threatened, and endangered
SHPO .....State Historic Preservation Officer
TDS .....Total Dissolved Solids
TLP .....Traditional Licensing Process
TMDL .....total maximum daily loads
USACE .....U.S. Army Corps of Engineers
USBM .....U.S. Bureau of Mines
USEPA .....U.S. Environmental Protection Agency

USFWS .....U.S. Fish and Wildlife Service

USGS .....U.S. Geological Survey

1.0 INTRODUCTION AND BACKGROUND

Lock+ Hydro Friends Fund XLII, LLC (Hydro Friends Fund), a wholly owned project development subsidiary of Hydro Green Energy, LLC (HGE) of Westmont, IL, is pursuing an original license from the Federal Energy Regulatory Commission (FERC or Commission) for the proposed Braddock Locks and Dam Hydroelectric Project (FERC No. 13739) ("Braddock Locks and Dam Project" or "Braddock Project" or "Project"). The proposed Project is located in Allegheny County, Pennsylvania, and would utilize the head effect of the existing U.S. Army Corps of Engineers' (USACE) Braddock Locks and Dam, located on the Monongahela River. On April 13, 2011, the Commission, under the authority granted to it by Congress under the Federal Power Act (FPA), 16 U.S.C. § 791(a), *et seq*., issued a 3-year preliminary permit to Hydro Friends Fund to conduct investigations and secure necessary data to determine the feasibility of the proposed Project and to prepare a license application. Hydro Friends Fund has prepared this Pre-Application Document (PAD) and associated Notice of Intent (NOI) pursuant to 18 Code of Federal Regulations (CFR) §§ 5.5 and 5.6 of the Commission's regulations. The filing of this PAD and the associated NOI mark the formal start of the Commission's licensing process.

Hydro Friends Fund proposes to utilize technology provided by HGE. HGE possesses proprietary hydropower technology and is focused on the development of new hydropower generation at existing non-powered dams in an environmentally responsible and cost-competitive fashion. The technology for deployment at the Braddock Locks and Dam is known as "Dam+™" and is based on over 130 years of hydropower production in the United States, as well as methods and designs commonly used for fabrication and installation of modular offshore oil, gas, and liquefied natural gas systems. The Dam+™ power generating system is comprised almost entirely of components that are "off the shelf," dramatically reducing product development time and increasing operational integrity. The system is modular in nature, which simplifies installation, operations, and maintenance.

More specifically, the proposed Project will deploy hydropower turbines within a "Large Frame Module" (LFM) that will be deployed on the left (looking downstream) side of the dam, opposite the location of the existing navigational locks. As discussed in the preliminary permit, the

hydropower installation will require some modification of the existing dam to allow for the hydropower system. The extent of the work required, and the specific details of that modification, will be finalized after additional consultation with USACE and addressed in the license application. HGE's technology eliminates the need for a traditional powerhouse and provides for the development of hydropower generation in a manner that minimizes the civil work, costly installation processes, and environmental effects associated with conventional hydropower. Additionally, the proposed Project footprint is small, and the proposed technology is designed to be installed and operated without interfering with USACE's navigational mission and with limited interaction with the USACE infrastructure. HGE's hydrokinetic power project in Hastings, Minnesota (FERC No. 4306) successfully demonstrated a similar modular hydropower technology.

This PAD provides existing, relevant, and reasonably available information to the Commission and interested stakeholders to enable these entities to identify issues and related information needs, develop study requests and study plans, and prepare documents analyzing any license application that may be filed with the Commission. In accordance with 18 CFR §§ 5.5 and 5.6 of the Commission's regulations, Hydro Friends Fund exercised due diligence in preparation of this PAD by contacting appropriate governmental agencies, non-governmental organizations (NGOs), Native American tribes, and others potentially having information pertinent to this licensing by distributing a PAD Questionnaire designed specifically to identify existing, relevant, and reasonably available information related to the Project. In preparation for this PAD, Hydro Friends Fund staff visited the project site, developed and distributed the PAD questionnaire on October 14, 2011 and met at length with staff for USACE in Pittsburgh, PA in August 2011 (see Appendix A for Consultation and Correspondence). Hydro Friends Fund staff also conducted stakeholder outreach at a November 2011 Hydropower Summit in Harrisburg, PA.

As described in this PAD and the associated NOI, Hydro Friends Fund is requesting to use the Traditional Licensing Process (TLP) in support of this licensing effort. Hydro Friends Fund's formal request for authorization to use the TLP and justification for this request, as required by 18 CFR § 5.3, is included in the NOI that is being filed simultaneously with this PAD.

As provided in 18 CFR § 5.8 of the Commission's regulations, FERC will review this PAD and associated NOI. Within 60 days of the PAD and NOI being filed, FERC will issue notice of the commencement of the licensing proceeding and act on Hydro Friends Fund's request to use the TLP. If FERC grants Hydro Friends Fund permission to use the TLP, within 30 to 60 days of the notice, Hydro Friends Fund will hold a Joint Agency/Public Meeting and site visit.

2.0 PURPOSE OF PRE-APPLICATION DOCUMENT

The filing of this PAD and the associated NOI by Hydro Friends Fund marks the formal start of the licensing process for the proposed Braddock Locks and Dam Project. The purpose of this PAD is to provide a description of the existing and proposed Project facilities and operations. The PAD is also intended to be a source of existing, relevant, and reasonably available information and data related to the proposed Project area and the environment associated with the proposed Project. Furthermore, the PAD is intended to enable resource agencies and interested parties to identify potential resource issues and related informational needs, and to develop study requests (18 CFR § 5.6(b)).

2.1 Search for Existing, Relevant, and Reasonably Available Information

Hydro Friends Fund has undertaken an extensive search to identify and review information potentially relevant to the licensing of the proposed Braddock Locks and Dam Project. Hydro Friends Fund's search for relevant information included a review of existing documents from a number of sources, including Internet databases, federal and state resource agencies, the USACE, NGOs, universities, and municipalities, as well as documents related to previous development activities at the Braddock site. In addition to these sources, Hydro Friends Fund conducted reviews of relevant comprehensive planning documents, geographic information systems (GIS) data, and publicly available environmental assessments and reports.

As described above, Hydro Friends Fund also distributed a PAD Information Questionnaire to over 100 potentially interested parties to solicit additional sources of existing and reasonably available information relevant to the proposed Project and its vicinity. A copy of the PAD information questionnaire, as well as a list of the parties who received the document, is provided in Appendices A and B of this PAD. A total of ten parties responded to the survey. Copies of the completed surveys are also included in Appendix A of this PAD. Hydro Friends Fund reviewed each of the returned surveys and identified documents believed to be potentially relevant to the proposed Braddock Locks and Dam Project. These documents have been acquired and/or reviewed, and their relevance determined. Relevant information has been summarized in the various resource-oriented sections of this document, and Section 9.0 of this

PAD contains an overall summary of this information. A bibliography of relevant literature is provided in Section 10.0 of this PAD.

2.2 Description of Consultation Process Undertaken by Hydro Friends Fund Prior to the Submittal of the PAD

Hydro Friends Fund has undertaken initial stakeholder consultation in advance of filing this PAD. The purpose of these outreach activities was to: (1) notify the proposed Project's stakeholders of the upcoming licensing activities, (2) identify available information, and (3) identify likely study needs in advance of the start of the formal licensing process.

Hydro Friends Fund's preliminary consultation began with the identification of parties potentially interested in the licensing of the proposed Braddock Locks and Dam Project. As noted above, Hydro Friends Fund mailed a PAD questionnaire to over 100 potentially interested parties in an attempt to solicit any existing, relevant, and reasonably available information regarding the proposed Project, the USACE's Braddock Locks and Dam, and the surrounding environment, and to obtain a better understanding of the parties' interest in the licensing process. Appendix B of this PAD presents the list of stakeholders who received a copy of the PAD questionnaire. The responses received from the distribution of the PAD questionnaire were then used to create the distribution list for the PAD.

In separate letters dated October 28, 2011, Hydro Friends Fund contacted the Pennsylvania Department of Environmental Protection (PADEP), Pennsylvania Department of Conservation and Natural Resource (PADCNR), Pennsylvania Historical and Museum Commission (PHMC) Bureau for Historic Preservation (BHP), and U.S. Fish and Wildlife Service (USFWS). PADEP was asked to provide a federal consistency review regarding the applicability of the Commonwealth's coastal zone policies to the proposed Project, and the PADCNR and USFWS were asked to provide information on rare, threatened, and endangered (RTE) species within the proposed Project vicinity. The PHMC BHP was contacted in order to obtain information on historical and cultural resources that may have the potential to be affected by the proposed Project. As stated above, Hydro Friends Fund staff met with USACE in August 2011, and has had numerous information exchanges and consultations since then.

3.0 PROCESS PLAN, SCHEDULE, AND PROTOCOLS

As outlined in Table 3-1, Hydro Friends Fund has prepared a Process Plan and Schedule that incorporates the overall TLP schedule for this licensing.

TABLE 3-1
BRADDOCK PROJECT PROPOSED TRADITIONAL LICENSING PROCESS PLAN AND SCHEDULE

Activity	Responsible Party	Regulation or Timeframe	Proposed Date
Stage 1 Consultation			
File NOI and PAD, request to use TLP with FERC, and distribute to stakeholders	Hydro Friends Fund (HFF)	18 CFR § 5.3, 5.5, and 5.6	12/23/2011
File verification of December 22 public notice of NOI, PAD, and TLP request in local newspaper	HFF	18 CFR § 5.3	1/3/2011
Initiate tribal consultation	FERC	18 CFR § 5.7 [within 30 days of filing of NOI]	1/23/2012
FERC notices NOI/PAD and grants request to use TLP	FERC		2/21/2012
Provide FERC with written notice of Joint Agency/Public Meeting	HFF	18 CFR § 4.38 (b)(3)(i) [15 days prior to JAPM]	3/7/2012
Hold Joint Agency/Public Meeting	HFF	18 CFR § 4.38 (b)(3)(ii) [30-60 days after FERC grants use of TLP]	3/22/2012
File comments on PAD and study requests with HFF	Stakeholders	18 CFR § 4.38 (b)(3)(ii) [60 days after JAPM]	5/21/2012
Stage 2 Consultation			
Conduct studies	HFF		2/2012 - 6/2012
Issue study report(s) to stakeholders	HFF		8/1/2012
Issue Draft License Application to stakeholders	HFF	18 CFR § 4.38(c)(4) [90-day comment period]	9/1/2012
File comments on Draft License Application	Stakeholders	18 CFR § 4.38(c)(5)	11/30/2012
File Final License Application with FERC	HFF	18 CFR § 4.38(c)(9)	12/31/2012

1. If the due date falls on a weekend or holiday, the deadline is the following business day.
2. All Director's determinations are subject to request for rehearing to FERC pursuant to 18 CFR § 375.301(a) and § 385.713. Any request for rehearing must be filed within 30 days of determination.

JAPM = Joint Agency/Public Meeting

4.0 PROJECT LOCATION, FACILITIES, AND OPERATIONS

4.1 Potential Applicant

The potential applicant is Lock+ Hydro Friends Fund XLII, a wholly owned project development subsidiary of Hydro Green Energy, LLC of Westmont, IL.

The mailing address for the potential applicant is as follows:

Lock+ ™ Hydro Friends Fund XLII
900 Oakmont Lane, Suite 310
Westmont, IL 60559

The exact names and business addresses of the persons authorized to act as an agent for the potential applicant are:

Wayne F. Krouse
Managing Partner
Lock+ ™ Hydro Friends Fund XLII
900 Oakmont Lane, Suite 310
Westmont, IL 60559
(877) 556-6566
wayne@hgenergy.com

Mr. Mark Stover
Vice President of Corporate Affairs
Hydro Green Energy, LLC
Designated Representative of Lock+ ™ Hydro Friends Fund XLII
900 Oakmont Lane, Suite 310
Westmont, IL 60559
(877) 556-6566, ext. 711
mark@hgenergy.com

4.2 Project Location

The proposed Project is located at the USACE Braddock Locks and Dam, which is located on the Monongahela River in Allegheny County, Pennsylvania. Braddock Locks and Dam is one of nine navigational structures that provide year-round navigation on the Monongahela River between Pittsburgh, Pennsylvania, and Fairmont, West Virginia. A pool is maintained for 12.6 miles upstream to Locks and Dam 3 at Elizabeth, Pennsylvania. Located at river mile (RM) 11.2 at the City of Braddock, Pennsylvania, the lock chambers and operations buildings are situated

along the right bank of the river adjacent to a major steel-making plant (see Appendix C for a proposed Project location map). Road access to the USACE Braddock Locks and Dam is from 11th Street in Braddock (USACE 2011a, 2011b).

4.3 Existing Project Facilities

With the exception of minor infrastructure to deliver power to the local electric grid, the proposed Project will have limited effect on any structures or facilities of the Braddock Locks and Dam. For reference purposes, the following is description of the Braddock Locks and Dam.

The Braddock Locks and Dam was built from 1902 to 1906 and underwent a reconstruction that ended in 1953. Recently, its fixed crest dam was replaced with a gated dam. The Braddock Locks and Dam is comprised of a 721-foot gated dam, a land-side lock that is 110 feet wide and 720 feet long, and a river-side lock that is 56 feet wide by 360 feet long. These locks provide an 8.7-foot vertical lift (Port of Pittsburgh Commission undated).

4.4 Existing Project Operations at the Braddock Locks and Dam

The Braddock Locks and Dam is operated by the USACE and is manned during routine business hours during a routine 5-day workweek and utilizes lockage schedules. The Braddock Locks and Dam is operated as a run-of-river facility in order to maintain a near-constant upper pool, and is operated for navigational purposes on the Monongahela River.

4.5 Proposed New Project Facilities and Integrated Operations

4.5.1 Project Boundary

The proposed Project Boundary will encompass the footprint of the LFM, which consists of an area immediately downstream and upstream from the dam, as well as the proposed new transmission line. The proposed Project Boundary also encompasses certain land for a proposed new switchyard (containing a new transformer) and control room (Appendix C). The proposed Project would be developed in close coordination with the USACE, which controls the access to and the facilities of the Braddock Locks and Dam; however, the proposed Project will interact physically with the dam, but as stated earlier, the detailed description of that interaction will be provided at a later date after further consultations with USACE. Hydro Friends Fund anticipates

entering into a Memorandum of Agreement with the USACE in which Hydro Friends Fund will lease lands from the USACE to obtain sufficient rights to construct the proposed Project and to maintain Project structures and facilities for Project operation. Hydro Friends Fund may need to lease land at the south abutment from a railroad company for access during installation and/or for site operations access.

4.5.2 Proposed Project Facilities

The proposed Project will consist of one LFM that is approximately 55 feet long and 40 feet high that contains five hydropower turbines, which will be installed in a single row, along with flow-control door assemblies that can open and close off flow to the units during an event that would require a suspension of generation. The LFM will be placed at the dam on the side of the dam furthest away from the navigational lock. If needed, the LFM would be housed between two pre-fabricated concrete walls that would serve to guide flow into the turbines downstream of the dam (essentially acting as a conduit).If needed, the LFM will be anchored to new pilings in the river bed.

Critical Energy Infrastructure (CEII) Appendix A contains early design phase images of the proposed Project facilities. For security and intellectual property reasons, these drawings are being filed separately as CEII.

4.5.2.1 Reservoir Gross Storage Capacity and Normal Maximum Water Surface Area and Elevation

The existing facilities at the Braddock Locks and Dam will be used to facilitate hydro generation, and the proposed Project will operate in run-of-river fashion; therefore, it will not impound additional water or result in additional storage capacity and the USACE will continue to control reservoir levels. The normal pool elevation for the Braddock pool is 718.7 feet above mean sea level (msl) (USACE 2011a) and the storage capacity of the Braddock Locks and Dam at crest elevation is 1,190 acre-feet. Typical elevation of the downstream Emsworth pool is 710 feet msl.

4.5.2.2 Number, Type, and Hydraulic Capacities of Turbines and Generators, and Installed (Rated) Capacity of Proposed Turbines or Generators

The proposed Project will utilize a five-turbine LFM deployed downstream of the Braddock Locks and Dam. Each of the low-head modular bulb turbines will have an installed capacity of approximately 750 kW based on a design head of 8.7 feet and an approximate diameter of 7 feet. The entire system of low-head modular bulb turbines will produce approximately 3.75 MW from generator to grid, based on data and efficiency calculations conducted by HGE. However, the HGE low-head modular bulb turbine is undergoing additional design work (some design work through a grant program provided by the U.S. Department of Energy) at the present time and the capacity may change. The final installed, minimum, and maximum capacities will be known during the preparation of the license application.

4.5.2.3 Number, Length, Voltage, and Interconnections of Any Primary Transmission Lines Proposed to be Included as Part of the Project

Interconnection opportunities are currently being investigated and preliminary options are being pursued. Hydro Friends Fund anticipates that the generated power will connect to the electric grid with the installation of a new transformer in a small, new switchyard and a new line to an existing substation (Appendix C). A low-voltage, 36.7-kilovolt (kV) (or less) distribution line will run from the hydropower station to the new switchyard that is approximately 25 feet by 50 feet. If required, a 69-kV transmission line will run approximately 3,000 feet from the switchyard to connect to an existing substation. However, as this proposed Project is still in the design phase, and transmission options are still under analysis, future licensing documents will provide additional detail.

4.5.3 Energy Production

The proposed Project will consist of five low-head bulb hydro turbines embedded into a patented and patented-pending LFM. Total proposed Project output is estimated at 25,020 megawatt hours (MWh) per year. The estimated average monthly generation is provided below in Table 4-1.

TABLE 4-1
ESTIMATED AVERAGE MONTHLY GENERATION

Month	Estimated Average per Month (MWh)
January	2,268
February	2,196
March	2,410
April	2,395
May	2,409
June	2,183
July	2,030
August	1,656
September	1,348
October	1,784
November	2,018
December	2,323
Total	**25,020**

4.5.4 Proposed Project Operation

The proposed Project will operate in run-of-river mode, generating power using the head differential of the USACE's dam without affecting the USACE's operations. A computerized operating system will assure a consistent run-of-river operation. It is anticipated that HGE staff will be on site daily. The Applicant intends to provide USACE with operational override capabilities in the event of emergencies scenarios.

4.5.5 New Facilities or Components to be Constructed, Plans for Future Development or Rehabilitation of the Project, and Changes in Project Operation

As described in Sections 4.5.2 through 4.5.4, the proposed Project will include the LFM and appurtenant transmission and substation facilities.

The Applicant has no plans for future development or installation at the Braddock Locks and Dam at this time, beyond that associated with the proposed development described above.

5.0 DESCRIPTION OF EXISTING ENVIRONMENTAL RESOURCES AND POTENTIAL RESOURCE IMPACTS

5.1 Description of the Basin

5.1.1 Drainage Area and Length of River

The Monongahela River originates in the Allegheny Plateau in Marion County, West Virginia, and flows north for 128 miles through Marion and Monongalia counties in West Virginia. The river continues to the confluence with the Alleghany River in Pittsburgh, Pennsylvania, forming the Ohio River at an elevation of 694.23 feet msl. The Monongahela River is formed by the confluence of the Tygart Valley and West Fork rivers at an elevation of approximately 2,359 feet msl near Fairmont, West Virginia. The proposed Project is located within the Lower Monongahela River Watershed (Hydrologic Unit Code [HUC] 5020005) of the Monongahela River Sub Basin. The Monongahela River Sub Basin, located within the Ohio River Basin, drains an area of 7,340 square miles of Maryland, Pennsylvania, and West Virginia. The main stem of the Monongahela extends 128 miles from just above Fairmont, West Virginia, to the Point at Pittsburgh, flowing northerly, and the USACE maintains nine locks and dams on the river (Committee on Water Quality Improvement for the Pittsburgh Region, National Research Council 2005). The Monongahela River drains approximately 7,337 square miles of the basin at Braddock Locks and Dam (U.S. Geological Survey [USGS] 2011a). The main stem of the river has an average stream gradient of 1.15 feet per mile. The Braddock Locks and Dam is at RM 11.2 of the Monongahela River (USACE 2011b).

5.1.2 Major Land and Water Uses

The land within the Monongahela Watershed is predominantly forested or used for agricultural purposes (about 80 percent, or 5,909 square miles). The remaining land uses are industrial and urban development (about 20 percent, or 1,477 square miles). Due to rough terrain and poor soils in the area, most agricultural lands extend east and west from the Monongahela River, with dairy farming and livestock-rearing being the dominant agricultural use (PADEP 2003).

Industrial and urban development is primarily located along the river valley. Mining of coal, sand, and limestone, and extraction of oil and natural gas are the major industries within the

Monongahela River Basin. The proposed Project is located in the Pittsburgh metropolitan area, which is characterized by urban and industrial development and has a history of extractive mining.

The major consumptive water use for the Monongahela River is for industrial and commercial activities. Public water supply is a secondary consumptive source for the river, particularly in the Pittsburgh area. Non-consumptive uses of the Monongahela River include navigation, hydroelectric generation, and recreation. Nine navigation locks and dams owned and operated by the USACE are located along the 128 miles of the river and aid with the commercial shipping of products such as coal. Recreational activities include boating, fishing, and some whitewater sports in the river's upper reaches (USGS 2000).

5.1.3 Dams and Diversions within the Basin

In addition to the Braddock Locks and Dam, there are eight other locks and dams along the Monongahela River. Six locks and dams are located on the Monongahela River from Braddock, Pennsylvania, to 79 miles upstream at Point Marion, Pennsylvania. Located 12.6 miles upstream of the Braddock Locks and Dam is the USACE's Locks and Dam No. 3 in Elizabeth, Pennsylvania (USACE 2004). Refer to Figures 5-1 and 5-2 for river profiles and dams/diversions within the basin.

Table 5-1 provides information on the existing locks and dams along the Monongahela River that are owned and operated by the USACE.

5.1.4 Tributary and Rivers and Streams

The Monongahela River is a large watershed comprised of six sub-watersheds. Moving upstream, the major sub-watersheds are the Youghiogheny River, Lower Monongahela River, Upper Monongahela River, Cheat River, Tygart Valley River, and West Fork River. The largest tributaries on the Monongahela River are the Cheat and Youghiogheny rivers (West Virginia Department of Environmental Protection 2000). Additionally, there are many smaller tributaries including Turtle Creek, Thompson Run, Streets Run, Homestead Run, and Peters Creek.

TABLE 5-1
EXISTING LOCKS AND DAMS ON THE MONONGAHELA RIVER THAT ARE OWNED AND OPERATED BY THE USACE

Locks and Dams	River	River Mile
Braddock	Monongahela	11.2
Locks & Dam 3	Monongahela	23.8
Locks & Dam 4	Monongahela	41.5
Maxwell	Monongahela	61.2
Grays Landing	Monongahela	82.0
Point Marion	Monongahela	90.8
Morgantown	Monongahela	102.0
Hildebrand Lock	Monongahela	108.0
Opekiska Lock	Monongahela	115.4

5.2 Topography, Geology, and Soils

5.2.1 Existing Environment

The basin, including the proposed Project area, is included within the Appalachian Plateaus Physiographic Province. Exposed geologic formations in this Province are sedimentary in origin and Pennsylvanian or Permian in age. Quaternary age alluvial deposits are also present along lakes, rivers, and streams in this Province. Glacial deposits are absent from the region since the area is beyond the southern limit of Pleistocene glacial advances (West Virginia Geological and Economic Survey 2005). The land surface is underlain by sedimentary rocks (sandstone, shale, coal, and limestone) of Pennsylvanian, Mississippian, and Devonian age that are fractured and have been faulted and folded in many areas. A layer of weathered rock material, and Quaternary glaciofluvial deposits, and alluvium sits on top of the bedrock. The weathered rock material is generally thin (less than 20 feet), the glaciofluvial deposits commonly range in thickness from 20 to 500 feet, and the alluvium is generally less than 100 feet thick (USGS 1995).

Relief is generally greatest in the southeastern mountainous areas where the valleys are wide with steep sides and the uplands are broad, linear ridges. The relief is lowest and valleys and uplands are wide in the northern areas that have been eroded by glacial activity (USGS 1995).

FIGURE 5-1
MONONGAHELA EXISTING RIVER PROFILE

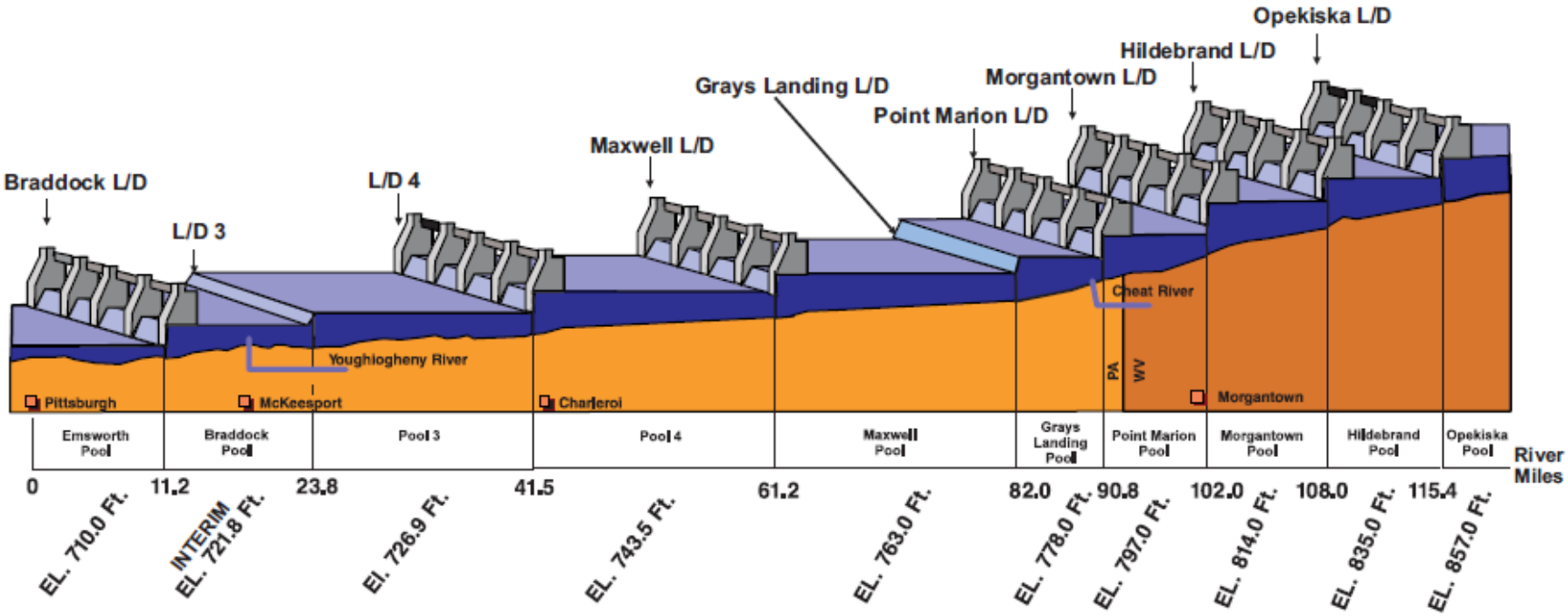


Figure Source: U.S. ACOE 2004 The Monongahela River (http://www.lrp.usace.army.mil/nav/nav.htm)

FIGURE 5-2
USACE PITTSBURGH DISTRICT DAMS AND DIVERSIONS ALONG THE MONONGAHELA RIVER AND THE LARGER OHIO RIVER BASIN

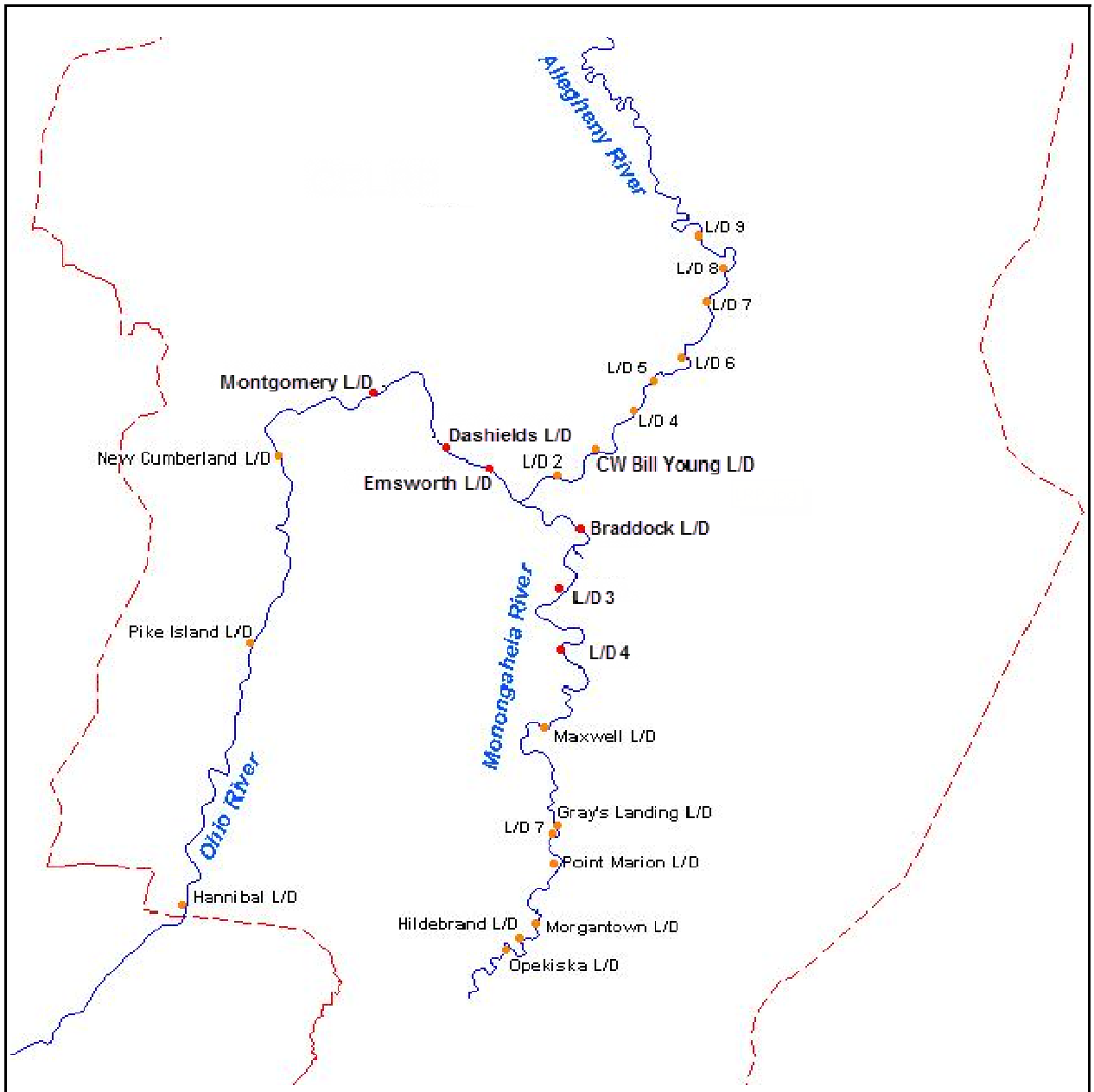


Figure Source: Pittsburgh District, U.S. Army Corps of Engineers (http://ourrivers.lrh.usace.army.mil/Locks/lp.htm)
* Figure has been modified to include the full names of the Braddock Locks and Dam (Braddock L/D) and CW Bill Young Lock and Dam (CW BillYoung L/D).

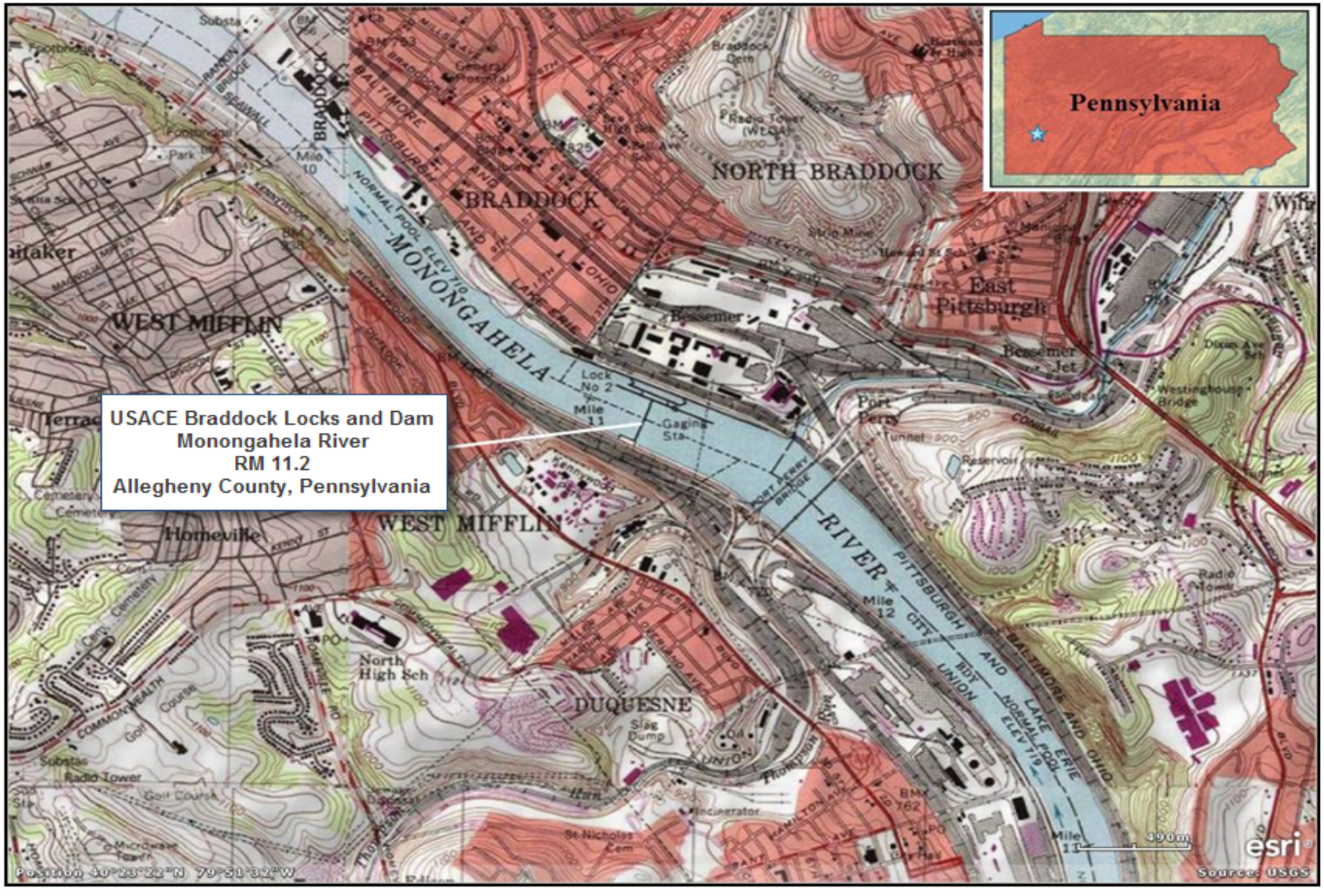
Geologic formations in the proposed Project's vicinity are relatively flat-lying, horizontally bedded, Pennsylvanian age, sedimentary deposits. The sedimentary deposits have a slight westward dip and are generally thin gradually from east to west. The Pennsylvanian age sedimentary deposits are part of a relatively thick sequence of interbedded sandstone and shale with occasional calcareous shale, limestone, and coal deposits.

The present topography was formed by regional uplift of the sedimentary deposits during the Appalachian Orogeny in the Permian Period. Following regional uplift, deposition of new material ceased and erosion of exposed sedimentary layers began. The continued erosion of the sedimentary deposits over the remainder of geologic time gradually formed the ridge and valley structures that make up the present topography. The result is a dendritic pattern of relatively steep valleys and high ridges throughout the Appalachian Plateau Province. The ridges and steep valleys are formed by gradual erosion of the sedimentary layers by rivers, streams, and intermittent drainage features of the region (USGS - U.S. Bureau of Mines [USBM] 1968). Figure 5-3 presents a topography map of the proposed Project area.

Although the geologic formations are relatively flat lying and they regionally thin and dip from the east to the west, the presence of several anticlines and synclines can cause this trend to be disrupted in some locations. The anticline and syncline structures are generally broad and flat, but some cause locally steeper dips in the structure. The overall trend of these structures is northeast to southwest, although locally, variations can trend to the north and even northwest (USGS-USBM 1968).

Soils in the region are generally derived in place from physical and chemical weathering of the bedrock materials. Because of the steepness of the landscape and erodibility of the geology, the soil cover along the ridges and valleys in the region tends to be relatively thin. Soil sequences along ridges and valleys are commonly 3 to 4 feet thick overlying the sedimentary bedrock. Thicker soil sequences may be present in benches on valley slopes, or at the base of the valleys, in floodplains, and along stream terraces. Soil sequences in these areas are typically 5 feet or more in thickness overlying the sedimentary bedrock (U.S. Department of Agriculture Soil Conservation Service 1977).

FIGURE 5-3
TOPOGRAPHY SURROUNDING THE USACE BRADDOCK LOCKS AND DAM



5.2.1.1 Coal Resources

Sedimentary beds deposited during the Pennsylvanian Period contain large bituminous coal seams in the western half of the Commonwealth. The coal beds are of significant economic interest and are mined in many locations where they are of sufficient thickness. Allegheny County is within the Main Bituminous Field of Pennsylvania; specifically within the area of high volatile bituminous coal (Allegheny County Economic Development [ACED] Planning Division 2008). See Figure 5-4 for the geographic distribution of coal resources in Pennsylvania (Pennsylvania Bureau of Topographic and Geographic Survey 1992).

5.2.1.2 Geological Features

The geology of the proposed Project's area consists of sedimentary formations primarily composed of sandstone, siltstone, and shale. In the site vicinity, these deposits are part of the Pennsylvanian age Conemaugh and Monongahela Formations. The Pennsylvanian Washington Formation (i.e., Dunkard Group) is also present near the tops of ridges to the west of the Monongahela River. Occasional limestone or calcareous shale deposits and coal deposits are present within the sandstone and shale of these formations (McColloch and McColloch 2005).

Structural Geology/Seismicity

The geologic materials are relatively flat lying with gradual thinning and dipping from east to west. Faulting is generally absent from bedrock exposures visible at the ground surface (Hennen and Reger 1913). Jointing is present in the Pennsylvanian sedimentary deposits. Joints typically have a principal set with strike direction to the north-northeast and a secondary set approximately perpendicular to the primary set (Carlston 1958). The National Seismic Hazard Mapping Project developed by the USGS states that there are no faults within 100 miles of the proposed Braddock Locks and Dam Project.

Dam Site Geology

The proposed Project is located within the Casselman Formation (Figure 5-5). The primary rock type is shale and the secondary rock type is siltstone (Pennsylvania Bureau of Topographic and Geologic Survey, Department of Conservation and Natural Resources 2001). Records of specific

geologic materials encountered at the dam sites were not available for use in preparation of this PAD.

FIGURE 5-4
GEOGRAPHIC DISTRIBUTION OF COAL IN PENNSYLVANIA

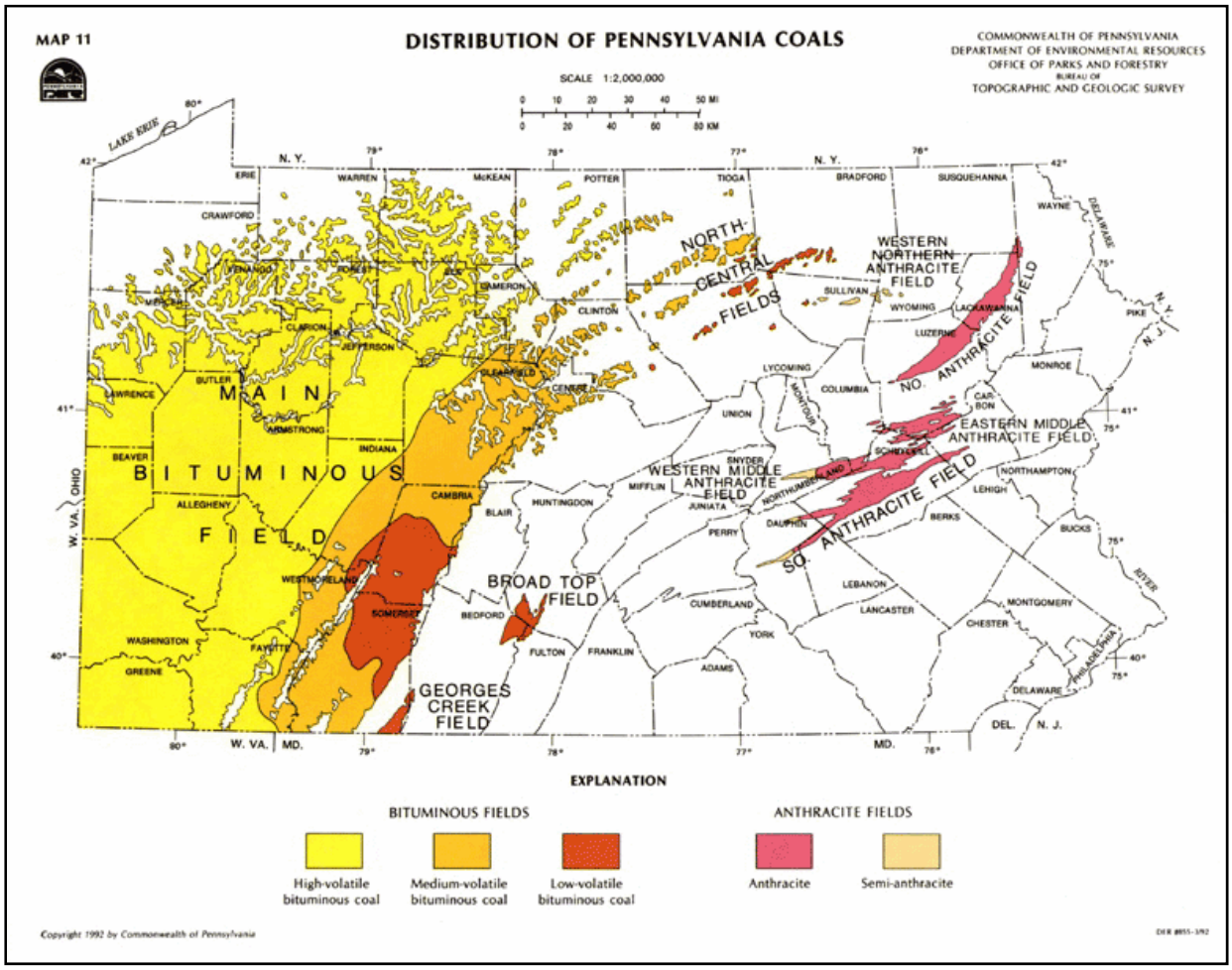


Figure Source: Pennsylvania Bureau of Topographic and Geographic Survey 1992

5.2.1.3 Soils

Figure 5-6 presents a map of the soils located near the proposed Project, and Table 5-2 presents definitions for the map unit symbols associated with Figure 5-6. The soil map units represent soils or miscellaneous areas within the survey area. Map unit delineation on a soil map represents an area that is dominated by one or more major soil types. Soils in areas of steep slope are commonly shallow, weakly developed, poorly drained, and have low fertility and high erosion potential. Soils on gentler slopes and soils over unconsolidated sediments are commonly deep, well-drained, and fertile (USGS 1995).

FIGURE 5-5
GEOLOGY SURROUNDING THE USACE BRADDOCK LOCKS AND DAM

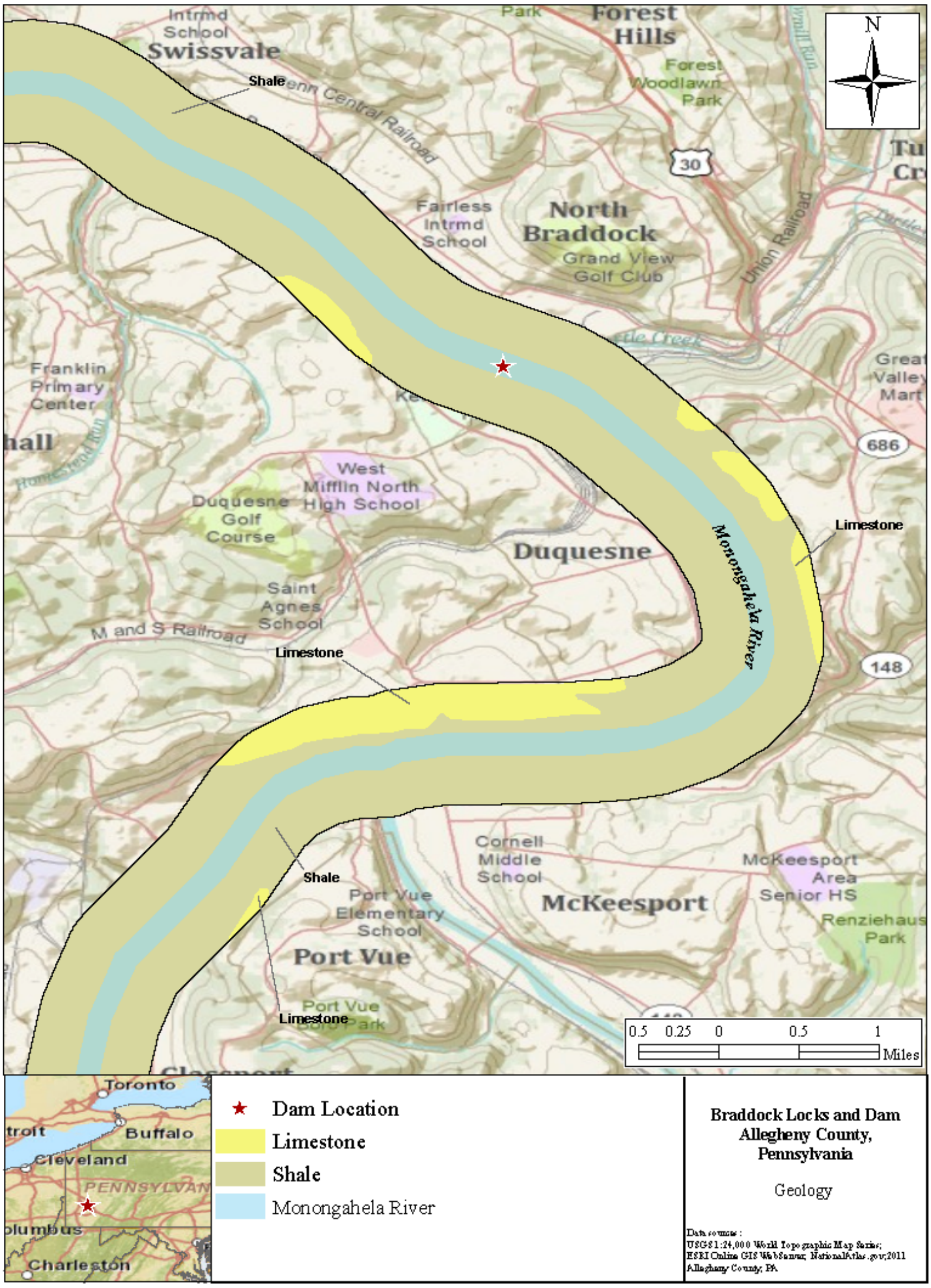


FIGURE 5-6
SOILS SURROUNDING THE USACE BRADDOCK LOCKS AND DAM

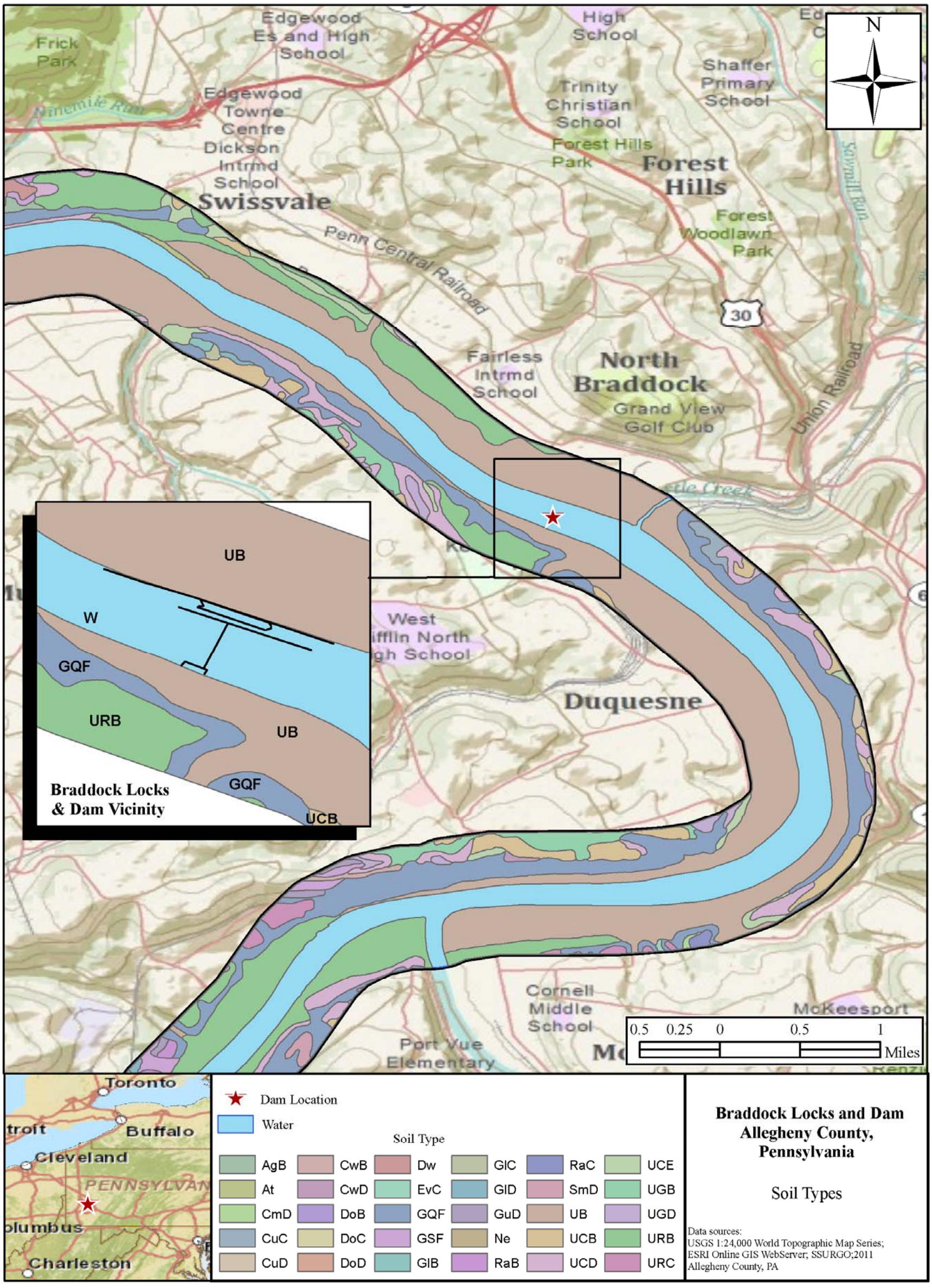


TABLE 5-2
SOIL TYPES SURROUNDING PROPOSED BRADDOCK PROJECT
(COMPANION TABLE TO FIGURE 5-6)

Map Unit Symbol	Map Unit Name and Slope
GQF	Gilpin-Upshur complex, very steep
UB	Urban land, consociation
URB	Urban land-Rainsboro complex, gently sloping
W	Water

5.2.1.4 Reservoir Shoreline and Streambanks

The proposed Project will not use or create a reservoir, and therefore, will have no effect on current shoreline uses or management. However, it is noteworthy to mention that based on the mapped soil types, soils in the vicinity of the proposed Project have been significantly modified with urban fill and the existing shoreline consists primarily of gravelly soils formed on outwash deposits. The river-right bank of the Monongahela River at the proposed Project is flanked by a concrete embankment that comprises part of the locks structure; the remaining shoreline is buffered by rock rip-rap.

5.3 Water Resources

5.3.1 Existing Environment

5.3.1.1 Drainage Area

Real-time hydrologic information was obtained from a USGS gaging station (Gage No. 03085000) located at the USACE Braddock Locks and Dam on the Monongahela River. The gage is located at 40°23'28" latitude and 79°51'30" longitude. The contributing drainage area of the gage is 7,337 square miles.

5.3.1.2 Monthly Minimum, Mean, and Maximum Flows

USGS Gage No. 03085000 was used to calculate the minimum, mean, and maximum monthly flows passing through the USACE Braddock Locks and Dam (Table 5-3).

5.3.1.3 Monthly Flow Duration Curves

Annual and monthly flow duration curves have been developed for the proposed Project from USGS Gage No. 03085000 located at the USACE Braddock Locks and Dam on the Monongahela River in Allegheny County, Pennsylvania. The flow duration curves are presented in Appendix D.

TABLE 5-3
USACE BRADDOCK LOCKS AND DAM HYDROLOGIC DATA 1943-2004

Month	Average Flow (cfs)	Minimum Flow (cfs)	Maximum Flow (cfs)	10% Exceedance (cfs)	90% Exceedance (cfs)
January	17,552	1,290	188,000	35,500	4,209
February	20,691	1,300	135,000	39,600	5,554
March	24,266	2,170	171,000	44,810	8,427
April	18,642	2,650	140,000	33,800	6,169
May	14,770	1,710	121,000	32,310	3,929
June	9,216	1,340	158,000	20,810	2,310
July	6,296	1,180	88,100	13,200	1,880
August	5,747	1,040	144,000	11,810	1,820
September	4,980	703	117,000	9,396	1,710
October	5,390	828	162,000	10,600	1,750
November	9,569	720	154,000	19,700	2,229
December	15,496	1,000	112,000	30,520	3,834
Annual	12,692	703	188,000	29,500	2,300

cfs = cubic feet per second

5.3.1.4 Existing and Proposed Uses of Project Waters

The Braddock Locks and Dam is operated as a run-of-river facility in order to maintain a near-constant headwater elevation for upstream navigation purposes. It is currently maintained as part of the larger USACE Monongahela River Locks and Dams system, which provides slack water navigation on the entire length of the river from Pittsburgh, Pennsylvania, to above Fairmont, West Virginia. Hydro Friends Fund's development of hydroelectric generation capabilities will not affect current USACE operation and use of the Braddock Locks and Dams.

There are no known water withdrawal sites located within the proposed Project's vicinity or immediately upstream of the proposed Project. Eight National Pollutant Discharge Elimination System (NPDES) permit sites have previously been authorized as point discharge sources in the vicinity of the proposed Braddock Project (Table 5-4).

5.3.1.5 Existing Instream Flow Uses

The Monongahela River is used for navigation and recreational activities. Other than the mainstem of the Monongahela River, there are no anticipated Project-affected streams associated with the proposed Project. The proposed Project has no potential to affect other existing water rights or uses.

TABLE 5-4
NPDES PERMITTED DISCHARGES TO THE MONONGAHELA RIVER ADJACENT TO THE PROPOSED BRADDOCK PROJECT

NPDES ID	Facility Name	Site Description	Status of Permit
PAG066102	Braddock Borough	Sewerage Systems	Expired
PA0217387	Braddock Plant	Industrial Gases	Expired
PAR806127	Braddock Terminal	General Warehousing and Storage	Expired
PA0094510	Edgar Thomson Plant	Steel Works	Expired
PAR606124	Josh Steel Company	Scrap and Waste Materials	Expired
PAR606125	Josh Steel Company	Scrap and Waste Materials	Expired
PAG066114	North Braddock Borough	Sewerage Systems	Expired
PAG066105	Rankin Borough	Sewerage Systems	Expired

Note: Data obtained from U.S. Environmental Protection Agency (USEPA) Envirofacts Data Warehouse (USEPA 2011)

5.3.1.6 Federally Approved Water Quality Standards

Pennsylvania has five protected use designation categories, as pursuant to 25 PA Code §93.3: Aquatic Life, Water Supply, Recreation and Fish Consumption, Special Protection, and Other. Minimum use designations that apply to all Pennsylvania surface waters include:

- Warm Water Fishes
- Potable/Industrial/Livestock/Wildlife Water Supply
- Irrigation
- Boating
- Fishing
- Water Contact Sports
- Esthetics

The majority of the water bodies within the Monongahela River Watershed have been designated as having life and human health use. Protected water uses pertinent to the proposed Project include warm water fisheries and navigation (State of Pennsylvania 1979). Thirty-six streams within the Monongahela River basin are listed as 303(d) impaired waters for reporting year 2004[1]. Of those, only two—Turtle Creek and Ninemile Run—are located within the proposed

[1] The 2006 303(d) list from Pennsylvania was approved by USEPA on May 10, 2007. USEPA is currently obtaining an electronic version of this submittal for data entry into this system. Until that process is complete, USEPA is currently using the State's 2004 submittal, which was approved by USEPA on June 01, 2005.

Project's vicinity (Table 5-5). Title 25, Chapter 93 of Pennsylvania Code outlines the water quality standards for Pennsylvania warm water fisheries and trout waters (Table 5-6).

5.3.1.7 Existing Water Quality Data

The lower Monongahela and its tributaries have been extensively studied by federal and state agencies and NGOs. The Commonwealth of Pennsylvania is a member of the Ohio River Valley Water Sanitation Commission (ORSANCO). ORSANCO is an interstate council comprised of eight states and the federal government, who work collectively to set Ohio River Basin discharge pollution control standards and coordinate the control and abatement of pollution in the Ohio River Basin (ORSANCO 2011). The Pennsylvania Department of Environmental Protection monitors the quality of state waters and enforces the water quality regulations and standards set forth by the state and by ORSANCO.

Readily available, recent, and pertinent water quality data are discussed below.

In 1988, the Commission prepared a Final Environmental Impact Statement (FEIS) to evaluate the impacts of proposed hydroelectric developments at up to 19 locations in the Upper Ohio River Basin, including the Braddock Locks and Dam. The FEIS included an assessment of historic water quality data collected by ORSANCO, the USGS, and the USACE. The Commission's 1988 assessment of conditions found a number of water quality parameters to be of concern in the basin. The FEIS indicated that water temperatures were elevated because many power plants and other industries discharged heated water into the Monongahela and other rivers within the basin. High water temperatures reduce dissolved oxygen (DO) concentrations and inhibit growth of some fish species. DO concentrations well below saturation occur, especially in summer months when flows are low, because major point and nonpoint sources of biochemical oxygen demand (BOD) exist; BOD includes organic and nitrogenous compounds that biodegrade rapidly, resulting in reduced DO concentrations. There are also areas where pH remains low because acid mine wastes still are discharged.

TABLE 5-5
303(D) IMPAIRED WATERS NEAR PROPOSED PROJECT VICINITY

Water Body Name	STORET Water Body ID	State Basin Name	Cause of Impairment	Cycles Listed	Latest TMDL Date
Turtle Creek	PA10C18694_20011017-1130-GGM	White Deer-Buffalo Creeks	Siltation	2004	--
Turtle Creek	PA19A37204_4705	Turtle Creek	Metals (other than Mercury)	1996, 1998, 2002, 2004	Jul-07-2009
Turtle Creek	PA19A37204_990102-1010-TVP	Turtle Creek	Metals (other than Mercury)	1996, 1998, 2002, 2004	Jul-07-2009
Turtle Creek	PA19A37204_990102-1010-TVP	Turtle Creek	pH	2002, 2004	Jul-07-2009
Turtle Creek	PA19A37204_990102-1011-TVP	Turtle Creek	Metals (other than Mercury)	2002, 2004	Jul-07-2009
Turtle Creek	PA19A37204_990102-1011-TVP	Turtle Creek	pH	2002, 2004	Jul-07-2009
Turtle Creek	PA19A37204_990301-0905-ALF	Turtle Creek	Metals (other than Mercury)	1996, 1998, 2002, 2004	Jul-07-2009
Turtle Creek	PA19A37204_990301-0905-ALF	Turtle Creek	Nutrients	2002, 2004	--
Turtle Creek	PA19A37204_990301-0905-ALF	Turtle Creek	Siltation	2002, 2004	--
Turtle Creek	PA19A37204_990301-1230-ALF	Turtle Creek	Nutrients	2002, 2004	--
Turtle Creek	PA19A37204_990301-1230-ALF	Turtle Creek	Siltation	2002, 2004	--
Turtle Creek	PA19A37204_990302-1000-ALF	Turtle Creek	Metals (other than Mercury)	1996, 1998, 2002, 2004	--
Turtle Creek	PA19A37204_990302-1000-ALF	Turtle Creek	Nutrients	2002, 2004	--
Turtle Creek	PA19A37204_990302-1000-ALF	Turtle Creek	Siltation	2002, 2004	--
Turtle Creek	PA19A37204_990302-1200-ALF	Turtle Creek	Metals (other than Mercury)	1996, 1998, 2002, 2004	--
Turtle Creek	PA19A37204_990302-1200-ALF	Turtle Creek	Suspended Solids	2002, 2004	--
Ninemile Run	PA19A37201_9962	Turtle Creek	Ammonia, Un-ionized	2002, 2004	--
Ninemile Run	PA19A37201_9962	Turtle Creek	Nonpriority Organics	2002, 2004	--
Ninemile Run	PA19A37201_9962	Turtle Creek	Taste and Odor	2002, 2004	--

Table Source: Pennsylvania 303(d) Listed Waters for Reporting Year, 2004, online: http://iaspub.epa.gov/waters10/attains_impaired_waters.impaired_waters_list?p_state=PA&p_cycle=2004#content
TMDL = total maximum daily loads

TABLE 5-6
WATER QUALITY STANDARDS FOR PENNSYLVANIA
WARM WATER FISHERIES

Parameter	Warm water Streams	
Dissolved Oxygen (mg/L)	Minimum daily average 5.0, Minimum 4.0	
pH	Minimum 6.0, Maximum 9.0	
Turbidity (nephelometric turbidity units [NTU])	May 15-Sept 15 Maximum 40 Sept 16-May 14 Maximum 100	
Temperature (°F)	Jan 1-31	40
	Feb 1-29	40
	Mar 1-31	46
	Apr 1-15	52
	Apr 16-30	58
	May 1-15	64
	May 16-30	72
	June 1-15	80
	June 16-30	84
	July 1-31	87
	Aug 1-15	87
	Aug 16-30	87
	Sept 1-15	84
	Sept 16-30	78
	Oct 1-15	72
	Oct 16-31	66
	Nov 1-15	58
	Nov 16-30	50
	Dec 1-31	42

Source: 25 Pennsylvania Code § 93.7, 93.9u-v
mg/L = milligrams per liter

The USGS conducted assessments on the Allegheny and Monongahela River basins from 1996 to 1998 and summarized them in a report titled, Water Quality in the Allegheny and Monongahela River Basins, which was published in 2000. This report summarized major findings about water quality in the Allegheny and Monongahela River Basins by the USGS National Water-Quality Assessment (NWQA) Program. The USGS found that ecologically the streams of these basins present a diversity of habitats. The mountainous areas are typically dominated by streams with low-nutrient levels and remain cold all year, which support trout and a few other cold water fish species and commonly include diverse aquatic-invertebrate

populations. Streams along the western side of Allegheny/Monongahela River Basin (AMRB) are typically warm water systems with a much greater diversity of fish species (USGS 2000).

AMRB streams and rivers range from high quality—those that support diverse aquatic life—to those that are seriously degraded, supporting few aquatic species and few human uses of the water. The northern one-third of the study area typically contains higher quality stream reaches in addition to mountainous areas in eastern sections (USGS 2000).

The study found that urban development and coal-mining activities through much of the AMRB have significantly influenced water quality and aquatic life; industrial activity in small and large towns has resulted in contaminated streambed sediments and contaminated fish. Acid- and/or mineral-laden mine drainage from abandoned coal mines is one of the most serious and persistent water-quality problems in the AMRB (USGS 2000).

The study used Canadian aquatic-life guidelines and found that zinc and chromium were present at all bed-sediment sampling sites in AMRB. Additionally, at the 50 sites sampled, the aquatic-life Probable Effects Level (PEL) for zinc (315 micrograms per gram [µg/g]) and chromium (90.0 µg/g) was exceeded at 15 and at 5 sites, respectively. The study found that 11 bed-sediment samples from AMRB had zinc concentrations among the highest 10 percent nationally of samples analyzed by NWQA since 1991. In addition, PELs were most often exceeded in areas subjected to mining or industrial land use in AMRB. Trace elements, such as zinc, that exceed aquatic-life guidelines can potentially contribute to the degradation of aquatic communities in streams, and the study found that some sites in AMRB were among the most degraded sites nationally for aquatic invertebrates (Table 5-7) (USGS 2000).

TABLE 5-7
NATIONAL INDICATORS FOR INVERTEBRATE STATUS

National indicators for invertebrate status (Appendix) with zinc and chromium concentrations in bed sediment, in micrograms per gram of sediment

Stream name and location	Predominant land use	Invertebrate status	Zinc	Chromium
French Creek at Utica, Pa.	Mixed	●	120	58
East Hickory Creek near Queen, Pa.	Forested	●	190	63
South Branch Plum Creek at Five Points, Pa.	Agriculture	●	130	82
Deer Creek near Dorseyville, Pa.	Urban	●	170	88
Dunkard Creek at Shannopin, Pa.	Mining	●	190	88
Youghiogheny River at Sutersville, Pa.	Mixed	●	410	87
Stonycreek River at Ferndale, Pa.	Mining	●	700	90
Monongahela River at Braddock, Pa.	Mixed	●	510	110
Allegheny River at New Kensington, Pa.	Mixed	●	330	120

● lowest 25 percent nationally (Least-degraded sites)
● middle 50 percent nationally
● highest 25 percent nationally (Most-degraded sites)

Figure Source: USGS 2000

Another water quality study was conducted by 3 Rivers 2nd Nature in 2001. The study was conducted through a strategic program developed by the STUDIO for Creative Inquiry, in partnership with 3 Rivers Wet Weather Inc., Allegheny County Sanitary Authority (also known as ALCOSAN), and the Allegheny County Health Department, and it was intended to reveal patterns and relationships between water quality, public use, and the functioning ecosystems of urban river systems. Rivers were monitored at selected sites for bacteria that indicate the presence of fecal matter as well as basic field parameters such as temperature, pH, and DO. Tributary streams (free-flowing and culverted) that flow into the Monongahela River were also investigated (Table 5-8) (3 Rivers 2nd Nature 2001).

Additionally, wet weather sampling was conducted to focus on bacteriological analyses. Table 5-9 presents the dry weather results for the Monongahela River Pool 2. The table presents the average concentrations of additional parameters for tributary streams from the Braddock Locks and Dam to Locks and Dam No. 3 in Elizabeth, Pennsylvania in the 2011 recreational season.

TABLE 5-8
SELECTED TRIBUTARY MONITORING SITES IN THE PITTSBURGH POOL

Tributaries Pool 2	River Mile Point	Reason for Sampling
Turtle Creek	Monongehela MP 11.6	Access/use and affect on river
Thompson Run	Monongehela MP 12.2	Access/use and affect on river
Crooked Run	Monongehela MP 14.6	Access/use and affect on river
Youghiogheny River	Monongehela MP 15.5	Culverted/affect on river
Sandy Creek	Monongehela MP 17.0	Access/use and affect on river
Pine Run	Monongehela MP 18.7	Culverted / affect on river
Coursin Run	Monongehela MP 20.0	Access/use and affect on river
Peter's Creek	Monongehela MP 19.9	Access/use and affect on river
Wiley Run	Monongehela MP 22.6	Culverted /affect on river
Fallen Timber Run	Monongehela MP 23.1	Access/use and affect on river

Table Source: 3 Rivers 2nd Nature 2001

TABLE 5-9
AVERAGE CONCENTRATIONS OF ADDITIONAL PARAMETERS FOR TRIBUTARY STREAMS

Pool 2	Ammonia mg/L	TDS mg/L	Alkalinity mg/L	Hard-ness mg/L	Total Iron mg/L	Nitrate mg/L	Ortho Phosphate mg/L	Temp °C	PH SU	DO mg/L	Conductivity mg/L
Fallen Timber Run	0.066	918	153	316	0.225	0.3	0.19	15.59	7.76	8.56	1208
Wiley Run	0.069	1095	78	380	0.279	0.3	0.17	16.32	7.42	7.23	1338
Peters Creek	0.199	797	97	262	0.938	2.4	1.06	19.73	7.63	8.62	
Coursin Run	0.054	546	157	238	0.116	0.6	0.13	14.59	7.97	9.15	743
Pine Run	0.071	852	54	262	0.192	1.7	1.06	16.10	7.57	9.00	1162
Sandy Creek	0.058	1175	81	402	0.092	0.3	0.37	16.19	7.76	8.65	1483
Yough River	0.055	195	33	63	0.440	0.6	0.14	20.52	7.61	7.40	289
Crooked Run	9.572	477	126	143	0.533	0.7	1.43	17.93	7.26	2.09	758
Thompson Run	1.675	909	78	288	0.460	2.3	1.32	18.71	9.43	7.24	1214
Turtle Creek	0.117	697	73	227	0.877	1.5	0.22	18.58	7.42	7.60	1021

Conductivity unavailable for Peters Creek.

Table Source: 3 Rivers 2nd Nature 2001

These data show that the majority of the parameters are within the Pennsylvania water quality criteria for the designated uses of the tributary streams. Crooked Run exceeded the DO criteria of a minimum of 4.0 milligrams per liter (mg/L), however, only one of the six DO measurements taken over the recreational season were above 4.0 and three of the six measurements were less

than 0.1 mg/L. Two of the pH values at Thompson Run measurements exceeded 9.0, which is over the state water quality standard. Several of the streams exceeded the Total Dissolved Solids (TDS) criteria of a daily maximum of 750 mg/L. Peters Creek exceeded the temperature requirement for trout-stocked streams on June 27 of 22.2 degrees Celsius (°C) with a temperature of 23.2 °C. The temperature requirement increases to 23.3°C on July 1-31 (3 Rivers 2nd Nature 2001).

Additional raw water quality data collected by 3 Rivers 2nd Nature was recorded in an Access database and is available for public download. Relevant data from the database has been assimilated into table format and is presented in Appendix E.

Additional water quality data collected by the PADEP is presented in Appendix F. The data provided in this Appendix consists of site-specific excerpts of TDS, chloride, sulfate, and bromide sampling results from the Monongahela waterway as of June 22, 2011 (PADEP 2011).

Abandoned Mine Drainage

Although it is not easily accounted for in land use designation, coal mining has the greatest influence on surface water and ground water quality of any single land use in the Allegheny and Monongahela River basins (USGS 2000). Coal mining has been central to the economy and culture in the Allegheny River and Monongahela River basins for more than 200 years, and was largely unregulated until 1977.

The Allegheny-Monongahela watershed contains the greatest concentration of abandoned coal-mine sites in the nation. There are nearly 1,200 abandoned coal mines in the West Virginia portion of the Allegheny-Monongahela watershed alone (American Rivers 2004). When mines are abandoned, ground water slowly seeps into the mine and mixes with toxic materials left behind in the coal-mining process. Eventually, contaminated water fills the mine and the abandoned mine drainage begins to seep out into nearby streams and rivers.

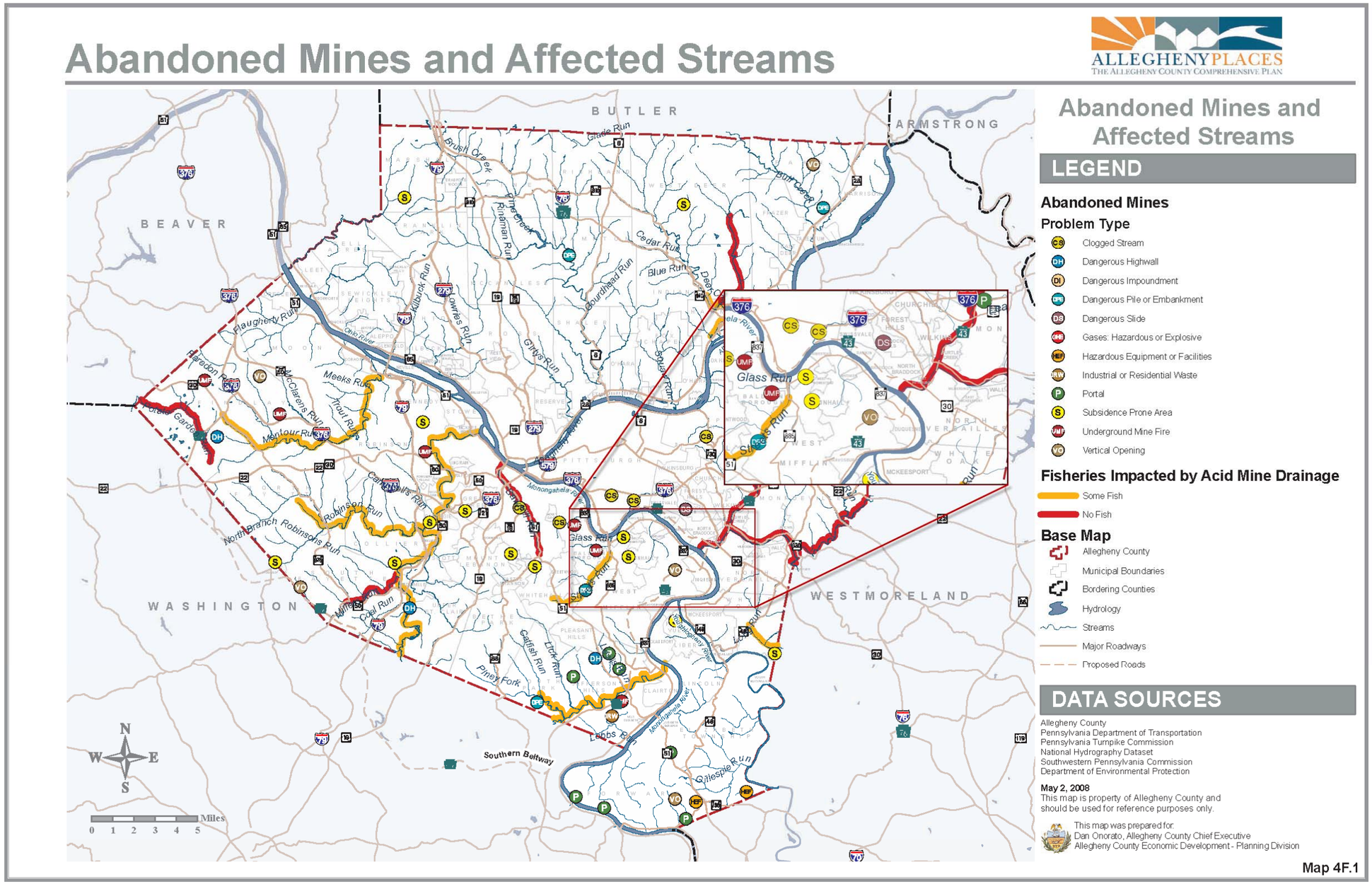
No abandoned mine drainage water quality information specific to the Braddock Locks and Dam, other than the information obtained in Figure 5-7, was found during the development of this PAD. The following generally describes abandoned mine drainage impacts to the

Monongahela watershed. It is noted that these impacts are generally more prevalent in the downstream reaches of the Monongahela River and have been improving during the past 25 years (USGS 2000).

Abandoned mine drainage contains heavy metals such as iron, manganese, aluminum, zinc, arsenic, barium, cadmium, cobalt, copper, and silver. When certain concentrations of these contaminants are released into rivers and streams, the abandoned mine drainage may become potentially dangerous to wildlife and may exceed drinking-water standards. Coal mine drainage affects pH levels in both surface water and ground water supplies causing degradation in water quality. Abandoned mine drainage can be acidic (pH levels below 7) or alkaline (pH levels above 7) (USGS 2000).

Coal mines disrupt existing flow patterns of ground water and surface water. Oxygen dissolved in surface water is transported to rock strata containing pyrite, which produces sulfuric acid. Sulfuric acid may emerge in springs and streams carrying large amounts of dissolved metals downstream. Sulfate is a stable indicator of coal-mining activity. Current regulations do not require treatment of mine discharge water for sulfate. Discharge water is generally regulated and treated to reduce concentrations of iron and manganese, and to maintain pH in the range of 6.5 and 8.5 units. As recently as the 1960s, the Monongahela River was occasionally too acidic to support a diverse aquatic community. Since the early 1970s, the median pH at the USGS NWQA sampling sites increased from 7.0 in the period 1975 to 1987 to 7.6 in the period 1987 to 1998 in the Monongahela River (USGS 2000).

FIGURE 5-7
ABANDONED MINES AND AFFECTED STEAMS NEAR THE USACE BRADDOCK LOCKS AND DAM



Untreated mining-related point source discharges from deep, surface, and other mines typically contain low pH values and high concentrations of metals, iron, aluminum, and manganese (U.S. Environmental Protection Agency [USEPA] 2002). In addition to point sources, nonpoint sources also contribute to water quality impairments in the Monongahela watershed. Nonpoint sources represent contributions from diffuse sources, including rainfall runoff, rather than from a defined outlet. Based on the identification of a number of abandoned and revoked mining activities in the Monongahela watershed, these two sources represent a significant nonpoint source within the watershed. Abandoned and revoked mines can contribute significant amounts of acid mine drainage, which produces low pH and high metals concentrations in surface and subsurface water (USEPA 2002).

Median concentrations of dissolved solids have decreased at the Monongahela River USGS NWQA sampling sites over the last 25 years. Dissolved solids have been reduced by 6 percent in the Monongahela River. Contrary to dissolved solids, median nitrate concentrations have increased by 25 percent in the Monongahela River. Elevated nitrate concentrations can result in increased plant and algal growth. This increase may be partly the result of changes in the form of nitrogen due typically to sewage-treatment-plant upgrades. Nitrate increases can be related to both point-source discharges, such as industrial wastewater discharges and sewage, or nonpoint sources including atmospheric deposition and agricultural fertilizer use. There has been a general improvement in water quality since coal-mining activity has decreased over the past 25 years (USGS 2000).

5.3.1.8 Reservoir Data

There is no reservoir associated with the proposed Project. However, the existing USACE Braddock Locks and Dam maintains a pool that extends 12.6 miles upstream.

5.3.1.9 Gradients – Downstream Reaches

Water-level elevations at Braddock pool are typically maintained by USACE at 718.7 feet msl and 710 feet msl at Emsworth pool (USACE 2011a). The mainstem of the Monongahela River has an average stream gradient of 1.15 feet per mile.

5.4 Fish and Aquatic Resources

5.4.1 Existing Environment

The Monongahela River originates in the Allegheny Plateau located in Marion County, West Virginia, and is formed by the confluence of the Tygart Valley and West Fork rivers at an elevation of approximately 2,359 feet msl near Fairmont, West Virginia. The river flows north for 128 miles through Marion and Monongalia counties in West Virginia and continues to the confluence with the Allegheny River in Pittsburgh, Pennsylvania, forming the Ohio River at an elevation of 694.23 feet msl (USACE 2004).

The Monongahela River has a drainage area of 7,386 square miles in northern West Virginia, southwestern Pennsylvania, and northwestern Maryland. The entire length of the Monongahela River is controlled and maintained for navigation by a series of nine locks and dams owned and operated by the USACE. The mainstem of the river has an average stream gradient of 1.15 feet per mile. The Braddock Locks and Dam is located at RM 11.2.

The locks at all projects on the Monongahela River allow both fish migrating upstream or downstream to pass around the dams to reach spawning or foraging grounds. This may be intermittent, though, as they are opened and closed for navigation. Because of this, similar species occur throughout the system but occupy different habitats based on life stage, flow conditions, water quality, and seasonal and diel behaviors (Stauffer et al. 1995, Jenkins and Burkhead 1993).

5.4.1.1 Fish and Aquatic Resources

Existing Fish and Aquatic Resources

Poor water quality conditions led to significant declines and eradication of fish and aquatic communities of the Monongahela River prior to 1970. Lockchamber studies from 1967 to 2010 have shown a steady recovery of fish assemblages as a result of concerted federal and state efforts to improve water quality (Pennsylvania Fish and Boat Commission 2011b). A study conducted by Pennsylvania Fish and Boat Commission in 2010 showed that Braddock pool provides habitat for 32 fish species. The 2010 study also showed an increase of 7 species,

including 3 remarkable species, and an increase of more than 22,000 individuals collected from 2003. See Table 5-10 for a list and count of all species collected.

A survey conducted in 2009 showed that smallmouth bass was the most abundant game fish species and ranged in size from 3 to 14 inches (Table 5-11) and that of all the study areas, the highest number of percids was collected at Braddock pool. As evident by the collection data, another important component of the Monongahela River fish community is the carp and minnow family. Except for the common carp, these are typically very small individuals and tend to inhabit sandbars or riffle areas within a riverine environment. Overall, the fish population in the Monongahela River at Braddock Locks and Dam has greatly improved in health, diversity, and abundance. The number of species collected by the Pennsylvania Fish and Boat Commission has increased from 4 species in 1967 to 32 species in 2010 (Figure 5-8). Additional fisheries data collected by the Pennsylvania Fish and Boat Commission (2011b) is available in the Three Rivers Management Plan and is presented in Appendix G.

TABLE 5-10
SUMMARY OF 2003 AND 2010 RESULTS OF LOCK CHAMBER SURVEYS AT BRADDOCK LOCKS AND DAM

Fish Species (Common Name)	09/15/2003	10/01/2010
	# Collected	# Collected
Bluegill	5	408
Bluntnose minnow	-	1,437
Brook silverside	-	6
Channel catfish	68	113
Channel darter	-	6
Channel shiner	96	2,507
Common carp	79	6
Emerald shiner	344	4,535
Flathead catfish	21	6
Freshwater drum	181	196
Ghost shiner	81	465
Gizzard shad	60	13,294
Green sunfish	-	9
Largemouth bass	-	2
Logperch	-	11
Longnose gar	-	1

Fish Species (Common Name)	09/15/2003	10/01/2010
	# Collected	# Collected
Mimic shiner	119	-
Mooneye	1	-
Pumpkinseed	-	32
Quillback	-	1
Redear sunfish	1	-
River carpsucker	1	-
Rock bass	1	3
Sauger	6	8
Saugeye	1	-
Silver chub	-	6
Silver redhorse	1	3
Skipjack herring	1	38
Smallmouth bass	1	3
Smallmouth buffalo	18	3
Smallmouth redhorse	2	3
Spotfin shiner	1	66
Spotted bass	-	94
Walleye	9	7
White bass	27	98
White crappie	-	2
White perch	2	-
Yellow perch	-	1
Total # Collected	**1,127**	**23,370**
Total # Species	**25**	**32**
# Remarkable Species	**11**	**14**

Existing Macroinvertebrate Resources

There is limited to no readily available information on the composition of macroinvertebrate communities of the Monongahela River. However, general life history, temporal, and spatial characteristics of macroinvertebrates found within Pennsylvania is provided in Section 5.4.1.4.

TABLE 5-11
2009 SUMMARY OF GAME FISH AND PANFISH SPECIES, SIZES AND NUMBERS COLLECTED AT BRADDOCK LOCKS AND DAM

Fish Species	Number Collected	Size Range (inches)
Sauger	33	7-13
Walleye	4	8-12
Saugeye	2	11
Smallmouth bass	57	3-14
Largemouth bass	1	9
Hybrid striped bass	-	-
White bass	-	-
Rock bass	6	7-8
Bluegill	4	7-8
Black crappie	-	-
Muskellunge	-	-
Channel catfish	8	14-19

Source: Pennsylvania Fish and Boat Commission 2011a

FIGURE 5-8
FISH SPECIES COLLECTED AT BRADDOCK LOCKS AND DAM

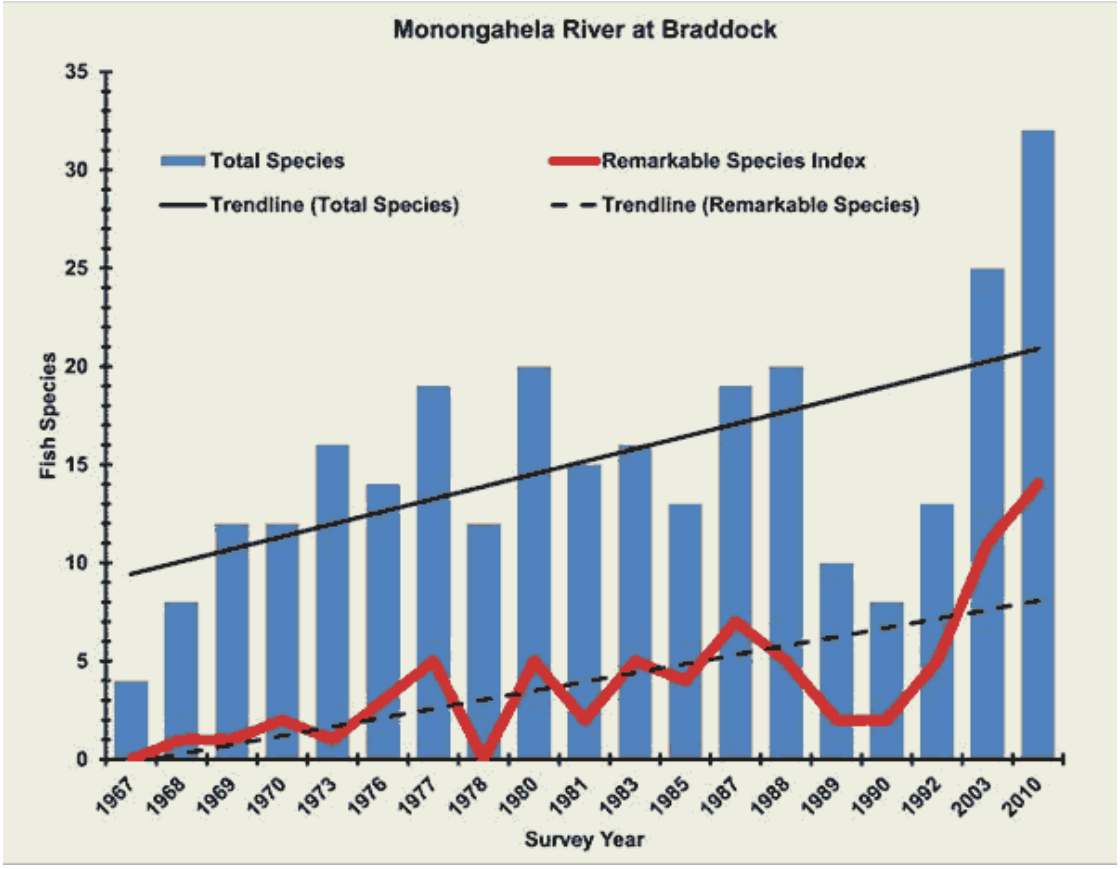


Figure Source: Pennsylvania Fish and Boat Commission 2011a

5.4.1.2 Essential Fish Habitat

U.S. Congress, as stated in the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.), defines essential fish habitat for federally managed fish species as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (National Marine Fisheries Service, National Oceanic and Atmospheric Administration undated). Essential fish habitat is only applicable to federally managed commercial fish species that live out at least one component of their lifecycle in marine waters (National Marine Fisheries Service, National Oceanic and Atmospheric Administration undated). None of the fish in the Braddock pool are federally managed; therefore, there is no designated essential fish habitat in the proposed Project boundary.

5.4.1.3 Temporal and Spatial Distribution of Fish and Aquatic Communities Fisheries

Fishery Resources

Fish are typically distributed according to habitat preferences, which often changes seasonally. A very large component of the fish community of the Monongahela River is the sunfish family (Centrarchidae). This includes popular sport fish like largemouth, spotted, and smallmouth bass and members of the *Lepomis* genus like bluegill and longear sunfish. Members of the sunfish family tend to inhabit shoreline areas throughout most of their life history, although they may orient themselves seasonally according to depth, temperature, woody debris, or other structural habitat features available in the pools at the Braddock Locks and Dam (for more information on life histories of fish species see Section 5.4.1.4). The large piscine predators (walleye, hybrid striped bass, and muskellunge) are also popular game fish and tend to inhabit the deeper reaches during daylight hours and make crepuscular movements into shallows to feed.

Macroinvertebrate Resources

As mentioned previously, there is limited to no information on temporal and spatial characteristics of Monongahela River mollusk, crayfish, and aquatic insect communities. No readily available information on aquatic insects could be located, and little can be discussed of their compositions throughout the year. Distributions and types of crayfish species have been documented primarily from the lower Monongahela River basin; however, like many other

crayfish species, there is little information on their life histories, feeding habits, and habitat use at different times of the year (Jezerinac et al. 1995).

5.4.1.4 Life History

Fisheries Resources

Walleye (Sander vitreus)

Walleye usually occur in large rivers and lakes and prefer a bottom of loose aggregates. They are generally found in deeper waters during the day and tend to move into shallower areas during heavy cloud cover and at night for feeding. They can be sensitive to low pH levels (Carlson 1992). Walleye are opportunistic predators, beginning on crustaceans and aquatic invertebrates as juveniles and moving to fish and other larger vertebrates and invertebrates as they mature (Smith 1985).

Male walleye mature at age 2 to 3, while females mature at age 4 to 5. They spawn in the spring following ice out when water temperatures reach 35 degrees Fahrenheit (°F) to 44°F. Walleye prefer to spawn over substrates ranging in size from sand to boulders, but preferably select cobble to rock-size substrate in water generally 2 to 4 feet deep. Walleye are not nest builders, instead they broadcast their eggs along the substrate. Eggs hatch between 7 and 26 days, depending on the water temperature (Smith 1985). Generally, less than 20 percent of the eggs survive to hatching, and more commonly only 5 percent under natural conditions. While males tend to remain in the area following spawning, no parental care is undertaken.

Sauger (Sander canadensis)

The sauger spawn in the spring, slightly later than walleye but in roughly the same habitat type. Saugers generally prefer larger bodies of water, but their life history is very similar to walleye. They are found in a region that extends south to Alabama and north to Alberta, Canada (Werner 1980).

Saugeye

Saugeye are a hatchery-produced hybrid made from a cross between a female walleye and a male sauger, which results in a fast-growing fish that has excellent survival abilities. Saugeye are

tolerant of turbid waters and are highly adaptable to most lake and river environments. This hybrid can occur naturally where both parent species are found but it is rare. A small percentage of saugeye can reproduce. They will reproduce with one another or either parent species if they are present in the same water body. Saugeye, like their parent species, scatter their eggs over a hard bottom and provide no parental care for the young (Ohio Department of Natural Resources undated).

Smallmouth Bass (Micropterus dolomieui)

Smallmouth bass can be found in almost all manner of aquatic habitat but are most abundant in large rivers and lakes. They prefer slow to moderate current and select areas of rocky shorelines. Like the yellow perch, smallmouth bass are opportunistic feeders and generally feed during daylight hours on aquatic invertebrates, crustaceans, and small fish.

Smallmouth bass sexually mature at age 3 to 6 years (Extreme Bass Lures undated). Spawning usually occurs in late spring/early summer when water temperatures reach 62°F to 65°F. Spawning occurs in 2 to 20 feet of water but average spawning depth is approximately 3 feet. Males build and maintain a nest in gravelly substrate until the fry emerge and disperse. Multiple females may visit a nest over a 30- to 36-hour period. Eggs hatch between 7 and 21 days, depending on the water temperature (Smith 1985).

Largemouth Bass (Micropteris salmoides (Lacepede))

Largemouth bass are mostly found in warm and weedy portions of lakes, bays and some rivers, and prefer a much softer bottom substrate. Similar to the smallmouth bass, the largemouth bass are opportunistic feeders and generally feed during daylight hours on aquatic invertebrates, crustaceans, and small fish or anything that moves on or under the surface of the water.

Largemouth bass sexually mature at age 5 years. Spawning usually occurs in late spring/early summer when water temperatures reach 60°F (Smith 1985).

Spawning occurs in shallow water from 1 to 4 feet. Spawning behavior is very similar to the smallmouth bass, but the two species rarely compete for spawning areas due to differing depth and substrate preferences. Males build and maintain a nest in a siltier substrate until the fry

emerge and disperse. Multiple females may visit the largemouth bass nest. Eggs hatch between 3 and 5 days, depending on the water temperature (Werner 1980).

Rock Bass (Ambloplites rupestris (Rafinesque))

Rock bass are mostly found in rivers and lakes where abundant rocky substrate exists. They prefer moderate to fast current, but do well along gravelly and rocky shores in lakes and reservoirs. Young rock bass are usually abundant in aquatic vegetation where the species is present. Rock bass are also opportunistic feeders and generally feed during daylight hours on aquatic invertebrates, crustaceans, and small fish but have been observed feeding during darkness as well.

Rock bass may reach sexual maturity within 1 year. Spawning usually occurs in late spring/early summer between mid-May and mid-June when water temperatures reach 60°F to 70°F (Werner 1980). Spawning occurs in shallow water over any substrate, although silt-free substrate is preferred. Males build and maintain a nest that is plate-like in size using their pectoral fins, unlike the largemouth and smallmouth bass, which use caudal fins. Multiple females may visit a rock bass nest. Eggs hatch between 3 and 5 days, depending on the water temperature (Werner 1980).

Bluegill (Lepomis macrochirus)

Bluegills spawn in early summer and tend to occupy more open habitat. Bluegills leave the nest when they are 1/4 to 1/3 inches in length. At approximately 1-inch in length, they return to the vegetated portion of the lake and feed on zooplankton, and as they develop they will begin to feed on insects, invertebrates, and occasionally on small fish. Bluegills were originally found in a region that extended from the St. Lawrence River south to Georgia and then west to Texas and Minnesota. It has since been introduced to areas beyond this range (Werner 1980).

Channel Catfish (Ictalurus punctatus)

Channel catfish frequently spawn in streams and can reach 24 years of age. Channel catfish live in large streams, lakes, or rivers with sandy or rocky bottoms. They are not normally associated with heavily vegetated areas and they feed at night on all types of aquatic organisms. This species was originally found throughout the central part of the United States from Florida to

Canada and along the western slopes of the Appalachians to Montana. The species has since been introduced east of the Appalachians and westward to California (Werner 1980).

Macroinvertebrate Resources

Freshwater Clams and Mussels (Paleoheterodonta and Veneroida)

There is very little specific information available about the current spatial and temporal distribution of freshwater bivalves in the proposed Project vicinity. Eight species of freshwater mussels have been found in the Monongahela River since 1960 (Pennsylvania Fish and Boat Commission 2011b). Freshwater mussels have recently become widely recognized as important components of stream ecosystems, however, there is a general lack of data regarding their abundance, life history characteristics, and distribution. However, studies have shown that the mussel population in the Monongahela River has mirrored the decline and rebound of the fish communities, as a result of the mussel's dependence on specific fish host species and water quality conditions (Pennsylvania Fish and Boat Commission 2011b).

Crayfish (Decapoda)

There is very little specific information available about the current spatial and temporal distribution of crayfish in the proposed Project vicinity. Though nine crayfish species have been documented in Pennsylvania, little is known about their life histories, feeding habits, and habitat use throughout the year (NatureServe 2008). Crayfish can be found in a variety of habitats, including riffles and pools with cobble and boulder/rubble substrates, undercut banks, debris piles, and moist depressions under rocks. Larger adults tend to be found under cobbles in deeper water, while younger crayfish live along the water margins (Nuttall 2008). Crayfish species are opportunistic omnivores, feeding on plants, animals, worms, insects, fish eggs, and detritus. They will often scavenge, as well as prey on live food items, such as fish, mollusks, and insects. Typical breeding periods for all crayfish species occur from spring through summer months. Juveniles and adults molt during summer months, with juveniles molting as many as three times in a given year (Jezerinac et al. 1995).

Impoundments of lotic habitat can impact crayfish by increasing concentrations of major fish predators, such as bass and sunfish. Crayfish species are particularly sensitive to physical and

chemical habitat alterations, which can result from impoundment dredging and channelization (Williams et al. 1993). Loss of physical habitat structure, including gravel and boulder substrate, woody debris, and aquatic vegetation, can markedly increase their susceptibility to predation (Stein 1977).

Benthic Macroinvertebrates

Benthic macroinvertebrate communities in nearly all of Pennsylvania's waters are primarily comprised of insects from five different insect orders: *Plecoptera* (stoneflies), *Ephemeroptera* (mayflies), *Trichoptera* (caddisflies), *Diptera* (true flies), and *Coleoptera* (beetles). In addition, populations of *Odonata* (dragonflies and damsel flies), as well as *Hemiptera* (surface bugs), are common in the proposed Project vicinity, due to the large amount of surface water in the navigational pools. Brief descriptions of the life history of key benthic macroinvertebrate orders likely to occur within the proposed Project boundaries are provided below.

Stoneflies (Plecoptera)

Nearly all species of stoneflies are found exclusively in cold running water. They tend to have specific water temperatures, substrate type, and stream size requirements reflected in their distribution. Stoneflies range in size from a few millimeters to 5 centimeters and most are herbivores, either scraping algae from surfaces or shredding leaf litter (Merritt and Cummins 1984).

Mayflies (Ephemeroptera)

Mayflies occur in a wide variety of habitats in both standing and flowing water habitats. The greatest diversity generally resides in rocky-bottomed headwater streams (Merritt and Cummins 1984). Most mayfly nymphs are herbivore collector-gatherers or scrapers. Mayflies spend most of their 1-year life cycle as nymphs. Emergence from nymphs to adults is weather- and species-dependent and can occur from late spring through early fall (Ward and Kondratieff 1992).

Caddisflies (Trichoptera)

Caddisflies reside in a variety of aquatic habitats, with the majority of species being found in cool running water or still water. Larvae have a wide range of feeding mechanisms and commonly feed on algae, decaying plant material, and microorganisms. There are several

predaceous species as well (Merritt and Cummins 1984). Generally, larvae show little selectivity in food preferences but can show highly specialized food-capture methods with nets constructed of silk. Caddisflies may construct and reside in cases made of silk, sand, woody debris, shells, or leaf fragments during their changes in life stages (Ward and Kondratieff 1992).

Beetles (Coleoptera)

Beetles occupy a broad spectrum of aquatic habitats, ranging from cold headwater streams to stagnant wetland areas along lake shores. The majority of aquatic beetle species within the proposed Project boundary likely inhabit the various adjacent wetland areas. Some beetle larvae have gills or obtain oxygen through their body's surface, but others must sometimes travel to the water's surface to obtain air (Ward 1992). Many adult aquatic beetles carry an air bubble with them. This air bubble must be periodically replenished with oxygen at the water's surface. Feeding habits are diverse, but the majority of larvae are predaceous, with prey ranging from daphnia or other insect larvae to small fish (Ward 1992).

True Flies (Diptera)

The adults of aquatic dipterans are terrestrial and the larvae are aquatic. Diptera larvae occur in almost every type of aquatic habitat. They are found freely swimming, suspended from structure, or burrowing in substrate (Merritt and Cummins 1984). Some species produce several generations per year, whereas other species require several years to complete a single generation. Some dipterans are used as indicators of water pollution and eutrophication (Ward 1992).

Dragonflies and Damselflies (Odonata)

Dragonflies are found in slower river sections and navigational pools within the proposed Project vicinity. Larvae and adults are primarily predaceous, with larvae stalking underwater prey and adults, capturing prey on the wing. Dragonfly nymphs respire by means of gills lining the rectal chamber (Ward 1992).

True Bugs (Hemiptera)

Members of Hemiptera are largely terrestrial, but one species is aquatic in both the immature and the adult stages. Most aquatic hemipterans are found in well-vegetated, stagnant, or slow-

flowing habitats (Ward 1992). Within the proposed Project vicinity, hemipterans would most likely be found within the embayment, upstream of Braddock Lock and Dam.

Scuds (Amphipoda)

Scuds tend to prefer darker environments with a lot of structure in slow-moving waters, although they are frequently found in fast water. They are scavengers, feeding on decomposing plant and animal detritus. Most species breed between February and October, and the eggs hatch 1 to 3 weeks after breeding (Newman 2008).

Additional macroinvertebrate orders that have been documented within the proposed Project vicinity include: Lepidoptera, Megaloptera, Neuroptera, Tubificida, Basommatophora, Enchytraeida, Hemiptera, Hoplonemertea and Isopoda (USGS 2011b).

5.5 Wildlife and Botanical Resources

5.5.1 Existing Environment

The proposed Project's vicinity occupies one major land resource area, the Western Allegheny Plateau. The land use and land cover for this resource area is a mosaic of forests, urban-suburban-industrial activity, general farms, dairy and livestock farms, pastures, coal mines, and oil-gas fields. Urban and industrial activity is common in valleys along the major rivers. These land use activities are widespread, have diminished water quality, and reduced fish diversity. However, recent stream quality improvements have occurred in some rivers, including the Monongahela (Woods et al. 1999).

The specific ecoregion in which the proposed Project is located is the Monongahela Transition Zone. The unglaciated hills, knobs, and ridges of the Monongahela Transition Zone are typically underlain by interbedded limestone, shale, sandstone, and coal of the Monongahela Group. Entrenched rivers, gently dipping strata, and landslips occur in this group. Elevations in the Monongahela Transition Zone range from 575 to 1,900 feet and local relief near the proposed Project is 200 to 700 feet (Woods et al. 1999).

The potential natural vegetation for those ecoregions is mapped as mostly Mixed Mesophytic Forest, which is primarily Appalachian Oak Forest (dominants: white and red oaks). Today,

forests are extensive and urban, suburban, and industrial activities are found in the river valleys that also serve as transportation corridors. Typical streams have cobble, gravel and sand substrates, and moderate gradients. Bituminous coal mining is common and some oil production occurs. There is also some general farming, although it is less prevalent (Woods et al. 1999).

5.5.1.1 Botanical Resources

The proposed Project boundaries and the specific construction site consist of previously disturbed areas made up of grassy field areas and early succession vegetation. A majority of the vegetation is comprised of non-native vegetation.

As a whole, Allegheny County has a diversity of vegetation across its landscape, due in part to the physiography and the varied bedrock and soils of the region as well as human activities. Land clearing for industrial, commercial, and residential development has permanently altered the land, and the vegetation is reflective of these activities. Allegheny County is located in a White Oak - Black Oak (*Quercus velutina*) - Northern Red Oak forest cover type. These three species of oak are dominant in the forests, but other tree species are reported as common in forests located in southern Pennsylvania, including chestnut oak (*Q. prinus*), tulip tree (*Liriodendron tulipifera)*, blackgum (*Nyssa sylvatica*), sugar maple (*Acer saccharum)*, red maple *(Acer rubrum)*, white ash (*Fraxinus americana)*, green ash (*Fraxinus pensylvanica*), American elm (*Ulmus americana*), red elm (*Ulmus rubra*), basswood (*Tilia americana)*, cucumber tree (*Magnolia accuminata*), sweet gum (*Liquidambar styraciflua*), shortleaf pine (*Pinus echinata*), pitch pine (*P. rigida*), Virginia pine (*P. virginiana*), and loblolly pine (*P. taeda*). Black walnut (*Juglans nigra*), black cherry (*Prunus serotina*), American beech, and eastern hemlock may also be present (Western Pennsylvania Conservancy 1994).

5.5.1.2 Wildlife Resources

Mammals

Table 5-12 provides mammal species that exist in western Pennsylvania, and may be present in the proposed Project vicinity.

TABLE 5-12
LIST OF MAMMALS POTENTIALLY OCCURRING
IN THE VICINITY OF THE PROPOSED PROJECT

Common Name	Species Name
Beaver	*Castor canadensis*
Big brown bat	*Eptesicus fuscus*
Coyote	*Canis latrans*
Deer mouse	*Peromyscus maniculatus*
Eastern chipmunk	*Tamias striatus*
Eastern cottontail	*Sylvilagus floridanus*
Eastern pipistrelle	*Pipistrellus subflavus*
Fox squirrel	*Sciurus niger*
Gray fox	*Urocyon cinereoargenteus*
Gray squirrel	*Sciurus carolinensis*
Hairy-tailed mole	*Parascalops breweri*
Hoary bat	*Lasiurus cinereus*
House mouse	*Mus musculus*
Keen's myotis	*Myotis keenii*
Least weasel	*Mustela nivalis*
Little brown myotis	*Myotis lucifugus*
Long-tailed weasel	*Mustela frenata*
Masked shrew	*Sorex cinereus*
Meadow jumping mouse	*Zapus hudsonius*
Meadow vole	*Microtus pennsylvanicus*
Mink	*Mustela vison*
Muskrat	*Ondatra zibethicus*
Northern short-tailed shrew	*Blarina brevicauda*
Norway rat	*Rattus norvegicus*
Raccoon	*Procyon lotor*
Red bat	*Lasiurus borealis*
Red fox	*Vulpes vulpes*
Red squirrel	*Tamiasciurus hudsonicus*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis	*Myotis leibii*
Smoky shrew	*Sorex fumeus*
Sothern bog lemming	*Synaptomys cooperi*
Southern flying squirrel	*Glaucomys volans*
Southern red-backed vole	*Clethrionomys gapperi*
Star-nosed mole	*Condylura cristata*
Striped skunk	*Mephitis mephitis*
Virginia Opossum	*Didelphis virginiana*
White-footed mouse	*Peromyscus leucopus*
White-tailed deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*
Woodland jumping mouse	*Napaeozapus insignis*
Woodland vole	*Microtus pinetorum*

Table Source: The American Society of Mammalogists 2011

Avian Species

According to the National Audubon Society Christmas Bird Count, the City of Pittsburgh supports a wide variety of birds, including songbirds, blackbirds, and game birds (Table 5-13).

TABLE 5-13
NATIONAL AUDUBON SOCIETY CHRISTMAS BIRD COUNT
FOR THE CITY OF PITTSBURGH

Common Name	Count
American crow	15,120
European starling	8,371
American robin	1,068
Mallard	1,044
Canada goose	805
Rock pigeon	743
House sparrow	650
Dark-eyed (slate-colored) Junco	599
Northern cardinal	534
Mourning dove	480
Blue jay	408
Tufted titmouse	382
American goldfinch	308
House finch	262
Song sparrow	248
Chickadee sp.	213
Gull sp.	202
Black-capped chickadee	196
Carolina chickadee	163
White-breasted nuthatch	149
Downy woodpecker	139
Wild turkey	128
White-throated sparrow	116
Red-bellied woodpecker	110
Carolina wren	96
Ring-billed gull	68
Cedar waxwing	67
Northern mockingbird	63
Red-tailed hawk	60
American tree sparrow	55
Eastern bluebird	53
Northern flicker	43
Hairy woodpecker	27
Herring gull	18
Golden-crowned kinglet	18
Cooper's hawk	16
Great blue heron (blue form)	15
Double-crested cormorant	14

Common Name	Count
Pileated woodpecker	14
Brown creeper	12
Belted kingfisher	10
Eastern screech-owl	9
Red-breasted nuthatch	9
Hooded merganser	8
Sharp-shinned hawk	6
Swamp sparrow	6
Pied-billed grebe	5
Red-shouldered hawk	5
Peregrine falcon	5
Great horned owl	5
Barred owl	4
Yellow-bellied sapsucker	4
Eastern towhee	3
Field sparrow	3
Common merganser	2
American kestrel	2
Merlin	2
Common raven	2
Winter wren	2
Purple finch	2
Pine siskin	2
Redhead	1
Lesser scaup	1
Bufflehead	1
Red-breasted merganser	1
Accipiter sp.	1
American coot	1
Ruby-crowned kinglet	1
Hermit thrush	1
Brown thrasher	1
Fox sparrow	1
Turkey vulture	0
Bald eagle	0
Common grackle	0

Reptiles and Amphibians

Pennsylvania is home to a diverse population of amphibians and reptiles. Table 5-14 presents a list of reptiles and amphibians that are found in Allegheny County, Pennsylvania.

TABLE 5-14
AMPHIBIAN AND AQUATIC REPTILE SPECIES KNOWN TO OCCUR IN ALLEGHENY COUNTY, PENNSYLVANIA

Common Name	Scientific Name
American bullfrog	*Lithobates catesbeiana*
American toad	*Anaxyrus americanus*
Dusky salamander	*Desmognathus fuscus*
Eastern box turtle	*Terrapene carolina*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Eastern milk snake	*Lampropeltis triangulum triangulum*
Eastern painted turtle	*Chrysemys picta picta*
Eastern rat snake	*Pantherophis alleghaniensis*
Green frog	*Lithobates clamitans*
Jefferson salamander	*Ambystoma jeffersonianum*
Long-tailed salamander	*Eurycea longicauda*
Mountain dusky salamander	*Desmognathus ochrophaeus*
Northern copperhead	*Agkistrodon contortrix mokasen*
Northern ravine salamander	*Plethodon electromorphus*
Northern ribbon snake	*Thamnophis sauritus septentrionalis*
Northern ringneck snake	*Diadophis punctatus edwardsii*
Northern slimy salamander	*Plethodon glutinosus*
Northern two-lined salamander	*Eurycea bislineata*
Northern water snake	*Nerodia sipedon*
Pickerel frog	*Lithobates palustris*
Queen snake	*Regina septemvittata*
Racer	*Coluber constrictor*
Smooth green snake	*Liochlorophis vernalis*
Snapping turtle	*Chelydra serpentina*
Spiny softshell	*Apalone spinifera*
Spotted salamander	*Ambystoma maculatum*
Spring peeper	*Pseudacris crucifer*
Spring salamander	*Gyrinophilus porphyriticus*
Wood frog	*Lithobates sylvatica*
Yellow-bellied slider	*Trachemys scripta scripta*

Table Source: Pennsylvania Herp 2010, online at: http://paherp.org/db/

5.5.2 Temporal and Spatial Distribution of Species

5.5.2.1 Botanical Resources

Due to the lack of vegetation surrounding the proposed Project area, the following discussion provides the temporal and spatial distribution of the White Oak - Black Oak - Northern Red Oak forest cover type.

White oak, black oak, and northern red oak comprise the majority of the stock in this type. In general, oaks grow best on north- and east-facing, gently sloping, lower slopes; in coves and deep ravines; and on well-drained valley floors where soils are at least 36 inches deep. Medium-quality sites consist of moderately deep soils (20 to 36 inches) on upper and middle slopes facing north and east. Narrow ridgetops or south- and west-facing steep, upper slopes where soil is less than 20 inches deep are locations in which oaks survive but grow poorly (Woodland Stewardship 2011).

Common reproduction of oaks is through acorns. Beginning at approximately 50 years old, red oaks produce good acorn crops on a 2- to 5-year interval, which drop in the fall. Soon after falling, white oak acorns germinate; however, red oak acorns germinate the following spring (Woodland Stewardship 2011).

5.5.2.2 Wildlife Resources

Mammals

Some of the furbearing animals that are known to inhabit western Pennsylvania are beaver, fox, muskrat, opossum, river otter, skunk, and weasel. Beavers generally require small to large, slowly flowing brooks, streams, or rivers that are usually bordered by woodlands. Wetlands that provide an adequate food supply and sufficient water depths are beaver habitat requirements. Muskrats inhabit marshes and shallow portions of lakes, ponds, swamps, and sluggish streams. Wetlands with dense, emergent vegetation and stable water depths are muskrat habitat requirements. River otters inhabit streambanks, lakeshores, marshes, and other wetlands in forested areas. River otter habitat requirements include adequate den sites and burrows.

Beavers and muskrats are herbivorous and rely on riparian vegetation for summer and winter forage. River otters are piscivorous and depend on an adequate, year-round supply of forage fish species.

Birds

Pennsylvania is within the Atlantic flyway, one of four major North American flyways used by migrating birds. The flyway encompasses several primary migration routes and many more that

are tributaries of the other flyways. This area is important to migratory waterfowl and other birds that winter on the waters and marshes south of the Delaware Bay. The Atlantic flyway extends from the offshore waters of the Atlantic Coast, west to the Allegheny Mountains where it curves northwestward across northern West Virginia and northeastern Ohio, and continues across the prairie provinces of Canada and the Northwest Territories to the Arctic Coast of Alaska (Bird Nature undated).

5.6 Floodplains, Wetlands, Riparian, and Littoral Habitats

5.6.1 Existing Environment

The USFWS (Cowardin et al. 1979) defines wetlands as:

> *…lands transitional between terrestrial and aquatic system where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have been one or more of the following three attributes: (1) at least periodically, the land supports predominately hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some point during the growing season of the year.*

PADEP's wetland definition is consistent with that of the USACE. The USACE and the PADEP have jurisdiction over wetlands within Pennsylvania and, specifically, within the vicinity of the proposed Project.

According to the National Wetlands Inventory (NWI) and the Cornell University Geospatial Information Repository, there are limited wetlands present along the Monongahela River near the site of the proposed Project (Figure 5-9). The wetlands near the proposed Project are considered to be palustrine and permanently flooded with an unconsolidated bottom (Table 5-15). The riverine wetland present at the proposed Project location is permanently flooded with a lower perennial subsystem and an unconsolidated bottom. Riverine wetlands are hydraulically complex and occur in floodplains and riparian corridors in association with stream channels. Dominant water sources for this type of wetland are subsurface hydraulic connections between the stream channel and wetlands or overbank flow from the channel. Additionally, riverine wetlands typically extend perpendicular from the stream channel to the edge of the stream's floodplain (Brinson et al. 1995).

FIGURE 5-9
WETLANDS IN THE VICINITY OF THE USACE BRADDOCK LOCKS AND DAM

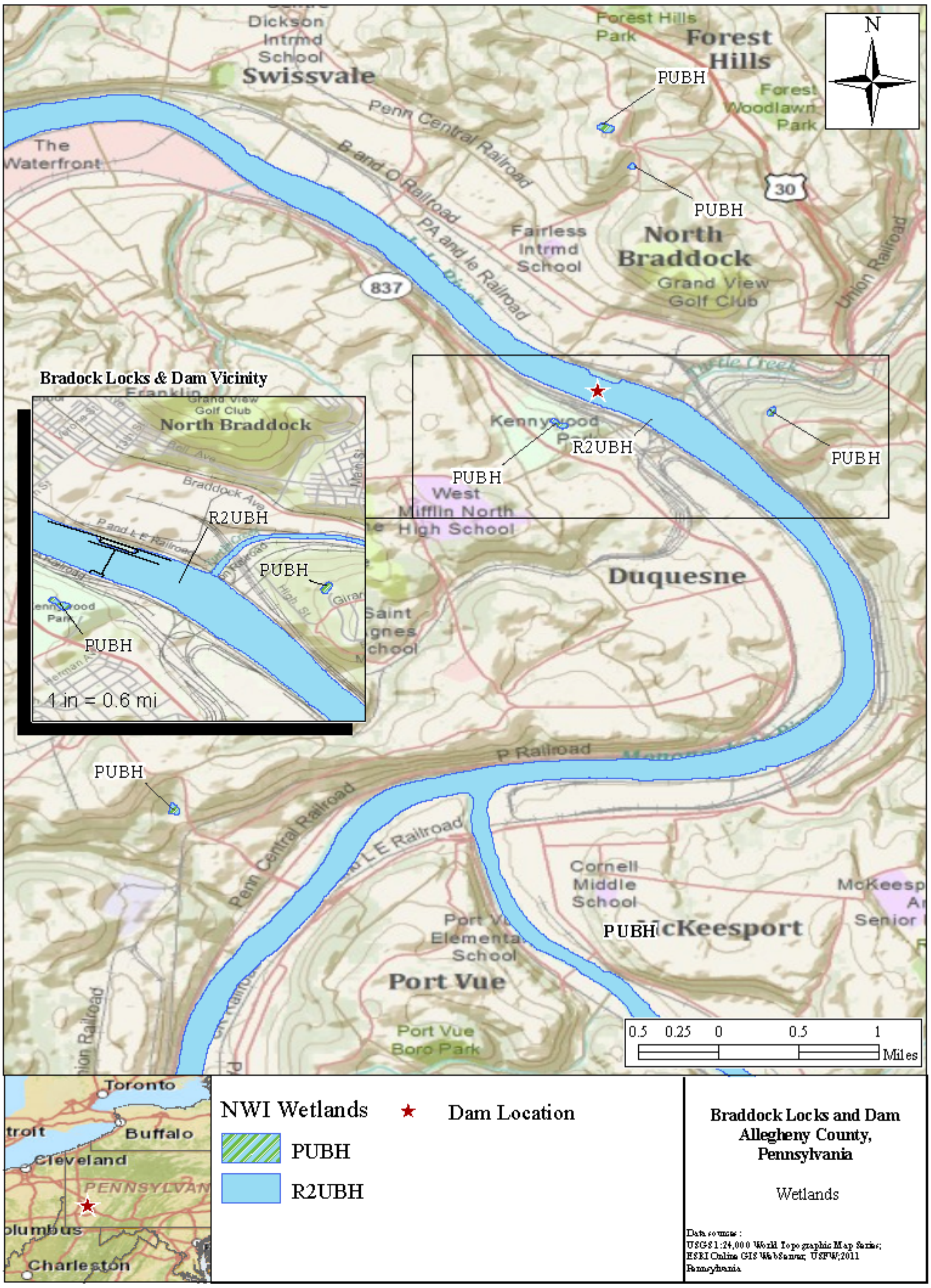


TABLE 5-15
NATIONAL WETLANDS INVENTORY CLASSIFICATION SYSTEM

Wetlands Code	System	Subsystem	Class	Subclass	Regime	Chemistry	Special Modifiers
R2UBH	Riverine	Lower perennial	Unconsolidated bottom	NA	Permanently flooded	–	–
PUBHx	Palustrine	NA	Unconsolidated bottom	NA	Permanently flooded	–	–

5.6.1.1 Plant and Animal Species

Plants

As noted above, Figure 5-9 presents information regarding wetlands in the proposed Project area; however, no formal surveys of wetland vegetation have been performed in support of the preparation of this document.

Animals

Lists of wildlife known to occur in wetland and riparian habitats in the proposed Project vicinity are not readily available; however, many of the species likely to occur typically use wetland or riparian habitats at some point in their lives. The following is a description of species that frequent wetland, riparian, and littoral habitats; however, these species have not been confirmed as occurring within the vicinity of the proposed Project.

Mammal species that make frequent use of open waters and can be typically found near littoral zones and the Monongahela River include the American beaver (*Castor canadensis*), Muskrat (*Ondatra zibethicus*), and American mink (*Neovison vison*) (Whitaker 1998). Avian species include the American black duck (*Anas rubripes*), American coot (*Fulica americana*), lesser scaup, ring-billed gull (*Larus delawarensis*), and great blue heron (*Ardea herodias*) (Sibley, 2003). Reptiles and amphibians include snapping turtle (*Chelydra s. serpentina*), Northern map turtle (*Graptemys geographica*), Eastern spiny softshell (*Apalone s. spinifera*), common watersnake, and bullfrog (Conant 1991). These species utilize open water and littoral habitats primarily for foraging and nesting.

Mammal species typically found within wetlands include white-tailed deer, star-nosed mole (*Condylura cristata*), water shrew (*Sorex palustris*), masked shrew (*Sorex cinereus*), and Southern bog lemming (*Synaptomys cooperi*) (Whitaker 1998). Avian species include yellow warbler (*Dendroica petechia*), song sparrow (*Melospiza melodia*), red-winged blackbird (*Agelaius phoeniceus*), Eastern phoebe (*Sayornis phoebe*), and common yellowthroat (*Geothlypis trichas*) (Sibley 2003). Reptiles and amphibians include pickerel frog (*Rana palustris*), Northern two-lined salamander (*Eurycea bislineata*), and Northern dusky Salamander (*Desmognathus fuscus*) (Conant 1991). The species that utilize wetlands are relatively wide-ranging generalists that can make use of multiple habitats.

Mammal species typically found within riparian areas include raccoon, Eastern chipmunk, Eastern gray squirrel, gray fox, and all of the known bat species in West Virginia (Whitaker 1998). These species typically use riparian habitats for nesting and cover, venturing out into surrounding habitats to forage. Avian species include American goldfinch, black-and-white warbler, blue-gray gnatcatcher, white-throated sparrow, and yellow-throated warbler (Sibley 2003). Reptiles and amphibians include Jefferson spotted salamander (*Ambystoma jeffersonianum*), Eastern American toad, wood frog, Northern coal skink (*Eumeces a. anthracinus*), Eastern milksnake (*Lampropeltis t. triangulum*), and Eastern ratsnake (*Elaphe obsoleta*) (Conant 1991). Many species utilize riparian zones for foraging and shelter, venturing into more aquatic habitats to forage and reproduce.

5.6.1.2 Invasive Species

Invasive wildlife species are those that are not native to the ecosystems to which they have been introduced and whose introduction causes or may cause economic or environmental harm. Invasive species, both plant and animal, crowd out native plants and animals. These species quickly and seriously degrade the quality of natural areas by altering natural processes and reducing the natural biodiversity (The Nature Conservancy 2008).

Invasive Aquatic and Wildlife Species

Invasive aquatic species of concern for the Ohio River Watershed include: zebra mussel, Asian carp, and Asiatic clam (Aquatic Invasive Species of Pennsylvania 2011). There are no known invasive amphibian species and only two invasive reptiles in Pennsylvania. The red-eared slider

(*Trachemys scripta elegans*) and the yellow-bellied slider (*Trachemys scripta scripta*) turtles have established breeding populations within Pennsylvania. These invasive turtle species are aggressive competitors for basking sites, food, and breeding habitat. Additionally, they are threats to many native Pennsylvania turtle species including the red-bellied turtle (*Pseudemys rubriventris*) that is state listed as threatened (Governor's Invasive Species Council of Pennsylvania [GISCP] undated, Pennsylvania Fish and Boat Commission 2011b).

Pennsylvania Biological Survey identified five non-native bird species (rock dove [pigeon], ring-necked pheasant, European starling, house sparrow, and mute swan) known to reproduce in Pennsylvania. European starling, house sparrow, and pigeons can cause considerable property, agricultural, and ecological damage. Additionally, species such as the mute swan (*Cygnus olor*) can impact native waterfowl directly through aggressive behavior, and indirectly by consuming large amounts of native vegetation (GISCP undated).

The Norway rat, house mouse, and thirteen-lined ground squirrel are three non-native, reproducing mammals in Pennsylvania. In addition to the three aforementioned species, feral swine have caused considerable damage following accidental or intentional introductions (GISCP undated).

Invasive Botanical Species

The majority of the most common weeds in Pennsylvania are non-native "invasive" plants that date back to colonial times and are considered widespread across the state. Certain weed species such as garlic mustard are more recent invaders that quickly spread across the state (GISCP undated).

Other well known or common non-native invasive plants, such as kudzu, giant hogweed, and goatsrue, in Pennsylvania are limited in the state or in regions of the state. Other species such as Japanese knotweed, Japanese hops, and tree of heaven are limited across the state but widespread in certain counties or regions (GISCP undated).

Table 5-16 contains non-native invasive plants with limited or widespread occurrences throughout Pennsylvania (GISCP undated).

TABLE 5-16
NON-NATIVE INVASIVE PLANTS WITHIN PENNSYLVANIA

Common Name	Scientific Name
Widespread Pennsylvania Occurrences	
Multiflora rose	*Rosa multiflora*
Johnsongrass	*Sorghum halepense*
Garlic mustard	*Alliaria petiolata*
Mile-a-minute	*Persicaria perfoliata*
Canada thistle	*Cirsium arvense*
Asiatic bittersweet	*Celastrus orbiculatus*
Japanese knotweed	*Fallopia japonica*
Tree of heaven	*Ailanthus altissima*
Purple loosestrife	*Lythrum salicaria* L.
Japanese hops	*Humulus japonicus*
Common reed	*Phragmites australis*
Limited Pennsylvania Occurrences	
Kudzu	*Pueraria lobata*
Giant hogweed	*Heracleum mantegazzianum*
Goatsrue	*Galega officinalis*

5.6.1.3 Wetland, Riparian, and Littoral Habitat Maps

Figure 5-9 presents a map of wetland and riparian habitats existing in the vicinity of the proposed Project. Table 5-15 defines the NWI classification system used on the wetlands maps (South Carolina Department of Natural Resources undated). Currently, data for littoral habitat cannot be found for the areas surrounding the proposed Project and no formal surveys for littoral habitat have been performed in support of preparation of this document.

5.6.1.4 Estimates of Wetland, Riparian, and Littoral Habitat Acreage

Wetland Acreage

There are no wetlands located within the proposed Project Boundary. However, the total combined acreage of the two wetlands within the inset map on Figure 5-9 is 2.58 acres.

Littoral and Riparian Zone Acreage

Currently, no information on littoral and riparian zone acreage can be found.

5.7 RTE Aquatic Species

5.7.1 Existing Environment

The Monongahela River originates in the Allegheny Plateau located in Marion County, West Virginia, and is formed by the confluence of the Tygart Valley and West Fork rivers at an elevation of approximately 2,359 feet msl near Fairmont, West Virginia. The Monongahela flows north for 128 miles through Marion and Monongalia counties in West Virginia and continues to the confluence with the Allegheny River in Pittsburgh, Pennsylvania, forming the Ohio River at an elevation of 694.23 feet msl (USACE 2004). The West Virginia/Pennsylvania border is located at approximately RM 91.5 on the Monongahela River. The river has a drainage area of 7,386 square miles in northern West Virginia, southwestern Pennsylvania, and northwestern Maryland. The entire length of the Monongahela River is maintained for navigation by a series of locks and dams owned and operated by the USACE. The main stem of the river has an average stream gradient of 1.15 feet per mile. The Braddock Dam and pool are located in Pennsylvania at Monongahela RM 11.2.

5.7.1.1 RTE Aquatic Species – Federal and State Listed

Based on information gathered from the Pennsylvania Natural Heritage Program (PNHP) no federally listed species occur within the proposed Project area. Table 5-17 lists the state and proposed endangered (PE) federally listed aquatic species that occur in Allegheny County, Pennsylvania, and could potentially occur in the proposed Project area. Based on a review of information gathered from the Pennsylvania Natural Diversity Inventory (PNDI), it was determined that the following RTE species could potentially be found in the proposed Project vicinity: Warmouth and Lilliput (PNDI 2011). However, additional correspondence with the PADCNR states that although PNDI records indicate species or natural resources of concern are located in the vicinity of the proposed Project, based on the information submitted to the agency concerning the nature of the proposed Project, immediate location, and detailed resources information, the PADCNR has determined that no impacts are likely.

5.7.1.2 RTE Aquatic Species – Habitat Requirements

The RTE species potentially occurring in the proposed Project vicinity, along with information on state and federal status and habitat requirements, are listed in Table 5-17. A list of state listed

aquatic and wetland RTE plant species potentially occurring in the vicinity of the proposed Project is presented in Table 5-18.

5.7.1.3 Biological Opinions, Status Reports, and Recovery Plans for Aquatic Species

No biological opinions, status reports, or recovery plans directly concerned with aquatic resources of the proposed Braddock Project's vicinity were identified.

5.7.1.4 Critical Habitat in Proposed Project Area for Aquatic Species

According to the USFWS, the proposed Project vicinity does not contain habitat that is currently a designated or proposed critical habitat, in accordance with the provisions of the Endangered Species Act.

5.7.1.5 Temporal and Spatial Distribution of RTE Aquatic Species in Proposed Project Area

Based on a review of information gathered from the PNDI, it was determined that the following state listed RTE species could potentially be found in the proposed Project vicinity: Warmouth and Lilliput (PNDI 2011).

Warmouth

The warmouth occurs naturally throughout the central and southeastern United States. It is distributed throughout Kansas, Iowa, and Missouri; north to southern Wisconsin, lower Michigan, Lake Erie, and western Pennsylvania; south to Florida; and west through the Gulf States to the Rio Grande (Hubbs and Lagler 1947, Larimore 1957). It has been introduced into California (Hubble 1966, Moyle 1976), Arizona (Minckley 1973), and other western states (Smith 1896).

TABLE 5-17
LIST OF RTE AQUATIC SPECIES OCCURRING IN ALLEGHENY COUNTY, PENNSYLVANIA

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Mussels and Snails			
Ellipsaria lineolata	Butterfly mussel	S1S2	This species reaches its greatest abundance in large rivers in stretches with pronounced current and a substrate of coarse sand and gravel. It appears to have been successful in adapting to impoundment conditions in the Cumberland and Tennessee rivers where it is locally common and can be found at depths of up to 20 feet.
Epioblasma triquetra	Snuffbox	S1	Found in riffles of medium and large rivers with stony or sandy bottoms, in swift currents, usually deeply buried.
Fusconaia flava	Wabash pigtoe	S2	This species may be found in medium-sized rivers as well as big rivers at depths up to 15 feet. A stable substrate composed of coarse sand and gravel appears most suitable, but it also tolerates other substrates.
Fusconaia subrotunda	Long-solid	S1	This species is found in medium to large rivers in gravel with a strong current, often in sand and gravel.
Leptodea fragilis	Fragile papershell	S2	This species is tolerant of a variety of aquatic habitats and can be found in small streams in strong current with coarse gravel and sand substrates but also rivers or river-lakes possessing slow current and a firm substrate composed of sand and mud. It can occur at depths of up to 15 or 20 feet but reaches greatest population density at normal water levels of 3 feet or less in areas such as shallow embayments.
Obovaria subrotunda	Round hickorynut	S1	Found in medium-sized to large streams in sand and gravel in areas with moderate flow. Typically found in medium-sized to large rivers, usually at depths of less than 6 feet but also occurs in Lake Erie and Lake St. Clair.
Plethobasus cyphyus	Sheepnose mussel	S1	Although it does inhabit medium-sized rivers, this mussel generally has been considered a large-river species. It may be associated with riffles and gravel/cobble substrates but usually has been reported from deep water (>2 meters) with slight to swift currents and mud, sand, or gravel bottoms. It also appears capable of surviving in reservoirs, such as upper Chickamauga Reservoir immediately below Watts Bar Dam. Specimens in larger rivers may occur in deep runs.
Pleurobema cordatum	Ohio pigtoe	S1	This species primarily inhabits large rivers but may be found in medium-sized rivers. It is also tolerant of some reservoir environments. In lotic situations, it is found in or immediately above riffles in heterogenous assemblages of gravel, cobble, and boulder. It also occurs in some habitats with greater depth and substrates of mud/sand/gravel but seems to require flowing water. In reservoirs, it tends to occur in the sublotic areas of dam tailwaters and may be in some overbank beds.
Potamilus alatus	Pink heelsplitter	S2	This species is found on a variety of substrates in slow to swiftly flowing water. It can also adapt to shallow lake and river-lake habitats. Substrates include clay, clay mixed with silt, sand, pea gravel and sand, and cobble/sand/silt.

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Quadrula cylindrica	Rabbitsfoot	S1	The typical habitat for this species is small to medium rivers with moderate to swift currents, and in smaller streams it inhabits bars or gravel and cobble close to the fast current. It is found in medium to large rivers in sand and gravel. It has been found in depths up to 3 meters. Despite their streamlined appearance, specimens are more often found fully exposed lying on their sides on top of the substrate.
Quadrula pustulosa	Pimpleback	S1	This species has generalized habitat preferences and can maintain abundant and viable populations in shallow to deep sections of large reservoirs as well as in small to medium-sized free-flowing rivers. It is usually found in a substrate consisting of coarse gravel, sand, and silt.
Quadrula quadrula	Mapleleaf	S1S2	This species is adaptable to various habitats and does well in shallow lakes and big river embayments, or in deep (15-18 feet) reservoir impoundments. The most suitable substrate is one composed of sand and fine gravel.
Toxolasma parvus	Lilliput	S1S2	This species is most commonly found in shallow water in lentic environments in mud, sand, or fine gravel.[d]
Tritogonia verrucosa	Pistolgrip mussel	S1	Found in large rivers with gravel or rocky substrates.
Truncilla donaciformis	Fawnsfoot	S1	This species occurs in both large and medium-sized rivers at normal depths varying from less than 3 feet up to 15 to 18 feet in big rivers such as the Tennessee. A substrate of either sand or mud is suitable and although it is typically found in moderate current, it can adapt to a lake or embayment environment lacking current.
Truncilla truncata	Deertoe	S1	This species is generalized in terms of substrate preference, usually occurring in fine gravel mixed with sand and mud. It is also considered a generalist in terms of the size of rivers it inhabits. It is more common in medium-sized rivers but may become numerous in large rivers, where it can live at depths of 12 to 18 feet. It will also establish viable populations in lakes lacking current.
Villosa iris	Rainbow mussel	S1	This species lives in riffles along the edges of emerging vegetation, such as Justicia beds, in gravel and sand in moderate to strong current. It becomes most numerous in clean, well-oxygenated stretches at depths of less than 3 feet. It is most abundant in small to medium-sized rivers but can also be found in inland lakes.
Fish			
Chaenobryttus gulosus	Warmouth	S3	This species occurs in ponds, lakes, swamps, and streams of low gradient with mud or debris over bottom; a pool species in streams where it often is near beds of vegetation or other cover; weedy turbid areas of rivers and backwaters. Tolerant of low oxygen levels of polluted waters. Common in lowlands, uncommon in uplands. Eggs are laid in a bowl-like nest made by male, often in sand or rubble bottom with thin covering of silt or detritus near a rock, stump, clump of vegetation, or similar object, at depths of 15 centimeters to 1.5 meters. Nests usually are separated from one another.
Erimystax x-punctatus	Gravel chub	S1	Found in clear to moderately turbid waters of large creeks and small to large rivers; in areas of moderate flow (usually riffles) over fine gravel or occasionally rocky substrate. Possible spawning occurred in meter-deep swift water adjacent to a gravel bar.

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Etheostoma tippecanoe	Tippecanoe darter	S3S4	Habitat includes medium-sized upland rivers and large creeks with moderate gradient and warm, usually clear water; adults occupy shallow and deep, moderate and swift runs and long shallow gravel/sand riffles. Spawning occurs at heads or tails of clean-swept gravel and pebble riffles in water 8-46 centimeters deep with gentle current.
Ichthyomyzon bdellium	Ohio lamprey	S3S4	Adults in medium to large rivers, larvae burrow near debris in mud bottom of quiet pools of creeks and small rivers. Eggs are laid in nests in gravel-bottomed riffles in small gravelly tributaries.
Moxostoma carinatum	River redhorse	S3S4	Generally confined to clearer large creeks and rivers; occasionally in natural lakes and reservoirs. Adults generally occupy moderate to swift water over clean gravel, boulders, and rubble, or in deep, fast-flowing portions of pools. Small individuals often are in pool shallows and backwaters. Spawns in excavated nest in gravel and gravel-rubble in shoals or large runs. Some medium-sized creeks or small rivers are ascended for spawning, but juveniles do not stay long in these smaller waterways. Intolerant of pollution and heavy siltation.
Notropis buchanani	Ghost shiner	S1	Found in low-gradient sections of large creeks and small to large rivers having moderate flow and moderately clear to turbid water. In larger pools and protected backwaters without noticeable current. Bottom may vary from silt/detritus to clean gravel.
Percina macrocephala	Longhead darter	S3	Habitat includes boulder- and cobble-strewn flowing pools and the areas above and below deep, fast riffles underlain with cobble, in larger upland creeks and small to medium rivers. Spawning presumably occurs in gravel shoals.
Phoxinus erythrogaster	Southern redbelly dace	S1	The southern redbelly dace is found in headwaters and upland creeks (often spring-fed) in generally clear water. It has been found to school under bank overhangs among tree roots in clear ponds with muck bottoms and also over gravel, rubble, or sand. It is found in the Great Lakes and Mississippi River basins from New York to Southern Minnesota, south to Tennessee and Alabama. There are isolated populations in the lower Mississippi River basin as well as Colorado and New Mexico.

[a] Information in this table was compiled from the Pennsylvania Natural Heritage Program (www.naturalheritage.state.pa.us).
[b] S1 – Critically imperiled (often five or fewer occurrences); S2 – Imperiled (often 20 or fewer occurrences); S3 – Vulnerable (often 80 or fewer occurrences); S4 – Apparently Secure (uncommon but not rare, some cause for long-term concern due to declines or other factors).
[c] Habitat requirements as indicated by NatureServe (www.natureserve.org).
[d] Habitat requirement as indicated by U.S. Forest Service (www.fs.fed.us).

TABLE 5-18
PENNSYLVANIA NATURAL HERITAGE PROGRAM (PNHP) LIST OF RTE AQUATIC AND WETLAND PLANT SPECIES OCCURRING IN ALLEGHENY COUNTY, PENNSYLVANIA

Scientific Name[a]	Common Name	State Status[b]
Aplectrum hyemale	Puttyroot	S3
Astragalus canadensis	Canadian milkvetch	S2
Camassia scilloides	Wild hyacinth	S1
Carex buxbaumii	Brown sedge	S3
Carex shortiana	Sedge	S3
Carex typhina	Cattail sedge	S2
Chionanthus virginicus	Fringe-tree	S3
Cypripedium calceolus var. parviflorum	Small yellow lady's-slipper	S1
Deschampsia cespitosa	Tufted hairgrass	S3
Dryopteris clintoniana	Clinton's wood fern	S2
Eleocharis quadrangulata	Four-angled spike-rush	S1
Festuca paradoxa	Cluster fescue	S1
Filipendula rubra	Queen-of-the-prairie	S1S2
Hierochloe hirta ssp. arctica	Common northern sweet grass	S1
Iodanthus pinnatifidus	Purple rocket	S1
Juncus dichotomus	Forked rush	S1
Juncus torreyi	Torrey's rush	S3
Lemna turionifera	A duckweed	S1S3
Lythrum alatum	Winged-loosestrife	S1
Marshallia grandiflora	Large-flowered marshallia	S1
Myriophyllum sibiricum	Northern water-milfoil	S1
Oxypolis rigidior	Stiff cowbane	S2
Populus balsamifera	Balsam poplar	S1
Potamogeton tennesseensis	Tennessee pondweed	S1
Ptelea trifoliata	Common hop-tree	S2
Ranunculus flabellaris	Yellow water-crowfoot	S2
Ruellia strepens	Limestone petunia	S2
Salix caroliniana	Carolina willow	S1
Senna marilandica	Wild senna	S3
Sisyrinchium atlanticum	Eastern blue-eyed grass	S1
Spiranthes lucida	Shining ladies'-tresses	S3
Trillium cernuum		S2
Veratrum virginicum	Virginia bunchflower	S1

[a] Information in this table was compiled from the Pennsylvania Natural Heritage Program (www.naturalheritage.state.pa.us).
[b] S1 – Critically imperiled (often five or fewer occurrences); S2 – Imperiled (often 20 or fewer occurrences); S3 – Vulnerable (often 80 or fewer occurrences); S4 – Apparently Secure (Uncommon but not rare, some cause for long-term concern due to declines or other factors).

Warmouth are found almost invariably in slow-moving or still waters having a soft substrate and dense beds of submerged, floating, or emergent aquatic vegetation or other dense cover such as stumps, brush, or boulders (Larimore 1957, Cross 1967, Germann et al. 1975, Pflieger 1975, Guillory 1978, Trautman 1981). In Illinois, Ohio, and Missouri, warmouth habitat consists chiefly of weedy, sluggish streams, oxbows, and backwaters adjacent to large rivers and clear to

moderately turbid, silt-bottomed ponds with dense cover along the shoreline (Larimore 1957, Pflieger 1975, Smith 1979, Trautman 1981). In California, where warmouth have been introduced, they are found in similar habitats where there is abundant vegetation and other cover in warm, turbid, muddy-bottomed sloughs and backwaters along the Sacramento, San Joaquin, and Colorado rivers. In California, warmouth also occur in cool, fluctuating reservoirs where salmonids predominate (Moyle 1976). In the Southeast, the warmouth is also found in marshes and swamps such as the Everglades (Bangham 1939, Meehean 1942) and in the Okefenokee Swamp and Suwanne River, Georgia, where it is one of the primary sport fishes (Germann et al. 1975).

Nesting and spawning activity of warmouth commences in April or when temperatures exceed 21°C (Larimore 1957, Germann et al. 1975). Spawning generally peaks in late May to early June, but may extend through August if temperatures are favorable (Larimore 1957, Guillory 1978). Multiple spawning of individual fish has been reported in Texas where one pair of warmouth spawned three times in one season (Toole 1946).

Eggs are laid in nests built and guarded by males (Larimore 1957). Nests are built near cover in shallow, protected areas over a variety of substrates (Larimore 1957, Germann et al. 1975). Nests in Georgia swamps were found near stumps, root bases of trees along the shoreline, and in sluggish areas having water lilies and emergent vegetation (Germann et al. 1975).

Lilliput

Generally, freshwater mussels remain buried in the substrate with only the most posterior margin of the shell and siphons exposed to the water column, though they may also be completely buried within the substrate or occasionally found laying on their sides at the surface. Mussels can be found scattered throughout the river bottom but also may form dense aggregations known as mussel beds when conditions are favorable. One of the critical components is good water quality and stable substrate, typically a mix of cobble, gravel, and sand.

Freshwater mussels have a unique and complicated lifecycle that requires a host fish species during the larval stage in order to metamorphose into juvenile mussels. The typical life cycle consists of males discharging sperm into the surrounding water, which are then dispersed by

water currents. The females draw in sperm through their incurrent siphon during feeding and respiration activities. The eggs in the outer gills of the females are fertilized internally and develop into larval forms referred to as glochidia. The glochidia are released generally in spring or summer, although some species are known to release in winter. The glochidia need to attach to a suitable host fish, either on the fish gills or on the fins. Some species are host-specific while others can use a wide variety of fish as hosts. These encysted larvae are essentially parasites, which grow and develop into juvenile mussels while on the host fish.

After metamorphosis, juvenile mussels drop from the host and settle to the stream or lake bottom and bury themselves in the substrate to continue their life cycle. Metamorphosis usually takes a few weeks, depending primarily on species and water temperature. Juveniles need to settle on substrate suitable for the adult life stage as they have limited mobility, although there has been some suggestion that they may not recruit to the adult bed itself but nearby and then move into the adult bed (O'Brien and Brim Box 1999).

Though there are many variations, freshwater mussel reproductive strategy is typically categorized as either short-term brooder (tachytictic) or long-term brooder (bradytictic). Short-term brooders typically spawn in the spring and brood larvae only until they are mature glochidia, which are then released to parasitize a host fish and complete metamorphosis to the juvenile stage. Long-term brooders generally spawn and fertilize eggs in late summer or early fall; females brood the glochidia over the winter and release them the following spring or early summer to complete the life cycle.

5.7.2 RTE Terrestrial Species

5.7.2.1 Existing Environment

The major land resource areas offer diverse wildlife and botanical habitats. RTE plant species that may occur in habitats within the proposed Project vicinity were identified using existing information. Based on a review of information gathered from the PNDI, it was determined that the following RTE species could potentially be found in the proposed Project vicinity: Red-Fruited Hawthorn (PNDI 2011).

5.7.2.2 RTE Terrestrial Species – Federal and State Listed

Based on information gathered from the PNHP, Table 5-19 lists the state listed terrestrial species that occur in Allegheny County, Pennsylvania, and could potentially occur in the proposed Project area. According to the USFWS, only one federally listed species is listed as threatened or endangered in Allegheny County, Pennsylvania: the Indiana bat (*Myotis sodalis*), listed in Table 5-20. Table 5-21 lists all state listed plant species that occur in Allegheny County, Pennsylvania, and could potentially occur in the proposed Project area.

While no longer federally listed, the bald eagle is monitored under the 2010 Post-Delisting Monitoring Plan for Bald Eagle and protected by the Bald and Golden Eagle Protection and the Migratory Bird Treaty Acts (USFWS 2009)

5.7.2.3 RTE Terrestrial Species – Habitat Requirements

The RTE species that may potentially occur in the proposed Project vicinity, along with information on state and federal status and habitat requirements, are listed in Tables 5-19 and 5-20. A list of state listed terrestrial RTE plant species potentially occurring in the vicinity of the proposed Project is located in Table 5-21.

5.7.2.4 Biological Opinions, Status Reports, and Recovery Plans for Terrestrial Species

No biological opinions or status reports directly concerned with terrestrial botanical and wildlife resources of the proposed Braddock Project's area and vicinity were available. However, a recovery plan prepared by the USFWS associated with the Indiana bat, a federally protected species, is available for review and implementation.

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TABLE 5-19
PNHP LIST OF RTE TERRESTRIAL SPECIES OCCURRING IN ALLEGHENY COUNTY, PENNSYLVANIA

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Reptiles and Amphibians			
Acris crepitans	Northern cricket frog	S1	This species inhabits the edges of sunny marshes, marshy ponds, and small slow-moving streams in open country. It may periodically range into adjacent nonwetland habitats in some regions. Eggs and larvae develop in the shallow water of ponds, marshes, ditches, slow streams, springs, or rain pools. Hibernation sites are underground on land near water; may hibernate communally.
Heterodon platirhinos	Eastern hognose snake	S3	Habitats include openly wooded upland hills, forest edges, fields, woodland meadows, prairies, forest-grassland ecotones, sand plains, barrier islands, fire-managed pinelands, river valleys, riparian zones, and various other habitats with loose soils and amphibian prey. This snake crawls on the surface and burrows into soil. It overwinters in burrows (made by mammal or self-dug) or under rocks of talus slopes. Eggs are laid in nests a few inches below the ground surface or in rotting wood.
Regina septemvittata	Queen snake	S3	This snake occurs only where crayfish are present and fairly abundant, generally in moderate to fast-flowing streams with ample cover, wooded or open conditions, and good exposure to sun. Habitat has been characterized as follows: streams with vegetation along the shoreline, and rocky (north) or sandy (south) bottoms; clean streams or marshes of open areas or woodlands; small clear creeks with rocky or dandy bottoms, stream impoundments; woodland streams and cypress domes; exposed rocky river shorelines; shallow rocky streams in agricultural, urban, and forested areas; shallow streams and rivers with plenty of sun, rocks, and overhanging shrubs and small trees; unpolluted rocky woodland streams; small rocky streams in wooded areas or open pastures, swampy woods; clear, spring-fed streams with moderate to fast currents and rocky bottoms, in lowland hardwood forests and shrub-carr communities. In some areas, the habitat may include slow-moving streams, ditches, canals, freshwater marshes, or the edges of ponds or lakes, but this species generally is uncommon or absent from these habitats. This snake basks on branches overhanging the water. Sometimes it travels on land away from water. Refuges include burrows, rocks, logs, and other cover.

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Sistrurus catenatus catenatus	Eastern Massasauga	S1	Habitats range from sphagnum bogs, fens, swamps, marshes, shrub-dominated peatlands, wet meadows, and floodplains to dry woodland; this snake prefers seasonal wetlands with a mixture of open grass-sedge areas and short closed canopy (edge situations).
Birds			
Ardea herodias	Great blue heron	S3S4B,S4N	Freshwater and brackish marshes, along lakes, rivers, bays, lagoons, ocean beaches, mangroves, fields, and meadows. Nests commonly high in trees in swamps and forested areas, less commonly in bushes, or on ground, rock ledges, and coastal cliffs. Often nests with other herons. Generally nests close to foraging habitat.
Asio flammeus	Short-eared owl	S1B,S3N	BREEDING: Broad expanses of open land with low vegetation for nesting and foraging are required. Habitat types frequently mentioned as suitable include fresh and saltwater marshes, bogs, dunes, prairies, grassy plains, old fields, tundra, moorlands, river valleys, meadows, savanna, open woodland, and heathland. In general, any area that is large enough, has low vegetation with some dry upland for nesting, and that supports suitable prey may be considered potential breeding habitat, although many will not have breeding short-eared owls. NON-BREEDING: Suitable breeding habitat may also be occupied by wintering birds. Short-eared owls tend to congregate and roost communally in the winter, often in sheltered sites near hunting areas. Winter roosts have been reported in abandoned dumps, quarries, gravel pits, storage yards, stump piles, old fields, small evergreen groves, bayberry thickets, dunes, and open, abandoned cellars. May also roost directly on the ground in tall grasses, possibly choosing vegetation of a coloration that blends with their plumage.

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Circus cyaneus	Northern harrier	S3B,S4N	BREEDING: Marshes, meadows, grasslands, and cultivated fields. Perches on ground or on stumps or posts. Nests on the ground, commonly near low shrubs, in tall weeds or reeds, sometimes in bog; or on top of low bush above water, or on knoll of dry ground, or on higher shrubby ground near water, or on dry marsh vegetation. NON-BREEDING: In the Northeast, winter in greatest numbers in the saltmarshes of the Atlantic coast, with the winter population exhibiting a tendency to increase from north to south (National Audubon Society 1971-74, 1982-83, 1985-87). Although harriers appear to prefer coastal regions in the Northeast, they will range inland during the winter when suitable open habitats are available (Root 1988), though avoiding the mountainous interior. Other habitats used by harriers during the nonbreeding season in both coastal and inland areas include agricultural fields (croplands, hayfields, and pastures), abandoned fields, and freshwater wetlands. Elsewhere in North America, wintering harriers have been observed in habitats similar to those in the Northeast (Craighead and Craighead 1956, Bildstein 1978, Temeles 1986, Collopy and Bildstein 1987, Littlefield and Thompson 1987).
Falco peregrinus	Peregrine falcon	S1B,S1N	Various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers (American Ornithologists' Union 1983). When not breeding, occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports. Often nests on ledge or hole on face of rocky cliff or crag. River banks, tundra mounds, open bogs, large stick nests of other species, tree hollows, and man-made structures (e.g., ledges of city buildings) are used locally (Cade 1982). Nests typically are situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang (Palmer 1988, Campbell et al. 1990). Tundra populations nests typically on rocky cliffs, bluffs, or dirt banks. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey. Substitute man-made sites include tall buildings, bridges, rock quarries, and raised platforms.

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Haliaeetus leucocephalus	Bald eagle	S2B	Breeding habitat most commonly includes areas close to (within 4 kilometers [km]) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds. Preferentially roosts in conifers or other sheltered sites in winter in some areas; typically selects the larger, more accessible trees. Perching in deciduous and coniferous trees is equally common in other areas. Wintering areas are commonly associated with open water though in some areas eagles use habitats with little or no open water if other food resources (e.g., rabbit or deer carrion) are readily available. Avoids areas with nearby human activity (boat traffic, pedestrians) and development (buildings). BREEDING: Usually nests in tall trees or on cliffs near water. Nest trees include pines, spruce, firs, cottonwoods, oaks, poplars, and beech. Ground nesting has been reported on the Aleutian Islands in Alaska, in Canada's Northwest Territories, and in Ohio, Michigan, and Texas. Nests located on cliffs and rock pinnacles have been reported historically in California, Kansas, Nevada, New Mexico, and Utah, but currently are known to occur only in Alaska and Arizona. Same nest may be used year after year, or may alternate between two nest sites in successive years. In British Columbia, nests with overhead canopy of foliage were most successful (Palmer 1988). See Livingston et al. (1990) for model of nesting habitat in Maine, Wood et al. (1989) for characteristics of nesting habitat in Florida (most nests in live pine trees). In Oregon, most nests were within 1.6 km of water, usually in largest tree in stand. In Colorado and Wyoming, forest stands containing nest trees varied from old-growth ponderosa pine to narrow strips of riparian vegetation surrounded by rangeland.
Lanius ludovicianus migrans	Migrant loggerhead shrike	S1B	This species prefers open habitat characterized by grasses and forbs of low statue interspersed with bare ground and shrubs or low trees. In Pennsylvania, this species uses pastures with scattered low trees (especially hawthorns, or other thorny shrub species, and crab-apples), farmsteads, mowed right-of-ways, and croplands. Scattered shrubs or trees, particularly thick or thorny species, serve as nesting substrates, hunting perches, and impaling stations. This species is a predator that preys on small songbirds, grasshoppers, and small rodents but does not have talons like raptors. This species will therefore impale the prey on a sharp thorn in a small tree such as a hawthorn.

Scientific Name[a]	Common Name	State Status[b]	Habitat Requirements[c]
Mammals			
Mustela nivalis	Least weasel	S3	Habitat varies geographically and includes open forests, farmlands and cultivated areas, grassy fields and meadows, riparian woodlands, hedgerows, alpine meadows, scrub, steppe and semi-deserts, prairies, coastal dunes, and sometimes rural residential areas; snow cover is not an obstacle; generally avoids deep dense forest and sandy desert. When inactive, occupies burrow made by vole or mole, or rests in nest in hole in wall of building or under corn shock or similar site. Den site may change often. Young are born in abandoned underground burrows made by other mammals (or similar secluded sites).
Myotis septentrionalis	Northern myotis	S1	Generally associated with forested communities. Hibernates in caves, mines, and tunnels from late fall through early spring. Hibernators frequently roost in crevices, drill holes, and similar sites but roosting in the open is not uncommon.

[a] Information in this table was compiled from the Pennsylvania Natural Heritage Program (www.naturalheritage.state.pa.us).
[b] S1 – Critically imperiled (often five or fewer occurrences); S2 – Imperiled (often 20 or fewer occurrences); S3 – Vulnerable (often 80 or fewer occurrences); S4 – Apparently Secure (uncommon but not rare, some cause for long-term concern due to declines or other factors).
[c] Habitat requirements as indicated by NatureServe (www.natureserve.org).

TABLE 5-20
USFWS LIST OF RTE TERRESTRIAL SPECIES OCCURRING IN ALLEGHENY COUNTY, PENNSYLVANIA

Scientific Name	Common Name	Federal Status	Habitat Requirements
Bats			
Myotis sodalis	Indiana bat	Endangered	Hibernates in caves. Forages in riparian areas, upland forests, ponds, and fields.

TABLE 5-21
PNHP LIST OF RTE PLANT SPECIES OCCURRING IN ALLEGHENY COUNTY, PENNSYLVANIA

Scientific Name[a]	Common Name	State Status[b]
Alisma triviale	Northern water-plantain	S1
Amelanchier humilis	Serviceberry	S1
Amelanchier obovalis	Coastal juneberry	S1
Antennaria virginica	Shale barren pussytoes	S3
Arnoglossum reniforme	Great Indian-plantain	S1
Baptisia australis	Blue false-indigo	S2
Carex careyana	Carey's sedge	S1
Castilleja coccinea	Scarlet Indian-paintbrush	S2
Clematis viorna	Vase-vine leather-flower	S1
Corallorhiza wisteriana	Spring coral-root	S1
Crataegus pennsylvanica	Red-fruited hawthorn	S2S3
Cuscuta campestris	Dodder	S2
Cuscuta pentagona	Field dodder	S2
Delphinium exaltatum	Tall larkspur	S1
Dodecatheon meadia	Common shooting-star	S1
Erythronium albidum	White trout-lily	S3
Helianthemum bicknellii	Bicknell's hoary rockrose	S2
Helianthus hirsutus	Sunflower	S2
Iris cristata	Crested dwarf iris	S1
Lithospermum canescens	Hoary puccoon	S2
Matelea obliqua	Oblique milkvine	S1
Meehania cordata	Heartleaf meehania	S1
Onosmodium molle var. hispidissimum	False gromwell	S1
Opuntia humifusa	Prickly-pear cactus	S3
Oxydendrum arboreum	Sourwood	S3S4
Passiflora lutea	Passion-flower	S2
Pedicularis lanceolata	Swamp lousewort	S1S2
Penstemon laevigatus	Beard-tongue	S3
Physalis virginiana	Virginia ground-cherry	S1S2
Platanthera peramoena	Purple-fringeless orchid	S2
Ratibida pinnata	Gray-headed prairie coneflower	S1
Rosa setigera	Prairie rose	S1
Rosa virginiana	Virginia rose	S1
Rudbeckia fulgida	Eastern coneflower	S3
Salix myricoides	Broad-leaved willow	S2
Scutellaria saxatilis	Rock skullcap	S1
Smallanthus uvedalius	Leaf-cup	S3
Solidago speciosa var. speciosa	Showy goldenrod	S2
Stenanthium gramineum	Featherbells	S1S2
Symphyotrichum ericoides	White heath aster	S3
Symphyotrichum praealtum	Veiny-lined aster	S3
Trillium flexipes	Declined trillium	S2
Trillium nivale	Snow trillium	S3
Vitis novae-angliae	New England grape	S1

[a] Information in this table was compiled from the Pennsylvania Natural Heritage Program (www.naturalheritage.state.pa.us).
[b] S1 – Critically imperiled (often five or fewer occurrences); S2 – Imperiled (often 20 or fewer occurrences); S3 – Vulnerable (often 80 or fewer occurrences); S4 – Apparently Secure (Uncommon but not rare, some cause for long-term concern due to declines or other factors).

Indiana Bat Recovery Plan (USFWS 2007)

Current Species Status: The Indiana bat is an endangered species that has been found in 27 states throughout much of the eastern United States. Based on censuses taken at hibernacula, the total known Indiana bat population was estimated to number about 353,000 bats in 1995; this represented a decline of about 60 percent since population surveys began in the 1960s.

Recovery Objective: The short-term objective of the recovery plan is to halt and reverse the continued decline of the Indiana bat. The long-term objective is the species' eventual delisting.

Recovery Criteria: Criteria for reclassification will be based upon the status of the Indiana bat throughout its range, as determined through a 12-year, two-stage process. The species may be reclassified from endangered to threatened following documentation of stable or increasing populations for three consecutive census periods (6 years) and permanent protection (i.e., public ownership or long-term easement/lease, and gate/fence [where necessary and feasible]) at all Priority One hibernacula. To delist, the above criteria must be met, in addition to protection and documentation of stable or increasing populations for three consecutive census periods at 50 percent of the Priority Two hibernacula in each state, and the overall population level must be restored to that of 1980.

USFWS Objectives:

1. Conduct research necessary for the survival and recovery of the Indiana bat.
2. Obtain information on population distribution, status, and trends.
3. Protect and maintain Indiana bat populations.
4. Provide information and technical assistance outreach.
5. Coordinate and implement the conservation and recovery of the Indiana bat.

On July 9, 2007, the bald eagle was removed from protection under the Endangered Species Act but is still protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (72 FR 37345-37372). Following this change in status, the USFWS wrote the National Bald Eagle Management Guidelines to provide recommendations to landowners about how to avoid disturbing bald eagles, therefore avoiding legal prosecution for violating the Bald and Golden Eagle Protection Act and 4-46 the Migratory Bird Treaty Act (USFWS 2007). Additionally, the

2009 Post-delisting Monitoring Plan will monitor the status of the bald eagle over a 20-year period by collecting data about occupied nests every 5 years (USFWS 2009).

5.7.2.5 Critical Habitat in Proposed Project Area for Terrestrial Species

According to the USFWS, the proposed Project vicinity does not contain habitat that is currently a designated or proposed critical habitat, in accordance with the provisions of the Endangered Species Act. The Indiana bat (*Myotis sodalis*) may be found state-wide, in suitable habitat, as part of its summer range. Preferred winter hibernation sites include: limestone caves; abandoned coal, limestone, and iron mines; and abandoned tunnels; however, the 1983 USFWS recovery plan for the Indiana bat indicates that there is no critical habitat in Pennsylvania for the species.

5.7.2.6 Temporal and Spatial Distribution of RTE Terrestrial Species in Proposed Project Area

Little information exists on the temporal and spatial distributions of RTE species within, or adjacent to, the proposed Project boundaries; however, it is possible that the Indiana bat could use the proposed Project area for foraging corridors during the non-hibernating period. Due to the managed nature of the proposed Project area, it is unlikely that other RTE species would use the area.

5.8 Recreation and Land Use

5.8.1 Existing Environment - Recreation

Pennsylvania offers a variety of outdoor recreational opportunities through federal, state, and local agencies as well as through the private sector. Public outdoor recreational areas include state parks, scenic rivers, state forests, trails and greenways, local parks, campgrounds, golf courses, and amusement parks.

Table 5-22 contains recreational opportunities available through Allegheny County parks and corresponds with Figure 5-10, which maps the locations of these facilities (Allegheny County Pennsylvania undated). Appendix H contains maps of greenways, parks, and trails within the county.

There are also three state forests in the region surrounding the proposed Project—Forbes State Forest, Clear Creek State Forest, and Gallitzin State Forest—and one national scenic trail, the Great Alleghany Passage.

Forbes State Forest

The Forbes State Forest provides numerous recreation opportunities such as (PADCNR undated b):

- 250 miles of trails and roads suitable for hiking
- Two developed state forest picnic areas
- Primitive backpack camping
- Six designated motorized campsites
- Hunting and fishing
- Vistas
- Horseback riding
- Mountain biking

Clear Creek State Forest

Clear Creek State Forest provides recreation opportunities such as (PADCNR undated b):

- 35 miles of trails and roads suitable for hiking
- Permitted camping
- Hunting and fishing
- Vistas
- Horseback riding
- Mountain biking

Gallitzin State Forest

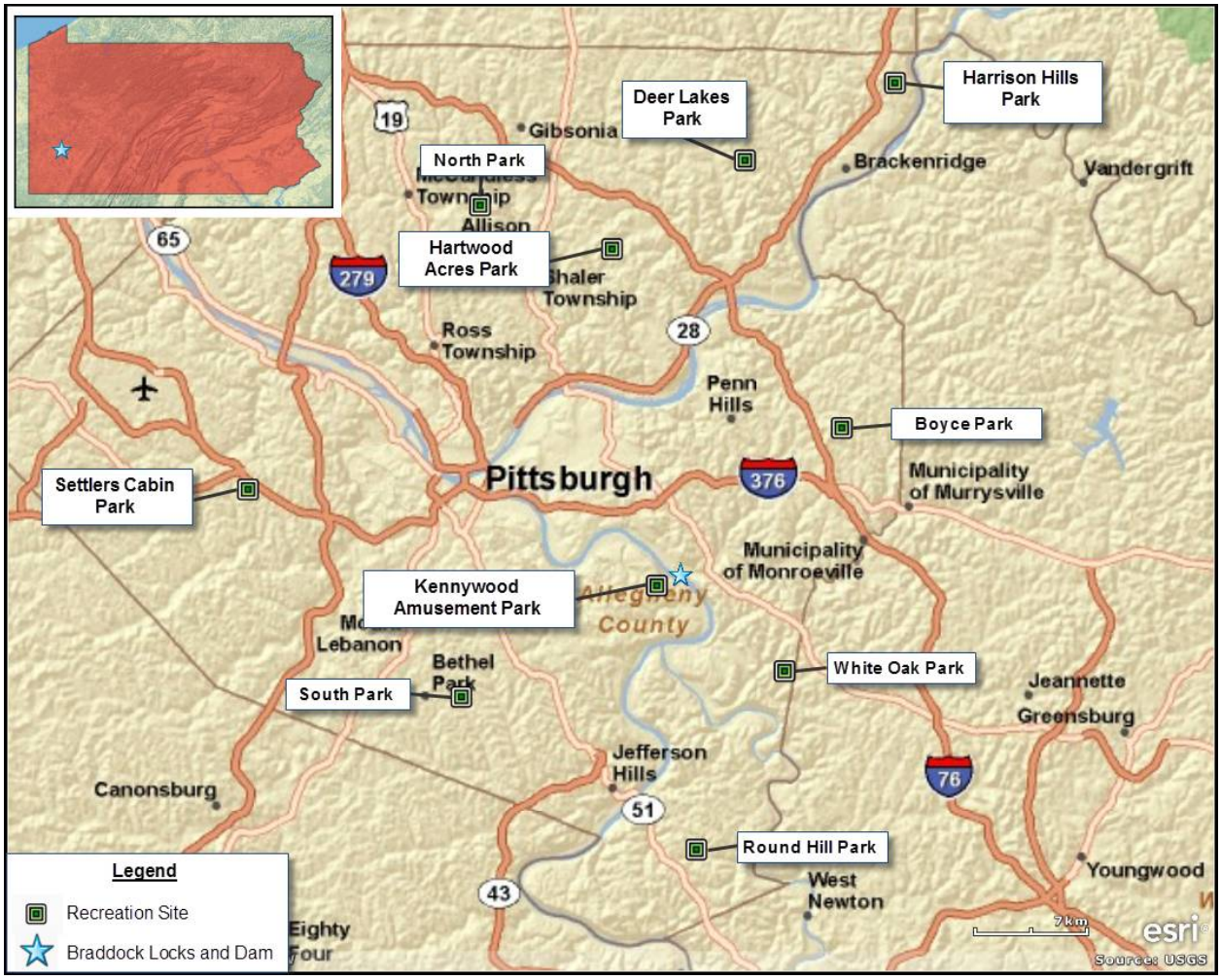
Gallitzin State Forest provides recreation opportunities such as (PADCNR undated a):

- 51 miles of trails and roads suitable for hiking
- One developed state forest picnic area
- Primitive backpack camping
- Six designated motorized campsites
- Hunting and fishing
- Horseback riding
- Mountain biking

TABLE 5-22
ALLEGHENY COUNTY PARK RECREATIONAL OPPORTUNITIES

Recreation Facility	Address	Acreage	Amphi-theater	Cabins	Groves / Shelters	Hiking / Trails	Picnicking	Fishing	Vistas	Swimming	Golf Course	Playground	Ball Fields / Tennis Courts	Other
Kennywood Amusement Park	4800 Kennywood Blvd. West Mifflin, PA 15122	--												Amusement park rides and concession stands
North Park	Pearce Mill Road Allison Park, PA 15101	3,075		x	x	x		x	x	x	x	x	x	Horseshoe pits, ice skating, nature center, wildfowl reserve, dog park
South Park	Buffalo Drive South Park, PA 15129	2,013	x	x	x	x	x			x	x	x	x	Ice skating, theatre, gardens, horse show rink, café, dog park, bike rental, model airplane field, BMX track
Boyce Park	675 Old Frankstown Road Pittsburgh, PA 15239	1,096					x			x			x	Four-season activity center, nature center, action park, skiing and snow tubing, model airplane field, log house tours
Round Hill Park	651 Round Hill Road Elizabeth, PA 15037	1,101			x	x						x		Visitor center, day on the farm program
Deer Lakes Park	1090 Bailey Run Road Tarentum, PA 15084	1,180			x	x					x	x	x	Flying disc society, observatory
Harrison Hills Park	5200 Freeport Road Natrona Heights, PA 15065	500			x	x			x			x		Environmental learning center, wildlife observation blind, birding area, guided walks and nature camps
Hartwood Acres Park	200 Hartwood Acres Pittsburgh, PA 15238	629	x			x								Mansion/stable complex, guided tours
Settlers Cabin Park	1225 Greer Road Oakdale, PA 15071	1,610		x	x	x				x				Log cabin
White Oak Park	3 Muse Lane McKeesport, PA 15131	810			x	x						x		Ash-grove, garden, dog park
Forbes State Forest	1291 Route 30 Laughlintown, PA 15655	59,000				x	x	x	x					Hunting, camping

FIGURE 5-10
ALLEGHENY COUNTY PARK RECREATIONAL OPPORTUNITIES



The Allegheny Passage

Upon completion, the 150-mile Great Allegheny Passage will connect with the 184.5-mile C&O Canal Towpath at Cumberland, Maryland, and create a 334.5-mile traffic-free and motorized-vehicle-free route between Pittsburgh and Washington, DC (The Allegheny Trail Alliance 2011).

The trail has a packed crushed limestone surface and was built mainly on abandoned rail bed. Bicycling and hiking are the two most popular activities that occur along the trail, and sections of the trail system are open to equestrians. The trail system is universally accessible between dawn and dusk, and the winter snow allows for cross-country skiing and snowshoeing. Fishermen can

take the trail to access fishing locations, and bird watching is another favorite activity that occurs along the trail (The Allegheny Trail Alliance 2011).

5.8.1.1 Existing Recreation Facilities, Capacities, and Opportunities

There are no recreational facilities or opportunities associated with the proposed Project. The proposed Project will not affect or alter recreational uses of lands or nearby waters.

5.8.1.2 Existing Shoreline Buffer Zones

The proposed Project does not include an impoundment and thus no shoreline buffer zones exist within the proposed Project Boundary.

5.8.1.3 Recreation Needs Identified in Management Plans

As discussed above, no recreation facilities are associated with the proposed Project. The Pennsylvania Outdoor Recreation Plan does not identify any planning issues or related recommendations that would bear relevance to the proposed Project lands or the installation or operation of the proposed Project. A summary of the Pennsylvania Outdoor Recreation Plan has been provided below for reference purposes.

Pennsylvania Outdoor Recreation Plan

Every 5 years, Pennsylvania is required to produce a new statewide plan to remain eligible to receive federal Land and Water Conservation Fund. The National Park Service (NPS) requires that each plan assesses outdoor recreation resources, identifies the current challenges of recreation providers, analyzes the current recreational needs of residents, and outlines a course of action to improve and enhance the state of outdoor recreation over the next 5 years (PADCNR 2011).

The Pennsylvania Outdoor Recreation Plan contains 28 programmatic and 5 funding recommendations to enhance outdoor recreation facilities and services. These recommendations are organized under four major goals of the plan: (1) strengthen connections between outdoor recreation, healthy lifestyles, and economic benefits in communities; (2) reconnect people to the outdoors and develop a stewardship ethic through outdoor recreation; (3) develop a statewide

land and water trail network to facilitate recreation, transportation, and healthy lifestyles; and (4) enhance outdoor recreation through better state agency cooperation (PADCNR 2011).

Several surveys were conducted for the development of the Plan. The following represents the findings of two of the surveys conducted—the Resident Survey and the Trail Gap Survey.

The Resident Survey results are presented in Table 5-23.

TABLE 5-23
RESIDENT SURVEY RESULTS FOR THE PENNSYLVANIA OUTDOOR RECREATION PLAN

Facilities	Respondents (%)	Number of Facilities Should be Increased (%)	Facility Quality Should be Improved (%)
Bicycle paths	61	55	42
Natural or wild areas	60	54	42
Indoor pools	58	51	38
Environmental education areas	55	56	43
Wildlife viewing areas	54	60	47
Bike lanes	49	69	60
Dog parks	45	64	51
Ice rinks	43	50	36
Rental cabins	42	62	46
Fish viewing areas	38	54	43
Nature inns/lodges	37	60	42
Rifle/handgun ranges	37	50	38
Skateboarding/rollerblading areas	36	51	39
Mountain bike trails	33	51	36
Archery ranges	31	51	36

Source: PADCNR 2011

The Trail Gap Survey found that among geographic issues respondents assigned the highest importance to providing connections between existing trails, closing a gap within an existing trail, and building trails that connect communities to each other (PADCNR 2011).

Additionally, respondents assigned less importance to: building trails that access open space (parks, forests, game lands, etc.); providing trails that connect neighborhoods, shopping areas, and workplaces within communities; providing convenient trailheads and access points; building

trails that provide access to remote areas; providing trails within walking distance of users' homes; and connecting neighborhoods to schools (PADCNR 2011).

5.8.1.4 Protected River Segments on Proposed Project Lands or in Project Area

No designated National Wild and Scenic Rivers are located within or adjacent to the proposed Project area (National Wild and Scenic Rivers 2011).

5.8.1.5 Proposed Project Lands – National Trails System or Wilderness Area

As previously discussed, the Great Allegheny Passage of the Potomac Heritage National Scenic Trail runs along the western bank of the Monongahela River and is adjacent to the proposed Project boundary. Once completed, the 150-mile Great Allegheny Passage will connect to the 184.5-mile C&O Canal Towpath at Cumberland, Maryland. The joining of these trails will create a 334.5-mile traffic-free and motorized-vehicle-free route between Pittsburgh and Washington, DC (The Allegheny Trail Alliance 2011).

5.8.1.6 Nationally or Regionally Important Recreation Areas

There are no nationally or regionally important recreation areas within the proposed Project boundary. However, as mentioned in sections 5.8.1 and 5.8.1.5, the Great Allegheny Passage is located in close proximity to the proposed Project Boundary.

5.8.1.7 Recreational and Non-Recreational Land Use and Management Adjacent to Proposed Project Boundary

Due to the limited terrestrial area associated with the proposed Project (i.e., land needed for the transmission right-of-way), very little land management, other than right-of-way maintenance, will be necessary.

5.8.2 Existing Environment – Land Use

The major land use in the Monongahela watershed is forested land, which comprises approximately 68 percent of the watershed area. Agricultural land makes up about 20 percent of the watershed area. The remaining 12 percent of the Monongahela watershed is barren land, urban land, and wetlands (USEPA 2002).

The lands surrounding the Braddock Locks and Dam are primarily industrial, vacant, or unclassified lands (Figure 5-11). Located in the vicinity of the proposed Project are several brownfields, including the Port Perry - North Versailles brownfields and Duquesne and Carrie Furnace brownfields, which have not been redeveloped. Partially redeveloped brownfields include the Regional Industrial Development Corporation (RIDC) City Center of Duquesne and the Steel Valley Area - Warehouse sites. Fully redeveloped brownfields in the proposed Project vicinity include the Waterfront site and the Keystone Commons site (Appendix I). Additionally, there are several greenways in the vicinity of the proposed Project that are a part of the Allegheny Land Trust GREENPRINT, and Allegheny County has proposed additional greenways to be constructed in the proposed Project's vicinity (Appendix H).

FIGURE 5-11
LAND USE CLASSIFICATIONS OF THE AREA SURROUNDING THE BRADDOCK LOCKS AND DAM

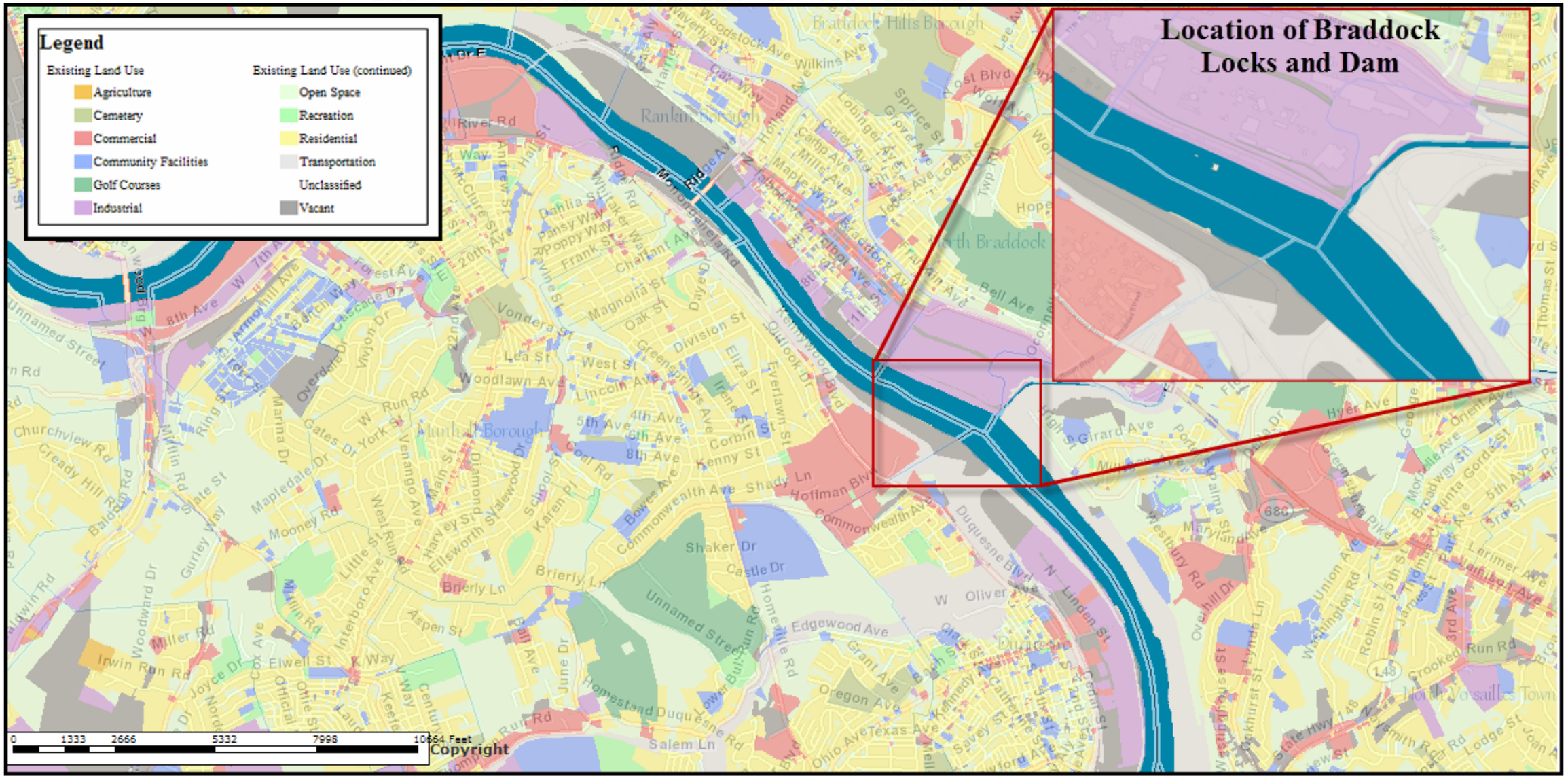


Figure Information sourced from http://www.alleghenyplaces.com/comprehensive_plan/viewer.aspx

5.9 Aesthetic Resources

5.9.1 Existing Environment

The area of the proposed Project and the Braddock Locks and Dam is a mixture of industrial/vacant lands, brownfields, and parks (Figure 5-12 and 5-13). As mentioned throughout Section 5.8, the Great Allegheny Passage runs along the western bank of the Monongahela River adjacent to the proposed Project location. The portion of the Great Allegheny Passage that passes through the vicinity of the proposed Project is called the Steel Valley Trail.

The Steel Valley Trail traces the shores of the Monongahela River and runs through historic battlefields and former steel mill sites in Homestead, Braddock, Duquesne, McKeesport, Glassport, and Clairton. These former steel mill sites and interpretive signage add interest to the surrounding area and the retail area called The Waterfront (see Site #10 in Appendix I – Brownfields for location). The Waterfront is now a retail center with offices, restaurants, and entertainment that were rebuilt to reflect characteristics of the early 20th century and the industrial past of the area (Rails to Trails 2011).

The Braddock Locks and Dam also contribute to the aesthetic resources of the area. As the first of nine navigation facilities on the Monongahela River, the Braddock Locks average 2,122 recreation vessels, 4,406 commercial tows, and 19.4 million tons of cargo, which adds visual interest to the River (Port of Pittsburgh Commission 2005).

Also in the vicinity of the proposed Project is Kennywood Amusement Park. The park was founded in 1898 and has been a designated National Historic Landmark since 1987. The amusement park features "Lost Kennywood," a replica of turn-of-the-century architecture that houses some of the park's most popular rides (Kennywood undated).

FIGURE 5-12
AERIAL VIEW OF THE BRADDOCK LOCKS AND DAM
AND SURROUNDING VICINITY

FIGURE 5-13
UPSTREAM AERIAL VIEW OF THE BRADDOCK LOCKS AND DAM
AND SURROUNDING VICINITY

5.10 Cultural Resources

The archaeological and historical record of Prehistoric and Historic period populations in southwestern Pennsylvania begins over 10,000 years before present (B.P.). This section begins with a brief overview of the cultural setting of the proposed Project, and is intended to provide contextual information regarding the nature and character of cultural resources within the proposed Project's vicinity. Section 5.10.2 describes the previously reported archaeological and historic resources within the proposed Project's vicinity, and Section 5.10.3 provides an overview of existing discovery measures, including previous archaeological and architectural surveys.

5.10.1 Cultural Context

5.10.1.1 Prehistoric Period

The earliest evidence for human occupation in the Upper Ohio River Valley dates to the Late Pleistocene. At the end of the Pleistocene, continental ice sheets blanketed much of the northeastern United States and extended as far south as New Castle, Pennsylvania. However, archaeological investigations at Meadowcroft Rockshelter in nearby Washington County, Pennsylvania, suggest that Paleoindian hunter-gatherers were occupying areas south of the glacial margin as early as 14,555 B.P. Seasonal changes in resource availability meant that Paleoindian groups developed resource procurement strategies that required seasonal migration. Intact archaeological sites in the Northeast and in the New England-Maritimes suggest that Paleoindian populations favored rich ecological zones associated with swamps, rivers, and postglacial lakes (Pasquariello and Loorya 2006).

A warming climate, and a greater ecological diversity following glacial retreat, prompted changes in subsistence strategies and technologies (Ritchie 1965). The changing climatic conditions during the Archaic period (10,000 to 3,000 B.P.) saw the emergence of mixed deciduous-coniferous forests and the appearance of essentially modern faunal assemblages in the Northeast (Quinn 1999). Technological developments, such as smaller projectile points, indicate a shift toward locally available fauna, such as white-tailed deer, turkey, waterfowl, and black bear. Seasonal availability of game animals, aquatic resources, and wild plant foods continued to

make hunting and foraging successful resource procurement strategies, and allowed for population growth throughout the Northeast (Fagan 2000).

Archaeological evidence from southwestern Pennsylvania reflects a "Pan-Appalachian" stylistic affinity in diagnostic tool types during the Middle Archaic (Adovasio et al. 1998). While the exact nature of this Pan-Appalachian influence is unclear, such a relationship suggests that populations in the vicinity of the proposed Project adopted technologies and cultural patterns radiating from points south (Adovasio et al. 1998). By the Late Archaic, the geographical scope of these relationships had expanded, and the archaeological record indicates similarities in diagnostic tool types that extend into New York State.

Archaeologists have long recognized a Terminal Archaic period that bridges the Archaic and Woodland periods in the Northeast (Ritchie 1965). The Terminal Archaic period saw an expansion in the distribution of sites at different elevations from valley floors to ridgetops. This transitional period is also characterized by a greater typological diversity in lithic tools and projectile points.

The Woodland period (3,000 B.P.–AD 1550) was characterized by widespread and significant changes in cultural patterns across the Northeast (Quinn 1999). The transition from Late Archaic to the Early Woodland period is typically defined by the manufacture and use of ceramic vessels. This development occurred in areas of eastern North America during the Late Archaic but became widespread in the Northeast approximately 3,000 B.P. (Quinn 1999, Stewart 2003).

Early Woodland cultural traditions are evidence of the continuation, adaptation, and intensification of Archaic period cultural trends (Fagan 2000). In the Upper Ohio River Valley, these trends culminated in the emergence of the Adena ceremonial complex at the end of the Early Woodland period (Stewart 2003, Fagan 2000). The Adena complex was marked by a focus on mortuary ceremonialism that is exemplified in the estimated 300 to 500 burial mounds that may once have existed across the Ohio River Basin (Fagan 2000). Adena burial mounds reveal the complexity of social, religious, economic, and political relationships at the end of the Early Woodland period.

The Middle Woodland is perhaps best known across the Ohio River Basin for the emergence of the Hopewell Interaction Sphere, a broad cultural pattern, which influenced cultural traditions from the American Midwest to the Great Lakes (Quinn 1999). Centered in southern Ohio, the Hopewell culture had antecedents in the Adena complex of the Early Woodland (Cowin 2003). The Middle Woodland also saw an increased reliance on incipient horticulture to augment hunting and gathering subsistence practices. Concomitant with an increase in cultivation, regional populations trended toward more sedentary villages and intensified seasonal foraging. Although these practices set the stage for larger changes during the Late Woodland, there is little evidence of large-scale sedentism or intensive horticulture during the Middle Woodland period in southwestern Pennsylvania.

Maize, bean, and squash horticulture became an increasingly important source of subsistence throughout the region during the Late Woodland period. Major sociopolitical changes accompanied these developments, including increased territorialization and changes in residence patterns. By the Late Woodland period, a distinctive Monongahela culture was present in the Upper Ohio River Valley. The Foley Farm-phase cultural assemblage that emerged toward the end of the Late Woodland period reveals significant changes in Monongahela cultural practices (Grumet 1995). Foley Farm-phase ceramics indicate increased contact with Iroquoian groups living to the north, and Susquehannock communities in the eastern part of the Commonwealth (Grumet 1995). Settlement patterns during the Foley Farm-phase also suggest dramatic shifts towards concentrated and fortified villages. The shifting residential patterns are similar to those of the neighboring Iroquoian and Susquehannock communities during the end of the Late Woodland period, and they suggest amplified hostilities brought about by increased competition for resources (Grumet 1995).

5.10.1.2 Historic Period

While direct contact between Native Americans and Europeans in the Trans-Appalachian region did not occur until the 17th century, European trade items were obtained by indigenous coastal groups from European fishing and whaling fleets and made their way inland through trading intermediaries during the 16th century (Quiggle 2008, Grumet 1995). By the 1680s, William Penn had established a colony in the eastern portion of Pennsylvania on land granted to him by

the King of England. Notwithstanding the success of Penn's colony near Philadelphia, the European presence west of Pennsylvania's Appalachian Mountains remained ephemeral and transitory throughout most of the 17th century.

In many ways, the European colonial expansion in the 18th century was driven by the fur trade (Grumet 1995, Wolf 1982). By the early 1700s, both the French and English had established trading posts in Pennsylvania, south of Lake Erie. The construction of Fort Niagara in 1726 allowed the French to expand their control over the region, and, by the mid-18th century, they had established a string of fortifications along the Niagara Frontier and along the southern shore of Lake Erie to present-day Erie, Pennsylvania (Quiggle 2008). While the French presence was established in the Great Lakes region, competing interest from the British increased across southwestern Pennsylvania. Both nations struggled to control trade and to win support of the powerful Iroquois tribes that dominated the region.

The site of the present-day City of Pittsburgh was still a frontier area during the mid-18th century when hostilities erupted between the French and the English. During the French and Indian War, southwestern Pennsylvania became the primary battleground for control of the continent (Commager 1999). The French established Fort Duquesne at the confluence of the Allegheny, Ohio, and Monongahela rivers as part of a string of fortifications designed to protect their access to critical inland waterways. The initial attempts by the British to wrest control of the region from the French and their Indian allies failed dramatically (Commager 1999). However, by the late 1750s, the cost of the conflict and the mounting number of military defeats became more than the French could bear. By the time the British captured Fort Duquesne in 1758 (renaming it Fort Pitt), the conflict was nearing its end, and the British had emerged as the dominant colonial power in the New World (Commager 1999).

Because of its relatively isolated location along the western frontier, southwestern Pennsylvania escaped direct conflict during the American Revolution. With the cessation of hostilities between the British and the Americans in 1783, the Pittsburgh region became the gateway to the American west (Lorant 1999). Goods and cargo flowing through the inland port of Pittsburgh provided the stimulus for economic development throughout the late 1700s and early 1800s.

The natural coal fields of western Pennsylvania spurred the growth of the iron and steel industry. Following the invention of the Bessemer process, the Pittsburgh region became one of the largest steel-producing centers in the world (Handlin 1999). Pittsburgh's industries blossomed during the Civil War, and by the 1900s, steel mills crowded the city's waterfront. One of the largest of these steel mills was the Edgar Thomson Works of the Carnegie Steel Company, located on the shores of the Monongahela River in North Braddock. Coal mines across southwestern Pennsylvania fueled the mills and the industrial growth of the region through the early 1900s. Employment in the steel mills and coal mines attracted waves of immigrants to the Pittsburgh region during this period (Handlin 1999). Despite this economic growth, the poor wages, dangerous working conditions, long hours, and exhausting labor led to bitterly contested labor disputes that rippled through the coal fields and steel mills of southwestern Pennsylvania during the 19th and early-20th centuries (David 1999).

Notwithstanding this labor unrest, the region's proximity to inland waterways, the availability of steel and coal, and the large immigrant workforce made Pittsburgh and southwestern Pennsylvania one of the principal industrial and manufacturing hubs in the country by the mid-20th century. The demand for steel and the industrial growth of the Pittsburgh region continued until after World War II when production in wartime industries declined.

5.10.2 Known Archaeological and Historic Resources in the Proposed Project's Vicinity

In preparing this PAD, Hydro Friends Fund conducted a search of the PHMC's Cultural Resources Geographic Information System (CRGIS) to identify known archaeological historic and archaeological resources within the proposed Project's vicinity, including those properties listed in or eligible for the National Register of Historic Places (National Register). While an area of potential effects (APE) has not been determined for this undertaking, Hydro Friends Fund believes that the proposed Project's footprint and its potential to impact historic properties are limited. Notwithstanding the limited potential impacts associated with this proposed Project, Hydro Friends Fund reviewed CRGIS data to identify archaeological and historic resources within approximately 1,500 feet of the Braddock Locks and Dam. This review was undertaken to better characterize the nature and types of known resources in the proposed Project's vicinity.

5.10.2.1 Archaeological Resources

No known archaeological resources listed in or eligible for inclusion in the National Register have been reported within 1,500 feet of the proposed Project. However, one archaeological resource has been identified upstream of the Braddock Locks and Dam. The Monongahela Navigation Company (MNC) Lock and Dam No. 2 (36AL0542) was constructed by the MNC in 1838-1841. The lock and dam was operated by the MNC between 1841 and 1906 when the original structure was replaced by the existing USACE Braddock Locks and Dam. The submerged archaeological remains of the original MNC Lock and Dam No. 2 are located more that 2,900 feet upstream from the Braddock Locks and Dam, well outside of the proposed Project boundary.

5.10.2.2 Historic Resources

Known historic resources within the proposed Project's vicinity include buildings, structures, and districts listed in or eligible for inclusion in the National Register. The Braddock Locks and Dam has been recommended as eligible for inclusion in the National Register, but a final determination of eligibility for this resource has not been made. Table 5-24 summarizes other known historic resources within approximately 1,500 feet of the proposed Project.

As noted Table 5-24, a National Historic Landmark district is located within the proposed Project's vicinity. Kennywood Park is a historic amusement park located near the left shoreline of the Monongahela River. While within the general vicinity of the proposed Project, Kennywood Park is separated from the Monongahela River by extensive rail lines and associated railway infrastructure. Construction and operation of the proposed Project is not expected to impact this National Historic Landmark.

A map of historic buildings, structures, and districts in Allegheny County that are listed in or eligible for inclusion in the National Register has been included as Figure 5-14 of this PAD. Figure 5-14 also identifies City of Pittsburgh Designated Historic Landmarks, none of which are located in the proposed Project's vicinity.

TABLE 5-24
HISTORIC RESOURCES WITHIN APPROXIMATELY 1,500 FEET OF THE PROPOSED PROJECT

Resource Name	PHMC Key Number	Resource Type	Description	National Register Status	Notes
Pittsburgh & Lake Erie Railroad (Port Perry to Rankin)	107871	Historic District	Linear resource	Eligible	—
Baltimore & Ohio Railroad: Pittsburgh Division (Maryland Line to City of Pittsburgh)	107870	Historic District	Linear resource	Eligible	—
Union Railroad (Dravosburg Borough to Monroeville Borough)	110340	Historic District	Linear resource	Eligible	—
Pennsylvania Railroad: Monongahela Line	112369	Historic District	Linear resource	Eligible	—
Edgar Thomson Works of the Carnegie Steel Company	107760	NA	Historic manufacturing facility	Eligible	—
Kennywood Park	093768	District	Historic amusement park	Listed	National Historic Landmark
Union Railroad Trestle	105560	Structure	Railroad bridge	Eligible	—

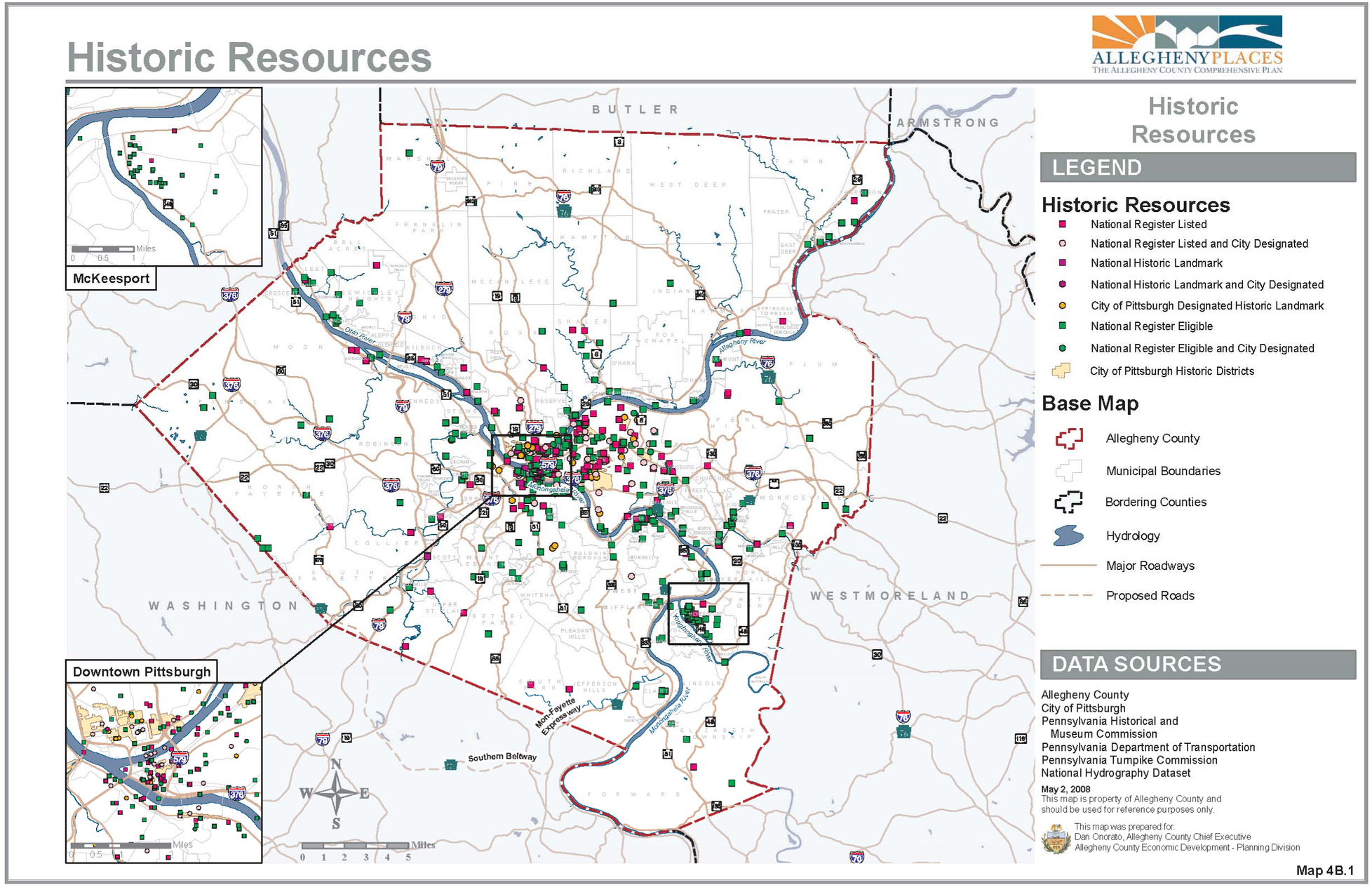
5.10.3 Existing Discovery Measures

The USACE has undertaken extensive surveys and inventories for the purpose of locating, identifying, and assessing historic and archaeological resources within the vicinity of the proposed Project. These studies were primarily undertaken in association with USACE's Lower Monongahela River Project to modernize Locks and Dams 2, 3, and 4 on the Monongahela River in Allegheny, Washington, and Westmoreland counties, Pennsylvania (Lower Mon Project). Studies conducted within the proposed Project's vicinity include:

- A literature review and preliminary field reconnaissance of the shoreline of Monongahela River Pools No. 2 and 3, upstream from the Braddock Locks and Dam;
- Archaeological investigations of sites selected for the relocation of municipal facilities potentially impacted by the Lower Mon Project;
- A high-resolution side-scan sonar investigation of Monongahela River Pool 3;
- Documentation of timbers and stones removed from the Monongahela River during 2006 dredging operations;
- Phase I and II submerged cultural resources investigations in Monongahela River Pool 3;
- Geomorphological investigations along the lower Monongahela River;
- A historical engineering evaluation of the Monongahela River Navigation System;
- Historic American Engineering documentation of the Braddock Locks and Dam; and
- Development and submission of a National Register Multiple Property thematic nomination for the historic resources of the Monongahela River Navigation System in Pennsylvania and West Virginia, 1838-1960.

In addition to these studies conducted by the USACE, archaeological investigations have been conducted in the proposed Project's vicinity in association with the proposed Mon/Fayette Expressway Project. These investigations included Phase I background research, field testing, and Phase II site evaluations.

FIGURE 5-14
HISTORIC RESOURCES FOR ALLEGHENY COUNTY, PENNSYLVANIA



5.10.4 Identification of Indian Tribes

Hydro Friends Fund has identified tribes with a potential interest in the proposed Project in the Pennsylvania Department of Transportation's (PennDOT) Interim Guidance/Procedures for Tribal Consultation and the associated List of Tribal Contacts (PennDOT undated, PennDOT 2008). In addition to the resources available from PennDOT, Hydro Friends Fund also consulted with the NPS's Native American Contact Database and the Grand Council of the Haudenosaunee's 2008 guidance document, entitled *Building Relationships between Federal Agencies and the Haudenosaunee*, to finalize an appropriate contact list (NPS 2009, Grand Council of the Haudenosaunee 2002).

A total of 12 tribes with a potential interest in the proposed Project have been identified, including: the Oneida Tribe of Indians of Wisconsin, the St. Regis Mohawk Tribe, the Stockbridge-Munsee Community of Wisconsin, the Oneida Indian Nation, the Shawnee Tribe, the Seneca-Cayuga Tribe of Oklahoma, the Onondaga Nation, the Seneca Nation of Indians, the Cayuga Nation, the Eastern Shawnee Tribe of Oklahoma, the Tonawanda Band of Senecas, and the Tuscarora Nation.

5.11 Socioeconomic Resources

The proposed Project is located in the City of Pittsburgh, Pennsylvania. The Pittsburgh region has seen population decline in the central city and the metropolitan area, and between 1970 and 2000 the population of the city fell by 35.7 percent (from approximately 520,000 to 335,00 people) (Committee on Water Quality Improvement for the Pittsburgh Region, National Research Council 2005). The 2010 census reported that 305,704 people reside in the City of Pittsburgh, which is a -8.6 percent change from the 2000 census.

The City of Pittsburgh is located in Allegheny County. The 2010 population for Allegheny County was 1,223,348 persons, which is a -4.6 percent change from the 2000 census (U.S. Census Bureau 2011a, 2011b). Table 5-25 provides summary statistics for the City of Pittsburgh, Allegheny County, and the Commonwealth of Pennsylvania.

TABLE 5-25
SUMMARY STATISTICS FOR THE CITY OF PITTSBURGH, ALLEGHENY COUNTY, AND THE COMMONWEALTH OF PENNSYLVANIA

Description	City of Pittsburgh	Allegheny County	Commonwealth of Pennsylvania
Population (2000)	334,563	1,281,666	12,281,054
Population (2010)	305,704	1,223,348	12,702,379
Persons with Bachelor's Degree or Higher (2005-2009) Age 25+	33.20%	33.50%	26.00%
Median Household Income (2005-2009)	$35,732	$46,212	$49,737
Percent of Persons Below Poverty Level (2009)	21.7%*	13.00%	12.50%
Unemployment Rate (September 2011)**	6.80%	7.20%	7.50%
Total Number of Firms (2007)	24,605	95,698	981,501

*People of all ages in poverty from 2005 to 2009
** Data Source: Unemployment Rates by County in Pennsylvania (http://www.bls.gov/ro3/palaus.htm) and Selected U.S. Bureau of Labor Statistics Economic Indicators (www.bls.gov/ro3/areaindicators.htm)

The Allegheny Institute for Public Policy reports that the U.S. Department of Labor statistics in 2010 found that the Pittsburgh metropolitan area has fewer private sector jobs as of 2011 than a decade ago. The area lost on average 32,000 jobs from the same month 2 years prior during the 2008 to 2010 recession. A year or more prior to the recession, the average job growth was moderate at approximately 1 percent per year, and the post-recovery period has been proving to be sluggish due to the total number of private jobs not climbing above levels posted more than a decade prior (Allegheny Institute for Public Policy 2011).

The Pittsburgh region has a concentration of jobs in education and health and the professional and business sector. These two sectors have added more than 50,000 workers since 2000 and account for almost all net new jobs in the region. However, manufacturing and retail trades are still seeing losses and stagnation. Pittsburgh does possess several strong economic attributes such as quality medical facilities and higher education institutions, which help sustain the regions economy but are not entirely sufficient at spurring long-term economic well-being in the private sector (Allegheny Institute for Public Policy 2011).

Coal has been mined across Pennsylvania's main bituminous coal field for more than 200 years, providing the fuel for the steel industry in the Pittsburgh region and beyond (PADCNR 2000, Durant undated). Although bituminous coal mining production has declined in recent years, mining operations in Pennsylvania still produced 63.5 million tons coal in 2007 (Freme 2008).

There are two active strip mines within Allegheny County, one in South Park Township and one in Findlay Township. There are no active underground mines currently operating in Allegheny County.

In addition to coal production, the most recent minerals yearbook for Pennsylvania lists the Commonwealth as 13th in the nation in total nonfuel mineral production value, with a total value of $1.97 billion. Nonfuel raw minerals and commodities recorded for Allegheny County during 2009 include vermiculite, sulfur (oil), steel, and common clay (USGS 2008, 2011).

There are four sites of industrial mineral mining within Allegheny County (ACED Planning Division 2008):

- McShane Quarry (sandstone) in Collier Township
- Brown Reserve Site (slag) in West Mifflin Borough
- Redland Brick Inc. (shale/clay) in Harmar Township
- Gascola Pit (slag) in the Municipality of Penn Hills

In addition, 4.5 million tons of river aggregate is dredged from the Allegheny and Ohio rivers per year to meet industry needs in Allegheny County (ACED Planning Division 2008).

5.12 Tribal Resources

There are no Native American reservation lands within the proposed Project boundary. Hydro Friends Fund has identified tribes with a potential interest in the proposed Project utilizing the PennDOT Interim Guidance/Procedures for Tribal Consultation and the associated List of Tribal Contacts (PennDOT undated, PennDOT 2008). In addition to the resources available from PennDOT, Hydro Friends Fund also consulted with the NPS's Native American Contact Database and the Grand Council of the Haudenosaunee's 2008 guidance document, entitled *Building Relationships between Federal Agencies and the Haudenosaunee*, to finalize an appropriate contact list (NPS 2009, Grand Council of the Haudenosaunee 2002).

A total of 12 tribes with a potential interest in the proposed Project have been identified, including:

- Oneida Tribe of Indians of Wisconsin
- St. Regis Mohawk Tribe
- Stockbridge-Munsee Community of Wisconsin
- Oneida Indian Nation
- Shawnee Tribe
- Seneca-Cayuga Tribe of Oklahoma
- Onondaga Nation
- Seneca Nation of Indians
- Cayuga Nation
- Eastern Shawnee Tribe of Oklahoma
- Tonawanda Band of Senecas
- Tuscarora Nation

6.0 PRELIMINARY ISSUES AND STUDIES LIST

6.1 Consultation to Date

To date, Hydro Friends Fund has performed the following initial consultation activities:

- Meetings with USACE
- PAD questionnaires were distributed to over 100 Project stakeholders.
- PADEP was contacted through letter regarding the location of the proposed Project relative to the State's coastal zone.
- Pennsylvania Department of Conservation and Natural Resource and the USFWS were contacted regarding the potential presence of threatened and/or endangered species within the proposed Project area.
- PHMC was contacted regarding historical or cultural resources that may potentially be impacted by the proposed Project.

6.2 Summary of Potential Issues and Study/Information Needs

Hydro Friends Fund believes additional studies will not be necessary beyond the following.

6.2.1 Desktop Entrainment/Impingement Study

Hydro Friends Fund proposes a Desktop Entrainment/Impingement Study to assess potential Project effects on fish mortality and injury using existing literature and site-specific information. Due to the exceedingly positive results of the fish mortality and entrainment study conducted by HGE at its Hastings, Minnesota project and the overly conservative estimates by the Desktop Study conducted prior to installation, Hydro Friends Fund has hard and tested data showing that Desktop Studies are more than adequate to represent what may be expected at the proposed Project. In addition, it is known that low-head bulb turbines maintain high survival rates for fish species that interact with the units.

Not all fish species occurring above and below the Braddock Locks and Dam may be susceptible to entrainment based on habitat use, behavior, and swimming abilities relative to the placement of the Project turbines in the water column, as well as the trash racks, which will prevent a large number of fish from entering the hydropower system. Accordingly, Hydro Friends Fund will

determine potential risk first by identifying fish species that are potentially subject to impingement and entrainment, and then by assessing likelihood of mortality based on the design parameters of the turbine array with respect to intake profiles and approach velocities.

6.2.2 Desktop Hydraulic Modeling Study

Although no navigational impact is expected and little to no environmental impact is expected, Hydro Friends Fund proposes to conduct a Desktop Hydraulic Modeling Study to determine potential alternative flow patterns as the result of hydro operations. Hydro Friends Fund will coordinate with the USACE and others regarding the modeling activities to be performed.

6.2.3 Desktop Water Quality Study

HGE's low-head, low-speed hydropower turbines are not expected to impact water quality. But, as part of the licensing process, Hydro Friends Fund proposes to conduct a literature review and synthesis of existing data to describe the baseline water quality conditions in the vicinity of the proposed Project. The objective of this effort will be to characterize the trends in DO, water temperature, and turbidity occurring immediately upstream and downstream of the existing dam, as well as overall spatial and temporal trends in the Monongahela River. Particular focus will be placed on characterization of the late summer months when water quality conditions are typically at their most critical levels. To the extent practicable, the best and most recent data for the proposed Project area will be used to characterize baseline conditions. For instance, effort to characterize pools upstream of the dam will utilize vertical profile data whenever possible in order to capture chemical and thermal stratification patterns typical of impoundments.

Hydro Friends Fund proposes the literature review/data synthesis approach based on an initial review, which revealed that significant pertinent data already exists for the Monongahela River. Every effort will be made to utilize contemporary data within the analysis. Known databases that will be reviewed include:

- USEPA's STORET (STOrage and RETreival) Database - A repository for water quality, biological, and physical data (http://www.epa.gov/storet/)

- ORSANCO - An interstate commission representing Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia, and West Virginia established to control and abate pollution in the Ohio River Basin (http://www.orsanco.org/data)
- USACE on-site data

Pertinent data will be synthesized into a draft Desktop Water Quality Report, which will be distributed to resource agencies and other interested stakeholders for review. Following review by licensing stakeholders, a final report will be filed with the Commission.

6.2.4 Cultural Resources

Hydro Friends Fund believes that both the proposed Project's prospective APE and its potential to impact historic properties are very limited. Given the proposed Project's proximity to the previously disturbed footprint of the existing Braddock Locks and Dam, construction and operation of the proposed Project is not expected to impact submerged archaeological deposits. However, effects on archaeological resources may result from ground-disturbing activities related to transmission line construction.

As discussed in Section 5.10, the USACE has conducted extensive surveys and inventories for the purpose of locating, identifying, and assessing historic and archaeological resources within the vicinity of the proposed Project. These studies were primarily (although not exclusively) undertaken in association USACE's Lower Mon Project. Based on a review of CRGIS data, a substantial and comprehensive amount of information regarding historic and archaeological resources within the proposed Project's vicinity has been collected by the USACE and other entities through archaeological and architectural investigations.

In Pennsylvania, the State Historic Preservation Officer (SHPO) is the Executive Director of the PHMC, and the SHPO's responsibilities to review, comment, and advise are fulfilled by the PHMC's BHP. In accordance with 36 CFR § 800, Hydro Friends Fund proposes to define an APE for this undertaking through consultation with the BHP, the USACE, and interested Indian tribes. Consistent with the PHMC's guidelines (2008), Hydro Friends Fund will file a Request to Initiate Consultation in Compliance with the State History Code and Section 106 of the National Historic Preservation Act. Based on the results of the BHP's review of the request, Hydro

Friends Fund will consult with the SHPO, affected Indian tribes, and the USACE to determine if additional cultural resources studies are necessary.

7.0 COMPREHENSIVE PLANS RELEVANT TO THE BRADDOCK PROJECT

As detailed in FERC's List of Comprehensive Plans (revised June 2011), Section 10(a)(2)(A) of the FPA requires FERC to consider the extent to which a project is consistent with the federal or state comprehensive plans for improving, developing, or conserving a waterway or the extent to which a waterway is affected by the proposed Project.

On April 27, 1988, FERC issued Order No. 481-A establishing that FERC will accord the FPA Section 10(a)(2)(A) comprehensive plan status to any federal or state plan that: is a comprehensive study of one or more of the beneficial uses of the waterway or waterways; specifies the standards, the data, and the methodology used; and is filed with the Secretary of FERC.

According to FERC, a comprehensive plan should contain the following:

- A description of the waterway or waterways that are the subject of the plan, including pertinent maps detailing the geographic area of the plan.
- A description of the significant resources of the waterway or waterways.
- A discussion of the goals, objectives, and recommendations for improving, developing, or conserving the waterway or waterways in relation to these resources. The description of the significant resources in the area should contain an examination of how the different uses will promote the overall public interest. Elements of significant resources to be included are:
    - Navigation
    - Power development
    - Energy conservation
    - Fish and wildlife
    - Recreational opportunities
    - Irrigation
    - Flood control
    - Water supply

As of June 2011, FERC lists 28 federal and state comprehensive plans applicable to Pennsylvania. Of these 28 listed plans, 5 are potentially relevant to the proposed Braddock Locks and Dam Project. Additionally, 2 state comprehensive plans (not identified by FERC) were identified by Hydro Friends Fund as being relevant to the proposed Project. Each plan is listed separately below, with a brief explanation for its inclusion as a relevant qualifying comprehensive plan.

7.1 Qualifying Comprehensive Plans Deemed Applicable

7.1.1 United States

- *U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. Department of the Interior. Environment Canada. May 1986.*

  This plan provides relevant guidance for waterfowl habitat management. This plan specifies the standards, data, and methodology used.

- *U.S. Fish and Wildlife Service. Undated. Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington D.C.*

  The proposed Project is located on the Monongahela River, which is a recreational fishing area for bass, crappie, catfish, and sunfish. This plan addresses the recreational fisheries policy for each state in the United States, and specifies the standards and methodology used.

7.1.2 Pennsylvania

- *Pennsylvania Department of Environmental Resources. 1983. Pennsylvania State Water Plan. Harrisburg, Pennsylvania. January 1983. 20 volumes.*

  The Pennsylvania State Water Plan is the result of the Water Resources Planning Act, passed in 2002. This Act requires the water plan to have several key components:
  - Surface and groundwater inventories.
  - Assessments of existing and future withdrawal use demands.
  - Identification of potential problems with water availability or conflicts among water uses or users.

- A review and evaluation of statutes, regulations, policies, institutional arrangements, alternatives, and recommended programs.

- *Pennsylvania Department of Environmental Resources. 1986. Pennsylvania's Recreation Plan, 1986-1990. Harrisburg, Pennsylvania.*

  Pennsylvania's Recreation Plan provides a vision for the future of recreation in the Commonwealth. As a result of extensive research and public participation, it reflects the concerns of its citizens and the strategies for implementation, as detailed by providers of park and recreation services throughout the state.

- *Pennsylvania Department of Environmental Resources. 1988. Pennsylvania 1988 Water Quality Assessment. Harrisburg, Pennsylvania. April 1988. Three volumes.*

  This plan summarizes and outlines management strategies for the surface waters in Pennsylvania. It describes water pollution controls and assessment/monitoring programs and reports on the conditions of waters in the Commonwealth. A water quality assessment report is published yearly by the PADEP, as required by the Clean Water Act.

7.1.3 Additional Comprehensive Plans

- *Pennsylvania Historical and Museum Commission. 2006. Honoring the Past, Planning for the Future: Pennsylvania's Historic Preservation Plan 2006-2011.*

  This plan was developed for the purposes of assisting the Commonwealth of Pennsylvania in identifying, prioritizing, and addressing historic preservation needs over the course of 5 years.

- *Pennsylvania Fish and Boat Commission. 2011. Three Rivers Management Plan - A Strategy for Managing Fisheries Resources of the Allegheny, Monongahela and Ohio Rivers.*

  This plan was developed by the Pennsylvania Fish and Boat Commission's Bureau of Fisheries and Fisheries Management Division. This plan was developed to function as a comprehensive approach to manage the fisheries resources of Pennsylvania's large rivers.

7.2 Qualifying Comprehensive Plans Deemed Not Applicable

The qualifying plans listed below were deemed not applicable because the proposed Project is not subject to the jurisdiction or scope of the comprehensive plans listed below (i.e., the proposed Project is not geographically located within the listed plans management areas).

Atlantic States Marine Fisheries Commission. 1996. Interstate fishery management plan for weakfish. Report No. 27. May 1996.

Atlantic States Marine Fisheries Commission. 1998. Amendment 1 to the Interstate Fishery Management Plan for Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*). Report No. 31. July 1998.

Atlantic States Marine Fisheries Commission. 1998. Interstate fishery management plan for Atlantic striped bass. Report No. 34. January 1998.

Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. Report No. 35. April 1999.

Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (*Anguilla rostrata*). Report No. 36. April 2000.

Atlantic States Marine Fisheries Commission. 2000. Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring. February 9, 2000.

Delaware River Basin Commission. 1967. Delaware River Basin compact. Trenton, New Jersey. January 1967. 51 pp.

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National Marine Fisheries Service. 1998. Final Recovery Plan for the shortnose sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. December 1998.

National Oceanic and Atmospheric Administration. 1980. Pennsylvania coastal zone management program and final environmental impact statement. Department of Commerce, Washington, D.C. August 1980.

National Park Service. 1982. The nationwide rivers inventory. Department of the Interior, Washington, D.C. January 1982.

National Park Service. 1987. Upper Delaware scenic and recreational river. Department of the Interior, Philadelphia, Pennsylvania. February 1987. 475 pp.

Ohio River Basin Commission. 1978. Upper Ohio main stem comprehensive coordinated joint plan. Cincinnati, Ohio. January 1978.

Ohio River Basin Commission. 1979. Allegheny River Basin comprehensive coordinated joint plan. Cincinnati, Ohio. October 1979.

Pennsylvania Department of Environmental Resources. 1990. The Pennsylvania scenic rivers program scenic rivers inventory. Harrisburg, Pennsylvania. April 1990.

Susquehanna River Basin Commission. 2009. Comprehensive plan for the water resources of the Susquehanna River Basin. Harrisburg, Pennsylvania. December 17, 2009.

U.S. Fish and Wildlife Service. 1988. The Lower Great Lakes / St. Lawrence Basin: A component of the North American waterfowl management plan. December 29, 1988.

U.S. Fish and Wildlife Service. 1989. Chesapeake Bay Alosid (shad and river herring) management plan. Annapolis, Maryland. July 1989.

U.S. Fish and Wildlife Service. 1989. Chesapeake Bay striped bass management plan. Annapolis, Maryland. December 1989.

U.S. Fish and Wildlife Service. 1992. Chesapeake Bay American eel fishery management plan. Annapolis, Maryland. December 18, 1992.

U.S. Forest Service. 1996. Allegheny National Wild and Scenic River management plan. Department of Agriculture. Warren, Pennsylvania. September 1996. Includes Appendices A (References), B (Glossary), and C (Allegheny Wild and Scenic River Corridor maps).

U.S. Forest Service. 2007. Allegheny National Forest land and resource management plan. Department of Agriculture. Warren, Pennsylvania. March 2007.

8.0 SUMMARY OF CONTACTS

Table 8-1 presents the federal agencies, state agencies, municipalities, NGOs, Native American tribes, and other potential Project stakeholders contacted during the preparation of the PAD. Hydro Friends Fund distributed to each of these parties a PAD Questionnaire and a proposed Project location map. Appendix A of this PAD contains responses received from stakeholders to the PAD questionnaire. Copies of additional correspondence with Project stakeholders are provided in Appendix A.

TABLE 8-1
STAKEHOLDERS CONTACTED

Organization Contacted	Name of Respondent	Position/Title of Respondent	PAD Questionnaire Response
Federal Agencies			
Advisory Council on Historic Preservation			No questionnaire response received.
Bureau of Land Management – National Office			No questionnaire response received.
Bureau of Land Management – Northeastern States Field Office	Derek Strohl	Natural Resources Specialist	Stakeholder does not know of any existing, relevant, and reasonably available information.
Federal Emergency Management Agency – National Office			No questionnaire response received.
Federal Emergency Management Agency – Regional Office			No questionnaire response received.
Federal Energy Regulatory Commission – National Office			No questionnaire response received.
Federal Energy Regulatory Commission – New York Regional Office			No questionnaire response received.
National Marine Fisheries Service – National Office			No questionnaire response received.
National Marine Fisheries Service – Northeast Regional Office			No questionnaire response received.
National Park Service – National Office			No questionnaire response received.
National Park Service – Northeast Regional Office			No questionnaire response received.
U.S. Army Corps of Engineers – Office of the Chief of Army Engineers			No questionnaire response received.
U.S. Army Corps of Engineers – Pittsburgh District			No questionnaire response received.
U.S. Bureau of Indian Affairs – Eastern Regional Office			No questionnaire response received.
U.S. Coast Guard – Marine Safety Unit Pittsburgh			No questionnaire response received.
U.S. Dept. of Energy – Philadelphia Regional Office			No questionnaire response received.
U.S. Dept. of Interior – Bureau of Reclamation			No questionnaire response received.
U.S. Environmental Protection Agency – National Office			No questionnaire response received.
U.S. Environmental Protection Agency – Region 3			No questionnaire response received.
U.S. Fish and Wildlife Service – National Office			No questionnaire response received.
U.S. Fish and Wildlife Service – Regional Office			No questionnaire response received.

Organization Contacted	Name of Respondent	Position/Title of Respondent	PAD Questionnaire Response
U.S. Fish and Wildlife Service – Pennsylvania Field Office			No questionnaire response received.
U.S. Fish and Wildlife Service – Mid-Atlantic Fishery Resources Office	Lawrence M. Miller	Project Leader	Stakeholder does not know of any existing, relevant, and reasonably available information.
U.S. Forest Service – National Office			No questionnaire response received.
U.S. Forest Service – Northeast Regional Office			No questionnaire response received.
U.S. Geological Survey – Water Science Center			No questionnaire response received.
State Agencies			
Pennsylvania Coastal Resources Management Program			No questionnaire response received.
Pennsylvania Dept. of Agriculture			No questionnaire response received.
Pennsylvania Dept. of Conservation and Natural Resources – Bureau of Recreation and Conservation			No questionnaire response received.
Pennsylvania Dept. of Conservation and Natural Resources			No questionnaire response received.
Pennsylvania Dept. of Conservation and Natural Resources – Bureau of Topographic and Geologic Survey	Victoria Neboga	Senior Geologic Scientist	Provided online resource links in a separate document for the following resources: Geology and Soils, Economic Resources, Geologic Hazards, Groundwater, and Other.
Pennsylvania Dept. of Environmental Protection			No questionnaire response received.
Pennsylvania Dept. of Environmental Protection – Southwest Regional Office			No questionnaire response received.
Pennsylvania Environmental Council – Southwest Regional Office			No questionnaire response received.
Pennsylvania Fish and Boat Commission			No questionnaire response received.
Pennsylvania Fish and Boat Commission – Southwest Regional Office			No questionnaire response received.
Pennsylvania Game Commission	Olivia Mowery	Environmental Planner	Pennsylvania Natural Diversity Inventory Database and Pennsylvania Game Commission wildlife databases may contain relevant information. Submit request online to obtain the information. The peregrine falcon is located within the vicinity of the proposed Project.

Organization Contacted	Name of Respondent	Position/Title of Respondent	PAD Questionnaire Response
Pennsylvania Game Commission – Southwest Regional Office			No questionnaire response received.
Pennsylvania Historical and Museum Commission – Bureau for Historic Preservation			No questionnaire response received.
Natural Heritage Institute	Kierstin Carlson	Associate Information Manager	Information is available through the Allegheny County Natural Heritage Inventory and the Pennsylvania Natural Heritage Program Database (www.naturalheritage.state.pa.us). Respondent noted that rare, threatened, and endangered species exist near the proposed Project area.
Pennsylvania Office of Attorney General			No questionnaire response received.
Pennsylvania Organization for Watersheds and Rivers			No questionnaire response received.
Municipalities			
Allegheny County			No questionnaire response received.
Allegheny County Conservation District			No questionnaire response received.
Borough of Avalon			No questionnaire response received.
Borough of Baldwin			No questionnaire response received.
Borough of Bellevue			No questionnaire response received.
Borough of Braddock	Paul Leger	Interim Manager	Stakeholder does not know of any existing, relevant, and reasonably available information. Stakeholder requested to be removed from all future Project-related mailings.
Borough of Brentwood			No questionnaire response received.
Borough of Bridgeville			No questionnaire response received.
Borough of Carnegie			No questionnaire response received.
Borough of Castle Shannon			No questionnaire response received.
Borough of Crafton			No questionnaire response received.
Borough of East Pittsburgh	David Gilliland	Borough Engineer	Stakeholder does not know of any existing, relevant, and reasonably available information. Stakeholder requested to be removed from all future Project-related mailings.

Organization Contacted	Name of Respondent	Position/Title of Respondent	PAD Questionnaire Response
Borough of Forest Hills			No questionnaire response received.
Borough of North Braddock			No questionnaire response received.
Borough of Oakmont			No questionnaire response received.
Borough of Plum			No questionnaire response received.
Borough of Swissvale			No questionnaire response received.
Borough of Turtle Creek	David Gilliland	Borough Engineer	Stakeholder does not know of any existing, relevant, and reasonably available information.
Borough of West Mifflin			No questionnaire response received.
Borough of West View			No questionnaire response received.
Borough of Wilkinsburg			No questionnaire response received.
City of Clairton			No questionnaire response received.
City of Duquesne			No questionnaire response received.
City of McKeesport			No questionnaire response received.
City of Pittsburgh			No questionnaire response received.
Greater Pittsburgh Chamber of Commerce			No questionnaire response received.
Kennedy Township			No questionnaire response received.
Township of North Versailles			No questionnaire response received.
Township of O'Hara Township			No questionnaire response received.
Township of Shaler Township			No questionnaire response received.
Native American Tribes			
Seneca Nation of Indians			No questionnaire response received.
Seneca-Cayuga Tribe of Oklahoma			No questionnaire response received.
Tonawanda Band of Senecas			No questionnaire response received.
Other Stakeholders			
3 Rivers Rowing Association			No questionnaire response received.
American Canoe Association			No questionnaire response received.
American Rivers			No questionnaire response received.
American Whitewater			No questionnaire response received.
Appalachian Watershed Corporation	Unidentified	Unidentified	Organization is no longer in service. Stakeholder requested to be removed from all future Project-related mailings.
Audubon Society of Western Pennsylvania			No questionnaire response received.
Center for Watershed Protection			No questionnaire response received.

Organization Contacted	Name of Respondent	Position/Title of Respondent	PAD Questionnaire Response
Clean Water Action			No questionnaire response received.
Community Environmental Legal Defense Fund			No questionnaire response received.
Defenders of Wildlife			No questionnaire response received.
Ducks Unlimited			No questionnaire response received.
Energy Association of Pennsylvania			No questionnaire response received.
Friends of the Riverfront, Inc.			No questionnaire response received.
Hon. Mark J. Gergely – Pennsylvania House of Representatives			No questionnaire response received.
Hon. Michael F. Doyle – U.S. House of Representatives			No questionnaire response received.
Hon. Paul Costa – Pennsylvania House of Representatives			No questionnaire response received.
Hon. William C. Kortz II – Pennsylvania House of Representatives			No questionnaire response received.
Hydropower Reform Coalition			No questionnaire response received.
Inland Rivers Ports & Terminals			No questionnaire response received.
Izaak Walton League of America			No questionnaire response received.
National Wildlife Federation			No questionnaire response received.
Ohio River Basin Commission			No questionnaire response received.
Ohio River Valley Water Sanitation Commission (ORSANCO)			No questionnaire response received.
Ohio River Watershed Summit			No questionnaire response received.
Penn Future			No questionnaire response received.
Pennsylvania Association of Environmental Professionals			No questionnaire response received.
Pennsylvania Center for Water Resources Research			No questionnaire response received.
Pittsburgh Trails Advocacy Group			No questionnaire response received.
Rachel Carson Trails Conservancy, Inc.			No questionnaire response received.
River Network			No questionnaire response received.
Sen. James R. Brewster – Pennsylvania State Senate			No questionnaire response received.
Sen. Jay Costa – Pennsylvania State Senate			No questionnaire response received.
Sen. Patrick J. Toomey – U.S. Senate			No questionnaire response received.
Sen. Robert Casey, Jr. – U.S. Senate			No questionnaire response received.
Sierra Club			No questionnaire response received.
Sierra Club Allegheny Group			No questionnaire response received.

Organization Contacted	Name of Respondent	Position/Title of Respondent	PAD Questionnaire Response
Sustainable Pittsburgh			No questionnaire response received.
The Allegheny Land Trust			No questionnaire response received.
The Allegheny Trail Alliance			No questionnaire response received.
The Allegheny Valley Trails Association	Debra Frawley	Greenways Coordinator	Stakeholder does not know of any existing, relevant, and reasonably available information. Stakeholder requested to be removed from all future Project-related mailings.
The Allegheny Watershed Network			No questionnaire response received.
The Alliance for Aquatic Resource Monitoring			No questionnaire response received.
The American Waterways Operators			No questionnaire response received.
The Foundation for Pennsylvania Watersheds			No questionnaire response received.
The National Organization for Rivers			No questionnaire response received.
The Nature Conservancy			No questionnaire response received.
Venture Outdoors			No questionnaire response received.
Water Resources Education Network			No questionnaire response received.
Waterways Association of Pittsburgh			No questionnaire response received.
Waterways Council			No questionnaire response received.
Western Pennsylvania Conservancy			No questionnaire response received.
Wild Resource Conservation Fund			No questionnaire response received.
Wildlife Habitat Council			No questionnaire response received.

9.0 SUMMARY OF RELEVANT EXISTING INFORMATION

9.1 Information Sources Obtained Through the PAD Questionnaire and Additional Consultation

As noted previously in this PAD, Hydro Friends Fund prepared a PAD questionnaire seeking assistance from resource agencies, municipalities, NGOs, and interested parties to identify and locate existing, relevant, and reasonably available information related to the proposed Braddock Locks and Dam Project. Of the over 100 surveys that were distributed to Project stakeholders, 10 responses were returned. In addition, Hydro Friends Fund performed additional consultation with potential sources of applicable information. A summary of the information identified through the PAD questionnaire and through additional consultation is provided in Table 9-1.

TABLE 9-1
SUMMARY OF CONSULTATION SOURCES FOR EXISTING, RELEVANT AND REASONABLY AVAILABLE INFORMATION

Organization	Representative	Questionnaire Response or Consultation	Relevant Data Obtained
1. Pennsylvania Dept. of Conservation and Natural Resources – Bureau of Topographic and Geologic Survey	Victoria Neboga	Questionnaire	Provided online resource links in a separate document for the following resources: Geology and Soils, Economic Resources, Geologic Hazards, Groundwater, and Other.
2. Pennsylvania Game Commission	Olivia Mowery	Questionnaire	Pennsylvania Natural Diversity Inventory Database and Pennsylvania Game Commission wildlife databases may contain relevant information. Submit request online to obtain the information. The peregrine falcon is located within the vicinity of the proposed Project.
3. Natural Heritage Institute	Kierstin Carlson	Questionnaire	Information is available through the Allegheny County Natural Heritage Inventory and the Pennsylvania Natural Heritage Program Database (www.naturalheritage.state.pa.us). Respondent noted that rare, threatened, and endangered species exist near the proposed Project area.
4. Pennsylvania Department of Conservation and Natural Resources – Bureau of Forestry	Adam Hnatkovich	Consultation	PNDI records indicate species or resources of concern are located in the vicinity of the proposed Project. However, based on the information submitted concerning the nature of the proposed Project, the immediate location, and detailed resource information, PADCNR has determined that no impact is likely.
5. Pennsylvania Department of Environmental Protection Interstate Water Office	Matthew D. Walderon	Consultation	The Pennsylvania Department of Environmental Protection Interstate Waters Office has determined that the above actions are located outside the Pennsylvania coastal zones and will not impact upon them. Therefore, these actions are consistent with the Pennsylvania CRM Program.

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11.0 STATEMENT REGARDING BENEFITS UNDER SECTION 210 OF PURPA

Hydro Friends Fund is not currently seeking Public Utility Regulatory Policies Act of 1978 (PURPA) benefits for the proposed Project.

APPENDIX A

AGENCY AND STAKEHOLDER CONSULTATION AND CORRESPONDENCE

October 11, 2011

TO: **Potentially Interested Parties**

SUBJECT: **Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)**
Information Request in Support of Licensing

Lock+™ Hydro Friends Fund XLII (Hydro Friends Fund), a wholly owned subsidiary of Hydro Green Energy, LLC (HGE), is beginning the Federal Energy Regulatory Commission ("FERC" or "Commission") licensing process for the proposed Braddock Locks & Dam Hydroelectric Project (Project) (FERC No. 13739). The proposed Project would utilize the head effect of the existing U.S. Army Corps of Engineers' (USACE) Braddock Locks & Dam, located on the Monongahela River in Allegheny, Pennsylvania.

HGE focuses on developing new hydropower generation at existing, non-powered dams in an environmentally-responsible manner. For this Project, Hydro Friends Fund proposes to deploy a patented power-generating "Large Frame Module" just downstream of the existing dam to take advantage of the head (difference in elevation between the upper and lower pools of the river) found at the Braddock Locks & Dam. The Project will operate in run-of-river mode, meaning the Project will not impound water or control the flows of the river. Most importantly, the Project has been designed to be installed and operate without interfering with USACE's navigational mission.

HDR Engineering, Inc. (HDR) is assisting Hydro Friends Fund in completing the requirements of the licensing process for the Project. The purpose of this letter is to:

1) Notify interested governmental agencies, local governments, tribal governments, non-governmental organizations, and individuals of the upcoming licensing proceedings; and

2) Request your assistance in identifying existing and reasonably available information relevant to the Project and its vicinity.

Although the Commission has issued a preliminary permit to Hydro Friends Fund to study the feasibility of developing the proposed Project, the formal FERC licensing process does not begin until Hydro Friends Fund files the required Pre-Application Document (PAD) and associated Notice of Intent. The PAD will provide FERC, resource agencies, and other stakeholders with existing and reasonably available information relevant to the proposed Project. The information presented in the PAD will assist FERC and other interested parties in identifying potential issues, determining information needs, developing study requests and plans, and preparing other documents required to analyze the license application. To prepare the PAD, Hydro Friends Fund will use information in its possession and information obtained from others.

Henningson, Durham & Richardson Architecture and Engineering, P.C.
in association with HDR Engineering, Inc.

1304 Buckley Road
Suite 202
Syracuse, NY 13212-4311

Phone: (315) 451-2325
Fax: (315) 451-2429
www.hdrinc.com

Hydro Friends Fund's goal is to file a complete and thorough PAD in a timely manner. We are asking for your assistance in identifying additional information of which you may be aware. To facilitate this information search, we have prepared an attached PAD Information Questionnaire.

Relevant information would include site or region-specific studies, data, reports, maps, or management plans related to any of the following resource areas:

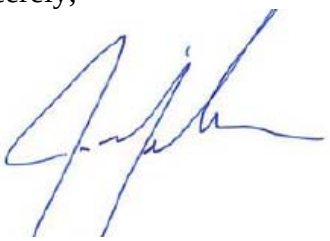
- Geology and soils
- Water resources
- Fish and aquatic resources
- Wildlife and botanical resources
- Wetlands, riparian, and littoral habitat
- Rare, threatened, and endangered species
- Recreation and land use
- Aesthetic resources
- Historical and archaeological resources
- Socioeconomic resources
- Tribal resources

You have been identified as potentially interested in the proposed Project and a possible source of information for the PAD. To help ensure that information you may have is available for inclusion in the PAD, **please fill out the attached PAD Information Questionnaire and return it to HDR in the enclosed self-addressed, stamped envelope within 21 days of your receipt of this letter.** This will allow time for follow-up contacts that may be needed. Not responding within 21 days will indicate you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environments or known potential impacts of the Project.

We want to thank you in advance for helping identify information that meets the criteria for inclusion in the PAD. We appreciate your assistance and look forward to a positive licensing process for all participants. If you have any questions about the proposed Project, please contact Jim Gibson with HDR at (315) 414-2202 or via email at Jim.Gibson@hdrinc.com. You may also contact Mark R. Stover, vice president of corporate affairs for Hydro Green Energy, LLC, at (877) 556-6566 x-711 or via email at mark@hgenergy.com.

Thank you again for your help with this process.

Sincerely,



Jim Gibson
Vice President, Hydropower Service

Enclosures (4)

Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
Licensing Pre-Application Document Information Questionnaire

Lock+™ Hydro Friends Fund XLII (Hydro Friends Fund), a wholly owned subsidiary of Hydro Green Energy, LLC, is beginning the Federal Energy Regulatory Commission ("FERC" or "Commission") licensing process for the proposed Braddock Locks & Dam Hydroelectric Project (Project) (FERC No. 13739). The proposed Project would utilize the head effect of the existing U.S. Army Corps of Engineers' (USACE) Braddock Locks & Dam, located on the Monongahela River in Allegheny, Pennsylvania. HDR Engineering, Inc. (HDR) is assisting Hydro Friends Fund in completing the requirements of the licensing process for the Project.

Hydro Friends Fund is preparing a Pre-Application Document (PAD) to provide FERC, resource agencies, and other stakeholders with existing and reasonably available information relevant to the proposed Project. The information presented in the PAD will assist FERC and interested parties in identifying potential issues, determining information needs, developing study requests and plans, and preparing other documents required to analyze the license application. To prepare the PAD, Hydro Friends Fund will use information in its possession and information obtained from others. This PAD Information Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in Hydro Friends Fund's possession.

1. Information about person completing the questionnaire:

Name and Title	
Organization	
Address	
Phone	
E-mail Address	

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* __ No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

__ geology and soils
__ water resources
__ fish & aquatic resources
__ wildlife & botanical resources
__ wetlands, riparian, & littoral habitat
__ rare, threatened & endangered species
__ recreation and land use
__ aesthetic resources
__ historical resources
__ socioeconomic resources
__ tribal resources
__ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

Resource Area	Specific Issue

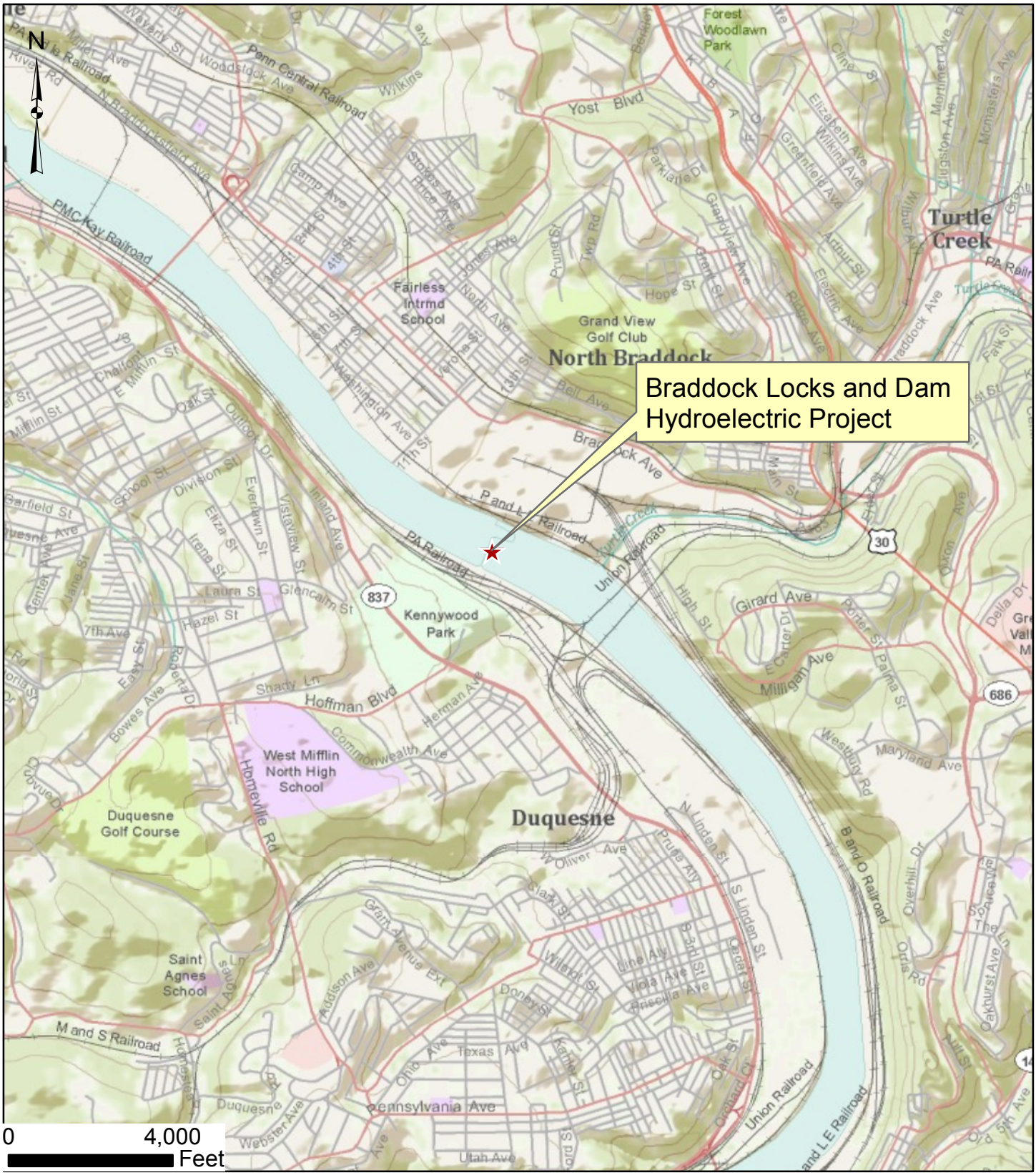
1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ___ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

Please return this Questionnaire to Jim Gibson with HDR in the enclosed, self-addressed, stamped envelope **within 21 days** of receipt to allow for any follow-up contact by Hydro Friends Fund's or HDR's representatives that may be needed. Not responding within 21 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.



MONOGAHELA RIVER, BRADDOCK, PA
LONGITUDE 79° 51' 28.90" W ; LATITUDE 40° 23' 21.03"N

LOCK+ HYDRO FRIENDS FUND XLII

BRADDOCK LOCKS AND DAM HYDROELECTRIC PROJECT

Project Area Location Map

Monday, October 10, 2011 11:11:05 AMG:\Projects\HydroGreen\LocationMapNewCumberland101011kaa.mxd

Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
Licensing Pre-Application Document Information Questionnaire

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1. Information about person completing the questionnaire:

Name and Title	DAVID GILLILAND BOROUGH ENGINEER
Organization	EAST PITTSBURGH BOROUGH
Address	813 LINDEN AVE E. PGH. PA 15112
Phone	412-824-5672 x113
E-mail Address	daveg@glennengr.com

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* X No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

___ geology and soils	___ recreation and land use
___ water resources	___ aesthetic resources
___ fish & aquatic resources	___ historical resources
___ wildlife & botanical resources	___ socioeconomic resources
___ wetlands, riparian, & littoral habitat	___ tribal resources
___ rare, threatened & endangered species	___ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	Same as #1
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* X No

Resource Area	Specific Issue

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes X No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

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1. Information about person completing the questionnaire:

Name and Title	DEBRA FRAWLEY, GREENWAYS COORD.
Organization	for ALLEGHENY VALLEY TRAILS ASSOC.
Address	P.O. BOX 264 FRANKLIN, PA 16323
Phone	814-432-4476 EXT. 121
E-mail Address	greenways@ficda.org

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* ✓ No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

___ geology and soils	___ recreation and land use
___ water resources	___ aesthetic resources
___ fish & aquatic resources	___ historical resources
___ wildlife & botanical resources	___ socioeconomic resources
___ wetlands, riparian, & littoral habitat	___ tribal resources
___ rare, threatened & endangered species	___ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

Resource Area	Specific Issue

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ___ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

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1. Information about person completing the questionnaire:

Name and Title	
Organization	Appalachian Watershed Corporation has not existed for more than 10 years
Address	532 Penn Street, New Bethlehem PA 16242
Phone	
E-mail Address	

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* ___ No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

__ geology and soils	__ recreation and land use
__ water resources	__ aesthetic resources
__ fish & aquatic resources	__ historical resources
__ wildlife & botanical resources	__ socioeconomic resources
__ wetlands, riparian, & littoral habitat	__ tribal resources
__ rare, threatened & endangered species	__ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
Licensing Pre-Application Document Information Questionnaire

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Hydro Friends Fund is preparing a Pre-Application Document (PAD) to provide FERC, resource agencies, and other stakeholders with existing and reasonably available information relevant to the proposed Project. The information presented in the PAD will assist FERC and interested parties in identifying potential issues, determining information needs, developing study requests and plans, and preparing other documents required to analyze the license application. To prepare the PAD, Hydro Friends Fund will use information in its possession and information obtained from others. This PAD Information Questionnaire will be used to help identify sources of existing, relevant, and reasonably available information that is not in Hydro Friends Fund's possession.

1. Information about person completing the questionnaire:

Name and Title	Paul Leger, Interim Manager
Organization	Braddock Borough
Address	415 Sixth Street Braddock, PA 15104
Phone	412-271-1018
E-mail Address	braddockmanager@comcast.net

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* X No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

___ geology and soils	___ recreation and land use
___ water resources	___ aesthetic resources
___ fish & aquatic resources	___ historical resources
___ wildlife & botanical resources	___ socioeconomic resources
___ wetlands, riparian, & littoral habitat	___ tribal resources
___ rare, threatened & endangered species	___ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ✓ No

Resource Area	Specific Issue

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ✓ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

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1. Information about person completing the questionnaire:

Name and Title	Lawrence M. Miller - Project Leader
Organization	USFWS - Susquehanna River Coord.
Address	P.O. Box 67000 Harrisburg, PA 17106-7000
Phone	717-705-7838
E-mail Address	larry_m_miller@fws.gov

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* [X] No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

___ geology and soils	___ recreation and land use
___ water resources	___ aesthetic resources
___ fish & aquatic resources	___ historical resources
___ wildlife & botanical resources	___ socioeconomic resources
___ wetlands, riparian, & littoral habitat	___ tribal resources
___ rare, threatened & endangered species	___ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

Resource Area	Specific Issue

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ___ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

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1. Information about person completing the questionnaire:

Name and Title	Olivia Mowery, Environmental Planner
Organization	PA Game Commission
Address	2001 Elmerton Ave. Harrisburg, PA 17110
Phone	717-787-4250 ext. 3128
E-mail Address	OMOWERY@PA.GOV

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

X Yes (*If yes, please complete 2a through 2e)* ___ No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

__ geology and soils	X recreation and land use
__ water resources	__ aesthetic resources
__ fish & aquatic resources	__ historical resources
X wildlife & botanical resources	__ socioeconomic resources
__ wetlands, riparian, & littoral habitat	__ tribal resources
__ rare, threatened & endangered species	__ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

Pennsylvania Natural Diversity Inventory Database and PGC wildlife databases

c. Where can HDR obtain this information?

Submit a request to the PGC (attn: Olivia Mowery) or online @ www.naturalheritage.state.pa.us

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	PGC Division of Environmental Planning and Habitat Protection
Address	2001 Elmerton Ave Harrisburg PA 17110
Phone	717-783-5957
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

Resource Area	Specific Issue
located within vicinity	peregrine falcon

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ___ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

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1. Information about person completing the questionnaire:

Name and Title	Derek Strohl, Natural Resources Specialist
Organization	Bureau of Land Management
Address	626 E. Wisconsin Ave., Ste 200 Milwaukee, WI 53202
Phone	414-297-4416
E-mail Address	DSTROHL@BLM.GOV

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* ✓ No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

___ geology and soils	___ recreation and land use
___ water resources	___ aesthetic resources
___ fish & aquatic resources	___ historical resources
___ wildlife & botanical resources	___ socioeconomic resources
___ wetlands, riparian, & littoral habitat	___ tribal resources
___ rare, threatened & endangered species	___ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

Resource Area	Specific Issue

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ✓ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

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1. Information about person completing the questionnaire:

Name and Title	Victoria Neboga, Senior Geologic Scientist
Organization	Bureau of Topographic and Geologic Survey
Address	3240 Schoolhouse road Middletown, Pa 17057
Phone	(717) 702-2026
E-mail Address	vneboga@pa.gov

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

✓ Yes (*If yes, please complete 2a through 2e)* __ No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

- ✓ geology and soils
- ✓ water resources
- ✓ fish & aquatic resources
- ✓ wildlife & botanical resources
- __ wetlands, riparian, & littoral habitat
- ✓ rare, threatened & endangered species
- ✓ recreation and land use
- __ aesthetic resources
- __ historical resources
- __ socioeconomic resources
- __ tribal resources
- ✓ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

See attached document

c. Where can HDR obtain this information?

Most of the sources are available on-line (see attached document with the links)

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	Victoria Neboga
Address	3240 Schoolhouse Road Middletown, PA 17057
Phone	(717) 702-2026
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ✓ No

Resource Area	Specific Issue

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ✓ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

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DCNR – Bureau of Topographic and Geologic Survey

Information Request in Support of Licensing for
Braddock Locks and Dam Hydroelectric Project (FERC No. 13739)

Geology and Soils

1. M. E. Johnson, 1929, Geology and mineral resources of the Pittsburgh quadrangle, Pennsylvania (Pittsburgh East, Braddock, Glassport, and McKeesport 7.5-minute quadrangles, Allegheny and Westmoreland Counties), Pennsylvania Geological Survey, 4th ser., 236 p. (out of print).
2. Bedrock geologic units of Pennsylvania, scale 1:250,000, as digital data sets, prepared by Miles, C. E., and Whitfield, T. G. (compilers, 2001, Bedrock geology of Pennsylvania: Pennsylvania Geological Survey, 4th ser., dataset, scale 1:250,000): http://www.dcnr.state.pa.us/topogeo/map1/bedmap.aspx#quads
3. Three Rivers Conservation Plan, Chapter 2: Land Resources: Pennsylvania Environmental Council http://www.dcnr.state.pa.us/brc/rivers/riversconservation/registry/62chap2.pdf
4. Newbury, R. L., Belz, D. J., Grubb, R. G., Soil Survey of Allegheny County, Pennsylvania, 1981: U.S. Department of Agriculture, 103 p.
5. Wagner, W. R., Lytle, W. S., and Kelley, D. R., 1972, Stratigraphic framework of greater Pittsburgh area- Parts 1 and 2: Pennsylvania Geological Survey, 4th ser., 20 p., 9 sections in 13 sheets (maybe obtained from Subsurface Geology Section , 400 Waterfront Drive, Pittsburg, Pa 15222, tel. 412-442-4236.)
6. Subsurface Rock Correlation Chart: http://www.dcnr.state.pa.us/topogeo/drc/tablepm.aspx

Economic Resources

7. Plate 10. Coal crop lines and structure contours of the Braddock quadrangle, Allegheny County, PA, by Clifford Dodge: http://www.dcnr.state.pa.us/topogeo/coal/pdfs/alleg_pl10.pdf
8. Plate 9. Crop line and mined-out areas of the Redstone coal in the Braddock quadrangle, Allegheny County, PA, by Clifford Dodge: http://www.dcnr.state.pa.us/topogeo/coal/pdfs/alleg_pl09.pdf

Geologic Hazards

9. U.S. Geological Survey Open-File report 79-1314, Landslides and related features of the Braddock quadrangle, Pennsylvania [Pittsburgh 1-by 2-Degree sheet], by J.S. Pomeroy and W.E. Davies: http://ucmstg/ucmstg/groups/public/documents/document/dcnr_007286.pdf
10. Briggs, R. P., Pomeroy, J. S., and Davies, W. E., 1975, Landsliding in Allegheny County, Pennsylvania: U. S. Geological Survey Circular 728, 18 p.
11. Reese, S. O., 2010, Digital bedrock aquifer characteristics by physiographic section of Pennsylvanina, digital dataset, Pennsylvania Geological Survey, 4th ser.: http://www.dcnr.state.pa.us/topogeo/groundwater/gw_data/dac_data/index.htm
12. Landslides in Western PA. Pittsburgh Geological Society: www.pittsburghgeologicalsociety.org.

Groundwater

13. Arthur M. Piper, 1933, Ground Water in Southwestern Pennsylvania: Pennsylvania Geological Survey, 4th ser., Water Resource Report 1, 406 p.
14. Gallaher, J. T., 1973, Summary ground-water resources of Allegheny County, Pennsylvania: Pennsylvania Geological Survey, 4th ser., 71 p.(out of print)
15. J.H. Adamson, J. B. Graham, and N. H. Klein, 1949, Ground-Water Resources of the valley-fill deposits of Allegheny County, Pennsylvania, 181 p., (supplement to W1).
16. McCarren, E., F., 1967, Chemical Quality of Surface Water in the Allegheny River Basin, Pennsylvania and New York: U. S. Department of the Interior.
17. Pennsylvania StreamStats: http://water.usgs.gov/osw/streamstats/pennsylvania.html

Other resources

1. Statewide County Natural Heritage Inventory Map: http://www.naturalheritage.state.pa.us/cnhi/cnhi.htm
2. PA Aquatic Community Classification Map: http://www.naturalheritage.state.pa.us/acc/acc.htm
3. Recreation activities: http://www.dcnr.state.pa.us/forestry/recreation/index.htm
4. Pennsylvania Natural Heritage Program (PNHP): http://www.naturalheritage.state.pa.us/

Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
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1. Information about person completing the questionnaire:

Name and Title	DAVID GILLILAND, BORO ENGINEER
Organization	TURTLE CREEK BOROUGH
Address	125 MONROEVILLE AVE TURTLE CREEK, PA 15145
Phone	412-824-5672 x113
E-mail Address	daveg@glennengr.com

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

___ Yes (*If yes, please complete 2a through 2e)* X No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

___ geology and soils	___ recreation and land use
___ water resources	___ aesthetic resources
___ fish & aquatic resources	___ historical resources
___ wildlife & botanical resources	___ socioeconomic resources
___ wetlands, riparian, & littoral habitat	___ tribal resources
___ rare, threatened & endangered species	___ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*

c. Where can HDR obtain this information?

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

___ Yes *(please list specific issues below)* ___ No

Resource Area	Specific Issue

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes ___X___ No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

   Comments:

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

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1. Information about person completing the questionnaire:

Name and Title	Kiersten Carlson, Associate Information Manager
Organization	PA Natural Heritage Program/Western PA Conservancy
Address	800 Waterfront Drive Pittsburgh, PA 15222
Phone	412-586-2314
E-mail Address	kcarlson@paconserve.org

2. Do you or your organization know of existing, relevant and reasonably available information that describes the existing Project environment (i.e., information regarding the Monongahela River in the vicinity of the Project)?

X Yes (*If yes, please complete 2a through 2e)* ___ No (*If no, go to 3*)

a. If yes, please indicate the specific resource area(s) that the information relates to:

___ geology and soils	___ recreation and land use
___ water resources	___ aesthetic resources
X fish & aquatic resources	___ historical resources
X wildlife & botanical resources	___ socioeconomic resources
___ wetlands, riparian, & littoral habitat	___ tribal resources
X rare, threatened & endangered species	___ other resource information

b. Please briefly describe the information or list available documents *(additional information may be provided on page 3 of this questionnaire).*
Allegheny County Natural Heritage Inventory and the PA Natural Heritage Program database.

c. Where can HDR obtain this information?
Pennsylvania Natural Heritage Program - Western PA Conservancy
www.naturalheritage.state.pa.us.

d. Please indicate whether there is a specific representative you wish to designate for a potential follow-up contact by Hydro Friends Fund's or HDR's representative for the resource area(s) checked above *(additional information may be provided on page 3 of this questionnaire).*

Representative Contact Information

Name	Same as person completing questionnaire
Address	
Phone	
Email Address	

Name	
Address	
Phone	
Email Address	

e. Based on the specific resources listed in 2a, are you aware of any specific issues pertaining to the identified resource area(s)? *(Additional information may be provided on page 4 of this questionnaire.)*

X Yes *(please list specific issues below)* ___ No

Resource Area	Specific Issue
rare, endangered and threatened species	they exist near the project area

1. Do you or your organization plan to participate in the Project licensing proceedings? ___ Yes X No

2. We are interested in your comments. If you have any questions or comments regarding the proposed Project, the PAD, or the licensing process, please add below:

Comments: You will probably need to do an environmental review (PNDI). You can get the County Natural Heritage Inventory report and polygons, and do the environmental review on our website - www.naturalheritage.state.pa.us

(Comments and/or questions may also be sent via email to: jim.gibson@hdrinc.com)

Please return this Questionnaire to Jim Gibson with HDR in the enclosed, self-addressed, stamped envelope **within 21 days** of receipt to allow for any follow-up contact by Hydro Friends Fund's or HDR's representatives that may be needed. Not responding within 21 days indicates that you are not aware of any existing, relevant, and reasonably available information that describes the existing Project environment or known potential impacts of the Project.

October 28, 2011

Pennsylvania Department of Environmental Protection
Coastal Zone Management Program
400 Market Street, 2nd Floor
Harrisburg, PA 17105

Subject: Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
Coastal Zone Consistency Determination

Dear Sir or Ma'am:

Lock+™ Hydro Friends Fund XLII (Hydro Friends Fund), a wholly owned subsidiary of Hydro Green Energy, LLC (HGE), is beginning the Federal Energy Regulatory Commission (FERC) licensing process for the proposed Braddock Locks & Dam Hydroelectric Project (Project) (FERC No. 13739). The proposed Project would utilize the head effect of the existing U.S. Army Corps of Engineers' (USACE) Braddock Locks & Dam, located on the Monongahela River in Allegheny, Pennsylvania.

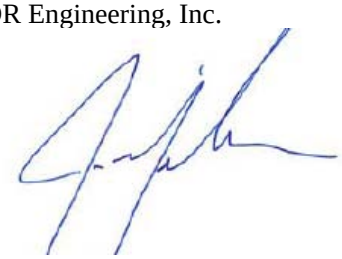
HGE focuses on developing new hydropower generation at existing, non-powered dams in an environmentally responsible manner. For this Project, Hydro Friends Fund proposes to deploy a patented power-generating "Large Frame Module" just downstream of the existing dam to take advantage of the head (difference in elevation between the upper and lower pools of the river) found at the Braddock Locks & Dam. The Project will operate in run-of-river mode, meaning the Project will not impound water or control the flows of the river. In addition, the Project has been designed to be installed and operate without interfering with USACE's navigational mission.

HDR Engineering, Inc. (HDR) is assisting Hydro Friends Fund in completing the requirements of the licensing process for the Project. HDR believes that the Braddock Locks & Dam Hydroelectric Project will be located outside of the State Coastal Zone; however, we respectfully request a determination from your office.

A general location map with the latitude and longitude indicating the location of the proposed Project along the Monongahela River has been enclosed with this letter, and the attached map shows the area for which the information is being requested.

It is our intent to include your decision in the Pre-Application Document, which we are currently finalizing. Therefore, we respectfully request a response to this determination at your earliest convenience. If you have any questions or need additional information regarding this Project or its location, please feel free to contact me at (315) 414-2202. Thank you for your assistance with this process.

Sincerely,
HDR Engineering, Inc.



Jim Gibson
Vice President

Enclosure

Henningson, Durham & Richardson Architecture and Engineering, P.C.
in association with HDR Engineering, Inc.

1304 Buckley Road
Suite 202
Syracuse, NY 13212-4311

Phone: (315) 451-2325
Fax: (315) 451-2429
www.hdrinc.com

October 28, 2011

Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, PA 17120

Subject: Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
Request for Historical and Cultural Information

Dear Sir or Ma'am:

HDR Engineering, Inc. (HDR), on behalf of our client Lock+™ Hydro Friends Fund XLII, is requesting any cultural or historical information your office may have regarding the upcoming licensing for the proposed Braddock Locks & Dam Hydroelectric Project (Project) (FERC No. 13739). The proposed Project would utilize the head effect of the existing U.S. Army Corps of Engineers' Braddock Locks & Dam, located on the Monongahela River in Allegheny, Pennsylvania.

As a requirement of the Pre-Application Document (PAD), HDR is responsible for including any information on historical and cultural resources that may have the potential to be affected by the Project.

A general location map with the latitude and longitude indicating the location of the proposed Project along the Monongahela River has been enclosed with this letter, and shows the area for which the information is being requested.

It is our intent to include the information that you may provide in the PAD, which we are currently finalizing. Please provide any information that you may have at your earliest convenience or within 30 days of receipt of this letter. If you have any questions or need additional information regarding this Project or its location, please feel free to contact me at (315) 414-2202. Thank you for your assistance with this process.

Sincerely,
HDR Engineering, Inc.

Jim Gibson
Vice President

Enclosure

Henningson, Durham & Richardson Architecture and Engineering, P.C.
in association with HDR Engineering, Inc.

1304 Buckley Road
Suite 202
Syracuse, NY 13212-4311

Phone: (315) 451-2325
Fax: (315) 451-2429
www.hdrinc.com

October 28, 2011

Pennsylvania Department of Conservation and Natural Resources
Rachel Carson State Office Building
P.O. Box 8767
400 Market St.
Harrisburg, PA 17105-8767

Subject: Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
Pre-Application Document Request for Threatened and Endangered Species Information

Dear Sir or Ma'am:

Lock+™ Hydro Friends Fund XLII (Hydro Friends Fund), a wholly owned subsidiary of Hydro Green Energy, LLC (HGE), is beginning the Federal Energy Regulatory Commission (FERC) licensing process for the proposed Braddock Locks & Dam Hydroelectric Project (Project) (FERC No. 13739). The proposed Project would utilize the head effect from the existing U.S. Army Corps of Engineers' (USACE) Braddock Locks & Dam, located on the Monongahela River in Allegheny, Pennsylvania.

HGE focuses on developing new hydropower generation at existing, non-powered dams in an environmentally responsible manner. For this Project, Hydro Friends Fund proposes to deploy a patented power-generating "Large Frame Module" just downstream of the existing dam to take advantage of the head (difference in elevation between the upper and lower pools of the river) found at the Braddock Locks & Dam. The Project will operate in run-of-river mode, meaning the Project will not impound water or control the flows of the river. In addition, the Project has been designed to be installed and operate without interfering with USACE's navigational mission.

HDR Engineering, Inc. (HDR) is assisting Hydro Friends Fund in completing the requirements of the licensing process for the Project. HDR is currently gathering information in support of the development of the Pre-Application Document (PAD). Under the FERC guidelines, the Project's developer is responsible for evaluating the potential impacts of the Project relicensing on threatened and endangered species.

In support of this process, HDR is requesting information regarding the following within the Project area:

- State and federally listed threatened or endangered species;
- Species proposed for listing as threatened or endangered, or species of concern;
- Designated critical habitat;
- Proposed critical habitat; and
- Candidate species.

Henningson, Durham & Richardson Architecture and Engineering, P.C
in association with HDR Engineering, Inc.

1304 Buckley Road
Suite 202
Syracuse, NY 13212-4311

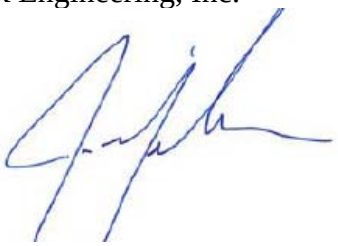
Phone: (315) 451-2325
Fax: (315) 451-2429
www.hdrinc.com

A general location map with the latitude and longitude indicating the location of the proposed Project along the Monongahela River has been enclosed with this letter. The attached map shows the area for which the information is being requested.

It is our intent to include your input in the PAD, which we are currently finalizing. Therefore, we respectfully request a response to this determination at your earliest convenience or within 30 days of receipt of this letter. If you have any questions or need additional information regarding this Project or its location, please feel free to contact me at (315) 414-2202. Thank you for your assistance with this process.

Sincerely,

HDR Engineering, Inc.



Jim Gibson
Vice President

Enclosure

October 28, 2011

United States Fish and Wildlife Service
P.O. Box 67000
Harrisburg, PA 17106-7000

Subject: Braddock Locks & Dam Hydroelectric Project (FERC No. 13739)
Pre-Application Document Request for Threatened and Endangered Species Information

Dear Sir or Ma'am:

Lock+™ Hydro Friends Fund XLII (Hydro Friends Fund), a wholly owned subsidiary of Hydro Green Energy, LLC (HGE), is beginning the Federal Energy Regulatory Commission (FERC) licensing process for the proposed Braddock Locks & Dam Hydroelectric Project (Project) (FERC No. 13739). The proposed Project would utilize the head effect from the existing U.S. Army Corps of Engineers' (USACE) Braddock Locks & Dam, located on the Monongahela River in Allegheny, Pennsylvania.

HGE focuses on developing new hydropower generation at existing, non-powered dams in an environmentally responsible manner. For this Project, Hydro Friends Fund proposes to deploy a patented power-generating "Large Frame Module" just downstream of the existing dam to take advantage of the head (difference in elevation between the upper and lower pools of the river) found at the Braddock Locks & Dam. The Project will operate in run-of-river mode, meaning the Project will not impound water or control the flows of the river. In addition, the Project has been designed to be installed and operate without interfering with USACE's navigational mission.

HDR Engineering, Inc. (HDR) is assisting Hydro Friends Fund in completing the requirements of the licensing process for the Project. HDR is currently gathering information in support of the development of the Pre-Application Document (PAD). Under the FERC guidelines, the Project's developer is responsible for evaluating the potential impacts of the Project relicensing on threatened and endangered species.

In support of this process, HDR is requesting information regarding the following within the Project area:

- State and federally listed threatened or endangered species;
- Species proposed for listing as threatened or endangered, or species of concern;
- Designated critical habitat;
- Proposed critical habitat; and
- Candidate species.

Henningson, Durham & Richardson Architecture and Engineering, P.C
in association with HDR Engineering, Inc.

1304 Buckley Road
Suite 202
Syracuse, NY 13212-4311

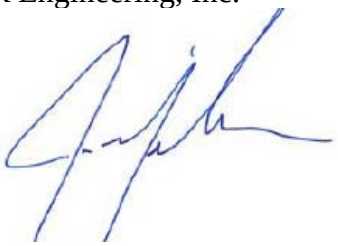
Phone: (315) 451-2325
Fax: (315) 451-2429
www.hdrinc.com

A general location map with the latitude and longitude indicating the location of the proposed Project along the Monongahela River has been enclosed with this letter. The attached map shows the area for which the information is being requested.

It is our intent to include your input in the PAD, which we are currently finalizing. Therefore, we respectfully request a response to this determination at your earliest convenience or within 30 days of receipt of this letter. If you have any questions or need additional information regarding this Project or its location, please feel free to contact me at (315) 414-2202. Thank you for your assistance with this process.

Sincerely,

HDR Engineering, Inc.



Jim Gibson
Vice President

Enclosure

pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

BUREAU OF FORESTRY

November 23, 2011 **PNDI Number: 21583**

Jim Gibson
Henningson, Durham, and Richardson Architecture and Engineering
1304 Buckley Road, Suite 202
Syracuse, NY 13212
FAX: 315-451-2429 (Hard copy will not follow)

Re: Braddock Locks and Dam Hydroelectric Project (FERC no. 13739), Response to Pre-application notice West Mifflin and North Braddock Townships, Allegheny County

Dear Mr. Gibson

Thank you for the submission of the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Receipt Number **21583** for review. PA Department of Conservation and Natural Resources screened this project for potential impacts to species and resources of concern under DCNR's responsibility, which include plants, terrestrial invertebrates, natural communities, and geologic features only. **NOTE:** please contact DCNR, Ecological Services, for subsequent reviews as additional project details become available.

No Impact Anticipated

PNDI records indicate species or resources of concern are located in the vicinity of the project. However, based on the information you submitted concerning the nature of the project, the immediate location, and our detailed resource information, DCNR has determined that no impact is likely. No further coordination with our agency is needed for this project.

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on-site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered. Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map).

This finding applies to impacts to DCNR only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure the U.S. Fish and Wildlife Service, PA Game Commission, and the Pennsylvania Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Sincerely,

Adam M. Hnatkovich, Environmental Review Specialist FOR Chris Firestone, Wild Plant Program Mgr.
Ph: 717-705-2822 Fax: 717-772-0271 Email: c-ahnatkov@pa.gov

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
INTERSTATE WATERS OFFICE

December 6, 2011

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E. Room
Washington, DC 20426

Re: Project Nos. P-13739, P-13740

Dear Ms. Bose:

On November 1, 2011, the Pennsylvania Coastal Resources Management (CRM) Program received a request from HDR Engineering, Inc. for Coastal Zone Consistency Determinations for the following hydroelectric projects proposed on the Allegheny and Monongahela Rivers in Pennsylvania:

Docket #	Project Name
P-13739	Braddock Lock and Dam Hydroelectric Project (Monongahela River)*
P-13740	C.W. Bill Young Lock and Dam Hydroelectric Project (Allegheny River)

*CRM previously provided a consistency determination for this project on June 13, 2011.

These projects were sent for our federal consistency review as required under 15 CFR Part 930 Subpart D - Consistency for Federally Licensed and Permit Activities. We have determined that the above actions are located outside of Pennsylvania's Coastal Zones and will not impact upon them. Therefore, these actions are consistent with Pennsylvania's CRM Program.

Please note that this determination pertains only to the federal consistency review requirements under the Federal Coastal Zone Management Act of 1972, as amended, and does not constitute a waiver from further Department of Environmental Protection's review or other Departmental permits.

Sincerely,

Matthew D. Walderon
Federal Consistency Coordinator
Coastal Resources Management Program

cc: Jim Gibson, Vice President, HDR Engineering, Inc.

APPENDIX B

AGENCY AND STAKEHOLDER CONTACT AND DISTRIBUTION LIST

Distribution List for the Braddock Locks and Dam Hydroelectric Project

3 Rivers Rowing Association
300 Waterfront Drive
Pittsburgh, PA 15222

Advisory Council on Historic Preservation
Old Post Office Building
1100 Pennsylvania Ave. NW, Suite 803
Washington, DC 20004

Allegheny County
501 County Office Building
542 Forbes Ave
Pittsburgh, PA 15219

Allegheny County Conservation District
400 North Lexington St., Suite 102
Pittsburgh, PA 15208

American Canoe Association
1340 Central Park Blvd, Suite 210
Fredericksburg, VA 22401

American Rivers
1101 14th Street, NW, Suite 1400
Washington, D.C. 20005-5637

American Water Resources Association-Pennsylvania State Section
1000 Church Hill Road, Suite 200
Pittsburgh, PA 15205

American Whitewater
P.O. Box 1540
Cullowhee, NC 28779

Appalachian Watershed Corporation
532 Penn St.
New Bethlehem, PA 16242

Audubon Society of Western Pennsylvania
614 Dorseyvill Road
Pittsburgh, PA 15238

Borough of Avalon
640 California Avenue
Pittsburgh, PA 15202

Borough of Baldwin
10 Community Park Drive
Pittsburgh, PA 15234

Borough of Bellevue
537 Bayne Avenue
Pittsburgh, PA 15202

Borough of Braddock
415 Sixth Street
Braddock, PA 15104

Borough of Brentwood
3624 Brownsville Road
Pittsburgh, PA 15227

Borough of Bridgeville
425 Bower Hill Road
Bridgeville, PA 15017

Borough of Carnegie
1 Glass Street
Carnegie, PA 15106

Borough of Castle Shannon
3310 McRoberts Road
Castle Shannon, PA 15234

Borough of Crafton
100 Stotz Avenue
Pittsburgh, PA 15205

Borough of East Pittsburgh
811 Linden Avenue
East Pittburgh, PA 15112

Borough of Forest Hills
2071 Ardmore Blvd.
Pittsburgh, PA 15221

Borough of North Braddock
600 Anderson Street
North Braddock, PA 15104

Borough of Oakmont
P.O. Box 384
504 Allegheny River Boulevard
Oakmont, PA 15139

Borough of Plum
4575 New Texas Road
Plum, PA 15239

Borough of Swissvale
7560 Roslyn Street
Swissvale, PA 15218

Borough of Turtle Creek
125 Monroeville Avenue
Turtle Creek, PA 15145

Borough of West Mifflin
3000 Lebanon Church Road
West Mifflin, PA 15122

Borough of West View
441 Perry Highway
West View, PA 15229

Borough of Wilkinsburg
605 Ross Ave
Wilkinsburg, PA 15221

Bureau of Land Management
1849 C St., NW
Washington, DC 20240

Distribution List for the Braddock Locks and Dam Hydroelectric Project

Bureau of Land Management
Northeastern States Field Office
626 E. Wisconsin Ave., Suite 200
Milwaukee, WI 53201-0631

Center for Watershed Protection
8391 Main St.
Ellicott City, MD 21043-4605

City of Clairton
551 Ravensburg Boulevard
Clairton, PA 15025

City of Duquesne
125 2nd Street
Duquesne, PA 15110

City of Duquesne
125 2nd Street
Duquesne, PA 15110

City of McKeesport
201 Lysle Blvd
McKeesport, PA

City of Pittsburgh
414 Grant Street, Suite 91 l
Pittsburgh, PA 15219

Clean Water Action
100 5th Ave., Suite 1108
Pittsburgh, PA 15222

Community Environmental Legal Defense Fund
P.O. Box 360
Mercersburg, PA 17236

Defenders of Wildlife
National Headquarters
1130 17th Street, NW
Washington, DC 20036

Ducks Unlimited
One Waterfowl Way
Memphis, TN 38120

Energy Association of Pennsylvania
301 APC Building
800 North Third St.
Harrisburg, PA 17102

Federal Emergency Management Agency
Federal Center Plaza
500 C St., SW
Washington, DC 20472

Federal Emergency Management Agency
Regional Office
Liberty Square Building 2nd Floor
Philadelphia, PA 19106

Kimberly Bose
Federal Energy Regulatory Commission
888 First Street NE
Washington, D.C. 20426

Federal Energy Regulatory Commission
New York Regional Office
19 W 34th St., Room 400
New York, NY 10001-3006

Friends of the Riverfront, Inc.
33 Terminal Way
Pittsburgh, PA 15219

Greater Pittsburgh Chamber of Commerce
Regional Enterprise Tower
425 Sixth Ave., Suite 1100
Pittsburgh, PA 15219

Hon. Mark J. Gergely
Pennsylvania House of Representatives
1540 Lincoln Way
White Oak, PA 15131

Hon. Michael F. Doyle
U.S. House of Representatives
2637 East Carson St.
Pittsburgh, PA 15203

Hon. Paul Costa
Pennsylvania House of Representatives
217 Ivis Office Building
P.O. Box 202034
Harrisburg, PA 15145

Hon. William C. Kortz II
Pennsylvania House of Representatives
751 Pittsburgh McKeesport Blvd.
Dravosburg, PA 15034

Hydropower Reform Coalition
1101 14th St NW, Suite 1400
Washington, DC 20005

Inland Rivers Ports & Terminals
316 Board of Trade Place
New Orleans, LA 70130

Izaak Walton League of America
707 Conservation Lane
Gaitherburg, MD 20878-2983

Kennedy Township
340 Forest Grove Rd.
Coraopolis, PA 15108

National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 1930-2276

National Marine Fisheries Service
Northeast Region
1315 East West Highway
Silver Spring, MD 20910

National Park Service
1849 C Street, NW
Washington, DC 20240

National Park Service
Northeast Regional Office
Custom House
200 Chestnut St. Fifth Floor
Philadelphia, PA 19106-2913

Distribution List for the Braddock Locks and Dam Hydroelectric Project

National Wildlife Federation
11100 Wildlife Center Drive
Reston, VA 20190-5362

Natural Heritage Institute
100 Pine St., Suite 1550
San Francisco, CA 94111

Ohio River Basin Commission
403 Bradley Hall
Lexington KY 40506-0058

Ohio River Valley Water Sanitation Commission
5735 Kellogg Ave.
Cincinnati, OH 45228

Ohio River Watershed Summit
West Virginia Rivers Coalition
329 Davis Avenue, Suite 7
Elkins, WV 26241

Penn Future
425 6th Ave., Suite 2770
Pittsburgh, PA 15219

Pennsylvania Assoc of Environmental Professionals
174 Crestview Drive
Bellefonte, PA 16823

Pennsylvania Center for Water Resources Research
107 Land and Water Research Building
University Park, PA 16802

Pennsylvania Coastal Resources Mgmt. Program
P.O. Box 2063
400 Market St., 2nd Floor
Harrisburg, PA 17105

Pennsylvania Dept. of Agriculture
2301 N. Cameron St.
Harrisburg, PA 17105

Pennsylvania Dept. of Conserv & Natural Resources
Bureau of Recreation and Conservation-SW Region
301 Fifth Avenue, Suite 324
Pittsburgh, PA 15222-2420

Pennsylvania Dept. of Conserv & Natural Resources
Rachel Carson State Office Building
400 Market St., P.O. Box 8767
Harrisburg, PA 17105-8767

Pennsylvania Dept. of Conserv & Natural Resources
Bureau of Topographic and Geologic Survey
3240 Schoolhouse Road
Middletown, PA 17057

Pennsylvania Dept. of Environmental Protection
Rachel Carson State Office Building
400 Market St.
Harrisburg, PA 17101

Pennsylvania Dept. of Environmental Protection
Southwest Regional Office
400 Waterfront Dr.
Pittsburgh, PA 15222

Pennsylvania Environmental Council
Southwest Regional Office
22 Terminal Way
Pittsburgh, PA 15219

Pennsylvania Fish and Boat Commission
1601 Elmerton Ave.
Harrisburg, PA 17110

Pennsylvania Fish and Boat Commission
Southwest Regional Office
236 Lake Road
Somerset, PA 15501

Pennsylvania Game Commission
2001 Elmerton Ave.
Harrisburg, PA 17110

Pennsylvania Game Commission
Southwest Regional Office
4820 Route 711
Bolivar, PA 15923

Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North St.
Harrisburg, PA 17120-0093

Pennsylvania Office of Attorney General
16th Floor
Strawberry Square
Harrisburg, PA 17120

Pennsylvania Organization for Watersheds and Rivers
610 North Third St.
Harrisburg, PA 17101

Pittsburgh Trails Advocacy Group
P.O. Box 233
Rural Ridge, PA 15075

Rachel Carson Trails Conservancy, Inc.
P.O. Box 35
Warrendale, PA 15086

River Network
7132 Pea Neck Road
St. Michaels, MD 21663

Sen. James R. Brewster
Pennsylvania State Senate
One Monroeville Center
3824 Northern Pike, Suite 350
Monroeville, PA 15146

Sen. Jay Costa
Pennsylvania State Senate
1501 Ardmore Blvd., Suite 403
Pittsburgh, PA 15221-4401

Sen. Patrick J. Toomey
U.S. Senate
100 West Station Square Dr., Suite 225
Pittsburgh, PA 15219

Sen. Robert Casey, Jr.
U.S. Senate
425 Sixth Avenue, Suite 2490
Pittsburgh, PA 15219

Distribution List for the Braddock Locks and Dam Hydroelectric Project

Seneca Nation of Indians
12837 Route 438
Irving, NY 14081

Seneca-Cayuga Tribe of Oklahoma
23701 South 655 Road
Grove, OK 74344

Sierra Club
85 Second St., Second Floor
San Francisco, CA 94105

Sierra Club Allegheny Group
3109 Forbes Ave., Suite 100
Pittsburgh, PA 15213

Sustainable Pittsburgh
425 Sixth Ave., Suite 1335
Pittsburgh, PA 15219

The Allegheny Land Trust
409 Board St., Suite 206A
Sewickley, PA 15143

The Allegheny Trail Alliance
P.O. Box 501
Latrob, PA 15650

The Allegheny Valley Trails Association
P.O. Box 264
Franklin, PA 16323

The Allegheny Watershed Network

The Alliance for Aquatic Resource Monitoring
Dickinson College-Environmental Studies Dept.
P.O. Box 1773-College & Louther St.
Carlisle, PA 17013

The American Waterways Operators
801 North Quincy St., Suite 200
Arlington, VA 22203

The Foundation for Pennsylvania Watersheds
9697 Loop Road
Alexandria, PA 16611

The National Organization for Rivers
212 West Chyenne Mountain
Colorado Springs, CO 80906

The Nature Conservancy
4245 North Fedirfedx Drive, Suite 100
Arlington, VA 22203

Tonawanda Band of Senecas
7027 Meadville Road
Basom, NY 14013

Township of North Versailles
1401 Greensburg Avenue
North Versailles, PA 15137

Township of O'Hara Township
325 Fox Chapel Road
O'Hara Township, PA 15238

Township of Shaler Township
300 Wetzel Road
Glenshaw, PA 15116

U.S. Army Corps of Engineers
Office of the Chief of Army Engineers
441 G. St., NW
Washington, DC 20314-1000

U.S. Army Corps of Engineers
Pittsbrugh District
2200 William S. Moorhead Federal Building
1000 Liberty Ave.
Pittsburgh PA 15222-4186

U.S. Bureau of Indian Affairs
Eastern Regional Office
545 Marriott Dr., Suite 700
Nashville, TN 37214

U.S. Coast Guard
MSU Pittsburgh
100 Forbes Avenue, Suite 1150
Pittsburgh, PA 15222

U.S. Dept. of Energy
Philadelphia Regional Office
Wanamaker Building
100 Penn Square East, Suite 890
Philadelphia, PA 19107-3396

U.S. Dept. of Interior
Bureau of Reclamation
1849 C St., NW
Washington, DC 20240-0001

U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

U.S. Environmental Protection Agency, Region 3
1650 Arch St
Philadelphia, PA 19103-2029

U.S. Fish and Wildlife Service
18th and C streets
Washington, DC 20240

U.S. Fish and Wildlife Service
Regional Office
300 Westgate Center Dr
Hadley, MA 01035

U.S. Fish and Wildlife Service
Pennsylvania Field Office
315 S Allen St., Suite 322
State College, PA 16801

U.S. Fish and Wildlife Service
Mid-Atlantic Fishery Resources Office
Fish and Wildlife Management Assistance Office
P.O. Box 67000
Harrisburg, PA 17106-7000

Distribution List for the Braddock Locks and Dam Hydroelectric Project

U.S. Forest Service
Northeast Regional Office
310 W. Wisconsin Ave., Room 580
Milwaukee, WI 53203

U.S. Forest Service
S.R. Yates Federal Bldg.
201 14th St. SW
Washington, DC 20090

U.S. Geological Survey
Water Science Center
1000 Church Hill Road
Pittsburgh, PA 15205

Venture Outdoors
304 Forbes Ave., 2nd Floor
Pittsburgh, PA 15222

Water Resources Education Network
226 Forster St.
Harrisburg, PA 17102

Waterways Association of Pittsburgh
P.O. Box 534
Lyndora, PA 16045

Waterways Council
801 North Quincy St., Suite 200
Arlington, VA 22203

Western PA Conservancy
800 Waterfront Drive
Pittsburgh, PA 15222

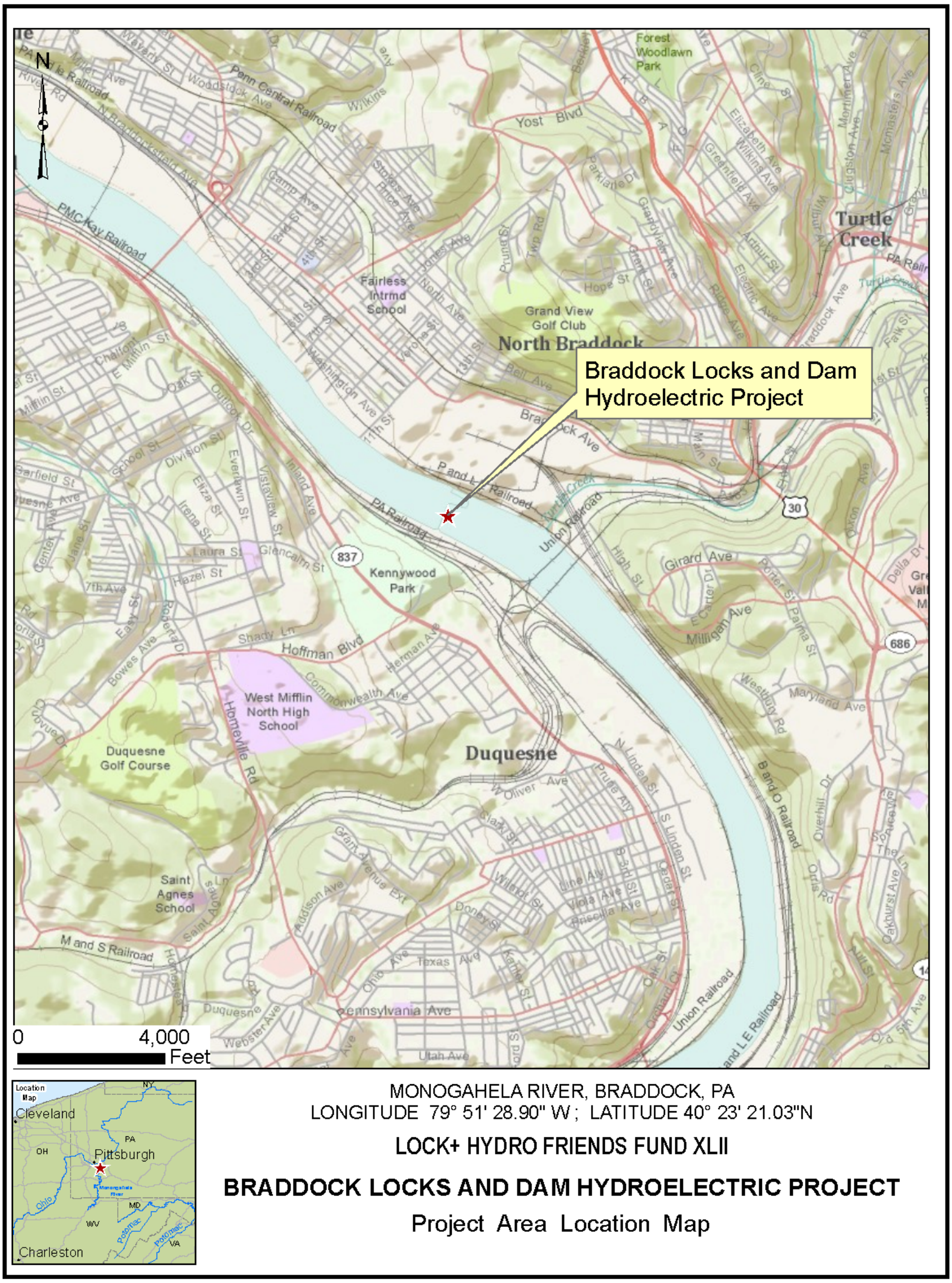
Wild Resource Conservation Fund
P.O. Box 8765
Harrisburg, PA 17105

Wildlife Habitat Council
1010 Wayne Ave., Suite 920
Silver Spring, MD 20910

APPENDIX C

PROJECT LOCATION MAPS

PROPOSED PROJECT LOCATION MAP



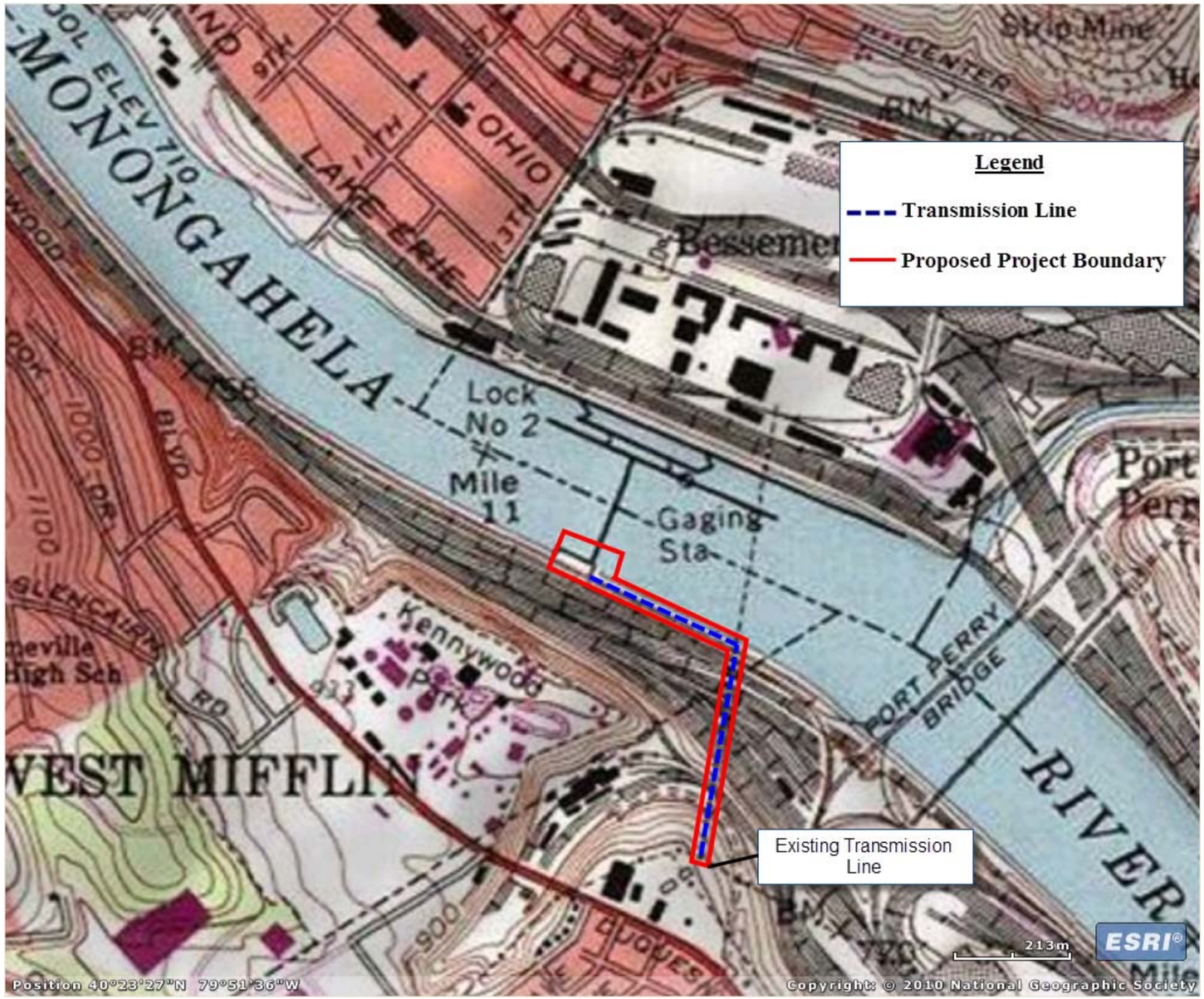
MONOGAHELA RIVER, BRADDOCK, PA
LONGITUDE 79° 51' 28.90" W ; LATITUDE 40° 23' 21.03"N

LOCK+ HYDRO FRIENDS FUND XLII

BRADDOCK LOCKS AND DAM HYDROELECTRIC PROJECT

Project Area Location Map

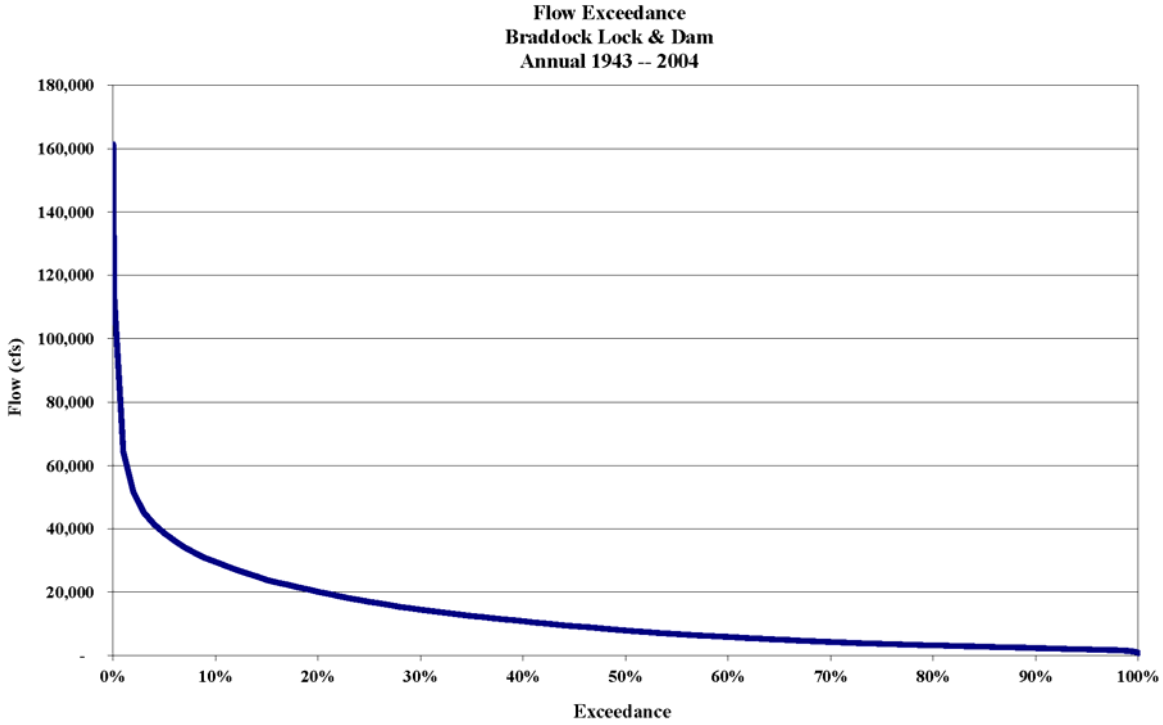
MAP OF USACE BRADDOCK LOCKS AND DAM AND PROPOSED PROJECT BOUNDARY

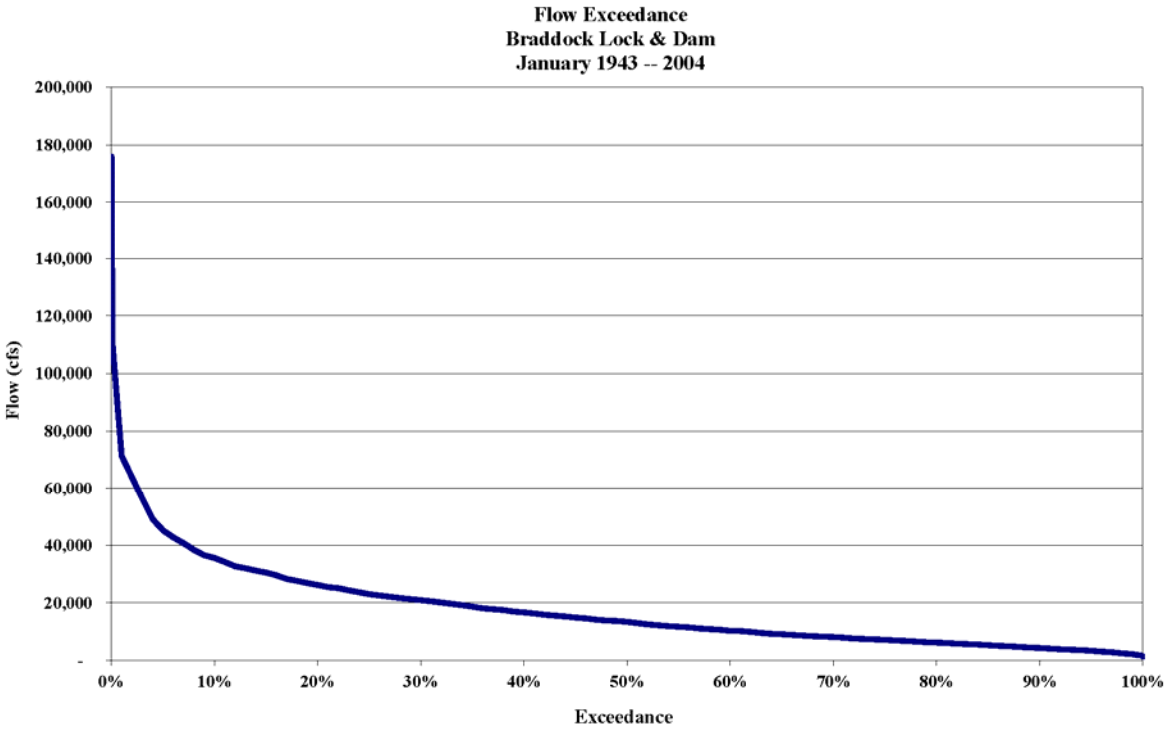


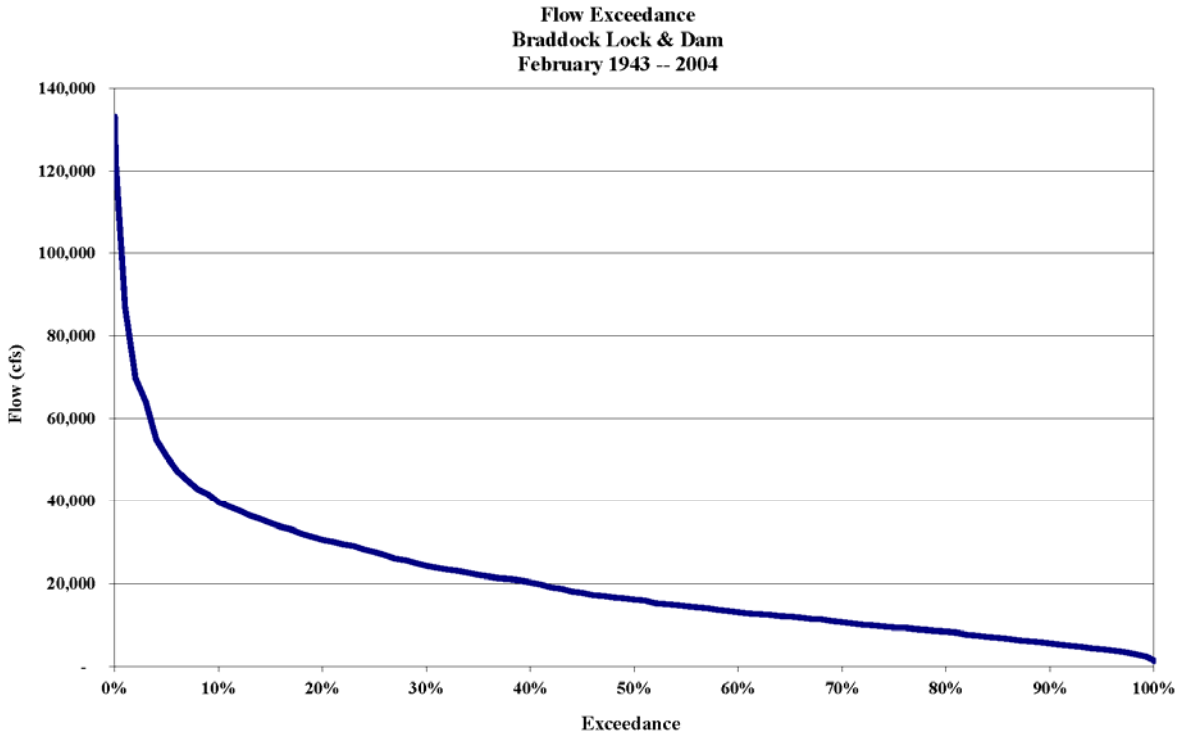
THE PROJECT FEATURES INDICATED ON THIS MAP ARE INTENDED TO PROVIDE ONLY A GENERAL INDICATION OF A POSSIBLE DEVELOPMENT CONCEPT AND POTENTIAL PROJECT BOUNDARY LOCATION. STUDIES AND CONSULTATION PERFORMED DURING THE TERM OF THE PERMIT AND LICENSING PROCESS WILL LEAD TO A MORE REFINED LAYOUT.

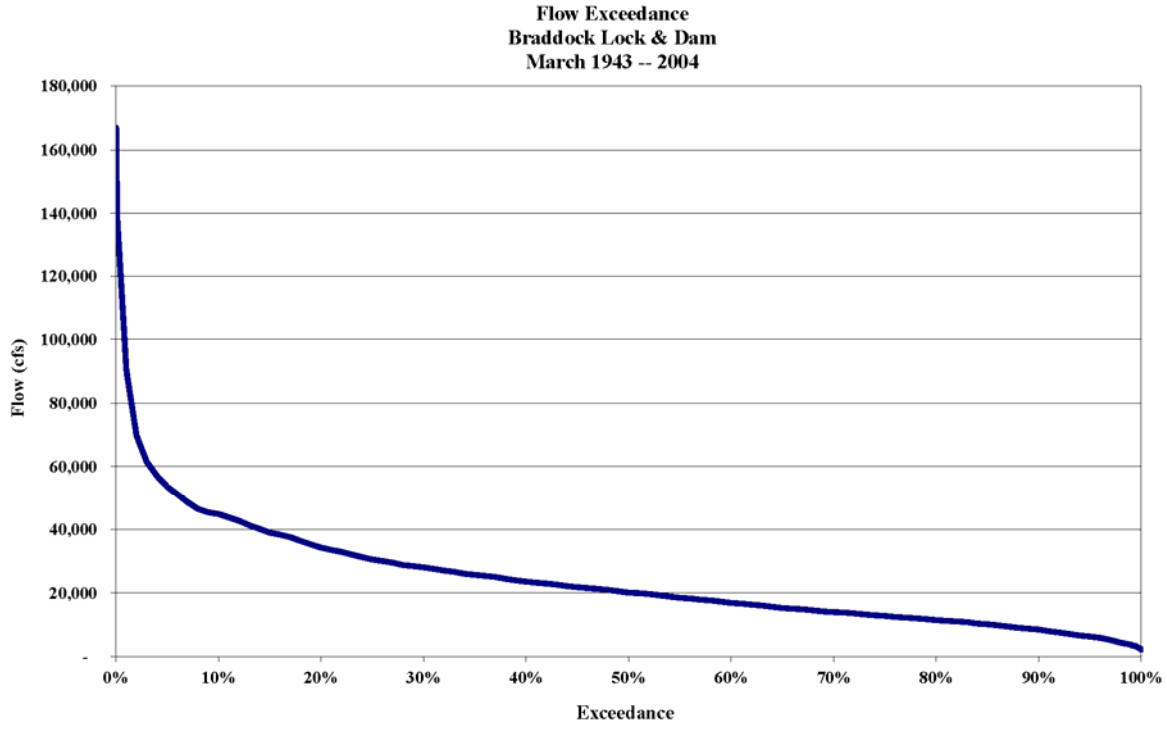
APPENDIX D

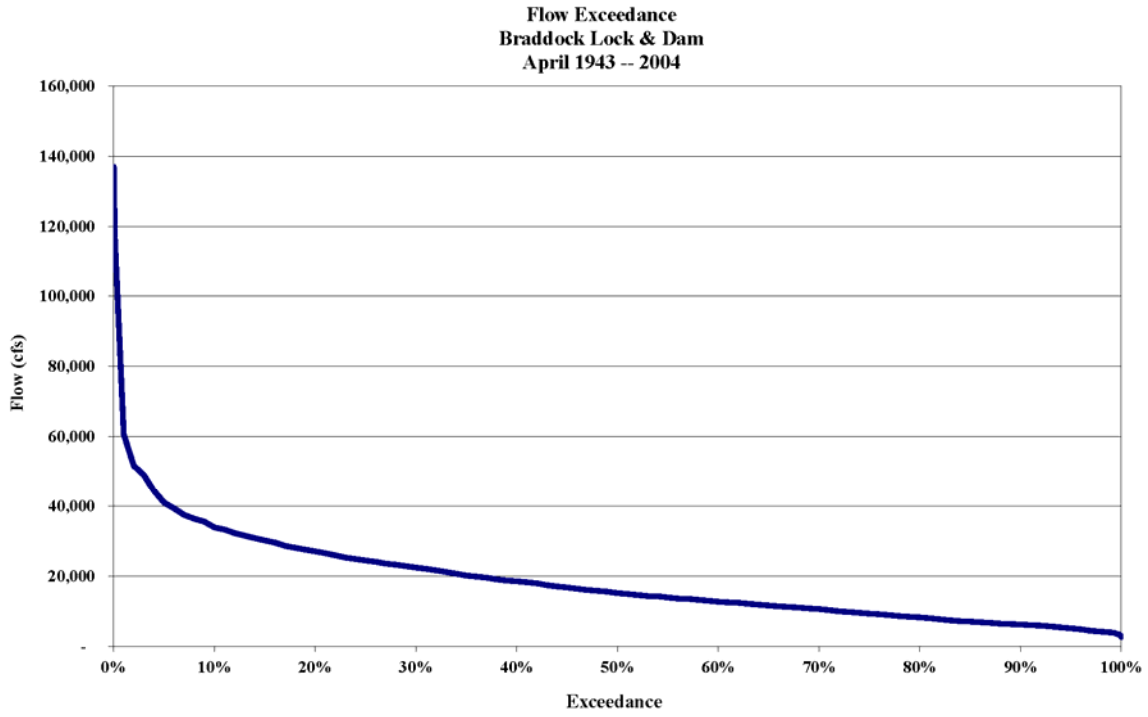
FLOW DURATION CURVES

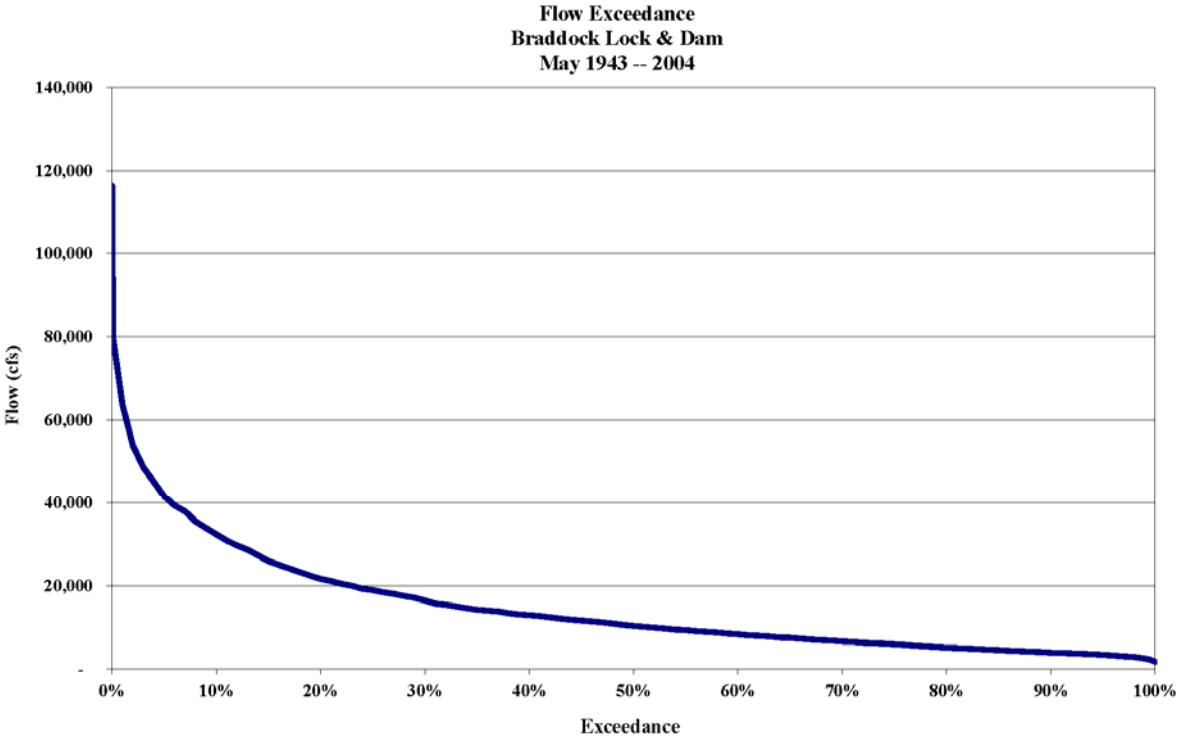


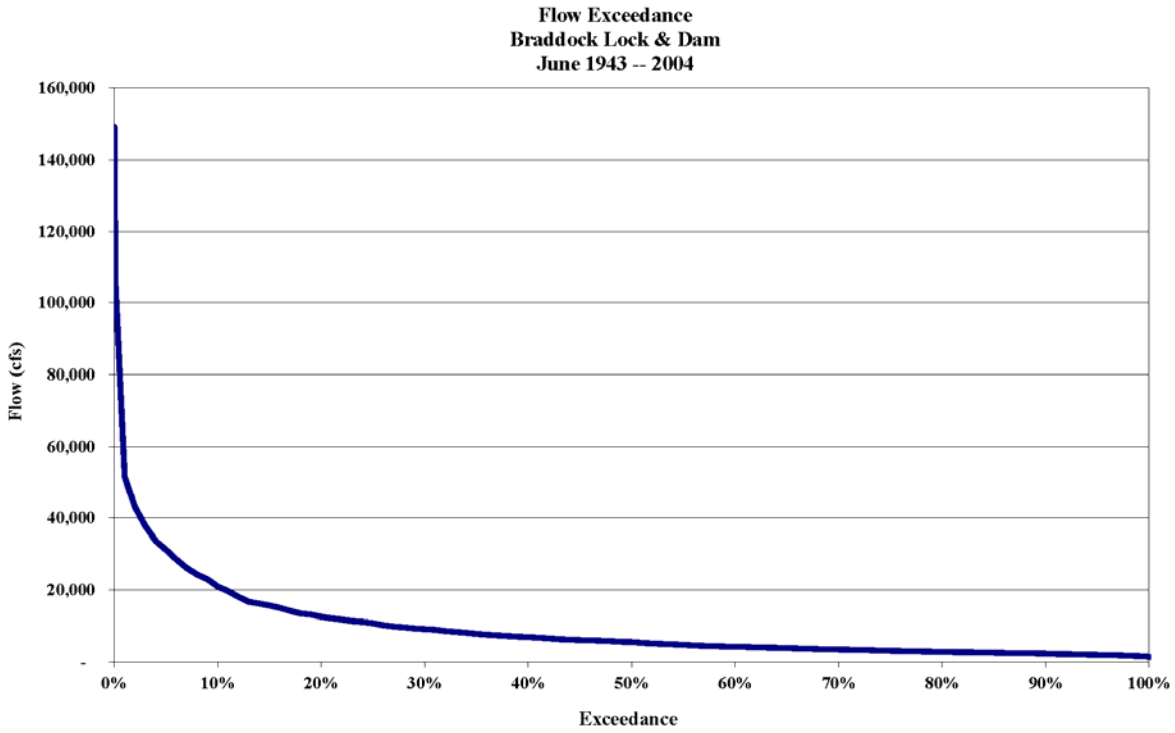


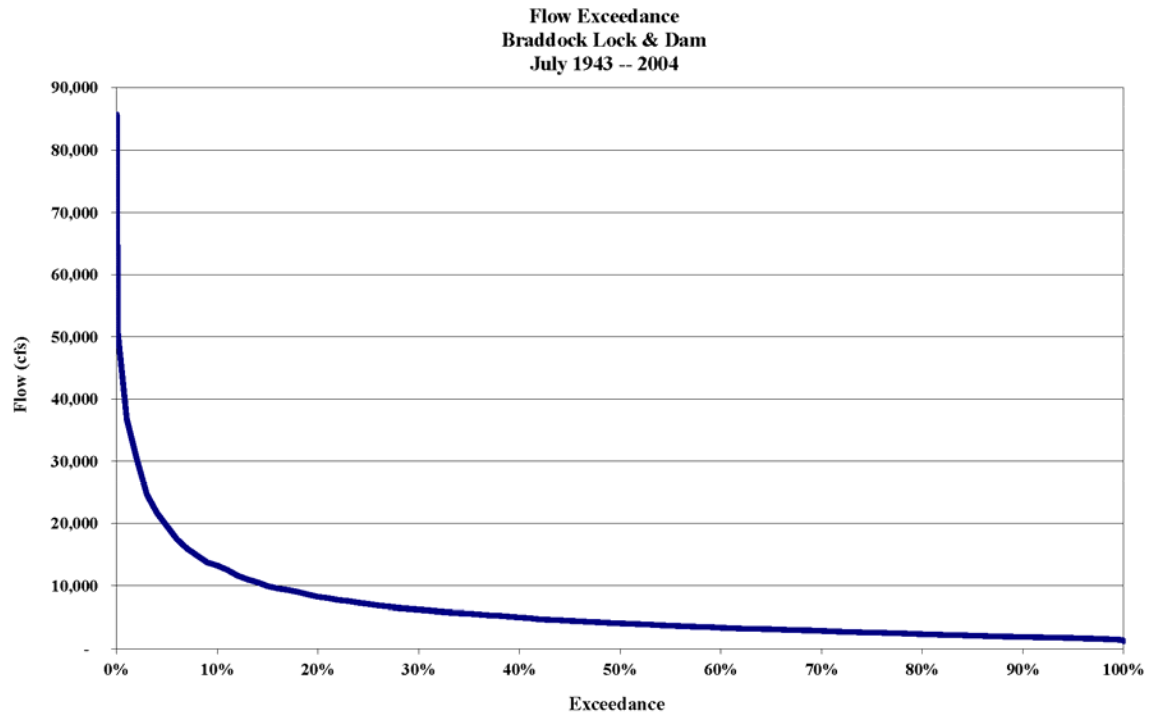


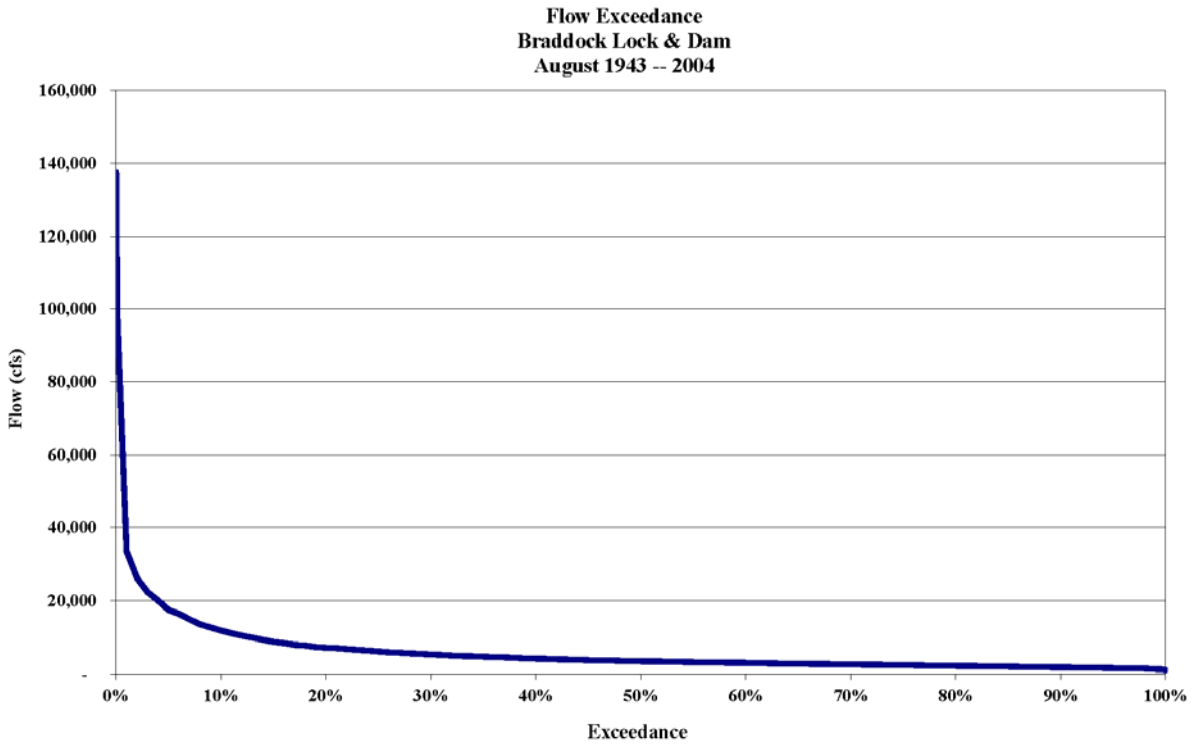


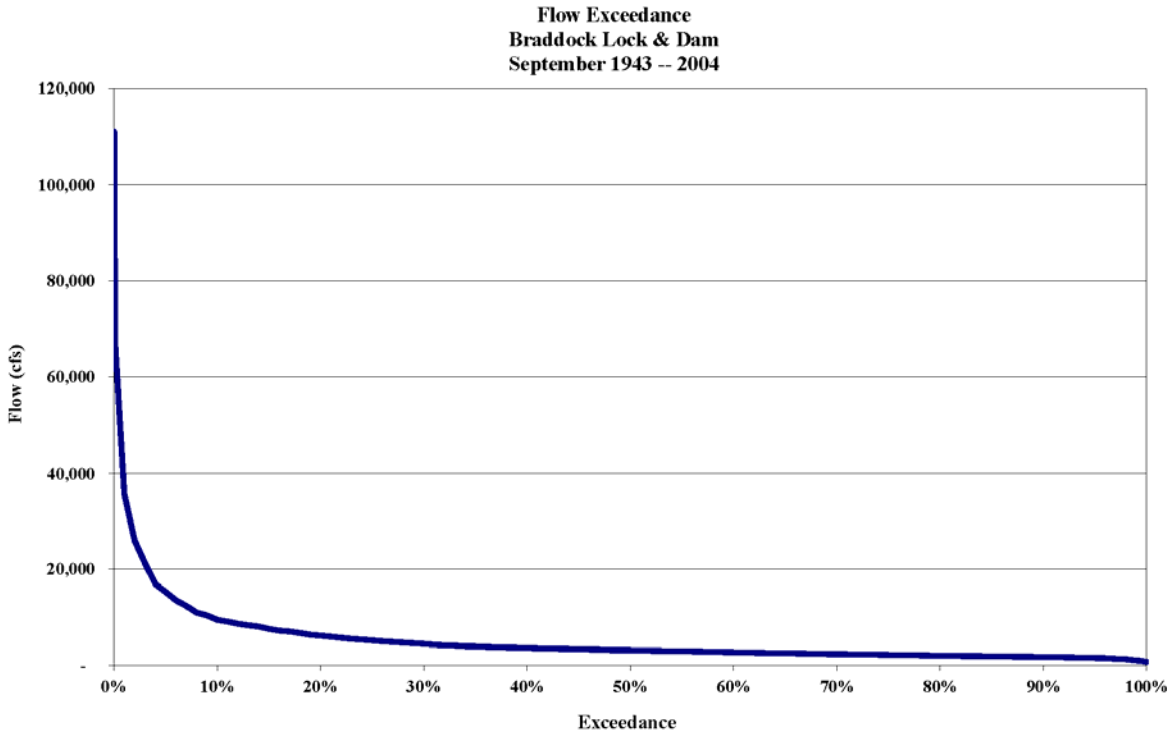


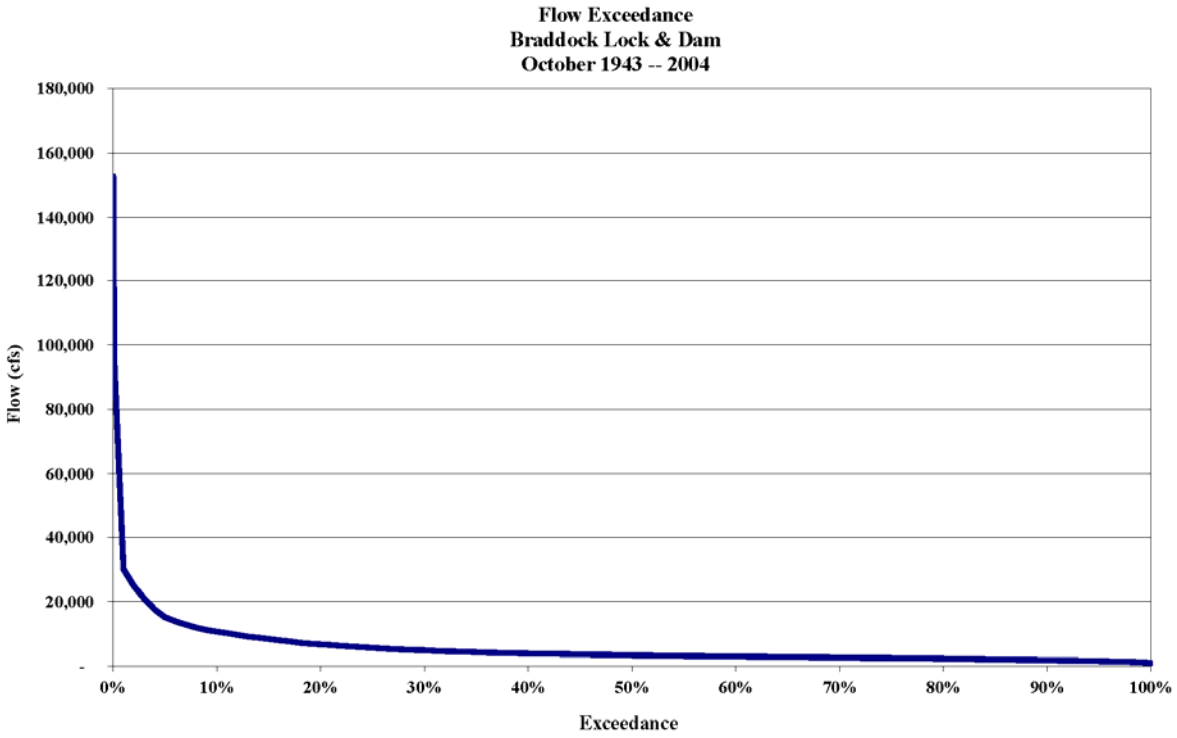


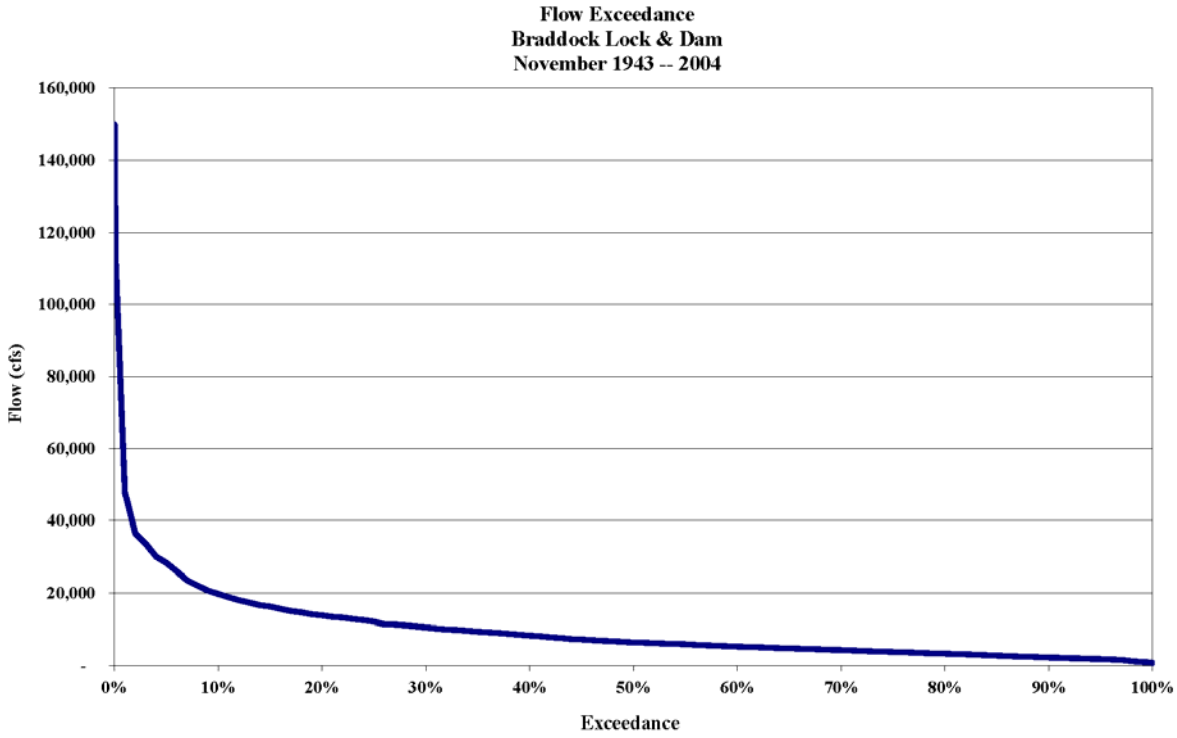


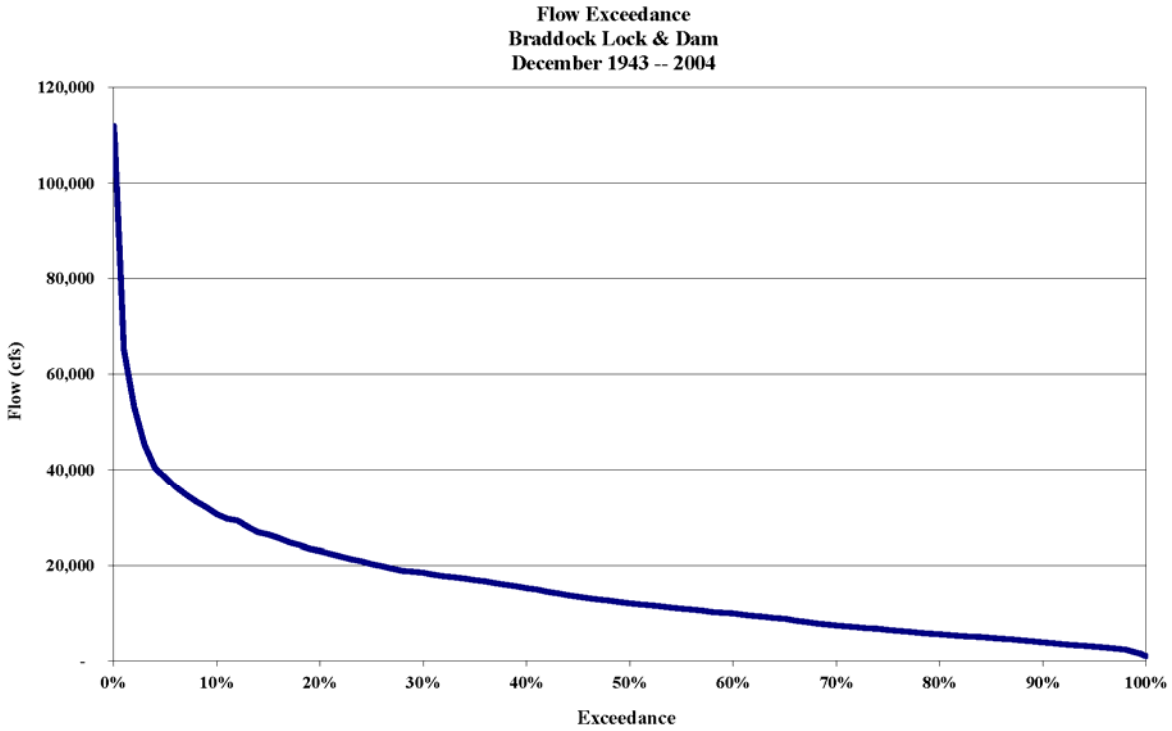








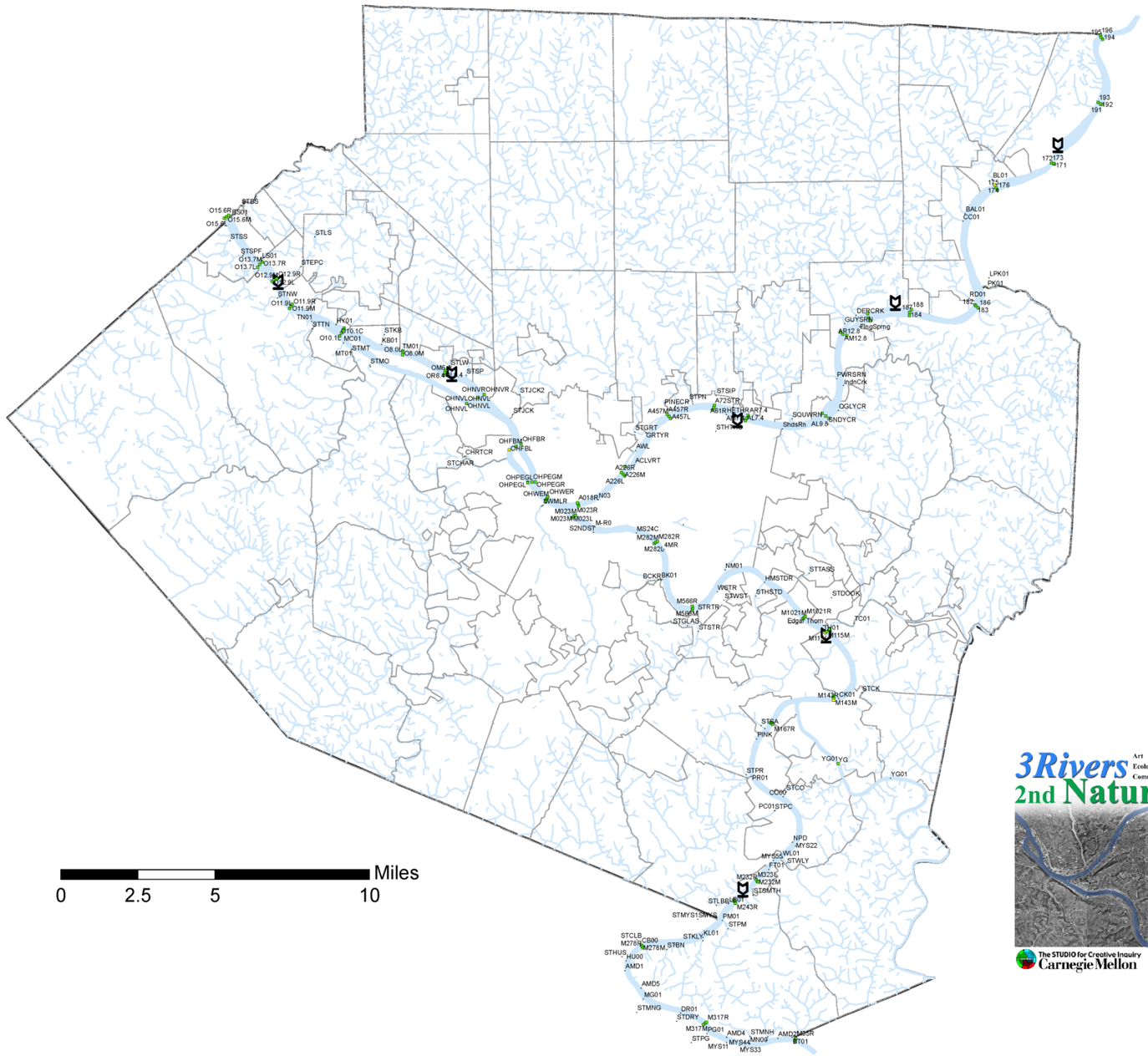




APPENDIX E

WATER QUALITY DATA COLLECTED BY 3 RIVERS 2nd NATURE

WATER QUALITY SITE SAMPLING MAP



Dry Weather Sites
Ecoli Geometric Mean

Legend

Streams

- Good (<200)
- Fair (200 - 1,000)
- Poor (1,000 - 10,000)

River

- Good (<200)
- Fair (200 - 1,000)
- Poor (1,000 - 10,000)
- Lock and Dam
- Hydrology
- Municipal Boundaries

Corresponding Water Quality Site Data

Data tables were created using the 3 Rivers 2nd Nature Water Quality Access Database located at http://3r2n.collinsandgoto.com/databases/index.htm. The Water Quality Data table was used in conjunction with the Site Descriptions table to create the following set of tables for only the Monongahela River.

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
BK01	BK01-1	Becks Run	Monongahela	Pgh Pool	6/21/2000	Dry	21.40	7.92	10.60	1850.00
FM01	FM01-1	Four Mile Run	Monongahela	Pgh Pool	6/21/2000	Dry				
HM01	HM01-1	Homestead Run	Monongahela	Pgh Pool	6/21/2000	Dry	16.00	7.37	3.00	2000.00
M0.23L	M0.23L-1	MP 0.23 Left	Monongahela	Pgh Pool	6/21/2000	Dry	25.30	7.40		375.00
M0.23M	M0.23M-1	MP 0.23 Mid	Monongahela	Pgh Pool	6/21/2000	Dry	25.40	7.40	9.80	375.00
M0.23R	M0.23R-1	MP 0.23 Right	Monongahela	Pgh Pool	6/21/2000	Dry	25.40	7.41		340.00
M0.23R	M0.23R-1Dup	MP 0.23 Right	Monongahela	Pgh Pool	6/21/2000	Dry	25.40	7.41		340.00
M10.21L	M10.21L-1	MP 10.21 Left	Monongahela	Pgh Pool	6/21/2000	Dry	25.00	7.31	8.00	320.00
M10.21M	M10.21M-1	MP 10.21 Mid	Monongahela	Pgh Pool	6/21/2000	Dry	25.60	7.15	7.83	330.00
M10.21R	M10.21R-1	MP 10.21 Right	Monongahela	Pgh Pool	6/21/2000	Dry	25.70	7.19	7.67	340.00
M5.66L	M5.66L-1	MP 5.66 Left	Monongahela	Pgh Pool	6/21/2000	Dry	24.90	7.36	8.50	820.00
M5.66M	M5.66M-1	MP 5.66 Mid	Monongahela	Pgh Pool	6/21/2000	Dry	25.00	7.37	8.80	820.00
M5.66R	M5.66R-1	MP 5.66 Right	Monongahela	Pgh Pool	6/21/2000	Dry	25.30	7.35	8.80	825.00
MFML	MFML-1	Mon @ 4 Mile Run Left	Monongahela	Pgh Pool	6/21/2000	Dry	25.30	7.35	9.00	620.00
MFMM	MFMM-1	Mon @ 4 Mile Run Mid	Monongahela	Pgh Pool	6/21/2000	Dry	25.20	7.38	9.10	610.00
MFMR	MFMR-1	Mon @ 4 Mile Run Right	Monongahela	Pgh Pool	6/21/2000	Dry	26.80	7.35	8.80	370.00
ST01	ST01-1	Streets Run	Monongahela	Pgh Pool	6/21/2000	Dry	20.40	7.72	8.90	3000.00
WT01	WT01-1	West Run	Monongahela	Pgh Pool	6/21/2000	Dry	19.30	7.54	10.00	2000.00
M0.23L	M0.23L-W1	MP 0.23 Left	Monongahela	Pgh Pool	6/26/2000	Wet	25.40	7.23	6.90	300.00
M0.23M	M0.23M-W1	MP 0.23 Mid	Monongahela	Pgh Pool	6/26/2000	Wet	25.40	7.23	6.78	300.00
M0.23R	M0.23R-W1	MP 0.23 Right	Monongahela	Pgh Pool	6/26/2000	Wet	25.70	7.21	6.76	280.00
M2.82L	M2.82L-W1	MP 2.82 Left	Monongahela	Pgh Pool	6/26/2000	Wet	25.30	7.20	6.75	340.00
M2.82M	M2.82M-W1	MP 2.82 Right	Monongahela	Pgh Pool	6/26/2000	Wet	25.30	7.22	6.75	400.00
M2.82R	M2.82R-W1	MP 2.82 Mid	Monongahela	Pgh Pool	6/26/2000	Wet	25.10	7.22	6.68	440.00
M0.23L	M0.23L-W2	MP 0.23 Left	Monongahela	Pgh Pool	7/5/2000	Wet	25.80	7.25		380.00
M0.23M	M0.23M-W2	MP 0.23 Mid	Monongahela	Pgh Pool	7/5/2000	Wet	25.30	7.31		380.00
M0.23R	M0.23R-W2	MP 0.23 Right	Monongahela	Pgh Pool	7/5/2000	Wet	25.30	7.26		380.00
M2.82L	M2.82L-W2	MP 2.82 Left	Monongahela	Pgh Pool	7/5/2000	Wet	25.40	7.17		390.00
M2.82M	M2.82M-W2	MP 2.82 Right	Monongahela	Pgh Pool	7/5/2000	Wet	25.50	7.29		390.00
M2.82R	M2.82R-W2	MP 2.82 Mid	Monongahela	Pgh Pool	7/5/2000	Wet	25.20	7.32		390.00
M0.23L	M0.23L-W3	MP 0.23 Left	Monongahela	Pgh Pool	7/12/2000	Wet	27.30	7.16	7.49	400.00
M0.23M	M0.23M-W3	MP 0.23 Mid	Monongahela	Pgh Pool	7/12/2000	Wet	27.00	7.13	7.73	390.00
M0.23R	M0.23R-W3	MP 0.23 Right	Monongahela	Pgh Pool	7/12/2000	Wet	27.10	7.16	7.68	400.00
M2.82L	M2.82L-W3	MP 2.82 Left	Monongahela	Pgh Pool	7/12/2000	Wet	26.50	7.15	7.94	360.00
M2.82M	M2.82M-W3	MP 2.82 Right	Monongahela	Pgh Pool	7/12/2000	Wet	26.30	7.18	8.21	360.00

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M2.82R	M2.82R-W3	MP 2.82 Mid	Monongahela	Pgh Pool	7/12/2000	Wet	27.40	6.98	7.76	380.00
BK01	BK01-2	Becks Run	Monongahela	Pgh Pool	7/20/2000	Dry	19.10	8.07	9.10	1150.00
FM01	FM01-2	Four Mile Run	Monongahela	Pgh Pool	7/20/2000	Dry	24.00	7.37	5.85	500.00
HM01	HM01-2	Homestead Run	Monongahela	Pgh Pool	7/20/2000	Dry	17.50	7.39	2.36	1000.00
M0.23L	M0.23L-2	MP 0.23 Left	Monongahela	Pgh Pool	7/20/2000	Dry	25.00	7.44	7.14	580.00
M0.23L	M0.23L-2Dup	MP 0.23 Left	Monongahela	Pgh Pool	7/20/2000	Dry	25.00	7.44	7.14	580.00
M0.23M	M0.23M-2	MP 0.23 Mid	Monongahela	Pgh Pool	7/20/2000	Dry	24.90	7.45	7.37	600.00
M0.23R	M0.23R-2	MP 0.23 Right	Monongahela	Pgh Pool	7/20/2000	Dry	24.90	7.49	7.24	500.00
M10.21L	M10.21L-2	MP 10.21 Left	Monongahela	Pgh Pool	7/20/2000	Dry	23.70	7.28	7.19	380.00
M10.21M	M10.21M-2	MP 10.21 Mid	Monongahela	Pgh Pool	7/20/2000	Dry	23.50	7.34	7.85	380.00
M10.21R	M10.21R-2	MP 10.21 Right	Monongahela	Pgh Pool	7/20/2000	Dry	24.70	7.33	7.63	380.00
M2.82L	M2.82L-2	MP 2.82 Left	Monongahela	Pgh Pool	7/20/2000	Dry	25.20	7.52	7.72	500.00
M2.82M	M2.82M-2	MP 2.82 Right	Monongahela	Pgh Pool	7/20/2000	Dry	24.90	7.49	7.51	450.00
M2.82R	M2.82R-2	MP 2.82 Mid	Monongahela	Pgh Pool	7/20/2000	Dry	24.90	7.46	7.42	480.00
M5.66L	M5.66L-2	MP 5.66 Left	Monongahela	Pgh Pool	7/20/2000	Dry	24.70	7.47	7.27	250.00
M5.66M	M5.66M-2	MP 5.66 Mid	Monongahela	Pgh Pool	7/20/2000	Dry	24.90	7.43	7.28	250.00
M5.66R	M5.66R-2	MP 5.66 Right	Monongahela	Pgh Pool	7/20/2000	Dry	24.80	7.40	7.28	220.00
NM01	NM01-1	Nine Mile Run	Monongahela	Pgh Pool	7/20/2000	Dry	18.40	9.95	6.49	1200.00
ST01	ST01-2	Streets Run	Monongahela	Pgh Pool	7/20/2000	Dry	16.30	7.85	8.20	900.00
WT01	WT01-2	West Run	Monongahela	Pgh Pool	7/20/2000	Dry	17.90	7.75	6.86	720.00
M0.23L	M0.23L-W4	MP 0.23 Left	Monongahela	Pgh Pool	7/31/2000	Wet	25.80	7.29	6.28	240.00
M0.23M	M0.23M-W4	MP 0.23 Mid	Monongahela	Pgh Pool	7/31/2000	Wet	25.30	7.23	6.34	240.00
M0.23R	M0.23R-W4	MP 0.23 Right	Monongahela	Pgh Pool	7/31/2000	Wet	25.80	7.17	6.30	240.00
M2.82L	M2.82L-W4	MP 2.82 Left	Monongahela	Pgh Pool	7/31/2000	Wet	26.20	7.38	7.23	310.00
M2.82M	M2.82M-W4	MP 2.82 Right	Monongahela	Pgh Pool	7/31/2000	Wet	26.20	7.36	6.97	310.00
M2.82R	M2.82R-W4	MP 2.82 Mid	Monongahela	Pgh Pool	7/31/2000	Wet	26.30	7.41	7.02	310.00
M0.23L	M0.23L-W5	MP 0.23 Left	Monongahela	Pgh Pool	8/7/2000	Wet	21.50	7.33	6.73	220.00
M0.23M	M0.23M-W5	MP 0.23 Mid	Monongahela	Pgh Pool	8/7/2000	Wet	21.50	7.26	6.83	210.00
M0.23R	M0.23R-W5	MP 0.23 Right	Monongahela	Pgh Pool	8/7/2000	Wet	22.60	7.05	6.62	210.00
M2.82L	M2.82L-W5	MP 2.82 Left	Monongahela	Pgh Pool	8/7/2000	Wet	21.60	7.25	6.92	210.00
M2.82M	M2.82M-W5	MP 2.82 Right	Monongahela	Pgh Pool	8/7/2000	Wet	22.00	6.84	8.27	200.00
M2.82R	M2.82R-W5	MP 2.82 Mid	Monongahela	Pgh Pool	8/7/2000	Wet	21.60	7.32	6.83	220.00
M0.23L	M0.23L-W6	MP 0.23 Left	Monongahela	Pgh Pool	8/8/2000	Wet	21.10	7.23	7.55	
M0.23M	M0.23M-W6	MP 0.23 Mid	Monongahela	Pgh Pool	8/8/2000	Wet	21.10	7.20	7.71	
M0.23R	M0.23R-W6	MP 0.23 Right	Monongahela	Pgh Pool	8/8/2000	Wet	21.30	7.03	7.50	
M2.82L	M2.82L-W6	MP 2.82 Left	Monongahela	Pgh Pool	8/8/2000	Wet	20.90	7.16	7.91	
M2.82M	M2.82M-W6	MP 2.82 Right	Monongahela	Pgh Pool	8/8/2000	Wet	21.00	7.24	7.92	
M2.82R	M2.82R-W6	MP 2.82 Mid	Monongahela	Pgh Pool	8/8/2000	Wet	21.00	7.24	7.68	

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
BK01	BK01-3	Becks Run	Monongahela	Pgh Pool	9/20/2000	Dry	19.80	7.75	8.83	865.00
Edgar Thompson	Edgar Thompson-1	Outfall at ET Plant	Monongahela	Pgh Pool	9/20/2000	Dry				
FM01	FM01-3	Four Mile Run	Monongahela	Pgh Pool	9/20/2000	Dry	21.80	7.29	5.78	371.00
HM01	HM01-3	Homestead Run	Monongahela	Pgh Pool	9/20/2000	Dry	15.80	7.35	0.10	865.00
M0.23L	M0.23L-3	MP 0.23 Left	Monongahela	Pgh Pool	9/20/2000	Dry	21.80	7.58	8.05	337.00
M0.23M	M0.23M-3	MP 0.23 Mid	Monongahela	Pgh Pool	9/20/2000	Dry	22.00	7.53	7.95	332.00
M0.23R	M0.23R-3	MP 0.23 Right	Monongahela	Pgh Pool	9/20/2000	Dry	23.70	7.64	8.04	330.00
M10.21L	M10.21L-3	MP 10.21 Left	Monongahela	Pgh Pool	9/20/2000	Dry	21.30	7.07	8.08	354.00
M10.21M	M10.21M-3	MP 10.21 Mid	Monongahela	Pgh Pool	9/20/2000	Dry	21.90	7.37	7.97	357.00
M10.21R	M10.21R-3	MP 10.21 Right	Monongahela	Pgh Pool	9/20/2000	Dry	21.50	7.40	8.02	360.00
M2.82L	M2.82L-3	MP 2.82 Left	Monongahela	Pgh Pool	9/20/2000	Dry	22.60	7.54	8.11	353.00
M2.82M	M2.82M-3	MP 2.82 Right	Monongahela	Pgh Pool	9/20/2000	Dry	22.70	7.56	7.97	355.00
M2.82R	M2.82R-3	MP 2.82 Mid	Monongahela	Pgh Pool	9/20/2000	Dry	22.70	7.53	8.28	352.00
M5.66L	M5.66L-3	MP 5.66 Left	Monongahela	Pgh Pool	9/20/2000	Dry	21.00	7.48	7.65	345.00
M5.66M	M5.66M-3	MP 5.66 Mid	Monongahela	Pgh Pool	9/20/2000	Dry	22.40	7.49	7.98	345.00
M5.66R	M5.66R-3	MP 5.66 Right	Monongahela	Pgh Pool	9/20/2000	Dry	22.70	7.49	7.95	338.00
NM01	NM01-2	Nine Mile Run	Monongahela	Pgh Pool	9/20/2000	Dry	17.60	10.17	6.07	1375.00
ST01	ST01-3	Streets Run	Monongahela	Pgh Pool	9/20/2000	Dry	18.00	7.23	4.31	1423.00
WT01	WT01-3	West Run	Monongahela	Pgh Pool	9/20/2000	Dry	18.70	7.68	4.46	957.00
M0.23L	M0.23L-W7	MP 0.23 Left	Monongahela	Pgh Pool	9/25/2000	Wet	20.50	7.40	7.19	372.00
M0.23M	M0.23M-W7	MP 0.23 Mid	Monongahela	Pgh Pool	9/25/2000	Wet	20.80	7.29	7.45	367.00
M0.23R	M0.23R-W7	MP 0.23 Right	Monongahela	Pgh Pool	9/25/2000	Wet	20.90	7.39	7.27	368.00
M2.82L	M2.82L-W7	MP 2.82 Left	Monongahela	Pgh Pool	9/25/2000	Wet	20.50	7.34	7.26	370.00
M2.82M	M2.82M-W7	MP 2.82 Right	Monongahela	Pgh Pool	9/25/2000	Wet	20.70	7.34	7.25	371.00
M2.82R	M2.82R-W7	MP 2.82 Mid	Monongahela	Pgh Pool	9/25/2000	Wet	20.70	7.34	7.34	371.00
M0.23L	M0.23L-W8	MP 0.23 Left	Monongahela	Pgh Pool	9/26/2000	Wet	19.10	7.38	7.38	361.00
M2.82M	M0.23M-W8	MP 2.82 Right	Monongahela	Pgh Pool	9/26/2000	Wet	17.20	7.33	7.38	365.00
M0.23R	M0.23R-W8	MP 0.23 Right	Monongahela	Pgh Pool	9/26/2000	Wet	19.80	7.40	7.18	357.00
M2.82L	M2.82L-W8	MP 2.82 Left	Monongahela	Pgh Pool	9/26/2000	Wet	20.80	7.35	7.48	367.00
M2.82M	M2.82M-W8	MP 2.82 Right	Monongahela	Pgh Pool	9/26/2000	Wet	20.40	7.34	7.36	352.00
M2.82R	M2.82R-W8	MP 2.82 Mid	Monongahela	Pgh Pool	9/26/2000	Wet	20.10	7.34	7.47	364.00
M0.23L	M0.23L-W9	MP 0.23 Left	Monongahela	Pgh Pool	9/27/2000	Wet	16.70	7.29	8.60	379.00
M0.23M	M0.23M-W9	MP 0.23 Mid	Monongahela	Pgh Pool	9/27/2000	Wet	17.40	7.26	8.74	352.00
M0.23R	M0.23R-W9	MP 0.23 Right	Monongahela	Pgh Pool	9/27/2000	Wet	16.70	7.19	8.51	375.00
M2.82L	M2.82L-W9	MP 2.82 Left	Monongahela	Pgh Pool	9/27/2000	Wet	15.00	7.46	8.66	368.00
M2.82M	M2.82M-W9	MP 2.82 Right	Monongahela	Pgh Pool	9/27/2000	Wet	16.50	7.34	8.47	365.00
M2.82R	M2.82R-W9	MP 2.82 Mid	Monongahela	Pgh Pool	9/27/2000	Wet	17.80	7.26	8.70	351.00

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M0.23L	M0.23L-W10	MP 0.23 Left	Monongahela	Pgh Pool	9/28/2000	Wet	17.80	7.36	8.68	384.00
M0.23M	M0.23M-W10	MP 0.23 Mid	Monongahela	Pgh Pool	9/28/2000	Wet	18.00	7.32	8.93	379.00
M0.23R	M0.23R-W10	MP 0.23 Right	Monongahela	Pgh Pool	9/28/2000	Wet	17.40	7.30	8.66	396.00
M2.82L	M2.82L-W10	MP 2.82 Left	Monongahela	Pgh Pool	9/28/2000	Wet	17.00	7.30	8.92	379.00
M2.82M	M2.82M-W10	MP 2.82 Right	Monongahela	Pgh Pool	9/28/2000	Wet	17.90	7.31	8.96	737.00
M2.82R	M2.82R-W10	MP 2.82 Mid	Monongahela	Pgh Pool	9/28/2000	Wet	18.50	7.31	8.68	381.00
BK01	BK01-4	Becks Run	Monongahela	Pgh Pool	10/4/2000	Dry	18.70	7.94	9.49	860.00
Edgar Thompson	Edgar Thompson-2	Outfall at ET Plant	Monongahela	Pgh Pool	10/4/2000	Dry				
FM01	FM01-4	Four Mile Run	Monongahela	Pgh Pool	10/4/2000	Dry	19.30	7.18	5.09	432.00
M0.23L	M0.23L-4	MP 0.23 Left	Monongahela	Pgh Pool	10/4/2000	Dry	19.60	7.41	8.57	383.00
M0.23M	M0.23M-4	MP 0.23 Mid	Monongahela	Pgh Pool	10/4/2000	Dry	19.60	7.40	8.70	382.00
M0.23R	M0.23R-4	MP 0.23 Right	Monongahela	Pgh Pool	10/4/2000	Dry	20.60	7.36	8.29	363.00
M10.21L	M10.21L-4	MP 10.21 Left	Monongahela	Pgh Pool	10/4/2000	Dry	18.30	7.26	8.86	395.00
M10.21M	M10.21M-4	MP 10.21 Mid	Monongahela	Pgh Pool	10/4/2000	Dry	18.40	7.31	9.07	389.00
M10.21R	M10.21R-4	MP 10.21 Right	Monongahela	Pgh Pool	10/4/2000	Dry	18.70	7.34	8.81	394.00
M2.82L	M2.82L-4	MP 2.82 Left	Monongahela	Pgh Pool	10/4/2000	Dry	19.30	7.39	8.32	398.00
M2.82M	M2.82M-4	MP 2.82 Right	Monongahela	Pgh Pool	10/4/2000	Dry	19.20	7.40	8.62	401.00
M2.82R	M2.82R-4	MP 2.82 Mid	Monongahela	Pgh Pool	10/4/2000	Dry	19.40	7.31	8.52	395.00
M5.66L	M5.66L-4	MP 5.66 Left	Monongahela	Pgh Pool	10/4/2000	Dry	18.90	7.47	8.48	399.00
M5.66M	M5.66M-4	MP 5.66 Mid	Monongahela	Pgh Pool	10/4/2000	Dry	18.80	7.44	8.97	398.00
M5.66R	M5.66R-4	MP 5.66 Right	Monongahela	Pgh Pool	10/4/2000	Dry	19.10	7.41	8.83	402.00
NM01	NM01-3	Nine Mile Run	Monongahela	Pgh Pool	10/4/2000	Dry	18.40	9.95	6.16	1322.00
ST01	ST01-4	Streets Run	Monongahela	Pgh Pool	10/4/2000	Dry	17.10	7.35	3.07	1314.00
WT01	WT01-4	West Run	Monongahela	Pgh Pool	10/4/2000	Dry	18.30	7.66	5.54	1045.00
CK01	CK01-1	Crooked Run	Monongahela	Pool 2	5/16/2001	Dry	15.00	7.37	3.81	984.00
CO01/MY02	CO01/MY02-1	Coursin Run	Monongahela	Pool 2	5/16/2001	Dry	11.60	8.08	9.40	726.00
FT01	FT01-1	Fallen Timber Run	Monongahela	Pool 2	5/16/2001	Dry	10.60	8.08	8.55	1207.00
M11.5L	M11.5L-1	MP 11.5 Left	Monongahela	Pool 2	5/16/2001	Dry	19.00	7.61	6.83	500.00
M11.5M	M11.5M-1	MP 11.5 Mid	Monongahela	Pool 2	5/16/2001	Dry	19.00	7.60	6.89	499.00
M11.5R	M11.5R-1	MP 11.5 Right	Monongahela	Pool 2	5/16/2001	Dry	19.20	7.58	7.00	489.00
M14.3L	M14.3L-1	MP 14.3 Left	Monongahela	Pool 2	5/16/2001	Dry	19.80	7.63	6.84	487.00
M14.3M	M14.3M-1	MP 14.3 Mid	Monongahela	Pool 2	5/16/2001	Dry	19.40	7.59	6.95	495.00
M14.3R	M14.3R-1	MP 14.3 Right	Monongahela	Pool 2	5/16/2001	Dry	19.80	7.55	6.86	482.00
M16.7L	M16.7L-1	MP 16.7 Left	Monongahela	Pool 2	5/16/2001	Dry	21.10	7.43	6.02	489.00
M16.7M	M16.7M-1	MP 16.7 Mid	Monongahela	Pool 2	5/16/2001	Dry	21.90	7.45	5.89	479.00
M16.7R	M16.7R-1	MP 16.7 Right	Monongahela	Pool 2	5/16/2001	Dry	21.30	7.44	6.15	475.00

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M23.2L	M23.2L-1	MP 23.2 Left	Monongahela	Pool 2	5/16/2001	Dry	19.80	7.66	6.79	469.00
M23.2M	M23.2M-1	MP 23.2 Mid	Monongahela	Pool 2	5/16/2001	Dry	21.00	7.67	7.03	458.00
M23.2R	M23.2R-1	MP 23.2 Right	Monongahela	Pool 2	5/16/2001	Dry	20.90	7.66	7.08	458.00
MY05	MY05-1	Mystery Stream 5	Monongahela	Pool 2	5/16/2001	Dry	11.60	5.04	8.40	1122.00
MY06	MY06-1	Mystery Stream 6	Monongahela	Pool 2	5/16/2001	Dry	11.80	8.07	8.37	1999.00
PC01	PC01-1	Peters Creek	Monongahela	Pool 2	5/16/2001	Dry	14.20	7.60	11.10	
PR01	PR01-1	Pine Run	Monongahela	Pool 2	5/16/2001	Dry	12.40	7.43	8.40	1313.00
SA01	SA01-1	Sandy Creek	Monongahela	Pool 2	5/16/2001	Dry	12.30	7.89	8.17	1546.00
TC01	TC01-1	Turtle Creek	Monongahela	Pool 2	5/16/2001	Dry	12.70	7.26	6.20	1052.00
TH01	TH01-1	Stream across from TC	Monongahela	Pool 2	5/16/2001	Dry	13.00	7.72	7.90	1503.00
WL01	WL01-1	Wiley Run	Monongahela	Pool 2	5/16/2001	Dry	11.40	6.45	8.66	1394.00
YG01	YG01-1	Youghiogheny River	Monongahela	Pool 2	5/16/2001	Dry	15.70	7.51	7.57	458.00
CK01	CK01-2	Crooked Run	Monongahela	Pool 2	5/30/2001	Dry	13.50	7.25	6.74	579.00
CO01/MY02	CO01/MY02-2	Coursin Run	Monongahela	Pool 2	5/30/2001	Dry	13.10	7.97	11.55	735.00
FT01	FT01-2	Fallen Timber Run	Monongahela	Pool 2	5/30/2001	Dry	12.00	7.45	10.93	1328.00
M11.5L	M11.5L-2	MP 11.5 Left	Monongahela	Pool 2	5/30/2001	Dry	17.10	7.36	10.24	212.00
M11.5M	M11.5M-2	MP 11.5 Mid	Monongahela	Pool 2	5/30/2001	Dry	17.40	7.30	10.46	193.60
M11.5R	M11.5R-2	MP 11.5 Right	Monongahela	Pool 2	5/30/2001	Dry	15.90	7.27	10.57	202.00
M14.3L	M14.3L-2	MP 14.3 Left	Monongahela	Pool 2	5/30/2001	Dry	17.20	7.28	10.46	217.00
M14.3M	M14.3M-2	MP 14.3 Mid	Monongahela	Pool 2	5/30/2001	Dry	17.30	7.23	10.55	209.00
M14.3R	M14.3R-2	MP 14.3 Right	Monongahela	Pool 2	5/30/2001	Dry	17.70	7.08	10.44	198.60
M16.7L	M16.7L-2	MP 16.7 Left	Monongahela	Pool 2	5/30/2001	Dry	17.50	7.28	10.42	270.00
M16.7M	M16.7M-2	MP 16.7 Mid	Monongahela	Pool 2	5/30/2001	Dry	17.50	7.19	10.77	190.20
M16.7R	M16.7R-2	MP 16.7 Right	Monongahela	Pool 2	5/30/2001	Dry	16.80	6.94	10.30	178.20
M23.2L	M23.2L-2	MP 23.2 Left	Monongahela	Pool 2	5/30/2001	Dry	17.00	6.61	10.33	169.90
M23.2M	M23.2M-2	MP 23.2 Mid	Monongahela	Pool 2	5/30/2001	Dry	17.01	6.50	10.27	161.80
M23.2R	M23.2R-2	MP 23.2 Right	Monongahela	Pool 2	5/30/2001	Dry	16.70	6.34	10.05	174.00
MY05	MY05-2	Mystery Stream 5	Monongahela	Pool 2	5/30/2001	Dry	13.60	6.37	10.71	947.00
MY06	MY06-2	Mystery Stream 6	Monongahela	Pool 2	5/30/2001	Dry	12.90	7.98	10.75	2250.00
PC01	PC01-2	Peters Creek	Monongahela	Pool 2	5/30/2001	Dry	16.10	7.90	10.50	
PR01	PR01-2	Pine Run	Monongahela	Pool 2	5/30/2001	Dry	12.70	7.75	11.02	1245.00
SA01	SA01-2	Sandy Creek	Monongahela	Pool 2	5/30/2001	Dry	13.30	7.98	10.57	1437.00

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
TC01	TC01-2	Turtle Creek	Monongahela	Pool 2	5/30/2001	Dry	14.40	7.34	9.50	920.00
TH01	TH01-2	Stream across from TC	Monongahela	Pool 2	5/30/2001	Dry	13.10	7.58	11.58	1074.00
WL01	WL01-2	Wiley Run	Monongahela	Pool 2	5/30/2001	Dry	12.10	7.76	10.83	1124.00
YG01	YG01-2	Youghiogheny River	Monongahela	Pool 2	5/30/2001	Dry	14.80	6.99	9.10	282.00
BN01	BN01-1	Bunola Run	Monongahela	Pool 3	6/12/2001	Dry	15.38	7.42	9.06	867.60
BT01	BT01-1	Becketts Run	Monongahela	Pool 3	6/12/2001	Dry	15.05	7.95	9.14	818.40
DR01	DR01-1	Dry Run	Monongahela	Pool 3	6/12/2001	Dry	16.57	8.12	7.37	859.40
KL01	KL01-1	Kelly Run	Monongahela	Pool 3	6/12/2001	Dry	17.35	7.85	8.48	778.70
LB01	LB01-1	Lobbs Run	Monongahela	Pool 3	6/12/2001	Dry	17.70	7.52	4.64	1904.50
M27.8L	M27.8L-1	MP 27.8 Left	Monongahela	Pool 3	6/12/2001	Dry	19.58	7.21	8.25	200.20
M27.8M	M27.8M-1	MP 27.8 Mid	Monongahela	Pool 3	6/12/2001	Dry	19.43	7.33	8.30	192.50
M27.8R	M27.8R-1	MP 27.8 Right	Monongahela	Pool 3	6/12/2001	Dry	19.44	7.45	8.16	191.80
M35.0L	M35.0L-1	MP 35.0 Left	Monongahela	Pool 3	6/12/2001	Dry	18.90	7.67	8.97	192.40
M35.0M	M35.0M-1	MP 35.0 Mid	Monongahela	Pool 3	6/12/2001	Dry	18.93	7.22	8.85	192.00
M35.0R	M35.0R-1	MP 35.0 Right	Monongahela	Pool 3	6/12/2001	Dry	18.93	7.12	8.57	192.50
MG01	MG01-1	Mingo Creek	Monongahela	Pool 3	6/12/2001	Dry	16.26	8.06	9.19	854.30
PG01	PG01-1	Pigeon Run	Monongahela	Pool 3	6/12/2001	Dry	17.91	7.70	7.59	1537.00
PM01	PM01-1	Perry Mill Run	Monongahela	Pool 3	6/12/2001	Dry	16.99	8.02	9.33	1013.20
SF01	SF01-1	Sun Fish Run	Monongahela	Pool 3	6/12/2001	Dry	15.06	7.72	8.87	1302.00
BN01	BN01-2	Bunola Run	Monongahela	Pool 3	6/19/2001	Dry	16.35	7.31	8.31	979.30
BT01	BT01-2	Becketts Run	Monongahela	Pool 3	6/19/2001	Dry	15.16	8.08	9.45	820.40
DR01	DR01-2	Dry Run	Monongahela	Pool 3	6/19/2001	Dry	16.58	8.07	8.18	948.70
KL01	KL01-2	Kelly Run	Monongahela	Pool 3	6/19/2001	Dry	17.01	7.74	8.25	651.40
LB01	LB01-2	Lobbs Run	Monongahela	Pool 3	6/19/2001	Dry	17.68	7.51	6.22	2214.80
M27.8L	M27.8L-2	MP 27.8 Left	Monongahela	Pool 3	6/19/2001	Dry	24.08	7.46	7.98	247.80
M27.8M	M27.8M-2	MP 27.8 Mid	Monongahela	Pool 3	6/19/2001	Dry	23.99	7.47	8.06	239.70
M27.8R	M27.8R-2	MP 27.8 Right	Monongahela	Pool 3	6/19/2001	Dry	23.83	7.72	8.07	240.80
M35.0L	M35.0L-2	MP 35.0 Left	Monongahela	Pool 3	6/19/2001	Dry	22.90	7.43	7.19	246.30
M35.0M	M35.0M-2	MP 35.0 Mid	Monongahela	Pool 3	6/19/2001	Dry	22.90	7.43	7.77	246.30
M35.0R	M35.0R-2	MP 35.0 Right	Monongahela	Pool 3	6/19/2001	Dry	22.89	7.43	7.46	246.40
MG01	MG01-2	Mingo Creek	Monongahela	Pool 3	6/19/2001	Dry	16.84	7.93	7.89	1049.30
PG01	PG01-2	Pigeon Run	Monongahela	Pool 3	6/19/2001	Dry	18.48	7.74	7.43	2050.30
PM01	PM01-2	Perry Mill Run	Monongahela	Pool 3	6/19/2001	Dry	17.08	8.05	8.98	1068.70
SF01	SF01-2	Sun Fish Run	Monongahela	Pool 3	6/19/2001	Dry	15.00	7.85	9.39	1537.00
2TH01	2TH01-1	Thompson Run	Monongahela	Pool 2	6/27/2001	Dry	18.92	9.51	7.17	1198.80
CK01	CK01-3	Crooked Run	Monongahela	Pool 2	6/27/2001	Dry	18.22	7.17	0.59	826.40

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
CO01/MY02	CO01/MY02-3	Coursin Run	Monongahela	Pool 2	6/27/2001	Dry	17.13	7.90	7.03	747.50
FT01	FT01-3	Fallen Timber Run	Monongahela	Pool 2	6/27/2001	Dry	17.19	8.01	8.24	1104.60
M11.5L	M11.5L-3	MP 11.5 Left	Monongahela	Pool 2	6/27/2001	Dry	25.70	7.42	7.52	292.50
M11.5M	M11.5M-3	MP 11.5 Mid	Monongahela	Pool 2	6/27/2001	Dry	25.61	7.44	7.29	290.40
M11.5R	M11.5R-3	MP 11.5 Right	Monongahela	Pool 2	6/27/2001	Dry	26.12	7.57	7.22	289.30
M14.3L	M14.3L-3	MP 14.3 Left	Monongahela	Pool 2	6/27/2001	Dry	25.68	7.46	7.10	302.00
M14.3M	M14.3M-3	MP 14.3 Mid	Monongahela	Pool 2	6/27/2001	Dry	25.64	7.42	7.76	307.90
M14.3R	M14.3R-3	MP 14.3 Right	Monongahela	Pool 2	6/27/2001	Dry	25.85	7.43	7.44	304.90
M16.7L	M16.7L-3	MP 16.7 Left	Monongahela	Pool 2	6/27/2001	Dry	25.54	7.40	7.34	312.30
M16.7M	M16.7M-3	MP 16.7 Mid	Monongahela	Pool 2	6/27/2001	Dry	25.91	7.46	7.01	317.80
M16.7R	M16.7R-3	MP 16.7 Right	Monongahela	Pool 2	6/27/2001	Dry	25.69	7.57	6.74	316.80
M23.2L	M23.2L-3	MP 23.2 Left	Monongahela	Pool 2	6/27/2001	Dry	25.48	7.53	7.02	349.00
M23.2M	M23.2M-3	MP 23.2 Mid	Monongahela	Pool 2	6/27/2001	Dry	25.70	7.43	6.76	334.50
M23.2R	M23.2R-3	MP 23.2 Right	Monongahela	Pool 2	6/27/2001	Dry	25.64	7.34	6.84	328.40
PC01	PC01-3	Peters Creek	Monongahela	Pool 2	6/27/2001	Dry	23.20	8.00	10.00	12.00
PR01	PR01-3	Pine Run	Monongahela	Pool 2	6/27/2001	Dry	17.37	7.46	8.57	1177.10
SA01	SA01-3	Sandy Creek	Monongahela	Pool 2	6/27/2001	Dry	17.95	7.92	8.63	1315.00
STH01	STH01-1	Smiths Run	Monongahela	Pool 2	6/27/2001	Dry	14.53	7.16	8.16	676.60
TC01	TC01-3	Turtle Creek	Monongahela	Pool 2	6/27/2001	Dry	20.84	7.52	9.55	1029.40
WL01	WL01-3	Wiley Run	Monongahela	Pool 2	6/27/2001	Dry	17.88	7.43	7.93	1278.90
YG01	YG01-3	Youghiogheny River	Monongahela	Pool 2	6/27/2001	Dry	23.03	7.42	7.20	274.70
PC01	PC01-4	Peters Creek	Monongahela	Pool 2	7/17/2001	Dry	21.30	7.70	9.30	
YG01	YG01-4	Youghiogheny River	Monongahela	Pool 2	7/17/2001	Dry	22.65	7.73	7.54	282.50
M23.2R	M23.2R-4	MP 23.2 Right	Monongahela	Pool 2	7/17/2001	Dry	27.57	7.58	6.56	338.20
M23.2M	M23.2M-4	MP 23.2 Mid	Monongahela	Pool 2	7/17/2001	Dry	27.60	7.66	6.76	340.20
M23.2L	M23.2L-4	MP 23.2 Left	Monongahela	Pool 2	7/17/2001	Dry	27.61	7.63	6.69	340.90
FT01	FT01-4	Fallen Timber Run	Monongahela	Pool 2	7/17/2001	Dry	17.16	7.94	8.69	1133.10
WL01	WL01-4	Wiley Run	Monongahela	Pool 2	7/17/2001	Dry	17.45	7.64	7.88	1380.90
CO01/MY02	CO01/MY02-4	Coursin Run	Monongahela	Pool 2	7/17/2001	Dry	16.51	7.94	8.63	762.70
PR01	PR01-4	Pine Run	Monongahela	Pool 2	7/17/2001	Dry	17.22	7.70	8.95	1106.00
SA01	SA01-4	Sandy Creek	Monongahela	Pool 2	7/17/2001	Dry	16.61	7.60	8.53	1452.30
M16.7R	M16.7R-4	MP 16.7 Right	Monongahela	Pool 2	7/17/2001	Dry	26.54	7.78	8.08	373.30
M16.7M	M16.7M-4	MP 16.7 Mid	Monongahela	Pool 2	7/17/2001	Dry	26.56	7.73	7.32	372.60
M16.7L	M16.7L-4	MP 16.7 Left	Monongahela	Pool 2	7/17/2001	Dry	26.46	7.70	7.03	371.50
M14.3R	M14.3R-4	MP 14.3 Right	Monongahela	Pool 2	7/17/2001	Dry	25.60	7.68	7.68	345.70

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M14.3M	M14.3M-4	MP 14.3 Mid	Monongahela	Pool 2	7/17/2001	Dry	25.44	7.70	7.78	339.00
M14.3L	M14.3L-4	MP 14.3 Left	Monongahela	Pool 2	7/17/2001	Dry	25.37	7.66	7.78	338.30
CK01	CK01-4	Crooked Run	Monongahela	Pool 2	7/17/2001	Dry	19.05	7.34	1.14	789.40
2TH01	2TH01-2	Thompson Run	Monongahela	Pool 2	7/17/2001	Dry	18.49	9.34	7.30	1229.00
TC01	TC01-4	Turtle Creek	Monongahela	Pool 2	7/17/2001	Dry	19.83	8.11	10.21	1045.20
M11.5R	M11.5R-4	MP 11.5 Right	Monongahela	Pool 2	7/17/2001	Dry	24.94	7.90	8.36	310.30
M11.5M	M11.5M-4	MP 11.5 Mid	Monongahela	Pool 2	7/17/2001	Dry	24.92	7.78	7.72	314.20
M11.5L	M11.5L-4	MP 11.5 Left	Monongahela	Pool 2	7/17/2001	Dry	24.93	7.72	8.05	315.60
BN01	BN01-3	Bunola Run	Monongahela	Pool 3	7/24/2001	Dry	20.60	7.27	7.47	1048.00
BT01	BT01-3	Becketts Run	Monongahela	Pool 3	7/24/2001	Dry	21.39	6.34	9.62	
DR01	DR01-3	Dry Run	Monongahela	Pool 3	7/24/2001	Dry	22.14	7.11	7.90	983.00
KL01	KL01-3	Kelly Run	Monongahela	Pool 3	7/24/2001	Dry	22.42	7.31	8.23	1088.30
LB01	LB01-3	Lobbs Run	Monongahela	Pool 3	7/24/2001	Dry	22.62	8.14	7.61	2473.60
M27.8L	M27.8L-3	MP 27.8 Left	Monongahela	Pool 3	7/24/2001	Dry	27.39	7.32	6.41	285.20
M27.8M	M27.8M-3	MP 27.8 Mid	Monongahela	Pool 3	7/24/2001	Dry	26.21	7.48	8.41	290.10
M27.8R	M27.8R-3	MP 27.8 Right	Monongahela	Pool 3	7/24/2001	Dry	26.97	8.06	8.25	286.00
M35.0L	M35.0L-3	MP 35.0 Left	Monongahela	Pool 3	7/24/2001	Dry	25.69	7.53	7.71	256.10
M35.0M	M35.0M-3	MP 35.0 Mid	Monongahela	Pool 3	7/24/2001	Dry	25.01	7.37	7.63	259.80
M35.0R	M35.0R-3	MP 35.0 Right	Monongahela	Pool 3	7/24/2001	Dry	25.01	7.25	8.45	259.80
MG01	MG01-3	Mingo Creek	Monongahela	Pool 3	7/24/2001	Dry	21.46	7.80	8.04	1571.30
PG01	PG01-3	Pigeon Run	Monongahela	Pool 3	7/24/2001	Dry	21.66	7.77	7.19	3409.40
PM01	PM01-3	Perry Mill Run	Monongahela	Pool 3	7/24/2001	Dry	26.49	7.04	7.70	1.50
SF01	SF01-3	Sun Fish Run	Monongahela	Pool 3	7/24/2001	Dry	20.36	7.90	8.36	1828.30
M35.0R	M35.0R-4	MP 35.0 Right	Monongahela	Pool 3	7/31/2001	Dry	24.24	7.64	7.47	156.80
M35.0M	M35.0M-4	MP 35.0 Mid	Monongahela	Pool 3	7/31/2001	Dry	24.28	7.49	7.64	156.20
M35.0L	M35.0L-4	MP 35.0 Left	Monongahela	Pool 3	7/31/2001	Dry	24.21	7.46	7.25	156.50
BT01	BT01-4	Becketts Run	Monongahela	Pool 3	7/31/2001	Dry	23.75	7.48	7.28	212.00
SF01	SF01-4	Sun Fish Run	Monongahela	Pool 3	7/31/2001	Dry	16.06	7.66	8.73	1824.20
PG01	PG01-4	Pigeon Run	Monongahela	Pool 3	7/31/2001	Dry	23.39	7.59	5.97	332.80
DR01	DR01-4	Dry Run	Monongahela	Pool 3	7/31/2001	Dry	22.96	7.50	6.55	326.90
MG01	MG01-4	Mingo Creek	Monongahela	Pool 3	7/31/2001	Dry	23.54	7.63	7.18	283.90
M27.8R	M27.8R-4	MP 27.8 Right	Monongahela	Pool 3	7/31/2001	Dry	24.20	7.38	7.44	175.30
M27.8M	M27.8M-4	MP 27.8 Mid	Monongahela	Pool 3	7/31/2001	Dry	24.35	7.26	7.81	161.00
M27.8L	M27.8L-4	MP 27.8 Left	Monongahela	Pool 3	7/31/2001	Dry	24.65	7.22	7.70	174.40
BN01	BN01-4	Bunola Run	Monongahela	Pool 3	7/31/2001	Dry	23.84	7.32	6.59	207.20
KL01	KL01-4	Kelly Run	Monongahela	Pool 3	7/31/2001	Dry	24.33	7.25	6.53	188.00
PM01	PM01-4	Perry Mill Run	Monongahela	Pool 3	7/31/2001	Dry	24.19	7.30	6.92	204.00
LB01	LB01-4	Lobbs Run	Monongahela	Pool 3	7/31/2001	Dry	24.99	7.16	6.37	237.00

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
PC01	PC01-5	Peters Creek	Monongahela	Pool 2	8/7/2001	Dry	22.50	7.40	6.40	
YG01	YG01-5	Youghiogheny River	Monongahela	Pool 2	8/7/2001	Dry	24.77	8.07	6.24	221.80
M23.2R	M23.2R-5	MP 23.2 Right	Monongahela	Pool 2	8/7/2001	Dry	27.21	7.54	6.34	261.60
M23.2M	M23.2M-5	MP 23.2 Mid	Monongahela	Pool 2	8/7/2001	Dry	27.14	7.56	7.40	261.90
M23.2L	M23.2L-5	MP 23.2 Left	Monongahela	Pool 2	8/7/2001	Dry	27.19	7.48	6.91	263.20
FT01	FT01-5	Fallen Timber Run	Monongahela	Pool 2	8/7/2001	Dry	20.07	7.61	7.33	1251.40
WL01	WL01-5	Wiley Run	Monongahela	Pool 2	8/7/2001	Dry	19.83	7.64	4.23	1431.40
PR01	PR01-5	Pine Run	Monongahela	Pool 2	8/7/2001	Dry	19.62	7.40	8.43	1110.50
SA01	SA01-5	Sandy Creek	Monongahela	Pool 2	8/7/2001	Dry	19.73	7.61	7.48	1571.70
M16.7L	M16.7L-5	MP 16.7 Left	Monongahela	Pool 2	8/7/2001	Dry	26.80	7.74	7.00	289.20
M16.7M	M16.7M-5	MP 16.7 Mid	Monongahela	Pool 2	8/7/2001	Dry	26.75	7.54	7.42	290.50
M16.7R	M16.7R-5	MP 16.7 Right	Monongahela	Pool 2	8/7/2001	Dry	26.82	7.52	7.20	284.30
M11.5L	M11.5L-5	MP 11.5 Left	Monongahela	Pool 2	8/7/2001	Dry	25.93	7.21	7.08	267.00
M11.5M	M11.5M-5	MP 11.5 Mid	Monongahela	Pool 2	8/7/2001	Dry	26.09	7.29	7.43	266.00
M11.5R	M11.5R-5	MP 11.5 Right	Monongahela	Pool 2	8/7/2001	Dry	26.18	7.31	7.20	264.50
TC01	TC01-5	Turtle Creek	Monongahela	Pool 2	8/7/2001	Dry	22.16	7.19	5.42	1044.10
CK01	CK01-5	Crooked Run	Monongahela	Pool 2	8/7/2001	Dry	21.13	7.11	0.10	717.90
M14.3R	M14.3R-5	MP 14.3 Right	Monongahela	Pool 2	8/7/2001	Dry	26.41	7.55	7.21	283.80
M14.3M	M14.3M-5	MP 14.3 Mid	Monongahela	Pool 2	8/7/2001	Dry	26.45	7.47	7.15	288.00
M14.3L	M14.3L-5	MP 14.3 Left	Monongahela	Pool 2	8/7/2001	Dry	26.34	7.46	6.62	269.30
PC01	PC01-6	Peters Creek	Monongahela	Pool 2	8/15/2001	Dry	21.10	7.20	4.40	
YG01	YG01-6	Youghiogheny River	Monongahela	Pool 2	8/15/2001	Dry	22.14	7.95	6.76	213.00
M23.2R	M23.2R-6	MP 23.2 Right	Monongahela	Pool 2	8/15/2001	Dry	26.53	7.44	6.53	240.10
M23.2M	M23.2M-6	MP 23.2 Mid	Monongahela	Pool 2	8/15/2001	Dry	26.40	7.44	6.88	237.70
M23.2L	M23.2L-6	MP 23.2 Left	Monongahela	Pool 2	8/15/2001	Dry	26.34	7.46	6.21	238.90
FT01	FT01-6	Fallen Timber Run	Monongahela	Pool 2	8/15/2001	Dry	16.53	7.47	7.59	1221.90
WL01	WL01-6	Wiley Run	Monongahela	Pool 2	8/15/2001	Dry	19.25	7.60	3.82	1417.40
PR01	PR01-6	Pine Run	Monongahela	Pool 2	8/15/2001	Dry	17.30	7.67	8.64	1019.30
SA01	SA01-6	Sandy Creek	Monongahela	Pool 2	8/15/2001	Dry	17.25	7.53	8.50	1575.30
M16.7L	M16.7L-6	MP 16.7 Left	Monongahela	Pool 2	8/15/2001	Dry	26.80	7.83	6.58	274.10
M16.7M	M16.7M-6	MP 16.7 Mid	Monongahela	Pool 2	8/15/2001	Dry	26.77	7.71	6.24	273.00
M16.7R	M16.7R-6	MP 16.7 Right	Monongahela	Pool 2	8/15/2001	Dry	26.92	7.60	6.24	268.90
TC01	TC01-6	Turtle Creek	Monongahela	Pool 2	8/15/2001	Dry	21.56	7.11	4.70	1035.90
M11.5R	M11.5R-6	MP 11.5 Right	Monongahela	Pool 2	8/15/2001	Dry	26.16	7.39	6.91	239.70
M11.5M	M11.5M-6	MP 11.5 Mid	Monongahela	Pool 2	8/15/2001	Dry	26.03	7.35	7.14	241.60

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M11.5L	M11.5L-6	MP 11.5 Left	Monongahela	Pool 2	8/15/2001	Dry	26.02	7.38	6.49	243.80
CK01	CK01-6	Crooked Run	Monongahela	Pool 2	8/15/2001	Dry	20.67	7.30	0.18	650.30
M14.3R	M14.3R-6	MP 14.3 Right	Monongahela	Pool 2	8/15/2001	Dry	26.85	7.63	7.05	258.20
M14.3M	M14.3M-6	MP 14.3 Mid	Monongahela	Pool 2	8/15/2001	Dry	25.60	7.66	6.46	248.40
M14.3L	M14.3L-6	MP 14.3 Left	Monongahela	Pool 2	8/15/2001	Dry	26.85	7.52	6.67	253.90
M35.0L	M35.0L-W1	MP 35.0 Left	Monongahela	Pool 3	8/20/2001	Wet	25.37	8.37	7.19	208.10
M35.0M	M35.0M-W1	MP 35.0 Mid	Monongahela	Pool 3	8/20/2001	Wet	24.29	7.30	7.81	211.70
M35.0R	M35.0R-W1	MP 35.0 Right	Monongahela	Pool 3	8/20/2001	Wet	25.30	7.16	7.01	206.60
M27.8R	M27.8R-W1	MP 27.8 Right	Monongahela	Pool 3	8/20/2001	Wet	26.64	7.34	6.53	275.10
M27.8M	M27.8M-W1	MP 27.8 Mid	Monongahela	Pool 3	8/20/2001	Wet	26.57	7.33	6.77	274.80
M27.8L	M27.8L-W1	MP 27.8 Left	Monongahela	Pool 3	8/20/2001	Wet	26.21	7.17	6.20	825.20
M0.23R	M0.23R-W11	MP 0.23 Right	Monongahela	Pgh Pool	8/20/2001	Wet	25.98	7.60	6.39	259.90
M0.23M	M0.23M-W11	MP 0.23 Mid	Monongahela	Pgh Pool	8/20/2001	Wet	25.95	7.48	6.72	260.30
M0.23L	M0.23L-W11	MP 0.23 Left	Monongahela	Pgh Pool	8/20/2001	Wet	25.98	7.49	6.66	260.20
M0.23L	M0.23L-W12	MP 0.23 Left	Monongahela	Pgh Pool	8/21/2001	Wet	0.00	0.00		
M0.23M	M0.23M-W12	MP 0.23 Mid	Monongahela	Pgh Pool	8/21/2001	Wet	0.00	0.00		
M0.23R	M0.23R-W12	MP 0.23 Right	Monongahela	Pgh Pool	8/21/2001	Wet	0.00	0.00		
M35.0L	M35.0L-W2	MP 35.0 Left	Monongahela	Pool 3	8/21/2001	Wet	24.89	7.33	6.75	213.30
M35.0M	M35.0M-W2	MP 35.0 Mid	Monongahela	Pool 3	8/21/2001	Wet	24.88	7.25	6.54	213.80
M35.0R	M35.0R-W2	MP 35.0 Right	Monongahela	Pool 3	8/21/2001	Wet	24.88	7.22	6.82	212.80
M27.8R	M27.8R-W2	MP 27.8 Right	Monongahela	Pool 3	8/21/2001	Wet	25.76	7.20	5.70	258.70
M27.8M	M27.8M-W2	MP 27.8 Mid	Monongahela	Pool 3	8/21/2001	Wet	25.78	7.22	6.80	256.50
M27.8L	M27.8L-W2	MP 27.8 Left	Monongahela	Pool 3	8/21/2001	Wet	25.86	7.23	6.52	256.80
M0.23L	M0.23L-W13	MP 0.23 Left	Monongahela	Pgh Pool	8/22/2001	Wet	0.00	0.00		
M0.23M	M0.23M-W13	MP 0.23 Mid	Monongahela	Pgh Pool	8/22/2001	Wet	0.00	0.00		
M0.23R	M0.23R-W13	MP 0.23 Right	Monongahela	Pgh Pool	8/22/2001	Wet	0.00	0.00		
M35.0R	M35.0R-5	MP 35.0 Right	Monongahela	Pool 3	8/22/2001	Dry	24.87	7.46	6.45	215.50
M35.0M	M35.0M-5	MP 35.0 Mid	Monongahela	Pool 3	8/22/2001	Dry	24.93	7.43	6.61	216.40
M35.0L	M35.0L-5	MP 35.0 Left	Monongahela	Pool 3	8/22/2001	Dry	24.89	7.36	7.09	216.60
BT01	BT01-5	Becketts Run	Monongahela	Pool 3	8/22/2001	Dry	14.47	7.82	9.52	1168.50
SF01	SF01-5	Sun Fish Run	Monongahela	Pool 3	8/22/2001	Dry	14.21	7.84	9.24	2083.30
PG01	PG01-5	Pigeon Run	Monongahela	Pool 3	8/22/2001	Dry	17.66	7.70	7.08	4390.30
DR01	DR01-5	Dry Run	Monongahela	Pool 3	8/22/2001	Dry	17.33	7.51	6.89	1025.40
MG01	MG01-5	Mingo Creek	Monongahela	Pool 3	8/22/2001	Dry	17.30	7.76	7.32	1752.50
M27.8L	M27.8L-5	MP 27.8 Left	Monongahela	Pool 3	8/22/2001	Dry	27.48	7.86	6.33	308.20
M27.8M	M27.8M-5	MP 27.8 Mid	Monongahela	Pool 3	8/22/2001	Dry	27.51	7.63	5.73	306.60
M27.8R	M27.8R-5	MP 27.8 Right	Monongahela	Pool 3	8/22/2001	Dry	27.28	7.55	6.51	306.40
BN01	BN01-5	Bunola Run	Monongahela	Pool 3	8/22/2001	Dry	16.88	7.52	7.29	997.80

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
KL01	KL01-5	Kelly Run	Monongahela	Pool 3	8/22/2001	Dry	16.44	7.44	6.82	1149.60
PM01	PM01-5	Perry Mill Run	Monongahela	Pool 3	8/22/2001	Dry	17.82	8.06	8.66	1397.30
LB01	LB01-5	Lobbs Run	Monongahela	Pool 3	8/22/2001	Dry	17.51	7.85	6.19	5609.80
M14.3L	M14.3L-W1	MP 14.3 Left	Monongahela	Pool 2	8/29/2001	Wet	26.62	7.68	5.91	302.10
M14.3M	M14.3M	MP 14.3 Mid	Monongahela	Pool 2	8/29/2001	Wet	26.85	7.54	6.12	314.50
M14.3R	M14.3R-W1	MP 14.3 Right	Monongahela	Pool 2	8/29/2001	Wet	26.62	7.47	5.58	304.40
M35.0L	M35.0L-W3	MP 35.0 Left	Monongahela	Pool 3	8/29/2001	Wet	25.19	7.44	6.51	327.70
M35.0M	M35.0M-W3	MP 35.0 Mid	Monongahela	Pool 3	8/29/2001	Wet	25.18	7.39	5.28	328.00
M35.0R	M35.0R-W3	MP 35.0 Right	Monongahela	Pool 3	8/29/2001	Wet	25.16	7.38	6.56	328.00
M27.8R	M27.8R-W3	MP 27.8 Right	Monongahela	Pool 3	8/29/2001	Wet	26.65	7.42	6.40	281.80
M27.8M	M27.8M-W3	MP 27.8 Mid	Monongahela	Pool 3	8/29/2001	Wet	26.27	7.39	6.27	285.90
M27.8L	M27.8L-W3	MP 27.8 Left	Monongahela	Pool 3	8/29/2001	Wet	26.32	7.37	5.94	292.90
M0.23L	M0.23L-W14	MP 0.23 Left	Monongahela	Pgh Pool	8/30/2001	Wet	0.00	0.00		
M0.23M	M0.23M-W14	MP 0.23 Mid	Monongahela	Pgh Pool	8/30/2001	Wet	0.00	0.00		
M35.0L	M35.0L-W4	MP 35.0 Left	Monongahela	Pool 3	8/30/2001	Wet	25.18	7.86	6.99	339.10
M35.0M	M35.0M-W4	MP 35.0 Mid	Monongahela	Pool 3	8/30/2001	Wet	25.20	7.59	6.52	340.50
M35.0R	M35.0R-W4	MP 35.0 Right	Monongahela	Pool 3	8/30/2001	Wet	25.30	7.48	6.54	340.30
M27.8R	M27.8R-W4	MP 27.8 Right	Monongahela	Pool 3	8/30/2001	Wet	25.40	7.46	5.94	325.70
M27.8L	M27.8L-W4	MP 27.8 Left	Monongahela	Pool 3	8/30/2001	Wet	25.71	7.44	6.22	332.70
M27.8M	M27.8M-W4	MP 27.8 Mid	Monongahela	Pool 3	8/30/2001	Wet	25.65	7.38	6.03	333.20
M14.3L	M14.3L-W2	MP 14.3 Left	Monongahela	Pool 2	8/30/2001	Wet	27.05	7.32	5.25	328.90
M14.3M	M14.3M-W2	MP 14.3 Mid	Monongahela	Pool 2	8/30/2001	Wet	27.12	7.37	5.68	324.90
M14.3R	M14.3R-W2	MP 14.3 Right	Monongahela	Pool 2	8/30/2001	Wet	26.98	7.36	5.92	333.70
BN01	BN01-6	Bunola Run	Monongahela	Pool 3	9/5/2001	Dry	16.21	7.54	8.75	969.90
BT01	BT01-6	Becketts Run	Monongahela	Pool 3	9/5/2001	Dry	19.88	6.72	9.47	4.50
DR01	DR01-6	Dry Run	Monongahela	Pool 3	9/5/2001	Dry	24.52	7.68	6.68	434.70
KL01	KL01-6	Kelly Run	Monongahela	Pool 3	9/5/2001	Dry	16.33	7.38	9.09	1099.50
LB01	LB01-6	Lobbs Run	Monongahela	Pool 3	9/5/2001	Dry	16.34	7.74	6.70	5687.70
M27.8L	M27.8L-6	MP 27.8 Left	Monongahela	Pool 3	9/5/2001	Dry	25.06	7.58	7.04	495.50
M27.8M	M27.8M-6	MP 27.8 Mid	Monongahela	Pool 3	9/5/2001	Dry	25.07	7.64	6.31	494.40
M27.8R	M27.8R-6	MP 27.8 Right	Monongahela	Pool 3	9/5/2001	Dry	24.97	7.84	6.76	490.70
M35.0L	M35.0L-6	MP 35.0 Left	Monongahela	Pool 3	9/5/2001	Dry	24.79	7.52	6.89	379.90
M35.0M	M35.0M-6	MP 35.0 Mid	Monongahela	Pool 3	9/5/2001	Dry	24.90	7.43	6.90	383.70
M35.0R	M35.0R-6	MP 35.0 Right	Monongahela	Pool 3	9/5/2001	Dry	24.82	7.39	6.71	386.10
MG01	MG01-6	Mingo Creek	Monongahela	Pool 3	9/5/2001	Dry	16.71	7.90	6.36	1717.80
PG01	PG01-6	Pigeon Run	Monongahela	Pool 3	9/5/2001	Dry	16.76	7.89	6.91	3102.30
PM01	PM01-6	Perry Mill Run	Monongahela	Pool 3	9/5/2001	Dry	16.43	7.87	7.60	1374.70
SF01	SF01-6	Sun Fish Run	Monongahela	Pool 3	9/5/2001	Dry	14.37	8.02	9.21	2056.00

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M0.23R	M0.23R-W15	MP 0.23 Right	Monongahela	Pgh Pool	9/26/2001	Wet	21.25	7.85	8.57	356.00
M0.23M	M0.23M-W15	MP 0.23 Mid	Monongahela	Pgh Pool	9/26/2001	Wet	21.28	7.76	8.94	349.00
M0.23L	M0.23L-W15	MP 0.23 Left	Monongahela	Pgh Pool	9/26/2001	Wet	21.27	7.72	8.01	360.00
M14.3R	M14.3R-W3	MP 14.3 Right	Monongahela	Pool 2	9/26/2001	Wet	21.73	7.62	8.49	346.30
M14.3M	M14.3M-W3	MP 14.3 Mid	Monongahela	Pool 2	9/26/2001	Wet	22.14	7.59	9.41	349.60
M14.3L	M14.3L-W3	MP 14.3 Left	Monongahela	Pool 2	9/26/2001	Wet	21.33	7.61	9.61	340.30
M16.7L	M16.7L-W1	MP 16.7 Left	Monongahela	Pool 2	9/26/2001	Wet	22.11	7.60	9.28	360.20
M16.7M	M16.7M-W1	MP 16.7 Mid	Monongahela	Pool 2	9/26/2001	Wet	21.85	7.59	9.72	363.60
M16.7R	M16.7R-W1	MP 16.7 Right	Monongahela	Pool 2	9/26/2001	Wet	21.73	7.60	9.69	362.10
M27.8R	M27.8R-W5	MP 27.8 Right	Monongahela	Pool 3	9/26/2001	Wet	20.98	7.73	9.95	421.20
M27.8M	M27.8M-W5	MP 27.8 Mid	Monongahela	Pool 3	9/26/2001	Wet	20.98	7.63	10.06	421.20
M27.8L	M27.8L-W5	MP 27.8 Left	Monongahela	Pool 3	9/26/2001	Wet	20.98	7.62	9.95	425.20
M0.23L	M0.23L-W16	MP 0.23 Left	Monongahela	Pgh Pool	9/27/2001	Wet	20.80	7.08	8.22	406.00
M0.23M	M0.23M-W16	MP 0.23 Mid	Monongahela	Pgh Pool	9/27/2001	Wet	21.50	7.12	8.28	407.00
M0.23R	M0.23R-W16	MP 0.23 Right	Monongahela	Pgh Pool	9/27/2001	Wet	19.90	7.11	8.74	418.00
M27.8R	M27.8R-W6	MP 27.8 Right	Monongahela	Pool 3	9/27/2001	Wet	20.37	7.61	9.40	455.50
M27.8M	M27.8M-W6	MP 27.8 Mid	Monongahela	Pool 3	9/27/2001	Wet	20.37	7.62	10.05	459.30
M27.8L	M27.8L-W6	MP 27.8 Left	Monongahela	Pool 3	9/27/2001	Wet	20.45	7.60	9.89	460.50
M14.3R	M14.3R-W4	MP 14.3 Right	Monongahela	Pool 2	9/27/2001	Wet	19.48	7.51	10.25	368.40
M14.3M	M14.3M-W4	MP 14.3 Mid	Monongahela	Pool 2	9/27/2001	Wet	19.65	7.60	10.02	372.30
M14.3L	M14.3L-W4	MP 14.3 Left	Monongahela	Pool 2	9/27/2001	Wet	19.22	7.63	9.25	358.20
M16.7L	M16.7L-W2	MP 16.7 Left	Monongahela	Pool 2	9/27/2001	Wet	20.55	7.77	8.73	412.30
M16.7M	M16.7M-W2	MP 16.7 Mid	Monongahela	Pool 2	9/27/2001	Wet	20.53	7.71	9.73	414.60
M16.7R	M16.7R-W2	MP 16.7 Right	Monongahela	Pool 2	9/27/2001	Wet	20.49	7.68	8.53	416.40
M0.23L	M0.23L-W17	MP 0.23 Left	Monongahela	Pgh Pool	10/15/2001	Wet	0.00	0.00		
M0.23M	M0.23M-W17	MP 0.23 Mid	Monongahela	Pgh Pool	10/15/2001	Wet	0.00	0.00		
M0.23R	M0.23R-W17	MP 0.23 Right	Monongahela	Pgh Pool	10/15/2001	Wet	0.00	0.00		
M16.7L	M16.7L-W3	MP 16.7 Left	Monongahela	Pool 2	10/15/2001	Wet	20.07	8.16	9.74	442.90
M16.7M	M16.7M-W3	MP 16.7 Mid	Monongahela	Pool 2	10/15/2001	Wet	20.19	7.98	9.19	443.00
M16.7R	M16.7R-W3	MP 16.7 Right	Monongahela	Pool 2	10/15/2001	Wet	20.16	7.92	9.53	443.00
M14.3R	M14.3R-W5	MP 14.3 Right	Monongahela	Pool 2	10/15/2001	Wet	18.19	7.86	9.62	350.50
M14.3M	M14.3M-W5	MP 14.3 Mid	Monongahela	Pool 2	10/15/2001	Wet	18.08	7.88	9.73	338.00
M14.3L	M14.3L-W5	MP 14.3 Left	Monongahela	Pool 2	10/15/2001	Wet	18.05	7.84	9.59	338.20
M27.8R	M27.8R-W7	MP 27.8 Right	Monongahela	Pool 3	10/15/2001	Wet	17.69	7.93	10.21	458.30
M27.8M	M27.8M-W7	MP 27.8 Mid	Monongahela	Pool 3	10/15/2001	Wet	17.58	7.76	10.41	455.40
M27.8L	M27.8L-W7	MP 27.8 Left	Monongahela	Pool 3	10/15/2001	Wet	17.78	7.73	10.67	458.10
M0.23L	M0.23L-W18	MP 0.23 Left	Monongahela	Pgh Pool	10/16/2001	Wet	0.00	0.00		
M0.23M	M0.23M-W18	MP 0.23 Mid	Monongahela	Pgh Pool	10/16/2001	Wet	0.00	0.00		

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M0.23R	M0.23R-W18	MP 0.23 Right	Monongahela	Pgh Pool	10/16/2001	Wet	0.00	0.00		
M27.8R	M27.8R-W8	MP 27.8 Right	Monongahela	Pool 3	10/16/2001	Wet	18.30	7.78	9.65	451.80
M27.8M	M27.8M-W8	MP 27.8 Mid	Monongahela	Pool 3	10/16/2001	Wet	18.35	7.75	9.79	451.10
M27.8L	M27.8L-W8	MP 27.8 Left	Monongahela	Pool 3	10/16/2001	Wet	18.39	7.72	9.72	452.10
M14.3R	M14.3R-W6	MP 14.3 Right	Monongahela	Pool 2	10/16/2001	Wet	18.67	7.80	9.07	402.80
M14.3M	M14.3M-W6	MP 14.3 Mid	Monongahela	Pool 2	10/16/2001	Wet	18.27	7.76	9.48	370.50
M14.3L	M14.3L-W6	MP 14.3 Left	Monongahela	Pool 2	10/16/2001	Wet	18.50	7.72	9.30	398.60
M16.7L	M16.7L-W4	MP 16.7 Left	Monongahela	Pool 2	10/16/2001	Wet	19.97	7.74	8.96	448.20
M16.7M	M16.7M-W4	MP 16.7 Mid	Monongahela	Pool 2	10/16/2001	Wet	19.93	7.70	8.53	455.90
M16.7R	M16.7R-W4	MP 16.7 Right	Monongahela	Pool 2	10/16/2001	Wet	19.91	7.70	8.53	454.30
M0.23L	M0.23L-W19	MP 0.23 Left	Monongahela	Pgh Pool	10/17/2001	Wet	0.00	0.00		
M0.23M	M0.23M-W19	MP 0.23 Mid	Monongahela	Pgh Pool	10/17/2001	Wet	0.00	0.00		
M0.23R	M0.23R-W19	MP 0.23 Right	Monongahela	Pgh Pool	10/17/2001	Wet	0.00	0.00		
M14.3R	M14.3R-W7	MP 14.3 Right	Monongahela	Pool 2	10/17/2001	Wet	16.49	7.06	9.58	376.70
M14.3M	M14.3M-W7	MP 14.3 Mid	Monongahela	Pool 2	10/17/2001	Wet	16.54	7.35	10.63	376.60
M14.3L	M14.3L-W7	MP 14.3 Left	Monongahela	Pool 2	10/17/2001	Wet	16.05	7.45	10.47	378.90
M16.7L	M16.7L-W5	MP 16.7 Left	Monongahela	Pool 2	10/17/2001	Wet	18.02	7.54	9.81	440.00
M16.7R	M16.7R-W5	MP 16.7 Right	Monongahela	Pool 2	10/17/2001	Wet	17.97	7.57	10.15	442.30
M16.7M	M16.7M-W5	MP 16.7 Mid	Monongahela	Pool 2	10/17/2001	Wet	18.05	7.59	10.08	441.50
M0.23L	M0.23L-W20	MP 0.23 Left	Monongahela	Pgh Pool	10/18/2001	Wet	0.00	0.00		
M0.23M	M0.23M-W20	MP 0.23 Mid	Monongahela	Pgh Pool	10/18/2001	Wet	0.00	0.00		
M0.23R	M0.23R-W20	MP 0.23 Right	Monongahela	Pgh Pool	10/18/2001	Wet	0.00	0.00		
M14.3R	M14.3R-W8	MP 14.3 Right	Monongahela	Pool 2	10/18/2001	Wet	15.73	7.91	10.92	412.60
M14.3M	M14.3M-W8	MP 14.3 Mid	Monongahela	Pool 2	10/18/2001	Wet	15.83	7.77	10.55	414.70
M14.3L	M14.3L-W8	MP 14.3 Left	Monongahela	Pool 2	10/18/2001	Wet	15.26	7.76	10.79	388.50
M16.7L	M16.7L-W6	MP 16.7 Left	Monongahela	Pool 2	10/18/2001	Wet	17.58	7.68	9.75	480.70
M16.7M	M16.7M-W6	MP 16.7 Mid	Monongahela	Pool 2	10/18/2001	Wet	17.55	7.73	10.17	480.20
M16.7R	M16.7R-W6	MP 16.7 Right	Monongahela	Pool 2	10/18/2001	Wet	17.49	7.76	9.26	480.30
M27.8R	M27.8R-W9	MP 27.8 Right	Monongahela	Pool 3	10/18/2001	Wet	15.64	7.71	10.19	469.50
M27.8M	M27.8M-W9	MP 27.8 Mid	Monongahela	Pool 3	10/18/2001	Wet	15.77	7.70	10.70	470.10
M27.8L	M27.8L-W9	MP 27.8 Left	Monongahela	Pool 3	10/18/2001	Wet	15.78	7.72	10.70	469.90
M0.23L	M0.23L-W21	MP 0.23 Left	Monongahela	Pgh Pool	9/16/2002	Wet	24.69	7.93	6.58	541.00
M0.23M	M0.23M-W21	MP 0.23 Mid	Monongahela	Pgh Pool	9/16/2002	Wet	24.72	7.98	7.01	542.00
M0.23R	M0.23R-W21	MP 0.23 Right	Monongahela	Pgh Pool	9/16/2002	Wet	24.81	7.97	8.09	520.00
M0.23L	M0.23L-W22	MP 0.23 Left	Monongahela	Pgh Pool	9/17/2002	Wet	24.56	7.94		531.00
M0.23M	M0.23M-W22	MP 0.23 Mid	Monongahela	Pgh Pool	9/17/2002	Wet	24.66	7.98		530.00
M0.23R	M0.23R-W22	MP 0.23 Right	Monongahela	Pgh Pool	9/17/2002	Wet	21.74	7.58		
M0.23R	M0.23R-W23	MP 0.23 Right	Monongahela	Pgh Pool	9/18/2002	Wet	24.76	8.30	7.00	340.00

Site ID	Sample ID	Site Description	River System	Pool Number	Date	Weather Condition During Sampling	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (microsiemens [µS])
M0.23M	M0.23M-W23	MP 0.23 Mid	Monongahela	Pgh Pool	9/18/2002	Wet	24.43	8.25	7.70	505.00
M0.23L	M0.23L-W23	MP 0.23 Left	Monongahela	Pgh Pool	9/18/2002	Wet	24.48	8.31	8.00	504.00
M0.23L	M0.23L-W24	MP 0.23 Left	Monongahela	Pgh Pool	5/13/2003	Wet	0.00	0.00		
M0.23M	M0.23M-W24	MP 0.23 Mid	Monongahela	Pgh Pool	5/13/2003	Wet	0.00	0.00		
M0.23R	M0.23R-W24	MP 0.23 Right	Monongahela	Pgh Pool	5/13/2003	Wet	0.00	0.00		
M0.23L	M0.23L-W25	MP 0.23 Left	Monongahela	Pgh Pool	5/14/2003	Wet	0.00	0.00		
M0.23M	M0.23M-W25	MP 0.23 Mid	Monongahela	Pgh Pool	5/14/2003	Wet	0.00	0.00		
M0.23R	M0.23R-W25	MP 0.23 Right	Monongahela	Pgh Pool	5/14/2003	Wet	0.00	0.00		
M0.23L	M0.23L-W26	MP 0.23 Left	Monongahela	Pgh Pool	6/4/2003	Wet	0.00	0.00		
M0.23M	M0.23M-W26	MP 0.23 Mid	Monongahela	Pgh Pool	6/4/2003	Wet	0.00	0.00		
M0.23R	M0.23R-W26	MP 0.23 Right	Monongahela	Pgh Pool	6/4/2003	Wet	0.00	0.00		
M0.23R	M0.23R-W27	MP 0.23 Right	Monongahela	Pgh Pool	6/23/2003	Wet	18.83	6.62	9.28	
M0.23M	M0.23M-W27	MP 0.23 Mid	Monongahela	Pgh Pool	6/23/2003	Wet	19.30	7.31	8.33	256.00
M0.23L	M0.23L-W27	MP 0.23 Left	Monongahela	Pgh Pool	6/23/2003	Wet	19.39	7.31	8.20	265.00
M0.23R	M0.23R-W28	MP 0.23 Right	Monongahela	Pgh Pool	6/24/2003	Wet	19.48	7.22	8.07	238.00
M0.23M	M0.23M-W28	MP 0.23 Mid	Monongahela	Pgh Pool	6/24/2003	Wet	19.52	7.20	8.41	232.00
M0.23L	M0.23L-W28	MP 0.23 Left	Monongahela	Pgh Pool	6/24/2003	Wet	19.44	7.18	8.50	234.00
M0.23R	M0.23R-W29	MP 0.23 Right	Monongahela	Pgh Pool	6/25/2003	Wet	21.31	7.30	7.85	254.00
M0.23M	M0.23M-W29	MP 0.23 Mid	Monongahela	Pgh Pool	6/25/2003	Wet	20.89	7.26	7.93	250.00
M0.23L	M0.23L-W29	MP 0.23 Left	Monongahela	Pgh Pool	6/25/2003	Wet	21.16	7.24	8.01	252.00

APPENDIX F

WATER QUALITY DATA: SITE-SPECIFIC EXCERPT OF TDS, CHLORIDE, SULFATE, AND BROMIDE SAMPLING RESULTS FROM THE MONONGAHELA WATERWAY AS OF 6/22/2011 (PADEP 2011)

SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
24	Mon River RMI 24 Elizabeth Lock & Dam	40°15' 43.9"	79°54' 04.5"	0592-407	7/29/2010	24467						
				0202-091	8/3/2010	24795						
				0592-412	8/12/2010	25959						
				0592-414	8/19/2010	26783						
				0592-418	8/26/2010	27485						
				0592-420	9/2/2010	28148						
				0592-425	9/9/2010	28635						
				0592-427	9/16/2010	29320						
				0592-431	9/22/2010	29795						
				0592-433	9/29/2010	30337						
				0592-435	10/7/2010	31361						
				0592-437	10/12/2010	31509						
				0592-439	10/21/2010	32958						
				0592-441	10/28/2010	33763						
23.0	Mon River RMI 23.0			0594-130	10/22/2008	38753	<1.0	23.9	105	<0.2	<50	4.383
21	Mon River RMI 20.5			0594-131	10/22/2008	38754	<1.0	23.1	79	<0.2	<50	4.444
18	Mon River RMI 17.5			0594-132	10/22/2008	38755	<1.0	24.1	91	<0.2	<50	4.537

*VanBriesen Research Group, Carnegie Mellon University (CMU)
** All TDS data collected by CMU was analyzed at 180℃. All TDS data collected by the Department prior to August 2010 was analyzed at 105℃ and 180℃ from August 2010 forward.

SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
				NA	10/25/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	10/26/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	10/27/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	10/28/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	10/29/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-154	11/3/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-157	11/5/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-161	11/7/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	11/10/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	11/12/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-165	11/14/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	11/17/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-168	11/19/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	11/21/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-175	11/25/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-181	12/1/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	12/4/2008	No sample	NA	NA	NA	NA	NA	NA

*VanBriesen Research Group, Carnegie Mellon University (CMU)
** All TDS data collected by CMU was analyzed at 180℃. All TDS data collected by the Department prior to August 2010 was analyzed at 105℃ and 180℃ from August 2010 forward.

SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
17	Mon River RMI 16.7 @ W.D. Mansfield Memorial Bridge	40°20' 42.8"	79°53' 08.0"	NA	12/8/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	12/11/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	12/15/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	12/18/2008	No sample	NA	NA	NA	NA	NA	NA
				NA	12/23/2008	No sample	NA	NA	NA	NA	NA	NA
				0594-204	12/30/2008	No sample	NA	NA	NA	NA	NA	NA
				0202-055	10/7/2009	35438	NA	NA	NA	NA	NA	NA
				0202-057	10/13/2009	35875	NA	NA	NA	NA	NA	NA
				1523-203	10/15/2009	36308	NA	NA	NA	NA	NA	NA
				0202-060	10/20/2009	36729	NA	NA	NA	NA	NA	NA
				0592-408	7/29/2010	24468						
				0202-092	8/3/2010	24796						
				0202-096	8/11/2010	25761						
				0202-101	8/18/2010	26596						
				0202-104	8/24/2010	27128						
				0592-421	9/2/2010	28149						
				0202-107	9/8/2010	28348						

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SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
				0202-110	9/14/2010	28916						
				0527-030	9/21/2010	29554						
				0202-113	9/29/2010	30232						
				0202-116	10/6/2010	31158						
				0202-119	10/12/2010	31545						
				0202-122	10/20/2010	32735						
				0202-125	10/26/2010	33438						
16	Mckeesport STP Outfall 001			0594-140	10/23/2008	39058	NA	11.2	15	<0.2	<50	8.38
				0594-143	10/24/2008	39211	<1.0	NA	NA	<0.2	NA	NA
				0594-146	10/25/2008	39243	<1.0	NA	NA	<0.2	NA	NA
				0594-148	10/26/2008	39245	<1.0	NA	NA	<0.2	NA	NA
				0592-211	10/27/2008	39218	NA	NA	NA	NA	NA	NA
				0592-215	10/28/2008	39453	NA	NA	NA	NA	NA	NA
				0592-219	10/29/2008	39561	<1.0	NA	NA	<0.2	NA	NA
13	Mon River RMI 12.9			0594-134	10/22/2008	38757	1.49	33.2	906	<0.2	80	9.39
12.0	Mon River RMI 12.0			0594-135	10/22/2008	38758	<1.0	15.5	111	<0.2	<50	3.158

*VanBriesen Research Group, Carnegie Mellon University (CMU)
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SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
11.1	Mon River RMI 11.1 Braddock Lock & Dam	40°23' 33.3"	79°51' 36.7"	0592-409	7/29/2010	24469						
				0202-093	8/3/2010	24797						
				0202-097	8/11/2010	25762						
				0202-102	8/18/2010	26597						
				0202-105	8/24/2010	27129						
				0592-422	9/2/2010	28150						
				0202-108	9/8/2010	28349						
				0202-111	9/14/2010	28917						
				0527-031	9/21/2010	29555						
				0202-114	9/29/2010	30324						
				0202-117	10/6/2010	31159						
				0202-120	10/12/2010	31546						
				0202-123	10/20/2010	32736						
				0202-126	10/26/2010	33439						
11.0	Mon River RMI 11.0			0552-868	10/17/2008	38096	<1.0	17.4	110	<0.2	<50	3.402
9.0	Mon River RMI 9.0			0594-137	10/22/2008	38760	<1.0	17.3	112	<0.2	<50	3

*VanBriesen Research Group, Carnegie Mellon University (CMU)
** All TDS data collected by CMU was analyzed at 180℃. All TDS data collected by the Department prior to August 2010 was analyzed at 105℃ and 180℃ from August 2010 forward.

SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
				0594-138	10/22/2008	38761	<1.0	13.8	88	<0.2	<50	2.863
				CMU*	9/29/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	10/6/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	10/13/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	10/20/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	10/27/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	11/3/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	11/10/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	11/17/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	12/1/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	12/8/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	12/15/2009	NA	NA	NA	NA	NA	NA	NA
				CMU*	1/5/2010	NA	NA	NA	NA	NA	NA	NA
				CMU*	1/12/2010	NA	NA	NA	NA	NA	NA	NA
				CMU*	1/19/2010	NA	NA	NA	NA	NA	NA	NA
				CMU*	2/3/2010	NA	NA	NA	NA	NA	NA	NA
				CMU*	2/23/2010	NA	NA	NA	NA	NA	NA	NA

*VanBriesen Research Group, Carnegie Mellon University (CMU)
** All TDS data collected by CMU was analyzed at 180℃. All TDS data collected by the Department prior to August 2010 was analyzed at 105℃ and 180℃ from August 2010 forward.

SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
4.5	Mon River RMI 4.5 Hays			CMU*	3/9/2010	NA						
				CMU*	3/23/2010	NA						
				CMU*	4/6/2010	NA						
				CMU*	4/20/2010	NA						
				CMU*	5/4/2010	NA						
				CMU*	5/18/2010	NA						
				CMU*	5/25/2010	NA						
				CMU*	6/1/2010	NA						
				CMU*	6/8/2010	NA						
				CMU*	6/15/2010	NA						
				CMU*	6/29/2010	NA						
				CMU*	7/5/2010	NA						
				CMU*	7/13/2010	NA						
				CMU*	7/27/2010	NA						
				CMU*	8/5/2010	NA						
				CMU*	8/10/2010	NA						
				CMU*	8/17/2010	NA						

*VanBriesen Research Group, Carnegie Mellon University (CMU)
** All TDS data collected by CMU was analyzed at 180℃. All TDS data collected by the Department prior to August 2010 was analyzed at 105℃ and 180℃ from August 2010 forward.

SAMPLE INFORMATION							LEAD (ug/L)	MAGNESIUM (mg/L)	MANGANESE (ug/L)	MERCURY (ug/L)	NICKEL (ug/L)	POTASSIUM (mg/L)
RMI	SAMPLE LOCATION	LATITUDE	LONGITUDE	SAMPLE ID#	DATE COLLECTED	LAB ID#	*@H=100 2.5 (CFC*		*1000 (PWS)*	*0.05 (THH)*	*@H=100 52 (CFC)*	
				CMU*	8/24/2010	NA						
				CMU*	8/31/2010	NA						
				CMU*	9/7/2010	NA						
				CMU*	9/14/2010	NA						
				CMU*	9/21/2010	NA						
				CMU*	10/7/2010	NA						
				CMU*	10/11/2010	NA						
				CMU*	10/19/2010	NA						
				CMU*	10/26/2010	NA						
				CMU*	11/3/2010	NA						
				CMU*	12/14/2010	NA						
				CMU*	1/19/2011	NA						
				CMU*	2/16/2011	NA						
				CMU*	3/16/2011	NA						

*VanBriesen Research Group, Carnegie Mellon University (CMU)
** All TDS data collected by CMU was analyzed at 180℃. All TDS data collected by the Department prior to August 2010 was analyzed at 105℃ and 180℃ from August 2010 forward.

APPENDIX G

THREE RIVERS MANAGEMENT PLAN FISHERIES DATA

Species	Monongahela River		Allegheny River		Ohio River	
	Braddock L/D	Maxwell L/D	L/D 3	L/D 8	Dashields L/D	Montgomery L/D
American eel [4]			1970	1970 1979	1970 1978-79	
Bigeye chub [3]				1968		1959
Bigeye shiner [4]					1975	
Black redhorse [3]	1977	1976	1980	1968 1970	1970	
Bluegill		1968 (100%) 1976 (25%)				
Bluntnose minnow					1970 (37%)	1970 (60%)
Brook silverside [1, 3]	2010	2003 2010	1981 1989	1987	1983	1995
Brown bullhead [5]	1968 (33%)	1969 (53%) 1970 (70%)	1970 (42%)		1958 (82%) 1968 (30%)	1957 (46%) 1958 (80%) 1959 (41%)
Channel catfish	1990 (30%)				1977 (36%)	1968 (20%)
Channel darter [1, 3]	2010		1991			1995 2005
Common carp	1969 (46%) 1970 (38%) 1980 (47%)	1989 (29%)			1967 (58%)	1969 (46%)
Cyprinid (unknown)			1987 (74%)	1987 (97%)	1987 (99%)	
Emerald shiner	1968 (33%) 1976 (74%) 1977 (50%) 1978 (86%) 1981 (85%) 1985 (48%) 1989 (98%) 2003 (31%)	1973 (68%) 1977 (41%) 1978 (91%) 1985 (77%) 1988 (34%) 2003 (83%)	1968 (84%) 1980 (38%) 1981 (78%) 1883 (92%) 1985 (61%)	1957 (82%) 1968 (70%) 1985 (71%)	1969 (35%) 1975 (98%) 1976 (53%) 1978 (60%) 1979 (86%) 1980 (63%) 1981 (62%) 1983 (49%) 1985 (71%)	1960 (77%) 1989 (64%)
Freshwater drum					1988 (38%)	1990 (32%) 1992 (27%) 1995 (55%) 1997 (49%)
Ghost shiner [1]	2003 2010	1985 2003 2010				1959
Gizzard shad	1973 (31%) 1987 (91%) 1988 (98%) 1992 (18%) 2010 (57%)	1987 (48%) 2010 (37%)	1988 (47%) 1989 (28%) 1990 (29%) 1991 (60%)		1991 (76%)	1988 (98%) 1999 (64%) 2001 (95%) 2005 (89%)
Highfin carpsucker [4]						1990 1999 2001
Largemouth bass [2]	1968-70 1977	1970 1973	1968 1988		1968-69 1987	1958 1968-69

Species	Monongahela River		Allegheny River		Ohio River	
	Braddock L/D	Maxwell L/D	L/D 3	L/D 8	Dashields L/D	Montgomery L/D
	1980 2010	1976-77 1985 1989				1988 1999
Logperch [3]	1980-81 1985 1987-89 2010	1987-89 2010	1968 1979-81 1983 1985 1987-89 1991	1957 1968 1970 1985 1987	1967 1969 1976 1980-81 1988	1969 1989 1999 2001 2005
Longnose gar [1]	2010	2010				
Mimic shiner [3]	1970 1973 1976-77 1980-81 1983 1985 1987 1992 2003	1976-77 1985 1987-88 2003 2010	1980-81 1983 1985 1991	1957 1968 1970 1979 1985 1987	1958 1969-70 1975 1979-81 1983 1985 1987	1959-60 1968-70 1989 1992 1995 1999 2001 2003 (66%) 2005
Mooneye [1, 3]	1992 2003	2003	1991		1991	1990 1995 1997 2005
Muskellunge [2]		1989	1980 1987	1968 1987	1977 1988	1988
Ohio lamprey [1, 3]			1968	1957		
Orangespotted sunfish [4]	1970	1969 1977				1970
Paddlefish [1, 3]		2003				
Pumpkinseed	1967 (70%)					
River carpsucker [4]	2003	2003				1958 1992 1999
River redhorse [1, 3]	1983		1988 1991			
River shiner [1]	1977				1968	1957
Saugeye [2]	2003					2005
Sauger [2]	1977 1987-88 1990 1992 2003 2010	1988-89 2003 2010	1980 1985 1990-91		1976 1983 1985 1987-88 1991	1988-90 1992 1995 1997 1999 2001 2003 2005
Silver chub [1]	2010	2003				1959 1995 2003
Skipjack herring [1]	1983 (41%) 2003 2010	2003 2010	1988		1979 1988 1991	1989-90 1995 1997 1999 2001 2003 2005
Smallmouth bass [2, 3]	1983	1973	1979-80	1957	1980	1988

Species	Monongahela River		Allegheny River		Ohio River	
	Braddock L/D	Maxwell L/D	L/D 3	L/D 8	Dashields L/D	Montgomery L/D
	1985 1987-88 2003 2010	1977-78 1985 1988-89 2003 2010	1983 1988-89 1991	1985 1987	1983 1985 1987-88 1991	1997 1999 2003 2005
Smallmouth buffalo [1]	2003 2010	1988 2010	1987			1989-90 1992 1995 1997 1999 2001 2003 2005
Smallmouth redhorse [3]	1985 1987-90 1992 2003 2010		1980 1985 1988-91	1968 1985	1980 1985 1987	1989-90 1992 1995 2005
Spotted bass [2]	1987 2010	1985 1988 2010	1983 1985 1988-89 1991		1976 1980 1983 1987-88	1958 1988-89 1992 1999 2005
Stonecat [3]			1980-81 1987	1957 1987	1980	
Tadpole madtom [1]				1979		
Threadfin shad [4]						1999
Tiger muskellunge [2]		1985	1985	1985	1983 1985	
Trout-perch [4]	1980		1979 (48%) 1980-81 1983 1985 1987-89	1957 1968 1970 (45%) 1979 (77%) 1985 1987	1977 1979-81	
Walleye [2]	1980 1983 1987-88 1992 2003 2010	1978 1985 1987-89 2003 2010	1980-81 1983 1988-91	1957 1968 1970 1979 1985 1987	1968-69 1980-81 1983 1987-88 1991	1968-69 1988-90 1995 1997 2001 2003 2005
Warmouth [1]	1976					1959

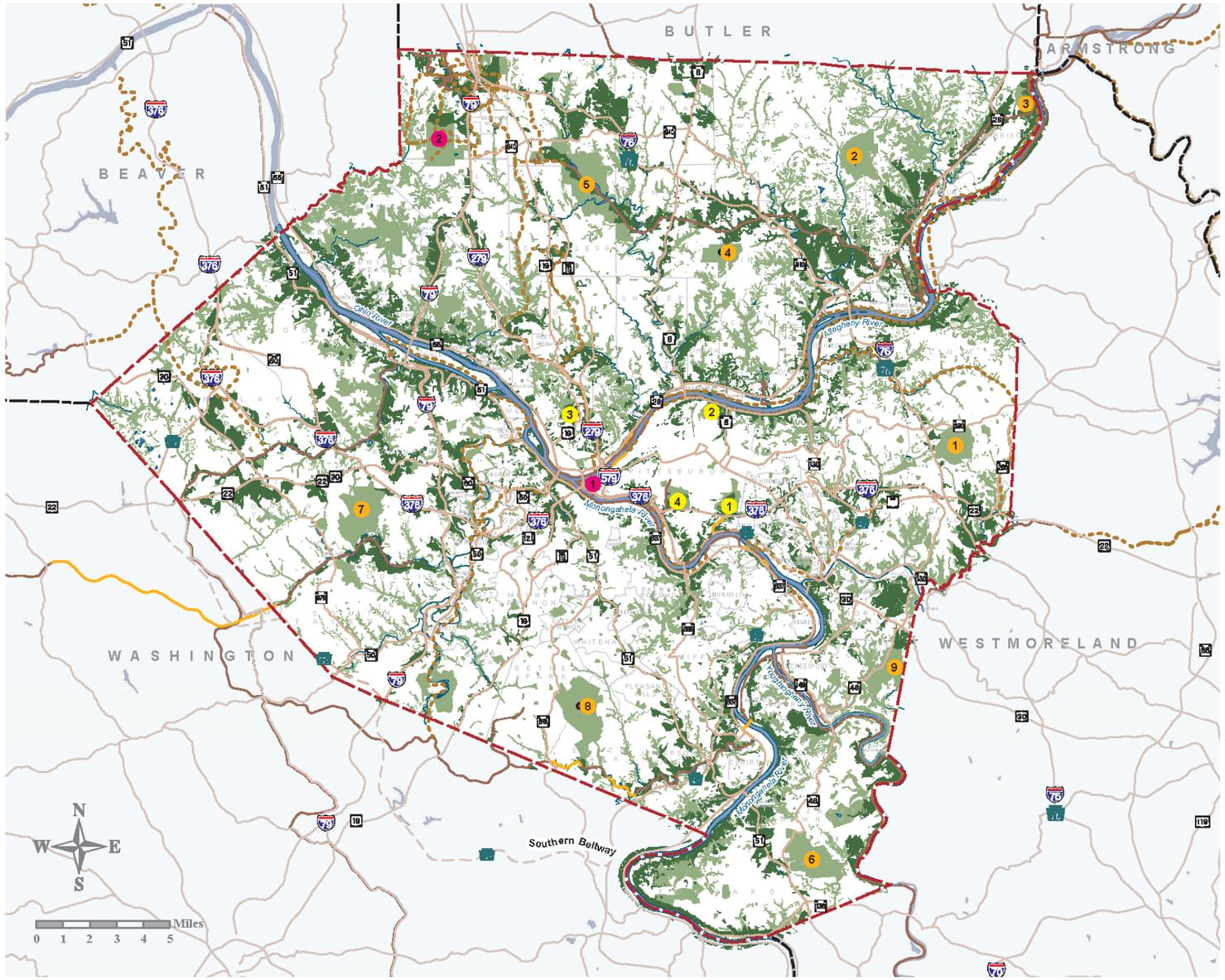
[1] Species currently or previously protected under 58 Pennsylvania Code Chapter 75.
[2] Important sport fish species.
[3] Species classified as pollution intolerant by ORSANCO (Thomas *et al.* 2005).
[4] Otherwise remarkable species (*e.g.*, first collection for the Three Rivers).
[5] ORSANCO originally reported the Ohio River fish as black bullheads, but investigation of voucher specimens revealed characters between brown bullhead and black bullhead, so the identifications were later changed to brown bullhead (Preston and White 1978).

APPENDIX H

MAPS OF GREENWAYS, PARKS, AND TRAILS WITHIN ALLEGHENY COUNTY

Greenways Network

ALLEGHENY PLACES
THE ALLEGHENY COUNTY COMPREHENSIVE PLAN



Greenways

LEGEND

Networks
- Proposed Greenways
- Allegheny Land Trust GREENPRINT*

Trails
- Open
- Proposed
- Under Construction
- Water Trail

Roads
- Major Roadways
- Proposed Roads

Base Map
- Allegheny County
- Municipal Boundaries
- Bordering Counties
- Hydrology**

Regional Parks

County Parks
1. Boyce Park
2. Deer Lakes Park
3. Harrison Hills Park
4. Hartwood Acres Park
5. North Park
6. Round Hill Park
7. Settler's Cabin Park
8. South Park
9. White Oak Park

Pittsburgh Parks
1. Frick Park
2. Highland Park
3. Riverview Park
4. Schenley Park

State Parks
1. Point State Park
2. State Gameland 203

* Area with highest priority for conservation
** Buffered rivers, conservation streams and wetlands

DATA SOURCES

Allegheny County
Allegheny County Conservation District
Southwestern Pennsylvania Commission
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset

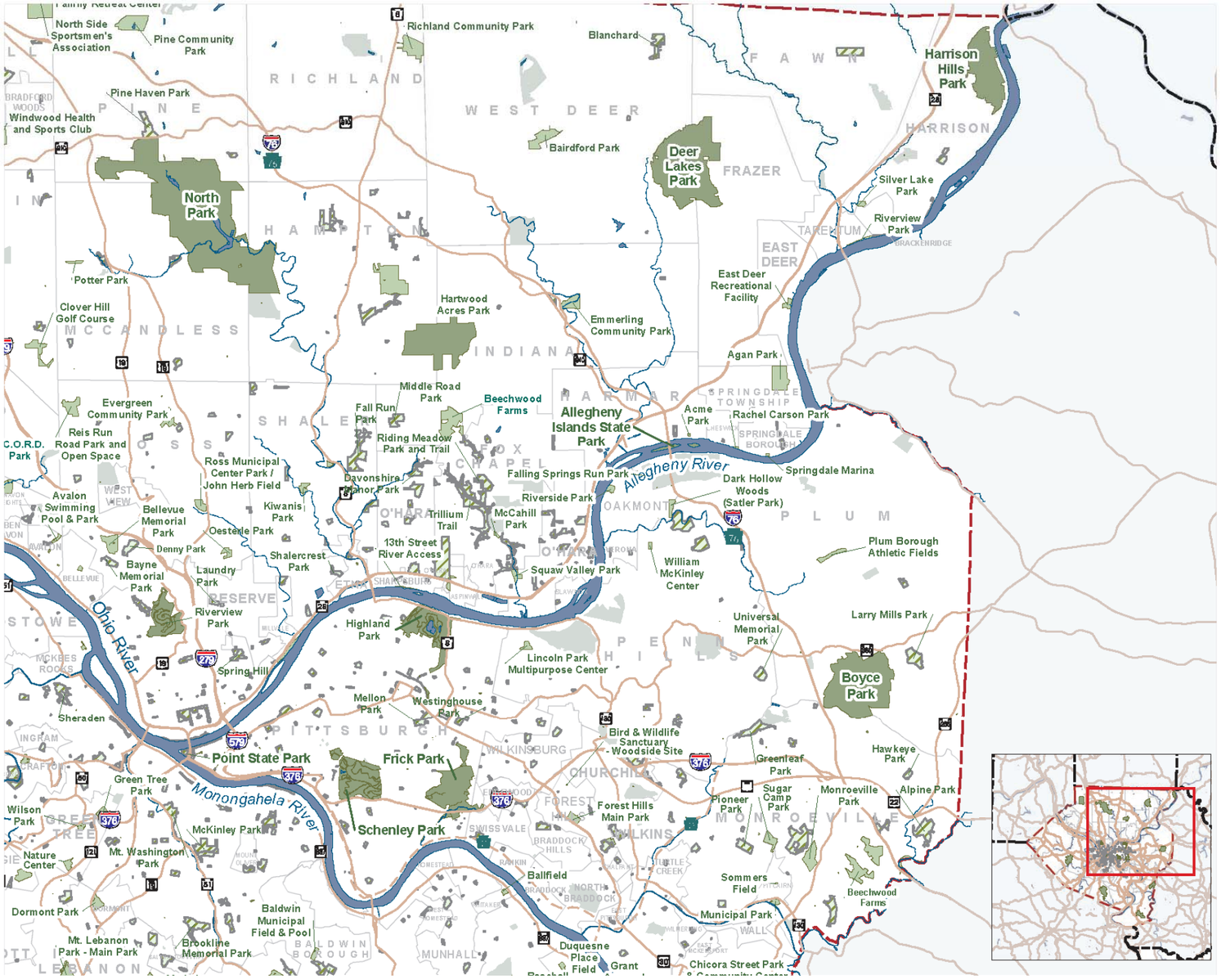
October 27, 2008
This map is property of Allegheny County and should be used for reference purposes only.

This map was prepared for:
Dan Onorato Allegheny County Chief Executive and
Allegheny County Economic Development - Planning Division

Map 4E.2

Parks (Northeast Quadrant)

ALLEGHENY PLACES
THE ALLEGHENY COUNTY COMPREHENSIVE PLAN



Parks (Northeast Quadrant)

LEGEND

Parks
- Regionally Significant Park
- Community Park
- Municipal Park
- Golf Courses

Base Map
- Allegheny County
- Municipal Boundaries
- Bordering Counties
- Hydrology
- Major Roadways
- Proposed Roads

The data for the Parks Maps was derived from surveys sent to all Allegheny County Municipalities.

N W E S

0 1 2 3 4 5 Miles

DATA SOURCES

Allegheny County
Allegheny County Municipalities
City of Pittsburgh
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset

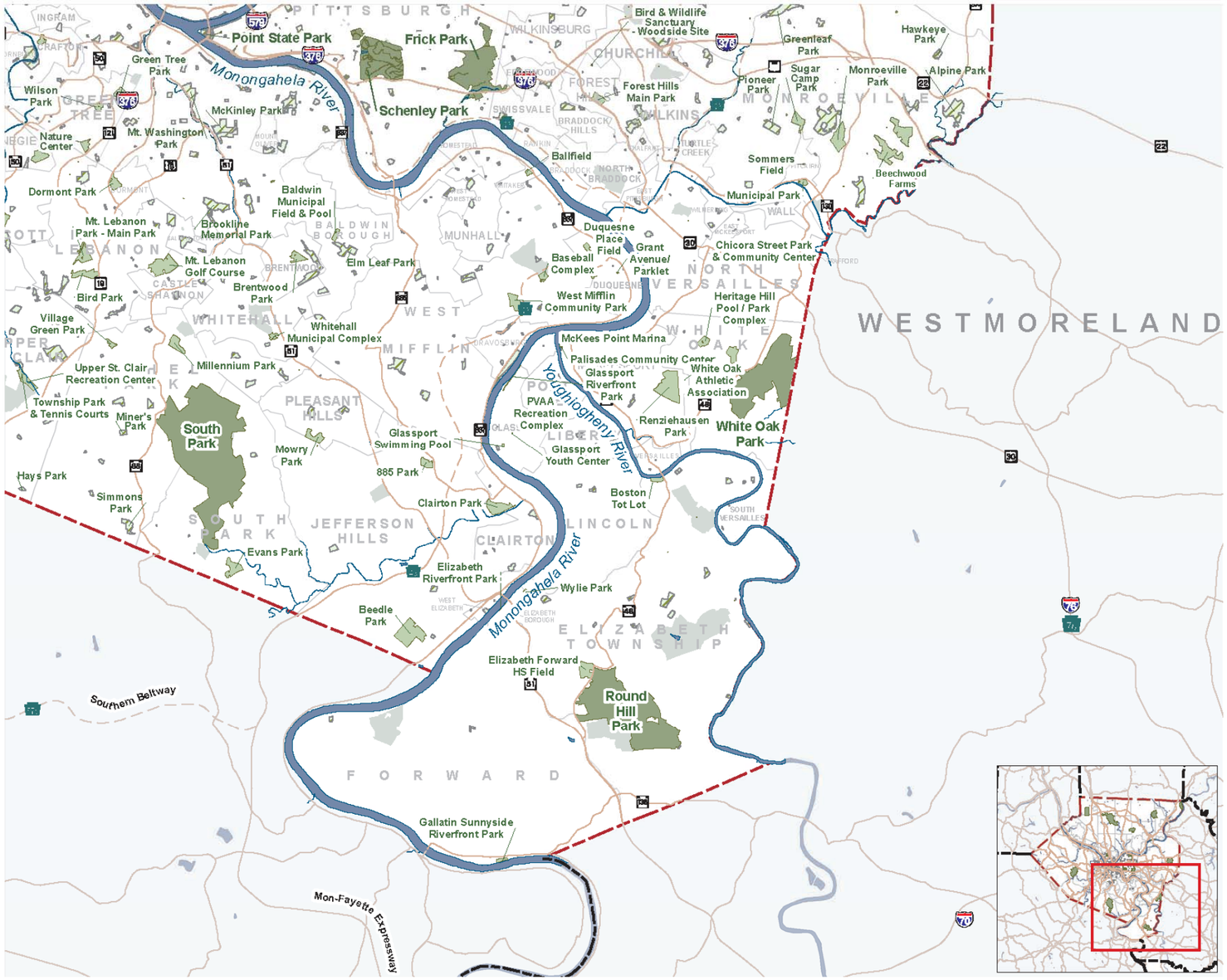
December 15, 2008
This map is property of Allegheny County and should be used for reference purposes only.

This map was prepared for:
Dan Onorato, Allegheny County Chief Executive
Allegheny County Economic Development - Planning Division

Map 4E.1b

Parks (Southeast Quadrant)

ALLEGHENY PLACES
THE ALLEGHENY COUNTY COMPREHENSIVE PLAN



Parks (Southeast Quadrant)

LEGEND

Parks

- Regionally Significant Park
- Community Park
- Municipal Park
- Golf Courses

Base Map

- Allegheny County
- Municipal Boundaries
- Bordering Counties
- Hydrology
- Major Roadways
- Proposed Roads

The data for the Parks Maps was derived from surveys sent to all Allegheny County Municipalities.

N
W E
S

0 1 2 3 4 5 Miles

DATA SOURCES

Allegheny County
Allegheny County Municipalities
City of Pittsburgh
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset

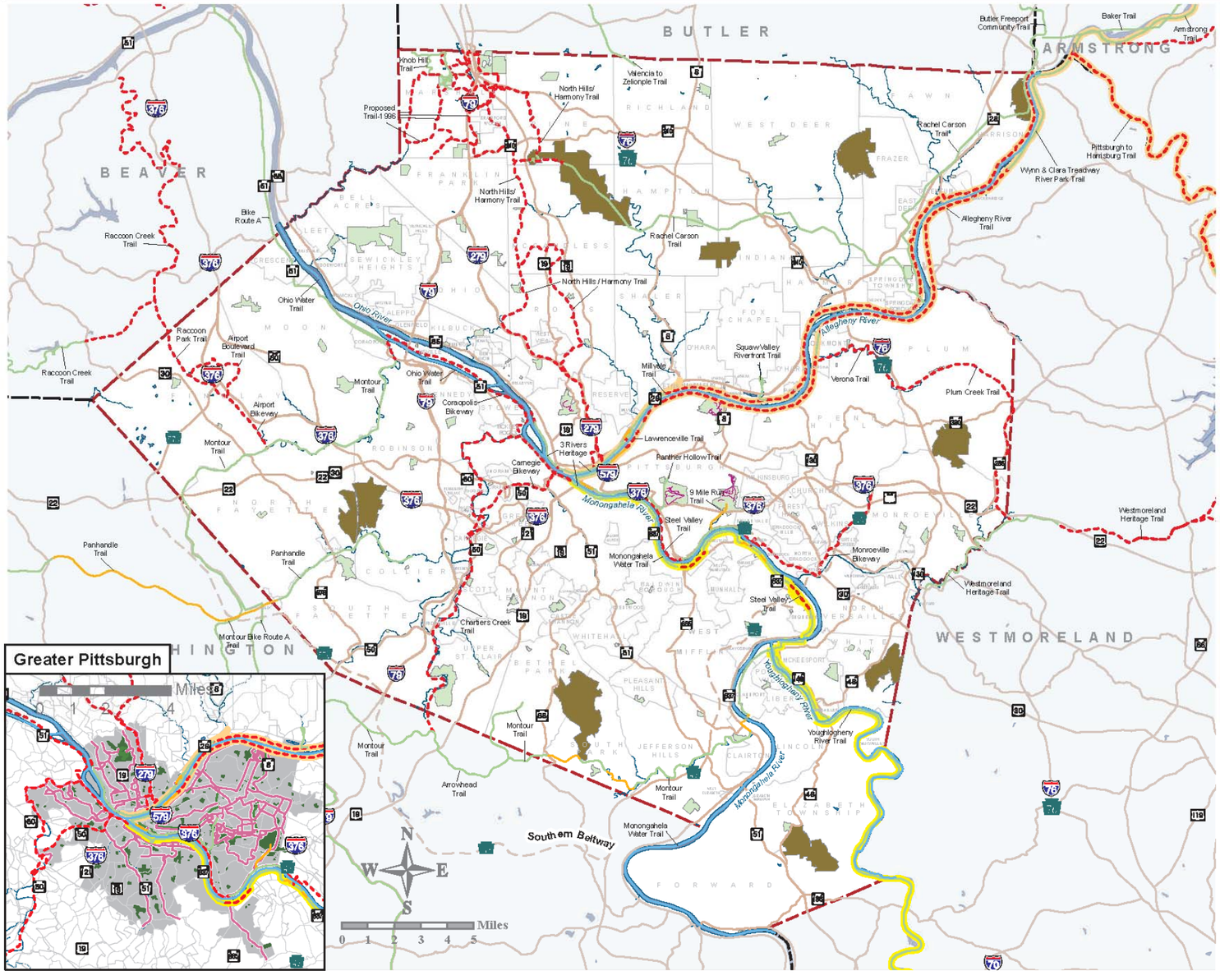
December 15, 2008
This map is property of Allegheny County and should be used for reference purposes only.

This map was prepared for:
Dan Onorato, Allegheny County Chief Executive
Allegheny County Economic Development - Planning Division

Map 4E.1d

Trails

ALLEGHENY PLACES
THE ALLEGHENY COUNTY COMPREHENSIVE PLAN



Trails

LEGEND

Trails

- Open
- Proposed
- Under Construction
- Water Trails
- Proposed Bike Plan

Mega Greenways

- Great Allegheny Passage
- Pittsburgh - Harrisburg Mainline Canal Greenway
- Pittsburgh to Erie Greenway

Base Map

- Allegheny County
- Municipal Boundaries
- Major Roadways
- Proposed Roads
- Hydrology
- County Parks
- Parks

DATA SOURCES

Allegheny County
Pittsburgh Department of Planning
Department of Conservation and Natural Resources
Marshall Township
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset

December 15, 2008
This map is property of Allegheny County and should be used for reference purposes only.

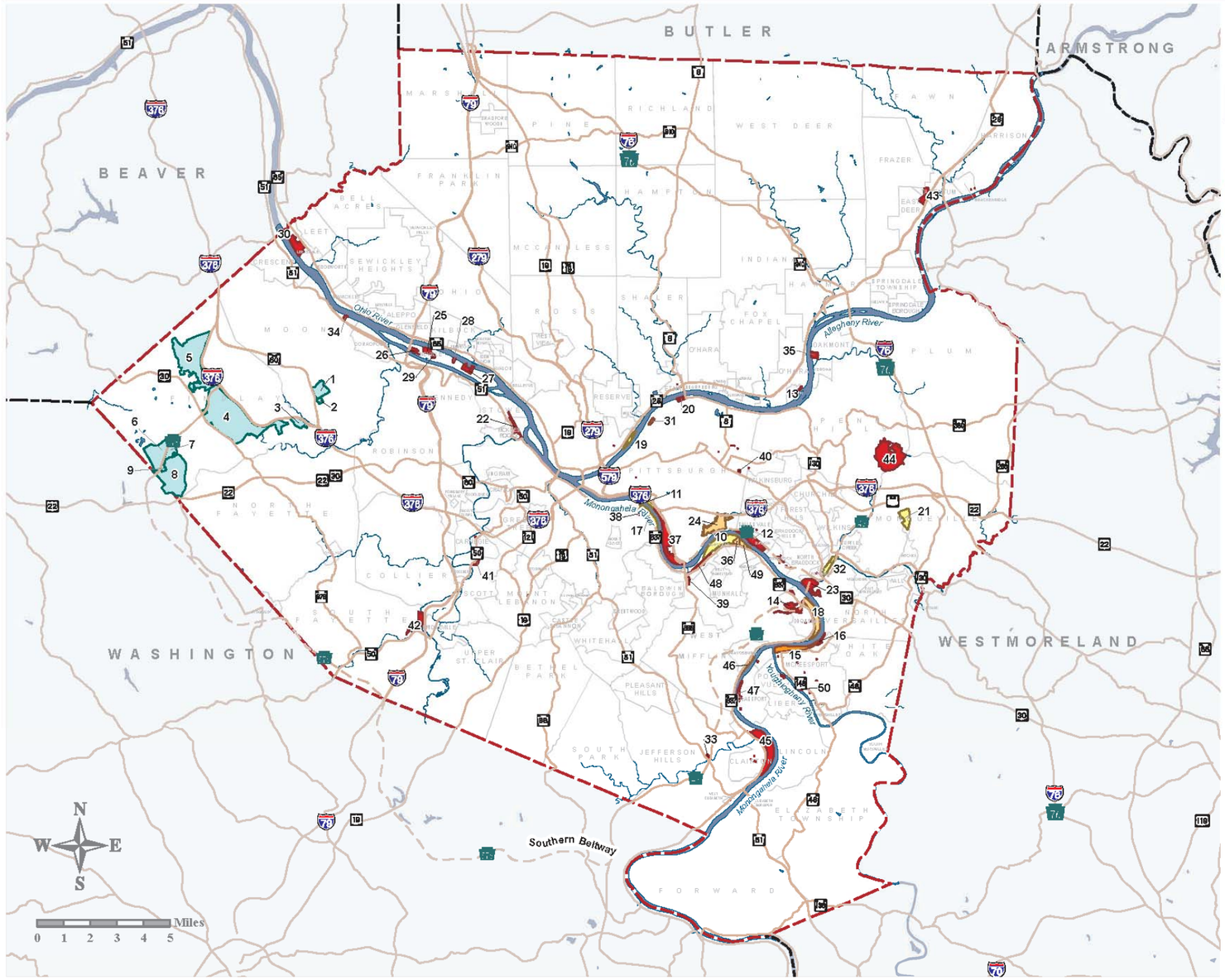
This map was prepared for:
Dan Onorato, Allegheny County Chief Executive
Allegheny County Economic Development - Planning Division

Map 4E.3

APPENDIX I

MAP AND LIST OF BROWNFIELDS WITHIN ALLEGHENY COUNTY

Brownfields and Redevelopment Sites



ALLEGHENY PLACES
THE ALLEGHENY COUNTY COMPREHENSIVE PLAN

Brownfields and Redevelopment Sites

LEGEND

Brownfields and Redevelopment Sites

- Planned
- Partially Redeveloped
- Redeveloped
- Airport Redevelopment Sites
- Not Redeveloped; Not Developed

Base Map

- Allegheny County
- Municipal Boundaries
- Bordering Counties
- Hydrology
- Major Roadways
- Proposed Roads

According to PADEP, Pennsylvania defines brownfields as abandoned, idle, or under-used industrial or commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.

DATA SOURCES

Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset

June 12, 2008
This map is property of Allegheny County and should be used for reference purposes only.

This map was prepared for:
Dan Onorato, Allegheny County Chief Executive
Allegheny County Economic Development - Planning Division

Map 4A.2

ALLEGHENY PLACES
THE ALLEGHENY COUNTY COMPREHENSIVE PLAN

Brownfield Map Sites

Map ID	Site Name	Type
1	Cherrington Commerce Park	Airport Redevelopment Site
2	Ewing Road	Airport Redevelopment Site
3	Industry Drive	Airport Redevelopment Site
4	Route 30 Commerce Park	Airport Redevelopment Site
5	Clinton Commerce Park	Airport Redevelopment Site
6	Chapman Commerce Center	Airport Redevelopment Site
7	Imperial Land Company - Site 2	Airport Redevelopment Site
8	Imperial Land Company - Site 3 Area B	Airport Redevelopment Site
9	Imperial Land Company - Site 3A	Airport Redevelopment Site
10	The Waterfront	Redeveloped
11	Eliza Furnace / Pittsburgh Technology Center	Redeveloped
12	Carrie Furnace	Not Redeveloped/Not Developed
13	Blawnox	Not Redeveloped/Not Developed
14	Duquesne	Not Redeveloped/Not Developed
15	RIDC Riverplace Industrial Center of McKeesport	Planned
16	Fifth Sterling	Not Redeveloped/Not Developed
17	South Side Works	Redeveloped
18	RIDC City Center of Duquesne	Partially Redeveloped
19	Washington's Landing	Redeveloped
20	Tippins Site	Not Redeveloped/Not Developed
21	Tech One Office and Research Park	Redeveloped
22	PL&E Site - McKees Rocks	Not Redeveloped/Not Developed
23	Port Perry - North Versailles	Not Redeveloped/Not Developed
24	Nine Mile Run - Summerset at Frick Park	Partially Redeveloped
25	Neville Island KOZ	Not Redeveloped/Not Developed
26	Neville Island KOZ	Not Redeveloped/Not Developed
27	Neville Island Industrial and Office Complex	Not Redeveloped/Not Developed
28	3400 Grand Ave - Neville Island	Not Redeveloped/Not Developed
29	M & B Development	Not Redeveloped/Not Developed
30	Leetsdale Industrial Park	Not Redeveloped/Not Developed
31	Lawrenceville RIDC	Not Redeveloped/Not Developed
32	Keystone Commons	Redeveloped
33	Former Westinghouse Research Lab	Not Redeveloped/Not Developed
34	Fab Tech and Buckeye Pipeline	Not Redeveloped/Not Developed
35	Edgewater Steel	Not Redeveloped/Not Developed
36	Steel Valley Area - Siemens	Partially Redeveloped
37	Hazelwood LTV	Not Redeveloped/Not Developed
38	W.N. Dambach Inc.	Not Redeveloped/Not Developed
39	Hays Former Army Ammunition Plant	Not Redeveloped/Not Developed
40	Point Breeze Manufacturing Center	Not Redeveloped/Not Developed
41	Carnegie Glass Plant	Not Redeveloped/Not Developed
42	Koppers Site	Not Redeveloped/Not Developed
43	Tarentum	Not Redeveloped/Not Developed
44	Untied Atlas	Not Redeveloped/Not Developed
45	USS Clairton	Not Redeveloped/Not Developed
46	USS Dravosburg	Partially Redeveloped
47	Glassport Foundry	Not Redeveloped/Not Developed
48	Steel Valley Area - WHEMCO	Not Redeveloped/Not Developed
49	Steel Valley Area - Warehouse	Partially Redeveloped
50	McKeesport Steel Foundry	Not Redeveloped/Not Developed