FRENCH CREEK WATERSHED CONSERVATION PLAN

UPDATE DECEMBER 2024

French Creek in New York (photo: WPC)

Prepared by
Western Pennsylvania Conservancy
In partnership with French Creek Valley Conservancy
For the communities & conservation partners of the watershed

Funding for this project was provided by
Pennsylvania Department of Conservation and Natural Resources,
Bureau of Recreation and Conservation, through a grant from the
Environmental Stewardship Fund

Cover Photo: French Creek in Utica, Pennsylvania (photo: WPC)

Western Pennsylvania Conservancy

water, land, life.

Headquarters Pittsburgh Office
800 Waterfront Drive
Pittsburgh, PA 15222
www.WaterLandLife.org
Toll-free: 1-866-564-6972
Email: info@paconserve.org

Northwest Regional Office
Galena Building, Suite 100
1140 Liberty Street
Franklin, PA 16323
Phone: 814-346-0377
Email: northwest@paconserve.org

Mission and Core Values

The Western Pennsylvania Conservancy protects and restores exceptional places to provide our region with clean waters and healthy forests, wildlife and natural areas for the benefit of present and future generations. The Conservancy creates green spaces and gardens, contributing to the vitality of our cities and towns, and preserves Fallingwater, a symbol of people living in harmony with nature.

The Western Pennsylvania Conservancy holds core values centered on visionary leadership, mission-focused work, science-based decisions, partnerships as key to accomplishing our work, innovation and agility, integrity, accountability and openness, employees and volunteers valued for their knowledge, commitment and diversity, results-driven work for long-term, regional impact and value, sustainable practices, and collaboration across areas of expertise.

French Creek Valley Conservancy
411 Chestnut Street
P.O. BOX 434
Meadville, PA 16335
(814) 337-4321
https://www.frenchcreekconservancy.org/
Email: watershed@frenchcreekconservancy.org

Mission and Core Values

The French Creek Valley Conservancy has a mission to promote the environmental integrity of the French Creek watershed, and to advocate the protection of its natural resources for the aesthetic, ecological, recreational, and economic benefit of all, through the coordination of land protection, education, and research.

French Creek Valley Conservancy envisions a clean and healthy French Creek watershed appreciated and protected by its residents, partners and neighbors.

ACKNOWLEDGEMENTS

The Pennsylvania Department of Conservation and Natural Resources, Western Pennsylvania Conservancy, French Creek Valley Conservancy and affiliates of the French Creek Conservation Consortium provided funding and support for the development of the French Creek Watershed Conservation Plan Update. The French Creek Conservation Consortium provided the framework for inter-agency collaboration and expertise from various technical backgrounds to advise the conservation planning process and guide the development of implementation projects. Western Pennsylvania Conservancy gathered publicly-available data and resources to compile this updated plan and attended a series of public and municipal meetings to gather input for the planning process. Several municipalities in the French Creek watershed supported this conservation planning process and are highlighted in the plan update. Numerous watershed residents and stakeholders voiced opinions regarding threats to French Creek, which were incorporated into this plan. In addition, Western Pennsylvania Conservancy would like to thank the watershed residents and staff from the various agencies, businesses, industries, and organizations that provided information for the development of the French Creek Watershed Conservation Plan Update and feedback on the draft plan.

French Creek Conservation Consortium

- Allegheny College ~ Creek Connections & Watershed Conservation Research Center
- Allegheny Valley Conservancy
- Chautauqua County Soil & Water Conservation District
- Chautauqua Watershed Conservancy
- City of Meadville
- Crawford County Conservation District
- Crawford County Planning Commission
- Ducks Unlimited
- Edinboro Lake Association
- Erie Bird Observatory
- Erie County Conservation District
- Erie County Planning & Community Development
- Findlay Lake Nature Center
- Foundation for Sustainable Forests
- French Creek Valley Conservancy
- Mercer County Conservation District
- Mercyhurst University
- Penn State Extension
- Pennsylvania Department of Conservation & Natural Resources
- Pennsylvania Department of Environmental Protection
- Pennsylvania Environmental Council
- Pennsylvania Fish & Boat Commission
- Pennsylvania Game Commission
- Pennsylvania Organization for Watersheds & Rivers
- Penn West University ~ Edinboro
- Richard King Mellon Foundation
- Seneca Nation of Indians
- Sherman Chamber of Commerce
- The Nature Conservancy
- Tom Ridge Environmental Center
- Trout Unlimited
- Union City Borough
- U.S. Army Corps of Engineers
- U.S. Dept. of Agriculture Natural Resources Conservation Service
- U.S. Fish & Wildlife Service
- Venango County Conservation District
- Western Pennsylvania Conservancy

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EXECUTIVE SUMMARY

Introduction to French Creek: An Everlasting Ecological Treasure

2022 Pennsylvania River of the Year poster (poster credit: POWR)

French Creek, in southwestern New York and northwestern Pennsylvania, is an ecologically significant waterway, containing a diverse species richness of birds, fish, and freshwater mussels and unique and important species like the eastern hellbender salamander. Scientists have compared the flora and fauna of the French Creek watershed to early 20th century inventories, indicating that French Creek has retained nearly all aquatic species historically represented here. This may be attributed to its relatively good water quality, abundance of wetlands and critical habitats, and overall rural character. French Creek is an ecological treasure to protect and celebrate.

Purpose

Originally published in 2002, this update to the watershed conservation plan was completed in 2024 with the purpose to serve as a current reference to information about the region, to catalog up-to-date resources and data, to highlight accomplishments realized over the past two decades, to identify continuing and emerging challenges, and to list potential partners who may support fundraising for natural resources conservation and community revitalization initiatives in French Creek. The primary goal of the plan is to identify problems and opportunities throughout the region and encourage voluntary cooperation among landowners and partners to achieve mutually-beneficial conservation outcomes. Through these partnerships, natural solutions can be accomplished to protect the natural beauty and bounty that French Creek provides its communities for generations to come. Partner and public surveys were used to highlight accomplishments of the past 20 years since the first plan was completed and to capture the special or unique concerns for this region. Local responses to those surveys helped develop additional, specific management options to achieve the goals of this plan. The plan provides new mapping of the French Creek watershed and discusses management options, which along with references to the plan, will be used in the future to support the need for funding and implementation of projects to conserve French Creek. Hyperlinks (blue-underlined font) will allow users to access current, accurate data and explore topics further.

Project Area Background & Lead Conservation Facilitator

Garnering the popular public vote, French Creek has won the honored designation of Pennsylvania River of the Year twice, in 2003 and 2022. Proud of the rural character, extensive history and close-knit culture of the communities here, French Creek is worthy of the fanfare! However, threats to its natural resources and healthy streams remain, requiring conservation partners, communities, and landowners to work together to employ the best conservation measures that will protect the future of this remarkable stream and region.

French Creek Valley Conservancy serves as the regional coordinator and liaison for watershed conservation actions, advocation, education and outreach. Since 2009, it has moderated the annual French Creek Conservation Consortium, which brings together public, private, and non-profit conservation stakeholders from throughout the watershed to update each other on current projects, identify new sources of funds or partners, avoid the duplication of efforts, and plan coordinated action in response to conservation needs in the watershed. This has provided a productive and collaborative mechanism for a variety of partners and projects to promote watershed protection, restoration, and habitat improvement activities throughout the French Creek watershed. The management options identified in this plan cover varied sectors and interests related to the resources of French Creek and will require open communication, collaboration, and leadership from all consortium partners and municipalities of the project area.

French Creek Valley Conservancy hosts an annual French Creek Cleanup, bringing together hundreds of volunteers of all ages. For more than 30 years, this annual event has included participants on foot and by boat, collecting garbage from French Creek, major tributaries, and conserved lands throughout the watershed. In recent years, stewardship projects including tree plantings and trail maintenance have been included in the day's activities.

French Creek is an official Pennsylvania Water Trail, and French Creek Valley Conservancy is the designated Water Trail Manager. The official water trail is approximately 78 navigable miles from the Union City Dam to the City of Franklin, when French Creek joins the Allegheny River. Providing Water Trail maps, access information, launch ownership, and paddling events are part of the Conservancy's water trail program. The PA Water Trail Program is managed by the Pennsylvania Environmental Council.

French Creek Valley Conservancy has developed fact sheets about the natural resources of the watershed and conducts educational programs in schools and on public lands throughout the region, partnering with many other conservation organizations to offer varied and robust programs and lesson plans about local conservation issues affecting French Creek.

French Creek cleanup volunteers (photo: FCVC)

Chapter Highlights

Chapter 1. Project Area Characteristics

- French Creek originates in Chautauqua County, in western New York and flows southwest through Erie, Mercer, and Crawford counties before meeting its confluence with the Allegheny River in Franklin County, Pennsylvania.
- The French Creek watershed drains portions of 72 townships, cities, and boroughs in northwest Pennsylvania (Figure 2). The entire French Creek watershed covers an area of approximately 1,237 square miles (791,405 acres). The main stem of French Creek flows 117 miles from its New York headwaters to its mouth at Franklin.
- A majority (86%) of the municipalities in the watershed has a comprehensive plan. Municipalities without these land-use controls are generally governed by county-wide controls. The list of municipal planning and development controls in place for municipalities in the French Creek watershed is shown in Table 1.
- Interstate-79, US-6, US-19, and US-322 are the major transportation roads through the watershed, and I-90 and I-80 lie just north and south of the watershed, respectively.
- Population centers with greater than 1000 people per square mile include: the city of Corry, Edinboro Borough, Union City Borough, Waterford Borough, and Wattsburg Borough in Erie County; Cambridge Springs Borough, Conneaut Lake Borough, the city of Meadville, and Venango Borough in Crawford County; and the city of Franklin in Venango County.
- Forests (54%) and agriculture (28%) are the predominate land-use types.

Chapter 2. Land Resources

- Soils of the French Creek watershed have been forming from glacial material (till and outwash) for only approximately 15,000 years since the last glaciation (Figure 8). This relatively young soil has not had time to form distinctive layers and primarily assumes its characteristics from glacial parent material, relatively wet climate, and organic material.
- Publicly-owned lands in the French Creek watershed include Pennsylvania Department of Conservation and Natural Resources Cornplanter State Forest (128.55 acres), Pennsylvania Game Commission State Game Lands (>30,000 acres), Pennsylvania Fish & Boat Commission including Tamarack Lake (>1,000 acres), U. S. Army Corps of Engineers Union City Dam and Woodcock Creek Lake (3,085 acres), U. S. Fish & Wildlife Service Erie National Wildlife Refuge (8,959 acres), and other government agencies including counties and local municipalities, as well as land trusts.
- Steep slopes are critical areas that often present the potential for severe erosion and landslides. Due to the rolling topography of much of the French Creek watershed, steep slopes are not common. Many stream segments flowing through highly agricultural areas have lost protective riparian buffers and consequently exhibit severe erosion of stream banks.
- Currently there is one permitted landfill and one Superfund site within the French Creek watershed.
- Due to a lack of coal deposits, the French Creek watershed has escaped the degradation from abandoned coal mine drainage. However, glacial processes left the area rich in sand and gravel deposits that are actively mined to provide material for roadways and other construction projects.

Chapter 3. Water Resources

- There are 10 major sub-basins to French Creek with a drainage area greater than 50 square miles, including West Branch of French Creek (77.7 mi^2), South Branch of French Creek (80.3 mi^2), LeBoeuf Creek (63.3 mi^2), Muddy Creek (83.6 mi^2), Conneauttee Creek (60.8 mi^2), Woodcock Creek (50.5 mi^2), Cussewago Creek (96.9 mi^2), Conneaut Outlet (101 mi^2), Little Sugar Creek (53 mi^2), and Sugar Creek (167 mi^2).
- Its glacial history has left the French Creek watershed rich with wetland resources (Figure 14). The New York headwater portions of the watershed contain two major wetland systems, Alder Bottom and Beaver Meadow Swamps.
- The Pennsylvania portion of the French Creek watershed contains a wide variety of wetland types. Vast marsh and swamp wetlands are associated with many glacial lakes and tributaries. In particular, Lake Pleasant Outlet in Erie County and Conneaut Lake Outlet in Crawford County support extensive marshes. Harmonsburg Fen, in Crawford County, is designated as an exceptionally-significant biodiversity area by PNHP and is conserved by FCVC. Conneaut Marsh is the largest marsh complex in Pennsylvania and designated as an exceptionally-significant biodiversity area by PNHP
- Many streams within the watershed, like LeBoeuf Creek and Muddy Creek, have extensive floodplain and forested wetlands. Of particular importance are the rare glacial bog and alkaline fen wetlands in the watershed. Erie County is home to the Wattsburg Fen Natural Area, part of the Titus and Wattsburg Bogs National Natural Landmark.
- Wetlands are integral parts of the watershed ecosystem serving as a link between terrestrial and aquatic environments and dramatically increase plant and animal diversity for both environments. They function in a variety of ways to benefit humans as well as wildlife. Wetlands improve water quality by stabilizing and filtering sediments and toxins. Wetland plants also remove or transform excessive nutrients and prevent them from entering waterways. Wetlands augment and help control water quantity in a watershed and provide important recharge areas for groundwater, especially important during low flows.
- Overall, the water quality in the French Creek watershed is relatively good due to the glacial history of the watershed and highly rural nature of the watershed.
- Nutrient enrichment is occurring in French Creek and many of its tributaries. This is evident by summer algal blooms and excessive aquatic weed growth. Excessive nutrients can have a negative effect on aquatic organisms as nutrient levels build up and oxygen levels are sometimes critically depleted during warmer summer months when flows are reduced.
- The PA DEP 2024 Integrated Water Quality Report lists numerous streams and lakes within French Creek as impaired (Figure 19). Primary sources of impairment documented were sediment and nutrients caused by agricultural, runoff, channelization and impoundments. Several lakes were listed as impaired by urban runoff, storm sewers and other sources contributing nutrients and suspended solids pollution that accumulates.
- Approximately 67 percent of watershed residents receive drinking/domestic water from a community or public water supply. Approximately 17 percent of those residents get their water from a public surface water supply and the other 83 percent are utilizing public groundwater supplies.
- Stream connectivity is important for all aquatic species in a number of ways, including access to thermal refuge, access to important spawning habitat, and for eliminating genetic isolation of populations.

Chapter 4. Biological Resources

- Fifty species of mammals' ranges overlap with the French Creek watershed (Appendix F).
- There are at least 379 bird species that nest, winter, or migrate throughout Pennsylvania. The Audubon Society has designated four Important Bird Areas within the watershed.
- Studies of amphibians and reptiles in the Erie County portions of the French Creek watershed documented 26 species, including 10 salamanders, eight toads and frogs, two turtles and six snake species
- The completely-aquatic eastern hellbender salamander (Cryptobranchus alleganiensis) is very sensitive to pollution and depends on waterways that are cool and clear, containing many large rocks. It has been designated Pennsylvania's State Amphibian and is one of the largest salamanders in the world and the largest salamander in North America.
- Many game species occur in the French Creek watershed. Some important game species include white-tailed deer, wild turkey (Meleagris gallopavo), ruffed grouse (Bonasa umbellus), eastern cottontail, numerous waterfowl species, introduced ring-necked pheasant (Phasianus colchicus), and squirrels. Popular furbearing species include coyote (Canis latrans), red fox (Vulpes vulpes), gray fox (Urocyon cinereoargenteus), beaver, muskrat, mink (Mustela vison), and raccoon.
- French Creek has gained national attention for its diversity of aquatic life. Eighty-eight species of fish have been recorded in the French Creek drainage. There are 15 species of darters in the French Creek watershed, which are an important indicator of water quality because they remain relatively stationary in stream systems and rely on high dissolved oxygen, low temperatures, and low bed siltation rates.
- Darters are important species of host fish that are vital to the completion of the freshwater mussel reproductive cycle, as they transport young mussels on their gills to aid in their dispersal.
- Native wild (not stocked) brook trout populations are found within 40 streams of the French Creek watershed. It is Pennsylvania's state fish and PA's only native stream trout. It is restricted to the smaller, colder and higher-quality tributaries and sub-watersheds. It can be regarded as an indicator of ecosystem quality.
- French Creek is probably most noted for its freshwater mussel species. Twenty-nine out of Pennsylvania's approximate 65 species of freshwater mussels have been recorded from the French Creek drainage. The unique and complex lifestyle of freshwater mussels makes them extremely vulnerable to pollution and habitat degradation.
- Aquatic insects and other macroinvertebrates are commonly used as indicators of water quality and have been studied by PA Department of Environmental Protection, U. S. Army Corps of Engineers, U. S. Geological Survey, university researchers, and other organizations in areas of the French Creek watershed.
- Invasive exotic plant species like purple loosestrife, hybrid cattails, and common reed are threats to the native vegetation especially in wetland areas throughout the watershed. These plants thrive in disturbed areas and once established, can quickly out-compete native plants.
- A total of 302 PNDI elements are reported within the French Creek watershed, including two mammals, 26 bird species, 26 fish species, 15 reptile and amphibian species, 33 insect species, 19 unionid species, four snails, 15 natural communities, one unique geological feature, and 153 plants.

Chapter 5. Cultural Resources

- The French had originally named French Creek "La Riviere aux Boeufs," or "the river of the cattle," for bison that were reported to have been found in this area. It was George Washington on his trip in 1753 that first called this waterway "French Creek".
- In the mid-1700s, the French established a series of forts—Fort Presque Isle (at present day Erie), Fort LeBoeuf (at present day Waterford), Fort Machault (at present day Franklin), and Fort Duquesne (at present day Pittsburgh)—in western Pennsylvania to halt English expansion westward.
- The Pennsylvania Historical & Museum Commission reviews and lists properties in Pennsylvania for inclusion on the list dozens of sites within the watershed on the National Registry that are listed in Appendix I.
- The French Creek watershed offers the outdoor enthusiast a good supply of outdoor recreational amenities. Public facilities offer access to French Creek, area lakes and reservoirs, natural areas, wildlife refuges, and hunting land (Figure 9).
- Existing trails and greenways within the French Creek watershed include Bessemer Trail, Meadville, Edinboro University Highlands Trail (bike trail for Edinboro University faculty, students, and staff only), Erie National Wildlife Refuge trails, French Creek Valley Conservancy select public properties, including Brock's Lookout, Lew's Land Trails, Smock Riverwalk; Routes 6 and 6N in Erie and Crawford Counties are designated as an on-road National Recreational Trail, South Branch French Creek Trail, State Game Lands trails throughout the watershed, The Ernst Bike Trail from Meadville to Conneaut Lake, Trails on WPC's Lowville Fen Natural Area north of Lowville, West Branch French Creek Trail, Western Pennsylvania Conservancy (select public properties), Woodcock Creek Lake trails
- Numerous local parks can be explored through DCNR's Explore PA Local Parks website. Many State Game Lands throughout the watershed, Cornplanter State Forest Ingraham Tracts, conservancy-protected public lands, and the Erie National Wildlife Refuge (with some restrictions) also provide areas for public hunting, fishing, bird and wildlife viewing. Ice-fishing is a common winter sport on area lakes and reservoirs, as well.
- Camping is available at private campground facilities at Conneaut Lake and in Meadville offering tent and RV campsites, as well as cabins and a variety of included recreational amenities, including fishing, swimming, basketball and pickleball courts.
- The main stem of French Creek is navigable by paddle craft for its entire length from the Union City Dam to its confluence with the Allegheny River at Franklin. There are several public access points along the entire stretch of French Creek and was developed into an official Pennsylvania Water Trail (Figure 25). It is managed locally by the French Creek Valley Conservancy (FCVC).
- Power boating and jet skiing are mainly restricted to lakes, although some power boating does occur on the lower reaches of French Creek where public access areas allow motorboats to be launched and the creek is large enough to maneuver. Many of the lakes and reservoirs in the watershed have motor or horsepower restrictions for powerboats. Conneaut Lake and Edinboro Lake have no restrictions on horsepower and these see extensive powerboat and jet ski usage.

- Thermal pollution is primarily caused by the loss of riparian buffers along streams also contributes to heat pollution from lack of shade.
- Agricultural and timber practices that cause excess erosion have the potential to contribute high levels of nutrients via sediment in runoff to surface waters and groundwater.
- As impervious surface area increases through development and urbanization, runoff from parking lots, roadways, rooftops, and other areas carry high levels of nutrients to receiving waterbodies.
- Nutrients and organic waste are often contributed by point sources (i.e. a pipe from a sewage treatment plant or industrial discharge, on-lot septic systems). Organic wastes are discharged from food processing plants and other industries and on-lot septic systems and can severely impact water quality.
- Many industrial, agricultural, and household processes produce toxic waste materials, such as heavy metals, hydrocarbons of petroleum origin, pesticides, organic poisons (PCBs) and inorganic poisons (chlorine and ammonia) that are not readily biodegradable and rarely occur in nature or in high concentrations.
- Chlorine is commonly used for wastewater treatment by municipal, industrial, and private treatment facilities. Chlorine is extremely toxic to freshwater mussel glochidia (young) and other aquatic organisms.
- Brine and petroleum products can be released from abandoned oil and gas wells. These substances can be extremely toxic to receiving waters. Brine often has a higher salt content than seawater and is found in deep aquifers.
- Roads and railways are often built along stream and river floodplains where topography is flat. These transportation corridors can negatively impact aquatic habitats by contributing pollutants in runoff. Common pollutants associated with runoff include road salt, heavy metals, and petroleum products. These pollutants can degrade riparian vegetation and alter aquatic habitats.
- Non-native, invasive species are defined as plants, animals, or other organisms introduced to an ecological system that cause economic or environmental harm or harm to human health. Invasive species are one of the most prominent threats to wildlife conservation in the project area. The Pennsylvania Natural Heritage Program (PNHP) administrates iMapInvasives as an online, GIS-based data management system used to assist community scientists and natural resource professionals working to protect our natural resources from the threat of invasive species.
- The activities that most commonly contribute sediments to surface waters are improper agricultural practices, deforestation, construction of buildings and roadways, urbanization, and mining. Increased amounts of suspended solids and sedimentation can lead to increased turbidity, which blocks sunlight penetration and decreases dissolved oxygen levels. Increased scour and erosive forces occur when sediment levels are increased because sediment particles act like sandpaper abrading the streambed.
- Human impacts to the landscape have altered the hydrology of the French Creek watershed in several ways. Dams, like the Union City Dam, Woodcock Creek Dam, Tamarack Lake dams, and others, have altered natural flow regimes.
- Diversion of surface water and extractions of groundwater occur throughout the French Creek watershed. Farmers irrigate fields from nearby streams during the warmest, driest months of the year when aquatic organisms are already stressed by higher water temperatures and low dissolved oxygen levels.

- The majority of private residences in the watershed depend upon public or private groundwater withdrawals for their water needs. Industries are another user of groundwater. Because groundwater recharges streams and lakes, alterations to groundwater levels can impact aquatic, wetland, and riparian habitats.
- Mining also has the potential to alter watershed hydrology. Removing large amounts of sand and gravel potentially alters flow regimes of groundwater in the mined area. Subtle increases or decreases in groundwater levels can negatively impact stream, lakes, and wetlands and alter the habitats for many organisms.
- Modifications to natural stream channels and streambanks are frequent occurrences. Often these modifications occur without adequate thought to the impacts to aquatic organisms or areas downstream of the modification. It is important to note that alterations to the natural stream channel or streambank design are usually not without negative consequence.
- The French Creek watershed has many recreational opportunities that focus on the natural resources of the watershed. As recreational demands in the watershed increase as populations increase, aquatic habitats are at risk of being trampled and disturbed.
- Climate change refers to long-term shifts in temperatures and weather patterns having widespread effects on the environment: glaciers and ice sheets are shrinking, river and lake ice is breaking up earlier, plant and animal geographic ranges are shifting, and plants and trees are blooming sooner.
- The Nature Conservancy's Resilient and Connected Landscapes project comprehensively mapped resilient lands and significant climate corridors across eastern North America and developed innovative new techniques for mapping climate-driven movements.
- Flooding is a common occurrence in the French Creek watershed. Large flood events can damage homes, roads, bridges, and other infrastructure; wipe out crops; and harm or displace people. Climate change may cause river floods to become larger or more frequent. Municipalities should develop stormwater management ordinances to address these concerns.
- Forest fragmentation, threats to forest regeneration, and invasive species compromise forest health and resilience to those very same threats. Equally important is identifying that the lack of forest age diversity poses a threat to the upper watershed. Sustainable forest management will cultivate forest age diversity and ecosystem/watershed resilience.
- Illegal dumps pose direct threats to the watershed and have a high potential to contaminate waterways. Waste containing hazardous materials soaked by rainfall may cause contaminants to leach through the soil or run off the land surface, contaminating ground or surface water. Trash and debris can directly enter the stream through heavy rainstorms, affecting water quality and stream aesthetics.
- the annual French Creek Cleanup organized by FCVC, there are several other groups that work to clean-up illegal dumpsites and littering through the region, including Keep Pennsylvania Beautiful affiliates: Keep Erie County Beautiful, Tri-County CleanWays (Butler, Lawrence, and Mercer counties), and PA CleanWays of Venango County.
- Alternative energy sources should be planned to avoid the loss of diverse habitat within natural lands to those installations. The clear-cutting of forests or conversion of agricultural land in the watershed for solar energy production should be a concern to the watershed's integrity.

Chapter 7. Management Options

Management options are organized by chapters of the plan and aim to restore, maintain, and enhance the resources within the French Creek watershed. The success of this plan is dependent upon support and cooperation from numerous watershed organizations, state and federal agencies, counties and municipalities, businesses, industries, and public of the French Creek watershed. The plan is intended to serve as a reference and to guide voluntary actions; it is not a regulatory document. The plan and management options can be referenced to support the need for grant funding for conservation partners and municipalities to implement projects. French Creek Conservation Consortium affiliates and other potential partners included in the Directory of Watershed Resources (Appendix M) may provide planning and fundraising guidance and technical assistance to complete projects and support the conservation goals listed below.

- **Project Area Characteristics Management Options**
  - Goal 1-A: Proactively plan for and manage future development to comply with local comprehensive plans and regional culture.
  - Goal 1-B: Carefully plan development to ensure economic enhancement while preserving community character without adversely affecting quality of life.
  - Goal 1-C: Enhance marketability to prospective business and establish economic stability to maintain a balanced workforce.
  - Goal 1-D: Encourage economic growth with minimal impacts to the environment.
  - Goal 1-E: Increase communications and cooperation among municipalities and counties within the region to promote sharing of services and improve conditions collectively affecting the watersheds.
  - Goal 1-F: Enhance transportation infrastructure.
  - Goal 1-G: Enhance financial support and services to prepare emergency response providers.
  - Goal 1-H: Educate stakeholders how land use planning can be effective and about benefits of watershed protection and the use of best management practices.
  - Goal 1-J: Support community libraries and expand service opportunities.
- **Land Resources Management Options**
  - Goal 2-A: Explore opportunities to generate alternative energy.
  - Goal 2-B: Reduce impacts caused by dirt and gravel roadways.
  - Goal 2-C: Establish cooperation between surface and subsurface rights landowners and develop protection rights for surface landowners in order to protect their property.
  - Goal 2-D: Preserve agricultural lands and culture for future generations.
  - Goal 2-E: Establish or enhance incentives for land protection and conservation practice implementation.
  - Goal 2-F: Deter illegal dumping of trash through monitoring, inventorying, and cleaning up illegal dumpsites, and through public education and outreach
  - Goal 2-G: Work with agriculturalist to install best management practices at their farms to reduce impacts on herds and area waterways.
  - Goal 2-H: Minimize impacts caused by exploration, production, retirement, and abandonment of wells.
  - Goal 2-I: Reclaim abandoned wells, mines, and quarries.
  - Goal 2-J: Protect ecologically significant lands.
  - Goal 2-K: Increase awareness about practices to assist agricultural and forest landowner in managing their lands effectively.
- **Water Resources Management Options**
  - Goal 3-A: Protect area waterways while increasing wildlife habitat opportunities.
  - Goal 3-B: Increase awareness about the benefits of riparian corridors.
  - Goal 3-C: Investigate wetlands and their functions and protect their resources.

- Goal 3-D: Educate stakeholders about the value and importance of wetlands.
- Goal 3-E: Reduce the amount of erosion, sedimentation, and other pollutants entering waterways.
- Goal 3-F: Monitor water quantity to ensure demand does not exceed water supply.
- Goal 3-G: Monitor the use of brine water as a treatment on dirt and gravel roads.
- Goal 3-H: Minimize potential flooding damages by taking a proactive approach to managing floodplains.
- Goal 3-I: Encourage non-structural approaches to floodplain management.
- Goal 3-J: Minimize impacts from stormwater through planning.
- Goal 3-K: Establish, maintain, or upgrade sewage treatment facilities.
- Goal 3-L: Establish, maintain, or upgrade water treatment facilities.
- Goal 3-M: Develop a monitoring plan for the watershed or completed project areas, integrating quality assurance/quality control standards into the plan.
- Goal 3-N: Promote conservation practices to reduce water consumption.
- Goal 3-O: Assess natural and man-made impoundments and implement ecosystem enhancement recommendations.
- Goal 3-P: Protect and evaluate waterways that are designated or eligible for classification as High Quality, Exceptional Value, or Class A.
- Goal 3-Q: Reduce water quality impacts by properly disposing of un-needed medication.
- Goal 3-R: Provide educational programs educating residents about impacts and pollution sources.

- **Biological Resources Management Options**
  - Goal 4-A: Reduce impacts caused by invasive and nuisance species.
  - Goal 4-B: Develop, adopt, and implement management plans to protect forest and wildlife resources.
  - Goal 4-C: Implement best management practices to protect forest resources.
  - Goal 4-D: Identify Important Bird and Mammal Areas
  - Goal 4-E: Identify and protect biologically diverse areas.
  - Goal 4-F: Enhance aquatic habitats.
  - Goal 4-G: Protect rare, threatened, and endangered species and their habitats.
  - Goal 4-H: Identify and protect important habitats for plant and animal species.
  - Goal 4-I: Increase the use of native plants in landscaping and remediation projects.
  - Goal 4-J: Implement wildlife management practices to protect biodiversity.

- **Cultural Resources Management Options**
  - Goal 5-A: Increase awareness of recreational resources through marketing and outreach.
  - Goal 5-B: Enhance recreational opportunities for sportsmen and outdoor enthusiasts.
  - Goal 5-C: Increase recreational opportunities for area youth by establishing programs, encouraging outdoor recreational activities and opportunities.
  - Goal 5-D: Improve recreational facilities and ensure availability and access.
  - Goal 5-E: Establish, expand, and improve area trails.
  - Goal 5-F: Link recreational facilities to each other.
  - Goal 5-G: Encourage environmentally sound practices when operating recreational vehicles and enforce existing laws to minimize intrusion on private lands.
  - Goal 5-H: Expand awareness, appreciation, and support for the arts.
  - Goal 5-I: Highlight and preserve local history to promote its appreciation within the region.
  - Goal 5-J: Promote community involvement in conservation and educational initiatives.
  - Goal 5-K: Establish ongoing environmental education programs and displays.
  - Goal 5-L: Educate recreation users about proper and safe practices.

CHAPTER 1. PROJECT AREA CHARACTERISTICS

Location

French Creek and the West Branch of French Creek originate in Chautauqua County, in western New York and flow southwest to their confluence in Erie County, Pennsylvania. The South Branch of French Creek originates near Corry in Erie County and flows west to its confluence with French Creek west of Union City in Erie County. French Creek then flows south through Crawford County, the northeast corner of Mercer County, and finally into Venango County, where it flows southeast to its confluence with the Allegheny River at Franklin, Pennsylvania (Figure 1). As part of the Allegheny River watershed, French Creek contributes to the Ohio River, the Mississippi River, and ultimately the Gulf of Mexico. The French Creek watershed drains portions of 72 townships, cities, and boroughs in northwest Pennsylvania (Figure 2). Approximately 93% of the watershed is within Pennsylvania, with the remaining 7% comprised of headwater areas in New York.

Size

The entire French Creek watershed covers an area of approximately 1,237 square miles (791,405 acres). The main stem of French Creek flows 117 miles from its New York headwaters to its mouth at Franklin. A relatively large tributary watershed, French Creek constitutes 11 percent of the drainage basin for the Allegheny River, which covers approximately 11,000 square miles.

Topography and Glacial History

The French Creek watershed lies almost entirely (over 90 percent of the watershed) within the Northwestern Glaciated Plateau Section of the physiographic Appalachian Plateaus Province. This region is characterized by low, gently rolling hills, broad valleys, and glacial features (Hasse, 1992). Elevation in the watershed ranges from about 1000 feet at the mouth of French Creek and extreme western portions of the watershed to approximately 1900 feet in northeastern sections of the watershed. Vertical topographic relief increases from the northwest to the east, the southwest, and the south.

The small portion of the watershed that lies outside the Northwestern Glaciated Plateau Section is comprised of the extreme south and southeastern sections in Venango and a small portion of eastern Crawford counties. This portion of the watershed lies in the High Plateau Section of the physiographic Appalachian Plateaus Province. This area was unaffected by glacial processes, resulting in steeper side slopes and a plateau top, that was uplifted and bisected by deep valleys and eroded by streams.

The topography of the French Creek watershed is characteristic of glaciated regions. Advancing glaciers gouged out valleys and rounded hills. When they receded, they left thick deposits of clay, silt, sand, and gravel, known as glacial drift, in the valleys and across the landscape. The bedrock of the area was formed during the Devonian, Mississippian, and Pennsylvanian Periods of the Paleozoic Era, or about 300-400 million years ago and is characterized by sandstones, siltstones, and shales. These areas were not as affected by the mountain-building processes as were the adjacent areas to the east (Barnes and Sevon, 1996).

Overview of the French Creek Watershed

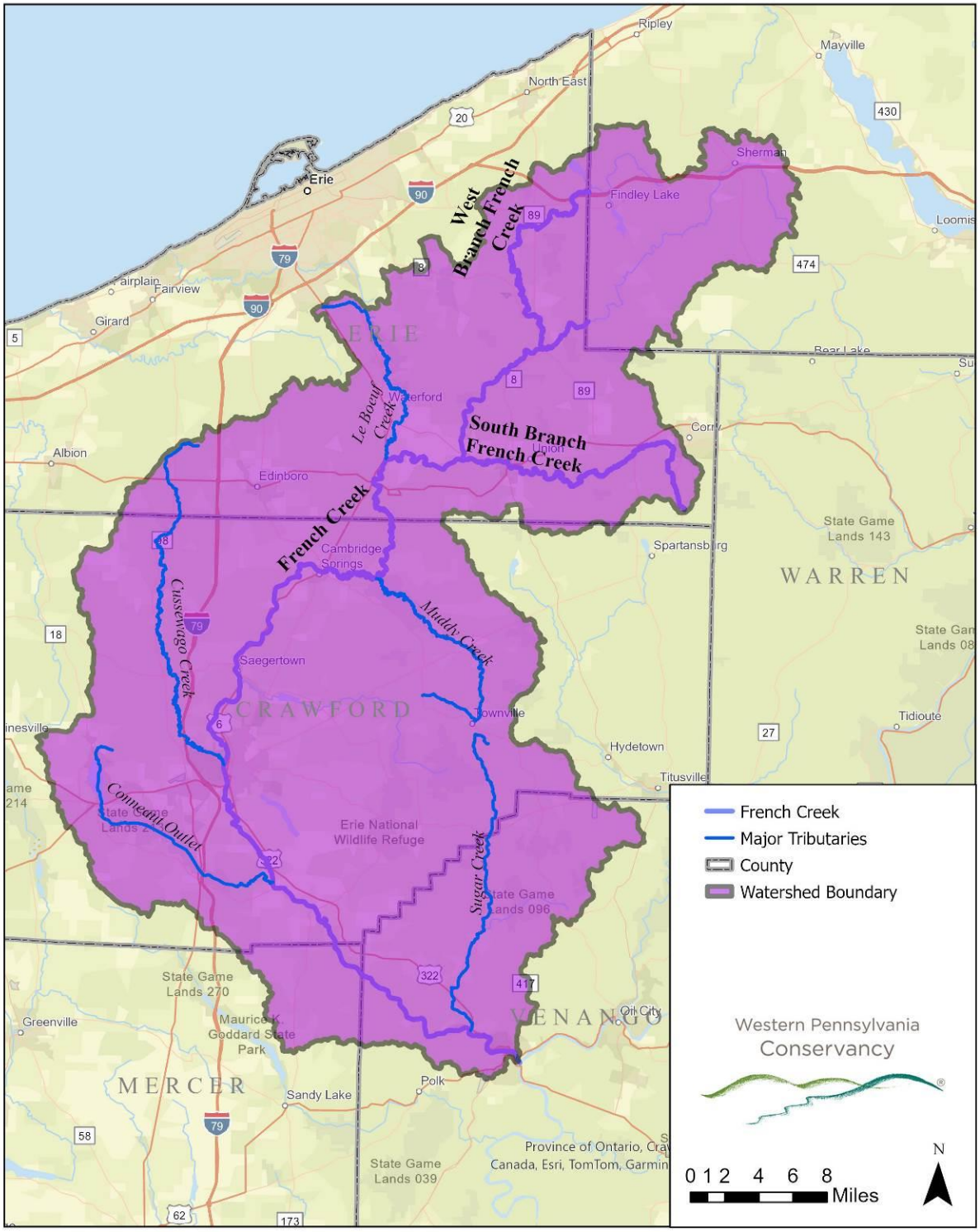


Figure 1. Overview of the French Creek Watershed Boundary

French Creek Watershed Municipalities

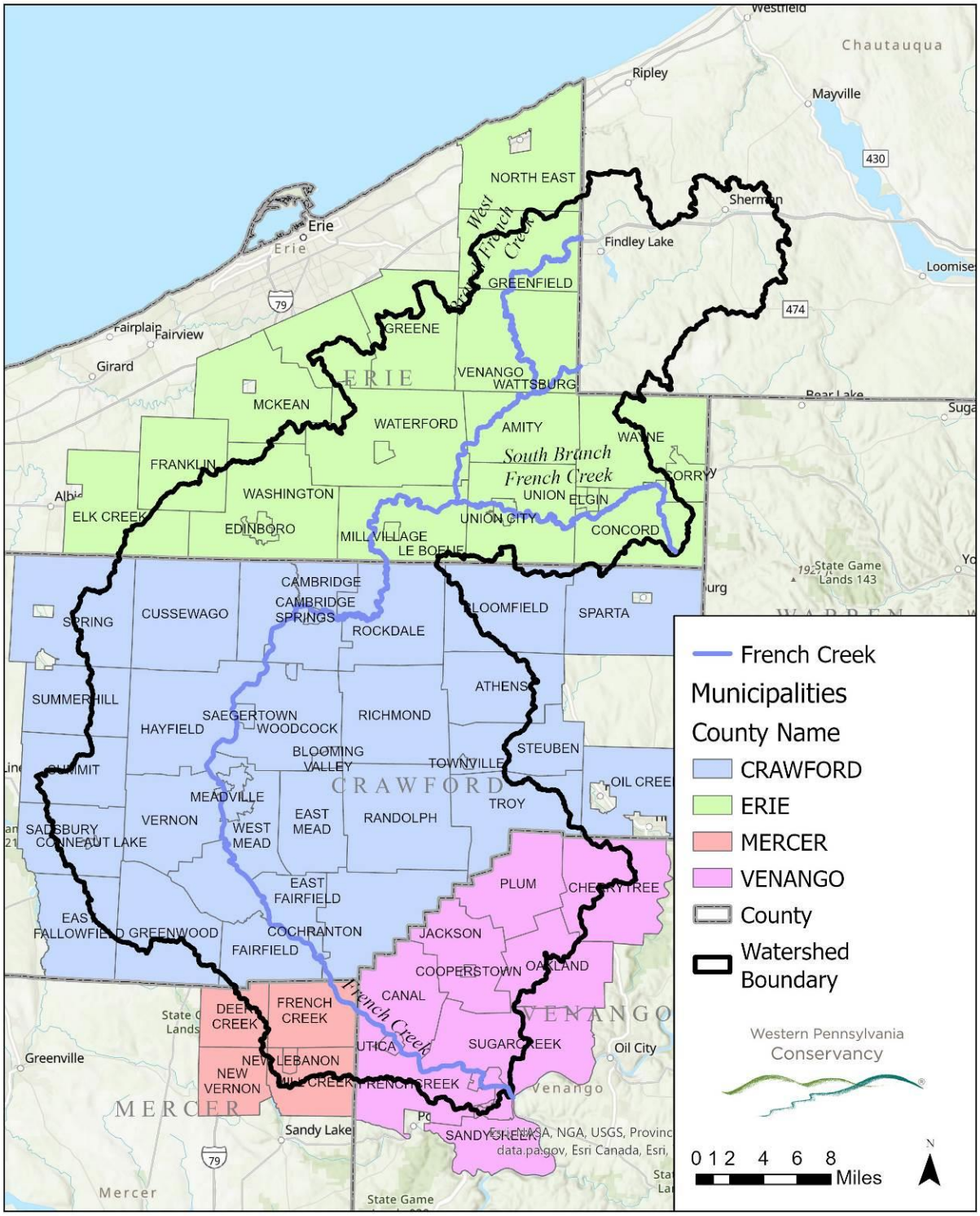


Figure 2. French Creek Watershed Municipalities

The French Creek landscape was shaped by four separate glaciations during the Pleistocene Epoch, which occurred between about 2,000,000 and 20,000 years ago. The oldest glaciation, the older pre-Illinoian, occurred between about 2,000,000 and 770,000 years ago. Not much is known about this period except that it is responsible for the Slippery Rock Till. The younger pre-Illinoian glaciation was the most extensive Pennsylvania glaciation and occurred prior to 770,000 years ago. It is responsible for the highly eroded Mapledale Till. The late Illinoian glaciation occurred between 196,000 and 128,000 years ago. It is responsible for the Titusville Till and contributes greatly to the topography of northwest Pennsylvania. The most recent glacial advance, the late Wisconsinan, is divided into four separate advances, which occurred between 22,000 and 17,000 years ago. These advances are recognized by the glacial till they deposited on the landscape, overlaying that of the late Illinoian glacial period, although not reaching as far south as the late Illinoian. The earliest and most southward advance is known as the Kent Till. Subsequent advances, which traveled increasingly shorter distances into Pennsylvania are the Lavery Till, Hiram Till, and the most recent Ashtabula Till. The Wisconsinan glaciation had early and middle periods prior to the late period, however it is speculative as to whether they reached Pennsylvania. The advances of the late Wisconsinan would have overlaid these earlier Wisconsinan advances, reaching further into Pennsylvania.

Northwest Pennsylvania's glacial history was important to formation of the French Creek watershed. Many characteristics of the watershed can be attributed to its glacial history. The late Illinoian glaciation is responsible for most of the landscape characteristics. The southernmost terminal moraine of the Titusville Till stretches from Beaver County in the southwest, through Crawford County, to Warren County in the northeast. The area behind the moraine, which encompasses most of the French Creek watershed, has broad uplands separated by linear valleys and long, linear, rounded ridges. Landscape features run northwest to southeast, which was the flow direction of the glaciers as well as pre-glacial drainage (Sevon and Fleeger, 1999). Additionally, the glacial history is responsible for many wetland areas and glacial lakes here.

Perhaps the most interesting result of the glaciers in northwest Pennsylvania is the reversal of the direction of drainage for river systems. Prior to glaciation, the Allegheny River consisted of three separate stream systems that flowed north into the ancestral St. Lawrence drainage. The massive continental ice sheet and deposited glacial till blocked the northerly flow of these systems causing them to flow southward and eventually join to form the present-day Allegheny River system and contribute to the Ohio River drainage. One of the three ancient Allegheny systems, the "middle" Allegheny system, formed the French Creek drainage.

It has been theorized that this reversal of flows allowed aquatic species from the northern ancestral St. Lawrence drainage to be mixed with species from the Ohio River drainage. This species "capturing" theory has been used to explain the high biodiversity found in French Creek and other parts of the Allegheny and Ohio River drainages. Yet, others have theorized that the Ohio River drainage historically contained all native species presently found in the French Creek watershed and the large number of Atlantic slope species not found in the French Creek drainage, which may be evidence that the flow-direction reversal contributed interior species to certain Atlantic slope drainages.

Sugar Creek (Photo: WPC)

Major Tributaries

There are 10 major sub-basins to French Creek with a drainage area greater than 50 square miles.

- West Branch of French Creek (77.7 mi^2) originates in Chautauqua County, New York and joins the main branch of French Creek at Wattsburg, Erie County, Pennsylvania.
- South Branch of French Creek (80.3 mi2) originates near Corry, Erie County, and joins French Creek west of Union City.
- LeBoeuf Creek (63.3 mi2) flows through Waterford in Erie County, drains Lake LeBoeuf, and joins French Creek near the village of Indian Head.
- Muddy Creek (83.6 mi2) flows through the Seneca Division of the Erie National Wildlife Refuge and joins French Creek near the village of Miller Station, Crawford County.
- Conneauttee Creek (60.8 mi2) enters and drains Edinboro Lake, flows through Edinboro, Erie County, and joins French Creek near Cambridge Springs, Crawford County.
- Woodcock Creek (50.5 mi2), which has been dammed by the United States Army Corps of Engineers (USACE) to form Woodcock Creek Lake, joins French Creek near Saegertown, Crawford County.
- Cussewago Creek (96.9 mi2) joins French Creek at Meadville, Crawford County.
- Conneaut Outlet (101 mi2) drains Conneaut Lake and joins French Creek south of Shaw's Landing, Crawford County.
- Little Sugar Creek (53 mi2) joins French Creek at Cochranton, Crawford County.
- Sugar Creek (167 mi2) joins French Creek at the village of Sugarcreek, Venango County, four miles upstream of Franklin.

Natural resources pressures and species distribution may differ significantly among sub-basins, requiring different solutions to natural resource restoration, maintenance, and enhancement needs.

French Creek Watershed Major Sub-Basins

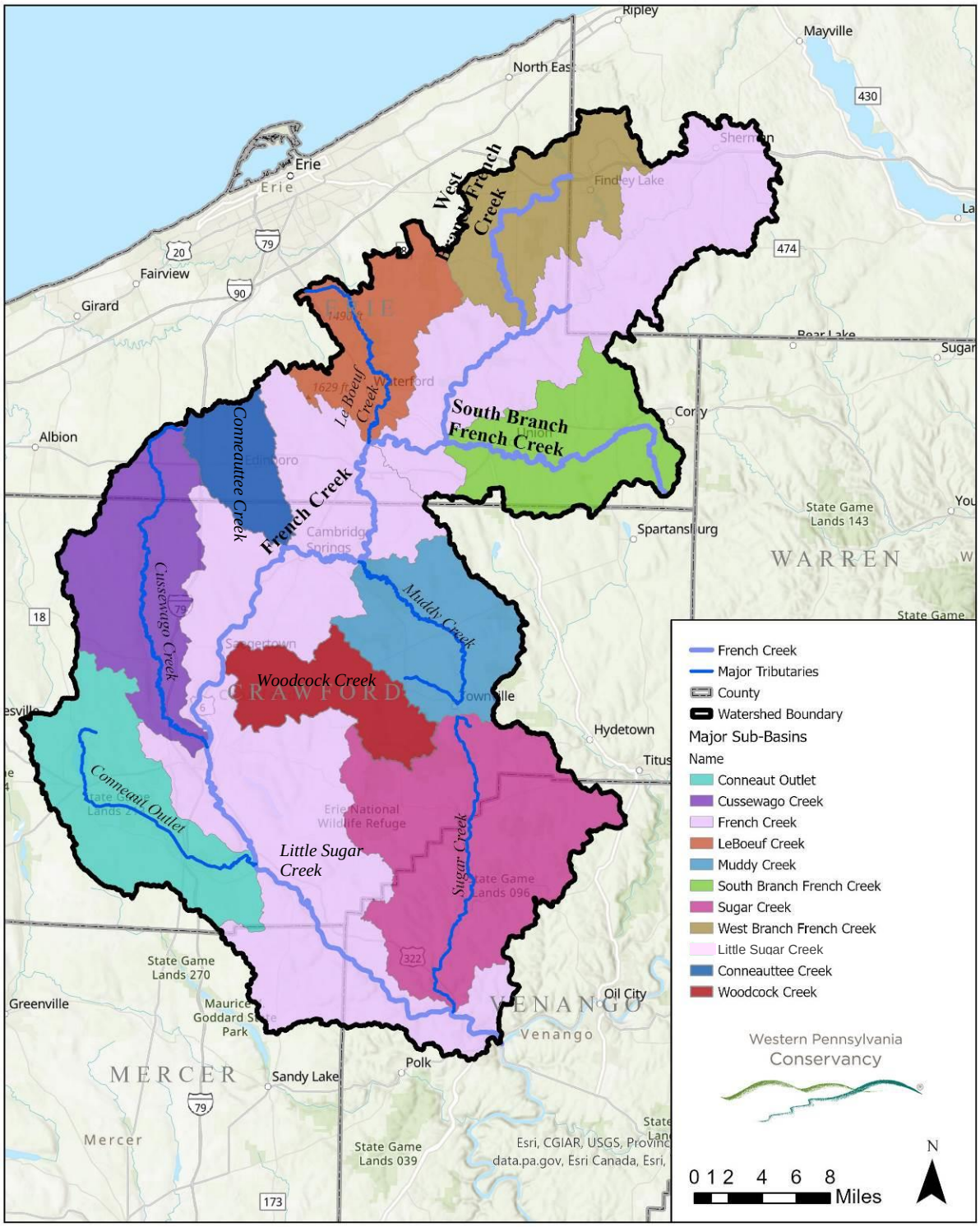


Figure 3. French Creek watershed Major Sub-Basins

Land Use

The French Creek watershed is highly rural with a few urban centers. The landscape is a mix of land use classifications, primarily divided between forested and agricultural (Figure 4). The estimated percentages of land cover types of the watershed are as follows:

Mixed forest and evergreen forest	54%
Hay/pasture	19%
Row crops	9%
Open water and wetlands	9%
Urban and lawns	9%
Surface mine/quarry	<1%

The northern portion of the French Creek watershed is a changing landscape. The watershed is seeing increasing suburban development from the city of Erie. This trend brings about an increase of impervious surfaces as parking lots and roadways increase thus increasing the amount of polluted run-off that reaches the stream. There is current pressure to subdivide farms for development of home sites as well as other commercial operations. Suburban development and large-scale farming operations generally have a greater negative impact to the health of a stream than smaller farms and open areas. In 2017, there were 1,162 farms in Erie County totaling 153,403 acres, for an average size of 132 acres. Compared to 2012 data, these data represented an 18% decrease in the number of farms, a 9% decrease in the overall acreage of farmed lands in the county, and an 11% increase in the average size of farm. This representative loss of small farming operations in favor of larger operations and a net loss of agricultural land in Erie County is a trend observed throughout the region. Please see 2017 Census of Agriculture, U.S. Summary and State Data, for data per county and complete foot notes, explanations, definitions, commodity descriptions, and methodology.

The middle portion of the French Creek watershed, largely in Crawford County, faces pressures from the urbanized areas surrounding Meadville, the largest city on French Creek. Point discharges from industries and municipal sewage treatment plants in and around Meadville have negatively affected the water quality of sections of French Creek. Increases in impervious surfaces due to urban development have increased the incident of flash flooding and disturbances to the streambed. The rural portions of the watershed in Crawford County also face suburban sprawl and home site development. Additionally, much of the riparian buffers to streams in the watershed have been fragmented. In 2017, there were 1,091 farms in Crawford County, with an average size of 178 acres, for a total farmed area of 194,447 acres. Compared to 2012 data, these data represented a 19% decrease in the number of farms, a 15% decrease in the overall acreage of farmed lands in the county, and a 6% increase in the average size of farm.

The lower portion of the watershed, largely in southeastern Crawford and northern Venango counties, has limited agriculture and a steeper, more forested terrain. Land use in this part of the watershed reflects the unglaciated nature of the landscape. Failing septic systems associated with streamside cottages and older homes are suspected of impacting these and other sections of French Creek. Venango County, where most of the southern, unglaciated portion of the watershed is found, had 409 farms in 2017, with an average size of 130 acres, for a total farmed area of 53,338 acres. Compared to 2012 data, these data represented a 12% decrease in the number of farms, a 13% decrease in the overall acreage of farmed lands in the county, and a 2% decrease in the average size of farm.

French Creek Watershed Land Cover

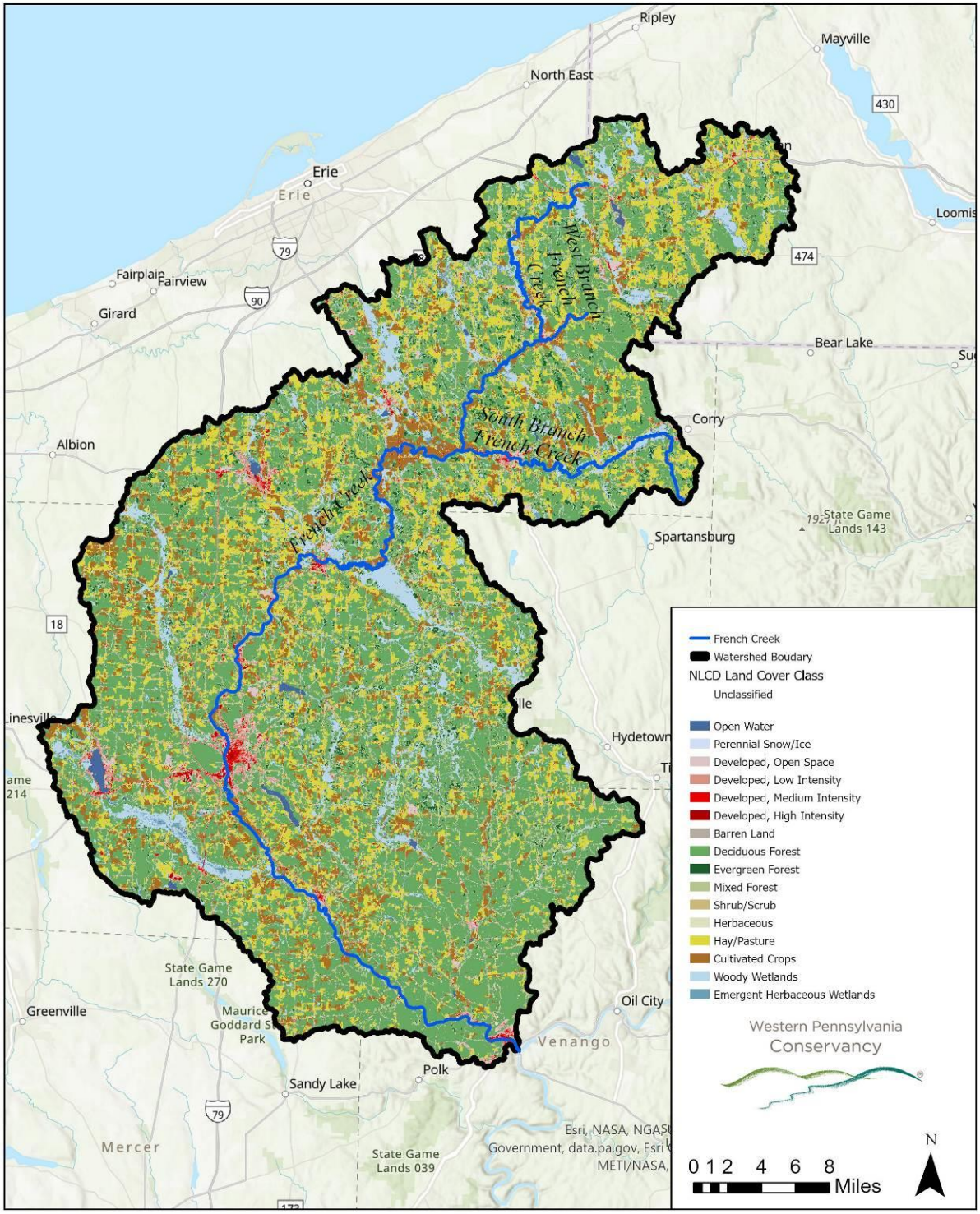


Figure 4. French Creek Watershed Land Cover

Forestry

Forests provide a variety of resources and environmental services, including timber, wildlife habitat, water filtration, aesthetics, recreation, and employment. In 1630, an estimated 95 percent of Pennsylvania was forested. Harvesting timber to support a growing nation reduced the forest coverage of Pennsylvania to 30 percent by 1907. Over the past century, the number has rebounded; today, Pennsylvania Department of Conservation and Natural Resources (PA DCNR) estimates that 57 percent of Pennsylvania's land area is forested (2021).

Nationally, Pennsylvania ranks first in hardwood production. Seventeen million of Pennsylvania's 28 million acres are covered by forest. Private landowners own the majority of forest in Pennsylvania —71 percent or 12.5 million acres. State forests and state game lands make up 22 percent of Pennsylvania's forest area; and three percent is national forestland.

New York has 18.6 million acres of forestland, accounting for 62 percent of its land cover. Much of this land is privately owned and managed for wood or pulp. The majority of land owned by the state is forested.

Forestry is a key component to the history and future of many communities. Before settlement in the region, the landscape was forested and provided habitat for numerous species of wildlife. The lumber industry in the region started in the 1800s and is a major component of the local economy. Many livelihoods are based on the forest industry, remaining an important economic driver of the region.

Forests play a vital role in maintaining good water quality, serving as the headwaters and living filters for municipal drinking/domestic water supplies and sustaining high-quality coldwater streams with productive fisheries and abundant wildlife habitat. Sound management of our forest and planting trees along streams on private lands helps keep these important waters clean. Sustainable harvesting of forests is also important in maintaining forest health, providing a steady flow of wood products to the economy, creating wildlife habitat, and enhancing forest health and diversity.

Agriculture

Agriculture played a historically significant role in the development of the region and continues to play an important role in the watershed's economy, both in Pennsylvania and New York. Although agriculture is the top land use in the region, a drastic decrease in agricultural activity has been seen. Corporate farming companies and residential and commercial development companies are buying many of the small family farms that remain in the area. Several programs are available to assist farmland owners in maintaining their farms and keeping them in agricultural production. USDA Farm Service Agency (FSA) administers the 2018 Farm Bill programs.

Prime Agricultural Soils

Soils that are important in meeting the short- and long-term needs for food production are prime agricultural soils. These soils meet certain physical, chemical, and slope characteristics that produce the highest yields with minimal input of energy and economic resources. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in each county is responsible for designating the prime agricultural soils based upon predetermined criteria. Typically, the criteria include level to nearly-level slopes, a well-drained structure, deep horizons, an acceptable level of alkaline or acid components, and the capacity for producing food and crops. Regenerative agriculture methods should be demonstrated through agriculture education, service, and merchandising cooperatives.

Farmland of Statewide Importance

Farmland of statewide importance consists of soil that did not meet the criteria to be designated as prime agricultural soil, but are important agricultural soils nonetheless. These soils, when managed properly, can produce high yields of crops. Farmland of statewide importance, designated by the State Rural Development Committee, may include soils selected for agriculture by state law.

Agricultural Land Preservation

Agricultural lands are key properties sought for commercial and residential development. These large areas of open space require less preparation prior to development; and are therefore less expensive to develop.

Agricultural preservation benefits the economy, community, environment, and food supply. The agricultural industry contributes $1 trillion to the national economy through product exports and employment. Open lands protect the environment through flood control, maintaining air quality, recharging groundwater, providing food and habitat for wildlife, and protecting wetlands and watersheds.

Pennsylvania

Pennsylvania has been pursuing farmland preservation since 1988, when the **Farmland Protection Program** was formed by state legislature. To qualify for the Farmland Protection Program, farms must be designated in agricultural security areas.

The **Agricultural Security Area (ASA)** program, created by the Pennsylvania legislature, is administered at the township level. ASAs are rural, agricultural areas targeted for protection from urban development. They receive special consideration regarding local ordinances affecting normal farming practices, state agency rules and regulations, and in eminent domain condemnation proceedings. To be eligible for an ASA designation, at least 250 acres must be nominated. The 250 acres do not have to be contiguous, but individual parcels must be no less than 10 acres. Lands eligible for the program include pasture, hayland, woodland, and cropland.

In addition to the ASA program, Pennsylvania administers the **Clean and Green Program**, which provides incentives to landowners for preservation of agricultural land, forestland, and open space. The program provides real estate tax benefits by taxing land based on its "use value," rather than its market value. The program is voluntary and is administered by individual county assessment offices.

New York

In 1971, the New York legislature passed the **Agricultural Districts** law to encourage farmers to partner together and commit their land to agricultural uses in return for property tax relief and protection from outside intrusions. The law was amended many times, and in 1992, it was improved with the passage of the **Agricultural Protection Act**. The act strengthened farmers' right to farm, placed greater scrutiny on state projects that might negatively affect agriculture, and set in motion the development of county agricultural and farmland protection strategies. New York's Agricultural Districts are similar to ASAs in Pennsylvania. Several factors are considered before Agricultural District enrollment is granted—the viability of active agriculture, presence of viable farms not currently in active agriculture, nature and extent of other land uses, and county development patterns and needs. Landowners make their request to the county agricultural and farmland preservation board and county planning board, where a public meeting is held.

Nutrient Management Program

The Nutrient Management Program was enacted in 2005 through Act 38, which coordinates existing laws and regulations, such as Right to Farm and the Nutrient Management Act, along with new initiatives. The requirements of this act only apply to high-density animal operations, which are defined as operations with at least 2,000 pounds of animal weight per acre.

Act 38 was established to ensure that local government ordinances regulating normal agricultural operations were consistent with the authority given to them to protect citizens' health, safety, and welfare. Act 6, the previous Nutrient Management Act, was replaced with Act 38, which retained most of the current laws and regulations, adding manure setback and riparian buffer requirements. Manure cannot be applied to fields within 100 feet of a waterbody, unless a vegetative riparian buffer of at least 35 feet wide, meeting U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS) standards, is used to prevent runoff. The new act provides timely review of potentially unauthorized local ordinances and requires certain farms to develop odor management plans.

Odor management plans are site-specific plans that identify economically viable practices, technologies, standards, and strategies to manage impacts of odors generated from animal housing or manure storage. Concentrated Animal Operations (CAOs) and Concentrated Animal Feeding Operations (CAFOs) that build or expand animal housing facilities or manure storage facilities are required to have an odor management plan. New agricultural operations that will be regulated as a CAO or CAFO, and existing animal operations that increase in size, becoming a CAO or CAFO, also need odor management plans that must be written by certified odor management specialist.

Planning and Development Controls

The highly rural French Creek watershed is largely comprised of private landowners, some who may oppose land-use regulations. Often this opposition is a double-edged sword, which leaves those same landowners unprotected against rampant residential, commercial, or industrial development on neighboring properties. Examples of this were clearly evident during this planning process as residents throughout the watershed opposed power plant proposals, racetrack development, and cell phone tower placement, to name a few. Some municipalities in the watershed have little or no zoning and subdivision regulations, and many of the regulations in place are quite dated and provide little protection for environmental or social concerns. Municipalities without these land-use controls are generally governed by county-wide controls. The list of municipal planning and development controls in place for municipalities in the French Creek watershed is shown in Table 1.

Table 1. List of Municipal Planning and Development Controls for Municipalities in the French Creek Watershed

Erie County Comprehensive Plan					
Municipality	**Comprehensive Plan**	**Zoning Ordinance**	**Subdivision Regulations**	**Stormwater Management**	**Official Map**
Amity Township	Yes	Yes	No	No	No
Concord Township	Yes	Yes	No	No	No
Corry City	Yes	Yes	Yes	No	No
Edinboro Borough	Yes	Yes	Yes	No	No
Elgin Borough	Yes	Yes	No	No	No
Elk Creek Township	Yes	No	Yes	Yes	No
Franklin Township	Yes	Yes	Yes	Yes	No
Greene Township	Yes	Yes	Yes	Yes	Yes
Greenfield Township	Yes	Yes	Yes	Yes	No
LeBoeuf Township	Yes	Yes	No	No	No
McKean Township	Yes	Yes	Yes	Yes	Yes
Mill Village Borough	Yes	Yes	No	No	No
North East Township	Yes	Yes	Yes	Yes	No
Summit Township	Yes	Yes	Yes	Yes	Yes
Union Township	Yes	Yes	No	No	No
Union City Borough	Yes	Yes	Yes	No	No
Venango Township	Yes	Yes	Yes	Yes	No
Washington Township	Yes	Yes	Yes	Yes	Yes
Waterford Borough	Yes	Yes	Yes	No	No
Waterford Township	Yes	Yes	Yes	Yes	No
Wattsburg Borough	No	Yes	No	No	No
Wayne Township	No	Yes	No	No	No
Source: Erie County Department of Planning					

Mercer County Comprehensive Plan					
Municipality	**Comprehensive Plan**	**Zoning Ordinance**	**Subdivision Regulations**	**Stormwater Management**	**Official Map**
Deer Creek Township	Yes	No	No	No	No
French Creek Township	Yes	No	No	No	No
Mill Creek Township	Yes	No	No	No	No
New Lebanon Borough	Yes	Yes	No	No	No
New Vernon Township	Yes	Yes	No	No	No
Source: Mercer County Regional Planning Commission					

Crawford County Comprehensive Plan					
Municipality	**Comprehensive Plan**	**Zoning Ordinance**	**Subdivision Regulations**	**Stormwater Management**	**Official Map**
Athens Township	No	No	No	Yes	No
Bloomfield Township	Yes	Yes	No	Yes	No
Blooming Valley Borough	Yes	Yes	Yes	Yes	No
Cambridge Township	Yes	Yes	Yes	Yes	No
Cambridge Springs Borough	Yes	Yes	Yes	Yes	No
Cochranton Borough	Yes	Yes	Yes	Yes	No
Conneaut Lake Borough	Yes	No	No	Yes	No
Cussewago Township	Yes	No	No	Yes	No
East Fairfield Township	Yes	Yes	Yes	Yes	No
East Fallowfield Township	Yes	No	No	Yes	No
East Mead Township	Yes	Yes	No	No	No
Fairfield Township	Yes	Yes	Yes	Yes	No
Greenwood Township	Yes	Yes	Yes	Yes	No
Hayfield Township	No	No	No	Yes	No
Meadville City	Yes	No	Yes	Yes	No
Oil Creek Township	No	No	No	Yes	No
Randolph Township	Yes	No	Yes	Yes	No
Richmond Township	Yes	Yes	Yes	Yes	No
Rockdale Township	Yes	Yes	Yes	Yes	No
Sadsbury Township	Yes	Yes	Yes	Yes	No
Saegertown Borough	Yes	Yes	Yes	Yes	No
Spring Township	Yes	Yes	Yes	Yes	No
Steuben Township	Yes	Yes	Yes	Yes	No
Summerhill Township	Yes	Yes	Yes	No	No

Summit Township	Yes	Yes	Yes	Yes	No
Townville Borough	Yes	Yes	Yes	Yes	No
Troy Township	No	No	No	Yes	No
Union Township	No	No	No	Yes	No
Venango Borough	Yes	No	Yes	Yes	No
Venango Township	Yes	Yes	No	Yes	No
Vernon Township	Yes	No	No	Yes	No
Wayne Township	Yes	Yes	Yes	Yes	No
West Mead Township	Yes	No	No	Yes	No
Woodcock Borough	Yes	No	Yes	No	No
Woodcock Township	Yes	Yes	Yes	Yes	No
Source: Crawford County Planning Commission					

Venango County Comprehensive Plan					
Municipality	**Comprehensive Plan**	**Zoning Ordinance**	**Subdivision Regulations**	**Stormwater Management**	**Official Map**
Canal Township	Yes	No	No	No	No
Cherrytree Township	Yes	No	No	No	No
Cooperstown Borough	Yes	No	No	No	No
Franklin City	Yes	Yes	Yes	No	No
French Creek Township	Yes	No	No	No	No
Jackson Township	Yes	No	No	No	No
Oakland Township	No	No	No	No	No
Plum Township	No	No	No	No	No
Sugarcreek Borough	Yes	Yes	No	No	No
Utica Borough	No	No	No	No	No
Source: Venango County Planning Commission					

The Pennsylvania Climate Change Mitigation and Resilience Network (PA Climate Network) was formed in 2023 to serve as a trusted hub for sharing best practices and advancing climate education and literacy throughout the state for all Pennsylvanians. Stormwater Management Plans and Climate Action Plans should be developed by communities in anticipation of more frequent and severe weather events stressing dated and often inadequate or failing infrastructure. Many funding programs have become available through the Bipartisan Infrastructure Law.

In 2021, the Pennsylvania Climate Action Plan outlined a pathway to reaching Pennsylvania's greenhouse gas reduction goals of 26 percent by 2025 and 80 percent by 2050 from 2005 levels. Some climate action plans that have been enacted within the watershed include the Meadville Climate Action Plan 2022 and in 2023, the Erie County Community Climate Action Plan was developed, both serving as references for other counties and communities considering the benefit of these planning guides.

Whether driven by local municipalities or citizen-based organizations, community revitalization initiatives should be informed by the needs of the residents living there and empowered by the governments managing those community resources. Revitalization efforts seek to reactivate engagement between local governments and the public to cooperatively plan community development projects that enhance the aesthetics of the town, manage growth with smart design principles and nature-based solutions for infrastructure needs (i.e. bioswales for stormwater management), bring competitive technologies and access to healthcare, emergency services, and good education. This will attract businesses to support economic development and interest families in living there to support social, recreational, and civic services to those communities.

Cambridge Revitalization Economic and Tourism Expansion (CREATE) has a goal to help make the Cambridge Springs area a place that residents and businesses can be proud to be part of and that visitors want to return to by creating a more vibrant downtown, inspiring a sense of community pride, capitalizing on French Creek, and expanding tourism.

The Cochranton Area Redevelopment Effort (CARE) fosters a broad range of improvements in the Cochranton area through revitalization initiatives, including community planning, beautification, support for enhanced medical services, development of senior housing facilities, historical preservation, advancement of the arts and outdoor recreation facilities.

Union City Borough set an excellent example by developing the French Creek Trail Town Plan to enhance natural and recreational resources and to maintain the green and sustainable characteristic of South Branch French Creek as an important community asset to propel economic development. The plan identified potential public parks along land and water trails through the borough, fishing piers and boating access facilities for ADA access, invasive species control, stream restoration, and native tree plantings, along with trail connectors to weave recreational traffic from the trails to the businesses in town. Since completing the plan, the borough has recruited partners and shared fundraising and project management responsibilities to implement several demonstration projects to improve their community.

Waterford Economic Community Action Network (W.E.C.A.N.) is a volunteer-supported, nonprofit civic organization working closely with Waterford Borough and Waterford Township that has come together to make a positive impact in its community. Its mission is to support the efforts of other nonprofits and to help promote local businesses and engage with others in a way that will help its community thrive. Its volunteer committees focus on revitalizing different parts of the community, including outdoor recreation and artistic beautification projects. It highlights local businesses of Waterford, and promotes kayaking, fishing, and boating opportunities on Waterford's various waterways, including the French Creek Water Trail.

Social/Economic Profile

Transportation

Roads

Interstate Highways, U. S. State Highways, and major secondary roads provide easy access to almost all parts of the French Creek watershed (Figure 5). Interstate 79 links the watershed with the Pittsburgh metropolitan area to the south and Erie to the north, and I-90, which runs north of

the watershed across Erie County, links the area with Cleveland and Buffalo. Interstate 80 intersects I-79 approximately 20 miles south of the watershed, allowing convenient access for east-west traffic.

The main stem of French Creek is within three miles of a U. S. Highway for its entire length after its confluence with the South Branch. U. S. Highway 6 runs from the city of Corry along the South Branch to the confluence with the main stem of French Creek. It continues, following the main stem, along with U. S. Highway 19, to Meadville and crosses French Creek seven times. From Meadville, U. S. Highway 322 continues along French Creek to its mouth at Franklin, crossing the creek only once in Franklin.

Railroads

The French Creek corridor, with wide, flat floodplains, provided an ideal route for railroads (Figure 5). Allegheny and Eastern Railroad operated through Union City from the city of Erie to Corry. Allegheny and Eastern Railroad was merged into Buffalo and Pittsburgh Railroad a subsidiary of Genesee & Wyoming Inc. in 2004. From Union City, Oil Creek and Titusville Railroad follows French Creek to Meadville. The Oil Creek Railway Historical Society operates a nearby tourist rail-line running tours between Titusville and Oil Creek. Norfolk Southern Railroad operates lines from Meadville to Franklin and Oil City, Venango County.

These tracks follow the main stem of French Creek. Also, from Meadville, a Norfolk Southern line runs southwest to Shenango, Mercer County and points west.

The Bessemer and Lake Erie Railway runs through an extreme western portion of the French Creek watershed in western Crawford County. Inactive rail beds run from Corry to Titusville, Union City to Cambridge Springs, Meadville to Conneaut Lake, and a section of the Penn Central Railway near Franklin.

Airports

No major airports exist within the French Creek watershed. Erie International Airport lies to the north in Erie. Other major international airports within an hour drive of the watershed include Pittsburgh, Cleveland, and Buffalo. Several small airports within the watershed include: Corry-Lawrence Airport in Corry, Port Meadville Airport in Meadville, and Venango Regional Airport in Franklin. The Erie County Airport in Wattsburg is currently listed as abandoned.

French Creek Watershed Transportation

Figure 5. French Creek Watershed Transportation

Demographics

Population Centers

Population centers with greater than 1000 people per square mile include: the city of Corry, Edinboro Borough, Union City Borough, Waterford Borough, and Wattsburg Borough in Erie County; Cambridge Springs Borough, Conneaut Lake Borough, the city of Meadville, and Venango Borough in Crawford County; and the city of Franklin in Venango County. These population centers account for nearly one-third of the entire watershed population and all are either located on the main stem or a major branch of French Creek or center around one of the glacial lakes within the watershed. The remainder of the population exists in more sparsely populated centers or scattered throughout the highly rural watershed.

All municipalities within the French Creek watershed are considered rural by the U.S. Department of Commerce with the exception of McKean and Summit Townships, both suburbs of the city of Erie, Sugarcreek Borough, the city of Corry, Edinboro Borough, Union City Borough, the city of Meadville, and the city of Franklin. Only the last five municipalities are considered 100 percent urban. Across the four-county region, the average population by race is approximately 90.7% white, 3.8% black, 2.2% Hispanic, and 5.5% other minorities.

Major Employers

The top 10 employers in Crawford County include Meadville Medical Center, State Government, Crawford County, Wal-Mart Associates Inc., Crawford Central School District, Allegheny College, Acutec Precision Aerospace Inc., Penncrest School District, The Arc of Crawford County Inc., and Channellock Inc. The top 10 employers in Erie County are Erie Indemnity Co., UPMC Hamot, Wabtec US Rail Inc., State Government, Saint Vincent Health Center, Wal-Mart Associates Inc., Federal Government, School District of the City of Erie, Erie County, and Regional Health Services Inc. The top 10 employers in Mercer County are Wabtec US Rail Inc., State Government, Wal-Mart Associates Inc., Joy Cone Company, UPMC Horizon, Steward Sharon Regional Health System, First National Bank of Pennsylvania, NLMK Pennsylvania

Corp, Grove City College, and Estes Express Lines. The top 10 employers in Venango County are UPMC Northwest, State Government, Joy Global Underground Mining Inc., Liberty Electronics Inc., Wal-Mart Associates Inc., Venango County, Franklin Area School District, Matric Limited, Oil City Area School District, and Webco Industries Inc. Unemployment rates within the watershed in 2024 were Erie–3.5%, Crawford–3.2%, Mercer–3.4%, Venango–3.5% compared to 3.4% statewide (Pennsylvania Department of Labor and Industry).

French Creek Watershed 2020 US Census Population Data

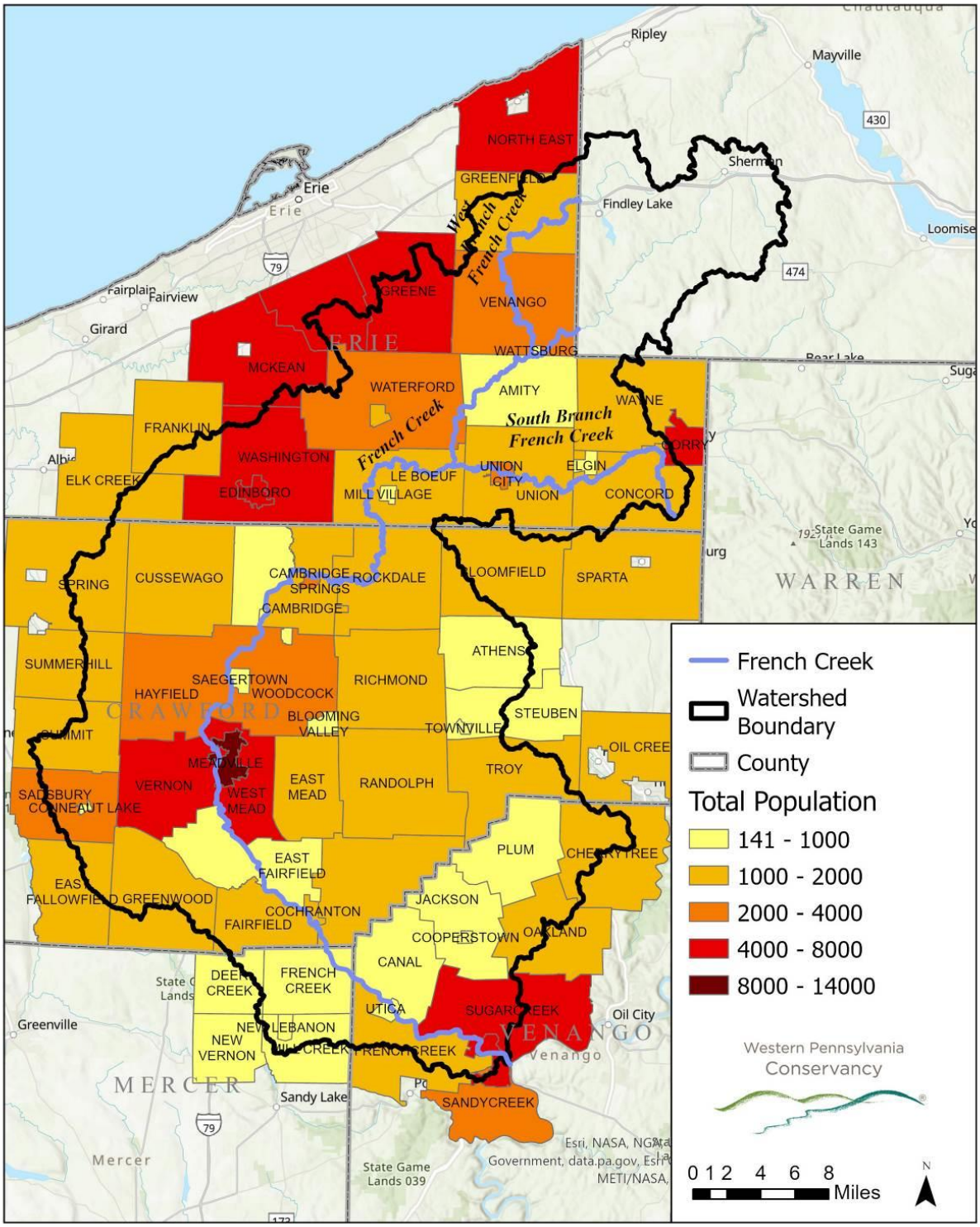


Figure 6. French Creek Watershed U.S. Census Population Data 2020

Outstanding or Unique Features

Forested wetland in Crawford County (Photo: WPC)

French Creek watershed are a product of its glacial history. Northwest Pennsylvania is home to seven inland glacial lakes. Five of the seven glacial lakes are found within the French Creek watershed. Conneaut Lake, the largest (by surface area) natural lake in the Commonwealth, is located in western Crawford County. Just east of Conneaut Lake is Conneaut Lake Kame, one of the largest kames in the state. The kame is a glacial deposit of sand and gravel in a depression formed near the terminal end of a glacier. Also associated with Conneaut Lake is Conneaut Marsh, the largest marsh complex in the state, which includes State Game Lands #213 and WPC's Conneaut Marsh Natural Area. Following Conneaut Outlet for several miles, Conneaut Marsh is the result of an ancient stream channel filled in with glacial material. It provides core habitat for several species of concern. Other glacial lakes within the watershed include Sugar Lake, Edinboro Lake, Lake LeBoeuf, and Lake Pleasant. These lakes have associated with them, wetlands, including rare calcareous fens, unique biological communities, and many species of concern.

Other outstanding glacial features occur throughout the watershed. Moraines, mounds of till representing the furthest advancement of a glacier, occur throughout the watershed for each advance of the Wisconsinan glaciation. A terminal moraine, marking the southernmost advance of the glaciations, runs through southeast Crawford County. Drumlins, smooth and rounded low-lying hills of glacial material, are found in Venango Township, Erie County. Additionally, there are numerous wetlands throughout the watershed, including rare wetland communities like bogs and fens. Wattsburg Fen Natural Area is an excellent example of these rare fens found in Erie County. This fen is part of the Titus and Wattsburg Bogs registered National Natural Landmark. Fens occur when wetland areas are fed by calcareous, highly alkaline groundwater giving rise to unique plant communities adapted to these alkaline conditions. The calcareous, alkaline groundwater is a result of glaciation.

French Creek is itself a unique feature. As a small to medium size, medium gradient river, French Creek is a relatively intact example of a free-flowing riverine system; an ecosystem type that is rapidly disappearing. Twenty-seven species of freshwater mussels and more than 80 species of fish, including 15 darter species, are still found in the watershed along with numerous other wildlife and plant species.

CHAPTER 2. LAND RESOURCES

Geology and Soil Characteristics

The uppermost bedrock of the French Creek watershed is derived from sedimentary materials laid down during the Devonian Period and the younger Mississippian and Pennsylvanian Periods (Figure 7). Shales and siltstones of the Devonian Canadaway and Conneaut Formations underlie the northernmost sections of the watershed. The Cattaraugus shales, sandstones, and redbeds also of Devonian age underlie most of southern Erie County and northern Crawford County.

Crawford County portions of the watershed also contain sandstones and shales of the Pocono Formation (Mississippian Period) and southern Crawford County uplands are associated with the Pottsville Group (Pennsylvanian Period). Pottsville shales and sandstones, along with those from the Pocono Group, make up the bedrock of the Mercer and Venango County portions of the watershed as well (Shepps *et al*., 1959).

Importantly for the water quality of French Creek, is the absence of the coal-containing Allegheny Group (Pennsylvanian Period). This has allowed French Creek to escape the fate of coal mining and associated mine drainage, which has decimated streams to the south and east.

Soils are formed through the interaction of five major factors. These soil-forming factors are: (1) parent material, (2) climate, (3) relief, (4) living organisms, and (5) time. The degree to which the soils are influenced by the individual factors of soil formation varies from place to place (U. S. Department of Agriculture, 1960). Soils of the French Creek watershed have been forming from glacial material (till and outwash) for only approximately 15,000 years since the last glaciation (Figure 8). This relatively young soil has not had time to form distinctive layers and primarily assumes its characteristics from glacial parent material, relatively wet climate, and organic material.

Soils in the glaciated French Creek watershed are generally of two primary categories:

- Gravelly soils of outwash terraces, floodplains, and moraines formed from stream deposits and glacial outwash.
- Soils of upland areas formed from the weathering of glacial till.

The outwash terraces are associated with the lowlands around stream channels. These are comprised of gravelly and sandy soils. Glacial outwash is formed from materials carried away from glaciers by meltwater. These soils may range from saturated to droughty depending on the level of the water table and the percent slope. The steep soils tend to be droughty while the soils in depressions are very poorly drained. These soil types include a small percentage of muck and peat producing areas northwest of Corry where bog and fen wetlands are present. The soils of this general area were historically used for intensive farming. Potatoes were the principal cash crop. Corn, small grains, and alfalfa were grown on the well-drained and moderately drained soils (U. S. Department of Agriculture, 1960). Dairy farming was the most common type of farming on the more poorly-drained soils. Although many farms still exist, including some dairy operations, much of the agriculture in the watershed has been lost and portions of this land have reverted to forests or meadows. The better-draining, sloping and moderately-steep soils are used as a source of sand and gravel.

French Creek Watershed Bedrock Geology

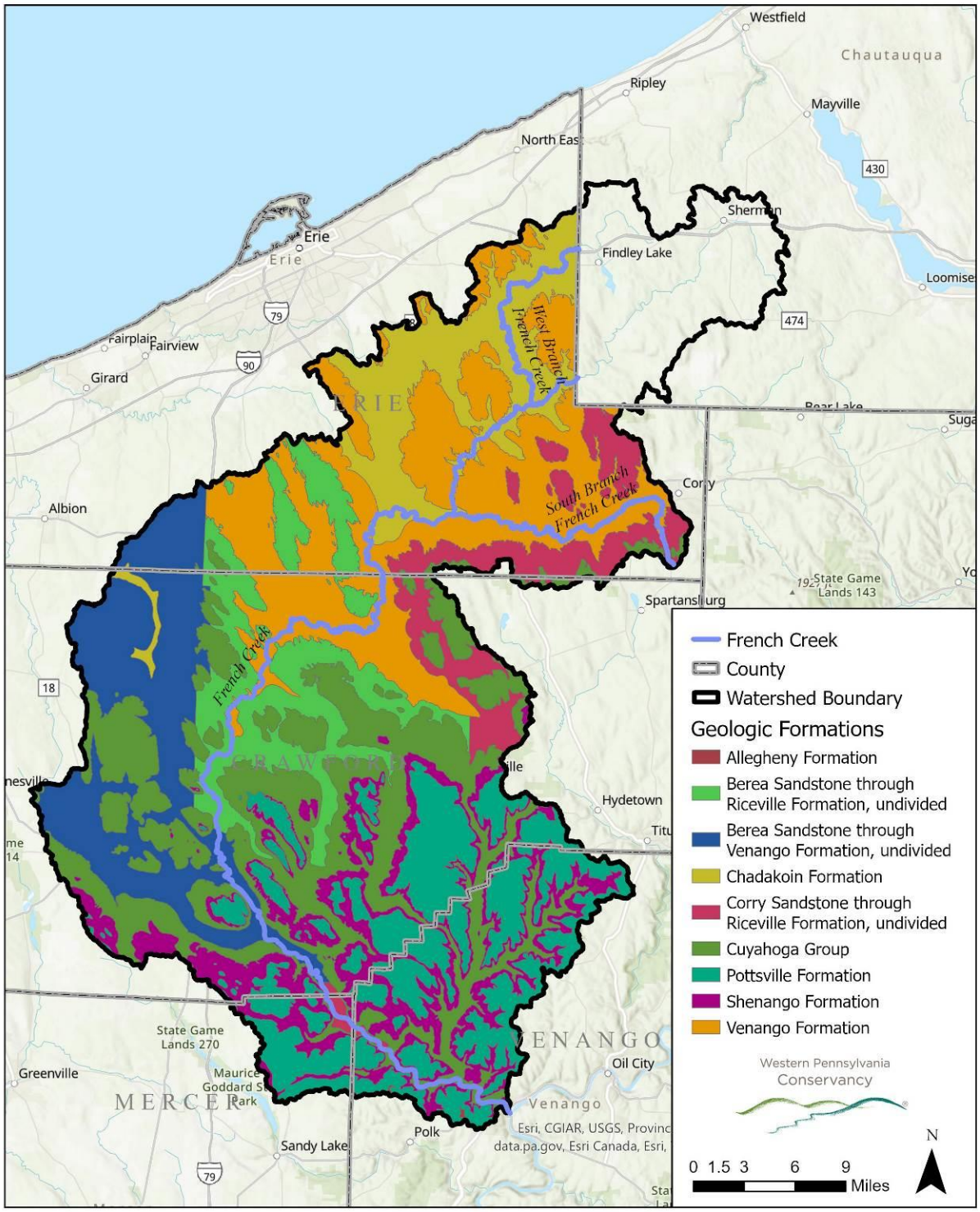


Figure 7. French Creek Watershed Bedrock Geology

French Creek Watershed Soil Layers

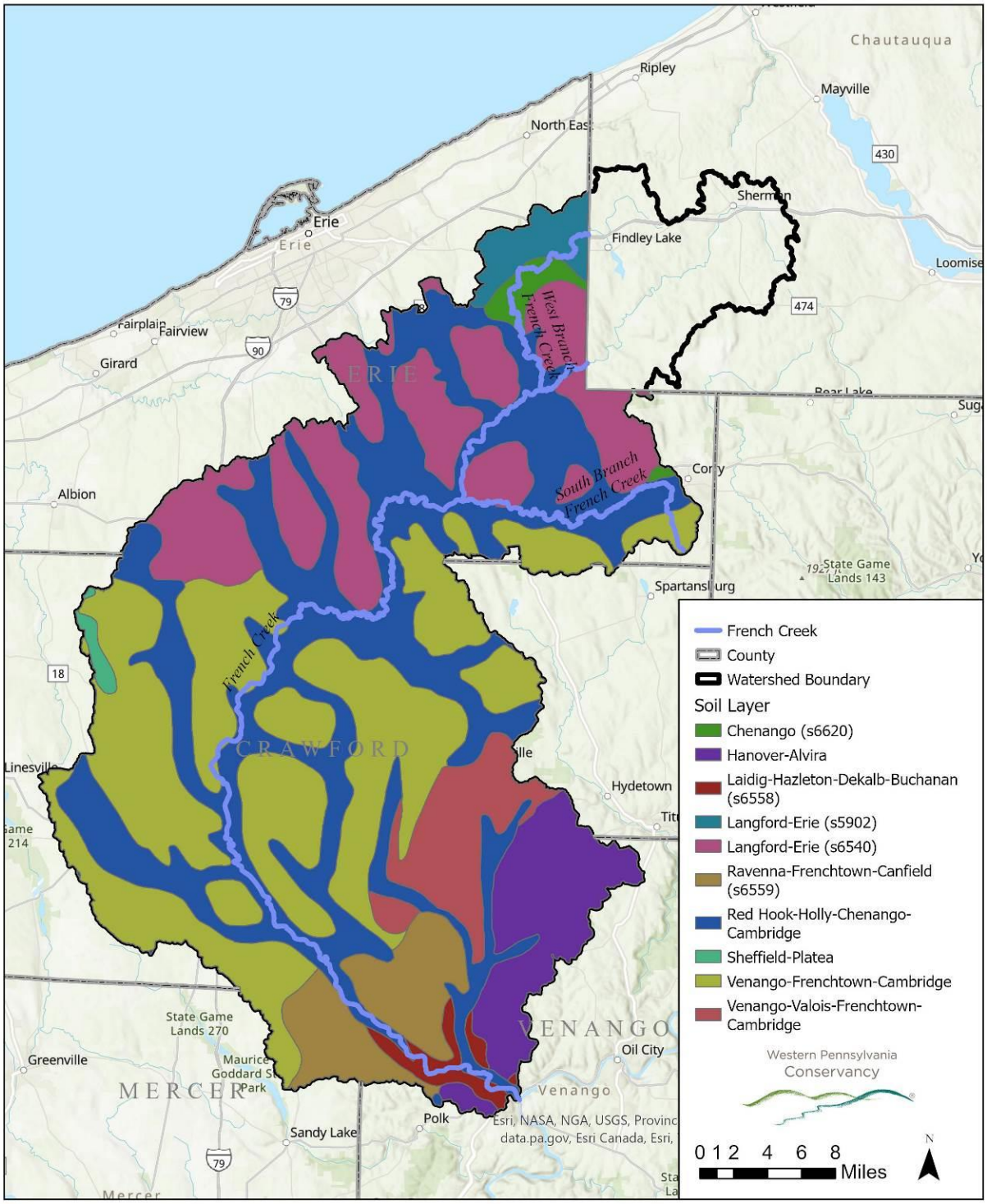


Figure 8. French Creek Watershed Soil Layers

Upland areas in glaciated portions of the watershed are rounded hills surrounded by the glacial outwash terraces. In general, these soils range from poorly drained in level areas to excessively drained in steep areas and ridge crests where the soil is thin. The soil is underlain by moderately calcareous till, forming a mantle that is slowly permeable to water resulting in a high-water table. Most of the soils of this general area were historically used for dairy farming and livestock production. Corn, hay, and small grains were the principal crops but often did not do well due to wet fields. Many of the dairy farming operations no longer exist and much of this land has reverted to forest.

Livestock in pasture (photo: WPC)

Silty and clayey soils of glacial lakebeds also occur in a few locations in the northern portions of the watershed. These areas indicate the previous existence of a lake, which captured the finest silt and clay particles of glacial outwash and filled in over time.

Portions of the extreme southern reaches of French Creek in Venango County have very steep-sided stream valleys associated with them. These areas were not reached by glaciers and exhibit very different topography and soil types. The floodplains are largely deposited alluvial material, which is usually well drained. The stream valley hillsides are well drained, stony soils underlain by shale, siltstone, and sandstone. The increased relief in this portion of the watershed has not favored agriculture and consequently many ridges are heavily forested.

Within these general soil classifications exist many soil types that vary greatly from one area to another. It is important to consider the soil type in a particular area when considering farming, development, or any project, which could impact the watershed. It is also important to consider soil types when implementing Best Management Practices (BMP) and riparian restoration projects through streambank stabilization. Some soils are much more erodible than others.

Ownership

Publicly-owned lands in the French Creek watershed are those owned by the Pennsylvania Department of Conservation and Natural Resources (DCNR), Pennsylvania Game Commission (PGC), Pennsylvania Fish & Boat Commission (PFBC), U. S. Army Corps of Engineers (USACE), U. S. Fish & Wildlife Service (USFWS), and other government agencies including counties and local municipalities (Figure 9; Appendix K). Local parks can be explored through DCNR's Explore PA Local Parks. Since 2002, public land ownership increased from four to seven percent of the total land area within the watershed.

A small section (128.55 acres) of Cornplanter State Forest, DCNR, is within the French Creek watershed in Crawford County near Townville. There are no other state parks in the watershed, but several nearby, including Presque Isle State Park, Pymatuning State Park, Maurice K. Goddard State Park, Oil Creek State Park.

PGC owns the majority of public lands, more than 30,000 acres of State Game Lands (SGL) in noncontiguous parcels spread throughout the watershed (Table 2).

Table 2. State Game Lands Within the French Creek Watershed

SGL #	Acreage	Township	County
96	4,954.41	Cherrytree, Jackson, Oakland, Plum	Venango
270	159.04 (in part)	Deer Creek, French Creek	Mercer
102	383.74	Amity, Union	Erie
109	1,969.82	Greene, Summit, Waterford	Erie
154	1,418.41 (in part)	Wayne	Erie
155	392.86	Venango	Erie
161	232.42	Greene	Erie
162	1,067.99	Amity	Erie
163	333.18 (in part)	Greenfield	Erie
167	628.50	Amity, Venango	Erie
190	393.86	Amity, Waterford	Erie
191	1,223.40	Greenfield, Venango	Erie
192	334.67	Washington, Waterford	Erie
218	1,338.93	Greene	Erie
69	4,475.85	Randolph, Richmond, Troy	Crawford
85	676.50	Western Game Farm, Rockdale	Crawford
122	2,734.24	Athens, Steuben	Crawford
146	525.58	Richmond	Crawford
144	648.48 (in part)	Sparta, Concord	Crawford, Erie
152	641.15	Cussewago	Crawford
199	1,129.35	Athens	Crawford
200	154.73	Richmond	Crawford
269	683.17	Cussewago	Crawford
277	1,070.39	Rockdale, Venango	Crawford
213	5,603.83	Greenwood, Union, Vernon	Crawford
435	710.29	Woodcock Creek Lake	Crawford
Sources: PA Game Commission; PA Natural Heritage Program			

The largest contiguous public land in the watershed is the USFWS Erie National Wildlife Refuge in Crawford County, separated among two divisions—Seneca Division and Sugar Lake Division—totaling 8,959 acres.

The USACE operates public access areas on 3,085 acres surrounding the Union City Dam and Woodcock Creek Lake. PFBC owns, leases, or has easements on more than 1,000 acres of public access areas, including Tamarack Lake (Appendix K). The Commission also operates two fish culture stations at Corry State Fish Hatchery and Union City Aquatic Conservation Center, the latter of which also began propagating freshwater mussels in 2020.

Western Pennsylvania Conservancy has protected 6,421 acres in the watershed up to 2024, some of which has been transferred to public lands, while approximately 5,254 acres have either been retained in fee-simple and maintained as public nature preserves or protected with private conservation easements. French Creek Valley Conservancy (FCVC) has protected 3,497 acres in

French Creek Watershed Public Lands

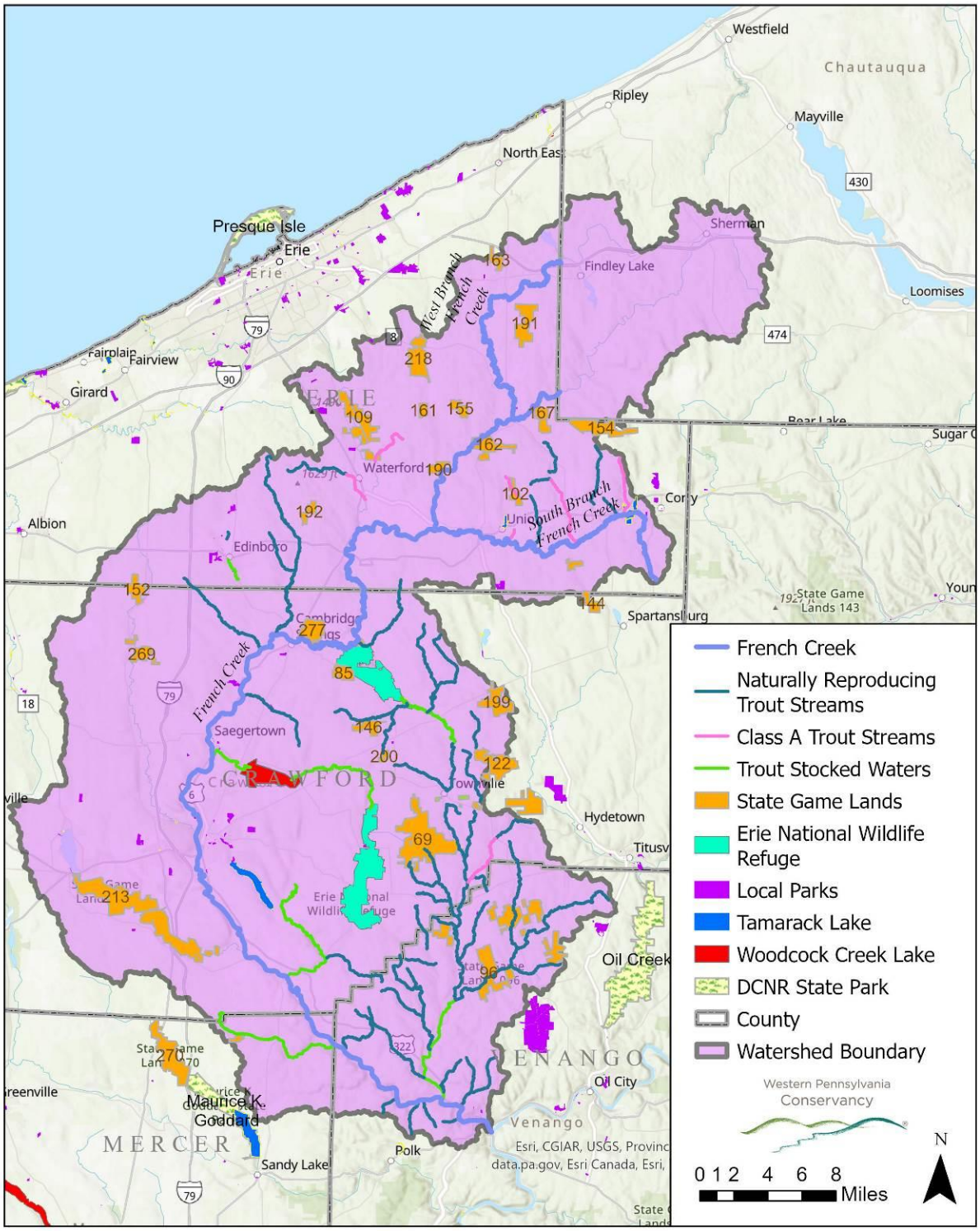


Figure 9. French Creek Watershed Public Lands

easements and public access areas throughout the watershed. Several other local and regional conservation organizations, including Allegheny Valley Conservancy and the Foundation for Sustainable Forests (FSF) and resource management agencies like county conservation districts and the USDA Natural Resources Conservation Service, have also protected forests, agricultural lands, wetlands, and the natural resources and rural character of the region through voluntary easements with cooperative private landowners (Appendix K). About 93 percent of the watershed is in private ownership, emphasizing the need for and awareness of community-supported conservation programs.

Private landowners may voluntarily cooperate with any land trust to protect their land, enhance property values and protect natural resources through a variety of conservation options. Voluntary legal agreements called conservation easements may limit development and subdivision while retaining private ownership of the property. Land can also be protected by selling or donating to accredited land trusts or public agencies, bargain sales, and establishing life estates. Accreditation is awarded by the Land Trust Alliance Accreditation Commission to entities that meet the highest national standards for excellence and conservation permanence. Please contact the resources in Appendix M for more information.

Critical Areas

A critical area is one that, due to its nature, has constraints on the types of activities or development that may occur there. Examples of critical areas include erosion-prone areas, stream banks, steep slopes, sinkholes, and karstic areas.

Steep slopes are critical areas that often present the potential for severe erosion and landslides. Due to the rolling topography of much of the French Creek watershed, steep slopes are not common. There are some instances of steeply-sloped valleys associated with southern portions of French Creek and some of its tributaries that lie outside of the glaciated portion of the watershed (Figure 10). When well-forested, these steep slopes pose little threat for erosion. Improper timbering practices or poor land use decisions can alter these steep slopes causing an increase in erosion or likelihood of landslides, particularly where roads or railroads are cut into steep slopes.

French Creek's glacial history has led to ancient, well-defined stream channels being filled with glacial till, causing present streams to meander through shallow stream valleys. It is important to note that the meandering of French Creek is a natural occurrence, and in itself does not present a problem. Loss of riparian buffers, alterations to hydrology, and improper land uses may lead to erosion problems along French Creek and its tributaries. Some municipalities, including Venango and Amity townships and Wattsburg and Union City boroughs in Erie County, have worked with regional technical service providers to stabilize the stream channel using a combination of rocks, logs, and root wads.

Many stream segments flowing through highly agricultural areas have lost protective riparian buffers and consequently exhibit severe erosion of stream banks. Crawford County Conservation District has developed a successful model program for riparian buffer planting partnering with local school districts to involve students in the planting efforts. A regional cooperative also was funded by the National Fish and Wildlife Foundation and led by Stroud Water Research Center to outreach and recruit cooperating landowners to plant riparian buffers.

French Creek Watershed Elevation Slopes

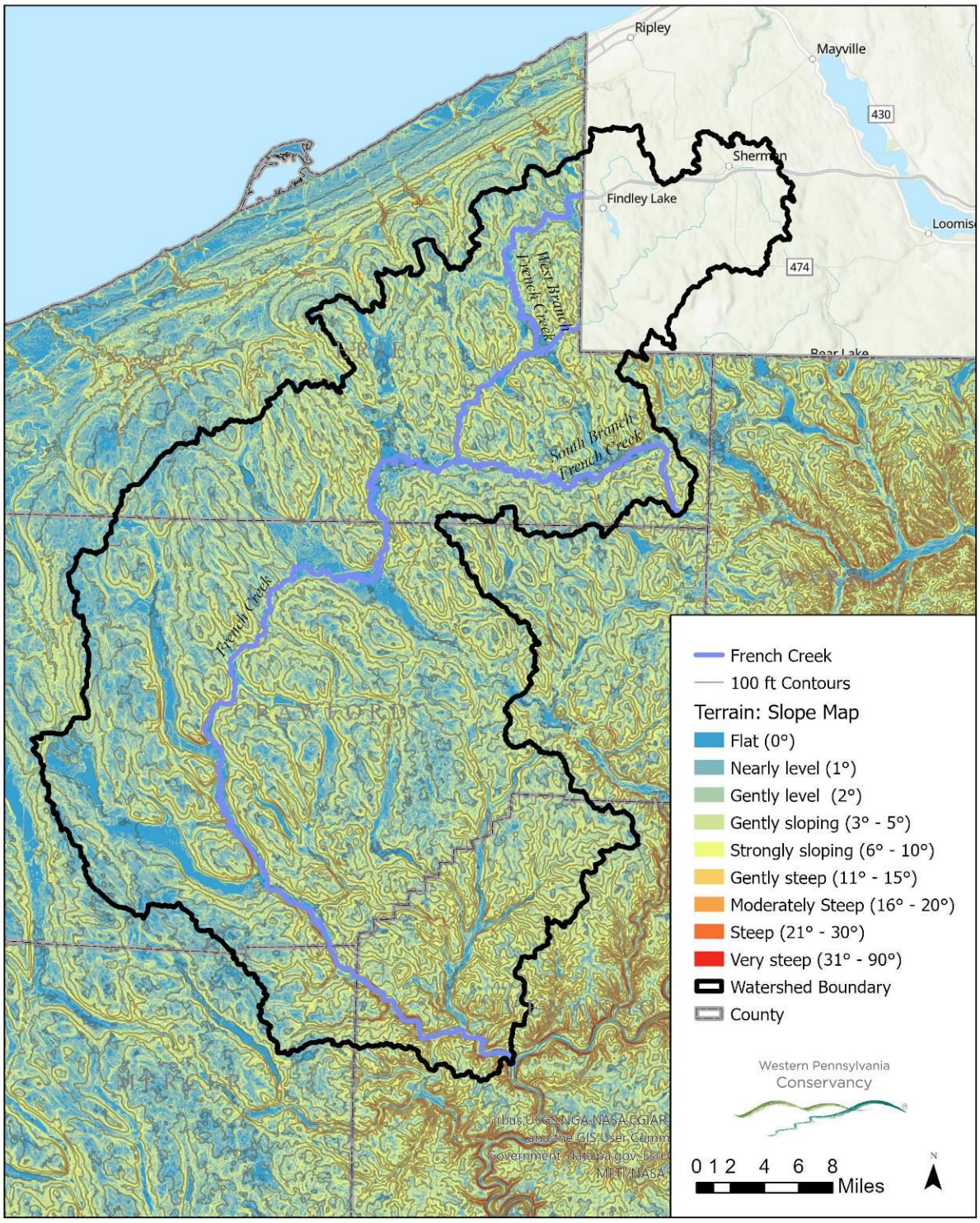


Figure 10. French Creek Watershed Elevation Slopes

Natural stream movement often causes problems for roads and railways that are built too close to streams or with constricting infrastructure (culverts) at road-stream intersections. There are many areas in the French Creek watershed where travel corridors were built along stream banks and probably continue to be built too close to streams. The result of natural stream movement is erosion of roads and rail beds necessitating the use of stone "riprapping" to reinforce these areas. Riprapping is often done when emergency subsidence demands immediate attention. Normally rock is used to stop further streambank erosion. Riprapping tends to transfer the stream's energy to other locations downstream where increased erosion may occur. Often these projects are undertaken without thought to the impacts to downstream areas. Best management practices for restrictive road-stream crossings include replacing the structure with adequately-sized infrastructure and reconstructing a simulated stream channel, stable bed, and stream banks through the crossing to accommodate increased flows expected with climate change and improve aquatic organism passage (AOP). County conservation districts should work with municipalities and road managers and the Penn State Center for Dirt and Gravel Road Studies for technical assistance, training, and funding to complete culvert replacement projects.

Landfills

Currently there is one permitted landfill in the French Creek watershed. Meadville Redi-Mix Landfill is a demolition landfill south of Meadville in West Mead Township, Crawford County. Landfill permits are granted and monitored by the Waste Management Program of the Pennsylvania Department of Environmental Protection.

Potential Hazard Areas

Hazardous Waste Sites

There is one Superfund site within the French Creek watershed as identified by the National Priorities List maintained by the U. S. Environmental Protection Agency (EPA). The Saegertown Industrial Area Superfund site in Crawford County was decided upon in 1993. These sites are regulated under Section 111 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Under this legislation, EPA also identifies potentially hazardous waste sites, which pose a threat of release of hazardous substances, pollutants, or contaminants. There are several potential hazardous sites in the French Creek watershed (Appendix C).

Mining Operations

Due to a lack of coal deposits, the French Creek watershed has escaped the degradation from abandoned coal mine drainage that has claimed the biological integrity of many Pennsylvania waterways. However, the glacial processes that shaped the northwestern Pennsylvania landscape left the area rich in sand and gravel deposits. These deposits are actively mined to provide material for roadways and other construction projects. Sand and gravel mining occur throughout the French Creek watershed (Figure 11). Open-pit gravel mining has the potential to alter the chemical properties of groundwater by exposing it to acid deposition and/or removing the alkaline bearing material. Surface runoff may also see an increase in sediment loads and

pollutants from inadequately maintained mining operations. In addition, alterations in hydrology are a threat to wetland and aquatic organisms that rely on specific natural flow regimes.

Oil and gas drilling also occur throughout the French Creek watershed (Figure 12). Areas in southeastern Crawford and Venango counties are historically famous for oil production. Presently, gas wells are much more common in the French Creek watershed than oil wells. Many areas throughout the watershed have active wells and a high number of abandoned wells also exist. Abandoned oil and gas wells have the potential to leach brine into groundwater and surface water. Aside from high salt concentrations, brine also contains heavy metals and other pollutants that can seriously degrade water quality. Funding is available to plug abandoned wells. All mining operations in the French Creek watershed are permitted and monitored by DEP Bureau of Mining in Knox, Pennsylvania (Appendix D).

Natural Erosion and Depositional Patterns

The relatively-young stream valleys of the French Creek watershed are a result of glaciation filling in original stream valleys with till, and modern streams now re-cutting these areas. Much of French Creek and its tributaries are low to medium-gradient streams that tend to meander across wide, shallow stream valleys following the least-resistant pathway through the gravelly till, often coinciding with the location of original stream valleys. This natural tendency to meander is often compounded by human impacts on the landscape. Loss of riparian zones and alterations in flow regimes due to loss of wetlands, increases in impervious surfaces, removing forests, and damming waterways, all have the compounding potential to increase erosive forces in flowing streams. Much of the work currently being done in the watershed to address these problems only attempts to fix the symptoms of erosion problems instead of looking for the causes and nature-based stormwater solutions that can be implemented on a watershed scale. It is imperative to gain a better understanding of the natural flow patterns of French Creek in order to more effectively control erosion and sediment deposition on a watershed scale. Coordinating cooperation from many private landowners is more complicated and difficult to achieve on a large scale and the French Creek watershed lacks large, contiguous tracts of protected or public lands on which to demonstrate wholistic implementation.

Best management practices (BMPs) for waterfront landowners seeking assistance with erosion control concerns, including natural and engineered structures, may be recommended based on site consultations from your county conservation district and a number of agencies and organizations that provide free technical assistance services. Service providers also consult on forest management issues and riparian forest buffer establishment along streams to control erosion. The PA Fish and Boat Commission works in collaboration with conservation districts and other consultants to design stream-bank stabilization structures that also provide habitat for aquatic species and can be permitted in PA with a General Permit – 01 for Fish Habitat Structures. Other primarily-stabilization designs may be permitted as General Permit – 03 for Stream Bank Stabilization. Larger sites and more extensive designs and earth disturbance limits may require Joint Permits or a Restoration Waiver & Environmental Assessment. The local county conservation district is the best first point of contact to assist the landowner with scheduling the appropriate partners for site consultation, planning, design, permitting, and construction assistance for their property and potential project.

French Creek Watershed Mining Operations

Figure 11. French Creek Watershed Mining Operations

French Creek Watershed Oil and Gas

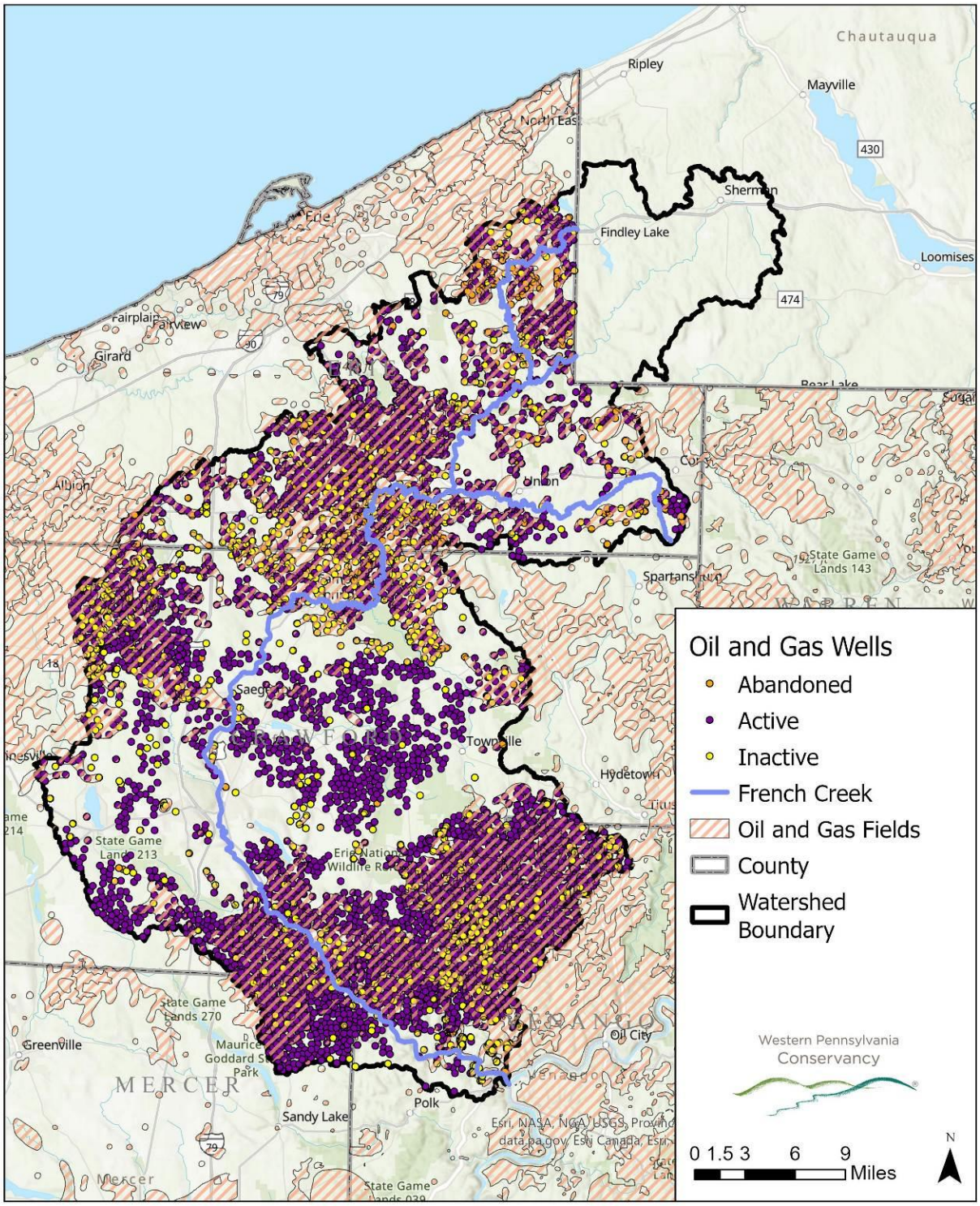


Figure 12. French Creek Watershed Oil and Gas

CHAPTER 3. WATER RESOURCES

Major Tributaries

The French Creek watershed has ten major tributaries whose sub-basins cover at least 50 square miles (Figure 3). In addition, those major sub-basins can be broken down further into the Pennsylvania State Water Plan designated small watersheds (Figure 13). The PA portion of the main stem of French Creek is classified as a warm water fishery (WWF) by the PA Department of Environmental Protection's Water Quality Standards (PA Title 25, Chapter 93).

West Branch of French Creek

The West Branch of French Creek originates in Chautauqua County, New York and flows southwest into Erie County, Pennsylvania before turning south. It joins French Creek near Wattsburg, draining approximately 78 square miles in portions of Northeast, Greenfield, and Venango townships and Wattsburg Borough in Pennsylvania. The low gradient West Branch and all of its tributaries are classified as WWF.

The West Branch sub-basin contains the most extensive wetlands, including rare fens, of any Pennsylvania headwater area. Although this sub-basin still contains blocks of contiguous forest and undeveloped riparian areas, it is beginning to see development pressure from the city of Erie and North East.

South Branch of French Creek

The South Branch of French Creek originates in Concord Township, Erie County and flows westward to its confluence with French Creek just west of Union City, draining approximately 80 square miles. It drains portions of Concord, Wayne, Amity, Union, and LeBoeuf townships, the City of Corry, and Elgin and Union City boroughs in Erie County, as well as small portions of Sparta and Bloomfield townships in Crawford County. The South Branch basin is classified as a Cold-Water Fishery (CWF) with the exception of one tributary, Beaver Run, one of two Exceptional Value (EV) streams in the French Creek watershed. Beaver Run contains a Class A naturally reproducing wild brown trout (*Salmo trutta*), population.

The South Branch sub-basin contains the largest bottomland forest area in the Pennsylvania headwater area. There are also extensive wetlands associated with the section of the South Branch sub-basin between Corry and Union City. Tributaries in this section have rare fens and calcareous seep wetlands associated with them. Much of the riparian areas of the South Branch are intact but the basin supports a high degree of agriculture that could potentially threaten these sensitive areas.

LeBoeuf Creek

LeBoeuf Creek forms from two major branches. The East Branch originates in Venango and Greene townships just north of Lake Pleasant in Erie County. The main branch originates in Summit Township, Erie County. The two branches flow southward to their confluence in

Waterford Township, Erie County and LeBoeuf Creek continues southward to Lake LeBoeuf in Waterford. From Lake LeBoeuf, LeBoeuf Creek flows south to its confluence with French Creek in LeBoeuf Township, draining 63.3 square miles. LeBoeuf Creek is classified as a Trout Stocked Fishery (TSF). According to the PA Fish & Boat Commission, however, LeBoeuf Creek was last stocked with trout in 1988 due to posting of private property (Lee, 2000). Trout Run, a tributary to LeBoeuf Creek, is classified as an EV stream and a Class A trout stream because of a naturally reproducing wild brown trout population.

The LeBoeuf Creek sub-basin contains extensive wetlands upstream from Lake LeBoeuf and Waterford, which include fen and calcareous marsh areas. Better draining headwater areas as well as parts of the sub-basin downstream are extensively farmed.

Muddy Creek

Muddy Creek also forms from two major branches. The East Branch originates in Athens Township, Crawford County where it meets the main branch. The main branch originates in Steuben and Richmond townships, Crawford County and drains Townville before entering Athens Township. The main stem of Muddy Creek flows northwest through Athens, Bloomfield, Richmond, and Rockdale townships in Crawford County. In addition, Muddy Creek flows through the northern Seneca division of the Erie National Wildlife Refuge. Muddy Creek joins French Creek from the left at river mile 55.58 and drains 83.6 square miles. The separate branches of Muddy Creek and its tributaries are classified as High-Quality Cold-Water Fisheries (HQ-CWF). The main stem of Muddy Creek is a High-Quality Trout Stocked Fishery (HQ-TSF).

Much of the headwater areas of the Muddy Creek sub-basin are extensively farmed. In contrast, the Erie National Wildlife Refuge and State Game Lands #85 protect extensive wetlands along the downstream sections of Muddy Creek. Western Pennsylvania Conservancy and FCVC have targeted the Muddy Creek sub-basin for outreach to landowners and implementation of agricultural Best Management Practices.

Conneauttee Creek

Conneauttee Creek and its tributaries originate in Washington and Franklin townships, Erie County and flow into Edinboro Lake. Upon leaving Edinboro Lake, Conneauttee Creek flows generally south-southeast, draining Edinboro and portions of Washington Township before entering Crawford County where it forms the border between Venango and Cambridge townships. Nearly half of the Conneauttee Creek basin is attributed to its major tributary, Little Conneauttee Creek.

Little Conneauttee Creek drains portions of McKean, Waterford, Washington, and LeBoeuf townships in Erie County and Cambridge Township, Crawford County. Little Conneauttee Creek drains 25.9 square miles before its confluence with Conneauttee Creek just above the mouth of Conneauttee Creek.

French Creek Small Watersheds

Figure 13. French Creek Small Watersheds

French Creek Sojourn (photo: FCVC)

Conneauttee Creek joins French Creek from the right at river mile 48.02, northwest of Cambridge Springs, Crawford County, and drains a total of 60.8 square miles. Conneauttee Creek is classified as a WWF with the exception of the segment between Edinboro Lake and the Erie-Crawford County border, which is a TSF. Little Conneauttee Creek and its tributaries are classified as a CWF.

The Conneauttee Creek sub-basin is extensively farmed and offers plenty of restoration opportunities for degraded riparian areas. This sub-basin has been targeted by conservation partners for agricultural BMP outreach and implementation. The Conneauttee Creek sub-basin has some wetlands including a calcareous fen associated with Edinboro Lake.

Woodcock Creek

Woodcock Creek drains portions of Randolph, Richmond, Woodcock, East Mead, and West Mead townships and the boroughs of Blooming Valley and Saegertown, all in Crawford County. Flowing generally westward, Woodcock Creek joins French Creek from the left at river mile 37.84, just south of Saegertown, and drains 50.5 square miles. Construction of the Woodcock Creek Lake dam was completed in July 1973. The congressionally authorized purposes for Woodcock Creek Lake are flood control, low flow augmentation for water quality, fish and wildlife enhancement, and recreation. Of these project purposes, only flood control and low flow augmentation for water quality have storage allocated for their operation. Woodcock Creek, from its headwaters to the reservoir dam, is classified as a HQ-CWF. From the reservoir dam to its mouth, Woodcock Creek is a CWF.

Cussewago Creek

Cussewago Creek is a south-flowing tributary that forms from two major branches. The West Branch originates in Elk Creek Township, Erie County and drains portions of Spring and Cussewago townships in Crawford County before its confluence with the main branch. The main branch drains portions of Franklin, Elk Creek, and Washington townships in Erie County before its confluence with the West Branch in Cussewago Township, Crawford County. Cussewago Creek and its tributaries also drain portions of Summerhill, Hayfield, and Vernon townships in Crawford County. Cussewago Creek joins French Creek from the right at river mile 31.38, at the city of Meadville, and drains 96.9 square miles. The entire basin is classified as a WWF.

Cussewago Creek has extensive wetlands and bottomland forest areas associated with it. The entire stream corridor has been designated by Audubon as an Important Bird Area (IBA) and

provides habitat for nesting bald eagles (*Haliaeetus leucocephalus*). The sub-basin does have extensive farming in some areas with opportunities for riparian restoration.

Conneaut Outlet

Conneaut Outlet begins at the outflow of Conneaut Lake in Conneaut Lake Borough. It flows southeast draining portions of Sadsbury, East Fallowfield, Hayfield, Vernon, Summit, Greenwood, Union, and Fairfield townships in Crawford County. Conneaut Outlet joins French Creek from the right at river mile 22.22 and drains 101 square miles. Conneaut Lake itself and several tributaries are considered the source basin for Conneaut Outlet and are classified as a High-Quality Warm Water Fishery (HQ-WWF). Conneaut Outlet, from the lake to its mouth, is classified as a WWF.

Conneaut Outlet is the remnant of an ancient streambed that was filled with glacial drift. Today, the Outlet meanders through a large, complex system of wetlands as a result of its glacial history. This robust emergent marsh is the largest marsh complex in the state. The marsh has been designated an IBA by Audubon and lies within SGL #213. The marsh is home to many birds including the state endangered American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), and black tern (*Chlidonias niger*), as well as bald eagles.

Little Sugar Creek

Little Sugar Creek drains southward through portions of West Mead, East Mead, Randolph, East Fairfield, and Wayne townships, Crawford County, before entering French Creek at Cochranton. Converging with French Creek from the left at river mile 18.96, Little Sugar Creek drains 53 square miles. The entire Little Sugar Creek sub-basin is classified as a CWF.

Mud Run, a tributary of Little Sugar Creek, is one of two streams that were dammed by the U.S. Department of Agriculture (USDA) to form Tamarack Lake.

Sugar Creek

Sugar Creek, the largest tributary sub-basin in the French Creek watershed, drains portions of Steuben, Troy, Oil Creek, Randolph, and Wayne townships in Crawford County, as well as Cherrytree, Plum, Oakland, Jackson, and Canal townships and Sugarcreek and Cooperstown boroughs in Venango County. Sugar Creek converges with French Creek from the left at river mile 4.2 and drains 167 square miles. Sugar Creek has East and West Branches, which converge at Cooperstown. The main stem is joined by another major tributary, Lake Creek, just downstream in Cooperstown. Lake Creek drains the southern Sugar Lake Division of the Erie National Wildlife Refuge. It also feeds and drains Sugar Lake. The entire Sugar Creek sub-basin is classified as a CWF.

The Sugar Creek sub-basin has been extensively mined for sand and gravel, limestone, and oil and gas. The watershed is also extensively farmed and has been targeted by the conservation partners for agricultural BMP outreach and implementation.

The major sub-basins within the French Creek watershed provide organizations and agencies the opportunity to divide the large French Creek watershed into smaller, more manageable units for restoration and conservation focal areas. Each sub-basin has unique resources and threats to those resources. By taking a sub-basin approach, streams receiving conservation and restoration programs can be prioritized depending upon measurable negative contributions by each sub-basin to the overall water quality of French Creek. In addition, high quality sub-basins that contribute positively to the overall water quality of French Creek can be recognized and protected.

Wetlands

Definition and Types

Wetlands on State Game Lands in Crawford County (photo: WPC)

Wetlands exist in a variety of different forms and are thus, sometimes difficult to define. Generally, wetland definitions are comprised of descriptions of three general characteristics: 1) the presence of water for a significant period of time during the year, 2) unique soils that differ from uplands, and 3) vegetation that is adapted to wet conditions (hydrophytes), and an absence of flooding-intolerant vegetation (Mitsch and Gosselink, 1986). Because the study of wetlands is growing in importance and the acceptance of the fundamental need to protect these ecosystems for their benefits to water quality and quantity, humans, and wildlife is increasing, it becomes necessary to adequately define wetland areas. The most widely accepted definition by wetland scientists and managers was adopted by the U. S. Fish & Wildlife Service in 1979 and is described in a report entitled *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al*., 1979):

> *Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water…Wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly 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 time during the growing season of each year.*

In Pennsylvania, wetland encroachment and alteration are regulated by both DEP and the USACE. Regulation of wetland dredging and filling requires a stricter wetland definition and is described in Section 404 of the 1977 Clean Water Act Amendments:

> *The term "wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in*

saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

The Pennsylvania Code, Title 25, Chapter 105, describes wetland classification and regulations pertaining to permitting for encroachment or alteration.

Its glacial history has left the French Creek watershed rich with wetland resources (Figure 14). The New York headwater portions of the watershed contain two major wetland systems, Alder Bottom and Beaver Meadow Swamps. The Alder Bottom Swamp and associated Alder Bottom Wildlife Management Area, managed by the New York Department of Environmental Conservation (NYDEC), is the largest wetland in the NY portion of the watershed and is characterized by a rare plant community, a rich hemlock-hardwood peat swamp (The Nature Conservancy, 1999).

The Pennsylvania portion of the French Creek watershed contains a wide variety of wetland types. The largest wetland systems are on glacial deposits that filled deep stream valleys, while many smaller wetlands formed in the irregular, hummocky topography of the end and ground moraines (Kline, 1993). Vast marsh and swamp wetlands are associated with many glacial lakes and tributaries. In particular, Lake Pleasant Outlet in Erie County and Conneaut Lake Outlet in Crawford County support extensive marshes. Harmonsburg Fen, in Crawford County, is designated as an exceptionally-significant biodiversity area by PNHP and is conserved by FCVC. Conneaut Marsh is the largest marsh complex in Pennsylvania and designated as an exceptionally-significant biodiversity area by PNHP. The entirety of the marsh is designated as an Audubon Important Bird Area. Many streams within the watershed, like LeBoeuf Creek and Muddy Creek, have extensive floodplain and forested wetlands. Of particular importance are the rare glacial bog and alkaline fen wetlands in the watershed. Erie County is home to the Wattsburg Fen Natural Area, part of the Titus and Wattsburg Bogs National Natural Landmark. Other small fen and bog wetlands occur in Erie County and elsewhere.

Wetland Benefits

Wetlands are integral parts of the watershed ecosystem. They function in a variety of ways to benefit humans as well as wildlife. Wetlands improve water quality in lakes and streams by stabilizing and filtering sediments and toxins. Wetland plants also remove or transform excessive nutrients and prevent them from entering waterways.

Wetlands augment and help control water quantity in a watershed. They retain waters during high flow periods to lessen flooding. Loss of wetlands can cause a dramatic increase in flash flooding incidents. Wetlands also provide important recharge areas for groundwater. This is especially important for low flow augmentation for streams and rivers.

Additionally, wetlands are important habitats for many species of plants and animals that depend upon these habitats and no others. Wetlands serve as a link between terrestrial and aquatic environments and dramatically increase plant and animal diversity for both environments. Lastly, wetlands are important for the recreational and aesthetic values they provide to humans. Boating, fishing, hunting, and birding are just a few of the activities provided by wetlands.

French Creek Watershed Wetlands

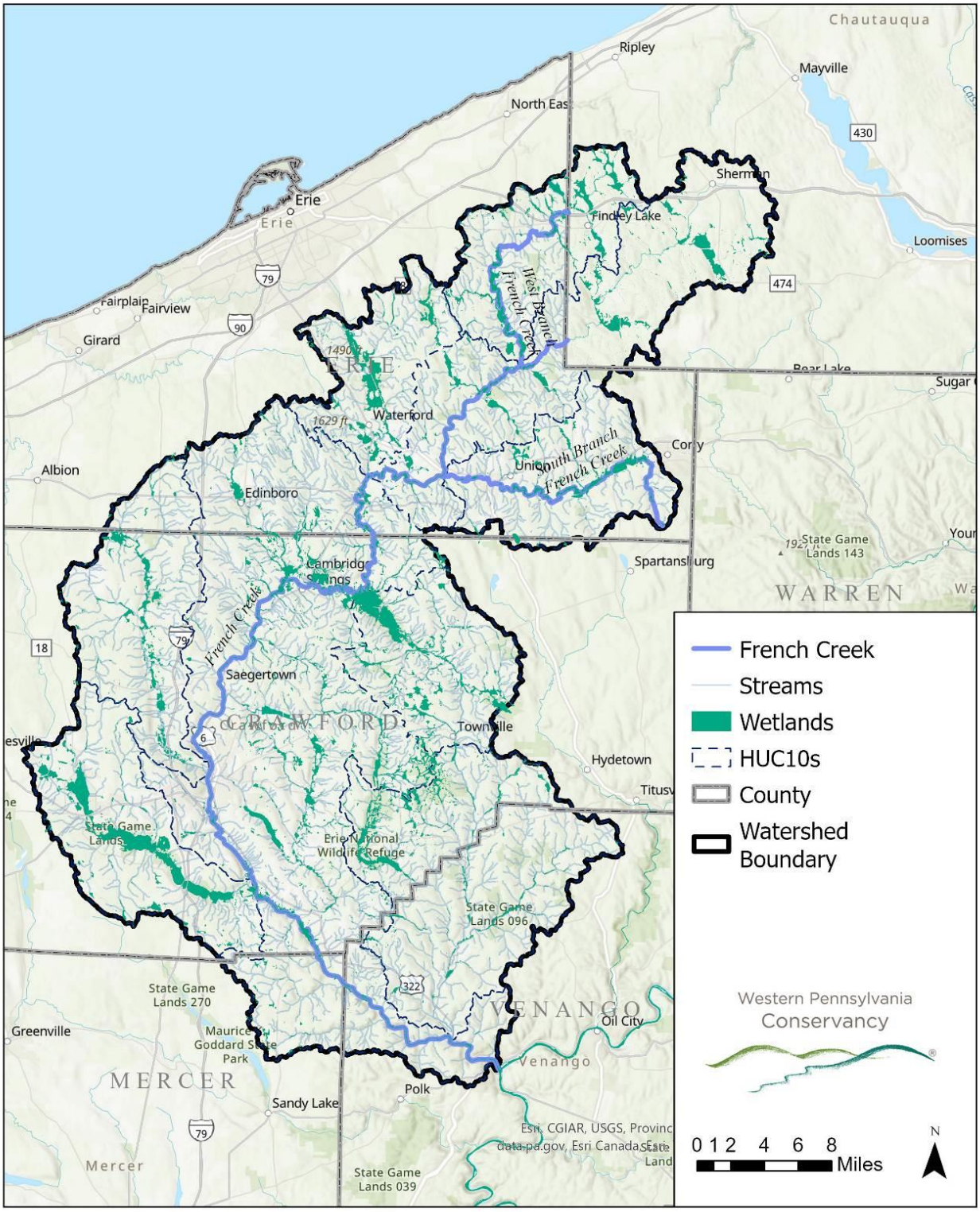


Figure 14. French Creek Watershed Wetlands

Floodplains

Many of French Creek's floodplains lie in broad, low relief valleys (Figure 15). Historically, the floodplains in the watershed would have been forested with silver maple (*Acer saccharinum*), eastern sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and several other species. These forested valleys and the streamside buffers that they furnished have been lost in many areas to agriculture, transportation routes and development. In better draining soils of the stream valleys, potatoes, corn, and other grains are grown in the fertile floodplains. Many population centers within the watershed are located in and around floodplains. This pattern of development increased following construction completion of the Union City Dam in 1971 and Woodcock Creek Lake dam in 1973 for flood risk management.

Rural farmhouse and characteristic scenic view of the watershed (photo: WPC)

French Creek is considered a relatively-young stream that meanders through gravel-filled streambeds with wide floodplains. The coarse-gravelly soils laid down by glacial events tend to be highly erodible. Many areas along French Creek have experienced extensive erosion due, in part, to a stream's natural tendency to meander as it cuts its way through the gravelly outwash plains of the former glacial advances.

Settlement and development have led to the loss of riparian buffers, draining and filling of wetlands, and increased impervious surfaces in the watershed, exacerbating the erosive forces of French Creek. Compounded with the increase in impervious surfaces due to roadway construction, these alterations to the watershed hydrology have significantly changed the stream channel and floodplain characteristics further downstream.

While many sections of French Creek's natural floodplain have been lost to development, transportation routes, agriculture, and erosion, other areas remain intact. Some sections of French Creek and its tributary sub-basins have large sections of intact floodplain forests and wetlands. These areas should be protected as other areas of degraded floodplains and riparian areas are restored.

Lakes and Ponds

The French Creek watershed has a number of natural lakes and ponds, as well as many man-made impoundments and beaver ponds. Five of northwestern Pennsylvania's seven large (> 50 acres) inland glacially-formed lakes are located within the watershed (Figure 16). Such lakes are critically imperiled in Pennsylvania due to their unique characteristics, rarity, and vulnerability. These water bodies are generally characterized by high-alkalinity water chemistry, associated wetland systems, and habitat for many plant and animal species of concern in the state. In addition, there are several man-made reservoirs, which serve flood control, water supply, low-flow augmentation, and recreational purposes.

French Creek Watershed Floodplains

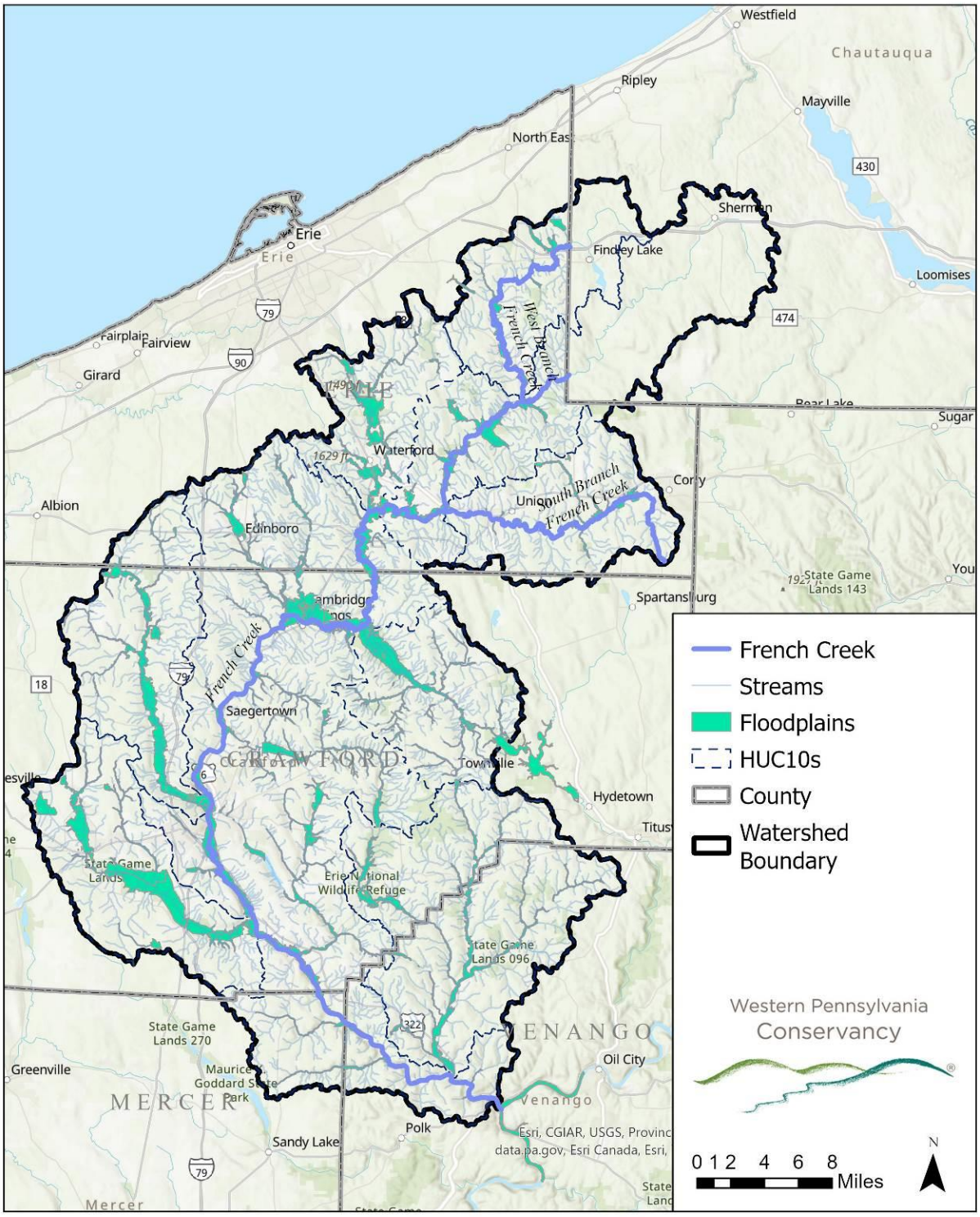


Figure 15. French Creek Watershed Floodplains

Lake Pleasant

Lake Pleasant is an oval-shaped natural, glacial lake covering approximately 64 acres (~ 1120' x 2560') located in southwest Venango Township, Erie County, which is drained by the Lake Pleasant Outlet tributary to French Creek. The lake's surface elevation is approximately 1300 feet, with the surrounding hillsides rising another 250 feet above the lake surface. The lake is 40–45 feet deep with a gravelly bottom covered with silt. Widely accepted as the best example of an intact glacial lake ecosystem in northwest Pennsylvania, protection of this lake has long-been a focus for Western Pennsylvania Conservancy, French Creek Valley Conservancy and other regional conservation organizations.

Lake Pleasant has good water quality with neutral to slightly-basic pH and relatively-high alkalinity. No motors are allowed on boats on the lake and minimal surface runoff flows into it, helping to protect its good water quality. Most of the water recharge to Lake Pleasant arrives via subsurface flow channels. The exclusion of boat motors helps minimize introductions of invasive-aquatic plants and animals, like Eurasian water-milfoil (*Myriophyllum spicatum*) and zebra mussel (*Dreissena polymorpha*), which often travel on hulls, trailers, and boat motors. There have been introductions of invasive wetland plants, like common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and hybrid cattail (*Typha X glauca*) to some wetland areas within the watershed.

Lake Pleasant is bordered to the north, west, and south by extensive wetlands. It is a rare pristine calcareous glacial lake which supports 36 species and natural communities of special concern. Among this diversity of rare plants and animals are 16 state endangered species.

Lake Pleasant faces many threats within its roughly 2.7-square-mile watershed. Mineral extraction in the form of sand and gravel mining pose threats to groundwater levels and chemistry. The lake is fairly nutrient-rich and faces the threat of over-eutrophication by the influx of nutrients, primarily nitrogen and phosphorus, from runoff associated with climate change, agriculture and forestry practices. In addition, septic systems associated with homes and cottages around the lake pose a potential threat of nutrient seepage into the lake. State Route 1001, locally known as Lake Pleasant Road, borders the eastern lakeshore and poses the threat of toxins and nutrients entering the lake via surface runoff. Specifically, petroleum products, nutrient-laden silt, heavy metals, and brine are common constituents of runoff from roadways. The vegetative buffer along the eastern lakeshore has been degraded through overuse by automobile traffic and provides no protection against runoff. With the presence of an asphalt plant at the northern edge of the watershed and the associated truck traffic, the potential for a catastrophic spill that could severely impact the lake's ecosystem exists. Despite these and other threats, the Lake Pleasant community has avoided excessive development of the lake's shoreline and loss of buffering wetlands, keeping the lake relatively healthy.

Lake Pleasant is classified as a HQ-CWF. Currently, Lake Pleasant is stocked with non-native trout by the PFBC as a put-and-take fishery. The impact of these trout on native species of forage fish and other native predators is not well understood. The lake also supports a good largemouth bass (*Micropterus salmoides*), fishery. To help reduce the risk of invasive species introduction, the use of live fish as bait is now prohibited. WPC owns approx. 70% of the Lake Pleasant shoreline and over 500 acres of the surrounding watershed.

French Creek Watershed Waterbodies

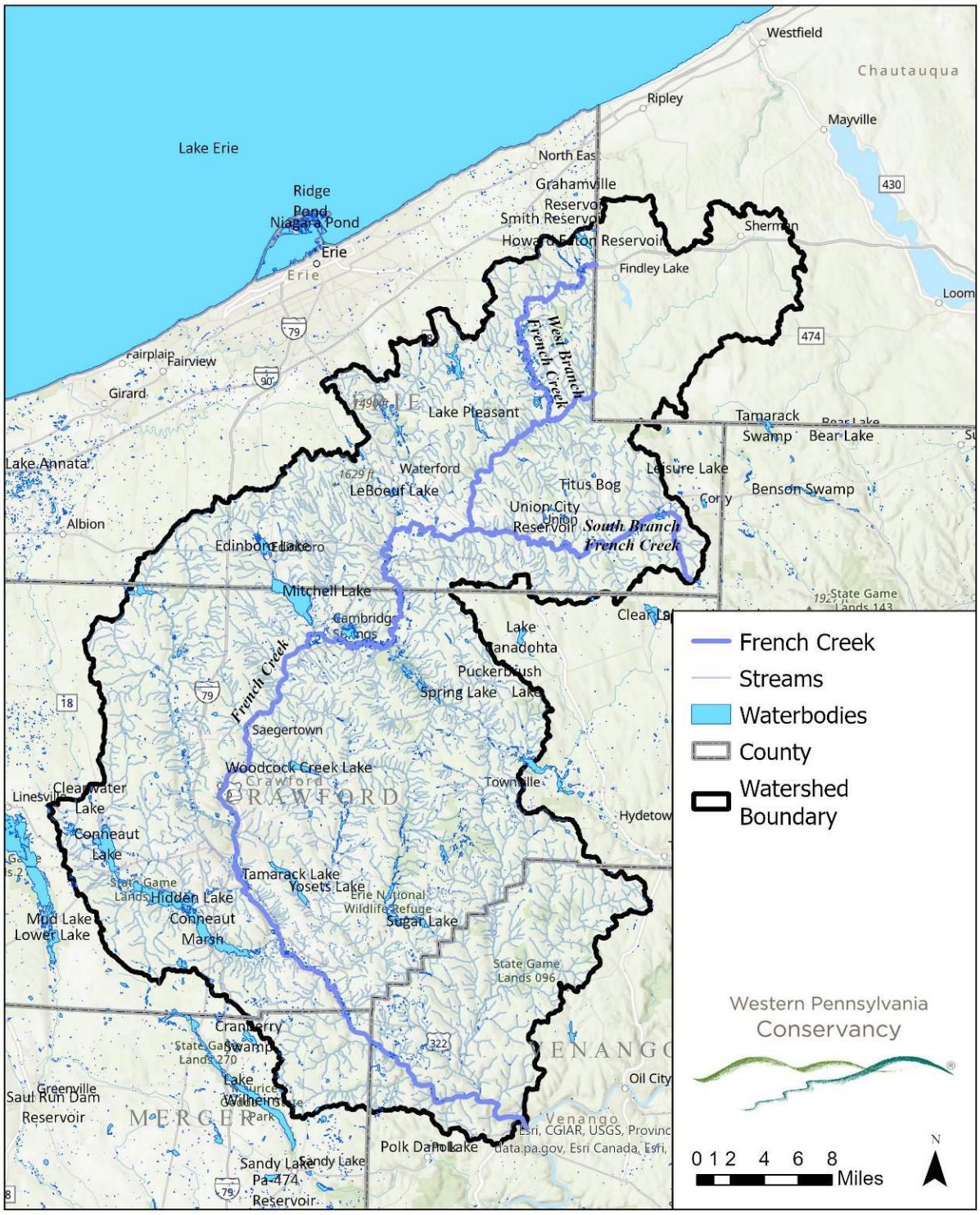


Figure 16. French Creek Watershed Waterbodies

Public access is maintained on the eastern shoreline via a cooperative license agreement between PFBC and WPC, and on the western shoreline via a WPC-maintained dock and paddle-craft launch.

Through a grant from DEP's Growing Greener program, WPC conducted a scientific assessment of the geology, hydrology, and ecology of the Lake Pleasant watershed in 2003. The object of this assessment was to gain a better understanding of the processes that occur in the watershed and ultimately affect the water quality and quantity of the lake ecosystem. Through this understanding, the *Lake Pleasant Watershed Conservation Plan* was developed by WPC to guide the implementation of conservation projects since. Western Pennsylvania Conservancy has also conducted floral inventories on native and invasive aquatic and wetland species associated with Lake Pleasant as part of a multi-year inventory project on all northwest glacial lakes.

Lake LeBoeuf

Lake LeBoeuf is another glacially-formed lake that covers approximately 70 acres in Waterford Borough and Waterford Township, Erie County. The lake has a surface elevation of 1166 feet and a maximum depth of 31 feet. The watershed covers 64.2 square miles. The major tributaries to Lake LeBoeuf are Trout Run and LeBoeuf Creek. The outlet stream is LeBoeuf Creek, a tributary of French Creek. An interesting feature of Lake LeBoeuf is an island in the middle of the lake that was formed during the glacial processes that formed the lake itself. The bottom of the lake is described as being composed of rock and silt.

Lake LeBoeuf still has a large area of associated wetlands composed of emergent marsh areas, shrub swamp, and tree savanna swamps. The lake and its associated wetlands contain four plant species of concern in Pennsylvania and one fish species. Lake LeBoeuf has fair water quality with relatively-high alkalinity. Warm water temperatures and summertime low dissolved-oxygen levels make this a warm water fishery (WWF) unable to sustain trout. However, the lake does support good panfish populations of black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), walleye (*Stizostedion vitreum*), and northern pike (*Esox lucius*), as well as a fair population of largemouth bass (PA Fish & Boat Commission, 2016). Lake LeBoeuf is a brood lake for muskellunge (*Esox masquinongy*) and is also stocked with walleye fingerlings.

Created by three overlapping glacial lakes, Lake LeBoeuf and its forested wetlands support populations of 10 plant species of concern. Among these, marsh bedstraw (*Galium palustre*) and red-head pondweed (*Potamogeton perfoliatus*) are state endangered.

The Commonwealth of Pennsylvania owns Lake LeBoeuf and the PFBC operates a public access area. There is a 10-horsepower restriction on boat motors on the lake, making fishing the primary recreational use. Although trout have been stocked in tributaries to the lake, Lake LeBoeuf is classified as a WWF.

Nutrient levels are fairly high in Lake LeBoeuf and algal blooms are common. The watershed is characterized by a mixture of forest and agricultural lands. There are several dairy operations within the watershed. Stormwater runoff from Waterford Borough and nutrients from septic systems around the lake are potential sources of nutrients.

Edinboro Lake

Edinboro Lake is another calcareous glacially-formed lake located in Edinboro Borough and Washington Township, Erie County. The lake is approximately 240 acres in size with a surface elevation of 1197 feet and a maximum depth of 34 feet. The lake watershed covers 16.2 square miles and incorporates four main tributaries: Conneauttee Creek, Shenango Creek, Whipple Creek (local name), and Lakeside Run (local name). The outlet stream is Conneauttee Creek, a major tributary to French Creek.

Edinboro Lake continues to have some areas of intact wetlands, including a rare fen. However, much of the lake's shoreline has been developed and extensive dredging has occurred in some wetlands to form channels at the lake's northern end. The lake and associated wetlands harbor 23 plant species of concern in Pennsylvania.

Edinboro Lake was originally dammed around 1900 with subsequent enlargements of the dam to its present size, which raises the water level in the lake approximately 11 feet. Historic reports state that Edinboro Lake was as deep as 50 feet (anecdotal); however, large silt deposits have left the lake shallower than previously reported.

Past assessments of the health of Edinboro Lake determined that it was in an advanced state of eutrophication with fair to poor water quality (Western Pennsylvania Conservancy, 2000). The lake showed strong stratification for temperature and dissolved oxygen levels, and nutrient levels were high, leading to excessive algal and plant growth. Land uses around the lake that may contribute excess nutrients and sediments via surface runoff include agriculture, golf courses, and development. Other nutrient sources include septic systems near the lake and Washington Township's sewage treatment plant discharge. There also is a large population of Canada geese (*Branta canadensis)* associated with the lake that contributes additional nutrients. Nutrients build up in the sediments on the lake bottom released during turnover events also contribute to the eutrophication problem. Other problems affecting the health of Edinboro Lake stem from excessive erosion and sedimentation within the basin, loss of wetland and shoreline to development, and no limitations on outboard motor size for boats on the lake.

The zebra mussel has built up a substantial population in Edinboro Lake. The effect of this invasive exotic mussel to the lake ecosystem can be detrimental, especially to native mussels. Of equal importance is the threat that the zebra mussel poses to French Creek, now with a direct linkage via Conneauttee Creek. Researchers from DEP and Edinboro University are monitoring the zebra mussel and other invasive threats. The lake was previously drawn down to expose many of the zebra mussels to freezing temperatures in the hopes of killing many of the adult mussels. Eradication of the zebra mussel may be impossible but it is hoped that periodic drawdowns may help keep the population under control. The effects of the drawdowns on other aquatic and wetland species are not fully understood; however periodic drawdowns have occurred for dam maintenance. The Edinboro Lakeside Association and Edinboro Lake Society are non-profit organizations formed locally to address the preservation, protection, and promotion of Edinboro Lake.

Edinboro Lake is a WWF supporting populations of largemouth and smallmouth bass (*Micropterus dolomieu*), bluegill (*Lepomis macrochirus*), and black crappie among others. It is utilized as a brood lake by the PFBC for muskellunge and is also stocked yearly with walleye fingerlings. Aside from fishing, the lake is utilized by a large number of powerboats and jet skis for skiing, tubing, and other recreational activities. A public access area is owned by the borough of Edinboro on the west side of the lake.

Conneaut Lake (photo: WPC)

Conneaut Lake

Conneaut Lake, the largest (by area) natural lake in the Commonwealth, is found in Summit and Sadsbury townships, Crawford County and borders the Borough of Conneaut Lake. The lake surface covers 929 acres and lies at an elevation of 1073 feet. Conneaut Lake's maximum depth is approximately 65 feet. The watershed covers 27.9 square miles and includes the drainage of the major tributary Inlet Run. Conneaut Outlet, a major tributary of French Creek that has associated with it a large marsh complex, drains the lake. Most of the lake's surrounding wetlands have been lost, although one large area still remains on the west side of the lake.

The lake and associated wetlands, including those immediately downstream around the outlet, contain 16 plant and six animal species of concern in Pennsylvania. Conneaut Lake has no identifiable dam although some rubble does exist near the outlet that may have been an early dam. The PA Game Commission does own a dam on the outlet near Geneva, which helps control water levels in Conneaut Marsh, downstream of the lake.

Conneaut Lake's watershed has a high degree of agriculture, some forested areas, and intensive development near the lake. These factors, coupled with the loss of wetlands surrounding the lake, have led to increased nutrient levels and greatly increased aquatic vegetation growth. Because Conneaut Lake is a major recreational area with high numbers of motor-boats and jet skiers during the summer months, the Conneaut Lake Aquatic Management Association was formed to address the overgrowth of aquatic vegetation. This organization has attempted to control aquatic plants, including the invasive Eurasian water-milfoil through weed harvesting, dredging, and herbicide application. Public access to the lake is possible at the north end via a PFBC access and the south end via a Conneaut Lake Borough access.

Conneaut Lake is classified as a HQ-WWF. The PFBC stocks the lake with walleye fry, muskellunge, white bass fingerlings (*Morone chrysops*), and yellow perch fry (*Perca flavescens*). There is a healthy northern pike population as well as many other warm and cool water species. The state record muskellunge and white bass were caught in Conneaut Lake. Gizzard shad (*Dorosoma cepedianum*), and quillback carpsucker (*Carpiodes cyprinus*), were introduced to the lake and pose a potential threat to panfish through competition for food (PA Fish & Boat Commission, 2019).

Sugar Lake

Sugar Lake is a glacially formed lake in Wayne Township, Crawford County. The surface area of the lake area is 90 acres with a surface elevation of 1288 feet and a maximum depth of 15 feet. The watershed covers 23.3 square miles with the major tributary being Lake Creek, which flows through the Erie National Wildlife Refuge's southern Sugar Lake Division. Lake Creek also drains the lake and joins with Sugar Creek at the Borough of Cooperstown in Venango County. The property surrounding the lake is largely in private ownership and large tracts of wetlands still occur. Some riparian areas have been developed as home sites. The wetland areas adjacent to the lake are home to nesting bald eagles the only species of concern, both state and federal, documented to date at Sugar Lake.

Although privately owned, Sugar Lake has a PFBC public access and is managed under Conservation Regulations, which govern fish harvest. There is a maximum six horsepower restriction, or electric motor only, limitation for boats on the lake. There are populations of both warm water and cool water fish species in the lake, with largemouth bass being the primary warm water predator, and the muskellunge the primary cool water predator (PA Fish & Boat Commission, 2017). Sugar Lake is used as a brood lake for muskellunge by the PFBC.

Woodcock Creek Lake

Woodcock Creek Lake was formed by a USACE dam project on Woodcock Creek completed in 1973. It was one of three flood-control reservoirs authorized for the French Creek basin by the Omnibus Rivers and Flood Control Act of 1962. The three-reservoir system consisted of Union City Reservoir, Woodcock Creek Lake, and Muddy Creek Reservoir. The Union City Reservoir was completed in 1971, but the Muddy Creek Reservoir was not approved for construction. The congressionally authorized purposes for Woodcock Creek Lake are flood control, low flow augmentation for water quality, fish and wildlife enhancement, and recreation. Of these project purposes, only flood control and low flow augmentation for water quality have storage allocated for their operation (U. S. Army Corps of Engineers).

Woodcock Creek Lake lies in Woodcock Township, Crawford County. The full pool of Woodcock Creek Lake covers 775 acres with a surface elevation of 1209 feet. The average summer pool covers 333 acres with a surface elevation of 1181 feet. The lake has a maximum depth of 72 feet at full pool. The drainage basin for the lake covers 45.7 square miles. Much of the drainage basin has historically been in agriculture, resulting in a great deal of sedimentation in the lake. The dam, its appurtenant works, and several adjacent recreational day use areas are operated and maintained by USACE. Portions of federal land located both to the west and east of the dam are leased to the Crawford County Conservation District and the PGC, respectively.

Woodcock Creek Lake supports fair populations of smallmouth and largemouth bass. The PFBC stocks walleye, muskellunge, and channel catfish (*Ictalurus punctatus*). Panfish populations are low in the lake because the lake experiences annual winter drawdowns, which reduces shoreline habitat needed for breeding and congregates fish making them more susceptible to predation. The PFBC also stocks woodcock creek above the lake, and woodcock creek below the dam with trout as a put-and-take fishery. The reservoir is designated as a HQ-CWF.

Union City Dam
Considered a dry dam due to its singular purpose of flood control, the Union City Dam was completed in 1971. Dry dams allow normal flows to pass through unhindered, but during periods of heavy rainfall or snow melt, higher flows are retained by the dam. During these periods of heavy flow, the reservoir behind the dam will fill up and the dam releases the water at a controlled rate. Situated on French Creek in Waterford Township, Erie County, the Union City Dam, under normal flow conditions, creates no impoundment. During high flow periods, the surface area of the impoundment can cover 2290 acres. The surface elevation of the full pool is 1278 feet.

The effects of this dam on the ecological health of French Creek are debated. While the USACE points out that the dam has saved millions of dollars in flood damages, the potential impact to the French Creek system is difficult to quantify. One potential problem is the alteration of natural flooding regimes. Flooding serves to inundate the floodplain with nutrients and may recharge groundwater in some areas. The Union City dam has stopped the natural flooding process. Also, holding French Creek at bank-full conditions for longer periods via retention and release from the dam may increase erosive forces to areas downstream.

Union City Reservoir
Not to be confused with the USACE Union City 'Dam' Reservoir, the Union City Reservoir is a small (25 acres) manmade impoundment that serves as a water supply for Union City Borough. Located in Union Township, Erie County, the reservoir has a surface elevation of 1394 feet and a maximum depth of approximately 23 feet. Bentley Run, a tributary to the South Branch of French Creek, drains Union City Reservoir. Union City Borough owns the impoundment and public access area. The reservoir provides good fishing for largemouth bass and other panfish and is utilized by the PFBC as a brood lake for muskellunge. Only non-motor boats are permitted on the reservoir. The Bentley Run Wetlands easement, which WPC holds on almost 350 acres of State Game Lands 102 adjacent to the reservoir, is open to public recreation and access.

Tamarack Lake
Tamarack Lake, a man-made impoundment a few miles southeast of Meadville, Crawford County, is unique in that it was formed across a watershed divide by the damming of two neighboring streams. Tamarack Lake was constructed in 1963 by the USDA Soil Conservation Service by damming Mill Run, a tributary of French Creek, and Mud Run, a tributary of Little Sugar Creek. The lake covers 562 acres and has a normal pool elevation of 1216 feet. Because the lake is situated on a saddle between two drainages, it is relatively shallow with a mean depth of 4.3 feet and a maximum depth of 13 feet. This has led to excessive aquatic vegetation that must be controlled by annual winter drawdowns.

Tamarack Lake is owned by the PFBC and maintains seven public access points. The lake is stocked with walleye and muskellunge fingerling. There is an electric-motors-only restriction for boats on the lake. Studies indicated that the excessive vegetation in the lake may contribute to slower than normal growth rates for bass and panfish (PA Fish & Boat Commission, 2024).

Eaton Reservoir
Eaton Reservoir is a man-made impoundment on a tributary to the West Branch of French Creek in northeastern Erie County constructed in 1941. It is owned by the borough of North East and served as a water supply impoundment, though the borough has used Lake Erie for the majority of their water supply since 2004. Eaton Reservoir will only be used for drinking/domestic water in emergencies or during periods of high use.

Easton Reservoir has a surface area of 244 acres and a surface elevation of 1422 feet. Its maximum depth is 15 feet. Eaton Reservoir is open for public fishing with a no-motor regulation for boats. The reservoir has healthy populations of walleye, smallmouth and largemouth bass, and panfish. The PFBC has historically stocked channel catfish, northern pike, and various species of forage fish. Recently it was determined that the northern pike population was stunted due to several possible factors, including warm temperatures and a large recruitment of small individuals. Attempts were made to transplant all northern pike from Eaton Reservoir to Presque Isle Bay in Lake Erie. The PFBC determined these efforts were futile in attempting to eradicate all northern pike from Eaton Reservoir (PA Fish & Boat Commission, 2008).

Findley Lake, N.Y.
Findley Lake was formed in 1810 by a private landowner who dammed the West Branch of French Creek in Chautauqua County, New York. The lake surface elevation is 1420 feet and covers 230 acres. Land use in the drainage basin is a mix of forest and agriculture. The lake is a major tourist attraction and has seen the development of the town of Findley Lake at the north end of the lake as well as numerous homes and cottages along the western and eastern lakeshores.

Watershed Hydrology

The hydrologic cycle, or water cycle, describes the flow of water through the aquatic, terrestrial and atmospheric environments. This cycle includes water storage and transportation. Water can be stored as groundwater, surface water, snow and ice, and atmospheric moisture. Water is transported through evaporation and transpiration from the Earth's surface to the atmosphere. Condensation and precipitation bring the moisture back to the earth. Runoff brings the water back to storage areas and the cycle continues. This process is driven by energy from the sun.

A water budget/hydrologic model provides a better understanding of how water cycles through this watershed, then informed decisions can be made regarding changes to groundwater and surface flows. Much of the information for developing a water budget exists in the form of United States Geologic Survey (USGS) gage station data sets and meteorological data. Comprehensive groundwater data can be pulled together with Geographic Information System (GIS) and analyzed to develop a working model that would allow water budget change predictions regarding land use changes, pollutants, mixing zones, and nutrient loading.

Surface Flow
Historically, there were a total of 20 USGS gauging stations in the French Creek basin, and nine stations are currently providing daily stream flow levels data (Table 3).

Table 3. USGS Gauging Stations in the French Creek Watershed, Current and Historic

Station #	Station Name	County	Dates of Operation
03021350	French Creek, Wattsburg	Erie	1974–present
03021410	W. Br. French Creek, Lowville	Erie	1975–present
03021500	French Creek, Carters Corners	Erie	1910–1971
03021518	Union City Reservoir on French Creek	Erie	1970–present
03021520	French Creek, Union City	Erie	1972–present
03021700	Little Conneauttee Creek, McKean	Erie	1960–1978
03021890	French Creek, Cambridge Springs	Crawford	2017–present
03022000	French Creek, Venango	Crawford	1938–1946 (partial)
03022500	French Creek, Saegertown	Crawford	1921–1939
03022540	Woodcock Creek, Blooming Valley	Crawford	1974–present
03022554	Woodcock Creek, Woodcock Creek Dam	Crawford	1974–present
03023000	Cussewago Creek, Meadville	Crawford	1910–1938
03023100	French Creek, Meadville	Crawford	1988–present
03023300	Van Horne Creek, Kerrtown	Crawford	not available
03023500	French Creek, Carlton	Mercer	1908–1925
03024000	French Creek, Utica	Venango	1932–present
03024500	Sugar Creek, Wyattville	Venango	1910–1916
03025000	Sugar Creek, Sugarcreek	Venango	1932–1979
03025200	Patchel Run, Franklin	Venango	1967–1978
03025500	Allegheny River, Franklin	Venango	1914–present
Source: USGS Water Resources Data for Pennsylvania			

Analysis of stream gauge data sets are important to determine how French Creek's flow regime has changed in response to land use changes, population growth, and dam construction. Comparison of the current data with pre-1970 data shows that the construction of the Union City Dam and the Woodcock Creek Dam have significantly reduced the yearly peak flows in French Creek. A more thorough analysis is needed to determine the effects of these projects on the overall flow regime in French Creek. It is possible that organisms adapted to natural flow regimes would be seriously impacted by alterations to these flows as a result of dam construction. Alterations to flow regimes may also impact the fluvial geomorphology of streams and cause increased erosion in areas of the French Creek watershed.

Stormwater Management

Municipalities, universities and prisons meeting certain criteria must obtain NPDES permit coverage for discharges of stormwater from their municipal separate storm sewer systems (MS4s). In Pennsylvania, there are 1,059 Small MS4s. Additional Small MS4s may be designated by DEP when appropriate and using DEP's designation criteria. MS4s must apply for NPDES permit coverage or a waiver if they are located in a census-designated Urban Area that meets EPA's automatic designation criteria for small MS4s, or if they are designated as needing a permit by DEP. Urban areas within the French Creek watershed include Conneaut Lake, Corry, Edinboro, Franklin, Meadville, and Saegertown (Figure 17).

Groundwater

Groundwater is an extremely important component of the water cycle and its quality, quantity and distribution need to be better understood to effectively protect the water and biological resources of the French Creek watershed. Groundwater serves as a major source of drinking/domestic water and contributes nearly all of the flow to streams during warm, summer months. Groundwater is key to the existence and health of rare fens and other wetlands, glacial lakes, and plant and animal communities that rely on the flow of high-quality groundwater. Nutrients, such as nitrogen and phosphorus, and other pollutants such as herbicides and pesticides, can infiltrate groundwater sources and threaten the water quality and health of aquatic ecosystems. Pollutants can also impact drinking/domestic water sources for people utilizing both private and public wells.

An aquifer is a body of rock material that is permeable to water flow and is underlain by impermeable material. It is capable of storing significant quantities of water fed by groundwater passing through the material. Southern portions of the French Creek watershed are underlain by Pennsylvanian Aquifers, which cover approximately 118 square miles. These are sandstone aquifers in the unglaciated portions of the watershed in Venango County and portions of southeastern Crawford County. Central portions of the watershed are underlain by Mississippian Aquifers covering approximately 326 square miles. These are sandstone and carbonate-rock aquifers in southern glaciated sections of the watershed. Approximately 780 square miles of the northern sections of the watershed have no principle aquifers (U. S. Geological Survey, 2018).

Groundwater in the French Creek watershed is, on average, hard to very hard. This is due to minerals that the groundwater dissolves while percolating through the glacial material, mainly constituents of calcium and magnesium. Chloride is also a constituent of groundwater and can cause water to be saline, similar to ocean water, if concentrations become too high. Higher

salinities are generally found at greater depths where aquifers hold ancient groundwater that does not flush and has time to dissolve chloride from surrounding bedrock. Salinity levels in the French Creek watershed are generally low even in deeper wells; this may be due to the increased rate of flow of groundwater through unconsolidated deposits and the subsequent flushing of even the deeper aquifers.

Groundwater supplies are recharged by precipitation entering the ground through recharge areas. These areas may be wetlands, lakes and streams, or other areas where soils are permeable to water flow. Identification and protection of recharge areas are important to insure quality and quantity of water for aquatic systems and drinking/domestic water supplies. Excess runoff resulting from an increase in impervious surfaces, draining of wetlands, and alterations to hydrology of a watershed decreases groundwater recharge. These factors lead to decreased base flows of streams, decreased water quality, decreased drinking/domestic water quality and quantity, and increased stress on aquatic and wetland organisms.

EPA Urban Areas for Stormwater Management

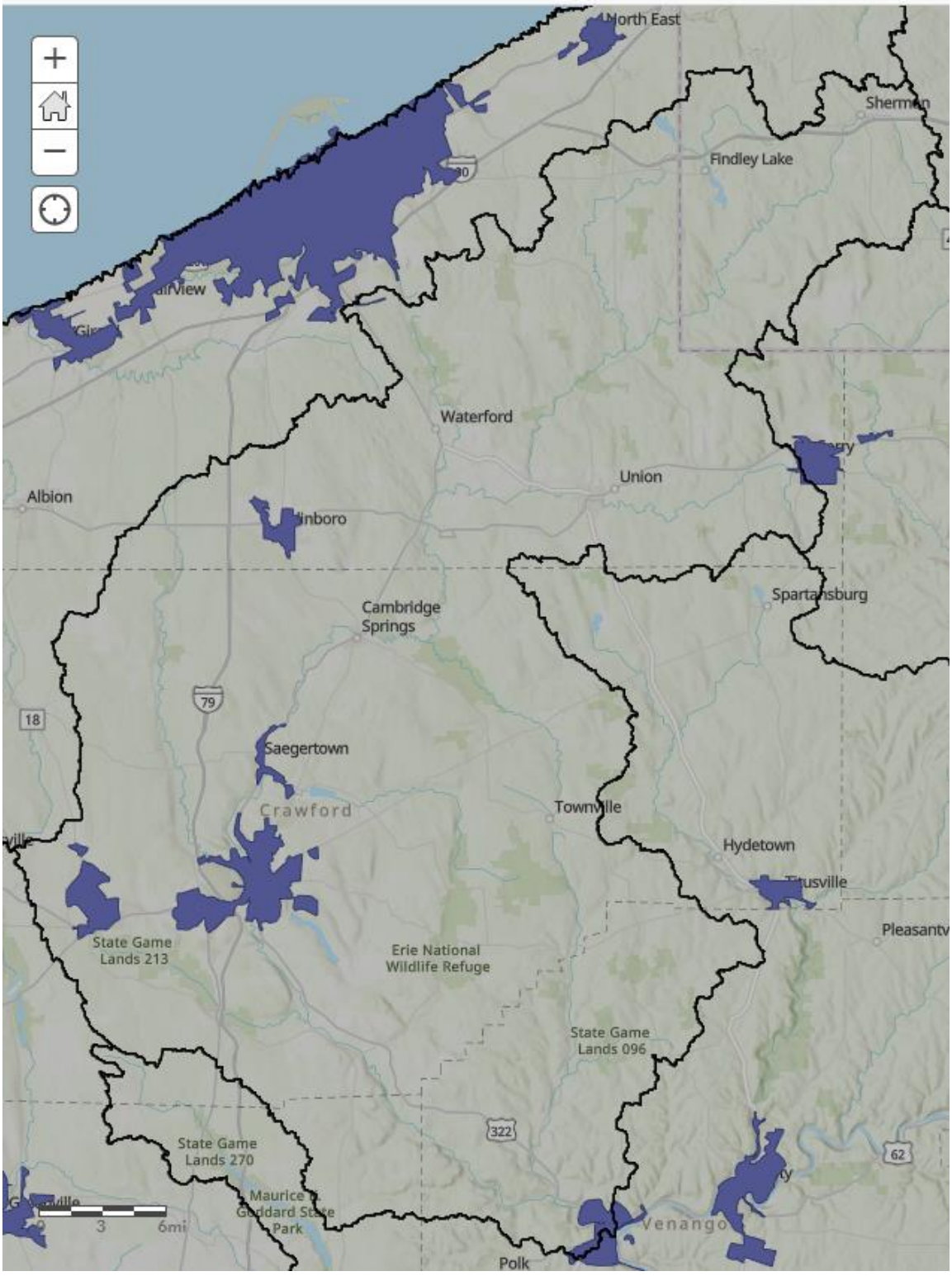


Figure 17. EPA Urban Areas for stormwater management
Map Source: [Urban Area Maps for NPDES MS4 Phase II Stormwater Permits | US EPA]

Water Quality

Natural Water Chemistry

Overall, the water quality in the French Creek watershed is relatively good; however, there are sections that are degraded by various pollutants. Water quality has remained good partially due to the glacial history of the watershed. Material deposited across the French Creek landscape by the glaciation process is high in carbonate, which acts as a natural buffer against acidification by atmospheric deposition and industrial discharges. The glacial material in the French Creek watershed is high in calcium carbonate ($CaCO_3$), as well as dolomite (CaMg(CO3)2), another carbonate-rich material. This leads to the alkalinity of water in the French Creek watershed.

Alkalinity refers to the buffering capacity of water, largely through the effects of both bicarbonate (HCO3) and carbonate (CO3). Most of the lakes and streams in the French Creek basin have circumneutral pH, yet have very high alkalinity due to dissolved bicarbonate. Carbonate is not present below pH 8.3. Alkalinity allows water to withstand certain levels of acidic input without affecting pH levels. Acids are high in hydrogen ions (H+). The more hydrogen ions there are, the higher the acidity. Carbonate (CO_3) binds to the hydrogen ions, neutralizing the acidic conditions. The more CO_3 that is available, the more acidity can be neutralized. The associated calcium in $CaCO_3$ is beneficial to aquatic organisms in a variety of ways; it helps ameliorate the effects of some dissolved compounds on aquatic organisms and it is important for shell and exoskeleton formation as well as many other physiological functions.

South Branch French Creek (photo: WPC)

Another factor leading to good water quality in French Creek is the highly rural nature of the watershed. With relatively little development and low percentages of impervious surfaces, precipitation and runoff in the watershed is able to seep into the ground and carries fewer pollutants to waterways. There are, however, threats to French Creek's naturally occurring good water quality. In areas where development has occurred at higher levels, especially around lakes, water quality has been degraded. In addition, point discharges from urban areas, including industrial discharges and sewage treatment plants have degraded sections of French Creek and certain lakes within the watershed. While the rural nature of the watershed has protected it from degradation due to urban runoff, the threat of degradation due to improper agricultural and forestry practices is substantial. Improper agriculture and forestry practices can impact water quality by increasing sediment loads, introducing nutrients and pesticides, and eliminating or reducing riparian buffers.

The French Creek watershed has a certain capacity for assimilating pollutants before water quality is degraded. Components of the watershed including wetlands, riparian buffers, alkaline soils, and intact forests all help to boost the capacity of the watershed to buffer water quality against degradation from pollutants. In areas where land use practices excessively disrupt these watershed components, water quality degradation occurs and can spread a significant distance

downstream until water inputs dilute the negative impacts sufficiently to restore water quality. For these reasons, we see good water quality in some sections of the French Creek watershed and degraded water quality in other areas of the watershed.

Nutrients and Energy Flow

Trout Run in Erie County (photo: WPC)

Vitally important to the protection of a waterway's resources is an understanding of how nutrients and energy cycle through the system. This includes how nutrients and energy sources enter the stream and move through the aquatic food web. In many aquatic environments, primary producers or autotrophs (plants and other photosynthesizing organisms) function as the primary energy source and their contribution is dependent upon the width and flow rate of the stream or river. Smaller or swifter moving waterways rely less on autotrophs (i.e. periphyton, macrophytes, and phytoplankton) for primary energy production than do larger, slower moving rivers (Allan, 1995). Lakes within the watershed, which are lentic (standing water) environments, rely much more heavily on primary production by autotrophs. In these instances, the limiting nutrients for primary production are usually nitrogen and phosphorus.

Generally, lotic (moving water) systems receive the bulk of their energy inputs in the form of non-living organic matter. This may come from dead aquatic macrophytes, terrestrial plant material that falls into the stream, dead aquatic organisms or terrestrial organisms that fall into the waterway, or organic soil matter. Non-living organic matter generally comes in three forms, based on particle size, coarse particulate organic matter (CPOM), fine particulate organic matter (FPOM), and dissolved organic matter (DOM).

The contribution to the stream of dead plant material from aquatic macrophytes, autumn leaf fall, or woody debris as well as dead organisms are referred to as CPOM. These materials are first softened by bacterial breakdown, and then macroinvertebrate shredders and detritivores further breakdown the material and utilize the energy. As small pieces are broken off and flow downstream, it becomes FPOM. Further breakdown, including feces from macro-organisms, causes DOM to enter the aquatic food web. The nutrients flow through the aquatic food web as microorganisms and macroinvertebrates are preyed upon by other macroinvertebrates and fish.

Eutrophication

Eutrophic lakes are nutrient rich, whereas oligotrophic lakes are nutrient-poor and are generally characterized as having clear water with low productivity, lower nutrient levels, and high levels of dissolved oxygen. Eutrophication is the process of nutrient enrichment in aquatic ecosystems, particularly lakes. This usually occurs from increasing the supply of nitrogen and phosphorus levels dissolved in water beyond what might be expected from the lake's geological setting, alone. Both oligotrophic and eutrophic lakes can be further enriched by human activities.

Common activities that lead to eutrophication include deforestation, agricultural development and urbanization. All lakes in the French Creek basin are essentially the same age, about 12,500 years old formed by the most recent glacial retreat.

Lakes collect sediments through run off over time. These sediments carry nutrients that provide for the growth of primary producers like photosynthetic aquatic plants and algae. As nutrient levels rise, lakes gradually become mesotrophic, or midway through the eutrophication process. Rates of sediment input can vary based on geology, soil conditions and human influences on land use that exacerbate erosion and sediment transport rates. Once nutrients are over-abundant, they no longer become the limiting factor for plant growth in an aquatic system. These aquatic systems are said to be eutrophic and may continue to the point of being hypereutrophic. When this occurs, plant production becomes so high that the water is depleted of oxygen during plant respiration and decaying plant matter further depletes oxygen levels. This leads to the death of aquatic organisms, which can further deplete oxygen levels as the organic tissue decays. The lakes in the French Creek watershed are all fairly productive and in various stages between mesotrophic and eutrophic, possibly even hypereutrophic during the summer months.

Nutrient enrichment is occurring in French Creek and many of its tributaries. This is evident by summer algal blooms and excessive aquatic weed growth. Eutrophication may not be as pronounced in the moving stream environment where oxygen levels are constantly replenished by flowing water, but excessive nutrients can still have a negative effect on aquatic organisms as nutrient levels build up and oxygen levels are sometimes critically depleted during warmer summer months when flows are reduced. This is especially problematic for French Creek's freshwater mussel species, which depend on oxygenated water and cannot move to find more suitable conditions. Excessive aquatic weed growth may also reduce aesthetic and recreational opportunities in the French Creek watershed.

Water Quality Designations

The Pennsylvania DEP develops water quality standards for all surface waters of the state, which are designed to safeguard Pennsylvania's streams, rivers and lakes, consist of both use designations and the criteria necessary to protect those uses. As part of the water quality standards program, DEP conducts stream use designation evaluations on an ongoing basis. Evaluations may be conducted on streams or stream segments that are found to be missing from the water quality standards (Chapter 93 of the department's Rules and Regulations) or on streams

or segments DEP believes to be improperly classified. Re-designation evaluations may also be conducted at the request of the Pennsylvania Fish and Boat Commission (PFBC). In addition, any person, agency, group, organization, municipality or industry may submit a rulemaking petition to the Environmental Quality Board (EQB) to request a stream re-designation.

Under Chapter 93 of the Pennsylvania Code, all commonwealth waters are protected for a designated aquatic life use, as well as, a number of water supply and recreational uses. The use designation shown in the water quality standards is the aquatic life use, including Warm Water Fishes (WWF), Trout Stocking (TSF), Cold Water Fishes (CWF) and Migratory Fishes (MF) (Figure 18).

French Creek Watershed Designated Use

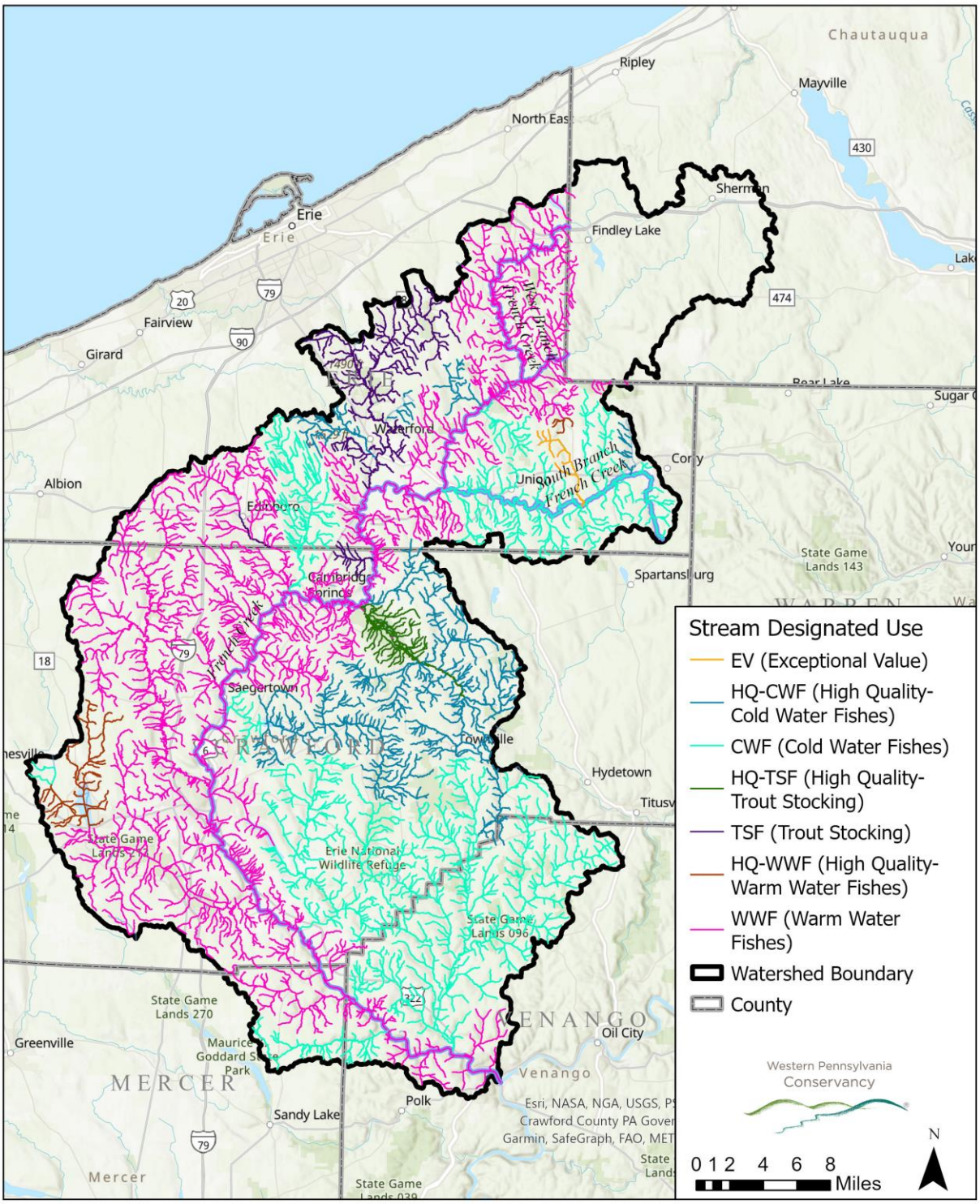


Figure 18. French Creek Watershed Designated Use

In addition, streams with excellent water quality may be designated High Quality Waters (HQ) or Exceptional Value Waters (EV). The water quality in an HQ stream can be lowered only if a discharge is the result of necessary social or economic development, the water quality criteria are met, and all existing uses of the stream are protected. EV waters are to be protected at their existing quality; water quality shall not be lowered.

Water Quality Impairments

Portions of French Creek have been listed as impaired in the PA 303(d) list of impaired waterways by sources of pollution, primarily sediment and nutrients, caused by agriculture, channelization, impoundments, runoff, and other natural sources (Fig. 19).

Point Sources

All industrial, commercial, and municipal discharges are authorized by EPA to be permitted by DEP in Pennsylvania under the National Pollutant Discharge Elimination System (NPDES) (Appendix E). DEP's NPDES Permitted Facilities Report can be used to identify facilities with NPDES and WQM permits issued by the Clean Water Program.

Sewage Treatment

Portions of French Creek have been historically degraded by sewage discharges from Meadville, West Mead Township, and Cambridge Springs' sewage treatment plants, as well as sewage treatment plant discharges (without tertiary treatment) from Saegertown, Waterford, Union City, Cochranton, Edinboro and Conneaut Lake. All of these discharges are rich in phosphorus and nitrogen. Pennsylvania DEP's Act 537 Sewage Facilities Program implements the Pennsylvania Sewage Facilities Act (Act 537) in order to address existing sewage disposal needs and to help prevent future problems through the proper planning, permitting, and design of all types of sewage facilities. The program's website (linked above) contains sewage planning fact sheets, policies and procedures, information on funding programs and planning guides.

Sewage management programs are regulatory programs enacted by municipalities for assuring the operation and maintenance needs, and thereby the long-term performance, of on-lot sewage disposal systems and other sewage facilities.

Chapter 71 of the PA Code (pertaining to Administration of the Sewage Facilities Planning Program), Section 71.71 requires municipalities to establish sewage management programs as

part of their official plans, or through revisions to their official plans that assure proper operation and maintenance of sewage facilities.

Municipalities are required to develop and implement comprehensive official sewage facilities plans that provide for the resolution of existing sewage management problems and provide for future sewage disposal needs of the land and municipalities. Many of the municipal Act 537 plans in the watershed are aging and should be updated (Fig. 20). A Guide for Preparing Act 537 Update Revisions (PDF) (362-0300-003) provides several model ordinances and scenarios to establish a sewage management program.

French Creek Watershed Stream Impairment Source

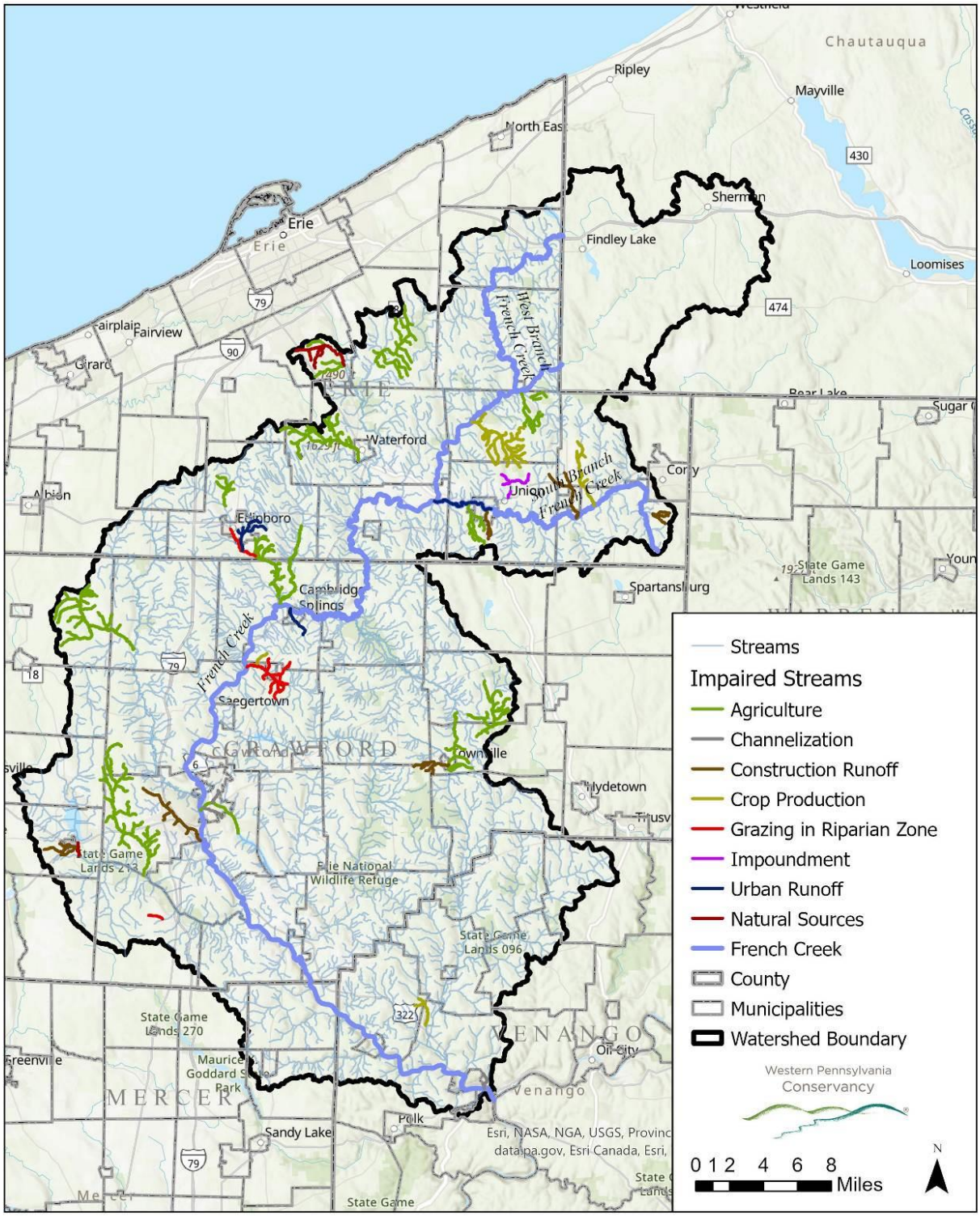


Figure 19. French Creek Watershed Stream Impairment Source

Non-Point Sources

Non-point source (NPS) pollution is a major cause of surface water degradation. Because NPS pollution cannot be traced to a pipe, ditch, or other discharge point, it's difficult to control. Non-point source pollution can travel via surface runoff or it can enter groundwater and flow via sub-surface channels. Other potential sources of NPS pollution include gravel mine drainage, urban runoff/storm sewers, residential runoff, atmospheric deposition, golf courses, development and construction projects, leachate from landfills, and silviculture projects.

Pennsylvania's Department of Environmental Protection (PA DEP) Integrated Water Quality Monitoring and Assessment Report satisfies the requirements of sections 305(b) and 303(d) of the Clean Water Act (CWA). Section 303(d) requires states to list all impaired surface waters not supporting uses even after appropriate and required water pollution control strategies have been applied. The 303(d) list includes the reason for impairment, which may be one or more point sources, like industrial or sewage discharges, or non-point sources, like abandoned mine lands or agricultural runoff and the pollutant causing the impairment such as metals, pH, mercury or siltation. 305(b) is the narrative report.

The PA DEP 2024 Integrated Water Quality Report lists numerous streams and lakes within French Creek as impaired (Figure 19). Primary sources of impairment documented were sediment and nutrients caused by agricultural, runoff, channelization and impoundments. Several lakes were listed as impaired by urban runoff, storm sewers and other sources contributing nutrients and suspended solids pollution that accumulates.

The Federal Clean Water Act requires states to develop lists of impaired waters within their state boundaries that do not meet their designated uses. State agencies are then tasked with developing a Total Maximum Daily Load (TMDL) for all waters identified on their list of impaired waters. A TMDL is a calculation of the total amount of a pollutant the water body can receive, while still meeting its designated use. Conneaut Lake has been prescribed Total Maximum Daily Loads (TMDLs) or target restrictions to reduce sources of pollution.

Trout Run Advance Restoration Plan

In 2018, PA DEP began allowing Advance Restoration Plans (ARP) as an alternative to creating a TMDL for an impaired stream. An ARP is like a TMDL, but with the additional components of a Watershed Improvement Plan (WIP). A U.S. EPA-approved ARP makes funding available to implement voluntary BMPs that will decrease sediment and nutrient pollution to the impaired water. Trout Run, a subwatershed of LeBoeuf Creek, is a small watershed in the northern portion of French Creek. In 2022 the EPA approved the *Trout Run ARP* developed by WPC and DEP. In 2023, WPC applied for EPA 319 funds to implement voluntary best management practices in the Trout Run watershed, pending award at the time of this plan update in 2024.

Conservation Framework for the French Creek Watershed

In 2021, the U.S. Army Corps of Engineers (USACE) completed a Planning Assistance to States (PAS) study in partnership with WPC to develop an objective, science-based Conservation Framework for the French Creek watershed. The conservation framework is a model intended to aid conservation and resource agencies in decisions regarding the restoration and protection of streams and associated aquatic resources within the French Creek basin, with the overall goal of

Act 537 Sewage Facilities Plan Ages for Northwest Pennsylvania

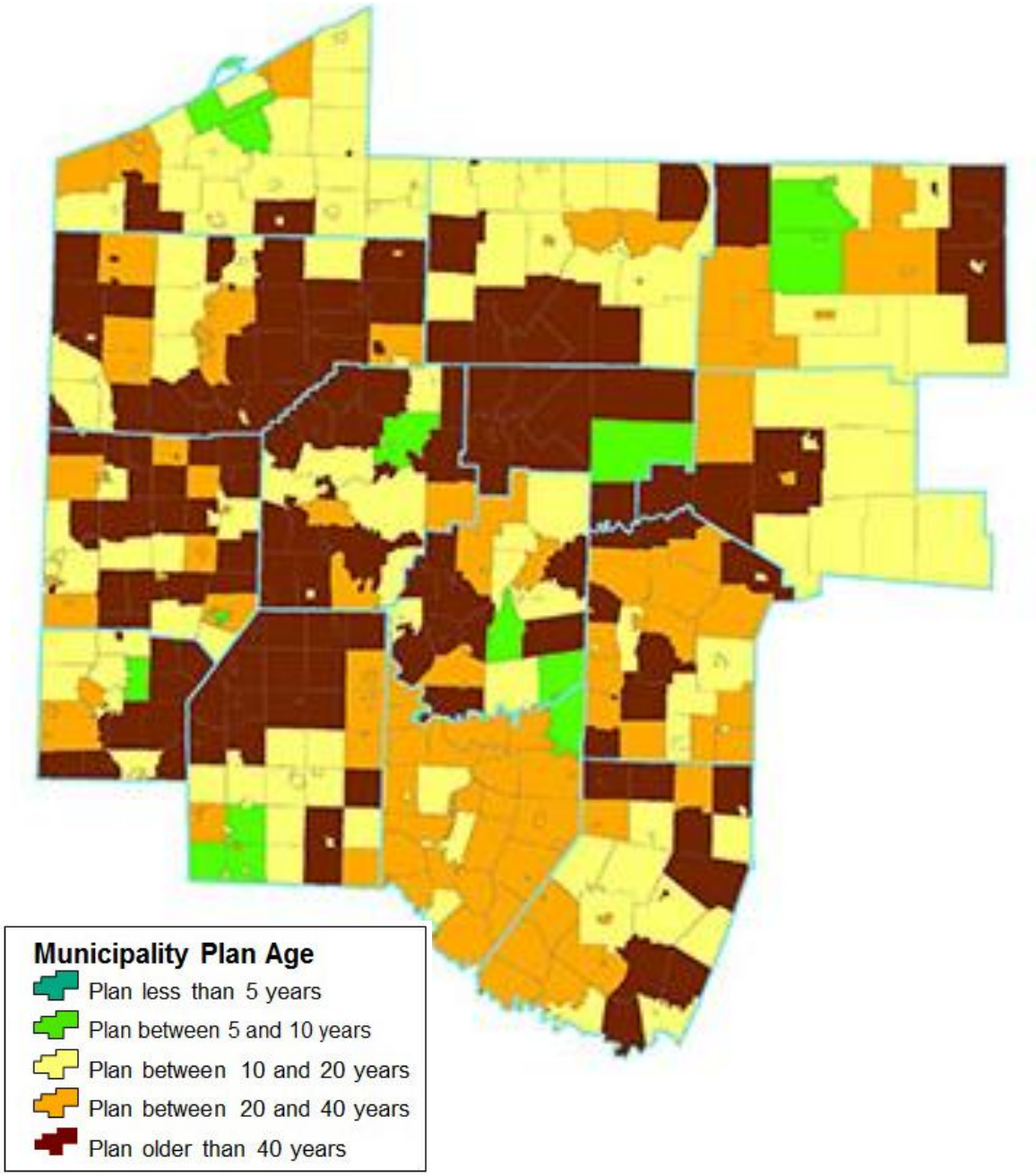


Figure 20. Act 537 Sewage Facilities Plan Ages for Northwest Pennsylvania
Map Source: Act 537 Official Plan Aging - Northwest

promoting continued sustainability of this regionally and globally significant watershed. The model is intended to predict biological impairment—as defined by Pennsylvania macroinvertebrate indices of biotic integrity (IBI)—as a function of landscape characteristics, including forested, agricultural, and residential/urban land cover.

Monitoring

There are several agencies, organizations, and individual researchers that have conducted water quality monitoring at various points throughout the watershed or in certain sub-watersheds.

U.S. EPA added Lake Pleasant to its Regional Monitoring Network for freshwater inland lakes in 2022, establishing a weather station and proposing installation of continuous water-sampling sensors.

Table 4. PA DEP Surface Water Quality Network Monitoring Stations in French Creek

Station #	Waterway	Location
L801	Conneaut Lake	Sadsbury Township, Crawford Co.
L804	Edinboro Lake	Edinboro Borough, Erie Co.
L805	Lake Pleasant	Venango Township, Erie Co.
L806	LeBoeuf Lake	Waterford Township, Erie Co.
L809	Sugar Lake	Wayne Township, Crawford Co.
L810	Tamarack Lake	West Mead Township, Crawford Co.
L811	Union City Reservoir	Union City Borough, Erie Co.
L812	Woodcock Creek Lake	Woodcock Township, Crawford Co.
826	French Creek	Utica Borough, Venango Co.
827	French Creek	Amity Township, Erie Co.
845	French Creek	City of Franklin, Venango Co.
846	French Creek	West Mead Township, Crawford Co.
847	French Creek	Woodcock Township, Crawford Co.
848	Lake Creek	Jackson Township, Venango Co.
849	Woodcock Creek	Woodcock Township, Crawford Co.
850	Conneauttee Creek	Washington Township, Erie Co.
851	Muddy Creek	Steuben Township, Crawford Co.
869	French Creek	Venango Township, Crawford Co.
879	Woodcock Creek	Randolf Township, Crawford Co.
Source: U.S. EPA STORET Database		

PA DEP conducts fish tissue sampling in area lakes and streams to monitor bioaccumulation of toxins and heavy metals. Of particular interest are high levels of mercury in fish sampled from Lake Pleasant, Lake LeBoeuf, and Edinboro Lake, as noted by the Erie County Health Department. Mercury is a component of various industrial emissions. It is contributed to waterways through dry and wet atmospheric deposition. Once in a lake ecosystem, the mercury settles to the bottom, accumulates in the substrate, and is taken up by aquatic organisms and accumulates in the tissue of fish. DEP also conducts “cause and effect” studies to document pollution occurrences and follow-up monitoring to assess the impacts of these occurrences.

U.S. Geological Survey conducts a variety of water quality and quantity monitoring programs for both surface and groundwater. There have been 20 USGS stations throughout the French Creek watershed and one on the Allegheny River at the mouth of French Creek that monitored daily streamflow levels during certain periods, some beginning as early as 1908 (Table 3).

As part of its National Water Quality Assessment Program (NAWQA), USGS had several stations within its network that also collected various water chemistry parameters. The NAWQA program focused on the Allegheny and Monongahela River basins in New York, Pennsylvania, Maryland, and West Virginia. The French Creek station at Utica was utilized as a NAWQA water quality monitoring station for various periods from 1956 until the NAWQA program in the Allegheny and Monongahela rivers basins was discontinued in 1998. Water quality parameters monitored included pH, temperature, specific conductance, dissolved oxygen, hardness, alkalinity, nitrogen, phosphorus, solids, and many major anions and cations. As part of the NAWQA monitoring program, algae, aquatic macroinvertebrates, and fish were also sampled at the French Creek, Utica station.

Previous data collected through the NAWQA program reported 48 fish species and 69 macroinvertebrate families collected at Utica. Aquatic macroinvertebrates are often used as indicators of water quality. A high number of families, including pollution intolerant forms such as those found at Utica, suggested good biodiversity and relatively good water quality. Groundwater wells throughout Pennsylvania are also monitored by USGS for groundwater levels. Only one well, in Erie County, is within the French Creek watershed. This well, near McKean, has been monitored daily since July 1966. (U. S. Geological Survey).

USACE policies mandate the implementation of a watershed scale monitoring program that includes the collection of hydrologic and water quality data. The Pittsburgh District Water Quality Unit, along with the Water Management and Hydrology and Hydraulics Units, is one of three units in the Water Resources Section. Routine annual water quality surveys are performed at both the Woodcock Creek Lake dam and the Union City Dam to monitor watershed trends and concerns, optimize reservoir operations, document compliance with Federal and State water quality standards and provide data for water control manual updates.

Creek Connections is an environmental education outreach project operated from Allegheny College in Meadville that works with middle and high school classes to monitor stream sites near their respective schools for educational purposes. Sites are regularly monitored by students and the data is obtainable online at http://creekconnections.allegheny.edu/. The program has been working with students on using water quality monitoring as the basis of watershed education for students since 1995. It was originally called the French Creek Environmental Education Project. The students routinely perform field analyses for temperature, pH, total dissolved solids, dissolved oxygen, nitrogen, phosphorus, alkalinity, and turbidity.

In 2021, Allegheny College received a $1.25M grant from the Richard King Mellon Foundation to establish the Watershed Conservation Research Center. The interdisciplinary center allows faculty and students to collaborate with the community and engage in conservation-based research and educational outreach focusing on the French Creek watershed and its unique biodiversity. Through its research and collaboration with partners, the center helps create

watershed stewards, identify areas of highest conservation value and greatest need for restoration, monitor aquatic species and advance scientific knowledge to aid in the protection of the watershed's species and habitats.

County Conservation Districts perform some water quality monitoring in sub-basins where their efforts are focused on implementing BMPs or other projects to address stream impairments. The PFBC also conducts water quality monitoring throughout the watershed. They utilize water chemistry field analysis, macroinvertebrate and fish sampling on stream segments that are routinely stocked to monitor the health of waterways and biological communities.

Numerous researchers associated with local universities also have performed monitoring projects throughout the watershed.

Monitoring in the French Creek watershed has not adequately addressed some questions regarding water quantity, quality and aquatic organisms. In a highly rural, largely agricultural watershed, it is not known where the most significant sources of nutrients are and data gaps still exist with regards to groundwater quality, quantity, and identification of important recharge areas. Biological monitoring has been largely restricted to easily-accessible riffle areas. Macroinvertebrate information as an indication of water quality is lacking for non-riffle and other areas. Aquatic organisms have not been adequately monitored to determine the health of aquatic communities as a whole or populations of certain species, including species of concern.

Water Supply

Public/Private

Approximately 67 percent of watershed residents receive drinking/domestic water from a community or public water supply. Approximately 17 percent of those residents get their water from a public surface water supply and the other 83 percent are utilizing public groundwater supplies. Approximately 4.87 million gallons of water per day are withdrawn from public groundwater supplies for drinking/domestic water. Another 1.01 million gallons of water per day are withdrawn from public surface water supplies. The remainder of the watershed population gets their drinking/domestic water from private wells. Approximately 3.09 million gallons of groundwater are used daily for drinking/domestic water from private wells (U. S. Geological Survey).

Cambridge Springs Borough is the only municipality in the French Creek watershed that has its public water supplied directly by a surface water intake from French Creek. Other public surface water supplies include 2600 acres of reservoirs in the watershed with the remainder of public water supply sources being wells and springs (Figure 21).

Well Head Protection Areas

States are required to establish wellhead protection programs by the Safe Drinking Water Act. Pennsylvania's wellhead protection program is administered by DEP and is intended to protect groundwater supplies from contamination. Major sources of groundwater contamination as listed by DEP include: pesticides, leaking storage tanks, surface impoundments, landfills,

French Creek Watershed Public Water Supplies

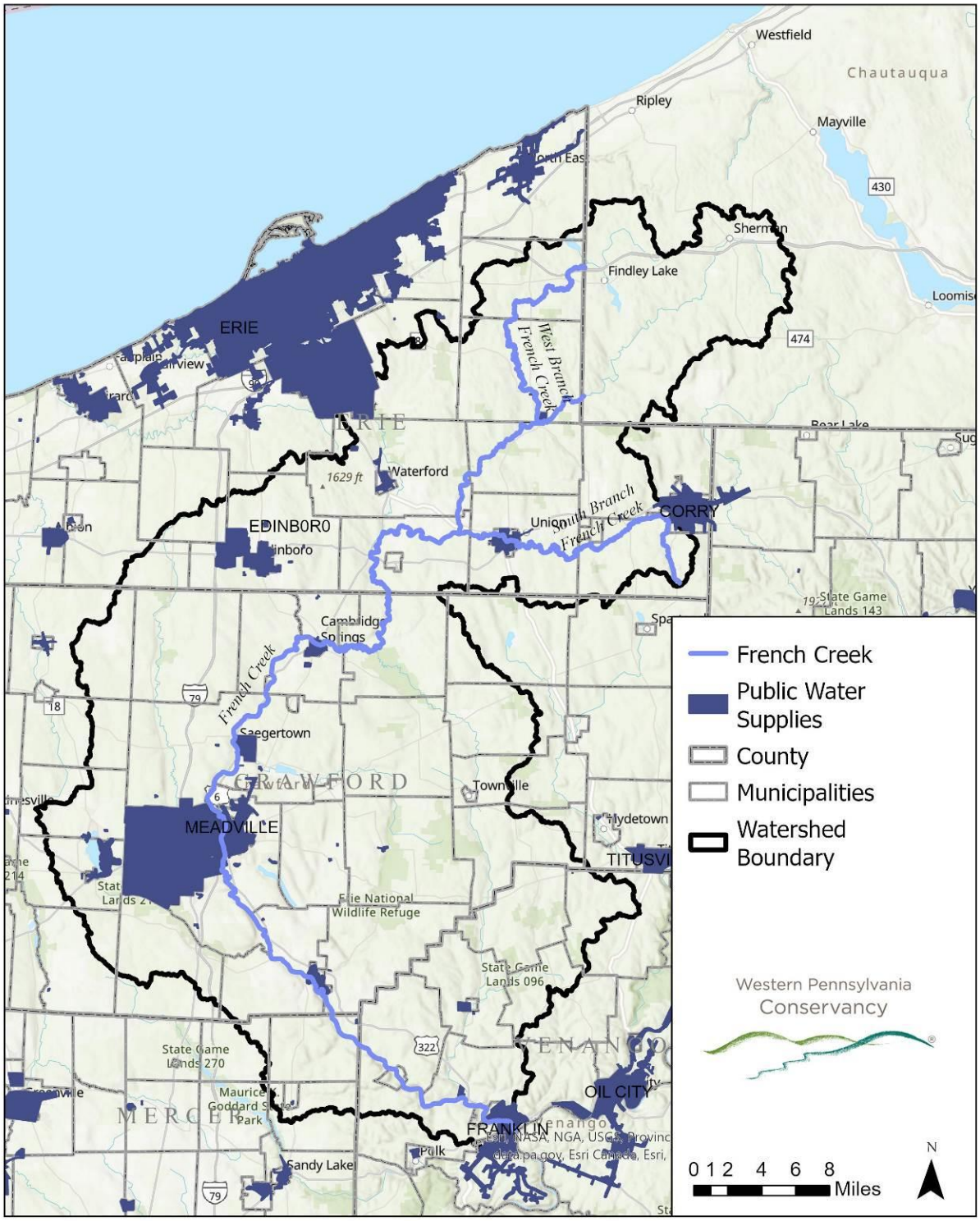


Figure 21. French Creek Watershed Public Water Supplies

hazardous waste sites, industrial facilities, spills, mining and mine drainage, pipelines, and sewer lines.

The wellhead is the location of the well and the area in the immediate vicinity that makes up the well's recharge zone. The wellhead protection program works by establishing buffer areas around public water wells. Typically, the buffer areas are laid out in three zones. Zone one is generally a 100-400-foot radius around the wellhead. Zone two is up to a half mile radius from the wellhead and zone three is any area outside of one-half mile that contributes to the well. Protection to the drinking/domestic water supply is afforded through assessments and monitoring, plugging of abandoned wells (water, oil or gas) in the vicinity, education of local water users, and assistance by DEP to the local municipality with establishing zoning regulations.

Aquatic Organism Passage

Culverts

Stream connectivity is important for all aquatic species in a number of ways, including access to thermal refuge, access to important spawning habitat, and for eliminating genetic isolation of populations. However, poor design of culverts and bridges (road-stream intersections) can negatively affect stream connectivity. Culverts can act as barriers to fish passage in a number of ways. A culvert can be perched above the stream bed, causing fish to have to jump large heights. Aquatic organisms have varying levels of mobility and passable culverts are essential for a connected ecosystem. High current velocities in culverts can make it impossible for organisms to move through them. Water depth within the culvert can be too shallow, or may not provide resting areas for organisms that are migrating upstream. In fact, properly designed and installed culverts also benefit other aquatic species that are less mobile than trout including mussels, hellbenders, other amphibians, reptiles and macroinvertebrates. Poorly designed and/or installed culverts also pose problems for stormwater runoff, infrastructure maintenance and public safety in the event of flooding. Often, an undersized culvert creates a blowout effect downstream, increasing water velocities and streambank erosion. A plugged culvert that cannot pass debris also acts as a dam during high water events, exacerbating flooding and becoming a public safety hazard.

The North Atlantic Aquatic Connectivity Collaborative (NAACC) is a collaboration of individuals from universities, conservation organizations, and state and federal natural resource and transportation departments focused on improving aquatic connectivity across a thirteen-state region, from Maine to West Virginia. NAACC has developed standardized protocols and training for assessing road-stream crossings (culverts and bridges) and developed a regional database for this field data. The information collected can be used to identify high priority bridges and culverts for upgrade and replacement.

The Penn State Center for Dirt and Gravel Studies is an independently funded non-profit entity under the Thomas D. Larson Pennsylvania Transportation Institute at Penn State University. The Center contracts with the State Conservation Commission to provide education, outreach, and technical assistance to entities involved with the Dirt, Gravel, and Low Volume Road

Maintenance Program. The Program and its grants are administered at the county level through the conservation district's local Quality Assurance Board. Grants cover a variety of road maintenance needs, including culvert and bridge replacements to improve fish passage and accommodate higher stream volumes and velocities expected to worsen with climate change. A municipality with dirt and gravel and low-volume roads with inadequate stream crossings and repair needs should seek technical assistance by first contacting its county conservation district.

Dams and Impoundments

In colonial times, French Creek was reported to have many small dams associated with mills throughout the watershed. Most of these structures have long since vanished but some dams built in the 1800s still remain. The dam that created Findley Lake in the New York headwaters of the West Branch of French Creek was built in 1810. There are also the remains of dams built at Saegertown and Venango, Crawford County.

Construction completion of the Union City Dam occurred in 1971 and has yielded cumulative damage prevention totaling more than $108 million through fiscal year 2022. Construction of the Woodcock Creek Lake dam was completed in 1973 and is congressionally authorized for flood control, low flow augmentation for water quality, fish and wildlife enhancement, and recreation. Of these project purposes, only flood control and low flow augmentation for water quality have storage allocated for their operation.

Tamarack Lake was formed by the construction of two dams on neighboring streams. Mill Run and Mud Run, in Crawford County, were dammed by the USDA to form Tamarack Lake.

PGC constructed dams in two SGLs within the French Creek watershed. Conneaut (Geneva) Marsh has a dam built on Conneaut Outlet to provide approximately 1,400 acres of habitat for waterfowl in SGL-213. Siegel Marsh Dam was built on a tributary of LeBoeuf Creek to form a 150-acre impoundment in SGL-218 for waterfowl habitat.

Edinboro Lake, a naturally formed lake, was originally dammed around 1900 for a mill and later raised to deepen the lake for boating. Howard Eaton Reservoir was formed in 1941 by a dam built on a West Branch of French Creek tributary for public water supply to North East Borough. American Rivers works with partners to reevaluate the need for dams that no longer serve their original purpose. Maintenance costs often exceed the cost of removal and generally the aquatic system benefits from the removal.

In 2023, FCVC and another adjacent landowner on the opposite bank of the Cussewago Dam cooperated with American Rivers and Beran Environmental to remove the obsolete low-head dam that hindered aquatic organism passage, was causing flooding in the adjacent mobile home park, and created a safety hazard for the local community. The project restored 1500 feet of the creek and reconnected more than 46 miles of upstream habitats. Volunteers from Allegheny College, FCVC, PFBC, USFWS, and WPC relocated over 1000 mussels of 10 species upstream.

Clockwise, top left: Cussewago Dam removal October 2023, adult rayed-bean mussels relocated during construction. Cussewago Creek flowing freely after dam removal (photos: American Rivers)

Water Withdrawal

Water withdrawal is an important factor of the hydrology of the French Creek watershed. Water withdrawals typically occur for irrigation and livestock purposes during the warmer, drier summer months. This coincides with the timing of the most stress on aquatic organisms due to water temperatures and low dissolved oxygen levels. Water withdrawals can compound the effects of already low dissolved oxygen levels and elevated water temperatures.

Inter-Basin Transfers

An inter-basin transfer occurs when water is pumped, diverted, or drained out of one watershed and into another. This has potentially negative consequences on water quality and quantity, and it increases the chances of spreading invasive exotic species. The only inter-basin transfer affecting French Creek occurred when the Borough of North East in Erie County used Eaton Reservoir (French Creek watershed) for its drinking/domestic water supply and the water was transported to the Lake Erie basin via pipes, resulting in a net loss of water for French Creek. North East installed an intake pipe from Lake Erie to its water filtration plant that now supplies 92% of its drinking/domestic water supply for residents.

CHAPTER 4. BIOLOGICAL RESOURCES

Wildlife

The French Creek watershed contains a wealth of wildlife resources, both aquatic and terrestrial. There is an abundance of species of concern, considered rare, threatened, or endangered in the state and in the nation, and also numerous game and non-game species. This amazing biodiversity leads to an enormous array of wildlife viewing and outdoor recreation opportunities. Perhaps more importantly, is the significance and importance this exceptional biodiversity places on conservation initiatives in the French Creek watershed.

Terrestrial

Mammals

There were 63 extant species of mammals in the Commonwealth with another 10 species considered either uncertain or extirpated within Pennsylvania (Merritt, 1987). Fifty species of mammals have ranges that overlap with the French Creek watershed (Appendix F). Two mammal species of concern, the least weasel (*Mustela nivalis*) and little brown bat (*Myotis lucifugus*), were listed for the French Creek watershed, as of December 2024. Current species listings should always be referenced by searching the PNHP website Environmental Review List of Species by HUC 8 watershed boundary of French Creek.

Some mammals, like mountain lions (*Felis concolor*), once common in the watershed and other areas of the state, have been lost due to the decline of habitat, while others, like the marten (*Martes americana*) and fisher (*Martes pennant*), have returned. White-tailed deer (*Odocoileus virginianus*), eastern chipmunk (*Tamias striatus*), woodchuck (*Marmota monax*), striped skunk (*Mephitis mephitis*), porcupine (*Erethizon dorsatum*), eastern cottontail rabbit (*Sylvilagus floridanus*), short-tailed shrew (*Blarina brevicauda*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethica*), opossum (*Didelphis marsupialis*), and beaver (*Castor canadensis*) are some of the more common mammals found within the watershed. There have been confirmed reports of river otters (*Lutra canadensis*) seen on French Creek and Cussewago Creek, and they are likely in Lake Pleasant.

Bats

Bats are common throughout Pennsylvania, and despite myths and common misperceptions, they do not readily spread rabies or entangle themselves in human hair. On the contrary, bats are both economically and environmentally beneficial, particularly in controlling insect populations. However, bats are currently being threatened by white-nose syndrome (WNS), which is devastating populations of all species of bats across Pennsylvania, New York, and the northeast. First documented in New York during the winter of 2006 and 2007, WNS is named for the white fungus that appears on the muzzles of dying bats. The exact cause of WNS is still unknown.

Depending on the species, bats may roost and/or hibernate in rock outcrops, cavities, mines, caves, or under tree bark. These habitats are highly vulnerable to degradation. Forestry and mining activities can disrupt and displace an entire colony of bats. Gates constructed at the entrance of abandoned mines and caves allow for the passage of bats and exclusion of humans to

limit disturbance to the habitat. Limitations of timber harvest of tree-roost sites during bat pup-rearing season from spring through mid-summer can help protect vulnerable species. Bat conservation is especially important now with the threat of WNS. Hibernacula—hibernation sites—should not be disturbed for any reason, in order to reduce the risk of spreading WNS and to avoid further distressing already sick bats (USFWS, 2009).

Birds

There are at least 379 bird species that nest, winter, or migrate throughout Pennsylvania. Many of these can be found in the French Creek watershed for at least part of the year. French Creek is located near the convergence of major migratory routes for songbirds and waterfowl that are traveling to the Atlantic coast and the Mississippi River and Gulf of Mexico from areas in the northeast U.S. and Canada during the fall and back to northern areas in the spring. Its location along these migratory routes and its diversity of habitats, including a wealth of wetlands, lakes, and streams, affords year-round birding opportunities in the French Creek watershed.

Canada geese (photo: WPC)

The Audubon Society has designated four Important Bird Areas within the French Creek watershed, Cussewago Bottom, Conneaut Marsh-Geneva Marsh, Hemlock Hill Research Area, and the Erie National Wildlife Refuge.

The Audubon Society defines an IBA as:

> *A site of special significance to breeding or non-breeding birds, which, on some basis, can be distinguished from surrounding areas. (Boundaries may be natural, such as watersheds, or man-made, such as roads and property boundaries.) In general, an IBA should exist as an actual or potential protected area, or it should have the potential to be managed in some way for the benefit of birds and other wildlife. There is no minimum or maximum size for an IBA, but whenever possible, an IBA should be large enough to supply all or most of the requirements of the birds during the season for which it is important.*

The Cussewago Bottom IBA is an area of riparian and bottomland habitats running along Cussewago Creek from Meadville to the headwaters of the stream. It is comprised of public State Game Lands #152 and #269 and privately-owned land. Habitat includes high-quality wetlands, bottom land and hardwood forest (Crossley, 1999). More than 200 species of birds probably occur on this IBA on a regular basis, including nesting bald eagles.

The Hemlock Hill Research Area IBA is a privately-owned site, protected by a conservation easement with FCVC, adjacent to the Erie National Wildlife Refuge in Crawford County. It is

comprised of habitat ranging from mixed woodlands to open fields in varying successional stages. It has been designated an IBA due to ongoing ornithological research at the site as well as the diverse avifauna raging from Carolinian to Boreal species that are found there (Crossley, 1999).

The Erie National Wildlife Refuge in Crawford County was established in 1959 primarily as waterfowl habitat and has been designated an IBA. This refuge has a variety of habitats ranging from mixed forest to fields with large areas of wetlands. Muddy Creek flows through a portion of the refuge. Over 236 species of birds have been recorded from the site, with at least 112 species breeding there (Crossley, 1999). There are large numbers of migratory waterfowl, songbirds, and shorebirds that inhabit the refuge during various times of the year. Nesting bald eagles are also in the area.

Conneaut (Geneva) Marsh is the final IBA in the French Creek watershed. The largest marsh system in Pennsylvania, Conneaut Marsh is owned entirely by the PA Game Commission. It is one of the most important IBAs in the state for wetland species. The habitat varies from forested wetland to scrub-shrub wetland to open, emergent marsh wetlands. It supports large numbers of waterfowl, shorebirds, and songbirds that prefer wetland habitats. The state endangered black tern, American bittern, and least bittern nest in Conneaut Marsh, as well as bald eagles.

Reptiles and Amphibians

The Pennsylvania Amphibian and Reptile Survey (PARS) began in 2013. PARS determines the distribution and status of all amphibians and reptiles throughout Pennsylvania, building upon previous atlas efforts and combining modern technology with an army of citizen scientists. The project is a joint venture between the PA Fish & Boat Commission (PFBC) and the Mid-Atlantic Center for Herpetology and Conservation (MACHAC), funded by the PFBC (via the US Fish & Wildlife Service's State Wildlife Grants Program), the PA Department of Conservation and Natural Resources (Wildlife Resources Conservation Program), and MACHAC.

The PNHP lists three reptile species of concern, Blanding's turtle (*Emydoidea blandingii**), the bog turtle (*Glyptemys muhlenbergii**), and the eastern massasauga (*Sistrurus catenatus**). There were no amphibian species listed as of the date of publication, but an effort is underway to get listing status for the eastern hellbender salamander.

Eastern hellbender salamander (photo by WPC)

Eastern Hellbender Salamander

The eastern hellbender (*Cryptobranchus alleganiensis*), a species of salamander found within the French Creek watershed, is considered to be very sensitive to pollution. It is completely aquatic, and depends on waterways that are cool and clear, containing many large rocks. The hellbender, which has been designated Pennsylvania's State Amphibian, is one of the largest salamanders in the world and the largest salamander in North America, reaching lengths of over two feet and

weighing up to five pounds. Finding this species denotes a healthy stream ecosystem. Hellbender populations have declined throughout their range, primarily due to human misperceptions and pollution. Preserving healthy streams and restoring stream habitats that have become degraded will maintain current populations of hellbenders and other salamanders, as well as aid in increasing their numbers and distribution. Studies are underway and should be funded to expand and continue assessing the population status of hellbenders throughout the French Creek watershed. Efforts have been made to elevate hellbender protection status and salvage and relocation efforts should be employed when potential threat to habitat exists from construction and instream disturbances.

Game Species

Many game species occur in the French Creek watershed. Some important game species include white-tailed deer, wild turkey (*Meleagris gallopavo*), ruffed grouse (*Bonasa umbellus*), eastern cottontail, numerous waterfowl species, introduced ring-necked pheasant (*Phasianus colchicus*), and squirrels. Popular furbearing species include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), beaver, muskrat, mink (*Mustela vison*), and raccoon.

Aquatic

Fish

French Creek has gained national attention for its diversity of aquatic life. Eighty-eight species of fish have been recorded in the French Creek drainage. This is more species than any other comparably-sized stream in Pennsylvania and anywhere northeast of Pennsylvania. In the book, The Fishes of Pennsylvania (2016), Dr. Jay R. Stauffer Jr. (Pennsylvania State University), Robert W. Criswell (Pennsylvania Biological Survey), and Douglas P. Fischer (Pennsylvania Fish & Boat Commission) present a comprehensive and current inventory of recorded freshwater and migratory fish species accounts.

Log perch (photo by WPC)

Darters

Biodiversity in French Creek is perhaps best represented by a group of fish known as darters. There are 15 species of darters in the French Creek watershed with as many as 13 collected from a single riffle area by researchers. Seven of the 15 French Creek darter species are listed among the fish species of concern in Pennsylvania (Table 5).

These small fish range from 1.5–7 inches in length and are related to perch and walleye. They get their name from the behavior of darting around the stream bottom in search of prey or to avoid predators. They live primarily in riffles and runs with high water quality; although some can be found in lakes. Many lack swim bladders, allowing them to rest on the bottom.

Darters are an important indicator of water quality because they do not migrate and remain relatively stationary in stream systems (White and Stauffer, 1992). Darters rely on high dissolved oxygen, low temperatures, and low bed siltation rates, making them highly susceptible to environmental threats (McAlpine, 1999).

Table 5. Fish Species of Concern within French Creek Watershed

Scientific Name	Common Name	Federal Status	State Status	G Rank	S Rank
*Amia calva**	Bowfin		DL	G5	S4
*Ammocrypta pellucida**	Eastern Sand Darter		PE	G4	S1
*Chrosomus eos**	Northern Redbelly Dace		PE	G5	S1
*Chrosomus erythrogaster**	Southern Redbelly Dace		PT	G5	S2
*Culaea inconstans**	Brook Stickleback		DL	G5	S4
Etheostoma camurum	Bluebreast Darter		DL	G4	S4S5
*Etheostoma exile**	Iowa Darter		PE	G5	S2
*Etheostoma maculatum**	Spotted Darter		DL	G3?	S4
*Etheostoma tippecanoe**	Tippecanoe Darter		DL	G3G4	S4
*Ichthyomyzon bdellium**	Ohio Lamprey		DL	G3G4	S4
*Ichthyomyzon greeleyi**	Mountain Brook Lamprey		DL	G4	S4
Labidesthes sicculus	Brook Silverside		DL	G5	S5
Lepisosteus osseus	Longnose Gar		DL	G5	S5
*Lepomis gulosus**	Warmouth		PE	G5	S3
Lethenteron appendix	American Brook Lamprey		DL	G4	S4
*Lythrurus umbratilis**	Redfin Shiner		PE	G5	S2
Moxostoma carinatum	River Redhorse		DL	G4	S4
*Nocomis biguttatus**	Hornyhead Chub		PE	G5	S1
*Notropis heterodon**	Blackchin Shiner		PE	G5	S1
Notropis heterolepis	Blacknose Shiner		PE	G5	S1
*Noturus eleutherus**	Mountain Madtom		PE	G4	S4
*Noturus miurus**	Brindled Madtom		PT	G5	S2
*Noturus stigmosus**	Northern Madtom		PE	G3	S4
Percina evides	Gilt Darter		DL	G4	S4
*Percina macrocephala**	Longhead Darter		DL	G3	S4
*Umbra limi**	Central Mudminnow			G5	S4
* Denotes a Species of Greatest Conservation Need (SGCN)					
PNHP: Searched 11/01/2024 by HUC 8 Watershed French Creek					

Darters are important species of host fish that are vital to the completion of the freshwater mussel reproductive cycle. Darters and other fish transport young mussels on their gills to aid in their dispersal throughout the watershed. While acceptable water quality and substrate conditions exist in many sections of French Creek, other areas are threatened by the invasive round goby and improper agricultural, forestry, and development practices contributing excess nutrients and silt.

Brook trout (Salvelinus fontinalis)

Native wild (not stocked) brook trout populations are found within the French Creek watershed. This species, Pennsylvania's state fish, and PA's only native stream trout, was probably more widely distributed in the watershed than it is today. Now it is restricted to the smaller, colder and higher quality tributaries and sub-watersheds. It can be regarded as an indicator of ecosystem quality and thereby a conservation target for land protection and stewardship. The brook trout is not a rare fish in the state, but has generally declined, or has become extirpated in many regions. The fore mentioned Unassessed Waters Initiative added new information regarding wild brook trout. In part, this is important because documented wild trout streams are granted more stringent protection through state environmental regulations. To date, wild brook trout have been documented in the following named streams and their unnamed tributaries; in some cases, co-occurring with the nonnative brown trout (*Salmo trutta*):

Table 6. Wild Brook Trout Streams in the French Creek Watershed (HUC 8)

Alder Run +
Baskin Run
Beatty Run UNT #
Dry Run
East Branch Sugar Creek #
East Branch Sugar Creek UNT (RM 1.76) #
East Branch Sugar Creek UNT (RM 1.86) #
East Branch Sugar Creek UNT (RM 2.62) #
East Branch Sugar Creek UNT (RM 3.62)
East Branch Sugar Creek UNT (RM 3.95) #
East Branch Sugar Creek UNT (RM 4.29) #
East Branch Sugar Creek UNT (RM 5.39)
Edinboro Lake UNT (RM 9.96)
French Creek UNT (RM 2.36)
French Creek UNT (RM 5.84)
French Creek UNT (RM 6.18)
French Creek UNT (RM 7.75) +
French Creek UNT (RM 7.80)
Hubbel Run
Lake Creek UNT (RM 14.74)
Lake Creek UNT (RM 3.21) #
Lick Run
McCune Run #

Mill Creek UNT (RM 1.27) #
Mill Creek UNT (RM 5.27)
Patchel Run UNT (RM 1.39) #
Red Run #
South Branch French Creek UNT (RM 18.94)
South Branch French Creek UNT (RM 17.24) <- UNT (RM 0.10)
South Branch French Creek UNT (RM 6.34) + #
Spencer Creek +
Sugar Creek #
Sugar Creek UNT (RM 12.38) #
Sugar Creek UNT (RM 17.59) #
Sugar Creek UNT (RM 4.58) #
Trout Run #
Warden Run #
West Branch Sugar Creek UNT (RM 1.25) #
Wolf Run UNT (RM 1.66) #
Woodcock Creek #
Notes: Listing as of 11/01/2024
"+" = Class A Brook Trout Stream (per PA Fish & Boat Commission)
"#" = wild brown trout (non-native species) also present
UNT = unnamed tributary to named stream
RM = river mile (distance of tributary from mouth of parent stream)
Source: Unassessed Waters Initiative, PA Fish & Boat Commission

As indicated in the table above, three French Creek watershed streams are classified as Class A Waters based solely upon the brook trout population. There is one additional stream identified as Class A Waters due to mixed brook trout and brown trout populations.

The presence of the non-native brown trout in streams harboring the native brook trout can be detrimental for the latter. Studies have shown that the larger adult brown trout can displace brook trout and reduce their abundance. In some cases, it has been shown that in the face of brown trout competition, a brook trout population will be limited and might only occupy the upper reaches of a stream. The presence of brown trout can be a factor to consider in the conservation and stewardship of native wild brook trout populations. Figure 22 shows trout stream designations determined by the Pennsylvania Fish and Boat Commission.

Freshwater Mussels

French Creek is probably most noted for its freshwater mussel species. Twenty-nine out of Pennsylvania's approximate 65 species of freshwater mussels have been recorded from the French Creek drainage. Twenty-seven of these have been recorded from the main stem of French Creek, with 26 of these still existing in the main stem. This represents a significant percentage of Pennsylvania's mussel resources given that continuing research indicates that 17 of the original 65 species have now been extirpated from the Commonwealth.

French Creek Trout Stream Designations

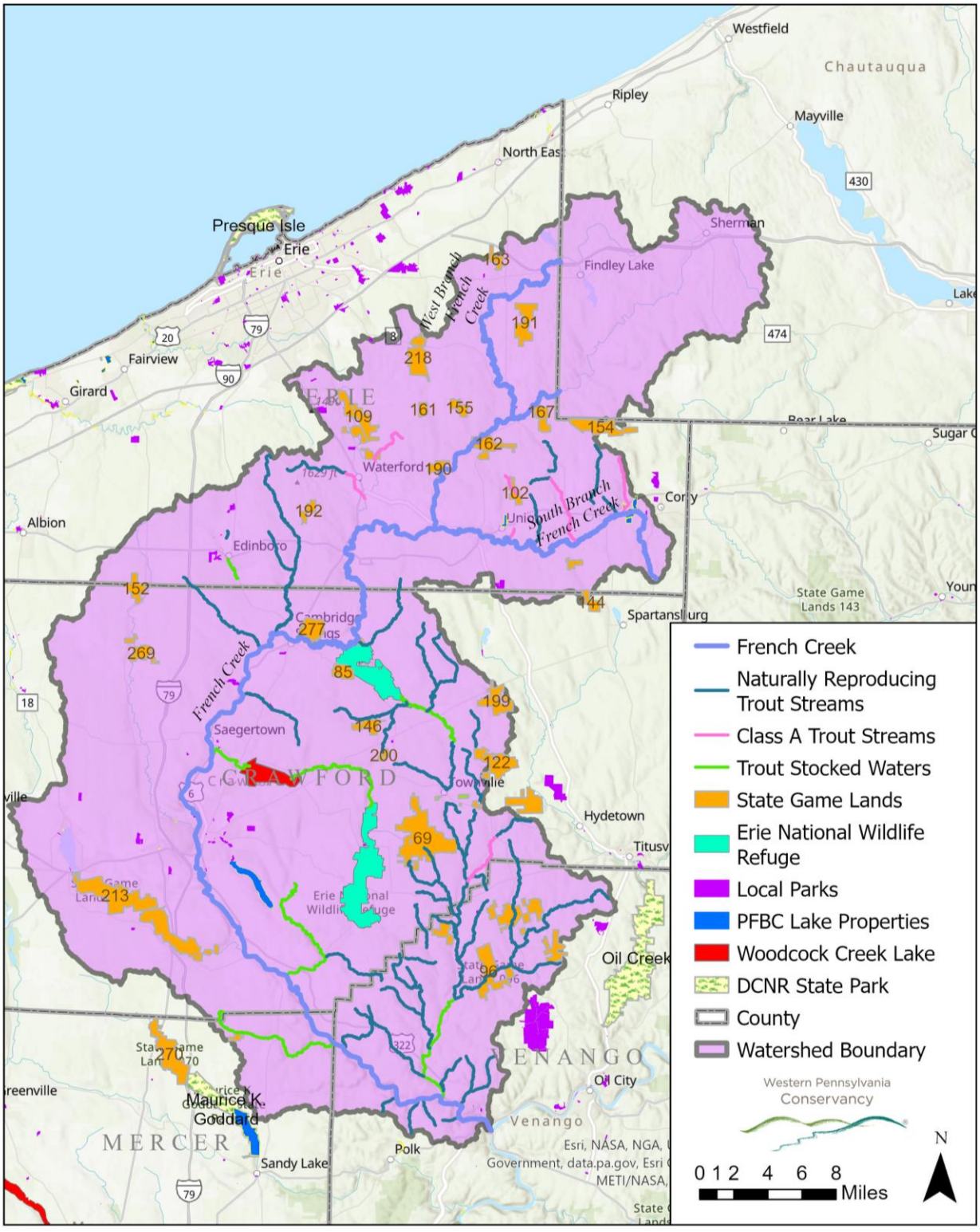


Figure 22. French Creek Trout Stream Designations

The unique and complex lifestyle of freshwater mussels makes them extremely vulnerable to pollution and habitat degradation. These organisms lead a relatively sessile existence as adults. They burrow into the stream bottom with a muscular foot and rarely move more than a few hundred feet during their lifetimes, which can sometimes be 50 or more years. They siphon water into their bodies using incurrent and excurrent siphons. The water then passes through their gills where oxygen is extracted for breathing and then through their gut where microorganisms and other material are filtered for food.

Wavy-rayed lampmussel (photo by WPC)

Pollutants in the water can be taken up in the mussels' body tissue. Siltation caused by excessive erosion can smother entire mussel beds. In addition, excessive nutrients can deplete the oxygen levels in the water. Freshwater mussels are also susceptible to chlorine commonly used in treating wastewater and discharged into the stream. All of these conditions are potential threats in the French Creek watershed as improper agricultural practices contribute nutrients, sediments, and pesticides to the water, improper timbering increases nutrient runoff and erosion, and riparian areas continue to be lost to timbering, agriculture, and development.

Table 7. Freshwater Mussel Species of Concern of French Creek Watershed

Scientific Name	Common Name	Federal Status	State Status	G Rank	S Rank
Alasmidonta marginata*	Elktoe			G4	S3S4
Amblema plicata*	Threeridge			G5	S2S3
Anodontoides ferussacianus*	Cylindrical Papershell			G5	S2S3
Cambarunio iris*	Rainbow			GNR	S3
Cyclonaias tuberculata*	Purple Wartyback			G5	SH
Epioblasma rangiana*	Northern Riffleshell	LE	PE	G1	S2
Epioblasma triquetra*	Snuffbox	LE	PE	G3	S2
Fusconaia subrotunda*	Longsolid	LT	PT	G3	S2
Lampsilis fasciola	Wavyrayed Lampmussel			G5	S3S4
Lasmigona complanata*	White Heelsplitter			G5	S1S2
Lasmigona compressa*	Creek Heelsplitter			G5	S2
Leptodea fragilis*	Fragile Papershell			G5	S2S3
Ligumia nasuta*	Eastern Pondmussel			G4	S2S3
Pleurobema clava*	Clubshell	LE	PE	G1G2	S2
Pleurobema sintoxia*	Round Pigtoe			G4G5	S3S4

Simpsonaias ambigua*	Salamander Mussel	PE	PE	G1G2	S1
Theliderma cylindrica*	Rabbitsfoot	LT	PE	G3G4	S1S2
Toxolasma parvum*	Lilliput			G5	S1S2
Villosa fabalis*	Rayed Bean	LE	PE	G2	S1S2
* Denotes a Species of Greatest Conservation Need (SGCN)					
PNHP: Searched 11/01/2024 by HUC 8 Watershed French Creek					

Macroinvertebrates

Aquatic insects and other macroinvertebrates are commonly used as indicators of water quality. Many studies by PA Department of Environmental Protection, U. S. Army Corps of Engineers, U. S. Geological Survey, university researchers, and other organizations have sampled the aquatic macroinvertebrates in areas of the French Creek watershed. The Nature Conservancy has also monitored aquatic macroinvertebrates in the New York headwaters of French Creek.

The most comprehensive macroinvertebrate sampling to date has been done through the DEP's Unassessed Waters Program. State water pollution biologists perform qualitative sampling of macroinvertebrates and identify specimens to the family level in the field.
A high of 25 families have been found at several of over 250 sampling sites throughout the watershed.

The USACE water quality team has collected macroinvertebrate data since the early 1970s for the French Creek watershed. The agency collects macroinvertebrates annually every spring from multiple locations within the French Creek and Woodcock Creek Lake watershed.
https://lrp.maps.arcgis.com/apps/dashboards/b9ac098f50324ebea3ab5e53c86bd61c

In general, aquatic insects and other macroinvertebrates densities and diversity in the French Creek watershed appear to be very good. Some areas where impairments have been noted due to several possible factors have shown depressed densities or diversity or both. Often, when pollution impacts sensitive macroinvertebrate species, an increase in tolerant species will be noted due to a lack of competition for resources. Benthic (bottom dwelling) macroinvertebrates are often the first to show signs of problems with water quality and should be monitored carefully and comprehensively throughout the watershed. Many fish and other higher aquatic organisms rely on macroinvertebrates for food and the macroinvertebrates themselves play an important role in breaking down organic material to add energy to the aquatic food web.

One of the major obstacles in assessing macroinvertebrate information for French Creek is the lack of genus and species level identification at sampling sites. Often, aquatic macroinvertebrates are identified to the order and family, but due to the time and/or expense required to perform genus or species level identification, this information is typically missing.

Vegetation

The French Creek watershed lies almost entirely within the region that historically would have been comprised of Northern Hardwood Forest communities. Dominant species would have included sugar maples (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), American beech (*Fagus grandifolia*), and eastern hemlock (*Tsuga canadensis*) interspersed with white pine (*Pinus strobus*), oaks (*Quercus spp*.), and other maples. This was especially true of upland areas in northern sections of the watershed. Eastern hemlock and white pine dominated the wetter, lowland areas. Oak, particularly white oak (*Quercus alba*), dominated the floodplain of the southern parts of the watershed.

Prior to European settlement, the area was almost entirely forested with some open prairie-like areas in the southern oak-forest sections of the watershed. Periods of intense timbering and clearing the land for agricultural purposes have left the French Creek watershed with a diverse array of plant communities. Within this mosaic of different land uses exists farmland habitat, grassland habitat, old-field habitat, and a variety of wetland habitats in addition to brushy and forested areas.

Currently in a period of agricultural decline, many pieces of land, particularly on the ridge tops, are reverting back to forest. These woodland patches are primarily a mixed oak community. The regeneration of forested areas expands the threats of improper timbering practices impacting the French Creek watershed. Of particular importance are areas of mature floodplain forest in riparian areas throughout the watershed. These areas are currently being targeted by timbering operations and are afforded little protection through wetland or riparian regulations.

Invasive exotic plant species like purple loosestrife, hybrid cattails, and common reed are threats to the native vegetation especially in wetland areas throughout the watershed. These plants thrive in disturbed areas and once established, can quickly out-compete native plants. Native aquatic plant communities are also at risk from the introduction of invasive Eurasian water-milfoil to lakes and streams in the watershed. This plant, found in many French Creek lakes, is a continuing threat to those lakes that contain many rare, threatened, and endangered native aquatic plants. Spread primarily by pieces attached to boat hulls, trailers, and propellers, once introduced, this plant can spread rapidly and out-compete native flora.

Pennsylvania Natural Heritage Program

The Pennsylvania Natural Diversity Inventory is a list of all plant and wildlife species, plant communities, and geologic features in the Commonwealth of Pennsylvania for which there is conservation concern. This list includes current and proposed vulnerable, rare, threatened, endangered, and extirpated species, as well as species of interest with unique or specific habitat needs or declining populations. It represents the most up-to-date, accurate, scientific information available and reflects current species terminology. The list includes all species and communities inventoried by PNHP and contains species that are not considered in environmental review. All species and communities subject to the environmental review process can be found on the Conservation Explorer Environmental Review Species List. It is searchable by county or HUC 8 watershed boundary.

The Pennsylvania Conservation Explorer tool provides conservation planning reports that compile names, descriptions, maps, locations, measurements, links and references for Natural Heritage Areas (core and supporting habitats), Important Bird Areas, State Lands, and agency-designated water resources that coincide with an area of interest defined by the user. For an overview and additional details, please visit the Pennsylvania Natural Heritage Program website and download the applicable County Natural Heritage Inventory report(s).

Species of Concern

A total of 302 PNDI elements are reported within the French Creek watershed and buffered locations shown in Figure 23 and Appendix H (PNHP 2024). These include two mammals, 26 bird species, 26 fish species, 15 reptile and amphibian species, 33 insect species, 19 unionid species, four snails, 15 natural communities, one unique geological feature, and 153 plants.

Mammal Species of Concern

The least weasel (*Mustela nivalis*) is the smallest weasel found in Pennsylvania and the world's smallest carnivore. They prey on mice, voles, small birds, insects, earthworms and small amphibians. They are voracious predators able to consume up to half their body weight each day.

The little brown bat (*Myotis lucifugus*) was once abundant in eastern North America, now populations are severely declining due to high mortality caused by an introduced, rapidly spreading fungal disease (white-nose syndrome) and increasing mortality by turbines at wind-energy facilities.

Freshwater Mussel Species of Concern

Five of the mussels found in French Creek are presently listed as Endangered and two listed as Threatened under the U.S. Endangered Species Act and the PA Fish Code. Twelve other mussel species are considered rare, threatened, or endangered in Pennsylvania according to PNHP (Table 7). One species, the purple wartyback, is considered extirpated from Pennsylvania, but was recorded from French Creek in the early 1900s.

Fish Species of Concern

Twelve of the 26 fish species of concern found in the French Creek watershed are considered threatened or endangered in the Commonwealth (Appendix H).

There are three special concern species of lamprey in the French Creek watershed. These ancient fish resemble eels and are related to the parasitic sea lampreys that have invaded the Great Lakes, but do not represent the same threat to fishes that the sea lamprey does. The mountain brook lamprey, Ohio lamprey, and American brook lamprey (*Lampetra appendix*), are all threatened in Pennsylvania.

Three madtom species within the watershed are considered species of concern. The mountain madtom (*Noturus eleutherus*) and northern madtom (*Noturus stigmosus*) are endangered in Pennsylvania and the brindled madtom (*Noturus miurus*) is considered threatened in the state.

There are six other fish species of concern documented from the French Creek watershed. The longnose gar (*Lepisosteus osseus*) has been documented from Conneaut Lake. The blackchin shiner (*Notropis heterodon*) was documented from Conneaut Lake, Lake LeBoeuf and Lake Pleasant. The blacknose shiner (*Notropis heterolepis*) was documented near West Branch French Creek in 2014 and 2015. The gravel chub (*Erimystax X-punctatus*) has been recorded from Sugar Creek and in the lower reaches of French Creek. The redfin shiner (*Lythrurus umbratilis*) has been recorded in the Erie County headwaters of Cussewago Creek and in the Crawford County sections of the stream, as well. The warmouth (*Lepomis gulosus*) can also be found in several lakes within the watershed.

Bird Species of Concern

There are 26 bird species of concern recorded from the French Creek watershed. Although great blue heron (*Ardea Herodias*) populations in Pennsylvania are Apparently Stable, they depend upon healthy, intact wetlands and rookery habitats, having suffered impacts from human development and land use in some areas. Care should be taken to protect and enhance wetland, stream, and riparian habitats to support the continued recovery of important ecological species.

The American bittern (*Botaurus lentiginosus*), as a nesting species, is dependent on expansive marshes and wetlands associated with lakes that provide breeding habitat for this Pennsylvania Endangered bird. Similarly-dependent on the protection and enhancement of wetland habitat, is the Pennsylvania Endangered least bittern (*Ixobrychus exilis*).

In Pennsylvania, the bald eagle (*Haliaeetus leucocephalus*) is protected under the Game and Wildlife Code. Although no longer listed as endangered or threatened, the bald eagle is protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Protection Treaty Act. Bald eagles have returned and nested on French Creek, north of the Union City Dam. There are a number of bald eagle nests in Crawford County portions of the watershed. Bald eagles currently nest on Sugar Lake and in the Conneaut Marsh along the Conneaut Outlet and in the Erie National Wildlife Refuge in Crawford County.

Listed as Pennsylvania Endangered, the black tern (*Chlidonias niger*) has been found to nest in Conneaut Outlet. Other birds found in Conneaut Marsh include the sedge wren (*Cistothorus platensis*), Pennsylvania Threatened, and the marsh wren (*Cistothorus palustris*), a candidate for listing. There is also a historic record for the short-eared owl (*Asio flammeus*), a Pennsylvania Endangered bird.

The upland sandpiper (*Bartramia longicauda*) is Imperiled in Pennsylvania due to multiple threats, including hunting, habitat loss and degradation, pesticides and predation. The sandpiper depends on grassland habitat and has adapted to some agricultural land uses.

Other Species of Concern

There are 33 insect species of concern found within the French Creek watershed that are tracked by PNHP. One reptile, Blanding's turtle (*Emydoidea blandingii*) is considered extirpated in Pennsylvania but was recorded from Conneaut Lake in 1904. That record might represent the movement of turtles from Lake Erie into the French Creek drainage via man-made canals.

The French Creek watershed is home to 97 vascular plant species of concern. Many of these are fully aquatic or wetland species associated with calcareous, alkalinity water chemistry. French Creek's lakes are circumneutral ($6 \leq pH \leq 8$) with high alkalinity. The overall alkalinity in the watershed's lakes, streams, and wetlands has allowed unique, alkalinity-loving plant communities to thrive. Many of these species are found at very few locations outside of the French Creek basin.

Groups of plant species of concern in the French Creek watershed include asters, native water-milfoils, sedges, pondweeds, and wild orchids. The latter group is an especially important group of wetland flowers found in several of the alkaline fen wetlands throughout the watershed. Wild orchids range from extremely conspicuous, such as the showy-lady's slipper (*Cypripedium reginae*), to small, inconspicuous flowers of the leafy white orchids (*Platanthera dilatata*), and leafy northern green orchids (*Platanthera hyperborea*).

Natural Communities and Habitats of Special Concern

In addition to species of concern, PNHP also tracks important natural communities and habitats. These are referred to as landscape element occurrences. A natural community is a group of different species that is adapted to living together under certain conditions or in certain habitats. Habitats found in the French Creek watershed are unique geologic or hydrologic features include calcareous glacial lake, high-gradient clearwater creek, medium-gradient clearwater river, and waterfalls.

Great blue heron nest (photo: WPC)

Important natural communities found in the French Creek watershed include eastern hemlock mixed mesic hardwood forest, basin graminoid-forb fen, calcareous marsh, hillside graminoid-forb fen, northern Appalachian calcareous seep, glacial bog, poor fen, robust emergent marsh, and shrub fen.

These landscape element occurrences are found in the French Creek watershed because of the unique soil types and hydrologic regimes, which resulted from the region's glacial history. They are considered rare because the exact conditions that allow them to exist occur nowhere else in Pennsylvania.

Important Habitats

Many important habitats have been discussed, including IBAs, wetlands, glacial lakes, preserved natural areas (i.e. Erie National Wildlife Refuge, State Game Lands, State Forests, and other protected areas) of French Creek. The French Creek watershed is a vast system of inter-related habitats. Especially important is the riparian habitat along the streams and lakes in the watershed. Not only does this provide habitat for numerous species, but it also provides protection to the wetland and aquatic habitats that it buffers. There are ranges of habitats from recently mined, highly disturbed areas through early-succession grasslands, mid-succession shrublands, and patches of late succession, mature forests. All of these different habitats that comprise the French Creek watershed account for the diversity of natural resources found within the basin.

French Creek Watershed Important Species and Core Habitats

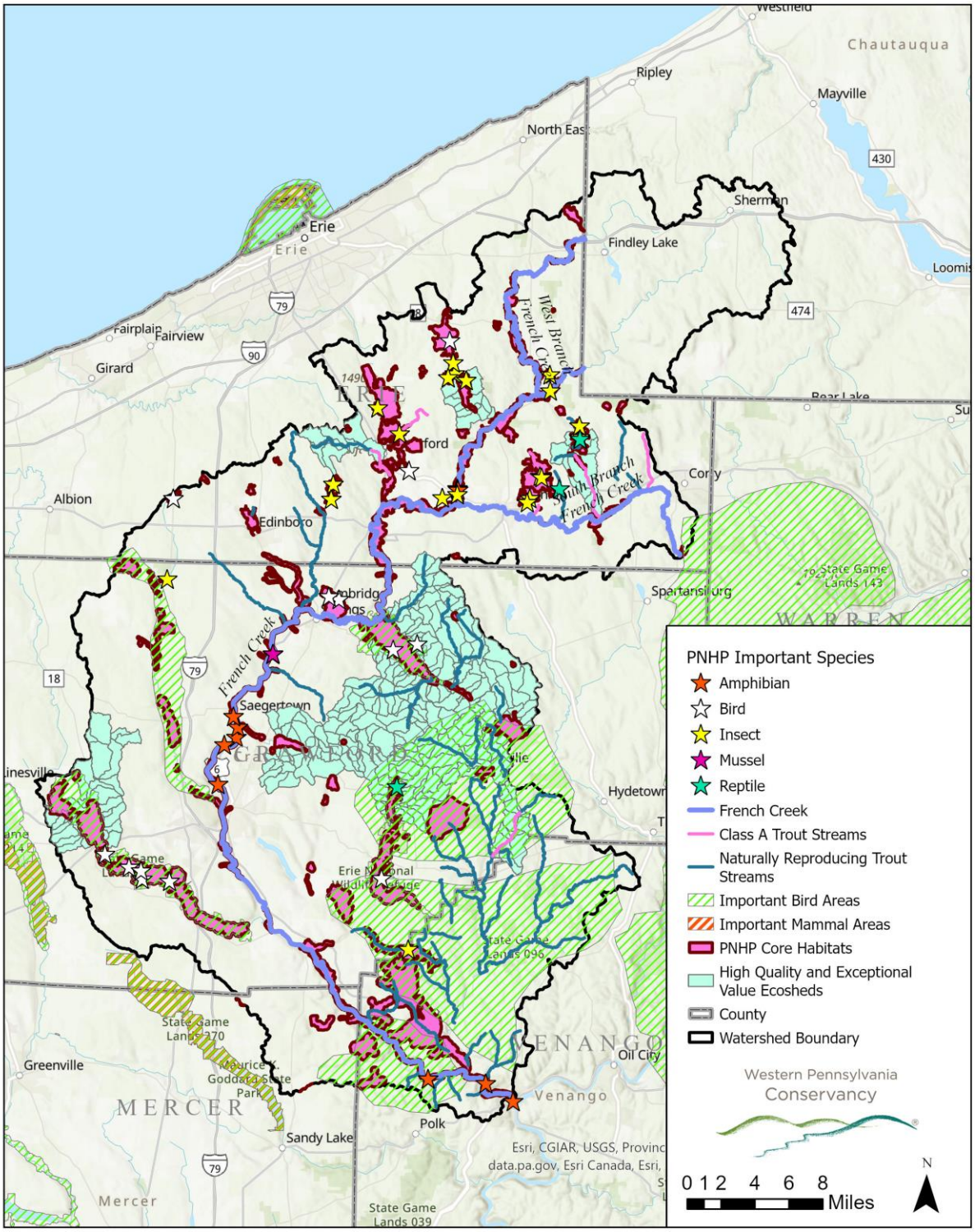


Figure 23. French Creek Critical Areas for Important Species and Core Habitats

CHAPTER 5. CULTURAL RESOURCES

Early History

The French Creek watershed has a rich history beginning several thousand years ago when humans first appeared on the landscape. The Native Americans that settled this region were descendants of peoples who migrated across a land bridge that connected Alaska with Asia and then spread across North America.

The Iroquois, which included the Seneca Nation of the upper Allegheny and French Creek region, settled along waterways of the French Creek valley, where their communities subsisted on wild game like fish, deer, turkey, squirrels, wild pigeons, and bear and the lush natural resources, including forests and wetlands, that they managed with prescribed fires and other methods to form orchards and meadows.

The French had originally named French Creek "La Riviere aux Boeufs," or "the river of the cattle," for bison that were reported to have been found in this area. It was George Washington on his trip in 1753 that first called this waterway "French Creek".

In the mid-1700s, the French established a series of forts—Fort Presque Isle (at present day Erie), Fort LeBoeuf (at present day Waterford), Fort Machault (at present day Franklin), and Fort Duquesne (at present day Pittsburgh)—in western Pennsylvania to halt English expansion westward. During the French and Indian War, the French Creek valley was an unsettled and wild battleground for the French, Native Americans, the American colonists, and the British as they fought for control of western Pennsylvania. The end of the French and Indian War did not bring peace to the French Creek valley, remaining a battleground through the Revolutionary War until the battle at Falling Timbers in 1794.

At the 2019 French Creek Conservation Consortium annual meeting, featured speaker Jay Toth, a tribal archaeologist of the Seneca Nation, expressed the importance of Native landscapes, culture and politics of western Pennsylvania, excerpted hereafter from the notes of that meeting (Appendix J).

> *In his story-telling style, Jay told about giant woolly mammoths roaming the landscape grazing and keeping forest growth at bay. He also highlighted the importance of Tamarack trees (American or Eastern Larch) in constructing wigwams and longhouses for natives. He told about the use of prescribed fire for management of the land…Chestnuts and white oaks played an important role in native culture. Acorns were a major food source before the use of corn and very important for making flour. Thus, they cultivated and manipulated the trees through these prescribed burns.*
>
> *Later when the natives grew corn it was black in color and they would eat it green or grind if for flour when mature. In examination of native palisade sites often these unique species of plants are found. Even today Jay said that land needs managed. His advice is to save the oldest and strongest trees—those are the seed trees. Get rid of invasive species and be aware of the unique species of plants that would signal possible native dwellings or mounds. Jay added--If you think there is a possible mound or other native signs, call Annie Marjenin at Mercyhurst University to investigate.*

Upon examination of the skeletal remains (during a burial mound relocation), he said that these natives lived a very hard life, most died in their mid-40s, one hundred percent of the women had severe sinus infections, (from smoke in the wigwams and longhouses as there were no smoke holes) many suffered from early blindness, and it was evident from the remains that they led difficult lives…"There were no modern-day drugs, there was lots of pain and suffering--it was a tough life and there is nothing romantic about it." Jay also stated that these reburials are difficult and they take an emotional toll as well.

As Europeans expanded into the wilderness of western Pennsylvania…Natives were displaced, pushed out and often times just eliminated… "Some archaeological sites are basically murder scenes," Jay said. They have found horses shot and tools still out in the field. Racism in history keeps repeating itself, Jay interjected. Even though the Seneca's had a good history with the Quakers, through politics in Philadelphia, natives came out on the short end of the deal. Locally, while the natives were granted the Cornplanter tract of land, the building of the Kinzua Dam flooded hundreds of acres of native land.

Jay ended his talk with a thought to ponder…the types of land that conservation organizations, such as those found at the (French Creek Conservation Consortium) meeting, will acquire are not "vacant lands." He pointed out that they are lands that native people used and lived on, lands where natives are potentially buried. He reminded everyone to look for the signs and be respectful.

The Seneca remained in Meadville into the early 1800s, until thousands of American settlers, many of them farmers, began cutting the trees, cultivating the land, and building dams and mills on the streams by the 1830s. The landscape, resources, and hunting grounds on which the Seneca lifestyle depended disappeared from the French Creek valley. These historic accounts of French Creek are largely chronicled in, *In French Creek Valley*, by John Earle Reynolds. Written in 1938 and reprinted in 1985, this book can be found in the Crawford County Historical Society.

Early settlers utilized French Creek as a transportation route for goods. Timber, skins, and other products could be shipped all the way to the Gulf of Mexico from the French Creek Valley, via the Allegheny, Ohio, and Mississippi Rivers. Until this time, settlers in the region had to traverse the 15 overland miles from Waterford to Lake Erie via the Portage Trail in order to get goods to the Atlantic Ocean. Then in 1837, The French Creek Feeder Canal was completed between Meadville and Conneaut Lake. This allowed goods to be transported from French Creek at Meadville to Conneaut Lake and then on to Lake Erie via the Erie Extension Canal, thus ending the need to transport goods overland to Lake Erie. The French Creek Valley prospered as timbering and farming molded the landscape. Many sites in the watershed became popular tourist attractions, like resorts in Cambridge Springs to bathe in the mineral-rich springs or on the glacial lakes, including Conneaut Lake and Lake Pleasant for family recreation.

Historical Sites

The Pennsylvania Historical & Museum Commission reviews and lists properties in Pennsylvania for inclusion on the National Register of Historic Places. Because of its rich history, the French Creek watershed has dozens of sites listed on the National Registry. These sights are listed in Appendix I. Significant historic preservation has been accomplished through historical societies, civic groups, etc.

Recreation

Lake Pleasant Heavy use (photo: WPC)

A variety of recreational opportunities exist throughout the French Creek watershed. Most of these opportunities highlight the natural resources in the basin. As the human population continues to expand, demands for recreational opportunities will only increase. Opportunities must be developed that satisfy these demands at the same time providing protection for the natural resources that outdoor recreationists potentially threaten. The quality of recreational opportunities in the French Creek watershed, and elsewhere, are inextricably linked to water quality, wildlife and plant quality, and overall environmental quality. Conservation of natural resources is necessary to ensure quality recreational opportunities exist in the future.

Recreational Uses and Demand

It is the responsibility of planners, municipal leaders, and recreational organizations to ensure that activities in the French Creek watershed do not negatively impact the rich diversity of natural resources that draw tourism dollars into the region. There is an abundance of recreational opportunities within the French Creek watershed, including hiking, biking, boating, hunting and fishing, that increase the quality of life for residents of the region.

In the wake of the global pandemic in 2020, citizens worldwide were encouraged to go outside, get fresh air and gather in open areas. Outdoor recreation became very popular and the demand for access to outdoor recreation equipment, facilities and public lands grew with it. Regional efforts continue among county planning agencies and local municipalities to develop trails leading to and through hub towns throughout the watershed and connecting major cities and inter-state tourism corridors to attract eco-tourism revenue into these small, rural towns that have quaint character and stunning natural beauty. Municipalities are renovating playgrounds and parks to be more inclusive and inviting to allow more residents the opportunity to experience the natural wonders of French Creek or participate in community sports and social events, they develop a sense of pride and care for the resources, and encourage a stewardship ethic among more members of the community.

Kayaker on French Creek (photo: WPC)

Recreation Facilities

The French Creek watershed offers the outdoor enthusiast a good supply of outdoor recreational amenities. Public facilities offer access to French Creek, area lakes and reservoirs, natural areas, wildlife refuges, and hunting land (Figure 9). There are a number of land and water-based trails at local parks and on public lands, many with stunning scenic vistas.

French Creek Watershed Public Access Points

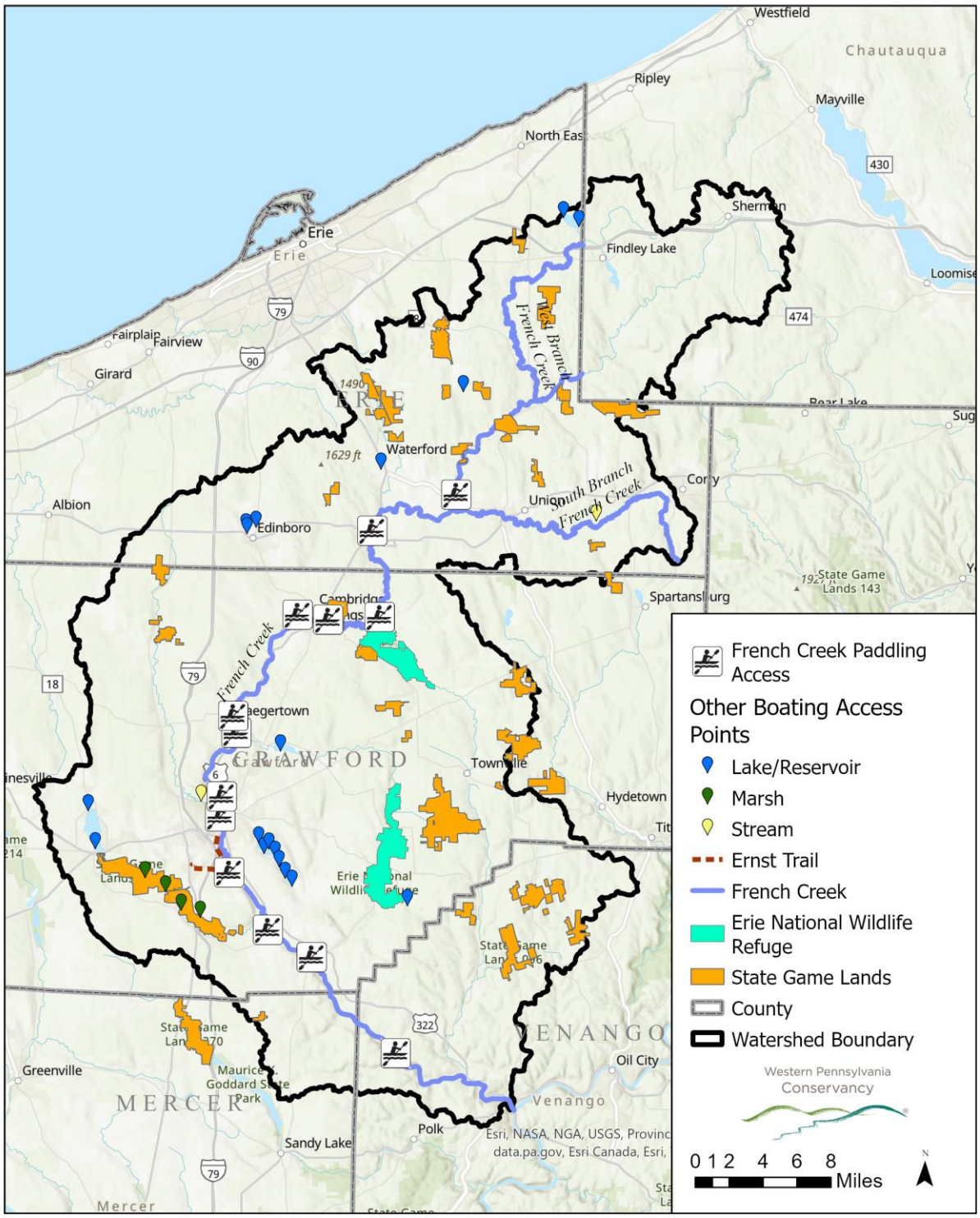


Figure 24. French Creek Watershed Public Access Points

Land-Based Recreation

Land-based recreational opportunities abound in the French Creek watershed. There has recently been a surge in interest in establishing trails and greenways throughout the basin. Greenways are open space areas designated for recreational use and environmental protection.

Biking and Hiking Trails

Improved hiking-biking trail (photo: WPC)

Today, many people are turning to alternative forms of transportation for travel, recreation, and fitness. Specifically, walking and biking have grown in popularity throughout the region. This resurgence has led to increased interest in walking and biking trails and greenways. These projects can benefit the individuals using them, the communities in which they are located or link together, and the environment through protection of open space and natural resource buffering. In response to this demand, several groups have begun planning and implementing trail and greenway development throughout the watershed. These projects range from preserved green space and paved walking trails to proposed rail trails and designated on-road bike routes. Many organizations are proposing to form new trails and greenways with the hope of providing linkages between trails within the watershed and between regions outside of French Creek. The designation of roads as trails is dependent upon modifications to existing roadways, such as widening berms, to increase safety for pedestrians and bicyclists. Several PA roadways have recently been designated as PA bicycle routes. These include PA Route 98 as Bicycle Route A and along Route 6/6N as US Bike Route 36/PA Bicycle Route Y.

Off-road facilities include trails, abandoned rail trails, rails with trails, and greenways with no designated trail. There is a nationwide movement to convert abandoned railway lines into recreational trails known as “rail trails”. More recently, some trail organizations have established trails along still-in-use railway beds. These trails are referred to as “rails with trails.”

Other forms of recreational transportation include all-terrain vehicles and snowmobiles. Presently, snowmobiling and All-Terrain Vehicle (ATV) riding occurs on select public lands, but both forms of recreational transportation are limited to private property. In particular, these motorized forms of off-road transportation can negatively impact the natural resources of the region when done irresponsibly. Statewide, efforts continue to include designated areas where ATV riding and snowmobiling can occur with minimal environmental impact.

In 2017, the Greater Erie Regional Trails—a project of the members of the Erie Area Council of Governments, funded in part by a multi-municipal grant from Erie County Gaming Revenue Authority—formed a network of partners and park facilities to manage trails throughout Erie County. Their website includes contacts for the network and an interactive map of trails, including the 1.1-mile loop of the West Branch French Creek Trail.

Existing trails and greenways within the French Creek watershed include:

- Bessemer Trail, Meadville
- Edinboro University Highlands Trail (bike trail for Edinboro University faculty, students, and staff only)
- Erie National Wildlife Refuge trails
- French Creek Valley Conservancy; select public properties, including:
  - Brock's Lookout
  - Lew's Land
  - Smock Riverwalk
- Routes 6 and 6N in Erie and Crawford Counties are designated as an on-road National Recreational Trail.
- South Branch French Creek Trail
- State Game Lands trails throughout the watershed
- The Ernst Trail from Meadville to Conneaut Lake
- Trails on WPC's Lowville Fen Natural Area north of Lowville
- West Branch French Creek Trail
- Western Pennsylvania Conservancy (select public properties)
- Woodcock Creek Lake trails

The Northwest Pennsylvania Greenways Plan, originally adopted in 2009, is a multi-county planning effort undertaken by the Northwest Regional Planning and Development Commission (Northwest Commission) on behalf of the eight counties it serves: Clarion, Crawford, Erie, Forest, Lawrence, Mercer, Venango, and Warren. It aimed to capture efforts to conserve and enhance natural system greenway corridors and establish new recreation and transportation corridors to create a regional greenway and trail network. Since 2009, efforts have continued throughout the region to plan for, expand, and preserve the greenways and trail network. To guide these ongoing efforts, an update of the Northwest Pennsylvania Greenways Plan was completed in 2022. This plan will also inform the Greenways Block Grant Program, which has funded more than 100 related projects since 2009.

French Creek Recreational Trails (FCRT) and Economic Progress Alliance of Crawford County (EPACC) are Crawford County organizations with existing trails that are working on additional trails and closing gaps in the region. The Erie County Greenways Program improved the quality of life in Erie County through the preservation and enhancement of the region's natural, scenic and recreational resources for public use. Erie County created the Greenways program to fund eligible projects throughout the county, using its allocations from the state Marcellus Legacy Fund. Through the Greenways program, a total of 36 projects have been funded in Erie County from 2013 through 2017. After the 2017 Program year, the Erie County Department of Planning and Community Development suspended this competitive grant program and initiated the Erie County Parks, Trails and Recreation Plan, to develop a strategic and implementable plan for focused investment in Erie County's network of recreational assets and their connections to communities within Erie County. The Erie County Department of Planning and Community Development will play an important role in supporting our municipalities and agencies that own and operate recreational assets throughout Erie County.

The Allegheny Valley Trails Association is a non-profit group working on trails in Venango County along French Creek and the Allegheny River. There is a proposed trail that will run from downtown Franklin upstream along French Creek on a former rail line.

Bird and Wildlife Watching, Fishing, and Hunting

The many State Game Lands throughout the watershed, Cornplanter State Forest Ingraham Tracts, conservancy-protected public lands, and the Erie National Wildlife Refuge (with some restrictions) provide areas for public hunting, fishing, bird and wildlife viewing. Ice-fishing is a common winter sport on area lakes and reservoirs, as well.

Ice-fishing and paragliding at Lake Pleasant (photo: WPC)

Camping

Camping is available at private campground facilities at Conneaut Lake and in Meadville offering tent and RV campsites, as well as cabins and a variety of included recreational amenities, including fishing, swimming, basketball and pickleball courts. Camping facilities information can be found by searching https://www.pacamping.com/find-a-campground.

Cross-country skiing

Many of the previously-mentioned trails can be utilized for cross-country skiing during winter months. There are designated cross-country ski trails at Eaton Reservoir, the Erie National Wildlife Refuge's Sugar Lake Division, and in Cornplanter State Forest's Ingraham Tracts in Crawford County. Cross-country skiing is also permitted on trails and roadways in State Game Lands throughout the watershed.

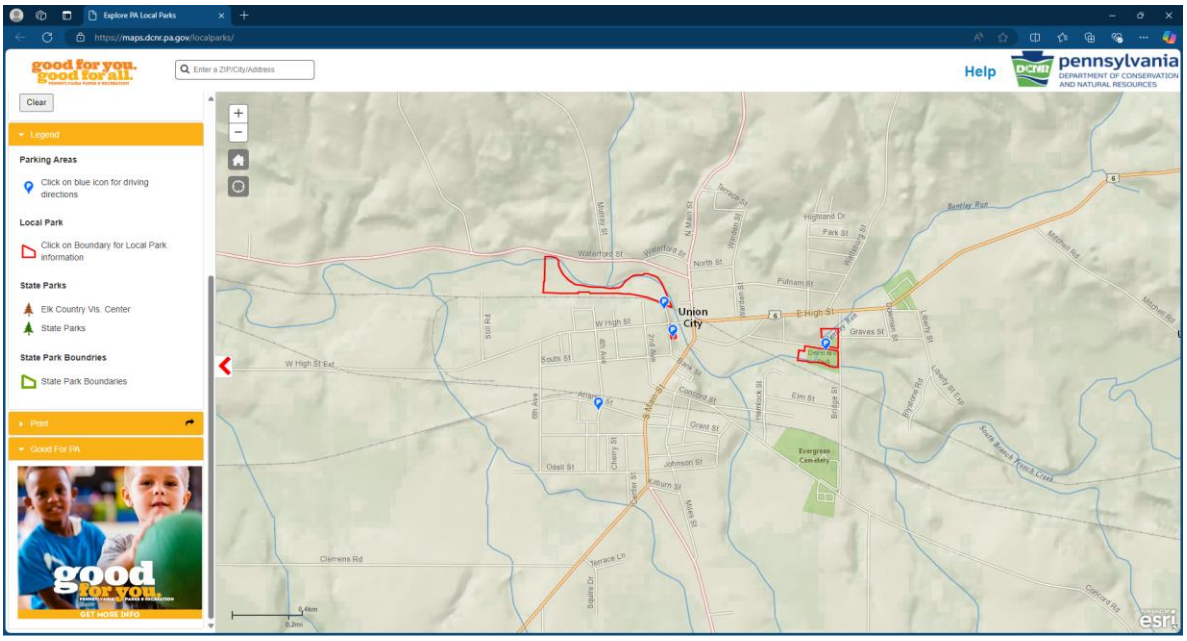
National Heritage Area

Venango County, the city of Titusville, and Oil Creek Township in Crawford County are designated by the National Park Service (NPS) as the Oil Region National Heritage Area and is managed within the PA Department of Conservation and Natural Resources' Pennsylvania Heritage Areas Program. Designation as a National Heritage Area increases the profile and reputation of a region, making it a bigger draw for heritage and recreational travelers. Through annual Congressional appropriations, NPS passes funds to NHA entities. This designation also highlights the region's booming oil history and works with a diverse background of organizations to promote cultural and natural resource conservation, recreation, and heritage education. Although most of the Oil Heritage Region amenities and recreational opportunities lie outside the French Creek watershed, this region is partially within the French Creek watershed and offers area residents many opportunities for educational and recreational pursuits.

Parks and Sports Fields

Local parks can be explored through DCNR's Explore PA Local Parks website. There, parks can be searched by name, municipality or county or by specific recreational amenities, like playgrounds, swimming, basketball, picnic pavilions, sport fields, etc. Driving directions can be

mapped to the parking area of each park. A small section of Cornplanter State Forest, DCNR, is within the French Creek watershed in Crawford County near Townville.



Example map of Union City Borough parks mapped through DCNR's Explore PA Local Parks website
Map source: https://maps.dcnr.pa.gov/localparks/

Film

Foundation for Sustainable Forests and French Creek Valley Conservancy have hosted Woods & Waters Film Series since 2017. It serves as an opportunity to gather friends of both organizations to view environmentally themed films and share conversation. The gatherings are now hosted both remotely and in person.

Water-Based Recreation

Paddle Sports

Throughout the spring, summer, and fall each year, paddling along French Creek has become a popular trend. Some concerns have been raised over the impacts to freshwater mussel and other aquatic life if access points are located in sensitive areas or if boating traffic increases significantly on French Creek. Recreational pressure should be monitored and managed, particularly at sites harboring sensitive species and habitats.

The main stem of French Creek is navigable by paddle craft for its entire length from the Union City Dam to its confluence with the Allegheny River at Franklin, with the possible exception of Saegertown Dam. At low-water, the Saegertown low-head dam is readily passible on river left where a gap exists. At high-water levels, paddlers should use caution to cross the dam anywhere with little trouble. Other areas requiring caution include the rapids just upstream from the Cochranton access and Polly's Rapids between Sugar Creek and Rocky Grove. There are several public access points along the entire stretch of French Creek and was developed into an official Pennsylvania Water Trail (Figure 25). It is managed locally by the French Creek Valley Conservancy (FCVC). Under this program, public access points are mapped at various locations

throughout the French Creek watershed for paddle sports and fishing access. Outreach and educational programming and signage help increase awareness of the trail and program. FCVC coordinates efforts to reduce gaps in public access along the French Creek Water Trail and to coordinate volunteer stewardship efforts to maintain it. Paddlers can obtain copies of the water trail maps and guides at FCVC's office in Meadville or on the website at www.frenchcreekconservancy.org.

Paddling is permitted on all lakes and reservoirs. Boats must be registered with the PFBC to use a PFBC-operated access area. Public access areas are designated on Findley Lake in New York, Eaton Reservoir, Lake Pleasant, Union City Reservoir, LeBoeuf Lake, Edinboro Lake, Conneaut Lake, Woodcock Creek Lake, Tamarack Lake, and Sugar Lake. Paddling also is permitted on several impoundments located in PA Game Commission's State Game Lands throughout the watershed, for example, Conneaut Marsh in SGL #213 near Geneva, Crawford County. Conneaut Lake and Edinboro Lake offer unlimited restrictions for powerboating and several other lakes and impoundments in the watershed offer access for limited horsepower or electric motors. Lake Pleasant, Eaton Reservoir, and Union City Reservoir allow no motors for boats.

French Creek Water Trail Public Access Sites

River Miles are used to identify locations of various sites along the creek. River Mile 0 is at the confluence of French Creek and the Allegheny River. "River Left" and "River Right" are used to indicate which side of the stream a site is on. Orient yourself looking downstream to determine left and right. PFBC (PA Fish and Boat Commission) launches require boat registration (other states accepted) or launch permit from a state park office or PFBC. Private and unofficial launches are not included in the list below.

76	**Union City Dam** Path - River Right	Lat 41 55 11 Lon 79 54 06	From PA Route 8 in Union City, follow PA Route 97N 2.5 miles. Turn right onto Middleton Road. Turn left at the dam. Go 0.7 miles to launch (drive across the dam to the parking lot on the far side). Carry boat from gate down Gravel Road Hill to water.
57	**John Anselmo** Paved Ramp - River Right	Lat 41 81 03 Lon 79 98 44	From Cambridge Springs North, turn right onto Miller Station Road. Follow for 3.5 miles to the bridge. The parking lot/launch is on the right, just before the bridge. *Please respect the farmer's fields.
50	**Cambridge Springs** Paved Ramp - River Right	Lat 41 48 26 Lon 80 02 37	PFBC. Follow US Routes 6E/19N 0.2 miles from the French Creek Bridge in Cambridge Springs, then turn right onto Miller Station Road, follow for 0.3 miles and turn right to access area.
49	**Cambridge Landing** Paved Ramp - River Right	Lat 41 48 20 Lon 80 03 29	Follow US Routes 6E/19N just past French Creek Bridge in Cambridge Springs. Turn immediate left onto Poplar Street and follow to Hickory Alley. Turn left into the Fireman's Park pavilion parking area. Launch is straight ahead.
48	**Conneautee** Path - River Right	Lat 41 48 40 Lon 80 04 44	From intersection with US Routes 6/19 in Cambridge Springs, follow McClellan Street (SR 1006) 1.3 miles west. Access point is located at the confluence of Conneautee Creek and French Creek.
44	**Karl Gerdon Park** Metal Ramp - River Right	Lat 41 46 14 Lon 80 06 39	From US Route 6 in Venango, turn onto South Street and follow to Karl Gerdon Park and the Venango VFD 25. Park in parking for Karl Gerdon Park and follow path to behind the fire department's building. Downhill path leads to launch site.
39	**Bertram Park** Paved Ramp - River Right	Lat 41 72 19 Lon 80 15 07	From Main Street (US 6/9) in Saegertown, access Bertram Park near the northern Saegertown Bridge on Route 198. Follow the drive to Bertram Park passed the pavilion to the launch site.
38	**Saegertown** Gravel Ramp - River Left	Lat 41 42 31 Lon 80 08 45	PFBC. From the intersection of US Routes 6/19 and PA Route 198 at H&H Market in the center of Saegertown, take US Routes 6W and 19S approximately 0.4 miles heading south. Access directly off US Routes 6/19.
32	**Joe Cat Launch** Path to Ramp - River Right	Lat 41 39 10 Lon 80 09 36	In Meadville from Spring Street, cross the Spring Street Bridge over French Creek. Turn right onto Lincoln Avenue. Follow to the stop sign and turn right onto Rogers Ferry Road. Follow around the curve to Wadsworth Avenue. Launch is on the left. Unload boats and carry in/out only. Park at Wadsworth Church or Lincoln Avenue Ball complex.
	Cussewago Creek Path - River Right	Lat 41 38 58 Lon 80 11 01	PFBC. From the Mead Avenue Bridge at Bicentennial Park in Meadville, take PA Route 102 (Cussewago Road) approximately 1.4 miles north, then turn right at the PA Fish and Boat Commission sign.
31	**Bicentennial Park** Paved Ramp - River Left	Lat 41 38 14 Lon 80 09 44	From US Routes 6/19 in Meadville, turn west onto Mead Avenue, then left onto French Street (just before Mead Avenue Bridge - look for historic log cabin), then right into the park. Access is straight ahead. Pavilion, picnic tables, kayak/canoe rack, and seasonal restrooms available.
26	**Wilson Chutes** Gravel Ramp - River Left	Lat 41 35 21 Lon 80 08 59	PFBC. Follow US Route 322 E approximately 2.3 miles southeast of Meadville, turn right onto Wilson Chutes Road, then left into the parking lot before Wilson Chutes Bridge.
22	**Shaw's Landing** Gravel Ramp - River Right	Lat 41 32 27 Lon 80 06 15	PFBC. Follow US Route 322 E 6.1 miles southeast of Meadville, turn right onto Town Hall Road (sign may say Creveling), then across bridge over French Creek, turn left onto Wightman Road (dirt) and follow 0.5 miles. Access is adjacent to Conneaut Outlet.
18	**Cochranton Boro** Paved Ramp - River Left	Lat 41 31 09 Lon 80 03 14	From the traffic light in Cochranton, follow PA Route 173 S 0.5 miles. Just past the railroad tracks, turn right into Cochranton Borough Park. Access is on the left. Parking and picnic takes available.
10	**Utica** Path - River Left	Lat 41 26 17 Lon 79 57 19	About 7.5 miles west of Franklin on US Route 322, turn left at a paved crossroads with a sign for Utica (Foster Road). After driving 2.4 miles down hill, look for the parking area on the right immediately after the railroad tracks and before you cross French Creek.
A123	**Franklin** Paved Ramp - River Right	Lat 41 22 53 Lon 79 49 12	PFBC. Located in Franklin, take US Route 322/Liberty Street East and turn left onto 8th Street (continuing on US Route 322). Turn right onto Elk Street. Access is on your left between 3rd Street and 4th Street.

Figure 25. French Creek Water Trail Public Access Points

Power Boats and Watercraft

Power boating and jet skiing are mainly restricted to lakes, although some power boating does occur on the lower reaches of French Creek where public access areas allow motorboats to be launched and the creek is large enough to allow the boats to maneuver. Many of the lakes and reservoirs in the watershed have motor or horsepower restrictions for powerboats. However, Conneaut Lake and Edinboro Lake are two of the glacial lakes in the watershed that have no restrictions on horsepower and these see extensive powerboat and jet ski usage. The current establishment of Hydrilla in Conneaut Lake is most likely due to boat/trailer traffic from Pymatuning Reservoir where Hydrilla has been growing for several years.

Environmental Education

The importance of environmental education has grown over the past 25 years. Pennsylvania has developed environment and ecology standards that are part a of school's curriculum. Students are tested on their knowledge through the Science Pennsylvania System of School Assessment (PSSA) and the Biology Keystone Exam.

PA DEP's Environmental Education and Information Center (EEIC) assists teachers and non-formal educators by conducting workshops, providing online lesson plans and sources of environmental curricula. The EEIC also does outreach to the general public through hands-on exhibits, the *Teaching Green* newsletter, and addressing questions at major events such as the PA Farm Show, Home Shows, Ag Progress Days and others. PA DEP also coordinates and funds the DEP Environmental Education Grants Program, established by the Pennsylvania Environmental Education Act of 1993. School districts, private schools, colleges and universities, intermediate units, environmental education centers, nonprofit conservation and education organizations and businesses and county conservation districts may apply for funding to develop new or expand current environmental education programming. 6-8

County conservation districts throughout the watershed collaborate with state and federal agencies, conservation groups, school districts, and other groups to provide environmental education to their communities. A part of that work is to organize and conduct county Envirothon competitions. The Envirothon programs in Pennsylvania provides environmental education to students throughout the state. County conservation districts organize regional Envirothon challenges where school groups compete against one another to test their knowledge of aquatic systems, forestry, soils, land use, wildlife, and current issues. The winning school from each county moves on to compete in the state Envirothon competition, and the winners of the state competitions compete at the national level.

Penn State University's Cooperative Extension offices provide environmental education outreach. Each office provides access to collegiate expertise and resources, while maintaining local service providers and accessibility. Programs run by cooperative extensions include after-school programs, youth development, 4-H, and economic and community development programs.

A number of environmental education/research facilities are located in and around the French Creek watershed, including Allegheny College and Penn West University (formerly Edinboro).

Creek Connections is an environmental education outreach project operated from Allegheny College that works with middle and high school classes to monitor stream sites near schools for educational purposes. Students routinely perform field analyses for temperature, pH, total dissolved solids, dissolved oxygen, nitrogen, phosphorus, alkalinity, and turbidity.

In 2021, Allegheny College received a $1.25M grant from the Richard King Mellon Foundation to establish the Watershed Conservation Research Center. The interdisciplinary center allows faculty and students to collaborate with the community and engage in conservation-based research and educational outreach focusing on the French Creek watershed and its unique biodiversity. Through its research and collaboration with partners, the center helps create watershed stewards, identify areas of highest conservation value and greatest need for restoration, monitor aquatic species and advance scientific knowledge to aid in the protection of the watershed's species and habitats.

CHAPTER 6. ISSUES, CHALLENGES, AND ACCOMPLISHMENTS

There are a multitude of activities in the French Creek watershed that can affect water quality, aquatic biota, and ultimately, quality of life for watershed residents. Most of the activities that potentially threaten the health of the French Creek watershed are important to the economic viability of the region and the wellbeing of residents. Therefore, it is important to find ways that these activities can coexist and thrive while maintaining the ecological integrity of the watershed. Humans are inextricably linked to the environment in which we live and we must foster this link by both utilizing and protecting natural resources with the goal of sustainability.

It is undeniable that human activities, such as agriculture, logging, mineral extraction, development, and even some forms of recreation can potentially threaten the health of the French Creek watershed. The goal of this plan is to provide information on ways to minimize those threats through education, research, and cooperative community-based approaches. Most of the potential threats and recommendations have been voiced by watershed stakeholders through the French Creek Conservation Consortium, through public stakeholder meetings for the conservation planning process, and public opinion surveys. Potential threats are described as types of pollutants, forms of habitat degradation, or other activities and land uses that may have a negative impact on the health of the watershed. Management recommendations that are offered to address these potential threats through restoration, maintenance, enhancement, and overall protection of the resources of the French Creek watershed.

Pollutants

"A pollutant is a by-product of human activities which enters or becomes concentrated in the environment, where it may cause injury to humans or desirable species" (Kline, n.d.). Pollutants are generally described as heat, nutrients and organic wastes, toxins/hazardous substances, and invasive exotic species.

Heat

Heat is considered a type of pollution that can impact aquatic organisms if water temperatures are elevated beyond tolerable limits. Elevated water temperatures decrease dissolved oxygen levels and magnify stresses associated with chemical pollutants. Thermal pollution is common when point discharges are released into a receiving stream at higher than ambient temperatures; however due to the relatively low number of major point discharges throughout the French Creek watershed and existing regulations, elevated temperatures associated with point source discharges probably produce a negligible effect on surface water temperatures. The loss of riparian buffers along streams also contributes to heat pollution from lack of shade.

Nutrients and Organic Wastes

PA DEP biologists have noted nutrients as the leading cause of stream impairment in the French Creek watershed. The primary nutrients affecting aquatic ecosystems are nitrogen and

phosphorus. Although important for plant growth and primary production in ecosystems, excess nitrogen and phosphorus can promote the eutrophication of streams and lakes. These nutrients cycle naturally through the environment and are initially introduced to aquatic and terrestrial ecosystems through the weathering of soil and rock and from the atmosphere. Anthropogenic impacts to the landscape have dramatically increased the amount of these nutrients entering aquatic systems.

Nitrogen and phosphorus cycle through the environment in similar continuous cycles, including via the growth, death and decay of plants and animals. Natural levels of these nutrients are augmented through fertilizer use, combustion, sewage, and organic waste breakdown. Using Model My Watershed, the French Creek watershed has approximately 536,510.3 (tons) of sediment, 1,377.26 (tons) of Nitrogen, and 454,826.21 (pounds) of Phosphorus annually released into the watershed. The table below shows the estimated annual sources of the sediment, nitrogen, and phosphorus loads within the French Creek watershed.

Table 8. French Creek Watershed Nutrient and Sediment Sources

Sources	Sediment (lbs)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
Hay/Pasture	2,130,613.66	100,220.78	37,141.02
Cropland	15,676,648.38	203,472.55	34,182.57
Wooded Areas	199,274.01	41,492.37	2,343.03
Wetlands	21,614.95	14,326.77	771.309
Open Land	22,150.55	1647.135	53.1405
Barren Areas	79.6005	213.885	7.2765
Low-Density Mixed	183,269.68	4,741.85	502.9605
Medium-Density Mixed	443,219.33	8,830.14	900.3015
High-Density Mixed	110,394.43	2199.267	224.2485
Low-Density Open Space	470,901.12	12,184.17	1292.3505
Farm Animals	0	262,199.20	57,551.16
Stream Bank Erosion	1,053,946,094.04	885,186.23	257,140.49
Subsurface Flow	0	1,091,323.74	32,993.42
Point Sources	0	108,799.11	29,800.58
Septic Systems	0	18,148.69	0

Source: WikiWatersheds Model My Watershed

Much of the atmospheric nitrogen is comprised of naturally occurring elemental (N_2) nitrogen. However, nitrogen reacts with hydrogen to form ammonia and with oxygen to form nitrites (NO_2) and nitrates (NO_3). Plants most readily utilize nitrogen in the form of nitrates. Human land-use practices tend to augment the naturally occurring supply of nitrogen resulting in increased rates of eutrophication of surface waters.

The French Creek watershed is well situated to receive air born pollutants from industrial areas to the west due to continental wind patterns. These pollutants can fall as wet deposition (rain or snow), or dry deposition attached to dust particles. Pennsylvania receives rainfall with an average pH of approximately 4.4 (USGS). The average acid precipitation in the French Creek watershed varies between 4.3 and 4.5. Acidic precipitation is the result of chemical reactions in

the atmosphere between naturally occurring elements, like oxygen and nitrogen, and the byproducts of the combustion of fossil fuels from industry, agriculture, and vehicles. Along with acidification of surface waters, acid precipitation carries various chemical pollutants, including nitrogen and phosphorus that impact streams, lakes, rivers, and ultimately groundwater. Because fossil fuel combustion is a widespread issue and Pennsylvania receives much of its air born pollutants from other states, it is difficult to implement strategies to combat this threat without federal and state cooperation and goal setting to limit air emissions. It has been noted that there is a lack of air quality monitoring stations within the French Creek watershed.

Agricultural practices throughout the watershed have the potential to contribute high levels of nutrients to surface waters and groundwater. In fact, statewide, agriculture has replaced acid mine drainage as the leading cause of non-point source pollution. Both crop production and livestock are major sources of nutrients. Fertilizers, applied to fields and stored on farms, are the major sources of nutrients in run-off reaching streams and lakes, and contributing to groundwater. These impacts are exacerbated when riparian buffers are removed and agricultural Best Management Practices are not utilized. Livestock are also direct contributors of nutrients, particularly nitrogen, to surface waters. Livestock that have direct access to streams in pasture areas may eliminate wastes directly into waterways. These impacts are worsened by associated erosion produced when livestock trample stream banks and destroy vegetation.

Phosphorus is much more important than nitrogen. If the N:P molar ratio is in excess of 16, phosphorus is the limiting factor for algal and plant growth in aquatic systems. Research has convincingly shown that biomass is determined by P concentrations. If N concentrations are low, the biomass will be limited to nitrogen fixing organisms (cyanobacteria in aquatic systems, legumes and alders in terrestrial systems), but the ultimate biomass is still a function of P alone (M. Ostrofsky, draft comments, 2024).

Nutrients can also be contributed to surface and groundwater supplies by other activities throughout the watershed. Increased run-off and erosion from poor timbering practices and mining operations can mobilize large amounts of nutrients trapped in the soil and transport them to streams and lakes. These effects can be minimized when BMPs are utilized to minimize soil disturbance.

Additionally, as impervious surface area increases through development and urbanization, runoff from parking lots, roadways, rooftops, and other areas carry high levels of nutrients to receiving bodies of water. These problems are compounded when development practices fail to limit or mitigate the effect of impervious surfaces through the use of alternative materials, use of greenspace, and sensitive and sufficient stormwater management design.

Nutrients and organic waste are often contributed by point sources (i.e. a pipe from a sewage treatment plant or industrial discharge, on-lot septic systems). Organic wastes are discharged from food processing plants and other industries. Organic wastes breakdown into nitrogen and phosphorus constituents and further contribute to profuse plant growth and low dissolved oxygen levels. Permitting and monitoring by DEP for point source discharges has helped to curb problems associated with these discharges; however, in the case of sewage treatment plants,

nutrients are still discharged even in treated effluents. Bypasses of raw sewage due to overloads do occur and result in even higher nutrient levels discharged.

When sewage treatment plants are severely overloaded by stormwater (expected to increase with the effects of climate change), they can discharge untreated sewage into French Creek during periods of overload. Some municipalities have constructed larger sewage treatment plants that incorporate ultraviolet (UV) treatment of wastewater instead of traditional chlorination techniques. UV treatment may kill pathogenic organisms in untreated sewage, but does nothing to reduce nutrients in the effluent. Other sewage treatment plants in the watershed should be upgraded to operate with similar capacity and avoid overloads that contribute untreated sewage to streams and lakes in the watershed.

A potential major threat to water quality in French Creek is nutrients released from on-lot septic systems associated with older homes and seasonal cottages along streams and lakes in the watershed. Because of the age of some of these structures, they escape regulation by DEP and can severely impact water quality. Although discussed here as a point source of pollution because they can be traced to a discharge pipe, once discharged, sewage and organic wastes can infiltrate groundwater and spread through sub-surface pathways reaching streams at a myriad of locations.

Toxins and Hazardous Materials

There are natural sources of some toxic substances such as heavy metals. However, many industrial, agricultural, and household processes produce [these and unnatural] toxic materials. Toxic wastes produced by human activities contain substances that rarely occur in nature, or not high concentrations. Toxic wastes, such as heavy metals, hydrocarbons of petroleum origin, pesticides, organic poisons, like PCBs and inorganic poisons, like chlorine and ammonia, are not readily biodegradable.

Toxins have the ability to severely impact water quality and can cause rapid mortality for large numbers of aquatic organisms. In other cases, toxins may not kill aquatic organisms outright, but may build up in their body tissue and affect physiological functions when certain levels are reached. Decreased reproductive success is a possible physiological effect of increased toxin levels in body tissue. Reproductive compromise has received national and international attention through studies of a family of pesticides (halogenated hydrocarbons) of which DDT is the most well-known. Raptors such as the bald eagle were particularly affected as pesticide residues accumulated in food chains and the bird's bodies. As a result of bald eagles feeding on fish that had built up high levels of these toxins, egg shell thickness decreased to the point that egg laying and incubation were no longer possible.

Build-up of toxins can also be harmful to humans and lead to health recommendations in the form of fish consumption advisories. Certain lakes in the watershed have been found to contain high levels of mercury in benthic sediments, which also leads to fish consumption advisories.

Chlorine is commonly used for wastewater treatment by municipal, industrial, and private treatment facilities. Chlorine is extremely toxic to freshwater mussel glochidia (young) and other

aquatic organisms. PA DEP water quality standards for chlorine allow for a mixing zone that extends 15 minutes downstream from the sewage treatment plant where discharged. This limit set does not satisfy the concerns of the USFWS regarding the protection of aquatic life.

Brine and petroleum products can be released from abandoned oil and gas wells. These substances can be extremely toxic to receiving waters. Brine often has a higher salt content than seawater and is found in deep aquifers. Deeply drilled oil and gas wells often pass through these aquifers and have the potential to release brine to the surface or shallower groundwater aquifers where drinking/domestic water contamination can occur. Brine commonly has many other toxins associated with it such as heavy metals.

Roads and railways are often built along stream and river floodplains where topography is flat. These transportation corridors can negatively impact aquatic habitats by contributing pollutants in runoff. Common pollutants associated with runoff include road salt, heavy metals, and petroleum products. These pollutants can degrade riparian vegetation and alter aquatic habitats. Whenever these transportation corridors occur in close proximity to waterways, there exists the potential for catastrophic spills of toxic materials. Any such spills could wipe out portions of the aquatic ecosystem and render the habitat unsuitable for an extended period.

Invasive Species

Non-native, invasive species are defined as plants, animals, or other organisms introduced to an ecological system that cause economic or environmental harm or harm to human health. Invasive species are one of the most prominent threats to wildlife conservation in the project area. Not all non-native species are harmful to wildlife, but some exotic species may have severe impacts. Invasive plant species can impact agricultural activities and inhibit forest regeneration in areas where disturbance (by deer, erosion, or human activities) gives them a competitive advantage. They may out-compete native species, causing cascading effects throughout the food chain, and reducing food availability and quality for species, such as wild turkey, bear, and birds. They can be devastating to rare species that exhibit specific food preferences or requirements, when they displace that native food source.

Exotic species may have been introduced for a specific purpose or inadvertently. For example, autumn olive, an invasive shrub species, was introduced to many Pennsylvania state parks and game lands for food and cover for wildlife and as a soil stabilization tool. Alternatively, invasive insects may burrow into the wood pallets of packing material, unbeknownst to humans, to later emerge and invade another country.

When invasive species dominate an area, they often cause decreased land value, increased maintenance and control costs, degraded soil or water quality, or direct human health concerns. West Nile Virus is one example of a non-native pathogen that has the potential to affect human health. Another is Japanese barberry, with its known connections to the spread of Lyme disease. Weeds threaten natural areas and wildlife. Invasive pests may decrease crop yields, affect livestock health, and require costly control efforts. Invasive species may be aesthetically unpleasing, encroach upon homes and gardens, affect landscaping, and threaten pets and humans.

Plants

Invasive species pose the most significant threat in areas that have been altered by disturbances, such as a water impoundment, development, mine, oil or gas well, or where poor forestry and agriculture practices are employed. In disturbed areas, invasive species can displace native plants intolerant to the changing conditions. Native wildlife species prefer native plant species for food and tend to avoid invasive plants, which allows invasive species to proliferate. When a non-native species establishes itself in a foreign habitat, it is usually free of natural predators and pathogens, allowing it to spread and multiply with little to no natural controls.

Some invasive plants pose a threat to health and human safety, and these plants are categorized as **noxious weeds.** There are separate lists of federal noxious weeds and state-designated noxious weeds. Noxious weeds can be federally designated by USDA Animal and Plant Health Inspection Service (APHIS). This designation adds additional penalties and controls on those species. The PA Department of Agriculture (PDA) defines, "Noxious weeds are identified as a plant that is determined to be injurious to public health, crops, livestock, agricultural land or other property and cannot be sold, transported planted, or otherwise propagated in Pennsylvania." The Pennsylvania noxious weed list is posted on the PDA website: https://www.pa.gov/en/agencies/pda/plants-land-water/plant-industry/noxious-weeds-and-controlled-plants/controlled-plant-noxious-weed-lists.html). According to PDA, it is illegal in Pennsylvania to propagate, sell, or transfer any of the state-designated noxious weeds (PDA).

Established Invasive Plant Species

The following species are established and generally widespread in the French Creek watershed and have significant impacts to natural resources. Because of their prevalence on the landscape, eradicating them is simply not feasible. Instead, management efforts for these species should be localized to contain, suppress, or exclude these species for the protection of critical resources such as rare species, high-quality habitats, and recreational assets. Strategic decision-making is required when determining if and where to control established invasive species.

Table 9. Established Invasive Plants in the French Creek Watershed. *Click on the scientific name for external resources that provide identification information and management recommendations.*

Scientific Name	Common Name	Growth Form	Habitat	Description
Alliaria petiolata	Garlic Mustard	Herb	Terrestrial	A biennial herbaceous plant in the mustard family that is often found in disturbed forests and floodplains. It competes with native spring wildflowers and is a toxic decoy to the rare West Virginia White butterfly (*Pieris virginiensis*).
Artemisia vulgaris	Mugwort	Herb	Terrestrial	An aggressive herb that invades meadows and riverbanks, preferring well-drained soils. It also tolerates poor growing conditions and urban areas. It grows in dense monotypic patches, outcompeting other vegetation.
Berberis thunbergii	Japanese Barberry	Shrub	Terrestrial	A shrub that is widespread in landscaping and readily escapes to natural areas by

				bird-dispersed fruits. It forms thickets in disturbed forests that outcompete native plants and increase tick populations by providing refuge for common hosts.
Celastrus orbiculatus	Roundleaf Bittersweet	Vine	Terrestrial	A vine that forms dense mats and harms trees by girdling trunks and taking over canopies. It also hybridizes with the native American bittersweet (*Celastrus scandens*), which leads to genetic swamping.
Cirsium arvense	Canada Thistle	Herb	Terrestrial	A perennial, rhizomatous thistle species that dominates meadows and outcompetes native plants. It is often found on roadsides and in old fields, and its seeds are wind-dispersed.
Elaeagnus umbellata	Autumn Olive	Shrub	Terrestrial	An aggressive shrub that takes over old fields, forming thick shrublands dominated by invasive species. Its fruits are dispersed by wildlife, facilitating spread into new areas.
Hesperis matronalis	Dame's Rocket	Herb	Terrestrial	A biennial herbaceous plant in the mustard family that competes with native spring wildflowers in mesic forest understories and floodplains.
Iris pseudacorus	Yellow Iris	Herb	Palustrine	A large herbaceous wetland plant that often grows emergent from standing water. Unmanaged populations can become dense, outcompeting native plant species.
Ligustrum obtusifolium, Ligustrum vulgare	Privets	Shrub	Terrestrial	A group of shrubs commonly planted for hedge rows. They grow dense in disturbed areas and forest understories, often dominating large areas.
Lonicera morrowii, Lonicera tatarica, Lonicera x bella, Lonicera maackii	Bush Honeysuckles	Shrub	Terrestrial	A group of shrubs that often grow in dense monocultures or in association with other invasive shrubs.
Lythrum salicaria	Purple Loosestrife	Herb	Palustrine	A wetland plant that spreads rapidly, forming dense colonies and monocultures that alter habitat structure and outcompete native species. Several species of beetle are approved as bio-controls that can suppress large infestations of this species.
Myriophyllum spicatum	Eurasian Water-milfoil	Herb	Aquatic	An aquatic plant that grows densely throughout the water column of lakes and ponds. This species commonly hitch-hikes on boating and fishing equipment, facilitating spread into new water bodies.
Phalaris arundinacea	Reed Canary Grass	Herb	Palustrine	A large grass species that colonizes marshes, floodplains, and wet meadows.

				It grows in rhizomatous patches that become extensive when left unmanaged, altering habitat structure and outcompeting native plant species.
Phragmites australis ssp. australis	Common Reed	Herb	Palustrine	A large grass of various wetland habitats and disturbed areas. It forms large clonal colonies that displace all other plant species, profoundly altering wetland habitats. Some infestations span across entire wetland complexes.
Potamogeton crispus	Curly-leaf Pondweed	Herb	Aquatic	A common aquatic invasive plant that displaces native aquatic plants and alters underwater habitats.
Reynoutria japonica syn. *Fallopia japonica*	Japanese Knotweed	Herb	Terrestrial	Aggressive invader of riparian and floodplain habitats that creates extensive, clonal colonies expanding by rhizome. It has dense growth habits that dominate riparian corridors, displacing native vegetation and altering riverbanks.
Rosa multiflora	Multiflora Rose	Shrub	Terrestrial	A very common invasive shrub that was originally introduced for fencerows and wildlife habitat improvement. Now, it forms large thickets in disturbed areas and forest understories that exclude and outcompete native vegetation and provide little value for native wildlife.
Typha angustifolia	Narrowleaf Cattail	Herb	Palustrine	A non-native cattail that forms dense, aggressive colonies in natural wetlands that displace native wetland vegetation. It readily hybridizes with the native broadleaf cattail (*Typha latifolia*), threatening our native species with genetic swamping.
Typha x glauca	Blue Cattail, Hybrid Cattail	Herb	Palustrine	The hybrid between the invasive narrowleaf cattail and the native broadleaf cattail. Like narrowleaf cattail, blue cattail will form dense colonies in critical wetland habitats. It can also back-cross with both parent species, muddling the distinct genetic identify of both parent species and further contributing to the genetic swamping of native cattail.

Emerging Invasive Plant Species

The following non-native species are emerging threats to the French Creek watershed that are known have significant impacts to natural resources. The current distributions of these species within the French Creek watershed are limited, and their containment should be a high priority. Management of these species should aim to slow the spread of these species and suppress the growth of current populations. Suitable habitat within the watershed should be monitored for pioneer populations of these species. Prioritizing management for these species now can prevent significant future and downstream impacts.

Table 10. Emerging Invasive Species Within the French Creek Watershed. *Click on the scientific name for external resources that provide identification information and management recommendations.*

Scientific Name	Common Name	Growth Form	Habitat	Description
Acer platanoides	Norway Maple	Tree	Terrestrial	A large tree that appears similar to the native sugar maple. This species can displace native canopy trees, altering forest composition. Norway maple is presence in a moderate abundance around the city of Meadville, and there is also a small population at Venango in the French Creek floodplain. It has not been recorded in any other part of the watershed.
Aegopodium podagraria	Bishop's Goutweed	Herb	Terrestrial	An aggressive herbaceous plant that forms large monotypic stands in in lowlands and floodplains, often in forest understories. It is available in the landscaping trade, but there are few naturalized populations in the French Creek watershed, which are widely scattered throughout the basin.
Ailanthus altissima	Tree-of-Heaven	Tree	Terrestrial	A mid-sized tree that colonizes disturbed areas. It is very hardy, tolerating poor and degraded conditions, including urban areas and soils impacted by pollution. It is also the primary host plant for the spotted lanternfly, an invasive species of insect and a significant threat to agriculture. In the French Creek watershed, tree-of-heaven populations are concentrated around developed areas in Meadville, Edinboro and Franklin, with very few outliers outside of these towns.
Alnus glutinosa	European Alder	Tree	Palustrine	A small to mid-sized tree that prefers disturbed areas, riverbanks, and wetlands. Mature trees produce abundant seed that lead to the formation of large monotypic stands. In the French Creek watershed, its distribution is largely limited to headwater areas in Erie county where it was commonly planted several decades ago.
Anthriscus sylvestris	Wild Chervil	Herb	Terrestrial	An herbaceous plant that colonies riverbanks, meadows, and disturbed areas. It produces abundant seed, enabling it to quickly overtake an area

				once established. The seeds can hitchhike in soils that stick to vehicles, boots, and machinery, facilitating long-range spread. Currently, wild chervil is mostly found along roadsides and other highly disturbed places; it has yet to spread into natural areas to a signficant extent.
Cabomba caroliniana	Carolina Fanwort	Herb	Aquatic	An aquatic plant that is native to the southeastern United States, but was introduced to the French Creek watershed, most likely from the aquarium trade. It forms dense monocultures underwater that alter habitat and displace native species. Currently, Carolina fanwort is limited to Conneaut Lake and its outlet through state game land #213. Efforts targeting Carolina fanwort should prioritize early detection in waterbodies that are not currently infested.
Conium maculatum	Poison Hemlock	Herb	Terrestrial	A non-native herb in the carrot family that is highly toxic when ingested. In open and disturbed places, it can also form dense, monotypic stands. There are very few recorded populations in the French Creek watershed, all of which are growing on roadsides or other disturbed areas.
Euonymus alatus	Burning Bush	Shrub	Terrestrial	A shade-tolerant shrub that is commonly found in landscaping and escapes into natural areas by bird-dispersed fruits. In the French Creek watershed, few populations have naturalized outside of plantings, but more are likely to appear if this species remains in landscaping.
Ficaria verna syn. Ranunculus ficaria	Lesser Celandine	Herb	Terrestrial	A spring-ephemeral invasive herb that forms monoculture carpets in lowlands and floodplains. This species displaces native spring wildflowers, impacting native biodiversity and reducing early-season food sources for native pollinators. It is abundant in French Creek floodplains from Meadville and downstream. It is nearly absent upstream from Meadville, with the exception of a few outlier populations. Populations found outside of the core distribution should be eradicated.

Frangula alnus	Glossy False Buckthorn	Shrub	Terrestrial	An invasive, thicket-forming shrub that thrives in both wetland and upland habitats, displacing native vegetation and impacting forest regeneration. Its fruits are dispersed by birds, facilitating long-range spread. There are few populations in the French Creek watershed, but they occur sporadically and are scattered in distribution.
Hydrilla verticillata	Hydrilla; Waterthyme	Herb	Aquatic	A highly aggressive aquatic plant and a federally-listed noxious weed. Once established, this species dominates waterbodies, choking out native aquatic vegetation. It profoundly alters aquatic ecosystems, impacting their ability to support wildlife such as fish and invertebrates. This species was first recorded in the French Creek watershed in 2022 from Conneaut Lake. A rapid response initiative was immediately put into action with the goal of containing this new infestation. Hydrilla has not yet been found in any other part of the French Creek watershed.
Hydrocharis morsus-ranae	Common Frogbit	Herb	Aquatic	A floating aquatic plant that reproduces clonally, rapidly spreading to cover water surfaces. The dense, floating mats that this species produces can profoundly alter aquatic and wetland plant communities. Currently, state game lands #213 is the only natural area in the French Creek watershed where common frog-bit is present. This population is extensive, spanning the entirety of the game land's large wetland complex. Management should prioritize preventing any further spread to new areas.
Lonicera japonica	Japanese Honeysuckle	Vine	Terrestrial	An invasive vine related to bush honeysuckles. It forms dense mats that smother competing vegetation. In the French Creek watershed, there are very few recorded populations, which are broadly scattered around the basin.
Microstegium vimineum	Japanese Stiltgrass	Herb	Terrestrial	An annual grass that thrives in disturbed ecosystems and a variety of conditions. This species forms a seedbank that lasts for 7-8 years,

				making eradication difficult once it is established. There are few populations in the French Creek watershed which are scattered throughout the basin. Management efforts should prioritize containing these infestations and preventing spread.
Najas minor	Brittle Naiad	Herb	Aquatic	An aquatic plant that forms dense colonies in slow-moving and still waters. There are a few infestations scattered around the French Creek watershed, including Edinboro Lake, Conneaut Lake, and Tamarack Lake.
Rhamnus cathartica	Common Buckthorn	Shrub	Terrestrial	An invasive, thicket-forming shrub that can establish in a variety of habitat types. Its fruits are bird dispersed, which facilitates long-range spread. Currently, there are two documented populations in the French Creek watershed. One is in a wetland area at state game lands #109. The other is within the city of Meadville in developed areas.

Potential Invasive Plant Species

There are many invasive plant species not currently found within the French Creek Watershed that could have serious impacts if introduced in the future. Monitoring for early detection and rapid response to such species is critical. For additional information on invasive species prevention, early detection, and rapid response, see the section below on page 109.

Table 11. Potential Invasive Plant Species Recorded Within 50 miles of the French Creek Watershed. *Click on the scientific name for external resources that provide identification information and management recommendations.*

Scientific Name	Common Name	Growth Form	Habitat	Description
Butomus umbellatus	Flowering rush	Herb	Aquatic	An emergent aquatic herb that is currently present in the Lake Erie watershed and on the Allegheny River near Franklin and Oil City. It spreads by rhizomes and seeds, which can be carried downstream to start new populations.
Cynanchum louiseae syn. *Vincetoxicum nigrum*	Black Swallow-wort	Vine	Terrestrial	A vine in the milkweed family that creates smothering mats. There are populations in the Shenango River watershed and the Lake Erie watershed. It may be a toxic decoy to Monarch Butterflies.
Galega officinalis	Goatsrue	Herb	Terrestrial	A class A Pennsylvania noxious weed that mostly grows in open and disturbed habitats. It has a dense

				growth habit that outcompetes native vegetation.
Ludwigia peploides	Floating Seedbox	Herb	Aquatic	A floating and emergent invasive herb that grows in large, dense clonal patches. An emerging population is present on the Allegheny River at Oil City.
Nelumbo lutea	American Lotus	Herb	Aquatic	A large, emergent aquatic plant that forms extensive monocultures in lakes, ponds, and river margins. Populations are present at the Pymatuning Reservoir and Presque Isle. This species is native to the southeastern United States, but is introduced to Pennsylvania.
Persicaria perfoliata	Mile-a-minute	Vine	Terrestrial	An aggressive, annual vine that spreads rapidly and forms a seedbank that persists for 7-8 years. Its bright blue berries are bird dispersed. In a single season, this species grows extensively, creating smothering mats of dense vines. The nearest population is on a floodplain in Franklin, less than 1000ft downstream from French Creek's confluence with the Allegheny River.
Rhodotypos scandens	Black Jetbead	Shrub	Terrestrial	A thicket-forming shrub that is occasionally planted in landscaping. It produces jet-black fruits that are bird dispersed. The nearest populations are in Erie county in the Lake Erie watershed.
Trapa natans	Water Chestnut	Herb	Aquatic	A floating aquatic plant that spreads rapidly to completely cover the surfaces of still and stagnant waters. Nearby populations are present in the Shenango River Watershed and on the Allegheny River near Warren.

Animals

Invasive animal species include forest pests, such as the emerald ash borer, spongy moth, and hemlock woolly adelgid, as well as aquatic species like the zebra mussel. The spongy moth is prevalent throughout Pennsylvania and New York State, and the emerald ash borer has caused devastating loss of ash trees, nearly causing the extinction of white ash.

Asian Clam (Corbicula fluminea)

The Asian clam is a non-native bivalve that has been documented from the French Creek drainage. It is highly prolific and dense populations can significantly alter benthic communities.

Beech Leaf Disease Nematode (Litylenchus crenatae mccannii)

Litylenchus crenatae mccannii is a species of nematode that is associated with a disease afflicting American beech trees (*Fagus grandifolia*), simply known as Beech Leaf Disease.

When the infected leaves unfurl, they appear curled, leathery, and disfigured with dark and off-color striping that indicates which portions of the leaves are infected. The infection interferes with the leaves' ability to photosynthesize, starving an afflicted beech tree. This leads to leaf wilt, severe defoliation, and eventually tree death after many years of infection. Beech leaf disease can infect both mature beech trees and young seedlings, posing an existential risk to American beech across its entire range.

Beech leaf disease was first discovered in North America in Lake County, Ohio in 2012. Since then, it has rapidly spread to every county in Pennsylvania and it continues to expand its range. Research is currently ongoing to develop safe and effective treatment options.

Chinese Mystery Snail (Cipangopaludina chinensis) and Japanese Mystery Snail (Cipangopaludina japonica)

Chinese mystery snail and Japanese mystery snail are large aquatic snails that were likely introduced through the aquarium trade. Both species feed on detritus, algae, and other organic material, directly competing with native detritivores, such as various snails and invertebrate species.

Common carp (Cyprinus carpio)

Many other exotic species threaten the native biota of French Creek. Common carp have been introduced to French Creek and several other carp species have the potential to be introduced from other PA waterways. Carp are primarily benthic feeders that can severely impact benthic communities, including freshwater mussels. They also aggressively compete with native benthic feeders for food resources.

Emerald Ash Borer (Agrilus planipennis)

The emerald ash borer (EAB), an invasive insect, was first positively identified in Pennsylvania in 2007 and in Cattaraugus County, New York in 2009. The EAB invasion was swift and thorough, decimating millions of trees throughout the country and changing forest composition in both Pennsylvania and New York. Quarantines were implemented in both states on the transport of ash products and all firewood to prevent the spread of the beetle to uncontaminated areas.

Purple box trap to monitor for invasive insects, like EAB

It is not the adult emerald ash borer beetles that cause the devastating effects of girdling and killing trees, but rather their larvae that feed under the bark. As the larvae eat paths under the bark, called "galleries," they disconnect the cells that carry nutrients and water to the limbs and leaves of the tree. Over time, usually within three years of the infestation, the tree dies as a result of stress and inability to circulate life-sustaining nutrients and water throughout the plant.

Hemlock Woolly Adelgid (Adelges tsugae)

This tiny, fluid-feeding insect was introduced from Japan in the early 20th century and was first discovered in Pennsylvania in 1969 and New York in 1985. The hemlock woolly adelgid (HWA) most commonly affects hemlocks, but can also affect spruce trees. Damage is inflicted when an

immature nymph or adult sucks sap from twigs, which causes host trees to lose needles and possibly die. HWA eggs hatch in February or March. This insect species prefers mild conditions and is most active from October to June. Cold weather may contribute to high mortality and will likely limit expansion of this pest. Chemical pesticides seem to be the most effective management tool, most successfully used in late September through October (Spichiger, 2004). As of 2024, only one population of hemlock woolly adelgid has been recorded in the French Creek watershed.

Round goby (Neogobius melanostomus)

Another relatively new invasive species that has been documented in the French Creek watershed is the round goby, a small benthic fish species that feeds on mussels as well as a large variety of other species. The round goby may outcompete a vast number of native species such as darters, sculpins, and catfish and affect freshwater mussels both directly through consumption and indirectly through impacts to host species. It was first introduced into the Great Lakes around 1990 by being released through the ballast waters on large freighter ships where it was picked up most likely from its native range in Eurasia. The high adaptability to a variety of habitats led to an extremely high abundance and distribution within the Great Lakes, greatly changing the ecosystem. Negative economic and ecological impacts have been a constant issue since its introduction. It was first noted within the French Creek watershed in 2013 in LeBeouf Lake, and by 2016 had made its way to the mainstem of French Creek. This introduction likely occurred through bait bucket transfer.

With French Creek recognized as having high species richness, with 80 species of fishes and 29 native mussel species, the potential threat that the round goby presents to the watershed is of high importance. Round gobies were first confirmed feeding on mussels within the French Creek watershed in 2019. Research to better understand the impacts of round gobies in the French Creek Watershed is occurring by faculty and students at Allegheny College and is highlighted in the “Seeing The Unseen: Aquatic Invaders and What’s at Stake” film https://youtu.be/DUlo_ofa3j0?si=VkNlK7-oIJZNuXr5&t=1053.

Several major papers cite the Round Goby’s presence in LeBeouf Lake/French Creek and the paper that documented gobies feeding on freshwater mussels (Stauffer et al., 2016, Clark et al., 2021 and Bradshaw-Wilson et al., 2019)

Brown trout and rainbow trout, the two most commonly- stocked species in the French Creek watershed, are also exotic species that compete with native game fish. This increased competition may have negative effects on native forage fish and benthic communities.

Spongy Moth (Lymantria dispar)

The spongy moth was introduced to the U.S. from Europe in the 1980s. This insect's feeding, which causes extensive damage, occurs while in the larval (caterpillar) stage. Eggs are deposited in July and overwinter on bark and stones. Spongy moth caterpillars hatch and begin feeding in early- to mid-May in the northern part of Pennsylvania and southern New York. Oak, sugar maple, beech, and aspen trees are preferred food sources for this caterpillar’s voracious appetite. Large populations may strip entire trees of their foliage, leaving them weakened and susceptible to disease, drought, and attack by other pests. A tree begins to suffer when 30% or more of its leaf surface is lost (Purdue Research Foundation, 2004).

Spongy moth populations are typically highest following wet, more temperate winters, while cold, dry winters cause death of egg masses. While there is no state program in New York to spray for spongy moths, private landowners in Pennsylvania with forested land containing 250 or more egg masses per acre may be eligible for insecticide applications administered through the PA DCNR Bureau of Forestry. However, the biggest factor controlling populations is a natural fungus, which grows on most hardwoods, and adversely affects the spongy moth. Additionally, the spongy moth population goes through a natural boom and bust cycle, and spraying is not necessary every year (Purdue Research Foundation, 2004).

Both the PA DCNR and PGC have robust spray programs for spongy moth. Here's a video about the PGC spongy moth spray program: https://youtu.be/cqK6FTugfSQ?si=AVF8iVJoBxCSkuWY.

Spotted Lanternfly (Lycorma deliculata)

The spotted lanternfly is a planthopper insect that was first detected in North America in 2014 in southeast Pennsylvania. Since then, it has spread throughout much of Pennsylvania and into numerous other states, often hitch-hiking along transportation corridors. Grapevines are among its preferred food sources, but it may also feed on hops, stone fruits, and some hardwood trees. Large populations pose a serious threat to vineyards and other agricultural operations.

Tree-of-heaven, the spotted lanternfly's natural host plant from its native range in Asia, is also an introduced, invasive species. Tree-of-heaven was originally planted long ago as a street tree for urban areas due to its tolerance for pollution and poor growing conditions. Established tree-of-heaven populations in the United States have played a critical role in facilitating the establishment and spread of spotted lanternfly. Targeting tree-of-heaven for removal in areas where spotted lanternflies are not yet prevalent may be an effective prevention method.

Zebra Mussel (Dreissena polymorpha)

The zebra mussel, a small black and white striped bivalve mollusk, was discovered in Edinboro Lake in 2000. Since its discovery in Edinboro Lake, the zebra mussel has also been documented in Sandy Lake and Canadohta Lake, two glacial lakes just outside of the French Creek watershed. Zebra mussels are widespread in Conneaut Lake, affecting boat hulls, docks and natural hard surfaces.

The zebra mussel first invaded the Great Lakes in the mid-1980s when it was transported from Europe in the ballast water of oceangoing ships. Once established, the zebra mussel quickly colonizes all available hard substrate on lake bottoms. In a little over 10 years since its presence was confirmed, it has had a dramatic effect on the Lake Erie ecosystem, filtering large quantities of water and depleting the aquatic environment of microscopic algae and zooplankton. Additionally, these organisms have clogged water intake pipes for drinking/domestic water and industries, and fouled boat hulls.

The closely-related **quagga mussel** (*Dreissena bugensis*) has similar invasive qualities. It has not been found in the French Creek watershed as of 2024, but is present in Lake Erie.

Managing Invasive Species

Integrated Pest Management (IPM) techniques incorporate science and information about the target pest, varying economic approaches, and utilization of ecologically sensitive control tactics to deal with infestations. The first step in effective invasive species management is prevention. Most invasive species are opportunistic and take advantage of disturbed areas or weakened species. Invasive species are less likely to establish in effectively managed landscapes and well protected, pristine natural areas. By preventing an invasive species from establishing or spreading, money can be saved and chemicals need not be applied.

The second step is early detection, followed by quick application of appropriate management techniques. Early detection and rapid response will save money and effort required to control the target species. To detect an invasive species early, correct identification is critical. Numerous tools and publications are available to help identify invasive species. Both the USDA National Invasive Species Information Center's (NISIC) website (www.invasivespeciesinfo.gov) and the Global Invasive Species online database (https://www.iucngisd.org/gisd/) are quality identification tools available at no cost. The following online field guides help identify both terrestrial and aquatic invasive species:

Pennsylvania's Field Guide to Aquatic Invasive Species: https://www.sleloinvasives.org/wp-content/uploads/2021/06/Pennsylvania-AIS_Field_Guide_Finalweb.pdf

Mid-Atlantic Field Guide to Aquatic Invasive Species: https://www.midatlanticpanel.org/wp-content/uploads/2017/01/MidAtlantic_AIS_Field_Guide_Web.pdf

Plant Invaders of Mid-Atlantic Natural Areas, Field Guide: https://bugwoodcloud.org/imageSites/pdf/midatlantic-web.pdf

Once positive identification is confirmed, small, isolated populations of invasive species should be contained. Established invasive populations can be controlled mechanically (physically pulling or cutting weeds), chemically (applying pesticides), or biologically (utilizing another living species to control the invasive target). Often, for well-established invasive species, a combination of control methods is necessary to efficiently and effectively control the species. When chemical means are necessary to control an invasive weed, insect, or animal, pesticides must be handled by an applicator certified by either the state of Pennsylvania or New York. Landowners and land managers should contact their County Cooperative Extension office or a private, certified applicator to seek assistance.

Education is a critical component in the management of invasive species. Volunteers, land managers, and community scientists should be taught to correctly identify invasive species that threaten their watershed. This facilitates easy, rapid detection and reporting to the proper agency at the first sign of encroachment. Addressing any invasive problems early helps minimize the negative impacts on native species and natural resources. Well established invasive species are more difficult and costlier to control. Invasive species fact sheets can be downloaded from the U.S. Forest Service: https://www.fs.usda.gov/managing-land/invasive-species and PA DCNR: https://www.dcnr.pa.gov/Conservation/WildPlants/InvasivePlants/InvasivePlantFactSheets/Pages/default.aspx.

The French Creek Cooperative Weed Management Area is an informal coalition of local organizations that share resources and information on invasive species in the watershed and acts to foster collaboration among those interested in common goals, like:

- Identification and management of invasive species
- Educational opportunities for landowners and land managers
- Developing common management objectives
- Setting realistic management priorities
- Facilitating effective treatment
- Coordinating efforts over geographical and municipal boundaries

The Pennsylvania Association of Conservation Districts (PACD) Partnerships for Regional Invasive Species Management (PRISM) Northwest Pilot Project is active in Erie, Crawford, Mercer, and Venango counties within the French Creek watershed, 13 counties in northwest Pennsylvania are part of the pilot project. The conservation districts from each county formed advisory groups consisting of local partner organizations and community members to identify and prioritize educational events and/or invasive species treatment projects in their counties. Projects may include demonstration-project tours, guided walks, invasive species visuals and factsheets, workshops and trainings, community science projects, and more.

Prevention, Early Detection, and Rapid Response

The most effective method of managing invasive species is to prevent their establishment entirely. By monitoring for pioneer populations of invasive species, new infestations can be detected early, before the species can become fully established and entrenched throughout the landscape. Increasing general awareness of invasive species among our communities can greatly increase the probability that new invasive species populations are discovered early. When new invasive species populations are revealed, swift action should be taken to quickly contain and potentially eradicate new invasive-species infestations entirely. Effective response actions often require an invested and collaborative effort between state agencies, other government sectors, conservation organizations, academia, municipalities, landowners and community members.

Volunteers transplanting live stakes of riparian shrubs to control erosion on Trout Run (photo: WPC)

The Pennsylvania Natural Heritage Program (PNHP) administrates iMapInvasives as an online, GIS-based data management system used to assist community scientists and natural resource professionals working to protect our natural resources from the threat of invasive species. It is driven by a partnership of dedicated conservation professionals that form a network of organizations working to ensure that the *i*MapInvasives partnership continues to grow and contribute to the field of conservation. Reports for invasive species impacting Pennsylvania can be submitted to Pennsylvania iMapInvasives by creating a free login account, or by submitting a public report. Current recorded distributions of invasive species in

Pennsylvania can be viewed on the iMapInvasives Web map Service. Through iMapInvasives, early detections for new invasive species populations can be flagged and reported to the appropriate agencies and organizations for management consideration.

Habitat Degradation

Habitat degradation is another major threat to aquatic organisms. In stream or river systems, habitats ranging from uplands to riparian forest areas to stream bottom substrate must be considered when determining habitat quality. Aquatic organisms rely on healthy riparian buffers for many reasons and the stream health cannot be considered separately from the adjacent land areas. French Creek faces many forms of habitat degradation stemming from human activities.

Erosion and Sedimentation

French Creek, and all streams, have naturally occurring amounts of suspended sediments that result from weathering of rocks and soils. These natural levels of suspended sediments rarely are high enough to muddy the water, impede sunlight penetration, or smother benthic aquatic organisms or fish eggs. Human activities on the landscape have a tremendous tendency to increase sediment loads of streams and lakes. Increases in erosion and sedimentation lead to higher than normal levels of suspended sediments in surface water and buildup of silt on stream bottoms that can smother aquatic organisms. The activities that most commonly contribute sediments to surface waters are improper agricultural practices, deforestation, construction of buildings and roadways, urbanization, and mining.

Increased amounts of suspended solids and sedimentation can lead to increased turbidity, which blocks sunlight penetration and decreases dissolved oxygen levels. Increased scour and erosive forces occur when sediment levels are increased because sediment particles act like sandpaper abrading the streambed. Sediments can also cover clean sand and gravel stream bottoms needed by many aquatic organisms for feeding, living, and laying eggs, and covering mussel beds.

Agricultural land use occurs over almost half (40%) of the French Creek watershed. Threats from increased sedimentation occur primarily from row cropping or livestock pasturing along waterways. Improper planting of row crops, and the often-associated loss of riparian buffer, can greatly increase sediment loads in run-off and lead to severe erosion of stream banks. This is especially evident where crops are planted adjacent to stream banks.

Livestock that have access to streams when pastured also increase erosion of stream banks through consumption and trampling of vegetation. There are several BMPs designed to decrease erosion and many of these provide additional benefits to the farmer. Simply fencing livestock out of streams and providing separate watering areas or reinforced stream crossings can greatly reduce the erosion of stream banks and increase the health of the livestock.

Improper timbering practices also have the potential to greatly increase erosion and sedimentation. The French Creek watershed, along with most of Pennsylvania, has gone through several cycles of large-scale timbering. With approximately half of the watershed reverted to forest, French Creek is facing threats from improper logging practices in areas where mature woodlots exist. Logging, when done unsustainably, removes a large portion of the vegetation

from the landscape resulting in increased runoff, which mobilizes large amounts of soil. In areas where the forests being timbered are along ridge tops, the effects may not be as detrimental to French Creek, but in other areas, steep, highly erodible slopes and mature riparian forests are being targeted by loggers. Logging riparian areas poses a significant threat to the aquatic habitats in the French Creek watershed. These riparian forests play key roles in buffering French Creek against activities on the landscape as well as providing shade and scenic value to the stream. Erosion from logging operations is increased by the use of heavy machinery for log skidding and through the construction of temporary logging roads without the use of BMPs.

Road and building construction are concerns regarding erosion and sedimentation as rural development occurs often near streams and lakes. If these projects are near waterways that could be potentially impacted, they are required to obtain permits from DEP and to follow erosion and sedimentation control plans to ensure sediments are prevented from running off site. These permits are issued by county conservation districts that may not have authority or adequate staff to enforce the regulations or monitor all sites. Often subcontractors are not aware of these regulations and sediment releases may occur due to lack of enforcement.

Dirt and gravel roads are common throughout the rural watershed. These roadways have the potential to contribute large amounts of sediment to nearby waterways. Sediments often carry oils, heavy metals, and salts, which further impact stream ecosystems. Hillside dirt and gravel roads are especially prone to erosion during heavy rainfall and spring snow melt events.

Sand and gravel mining occur throughout the watershed. All mining operations are required to obtain permits from DEP. The PA DEP Bureau of Mining (Knox District Office) is responsible for regulation of mining operations in the French Creek watershed. There are currently 110 permitted sand and gravel mining sites in the French Creek watershed. In addition, there is one sand stone mine located near Cooperstown, Venango County. The Sugar Creek sub-watershed does have the largest concentration of sand and gravel mining sites of any major tributary in the southern portion of the French Creek watershed and is also a popular area for oil and gas drilling. When surveyed for freshwater mussels, Sugar Creek was found to be practically devoid of viable populations (Western Pennsylvania Conservancy, 1994). More comprehensive assessments should be done in Sugar Creek to determine if the causes for the decreased mussel viability are related to impacts from mining or oil and gas wells.

Because mining operations are closely monitored by DEP, and sediments must be contained on-site, the amount of sediments reaching streams in the watershed may be low. Mining is however, a serious potential threat to water quality and aquatic organisms in French Creek and sites should be more thoroughly evaluated to determine actual threats. Barriers to prevent sediments from leaving mining sites do fail and can, in some cases, release catastrophic amounts of sediments to receiving streams.

Alterations of Hydrology

Hydrology is study of the movement of water through various stages on the earth's surface. Water is stored (i.e. groundwater, surface water, ice caps) and transported (i.e. evaporation, transpiration, precipitation) in a continuous cycle. Aquatic habitats evolve certain characteristics

based on the hydrology of water. Human impacts to the landscape have altered the hydrology of the French Creek watershed in several ways. Dams, like the Union City Dam, Woodcock Creek Dam, Tamarack Lake dams, and others, have altered natural flow regimes. In addition, water withdrawals from streams, lakes, and groundwater alter the watershed's hydrological patterns.

Concerns have been raised over the Union City Dam's negative effects on French Creek. As with many of the threats discussed, it is difficult to determine the impacts that the dam has had to French Creek. Certainly, the natural flooding regime that is responsible for distributing nutrients on the floodplain has been altered.

Alterations to natural flow regimes may disrupt nutrient flow in an aquatic ecosystem. Streams and rivers depend on nutrient inputs to provide much of the energy to the flowing aquatic system. Nutrients are passed through aquatic food webs and flow from headwater tributaries to higher order streams, lower in the watershed, to provide energy for all aquatic organisms. Annual flooding not only brings nutrients into a stream, but also helps disperse nutrients back to the floodplain where they can be utilized by plants and re-enter the aquatic system as autumn leaf fall or woody debris. In addition to alterations in nutrient flow, dams may exacerbate erosion problems downstream by altering natural flow levels. This potentially leads to increased scour in some areas, increased erosion, substrate instability, and increased sediment deposition.

Diversion of surface water and extractions of groundwater occur throughout the French Creek watershed. Farmers irrigate fields from nearby streams during the warmest, driest months of the year when aquatic organisms are already stressed by higher water temperatures and low dissolved oxygen levels. These withdrawals are often not regulated, and impacts to aquatic organisms are not adequately researched. Effects of these withdrawals have been documented by the PFBC on streams like Beaver Run in Erie County. This Exceptional Value stream contains a naturally reproducing brown trout population, which has decreased in numbers in recent years because of decreased precipitation and increased irrigation by area farmers.

The majority of private residences in the watershed depend upon public or private groundwater withdrawals for their water needs. The city of Meadville supplies its residents with drinking/domestic water from large-diameter groundwater wells. Other smaller towns utilize wells and springs or, in the case of Cambridge Springs Borough, obtain water directly from French Creek. Industries are another user of groundwater. Because groundwater recharges streams and lakes, alterations to groundwater levels can impact aquatic, wetland, and riparian habitats. A hydrologic budget that incorporates historic and current flows, groundwater and surface water, and inputs and withdrawals is needed to fully understand the impacts of hydrologic alterations to the French Creek watershed.

Mining has been discussed as a potential source of sedimentation and pollutants, however, it also has the potential to alter watershed hydrology. Removing large amounts of sand and gravel potentially alters flow regimes of groundwater in the mined area. Subtle increases or decreases in groundwater levels can negatively impact stream, lakes, and wetlands and alter the habitats for many organisms. Additionally, opening groundwater recharge areas to the atmosphere decreases filtration due to the remaining material being overburdened.

Only a very small percentage of the French Creek watershed is considered urban. However, research has shown that only a 10% increase in impermeable surfaces in a watershed can have a dramatic effect on aquatic habitats (Center for Watershed Protection). Increases in impermeable surfaces increase runoff and erosion and decrease infiltration to groundwater supplies. The resulting excessive flooding severely impacts streambeds and banks. Stormwater management plans should be considered in municipalities where population centers represent potential growth areas or where sprawl is occurring and impermeable surfaces are on the increase.

Because wetlands act as natural retention areas, loss of wetlands can increase the amount of water running overland and entering streams and lakes. This alteration to natural hydrology leads to increased erosion of streambeds and banks, increased flooding and flashiness, and loss of habitat for aquatic and riparian species.

Channel/Streambank Modification

Modifications to natural stream channels and streambanks are frequent occurrences. Often these modifications occur without adequate thought to the impacts to aquatic organisms or areas downstream of the modification. It is important to note that alterations to the natural stream channel or streambank design are usually not without negative consequence. Modifications at one point on a stream often cause problems such as increased erosion, flooding, or lowered water levels further downstream.

Channel modifications occur for a variety of reasons. Manipulation of stream channels for agricultural uses and flood control are both prominent in the French Creek watershed. Historically, unregulated by government, stream channelization has occurred to facilitate livestock watering and crop irrigation, as well as to reduce flooding by straightening and deepening stream channels. “Physical alteration of the channel bed has a number of negative impacts on aquatic species including the effects associated with siltation and alteration of nutrient loads, flow, and flushing flows. Physical alteration of the creek channel destroys habitat for some species while creating habitat for others; the newly created habitat may be of poorer quality than the original or may be occupied by species other than the targeted species.” (McAlpine, 1993). The community can engage in successful stream restoration projects and BMPs can be implemented to benefit farmer, livestock, and natural communities.

Stream channels are also modified for roadway and bridge replacement projects. These projects can severely disrupt benthic and riparian habitats. Although strictly monitored by DEP, PFBC, and USFWS, these projects can impact native freshwater mussel beds and fish spawning habitat. Relocations of freshwater mussels have been used as a tool to protect these organisms and allow bridge and roadway projects to occur.

Multiple bridges over French Creek have been replaced in the last few years, in Utica Borough, Cambridge Springs, Mead Avenue, Saegertown, and Cochranton. Biologists from USGS and PennDOT have translocated mussels from these sites in some cases and are monitoring the results of translocation on survival rates. Although hellbender salamanders do not yet have special designation status to offer protection from impacts associated with bridge replacement, agencies should work collaboratively to salvage and relocate animals when possible. Because of

the aging bridges found throughout the French Creek watershed, several bridges are scheduled to be replaced by PA Department of Transportation and local municipalities in the near future.

Streambanks are often modified by the removal of native vegetation and trees for the purpose of agriculture, livestock grazing, or development. Banks denuded of vegetation are prone to erosion, which increase the sedimentation in the streambed. This alters benthic habitat for aquatic insects, freshwater mussels, and fish spawning areas. Vegetation also helps shade stream channels, keeping water temperatures lower. Elevated water temperatures lower dissolved oxygen levels and magnify the effects of other stresses, such as pollutants. In addition, riparian vegetation is a major source of energy and nutrients for aquatic systems. This energy is added annually through autumn leaf fall and in the form of woody debris.

Many agencies and organizations are working to restore riparian habitat. It has been said that a functioning, intact riparian habitat is the most important tool in combating the effects of non-point source pollution and streambank erosion. Characterization of the riparian habitats throughout the French Creek watershed will be essential in enabling agencies and organizations to more effectively work on restoration in the most critical areas.

In some areas of the watershed, roadways are very close to waterways and result in accelerated erosion of streambanks due to increased run-off and destabilization of the stream banks. This is also true with railways along some portions of French Creek where it has been necessary to shore up rail beds with cement and rock riprap, which further destroys aquatic habitats and potentially displaces erosive forces further downstream.

Recreation

The French Creek watershed has many recreational opportunities that focus on the natural resources of the watershed. The activities are often associated with the lakes and waterways or riparian corridors along the waterways. It is estimated that recreational demands in the watershed will increase as populations increase. Aquatic habitats are at risk by humans trampling and disturbing them as they seek to enjoy the natural resources found there. In addition, many forms of recreation, such as ATV riding and power boating, may be highly incompatible with some areas. This leads to natural resource degradation and loss of aquatic habitat for many species. Any future recreational developments should be very carefully planned to ensure natural resources are protected. This will benefit all by ensuring outdoor enthusiasts will continue to be attracted to the French Creek watershed and by providing a boost to the local economy.

Climate Change

Climate change refers to long-term shifts in temperatures and weather patterns. Changes to Earth’s climate driven by increased human emissions of heat-trapping greenhouse gases are already having widespread effects on the environment: glaciers and ice sheets are shrinking, river and lake ice is breaking up earlier, plant and animal geographic ranges are shifting, and plants and trees are blooming sooner. Effects that scientists had long predicted would result from global climate change are now occurring, such as sea ice loss, accelerated sea level rise, and longer,

more intense heat waves. Some changes (such as droughts, wildfires, and extreme rainfall) are happening faster than scientists previously assessed (NASA 2024).

Climate Change in Pennsylvania

Below is an excerpt from Wild Heritage News, Fall 2018. The article, "Understanding Climate Change" was written by Pennsylvania Natural Heritage Program staff member Mary Ann Furedi.

> *Although climate change may be more evident in some regions of the planet, no place is considered immune to its effects. Even the climate of Pennsylvania has experienced notable change. Over the past 110 years, a time period associated with industrialization and the use of fossil fuels, Pennsylvania has undergone a long-term warming trend of almost 2˚F and an overall increased precipitation trend. Climate models show that this pattern will continue into the future at an accelerated rate. The Representative Concentration Path model, one of two emission models currently being used by climate scientists, shows that by 2050, Pennsylvania will be over 5°F warmer than at the end of the 20th century. The model also shows more precipitation in Pennsylvania as well (8% annual increase with a winter increase of 14%), but it will exhibit an altered pattern. More precipitation will fall in the winter, but as rain instead of snow. Alterations in these ecosystem drivers will result in a variety of effects such as a higher heat index in the summer, more extreme heat and storm events, and longer growing seasons. These changes will ultimately affect all aspects of life in Pennsylvania from human health and the economy to agriculture and water resources.*
>
> *Given these projected effects, it is likely that the plants, animals, and landscapes in Pennsylvania will be altered by climate change. The challenge now for those charged with the management and conservation of Pennsylvania's natural resources is how to adapt and mitigate for climate change.*

Climate Resiliency

The Nature Conservancy's Resilient and Connected Landscapes project is the first study to comprehensively map resilient lands and significant climate corridors across Eastern North America. Released in October 2016, the study took eight years to complete, involved 60 scientists, and developed innovative new techniques for mapping climate-driven movements. The tool can be found at https://www.maps.tnc.org/resilientland/#/explore. The tool includes three interactive maps to explain the project.

- Resilient Land identifies the most climate-resilient areas for each of 62 characteristic environments in Eastern North America. The study develops new methods for mapping species-relevant microclimates and highly connected lands in order to identify places where species are most likely to persist. The map tool allows non-profits, communities, and policy makers to view the resilience results and use basic analytic tools to understand the data and assess specific areas.

- Connected Landscapes maps climate-resilient sites, confirmed biodiversity locations, and species movement areas across Eastern North America. The study uses the information to prioritize a conservation portfolio that naturally aligns these features into a network of resilient sites integrated with the species movement zones. This network acts as a blueprint for conservation that represents all habitats.
- Conservation Strategies provides specific conservation strategies to act as illustrative examples of where the prioritized network of resilient and connected lands could be used, in conjunction with other spatial data, to strategically maximize benefits for multiple objectives.

Flooding and Stormwater

Rivers and streams experience flooding as a natural result of large rains storms or spring snowmelt that quickly drains into streams and rivers. Flooding is a common occurrence in the French Creek watershed. Large flood events can damage homes, roads, bridges, and other infrastructure; wipe out crops; and harm or displace people. Although regular flooding helps to maintain the nutrient balance of soils in the flood plain, larger or more frequent floods could disrupt ecosystems by displacing aquatic life, impairing water quality, and increasing soil erosion (U.S. EPA 2023[7]).

Climate change may cause river floods to become larger or more frequent than they used to be. Additionally, increased stormwater from impervious surfaces and turf grass also contribute to more frequent and larger flood events. Stormwater management involves planning for surface runoff into stream and river systems during rain and snowmelt events. Municipalities should develop stormwater management ordinances to address these concerns.

Forest Regeneration Threats

Forest fragmentation, threats to forest regeneration, and invasive species compromise forest health and resilience to those very same threats. Equally important is identifying that the lack of forest age diversity poses a threat to the upper watershed. Sustainable forest management will cultivate forest age diversity and ecosystem/watershed resilience.

The Sustainable Forestry Initiative (SFI) program is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists, among others that combines the perpetual growing and harvesting of trees with the long-term protection of wildlife, plants, soil and water quality. The SFI program was developed in 1994 to ensure North America's valuable forests were protected and to document the commitment of forest products industry members to keep our forests healthy and to practice the highest level of sustainable forestry. Currently, over 250 million acres of forestland in North America have been third-party audited to the SFI standard, making the SFI program among the world's largest sustainable forestry programs.

The Foundation for Sustainable Forests is a non-profit land trust operating in the French Creek watershed and northwest Pennsylvania that protects and stewards more than 2,600 acres of working woodlands to serve the community in perpetuity- supporting the rural economy through

sustainable forestry and providing critical services such as clean air and water, and recreational opportunities for the public to enjoy. As part of their commitment to the community, their properties remain on the tax rolls and support rural jobs in the sustainable timber and land stewardship industry.

Crawford County houses some critically important low-grade timber operations (ex. Jacob Weaver company, large pallet manufacturer), which makes ecological forestry possible. Without those markets, there is no immediate economic incentive to practice sustainable forestry. Encouraging the persistence and improvement of a robust low-grade timber industry in the region is part of encouraging long-term health and resilience in the forested watershed (A. Maloney, personal communication, 2024).

Salvage Yards

Automotive recycling operations provide a valuable environmental service by recovering usable parts. These "salvage yard" facilities are a major supplier of materials for the metals recycling industry. A DEP fact sheet assists salvage yard operators in the proper handling, storage and management of wastes. A few simple actions can greatly improve housekeeping, protection of the environment, and community relations. Areas used for draining fluids, storing wastes and crushing vehicles should be paved and, if possible, protected from the weather. Spills and leaks must be cleaned up. Wastes must be recycled or disposed of properly. Wastes may not be discharged to the ground, septic system, storm sewer or surface water (DEP 2015).

Illegal Dumping

In addition to being unsightly, illegal dumps pose direct threats to the watershed and have a high potential to contaminate waterways. Waste containing hazardous materials soaked by rainfall may cause contaminants to leach through the soil or run off the land surface, contaminating ground or surface water. Trash and debris can directly enter the stream through heavy rainstorms, affecting water quality and stream aesthetics.

The number of illegal dumpsites can be reduced through cleanups, education, and alternate disposal methods. Active participation by watershed residents and local government officials is needed to address illegal dumping issues. In addition, educating the public about the threats of illegal dumping is an important step in battling the prevalence of littering and illegal dumps. In addition to the annual French Creek Cleanup organized by FCVC, there are several other groups that work to clean-up illegal dumpsites and littering through the region, including Keep Pennsylvania Beautiful affiliates: Keep Erie County Beautiful, Tri-County CleanWays (Butler, Lawrence, and Mercer counties), and PA CleanWays of Venango County.

Alternative Energy

With respect to alternative energy sources, solar installations in the watershed may be a potential threat to French Creek. While solar installations are a net positive for the global carbon picture, locally we should be concerned about the loss of diverse habitat within natural lands to those installations. The clear-cutting of forests or conversion of agricultural land in the watershed for solar energy production should be a concern to the watershed's integrity.

CHAPTER 7. MANAGEMENT OPTIONS

Management options are organized by chapters of the plan and aim to restore, maintain, and enhance the resources within the French Creek watershed. The success of this plan is dependent upon support and cooperation from numerous watershed organizations, state and federal agencies, counties and municipalities, businesses, industries, and public of the French Creek watershed. The plan is intended to serve as a reference and to guide voluntary actions; it is not a regulatory document. The plan and management options can be referenced to support the need for grant funding for conservation partners and municipalities to implement projects. French Creek Conservation Consortium affiliates and other potential partners included in the Watershed Directory (Appendix M) may provide planning and fundraising guidance and technical assistance to complete projects and support the conservation goals listed below. Although primarily funded by Pennsylvania state funding, this plan addresses a watershed with critical habitat and cooperating partners in New York state that also are included in Appendix M.

Table 12. Commonly Used Acronyms

COG	Council of Governments
DU	Ducks Unlimited
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
HUD	Housing and Urban Development
NRCS	U.S. Department of Agriculture - Natural Resources Conservation Service
NYDEC	New York State Department of Environmental Conservation
NYNHP	New York Natural Heritage Program
NYSDAM	New York State Department of Agriculture and Markets
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
NYSEMO	New York State Emergency Management Office
NYSOCR	New York State Office of Community Renewal
NYSOPRHP	New York State Office of Parks, Recreation, & Historic Preservation
PA DCED	Pennsylvania Department of Community and Economic Development
PA DCNR	Pennsylvania Department of Conservation and Natural Resources
PA DEP	Pennsylvania Department of Environmental Protection
PAGS	Pennsylvania Geological Survey
PALMS	Pennsylvania Lake Management Society
PDA	Pennsylvania Department of Agriculture
PEC	Pennsylvania Environmental Council
PEMA	Pennsylvania Emergency Management Agency
PennDOT	Pennsylvania Department of Transportation
PENNVEST	Pennsylvania Infrastructure Investment Authority
PGC	Pennsylvania Game Commission
PNHP	Pennsylvania Natural Heritage Program
PSAB	Pennsylvania State Association of Boroughs
PSATS	Pennsylvania State Association of Townships
RWA	Rural Water Authority
SEO	Sewage Enforcement Officer
TNC	The Nature Conservancy
TPA	Tourist Promotion Agency
TU	Trout Unlimited
U.S. DOE	U.S. Department of Energy
U.S. EPA	U.S. Environmental Protection Agency
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WREN	Water Resources Education Network

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Table 13. Project Area Characteristics Management Options

Goal 1-A: Proactively plan for and manage future development to comply with local comprehensive plans and regional culture.

Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1. Develop municipal or multi-municipal comprehensive plans in municipalities lacking one in order to better guide the future development and recreation planning of each municipality. Plans should maximize green space, clustering building lots, establishing development zones, and sharing greenspace within developments.	Planning Departments, Municipalities, Citizens, Counties, COG	Foundations, Private Sources, PA DCED, NYSOCR	*High*
2. Develop land-use ordinances or subdivision regulations in accordance with comprehensive plans to protect the character of communities and resources from undesirable land uses.	Planning Departments, Municipalities, Citizens, Counties, COG	Foundations, Private Sources, PA DCED, NYSOCR	*Moderate*
3. Utilize responsible zoning to protect agricultural lands, without significantly impeding landowner rights.	Planning Departments, Conservation Groups, Conservation Districts, Municipalities, PDA	Foundations, Private Sources, PA DCED, PDA, NYSOCR, NYSDAM,	*Moderate*

Goal 1-B: Carefully plan development to ensure economic enhancement while preserving community character without adversely affecting quality of life.

Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1. Plan for commercial or residential development, based upon limitations of the physical characteristics of the region, including the consideration of water-use limitation in permitting decisions, water quantity, soil type, etc.	Planning Departments, Conservation Groups, Municipalities, NRCS, PA DEP, USGS, HUD, PAGS	Foundations, Private Sources, PA DCED, NYSOCR	*High*
2. Utilize county and municipal comprehensive plans to guide development activities to occur in designated growth areas and encourage the use of regional design standards to ensure that new developments are aligned with the cultural character of the region.	Planning Departments, Municipalities, Counties, Conservation Groups, NRCS, PA DEP, HUD, COG	Foundations, Private Sources, PA DCED, NYSOCR	*Moderate*

3. Repopulate current downtown and small-town business through incentive programs deterring relocation to areas not identified as growth areas in county comprehensive plans.	Planning Departments, Counties, Municipalities	Foundations, Private Sources, Legislature, PA DCED, NYSOCR	*High*
4. Implement U.S. EPA Smart Growth Principals or TNC Conservation by Design practices when development opportunities arise to maintain natural setting in existing and new communities.	Planning Departments, Conservation Groups, Municipalities, NRCS, PA DEP, HUD	Foundations, Private Sources, PA DCED, NYSOCR, HUD,	*Moderate*

Goal 1-C: Enhance marketability to prospective business and establish economic stability to maintain a balanced workforce.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Forge an alliance or network among local business and develop a local business directory and coordinating website promoting local businesses	Businesses, Chambers of Commerce, Planning Commissions	Private Sources	*Moderate*
2. Offer incentives and tax breaks to attract new business and provide quality jobs increasing the number of young adults capable or remaining in the area.	Municipalities, Counties, Businesses	Foundations, Private Sources, PA DCED, NYSOCR	*Moderate*
3. Increase economic stability to promote sustainable natural resource use, such as establishing local resources-oriented sustainable industries like value-added products and farmers' markets	Businesses, Planning Commissions, Chambers of Commerce, DCNR, DEC, PDA, NYSDAM	Foundations, Private Sources, PA DCED, NY DEC, NYSOCR	*Moderate*
4. Enhance the region's ability to increase the local workforce utilizing nature-based tourism. Promote sustainable industries to keep young adults in the region and improve economic viability.	Businesses, Chambers of Commerce, Planning Commissions	Foundations, Private Sources, PA DCED, NYSOCR	*High*
5. Support value-added agriculture and forestry processing to provide income opportunities for small agricultural producers	Conservation Groups, PDA, USDA, NYSDAM	Private Sources	*Moderate*
6. Upgrade and maintain technology, such as high-speed internet and cable, to enable the region to be competitive and attract new businesses.	Utility Companies, Counties, Municipalities	Foundations, Private Sources, PA DCED, NYSOCR	*High*

Goal 1-D: Encourage economic growth with minimal impacts to the environment.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1 Promote sustainable alternative-energy practices, increasing job markets and decreasing dependency on gas and oil.	Conservation Groups, EPA, DEP, DEC	Foundations, Private Sources, PA DEP, EPA	*Moderate*
2. Conduct feasibility studies and demonstration projects designed to integrate biological by-products of agriculture and forestry with energy production in ways that make these industries more self-sufficient, economically sustainable, and less environmentally impactful.	Conservation Groups, PDA, NYSDAM, EPA	Foundations, Private Sources, PA DEP, EPA, NY DEC	*Moderate*
3. The Pennsylvania Environmental Council has developed an Outdoor Towns Toolkit, which should be used as a resource for any applicable municipality in northwest Pennsylvania to guide education and coordination in the planning and development of outdoor towns.	Pennsylvania Environmental Council, Conservation Groups, Conservation Districts, Counties, Municipalities	Foundations, Private Sources, PA DCED, PA DCNR, PA Organization for Watersheds and Rivers, NYSOCR	*High*

Goal 1-E: Increase communications and cooperation among municipalities and counties within the region to promote sharing of services and improve conditions collectively affecting the watersheds.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Establish environmental advisory councils encouraging local communities and government to work together.	Conservation Groups, Municipalities, Counties, COG	Private Sources, PA DCED, NYSOCR	*Moderate*
2. Work with the Northwest Commission to facilitate regional planning initiatives. Foster communication and cooperation between municipalities, counties, and states.	Municipalities, Counties, Northwest Commission, Planning Commissions	Private Sources, PA DCED, NYSOCR	*High*
3. Establish memorandums of understanding between municipalities and public entities to share equipment to clean up after local disasters, such as flooding and tornados.	Municipalities, Counties, DCED, PA DCNR, PA DEP, NYSOCR, COG	Private Sources, PA DCED, NYSOCR	*Moderate*

Goal 1-F: Enhance transportation infrastructure.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Include sound geologic investigation and best management practices during maintenance and construction of roadways to minimize impacts.	Conservation Groups, Road masters, PennDOT, NYSDOT	Foundations, Private Sources, PennDOT, NYSDOT, PA DCED, NYSOCR	*High*
2. Promote alternative practices to road salt, ashes, and brine water use on roadways.	Conservation Groups, Universities, PennDOT, NYSDOT, USGS, PA DEP, NY DEC, EPA	Foundations, Private Sources, PA DEP, NY DEC, EPA	*High*
3. Implement best management practices that protect water resources when improving and upgrading dirt and gravel, secondary, or rural roadways, including improved road-stream crossing to facilitate aquatic organism passage and increase stormwater capacity.	Conservation Groups, Municipalities, Road masters, PA DEP, Center for Dirt and Gravel Roads	Foundations, Private Sources, PA DCED, NYSOCR, PennDOT, NYSDOT	*High*
4. Support municipal participation in the Dirt and Gravel Road Program to reduce erosion and sedimentation.	Conservation Groups, Conservation Districts, Municipalities, PA DEP	Foundations, Private Sources, PA DCED, NYSOCR, PennDOT, NYSDOT, PA DEP	*Moderate*

Goal 1-G: Enhance financial support and services to prepare emergency response providers.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Improve emergency services through additional funding, upgraded equipment, and training for volunteer or professional responders.	Emergency Service Providers	Foundations, Private Sources, PA DEP, NY DEC, PA DCED, NYSOCR	*Moderate*
2. Establish dry hydrants throughout the watershed to assist local firefighters in protecting the residents and dwellings and develop a maintenance program for dry hydrants	Conservation Districts, Fire Departments, Landowners	Foundations, Private Sources, PA DEP, NY DEC, PA DCED, NYSOCR	*Moderate*

Goal 1-H: Educate stakeholders how land use planning can be effective and about benefits of watershed protection and the use of best management practices.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Provide educational sessions/workshops for the public and municipal officials on integrated land-use planning and ordinances, habitat conservation, and protecting and enhancing biodiversity and provide tools that incorporate conservation goals into making communities more attractive and protecting biodiversity.	County Planning and Conservation Districts, Conservation Groups, Municipalities, PA DCED, NYSOCR, PSATS, PSAB	Foundations, Private Sources, PA DCED, NYSOCR, PSATS, PSAB	*Moderate*
2. Conduct workshops, seminars, and demonstrations for decision-makers, from developers to government leaders, emphasizing best management practices.	Conservation Groups, Planning Departments, Municipalities, Developers, DEP, DCNR, DEC	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*

Goal 1-J: Support community libraries and expand service opportunities.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Plant native flower gardens and shade trees in outdoor reading spaces and community parks; host library events and programs in cooperation with other conservation and civic groups; highlight local authors and artists	Counties, Municipalities, Libraries, Legislators	Foundations, Private Sources, Legislature	*High*
2. Establish story-walks on local trails and in local parks in cooperation with libraries to broaden usership.	Counties, Municipalities, Libraries, Legislators	Foundations, Private Sources, Legislature	*Moderate*
3. Expand services available at local public libraries through the additional funding for community programs and collection enhancement.	Counties, Municipalities, Libraries, Legislators	Foundations, Private Sources, Legislature	*Low*

Table 14. Land Resources Management Options

Goal 2-A: Explore opportunities to generate alternative energy.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Identify potential landscapes and redevelopment opportunities to incorporate alternate energy sources on individual households and/or industrial scales. Address potential threats to natural resources and quality of life for neighboring property owners.	Conservation Groups, PA DEP, EPA, DOE, Counties, Municipalities	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*

2.	Conduct feasibility studies or demonstration projects to harvest alternative energy sources, such as hydro, geo-thermal, wind, solar, kinetic and other non-fossil-fuel sources of energy. Study the effects of these projects on surrounding natural resources and properties.	Columbus Township, Citizens, Conservation Groups, DEP, U.S. DOE, USGS, U.S. EPA	Foundations, Private Sources, PA DEP, U.S. EPA, U.S. DOE	*Moderate*

Goal 2-B: Reduce impacts caused by dirt and gravel roadways.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Conduct updates to the dirt and gravel road inventory and NAACC database on a regular basis. Inventory culverts and bridges using NAACC protocols to determine if adequate passage for aquatic organism and flood volumes is present or should be upgraded.	Conservation Districts, Conservation Groups, PA DEP, NAACC	DEP, EPA, USFWS, Foundations, Private Sources, PA DEP, U.S. EPA, USFWS	*High*
2.	Enforce regulations against the use of brine water treatment on roads. Discourage the use of brine as a "beneficial coproduct" that can be used on rural dirt and gravel roadways for dust and ice suppression. Conduct a pilot project to control road dust with an alternative product, such as soybean oil.	Conservation Groups, PennDOT, NYSDOT, USGS, PA DEP, NY DEC, U.S. EPA	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*High*
3.	Implement best management practices, such as regrading and drainage pipe installations on dirt and gravel roadways identified in the County Dirt & Gravel Road Inventory.	Counties, Conservation Groups, Conservation Districts, Municipalities	PennDOT, NYSDOT, DEP, Private Sources, Foundations	*Moderate*

Goal 2-C: Establish cooperation between surface and subsurface rights landowners and develop protection rights for surface landowners in order to protect their property.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish protection and rights for surface landowners to hold subsurface-right owners responsible for ecological and physical damages caused on the property.	Landowners, Legislators, Resource Companies	Legislature	*Moderate*
2.	Assist property owners to research mineral rights and encourage the purchase of these rights, if feasible.	Conservation Districts, Conservation Groups, Landowners	Private Sources	*Moderate*

3. Encourage cooperation between surface and subsurface rights owners to minimize conflicts and impacts to natural resources.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP	*Moderate*
4. Organize third-party moderated discussions between surface and subsurface rights owners prior to beginning exploration, construction, and production activities to address and resolve issues.	Landowners, Subsurface Right Owners, PA DEP	Foundations, Private Sources	*Moderate*

Goal 2-D: Preserve agricultural lands and culture for future generations.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Promote farmland preservation programs and participate in Agricultural Security Areas Program to protect existing agricultural lands.	NRCS, Conservation Districts, Counties, PDA	Foundations, Private Sources, PDA, NRCS,	*High*
2. Enroll available agricultural and forestry lands into the Clean and Green program taking advantage of real estate tax benefits.	Municipalities, Counties, Planning Commissions, Landowners	Foundations, Private Sources, PDA	*Moderate*
3. Enroll agricultural lands in cost-incentive programs, such as Environmental Quality Incentives Program, Conservation Reserve Enhancement Program, Conservation Reserve Program, and Wildlife Habitat Improvement Program.	Conservation Districts, Conservation Groups, Cooperative Extensions, NRCS	Foundations, Private Sources, PA DEP, NRCS, PGC	*Moderate*
4. Demonstrate regenerative agriculture methods through agricultural education, service, and merchandising cooperatives.	NRCS, Conservation Districts, Counties, PDA, Municipalities, Planning Commissions, Landowners	Foundations, Private Sources, PDA, NRCS, USDA	*Moderate*

Goal 2-E: Establish or enhance incentives for land protection and conservation practice implementation.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Create tax incentives for private landowners who implement conservation practices, such as conservation easements and riparian buffers, and those who maintain large unfragmented tracks of land.	Conservation Groups, Legislators, Cooperative Extensions, NRCS, PA DCNR, PA DEP	Legislature, Private Sources, Foundations, PA DEP, NRCS, PGC, DCNR	*High*

Goal 2-F: Deter illegal dumping of trash through monitoring, inventorying, and cleaning up illegal dumpsites, and through public education and outreach

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Establish an affiliate of Keep America Beautiful and PA CleanWays in Crawford County to partner with Keep Erie County Beautiful, Tri-County Cleanways (Butler, Lawrence, and Mercer), and PA CleanWays of Venango County.	PA CleanWays, Keep America Beautiful, Solid Waste Authorities, Counties, DCNR	Foundations, Private Sources, PA DCNR	*Moderate*
2. Reduce the amount of illegal dumping and litter being disposed of along roadways and hillsides by educating residents, monitoring existing dumpsites, and prosecuting violator. Clean up litter and illegal dumpsites and organize volunteer clean-ups of waterways, trails, parks, and natural areas.	PA CleanWays, Solid Waste Authorities, Civic Groups, Counties, Municipalities, PA DEP, Conservation Groups, Law Enforcement, PA DCNR	Foundations, Private Sources, PA DEP, PA CleanWays, PA DCNR	*Moderate*
3. Renovate or remove abandoned or unsafe older buildings and infrastructure.	Municipalities, Counties, Landowners, DCNR	Foundations, Private Sources, PA DCED, PA DCNR	*Moderate*
4. Provide curbside recycling programs where economically feasible in municipalities throughout the French Creek watershed.	Trash Haulers, Solid Waste Authorities, Municipalities, Counties, DCNR	Foundations, Private Sources, PA DEP, NY DEC, DCNR	*Moderate*
5. Conduct cleanup activities at sites participating in the PA DEP Pennsylvania Land Recycling Program.	Counties, Businesses, PA DEP, DCNR	Foundations, Private Sources, PA DEP, U.S. EPA, DCNR	*Moderate*

Goal 2-G: Work with agriculturalist to install best management practices at their farms to reduce impacts on herds and area waterways.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Develop nutrient management plans to boost productivity and protect water resources on agricultural lands. Cultivate a pipeline of certified plan-writers to unlock federal funds.	Farmers, Conservation Districts, NRCS, PA DEP, NY DEC, FSA, DCNR	Foundations, Private Sources, Cost Share Programs, PA DEP, U.S., DCNR EPA	*Moderate*

2.	Minimize the concentration of animals in feedlots by encouraging extensive use of pasture on animal-dependent farms (e.g. dairy and beef).	Cooperative Extensions, PDA, NRCS, DCNR	Foundations, Private Sources, USDA, PA DEP, NY DEC, U.S., DCNR EPA, PDA, NYSDAM	*Moderate*
3.	Utilize organic sources of nutrients for crop production, including bioenergy crop production, as a component of nutrient management planning.	Conservation Districts, Conservation Groups, Cooperative Extension, PDA, NYSDAM, NRCS, DCNR	Foundations, Private Sources, PA DEP, NY DEC, NRCS, DCNR	*Moderate*
4.	Promote no-till farming and organic methods in appropriate areas. Most appropriate areas can be determined through research of nutrient and sediment inputs. Incentive programs should be established.	Conservation Districts, Conservation Groups, Cooperative Extension, PDA, NYSDAM, NRCS, DCNR	Foundations, Private Sources, PA DEP, NY DEC, NRCS, DCNR	*High*
5.	Promote conservation practices, such as cover crops, crop residue, contour strips, grassed waterways, riparian buffers, streambank fencing, and responsible pesticide/herbicide use.	Conservation District, Conservation Groups, Cooperative Extensions, PDA, NRCS, DCNR	Foundations, Private Sources, PA DEP, NY DEC, NRCS, DCNR	*High*
6.	Develop a model farm to demonstrate agricultural best management practices and offer educational tours for agricultural producers, agencies, and other interested parties.	Conservation District, Conservation Groups, Cooperative Extensions, PDA, NYSDAM, NRCS, DCNR	Foundations, Private Sources, PA DEP, NY DEC, USDA, PDA, NYSDAM, DCNR	*Moderate*
7.	Stabilize barnyard and livestock areas to properly manage runoff.	Conservation District, Conservation Groups, Cooperative Extensions, PDA, NYSDAM, NRCS, DCNR	Foundations, Private Sources, PA DEP, NY DEC, USDA, PDA, NYSDAM, DCNR	*High*
8.	Implement a riparian restoration programs to install streambank fencing to exclude livestock from streams, stabilize stream crossings, provide alternative watering sources to livestock, enhance riparian corridors with native vegetation, and minimize nutrients and sediments entering waterways.	Conservation District, Conservation Groups, Cooperative Extensions, PDA, NYSDAM, NRCS, DCNR	Foundations, Private Sources, PA DEP, NRCS, PGC, NY DEC, DCNR	*High*

9. Strategically place open-pit silos away from drainage areas.	Conservation Districts, Farmers, NRCS, PA DEP, NY DEC, DCNR	USDA, PA DEP, NY DEC, Foundations, Private Sources, DCNR	*Moderate*

Goal 2-H: Minimize impacts caused by exploration, production, retirement, and abandonment of wells.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Institute closer government oversight on gas-well exploration and production, including the impacts to the natural resources.	Conservation Groups, Landowners	Foundations, Private Sources, PA DEP	*Moderate*
2. Monitor the cumulative impacts of oil and gas wells to protect watershed resources and the rural character.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP	*Moderate*
3. Plug abandoned gas wells in the watershed to prevent brine water from entering the streams and potable water supplies	Conservation Groups, Conservation Districts, PA DEP, PA DCED, Counties, Municipalities, Landowners	Foundations, Private Sources, PA DCED, PA DEP	*High*
4. Develop, enforce, and implement best management practices specific to gas and oil exploration.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP	*Moderate*

Goal 2-I: Reclaim abandoned wells, mines, and quarries.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Inventory abandoned wells, quarries, and mines and develop a plan for remediation.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*
2. Redevelop abandoned sites through programs similar to brownfield redevelopment.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*
3. Support industry reclamation incentives.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*

4. Expand current reclamation programs, as well as implement high quality reclamation techniques.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*

Goal 2-J: Protect ecologically significant lands.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Develop a strategic plan to prioritize and protect ecologically significant areas through acquisition, conservation easement purchases, or other conservation practices.	Conservation Groups, Municipalities, PA DCNR	Foundations, Private Sources, DCNR	*High*
2. Coordinate with the local and regional conservation organizations that comprise the French Creek Collaborative to conduct outreach to watershed communities, protect and hold land, and work with agencies and other organizations.	Conservation Groups (incl. Land Trusts), Conservation Districts, PA DEP, NY DEC, PGC, PFBC	Foundations, Private Sources, DCNR, PFBC	*High*
3. Encourage farmland/forestland tax-matching programs to provide incentives to keep land in agriculture/forest and not convert it to residential use.	Conservation Groups, Conservation Districts, Legislators, Counties, PA DEP, PA DCNR, NRCS	Foundations, Private Sources, Legislature	*Moderate*
4. Work with forest landowners to sustainably manage their property and prepare forest conservation plans with sustainable management recommendations.	Conservation Districts, NRCS, PA DCNR, NY DEC, PGC	Foundations, Private Sources, USDA, PA DCNR, NY DEC	*Moderate*
5. Develop a program, through which landowners can obtain conservation easements for biologically diverse areas on their properties. Ensure that tax advantages of granting conservation easements remain as an encouragement to landowners.	Conservation Groups, Landowners, Legislators, PA DEP, NRCS, PDA, U.S. EPA, USDA	Foundations, Private Sources, Legislature	*High*

Goal 2-K: Increase awareness about practices to assist agricultural and forest landowner in managing their lands effectively.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Educate agricultural landowners through workshops and other programs available to increase sustainability and assist them financially; such as best management practices and new technology.	Conservation Districts, Conservation Groups, Landowners, NRCS, USDA, PDA, NYSDAM	Foundations, Private Sources, PA DEP, PDA, NYSDAM, USDA, NRCS	*Moderate*

2.	Educate forestland owners, by providing them with accurate information regarding sound silviculture practices, forest management plan development and insect and disease problems that can affect forest health.	Conservation Groups, Landowners, Foresters, DCNR, DEC	Foundations, Private Sources, PA DCNR, NY DEC	*High*
3.	Educate loggers, landowners, and municipal officials about forestry best management practices, sustainable forestry management, and sustainable forestry certification through workshops and other programs.	Conservation Groups, Landowners, Foresters, Municipal Officials, USFS, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, USFS, NY DEC	*Moderate*

Table 15. Water Resources Management Options

Goal 3-A: Protect area waterways while increasing wildlife habitat opportunities.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Install fish habitat structures and stream-bank stabilization devices, using nature-based solutions and methods, like soil bioengineering and large woody materials replenishment when possible and where appropriate. Assessments should be made that would document naturally reproducing wild, non-Class A trout streams that could benefit from habitat work that would push those streams from naturally reproducing to Class A. Since some of those naturally reproducing, non-Class A Streams flow through public lands, including State Game Lands and the Erie National Wildlife Refuge, you may consider starting there first.	Conservation Groups, Conservation Districts, Sportsmen Groups, NY DEC, PFBC, TU, PGC, USFWS, DCNR, USACE	Foundations, Private Sources, NY DEC, PFBC, DEP, DCNR, TU, USFWS, PGC	*High*
2. Establish and maintain riparian vegetation and implement best management practices using smart growth principles as a cost-effective means of reducing non-point source pollution.	Conservation Groups, Conservation Districts, Sportsmen Groups, PA DEP, NY DEC, PFBC, USACE	Foundations, Private Sources, PA DEP, NY DEC, USDA,	*High*
3. Protect and enhance existing riparian buffers to achieve maximum protection of water resources. Maintain an adequate vegetative buffer from the edge of the stream, for example encourage landowners not to mow to the stream.	Conservation Groups, Conservation Districts, Landowners, PA DEP, USACE	Foundations, Cost-Share Programs, Private Sources, PA DEP, U.S. EPA	*High*

4.	Conduct a visual assessment of streambanks and riparian areas and prioritize areas in need of restoration.	Sportsmen Groups, Conservation Groups, Conservation Districts, Landowners, PA DEP, NY DEC, PFBC, USACE	Foundations, Cost-Share Programs, Private Sources, PA DEP, U.S. EPA	*Moderate*
5.	Increase wildlife habitat by planting diverse native plant communities along riparian buffers.	Conservation Groups, Conservation Districts, Landowners, PA DEP, PFBC, NY DEC, USACE	Foundations, Cost-Share Programs, Private Sources, PA DEP, U.S. EPA	*High*

Goal 3-B: Increase awareness about the benefits of riparian corridors.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate citizens about riparian buffers, their benefits, and landscaping etiquette towards conservation, for example not mowing to stream.	Conservation Groups, Conservation Districts, NRCS, PA DEP, PA DCNR, NY DEC	Foundations, Private Sources, NY DEC, PA DEP	*High*
2.	Conduct outreach, education, and implementation programs on cost-share and easements for streamside corridor conservation.	Conservation Groups, DEP, DEC, NRCS, PFBC, PGC, USDA, EPA	EPA, DCNR, NRCS, PFBC, PGC, USDA, Private Sources, Foundations	*Moderate*
3.	Preserve and enhance vegetated streamside buffers.	Conservation Groups, PA DEP, NRCS, PFBC, PGC, USDA, U.S. EPA	Foundations, Private Sources, EPA, PA DCNR, NRCS, PFBC, PGC, USDA	*High*
4.	Develop partnership and community involvement to implement riparian and streambank restoration projects, pollinator habitat, rain gardens, green infrastructure, and lawn conversions to native wildflower meadows.	Conservation Groups, Conservation Districts, Landowners, PA DCNR, PA DEP, PFBC, USACE	Foundations, Cost-Share Programs, Private Sources, PA DCNR, PA DEP, U.S. EPA	*High*

Goal 3-C: Investigate wetlands and their functions and protect their resources.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Inventory and assess the watershed's wetlands and their functionality and develop restoration strategies based upon the assessment.	Planning Commissions, Conservation Groups, DCNR, PGC, PA DEP, NY DEC	PA DEP, NY DEC, PA DCNR, Private Sources, Foundations	*High*
2. Update wetland maps and develop a digital coverages database.	Conservation Groups, Planning Commissions, DCNR, PGC, DEP, DEC, EPA	Foundations, Private Sources, PA DEP	*Moderate*
3. Protect wetland habitats and surrounding buffers for birds and wildlife by limiting development, storm runoff, and other disturbances.	Conservation Groups, Planning Commissions, PA DCNR, PGC, PA DEP, NY DEC	PA DEP, PA DCNR, Private Sources, Foundations	*High*
4. Modify municipal ordinances to protect wetland areas of biological importance.	Conservation Groups, Municipalities, Planning Commissions, PA DEP, NY DEC	Private Sources, PA DEP, NY DEC, DCED	*Moderate*
5. Acquire or purchase conservation easements protecting important wetlands habitats.	Conservation Groups, Planning Commissions, PA DCNR, PGC, PA DEP	Foundations, Private Sources, PA DEP, PA DCNR	*High*

Goal 3-D: Educate stakeholders about the value and importance of wetlands.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Develop or expand outreach programs on the function and value of wetlands.	Conservation Groups, PA DEP, NY DEC, U.S. EPA	Foundations Private Sources, PA DEP, NY DEC, U.S. EPA	*High*
2. Educate municipal, county, state, and federal officials about planning and implementation of wetland-impact avoidance measures, and plan for mitigation and the establishment of replacement wetlands when impacts occur.	Conservation Groups, Municipalities, PA DEP, NY DEC, U.S. EPA	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*Moderate*

Goal 3-E: Reduce the amount of erosion, sedimentation, and other pollutants entering waterways.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Conduct targeted sub-watershed studies to determine sources of sedimentation and pollution impairments and develop strategies to reduce impacts by implementing best management practices.	Conservation Districts, Conservation Groups, PA DEP, USACE	Foundations, Private Sources, U.S. EPA, PA DEP, NY DEC, USACE	*High*
2. Establish permit processes that require all earth-moving industries to abide by the same erosion and sedimentation control standards.	Conservation Groups, Conservation Districts, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*
3. Promote stronger use of best management practices to control erosion and sedimentation in farming, forestry, development, and mining industries; conduct more site inspections to ensure compliance.	Conservation Groups, Conservation Districts	Private Sources, Foundations, PA DEP, NY DEC, U.S. EPA	*High*
4. Establish steep-slope ordinances for earth moving industries.	Conservation Groups, Conservation Districts, Municipalities, PA DEP	Foundations, Private Sources, DEP, EPA	*Moderate*
5. Incorporate environmentally-sensitive construction and maintenance techniques on dirt and gravel roads and host workshops and demonstrations for contractors and municipalities.	Conservation Groups, Conservation Districts, Municipalities, PA DEP	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*
6. Partner with local conservation districts to educate stakeholders about ways to reduce erosion and sedimentation impacts through wetland development.	Conservation Districts, Conservation Groups, Citizens, NRCS, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA, NRCS	*Moderate*
7. Increase enforcement of NPDES permits, especially permits related to road construction and timbering.	Conservation Groups, PA DEP, NY DEC, U.S. EPA	Private Sources, PA DEP, NY DEC, U.S. EPA	*High*
8. Establish streambank fencing and riparian corridors on active agricultural lands to reduce the amount of sediment from entering waterways.	Conservation Groups, Conservation Districts, NRCS, PGC	Foundations, Private Sources, PA DEP, NY DEC	*High*

9.	Outreach the Trout Run Advance Restoration Plan; recruit cooperating landowners to implement Nutrient Management Plans, Erosion and Sediment Control plans, and targeted BMPs (Ag, Forestry, riparian buffers, streambank stabilization) to restore the impaired watershed. Develop ARPs for other impaired small watersheds.	Conservation Groups, Conservation Districts, NRCS, PGC	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*

Goal 3-F: Monitor water quantity to ensure demand does not exceed water supply.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Work with U.S. Geological Survey on updating stream gauging station database to include current groundwater flow, depths and quality information.	Conservation Groups, Conservation Districts, USGS, PFBC, PA DEP	Foundations, Private Sources, USGS, PA DEP, U.S. EPA	*Moderate*
2.	Study and monitor the effects of well drilling on surface water and groundwater to determine impacts on water quality where it occurs, and work to minimize those impacts.	Conservation Groups, Conservation Districts, PA DEP	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*
3.	Monitor groundwater levels in critical areas that can be used as baseline data to determine loss of groundwater.	Conservation Groups, Conservation Districts, Citizens, Schools	Foundations, Private Sources, PA DEP, U.S. EPA	*Moderate*
4.	Conserve groundwater through the installation of riparian buffers, porous pavement and surfaces, and other best management practices.	Conservation Groups, Conservation Districts, Landowners	Foundations, Private Sources, Cost-share Programs, DEP	*High*
5.	Develop a locally-based program for disseminating information about protecting private well supplies to homeowners.	Conservation Groups, Conservation Districts, PA DEP, NY DEC, RWA	Foundations, Private Sources, DEP, WREN	*Moderate*

Goal 3-G: Monitor the use of brine water as a treatment on dirt and gravel roads.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Monitor illegal use of brine on rural roadways and deter use of brine as a “beneficial coproduct” of oil and gas well drilling wastewater to take advantage of permitting loopholes.	Conservation Districts, Groups, Center for Dirt & Gravel Roads, PA DEP, Municipalities, NY DEC	Foundations, Private Sources, PA DEP, NY DEC	*High*

2.	Enforce regulations against the use of brine-water treatment on roads; seek and promote alternative dust suppression and ice melt options for road maintenance.	Conservation Districts, Conservation Groups, Center for Dirt & Gravel Roads, Municipalities, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC	*High*

Goal 3-H: Minimize potential flooding damages by taking a proactive approach to managing floodplains.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Conduct a detailed flood-prone area assessment and update floodplain maps.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, DCED, PA DEP	*Moderate*
2.	Consult a hydrologist and discuss the potential use of natural stream channel design techniques, process-based restoration methods, and nature-based solutions to decrease flooding risks.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, DCED, PA DEP	*Moderate*
3.	Establish a dedicated flood-control program to minimize the risk and severity of flooding	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*Moderate*
4.	Acquire properties that are frequently impacted by serious flooding and convert them to public open spaces, such as parks and natural areas.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*Moderate*
5.	Discourage the development of primary and secondary residences in floodplain areas.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*Moderate*
6.	Maintain adequately-sized culverts and keep them free of debris to alleviate flooding.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*Moderate*
7.	Develop an education program addressing flood issues, flood prevention, flood recovery, and floodplain protection.	Conservation Groups, Municipalities, FEMA, PEMA, NYSEMO	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP, NYSEMO	*Moderate*

Goal 3-I: Encourage non-structural approaches to floodplain management.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Establish adequate riparian area vegetation and floodplain integrity to limit degradation of water quality and biological resources.	Conservation Groups, Municipalities, Landowners, PA DEP	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*High*
2. Implement channel improvement projects that use bioremediation techniques to limit flooding.	Conservation Districts & Groups, PA DEP, USACE	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*Moderate*
3. Create and maintain projects that promote alternative methods of flood control, reserving dredging as a last resort.	Conservation Districts & Groups, PA DEP, USACE	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*Moderate*
4. Identify areas where the floodplain can be re-established for flood control purposes.	Conservation Groups, Municipalities, PEMA, FEMA, PA DEP	Foundations, Private Sources, FEMA, PEMA, PA DCED, PA DEP	*Moderate*

Goal 3-J: Minimize impacts from stormwater through planning.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Develop and implement stormwater management plans. Encourage cooperation between municipalities and counties.	Conservation Districts, Conservation Groups, Counties, Planning Commissions, Municipalities, USACE	Foundations, Private Sources, PA DEP, PA DCED	*High*
2. Incorporate water quality design and pollution reduction in stormwater management.	Conservation Districts, Conservation Groups, Counties, Planning Commissions, USACE	Foundations, Private Sources, PA DEP, PA DCED	*High*
3. Develop a demonstration area of stormwater best management practices that incorporates water quality improvement techniques.	Conservation Districts, Conservation Groups, Counties, Planning Commissions, Municipalities, USACE	Foundations, Private Sources, PA DEP, PA DCED	*Moderate*

4.	Address current drainage issues by consulting with state management agencies.	Conservation Districts, Conservation Groups, Counties, Planning Commissions, Municipalities, USACE	Foundations, Private Sources, PA DEP, PA DCED, PENNVEST	*Moderate*
5.	Educate municipal and county officials about planning for stormwater best management practice implementation.	Conservation Groups, Municipalities, Counties, PA DEP, NY DEC, USACE	Foundations, Private Sources, PA DEP, NY DEC	*High*

Goal 3-K: Establish, maintain, or upgrade sewage treatment facilities.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage landowners with on-lot sewage or septic tanks to conduct maintenance activities on a routine basis as needed by their system.	Conservation Districts, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*
2.	Update Act 537 Sewage Facility Plans in municipalities where the plan is outdated in order to prepare for future development activities.	Conservation Groups, Municipal Authorities, Municipalities, PA DEP, PA DCED	Foundations, Private Sources, PA DEP, PA DCED	*Moderate*
3.	Work with municipalities and landowners to install proper septic tanks, wastewater treatment systems, or other alternatives to reduce the amount of untreated sewage entering the streams.	Municipalities, Landowners, Conservation Groups, Municipal Authorities, SEO, DEP, DCED	Foundations, Private Sources, PA DEP, PA DCED, NY DEC	*Moderate*
4.	Repair failing sewage lines and add new infrastructure in growth areas as identified in counties' comprehensive plans.	Municipalities, Counties, Municipal Authorities	Foundations, Private Sources, PA DEP, PA DCED, NY DEC	*Moderate*
5.	Upgrade or expand wastewater systems in critical need areas and where current systems are failing or inadequate for population growth.	Water Authorities, Municipalities, PA DEP, NYSDOH, U.S. EPA	Foundations, Private Sources, PA DEP, PA DCED, NY DEC	*Moderate*

6.	Design wastewater treatment systems to adequately serve communities, by separating stormwater from wastewater systems, in order to ease the occurrence of combined sewage overflows.	Municipal Authorities, Conservation Groups, Municipalities, SEO, PA DEP, PA DCED	Foundations, Private Sources, PA DEP, PA DCED, NY DEC	*Moderate*
7.	Educate homeowners about alternative sewage treatment systems, proper testing and maintenance of existing on-lot sewage systems.	Conservation Groups, Municipal Authorities, Municipalities, SEO, PA DEP, PA DCED, NY DEC	Foundations, Private Sources, PA DEP, PA DCED, NY DEC	*Moderate*
8.	Study prolonged impacts from sewage overflows where impairments occur.	Conservation Groups, Conservation Districts, PA DEP, NY DEC, PFBC	Foundations, Private Sources, PA DEP, NY, DEC, U.S. EPA, USFWS	*Low*

Goal 3-L: Establish, maintain, or upgrade water treatment facilities.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Repair failing water lines and add new infrastructure in growth areas as identified in counties' comprehensive plans.	Municipalities, Counties, Municipal Authorities	Foundations, Private Sources, PA DEP, PA DCED	*Moderate*
2.	Upgrade or expand water systems in critical need areas and where current systems are failing or inadequate for population growth.	Water Authorities, Municipalities, PA DEP, NYSDOH, U.S. EPA	Private Sources, PA DEP, NY DEC, PA DCED	*Moderate*
3.	Update water systems to adequately service the existing and future population growth demands of the region.	Conservation District, Conservation Groups, Water Authority	Private Sources, PA DEP, NY DEC, PA DCED	*Moderate*
4.	Educate community residents and water suppliers about potential threats to public water supply.	Conservation Districts, conservation Groups, Water Suppliers, Citizens	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*
5.	Develop or implement educational outreach programs for private well owners, specifically concerning sole source aquifer protection programs and protecting ground water supplies.	Conservation Districts, Conservation Groups, Landowners, RWA, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*

6.	Promote groundwater quality awareness when conducting education and outreach programs and provide educational information about potential threats to water supply.	Conservation Districts, Conservation Groups, Water Suppliers, Municipalities	Foundations, Private Sources, PA DEP, NY DEC, PA DCED, U.S. EPA	*Moderate*

Goal 3-M: Develop a monitoring plan for the watershed or completed project areas, integrating quality assurance/quality control standards into the plan.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Conduct a seasonal chemical, biological, and visual assessment of French Creek and its tributaries to determine what areas of the watershed are impacted, how they are impacted, and to prioritize future projects.	Conservation Groups, Conservation Districts, Community Groups, Schools & Universities, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*High*
2.	Collect water quality information on a seasonal basis and compare past and present monitoring results to check for changes in conditions.	Conservation Groups, Conservation Districts, Community Groups, Schools	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*Moderate*
3.	Monitor the biochemical oxygen demand above and below sewage effluents. Analyze water samples for bacteria to identify problem areas.	Conservation Groups, Conservation Districts, Community Groups, Schools	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*Moderate*
4.	Involve local schools, universities and community groups in water quality monitoring programs.	Conservation Groups, Conservation Districts, Community Groups, Schools	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*High*
6.	Conduct sub-watershed assessments on tributary streams that rate as impaired and those that are designated High Quality or Exceptional Value.	Conservation Groups, Conservation Districts, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC	*High*
7.	Conduct a groundwater quality assessment for French Creek and its tributaries.	Conservation Groups, Conservation Districts, PA DEP, NY DEC, USGS	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*

9.	Conduct biological studies of unassessed waters to assist in the re-designation process of naturally reproductive streams and to monitor for early detection of invasive species.	Conservation Groups, Conservation Districts, PA DEP, NY DEC, USGS	Foundations, Private Sources, PA DEP, NY DEC	*High*

Goal 3-N: Promote conservation practices to reduce water consumption.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate the public about the value of reducing water consumption and utilizing water conservation products and techniques.	Conservation Districts, Conservation Groups, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC, WREN	*Moderate*
2.	Establish an ongoing program for regional schools to promote water conservation.	Conservation Districts, Conservation Groups, Schools	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*
3.	Establish guidelines that require installation of low-flow devices for all new construction.	Conservation Groups, Developers, Legislators, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*
4.	Work with landowners and developers to incorporate environmentally-friendly water conservation practices in the homes and businesses.	Conservation Groups, Landowners, Developers, PA DEP, NY DEC	Private Sources	*Moderate*
5.	Educate citizens on the importance of water quantity and the benefits of water conservation.	Conservation Districts, Conservation Groups	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*
6.	Promote and establish a program for retrofitting homes and businesses for water conservation practices through tax breaks, rebates, and other incentives.	Conservation Groups, Landowners, Legislators, PA DEP, NY DEC	Private Sources, PA DEP, NY DEC	*Moderate*

Goal 3-O: Assess natural and man-made impoundments and implement ecosystem enhancement recommendations.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Assess, control, monitor, and mitigate exotic species that directly affect lake uses.	Conservation Groups, Conservation Districts, PALMS, PA DEP, NY DEC, USACE	Foundations, Private Sources, PA DEP, NY DEC, U.S.EPA	*High*
2. Assess and inventory lakes, wetlands, and ponds in the watershed for size, use, water quality, and aquatic life.	Conservation Groups and Districts, PALMS, PADEP, NYDEC, USACE	Foundations, Private Sources, PA DEP, NY DEC, U.S.EPA	*Moderate*
3. Inventory dams for their uses, and evaluate maintenance versus removal, while considering public safety, recreation, and present use.	Conservation Groups and Districts, American Rivers, USACE, PADEP, NYDEC	Foundations, Private Sources, PA DEP, NY DEC, U.S.EPA	*Moderate*
4. Research impacts of dams on French Creek aquatic communities and consider alternative management options if warranted.	Conservation Groups and Districts, American Rivers, USACE, PADEP, NYDEC	Foundations, Private Sources, PA DEP, NY DEC, U.S.EPA	*Moderate*
5. Gradually discharge overflows from flood control structures in order to protect aquatic life and stream habitats.	Conservation Groups, USACE, PADCNR, PADEP, NYDEC, PFBC	Foundations, Private Sources, USACE, PFBC, PA DCNR, NY DEC	*Moderate*
6. Conduct bathymetry mapping to determine true depths and better manage lake wildlife habitat opportunities.	Conservation Groups, PFBC, USACE	Foundations, Private Sources, PA DEP, PFBC	*Moderate*

Goal 3-P: Protect and evaluate waterways that are designated or eligible for classification as High Quality, Exceptional Value, or Class A.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Evaluate water quality and biological productivity to re-designate streams and waterways as High Quality, Exceptional Value, and Class A. Outreach to gain community support for added protection of these unique, high biodiversity areas.	Conservation Groups, Conservation District, PA DEP, PFBC	Private Sources	*High*
2. Work with local and state agencies to better enforce regulations protecting water quality, particularly for High Quality and Exceptional Value designated streams.	Conservation Groups, Conservation Districts, PA DEP	PA DEP	*High*

Goal 3-Q: Reduce water quality impacts by properly disposing of un-needed medication.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Establish a drug return program to properly dispose of old or un-needed medications, whether prescription or over the counter.	Conservation Groups, Conservation Districts, Police Departments	Foundations, Private Sources, Departments of Health, PA DEP, NY DEC	*Low*
2. Disseminate information to community members about how to properly dispose of old prescription drugs.	Conservation Groups, Conservation Districts, PA State Police, Departments of Health	Foundations, Private Sources, Departments of Health, PA DEP, NYSOPRHP	*Low*
3. Host a special collection day to assist residents in properly disposing old or unwanted prescriptions or over the counter medications.	Conservation Groups, Conservation Districts, Police Departments	Foundations, Private Sources, Departments of Health, PA DEP, NY DEC	*Low*

Goal 3-R: Provide educational programs educating residents about impacts and pollution sources.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Host stream monitoring workshops or trainings for adult and student volunteers.	Conservation Groups, Stakeholders, PADEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC	*Moderate*
2. Develop and implement education programs about point source pollution, how to report point source violations, and how to research permit information.	Conservation Districts, Conservation Groups, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*Moderate*
3. Develop and implement education programs about non-point source pollution discharges in the watershed and how to remediate them.	Conservation Districts, Conservation Groups, PA DEP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA	*Moderate*
4. Educate homeowners about the significance of water-use designations and ways to minimize non-point source pollution.	Conservation Districts, Conservation Groups	Foundations, Private Sources, PA DEP, NY DEC	*Low*

Table 16. Biological Resources Management Options

Goal 4-A: Reduce impacts caused by invasive and nuisance species.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Conduct watershed-wide inventories for invasive species. This baseline information would allow for monitoring and removal plans to be developed and implemented. Report findings to iMapInvasives.org	Conservation Groups, Conservation Districts, PA DCNR, Penn State Extension, PNHP	Foundations, Private Sources, PA DEP, PA DCNR, NY DEC, Conservation Districts	*High*
2. Incorporate an outreach program to educated citizens about invasive species and they can be controlled and/or removed safely without fear of additional spreading.	Conservation Groups, Conservation Districts, PA DCNR, Penn State Extension	Foundations, Private Sources, PA DEP, PA DCNR, NY DEC	*High*
3. Continue invasive species removal and control programs and projects. Early detection and rapid response strategies should be employed to control entire invasive species populations, when possible, and maximize public awareness through demonstration projects, community volunteer engagement, and public outreach.	Conservation Groups, Conservation Districts, municipalities, PA DCNR, NY DEC, PA DEP	Foundations, Private Sources, PA DEP, PA DCNR, NY DEC	*High*
4. Manage Canada goose populations near public recreation areas to reduce nutrient pollution to water quality, protect public health, and improve aesthetics.	Sportsmen Groups, Conservation Groups	Foundations, Private Sources	*Low*

Goal 4-B: Develop, adopt, and implement management plans to protect forest and wildlife resources.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Develop and use forest stewardship or forest management plans following Sustainable Forestry Initiative practices and participate in the Pennsylvania Forest Stewardship Program and/or the Tree Farm Program. Cultivate a pipeline of certified plan-writers to unlock federal funds.	Conservation Groups, Planning Departments, Landowners, PA DCNR, Universities	Foundations, Private Sources, PA DCNR	*Moderate*

2.	Adopt and utilize management plans that protect forest landscapes.	Conservation Groups, Planning Departments, Landowners, PA DCNR, Universities	Foundations, Private Sources, PA DCNR	*Moderate*
3.	Develop forest and wildlife management plans.	Conservation Groups, Landowners, PA DCNR, PGC, NY DEC, Universities	Private Sources, PA DCNR, PGC, NY DEC	*Moderate*
4.	Develop wildlife management plan on private forestland properties.	Landowners, PGC, NY DEC, Universities	Private Sources, PA DCNR, PGC, NY DEC	*Moderate*
5.	Develop detailed management plans for landowners of biologically diverse areas, including inventories of natural features and invasive or exotic species monitoring plans.	Conservation Groups, Landowners, PA DCNR, PGC, NY DEC, Universities	Private Sources, PA DCNR, PGC, NY DEC	*Moderate*
6.	Conduct studies in conjunction with Natural Heritage Programs to monitor biodiversity, including surveys for historical species of concern for which the current status is unknown.	Conservation Groups, Sportsman Groups, PA DCNR, PNHP, PGC, NY DEC, NYNHP, Universities	Foundations, Private Sources, PA DCNR	*Moderate*
7.	Educate the public about the use and purpose of Natural Heritage Inventories in planning, with an additional focus on understanding the importance of the natural resources that exist.	Conservation Groups, Municipalities, Counties, PNHP, NYSNHP, Universities	Private Sources, PA DCNR, NY DEC	*Moderate*
8.	Provide educational field trips to elected officials emphasizing natural resources and the value of those resources to the region.	Conservation Groups, Elected Officials, NY DEC, USFWS, PGC, PA DCNR, Universities	Foundations, Private Sources, PA DCNR	*Moderate*

Goal 4-C: Implement best management practices to protect forest resources.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote tree plantings, sustainable harvesting, and other best management practices	Conservation Groups, Landowners, Civic Groups, PA DCNR	Foundations, Private Sources, PA DCNR, NY DEC	*High*
2.	Work with Woodland Owner Associations to educate the public, restore degraded areas, and develop demonstration areas.	Conservation Groups, Landowners, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	*Moderate*

3.	Encourage forest managers to enhance the age and structural diversity of the region's forests, which would by proxy also improve tree species diversity. Encourage timber harvesters to use sustainable best management practices based upon forest type and since under the direction of a professional forester.	Conservation Groups, Landowners, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	*High*
4.	Establish cooperation between conservation districts and state agencies to enforce regulations on the logging industry to minimize erosion and sedimentation.	Conservation Groups, Conservation Districts, Landowners, PA DCNR, PA DEP	Foundations, Private Sources, PA DCNR, NY DEC	*Moderate*
5.	Decrease forest fragmentation by maintaining contiguous forest tracts and/or travel corridors between existing non-contiguous forest tracts.	Conservation Groups, Sportsman Groups, Landowners, PA DCNR, DEC	Private Sources, PA DCNR, PGC, NY DEC	*High*
6.	Explore potential for forest carbon offset markets to establish a presence in the watershed and monitor the potential impact to the forest landscape in terms of management, harvest cycles, etc. Outreach the availability of carbon programs for private forest landowners and educate about their potential impacts on the landscape.	Conservation Groups, Conservation Districts, Landowners, PA DCNR, PA DEP	Foundations, Private Sources, PA DCNR, NY DEC	*Moderate*

Goal 4-D: Identify Important Bird and Mammal Areas

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Identify, characterize, and recommend Important Bird Areas by partnering with local Audubon chapters and birding clubs. Identify and recommend Important Mammal Areas.	Conservation Groups, Landowners, PA DCNR, NY DEC, PGC	Foundations, Private Sources, Audubon Society, PA DCNR, NY DEC	*Moderate*
2.	Protect biological diversity areas through collaborative partnerships among the present owner, citizens, local organizations, and Pennsylvania Department of Transportation.	Conservation Groups, Landowners, NYSDOT, PennDOT, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	*High*
3.	Educate citizens and municipal leaders about biological diversity and the vital importance of conserving habitats and protecting species.	Conservation Groups, PGC, PA DCNR, USFWS, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	*High*

Goal 4-E: Identify and protect biologically diverse areas.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Update County Natural Heritage Inventories to document species of concern, their critical habitat areas, and biological diversity areas within the French Creek watershed to monitor, protect, and conserve.	Conservation Groups, Landowners, PA DCNR, PGC, PFBC, NY DEC, State Heritage Programs	Foundations, Private Sources, PA DCNR, NY DEC	*High*
2. Develop a land steward program for Biological Diversity Areas to train volunteers responsible for regular monitoring of these areas and utilize them for outreaching to landowners and liaising with conservation organizations.	Conservation Groups, Landowners, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	*Moderate*
3. Develop new biotic study areas throughout the watershed and encourage local schools to utilize this resource, thereby fulfilling state curriculum requirements and broadening educational understanding of ecological resources.	Conservation Groups, Landowners, School Districts, Universities, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	*Moderate*
4. Protect biological diversity areas though collaborative partnerships among the present owner, citizens, local organization, and Departments of Transportation.	Conservation Groups, Landowners, NYSDOT, PennDOT, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PA DCNR	*Moderate*
5. Restrict activities, such as grazing and off-road vehicles, and control invasive species within biological diversity areas.	Conservation Groups, Landowners, PA DCNR, PGC	Foundations, Private Sources, PA DCNR, NY DEC	*Moderate*
6. Limit herbicide use and utilize alternative management techniques in rights-of-way by working with utility companies.	Conservation Groups, Landowners, Utility Companies, PA DCNR	Private Sources, PA DCNR, NY DEC	*Moderate*
7. Refine information on Biological Diversity Areas contained in Natural Heritage Inventories.	Conservation Groups, Counties, PA DCNR, PFBC, PGC, NY DEC, PNHP, NYNHP	Foundations, Private Sources, PA DCNR, NY DEC	*Moderate*
8. Implement strategies to improve habitat within Biological Diversity Areas.	Conservation Groups, Landowners, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	*High*

9.	Establish biodiversity indices for selected stream segments to document the current status of biodiversity and to track changes over time as management recommendations are implemented.	Conservation Groups, Sportsman Groups, PA DCNR, PA DEP, NY DEC, PFBC, USFWS	Foundations, Private Sources, PA DEP, NY DEC, PA DCNR, PFBC, PGC, USFWS	*High*
10.	Develop an incentive program to encourage and reward landowners who develop management plans, decrease development, and employ other conservation practices in and around riparian corridors and biologically diverse areas.	Conservation Groups, Sportsmen Groups, Landowners, PA DCNR, PGC, PA DEP, NY DEC	Foundations, Private Sources, Cost-Share Programs, PA DCNR, PA DEP, PGC, NY DEC	*Moderate*

Goal 4-F: Enhance aquatic habitats.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Improve aquatic habitat for fish, mussels, and other organisms by implementing best management practices and other restoration activities.	Conservation Groups, Conservation Districts, Landowners, PNHP, NYNHP, PA DCNR, NY DEC, PFBC, TU, USFWS, PGC	Foundations, Private Sources, PA DCNR, PFBC, PA DEP, USFWS, PGC, TU	*High*
2.	Increase habitat and passage for fish, mussels, and other aquatic organisms by removing dams and replacing inadequate culverts on small tributaries and maintaining stable flow regimes downstream.	Conservation Groups, Conservation Districts, Landowners, PNHP, NYNHP, NY DEC, PFBC, PA DCNR	Foundations, Private Sources, American Rivers, PA DEP, NY DEC, PFBC, PA DCNR	*High*
3.	Use the North Atlantic Aquatic Connectivity Collaborative survey protocol to identify priority culverts to replace to restore aquatic organism passage.	Conservation Groups, Conservation Districts, Landowners, PNHP, NYNHP, NY DEC, PFBC, PA DCNR	Foundations, Private Sources, American Rivers, PA DEP, NY DEC, PFBC, PA DCNR	*Moderate*
3.	Incorporate aquatic habitat improvements into streambank stabilization and water quality remediation projects.	Conservation Groups, Conservation Districts, Landowners, PA DEP, PFBC, NY DEC, PA DCNR	Foundations, Private Sources, PA DEP, NY DEC, PFBC, PA DCNR	*High*

4.	Utilize large/coarse woody debris, in key stream reaches and headwater areas to enhance habitat and reconnect floodplains.	Conservation Groups, Conservation Districts, Sportsmen Groups, PFBC, PGC, PA DEP, NY DEC, PA DCNR	Foundations, Private Sources, PFBC, PA DEP, NY DEC, PA DCNR	*High*

Goal 4-G: Protect rare, threatened, and endangered species and their habitats.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop monitoring strategies and management plans for species of concern that are particularly vulnerable to habitat destruction by working with Natural Heritage Programs.	Conservation Groups, Landowners, PNHP, NYNHP, PFBC, PA DCNR	Foundations, Private Sources, PA DCNR, PFBC	*High*
2.	Protect or improve habitats that support threatened and endangered species and species of concern through acquisition, easements, and/or landowner education.	Conservation Groups, Landowners, PNHP, NYNHP, PFBC, PA DCNR	Foundations, Private Sources, PA DCNR, PFBC, NY DEC	*High*
3.	Appoint a liaison to work with members of PA Biological Survey to submit recent identification of rare, threatened, and endangered species within the watershed and to report the condition of these species' habitats.	Conservation Groups, Landowners, PNHP, PFBC, PA DCNR, PABS	Foundations, Private Sources, PA DCNR, PFBC, PGC	*High*

Goal 4-H: Identify and protect important habitats for plant and animal species.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Identify and protect additional environmentally sensitive areas and areas of high biodiversity. Monitor activities in critical habitat areas.	Conservation Groups, Landowners, PNHP, NYNHP, PFBC, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, PFBC, NY DEC	*High*
2.	Establish private backyard conservation areas to serve as wildlife habitat and travel corridors by providing activities and programs for landowners.	Conservation Groups, Landowners, PNHP, NYNHP, PFBC, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, PFBC, NY DEC	*Moderate*

3.	Maintain grassland species and meadow habitats on public lands through practices, such as controlled burns, limited mowing activity, and lawn conversion practices.	Conservation Groups, Landowners, PNHP, NYNHP, PFBC, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, PFBC, NY DEC	*Moderate*
4.	Identify high-quality wetlands located in the watershed. Protect unique habitats, including swamps and bogs with several state and federally listed rare, threatened, and endangered species.	Conservation Groups, Landowners, PNHP, NYNHP, PFBC, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, PFBC, NY DEC	*High*
5.	Establish a no-mow strategy for some fields in public lands allowing them to return to a more natural state providing habitat for wildlife.	Conservation Groups, PA DCNR, PGC, PFBC, NY DEC, PNHP	Foundations, Private Sources, PGC, PA DCNR, NY DEC	*Moderate*
6.	Delay mowing of fallow fields until July to protect bird-nesting sites.	Conservation Groups, PA DCNR, PGC, PFBC, NY DEC, PNHP	Foundations, Private Sources, PGC, PA DCNR, NY DEC	*Moderate*
7.	Conduct a study to determine what if any species of bats are located within the project area. Expand the management of bat habitats by expanding hibernating and maternity roosting sites and provide non-infested bats accessible and protected habitat sites.	Conservation Groups, PGC, PA DCNR, NY DEC, USFWS, Universities	Foundations, Private Sources, NY DEC, PA DCNR, PA DEP, USFWS	*Moderate*

Goal 4-I: Increase the use of native plants in landscaping and remediation projects.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Utilize native species in agricultural and landscaping projects, wildlife habitat plantings, and educational activities.	Conservation Groups, Landowners, PA DCNR	Foundations, Private Sources, NY DEC, PA DCNR	*High*
2.	Use native tree plantings in remediation projects, such as streambank fencing, streambank stabilization, or mine reclamation projects.	Conservation Districts, Conservation Groups, PA DCNR, NY DEC	Foundations, Private Sources, NY DEC, PA DCNR	*High*

3.	Conduct an assessment and develop a management plan for native species.	Conservation Districts, Conservation Groups, PA DCNR, NY DEC	Foundations, Private Sources, NY DEC, PA DCNR	*Moderate*
4.	Establish a reserve seed bank of native species that can be used in remediation efforts.	Conservation Districts, Conservation Groups, PA DCNR, NY DEC	Foundations, Private Sources, NY DEC, PA DCNR	*Moderate*

Goal 4-J: Implement wildlife management practices to protect biodiversity.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Foster continued involvement in hunting activities among all age groups and educate hunters on the importance of population control.	Conservation Groups, Sportsmen Groups, PA DCNR, PGC	Foundations, Private Sources, PGC,	*High*
2.	Promote and support deer management strategies, such as special hunting tag regulations and enclosures to protect sensitive species or natural areas from deer browse.	Conservation Groups, Sportsmen Groups, Pa DCNR, PGC, NY DEC	Foundations, Private Sources, PGC, NY DEC	*High*
3.	Support laws and regulation to maintain white-tailed deer populations at levels that will ensure healthy forests, productive agricultural lands, and healthy deer populations.	Conservation Groups, Sportsmen Groups, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PGC, NY DEC	*High*
4.	Develop areas for wildlife viewing and education to raise awareness about biodiversity.	Conservation Groups, Sportsmen Groups, Landowners, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PGC, NY DEC	*Moderate*
5.	Increase public and private lands available for hunting by working with sportsmen's groups and landowners.	Conservation Groups, Sportsmen Groups, Landowners, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PGC, NY DEC	*Moderate*
6.	Encourage hunters to participate in Deer Management Assistance Program to keep deer herds at ecologically healthy levels. Encourage private landowners to register their land in Deer Management Assistance Program to keep deer herds at ecologically healthy levels.	Conservation Groups, Sportsman Groups, Landowners, PA DCNR, PGC	Foundations, Private Sources, PGC	*Moderate*

7.	Sponsor outreach programs to educate landowners about wildlife management practices.	Sportsmen Groups, PGC, NY DEC, PA DCNR, PA DEP	Foundations, Private Sources, PGC, NY DEC, PA DCNR, PA DEP	*Low*

Table 17. Cultural Resources Management Options

Goal 5-A: Increase awareness of recreational resources through marketing and outreach.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish a campaign to market recreational and historical resources to community residents.	Historical Societies, Conservation Groups, Chambers of Commerce, Municipalities, PA DCNR, TPA	Private Sources, Foundations, TPA, NY DEC, PA DCNR, NYSOPRHP	*Moderate*
2.	Enhance local visitor's centers capability to serve tourists by being accessible and providing information during the weekends when most tourist visit and/or arrive.	Chambers of Commerce, TPA	Foundations, Private Sources, TPA	*Low*
3.	Utilize local recreational facilities to host community festivals and events	Historical Societies, Conservation Groups, Chambers of Commerce, Municipalities, TPA, PA DCNR	Private Sources, Foundations, TPA, PA DCNR, NYSOPRHP	*Moderate*
4.	Utilize local tourism promotion agencies (TPA) to highlight recreational opportunities	Historical Societies, Conservation Groups, Chambers of Commerce, Municipalities, TPA, PA DCNR	Private Sources, Foundations, TPA, PA DCNR, NY DEC, NYSOPRHP	*Moderate*
5.	Conduct an economic impact study of recreational activities to determine the impact that recreation has on the local economy.	Historical Societies, Conservation Groups, Chambers of Commerce, Municipalities, TPA, PA DCNR	Private Sources, Foundations, TPA, PA DCNR, NY DEC, NYSOPRHP	*Moderate*
6.	Promote tourism utilizing natural, cultural, and recreational resources.	Historical Societies, Conservation Groups, Chambers of Commerce, Municipalities, TPA, PA DCNR	Private Sources, Foundations, TPA, PA DCNR, NY DEC, NYSOPRHP	*Moderate*
7.	Conduct a tourism study to determine what attractions draw tourist to the region in order to target future outreach and marketing campaigns.	Area Businesses, TPA, PA DCNR, NYSOPRHP,	Foundations, Private Sources, TPA	*Moderate*

8.	Establish additional accommodations for visitors to the region including, motels, bed & breakfasts, campgrounds, restrooms, and places to eat.	Chambers of Commerce, Counties	Foundations, Private Sources	*Moderate*
9.	Work with tourist promotion agencies and local business to establish a recreation guide for the region including camping, lodging, and food destinations.	Conservation Groups, Trail Associations, Businesses, Chambers of Commerce, PTA, PA DCNR	Foundations, Private Sources, DCNR	*Moderate*
10.	Improve signage and awareness of public lands to encourage recreational use of public lands and deter trespassing on privately owned lands.	PGC, NY DEC, PA DCNR	Foundations, Private Sources, PGC, NYSOPRHP, PA DCNR	*Moderate*
11.	Highlight local attractions that provide winter recreational opportunities, such as snowmobile and cross-country skiing trails.	Conservation Groups, Snowmobile Clubs, Trail Groups, TPA, PA DCNR	Foundations, Private Sources, TPA, PA DCNR	*Moderate*
12.	Increase awareness about geocaching.	Conservation Groups, Conservation Districts, Counties, PA DCNR	Foundations, Private Sources, TPA, PA DCNR	*Low*

Goal 5-B: Enhance recreational opportunities for sportsmen and outdoor enthusiasts.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage agricultural landowners to participate in the Cooperative Farmland Program opening additional land to public hunting.	Conservation Groups, Sportsmen Groups, Landowners, PGC, PA DCNR	Foundations, Private Sources, PGC, PA DCNR	*Low*
2.	Encourage woodlot landowners to participate in the Cooperative Forestry Program opening additional land to public hunting.	Conservation Groups, Sportsmen Groups, Landowners, PGC, PA DCNR	Foundations, Private Sources, PGC, PA DCNR	*Moderate*
3.	Consider expanding Sunday hunting in Pennsylvania to make it competitive with neighboring states.	Sportsmen Groups, Chambers of Commerce, Legislators, PGC, TPA, PA DCNR	Legislators, PGC, PA DCNR	*Low*

4.	Identify new and protect existing areas open to hunting.	Conservation Groups, Sportsmen Groups, Landowners, PGC, NYSOPRHP, PA DCNR	Foundations, Private Sources, PGC, NY DEC, PA DCNR	*Moderate*
5.	Offer incentives to landowners encouraging them to allow hunting on their properties.	Conservation Groups, Sportsmen Groups, Landowners, PGC, NYSOPRHP, PA DCNR	Foundations, Private Sources, PGC, NY DEC, PA DCNR	*Low*
6.	Manage multiple uses to increase inclusive access to state game lands for non-hunting recreation, such as fishing, bird watching, or hiking.	Conservation Groups, Sportsmen Groups, PGC, PA DCNR	Foundations, Private Sources, PGC, PA DCNR	*Moderate*
7.	Improve water quality in order to aid the recovery of the local fishery as a local resource for recreation and tourism.	Conservation Groups, Sportsmen Groups, PFBC, PA DEP, NYSOPRHP, PA DCNR	Foundations, Private Sources, PA DEP, NYSOPRHP, PFBC, PA DCNR	*High*
8.	Protect and improve area waterways to maintain or expand fisheries and fishing opportunities.	Conservation Groups, Sportsmen Groups, PFBC, PA DEP, NYSOPRHP, PA DCNR	Foundations, Private Sources, PA DEP, NYSOPRHP, PFBC, PA DCNR	*Moderate*
9.	Designate a section of French Creek as a delayed harvest or fly-fishing only area.	Conservation Groups, Sportsmen Groups, PFBC, TU, PA DCNR	PFBC, PA DCNR	*Low*
10.	Create additional public access sites to area waterways for fishing and paddling.	Conservation Groups, Landowners, PFBC, PA DCNR	Foundations, Private Sources, PA DEP, NYSOPRHP, PFBC, NY DEC, PA DCNR	*High*
11.	Work with private landowners to provide access to waterways for anglers and small non-powered watercraft. Include acquiring easements to help meet that goal	Conservation Groups, American Rivers, PFBC, PA DCNR, NYSOPRHP, TU, DEP	Foundations, Private Sources, PA DEP, NYSOPRHP, PFBC PA DCNR, TU, DEP	*High*
12.	Remove low-head dams to improve paddle craft and natural fish passage.	Conservation Groups, American Rivers, PFBC, PA DCNR, NYSOPRHP	Foundations, Private Sources, PA DEP, NYSOPRHP, PFBC, NY DEC, PA DCNR	*High*

13.	Establish new and enhance existing access areas on the French Creek Water Trail for paddling and fishing access, including maps and signage.	Conservation Groups, Trail Associations, Businesses, Chambers of Commerce, Citizens, PFBC, PA DCNR, NYSOPRHP, TPA	Foundations, Private Sources, NYSOPRHP, PFBC, PA DCNR	*High*
14.	Enhance area fisheries by installing fish habitat structures.	Conservation Groups, PFBC, TU, PA DCNR	Foundations, Private Sources, PFBC, PA DCNR	*Moderate*
15.	Acquire and develop areas along the stream for primitive camping.	Conservation Groups, Businesses, PA DCNR, NYSOPRHP	Foundations, Private Sources, PFBC, PA DCNR, NYSOPRHP	*Moderate*
16.	Enhance camping experience through facility and program updates, encouraging more visitors to experience the natural environment.	Conservation Groups, Businesses, PA DCNR, NYSOPRHP	Foundations, Private Sources, PFBC, PA DCNR, NYSOPRHP	*Moderate*
17.	Implement the Union City Borough French Creek Trail Town Plan and develop similar plans for other municipalities of the watershed.	Conservation Groups, Trail Associations, Businesses, Chambers of Commerce, Citizens, PFBC, PA DCNR, NYSOPRHP, TPAs	Foundations, Private Sources, NYSOPRHP, PFBC, PA DCNR	*Moderate*

Goal 5-C: Increase recreational opportunities for area youth by establishing programs, encouraging outdoor recreational activities and opportunities.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Organize community sport leagues, such as baseball, basketball, and football and community or school programs to teach children how to swim.	Park and Recreation Authorities, School Districts, Communities, PA DCNR	Foundations, Private Sources, PFBC, PA DCNR	*Low*
2.	Establish community or school programs to teach children about outdoor recreational opportunities, such as hiking, camping, fishing, hunting, etc.	School Districts, Civic Groups, Communities, PFBC, PGC, PA DCNR, NYSOPRHP, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*
3.	Encourage participation by youth in outdoor recreation including hunting and fishing.	Conservation Groups, PFBC, PGC, PA DCNR	Foundations, Private Sources, PFBC, PGC, PA DCNR	*Moderate*

4.	Establish a place where teens can safely and legally gather during evenings, weekends, and summers.	Community Groups, Municipalities, Churches, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*
5.	Establish and enhance public parks, trails, and recreation centers to provide ample recreation opportunities throughout the watershed.	Park and Recreation Authorities, School Districts, Communities, PA DCNR	Foundations, Private Sources, PFBC, PA DCNR	*High*

Goal 5-D: Improve recreational facilities and ensure availability and access.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Provide and enhance amenities, such as bathrooms and parking lots, at recreational facilities, including trail heads and municipal parks.	Community Groups, Municipalities, PFBC, PA DCNR	Private Sources, Foundations, PA DCNR, PFBC	*Moderate*
2.	Establish a community center to host community events or classes, such as bingo and dance classes.	Municipalities, Civic Organizations, Citizens, PA DCNR	Private Sources, Foundations, PA DCNR	*Low*
3.	Redevelop recreational facilities for multiple uses providing a variety of activities and amenities.	Park and Recreation Authorities, Citizens, Municipalities, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Low*
4.	Update equipment and safety feature at existing community parks.	Park and Recreation Authorities, Citizens, Municipalities, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Low*
5.	Develop low-impact recreational facilities for camping, hiking, biking, wildlife viewing, bird watching, picnicking, fishing, and hunting.	Conservation Groups, Community Groups, PA DCNR, NYSOPRHP	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Moderate*
6.	Utilize resources of French Creek and its tributaries for recreational opportunities.	Conservation Groups, Businesses, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Moderate*
7.	Educate visitors to utilize recreational resources available to the public and respect private property owner rights.	Conservation Groups, Municipalities, Landowners, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*

8.	Establish recreational centers and community service opportunities throughout the watershed for the area's senior citizens.	Community Groups, Municipalities, Churches, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*

Goal 5-E: Establish, expand, and improve area trails.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Increase maintenance of trail corridors to provide a safer recreational opportunity.	Conservation Groups, Civic Groups, Trail Groups, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*High*
2.	Increase safety on trails & roadways by erecting highway signage alerting of trail crossings and offering safety seminars for trail users.	Municipalities, Trail Groups, PennDOT, NYSDOT, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP, PennDOT, NYSDOT	*Moderate*
3.	Maintain trail paths, whether water or land, free of debris and hazards.	Conservation Groups, Civic Groups, Trail Groups, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*
4.	Develop additional trails throughout the region including those identified in Northwest Pennsylvania Greenway Plan—Conneaut Lake Trail, French Creek Trail, French Portage Trail, and Lake Pleasant Connector Trail.	Trail Associations, Recreation Groups, Conservation Groups, PA DCNR, PA Northwest Commission, Conservation Districts, Counties, Municipalities	Foundations, Private Sources, PA DEP, PA DCED, PA DCNR	*High*
5.	Add environmental components to existing walking and hiking trails in the region by establishing plaques or signs along the trail to emphasize environmental features.	Trail Associations, Conservation Groups, PA DCNR	Foundations, Private Sources, PA DEP, PA DCNR, NYSOPRHP	*High*
6.	Establish additional recreational trails for snowmobile users that could also serve as an ATV, bike, or hiking trail during the off-season.	Trail Associations, Off Road & Snowmobile Clubs, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*
7.	Establish stewardship programs to enhance and maintain area trails, including hiking, biking, and off-road vehicle trails	Trail Associations, Off Road & Snowmobile Clubs, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*

8.	Develop or designate certain areas of trails for specific uses, such as off-road vehicle riding, snowmobiling, hiking, biking, cross-country skiing, and horseback riding.	Recreational Clubs, Trail Groups, Conservation Groups, Municipalities, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Moderate*
9.	Reduce vandalism along trails caused by motorized vehicles, such as ATVs	Trail Associations, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*High*
10.	Conduct a feasibility study investigating the preservation of abandoned railroad corridors for uses, such as rails-to-trails, that preserve these corridors and offer recreational opportunities.	Conservation Groups, Historical Societies, Municipalities, Civic Groups, Landowners, Trail Groups, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Moderate*

Goal 5-F: Link recreational facilities to each other.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Establish a network of multi-use trails by connecting existing and new recreational trails.	Conservation Groups, Park and Recreation Authorities, Counties, Municipalities, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Moderate*
2. Explore the possibility of connecting railroad corridors and trails from surrounding areas to existing trails.	Conservation Groups, Park and Recreation Authorities, Counties, Municipalities, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Moderate*
3. Develop highway bike/hike trails connecting communities by enhances existing roadways.	Conservation Groups, Park and Recreation Authorities, Counties, Municipalities, PennDOT, NYSDOT, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP, NYSDOT, PennDOT	*Low*
4. Establish greenway corridors and trails tin the watershed to connect activity hubs and greenway for public use.	Conservation Groups, Park and Recreation Authorities, Counties, Planning Commissions, Municipalities, PA DCNR	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Moderate*

Goal 5-G: Encourage environmentally sound practices when operating recreational vehicles and enforce existing laws to minimize intrusion on private lands.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Increase enforcement of illegal off-road vehicle use on private and public lands.	Police Departments, Municipalities, Counties, PA DCNR	Police Departments, Municipalities, PA DCNR, PGC	*Moderate*
2. Prohibit the use of recreational vehicles in areas at risk of being affected by their use, such as steep slopes, streambanks, stream crossings, and habitat for rare, threatened, or endangered species.	Conservation Groups, Police Departments, Municipalities, Counties, PA DCNR, PGC, NYSOPRHP, NY DEC	Foundations, Private Sources, PA DCNR, PGC, NY DEC, NYSOPRHP	*High*
3. Conduct feasibility studies for the development of recreational areas and trails for off-road vehicles.	Conservation Groups, Police Departments, Recreational Vehicles Riding Clubs, Counties, Municipalities, PA DCNR, PGC, NYSOPRHP, NY DEC	Foundations, Private Sources, PA DCNR, PGC, NY DEC, NYSOPRHP	*Low*
4. Establish environmentally sound public trails or parks for off-road vehicles.	Conservation Groups, Police Departments, Recreational Vehicles Riding Clubs, Counties, Municipalities, PA DCNR, PGC, NYSOPRHP, NY DEC	Foundations, Private Sources, PA DEP, NY DEC, PA DCNR, NYSOPRHP	*Low*
5. Work with dealerships to offer incentives for customers attending riding etiquette and safety programs.	Conservation Groups, Recreational Vehicle Ridging Clubs, Businesses, PA DCNR, NYSOPRHP	Foundations, Private Sources, PA DCNR, NYSOPRHP	*Low*

Goal 5-H: Expand awareness, appreciation, and support for the arts.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Increase awareness for the visual and performing arts, especially as it relates to nature art.	Businesses, Schools, Universities, Cultural Council, Locate Artists, Cooperative Artisans Network, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*

2.	Establish or expand an arts appreciation section in public and private school curricula.	Schools, Cultural Councils, Local Artists, Cooperative Artisans Network	Foundations, Private Sources	*Low*
3.	Broaden quantity and quality of the volunteer pool supporting the arts.	Citizens, Schools, Universities	Foundations, Private Sources	*Low*
4.	Expand space available for displays, storage, and instruction in the visual and performing arts.	Businesses, Schools, Universities	Foundations, Private Sources	*Low*
5.	Use an existing cultural council or establish a taskforce to expand, finance, coordinate, and promote art activities.	Cultural Council, Theaters, Universities, Local Artists, TPA	Foundations, Private Sources	*Low*
6.	Offer affordable, local, cultural activities, such as plays, concerts, etc.	Schools, Universities, Cultural Councils, TPA	Foundations, Private Sources	*Low*

Goal 5-I: Highlight and preserve local history to promote its appreciation within the region.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Inventory historical sites throughout the watershed and preserve historical sites and landmarks.	Municipalities, Citizens, Historical Societies, PHMC, NYSOPRHP, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*
2.	Install interpretive signage at historical locations.	Municipalities, Citizens, Historical Societies, PHMC, NYSOPRHP, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*
3.	Protect historical sites from vandalism.	Municipalities, Citizens, Historical Societies	Foundations, Private Sources	*Moderate*
4.	Establish driving, walking, and/or biking tours highlighting historical sites and structures to increase awareness of local history.	Municipalities, Citizens, Historical Societies, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*
5.	Establish a network within the historical community for projects and funding.	Municipalities, Citizens, Counties, Historical Societies, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*

6.	Determine if local historical sites and structures could be added to the National Register.	Municipalities, Citizens, Historical Societies, PHMC, NYSOPRHP, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*
7.	Establish a rail tour highlighting scenery and history of the railroad.	Historical Societies, Conservation Groups, Railroads, DCNR	Foundations, Private Sources, PA DCNR, PHMC, NYSOPRHP	*Low*
8.	Incorporate local history into classes taught at local school districts.	Schools, Historical Societies, Citizens, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*
9.	Increase awareness of the watershed's historical Native American culture.	Historical Societies, Seneca Nation of Indians, Native American Ancestors, Schools & Universities, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*
10.	Host community events or festivals commemorating local historical events, places, and cultures.	Historical Societies, Communities, Civic Groups, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*
11.	Conduct anthropological or archeological studies within the French Creek region.	Historical Societies, Seneca Nation of Indians, Landowners, PHMC, PA DCNR	Foundations, Private Sources, PHMC, PA DCNR	*Low*
12.	Establish an organization to preserve historic sites, structures, and relics.	Municipalities, Citizens, PA DCNR	Foundations, Private Sources, PA DCNR	*Low*
13.	Support annual events and attractions honoring the history of the region and supporting the local artisans.	Historical Societies, Artisan Networks, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*

Goal 5-J: Promote community involvement in conservation and educational initiatives.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Involve students and citizen in watershed activities, such as water quality monitoring and stream cleanups.	Conservation Districts, Conservation Groups, School Districts, PA DCNR	Foundations, Private Sources, PA DEP, PA DCNR, NY DEC	*High*

2.	Create a watershed-wide recognition rewarding those advancing environmental education.	Conservation Districts, Conservation Groups, PA DCNR	Foundations, Private Sources , PA DCNR	*Moderate*
3.	Establish additional environmental education opportunities for children and adults that lead toward action.	Conservation Districts, Conservation Groups, Cooperative Extensions, School Districts, PA DCNR	Foundations, Private Sources, PA DEP, PA DCNR	*High*
4.	Partner with businesses and industries to support local watershed work.	Conservation Groups, Businesses, PA DCNR	Private Sources, PA DCNR	*Moderate*
5.	Support in the classroom programming on aquatic life processes with TU's Trout in the Classroom.	TU, PFBC, schools, PA DCNR	TU, PA DEP, PA DCNR, Foundations, Private Sources	*Moderate*
6.	Establish a Forestry in the Classroom program similar to Trout Unlimited Trout in the Classroom program.	Timber Harvesters, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PA DCNR, PGC, NY DEC	*Moderate*
7.	Establish a communication network for school districts with the French Creek watershed to share information collected.	School Districts, Conservation Groups, PA DCNR	Private Sources, PA DCNR	*High*
8.	Identify opportunities to engage local citizens in conservation and stewardship efforts with varying degrees of involvement to enable a wide range of able individuals to contribute.	Conservation Districts, Conservation Groups, PA DCNR	Private Sources, Foundations, PA DCNR	*High*
9.	Establish volunteer corps to assist efforts of community planners, conservation organizations, and civic groups.	Conservation Groups, Civic Groups, PA DCNR	Foundations, Private Sources, PA DEP, PA DCNR	*Moderate*
10.	Establish "Friends" groups to maintain public parks and trails, and to diffuse conflicts between adjacent property owners, and park or trail users.	Concerned Citizens, Conservation Groups, Municipalities, Counties, PA DCNR, NY DEC, NYSOPRHP	Foundations, Private Sources, PA DCNR	*Moderate*
11.	Recruit maintenance and patrol crews to clean-up liter and maintain order at public sites and trails.	Conservation Groups, Concerned Citizens, PA DCNR	Foundations, Private Sources, PA DCNR	*Moderate*

12.	Establish a partnership among school districts, conservation groups, and agencies to educate students about watersheds.	Conservation Districts, Conservation Groups, School Districts, PA DCNR	Foundations, Private Sources, PA DCNR	*High*

Goal 5-K: Establish ongoing environmental education programs and displays.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Incorporate the sensitivity of nature and its protection into environmental education displays at nature parks and trails in order to protect the plants, animals, and habitats being highlighted.	Conservation Groups, Conservation Districts, Environmental Educators, PA DCNR	Foundations, Private Sources, PA DCNR, NY DEC, PA DCNR	*High*
2.	Conduct outreach campaign to educate watershed residents about how the land-uses in their communities impact the environment.	Conservation Districts, Conservation Groups, Cooperative Extensions, PA DCNR	Foundations, Private Sources, PA DCNR, NY DEC, PA DCNR	*Moderate*
3.	Utilize media, such as newspapers, radio stations, and television stations, to outreach to residents for increased participation and educational messages.	Conservation Districts, Conservation Groups, Media, PA DCNR	Foundations, Media Outlets, Private Sources, PA DEP, PA DCNR	*Moderate*
4.	Increase awareness of watershed-related issues through the distribution of materials and educational programs the focus on the French Creek watershed.	Conservation Districts, Conservation Groups, Cooperative Extensions, PA DCNR	Foundations, Private Sources, PA DEP, NY DEC, PA DCNR	*Moderate*
5.	Promote environmental education campaigns, such as "Everybody lives downstream" and storm drain stenciling.	Conservation Districts, Conservation Groups, Schools, PA DCNR	Foundations, Private Sources, PA DEP, NY DEC, U.S. EPA, WREN, PA DCNR	*Moderate*
6.	Expand French Creek Valley Conservancy environmental education leadership role through staff capacity and funding support.	Conservation Districts, Conservation Groups, Schools, PA DCNR	Foundations, Private Sources, PA DCNR	*High*
7.	Develop and publish an informational brochure about what a watershed is, issues affecting the health of the watershed, and increasing awareness.	Conservation Districts, Conservation Groups, PA DCNR	Foundations, Private Sources, WREN, PA DCNR	*High*

8.	Strengthen the environmental education curriculum in local schools.	Departments of Education, School Districts, PA DCNR	Foundations, Private Sources, PA DCNR	*High*

Goal 5-L: Educate recreation users about proper and safe practices.

Method to Achieve Goal:		*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate hunters, fishermen, and other outdoor sportsmen about the importance of land etiquette.	Conservation Groups, Sportsmen Groups, PGC, PFBC, NY DEC, NYSOPRHP, PA DCNR	Foundations, Private Sources, PFBC, PGC, NY DEC, NYSOPRHP, PA DCNR	*Moderate*
2.	Educate sportsmen about areas open to public usage providing detailed maps delineating public-use areas.	Conservation Groups, Sportsmen Groups, NYSOPRHP, NY DEC, PFBC, PGC, PA DCNR	Foundations, Private Sources, PFBC, PGC, NY DEC, PA DCNR, NYSOPRHP, PA DCNR	*Moderate*
3.	Educate off-road vehicle operators to recreate in an environmentally sound manner.	Conservation Groups, Recreational Vehicle Riding Clubs, PA DCNR, NY DEC, NYSOPRHP, PA DCNR	Foundations, Private Sources, PA DCNR, NY DEC, NYSOPRHP, PA DCNR	*Low*

ABBREVIATIONS AND ACRONYMS

ATV – All-Terrain Vehicle
BMP – Best Management Practice
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS – Comprehensive Environmental Response, Compensation, and Liability Information System
CPOM – Coarse Particulate Organic Matter
CWF – Cold Water Fishery
DCNR – Pennsylvania Department of Conservation and Natural Resources
DDT – Dichlorodiphenyltrichloroethane
DEP – Pennsylvania Department of Environmental Protection
DOM – Dissolved Organic Matter
EASI – Environmental Alliance for Senior Involvement
EPA – United States Environmental Protection Agency
EV – Exceptional Value
FCVC – French Creek Valley Conservancy
FPOM – Fine Particulate Organic Matter
GIS – Geographic Information System
HQ-CWF – High-Quality Cold-Water Fishery
HQ-TSF – High Quality Trout Stocked Fishery
HQ-WWF – High Quality Warm Water Fishery
IBA – Important Bird Area
MHP – Mobile Home Park
NAWQA – National Water Quality Assessment Program
NPDES – National Pollution Discharge Elimination System
NPS – Non-Point Source
NRCS – Natural Resource Conservation Service
PEC – Pennsylvania Environmental Council
PA DOT – Pennsylvania Department of Transportation
PFBC – Pennsylvania Fish & Boat Commission
PGC – Pennsylvania Game Commission
PNHP – Pennsylvania Natural Heritage Program
SGL – State Game Lands
STORET – Storage and Retrieval Database
STP – Sewage Treatment Plant
TMDL – Total Maximum Daily Load
TNC – The Nature Conservancy
TSF – Trout Stocked Fishery
UNT – Unnamed Tributary
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
USFWS – United States Fish & Wildlife Service
USGS – United States Geological Survey
WPC - Western Pennsylvania Conservancy
WQN – Surface Water Quality Monitoring Network
WWF – Warm Water Fishery

GLOSSARY OF TERMS

303(d) Report	Report required under Section 303(d) of the federal Clean Waters Act from each state listing impaired waters within the state that would not support designated uses even after appropriate and required water pollution control technologies have been applied.
305(b) Report	Report required under Section 305(b) of the federal Clean Waters Act from each state on the state's water quality conditions and water quality management program.
algal bloom	A sudden growth of algae in an aquatic ecosystem. Often induced by nutrient enrichment from pollution.
alkaline	Having a pH greater than 7
alkalinity	The ability of a material to buffer acidity. Usually measured in mg/L $CaCO_3$.
alluvial	Pertains to the environments, processes, and products of streams or rivers. Materials (sediments, detritus, etc.) deposited by flowing water are referred to as alluvial deposits.
anthropogenic	Resulting from human activity.
aquatic	Relating to freshwater.
aquifer	A body of permeable rock that is capable of storing significant quantities of water, that is underlain by impermeable material, and through which groundwater moves.
atmospheric deposition	Matter that falls to the earth either as wet deposition (rain and snow) or dry deposition (dust particles).
autotrophs	An organism that manufactures its own food, using carbon dioxide as its source of carbon and sunlight as an energy source; generally photosynthetic organisms.
avifauna	Bird life
bank-full flow	The maximum amount of discharge that a stream channel can carry without overflowing.

basin (drainage)	*See* **watershed**
bedrock	The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
benthic	Refers to the bottom sediments and immediately adjacent zone in an aquatic ecosystem.
Best Management Practices	Refer to the most environmentally appropriate techniques for agriculture, forestry, mining, development, urban stormwater management, and other practices that are potential threats to natural resources.
bioaccumulation	The build-up of toxic substances in animal tissue which increases as level in the food chain increases.
biodiversity	The variety of all living things. Can be measured by genetic variability, species richness, or ecosystem complexity.
bog	A plant community adapted to acidic, wet areas. Generally, decomposition rates are slow, resulting in peat formation.
bottomland	Lowland areas generally around waterways.
brine	A saline solution containing high levels of inorganic salts; typically comprises deep groundwater and may be brought to the surface during oil and gas drilling.
calcareous	Describes substances containing calcium carbonate ($CaCO_3$).
carbonate (CO_3)	A substance that bonds to hydrogen ions in any acid, and forms bicarbonate. This reaction reduces acidity and raises alkalinity.
comprehensive plan	A general policy guide for the physical development of a municipality, taking into account many factors including location, character, and timing of future development. A plan provides a blueprint for housing, transportation, community facilities and utilities, and for land use.
conductivity	*See* **specific conductance**
confluence	The meeting of two waterways. The terminal end of the smaller (tributary) waterway at the confluence is referred to as the tributary's mouth.

conservation	The maintenance of environmental quality and resources; resources include physical, biological, or cultural. Ecosystem management within given social and economic constraints; producing goods and services for humans without depleting natural ecosystem diversity, and acknowledging the naturally dynamic character of biological systems.
conservation easement	A legal agreement a property owner makes to restrict the type and amount of development that may take place on his or her property.
contaminant	*See* **pollutant**
contiguous	Adjacent
CPOM	Course particulate organic matter; comprised of dead plant (fallen leaves and woody debris) and animal material (decaying organisms).
darter	Small fish, related to perch and walleye. Most rely on clean, flowing water and silt-free substrate. Some species live in lakes or stream pool habitats.
detritivore	An animal that feeds on dead material (detritus), usually plant material but can include animal material.
dissolved oxygen	Oxygen held in solution in water; utilized by aquatic organisms for respiration. Important indicator of water quality as dissolved oxygen levels often decrease as pollution increases.
dissolved solids	Minerals dissolved in a solution in water; usually reaches a threshold before particles begin to precipitate out of solution. Important indicators of water quality as high dissolved solids indicate an inflow of sediments or other pollutants.
DOM	Dissolved organic matter; organic matter that has been broken down through mechanical and chemical means and is held in solution in water.
droughty	Extremely dry; refers to well-drained soil.

drumlin	A streamlined, spoon-shaped hill of glacial till formed under a moving ice sheet and elongated in the direction of ice movement.
dry dam	Man-made dam that allows normal stream flows to pass through unhindered, but during periods of heavy rainfall or snow melt, higher flows are retained by the dam and released at a pre-determined rate.
ecology (ecological)	The study of the interrelationships among organisms and between organisms, and between them and all aspects, living and nonliving, of their environment.
ecosystem	A discrete unit that consists of living and nonliving parts, interacting to form a stable system. This term can be applied to different levels (e.g. processes that govern a small pond may be the same in a large lake, the ocean, and the earth).
ecotourism	Tourism that highlights the natural resources of an area with emphasis on conservation; the tourism activities are generally designed to be non-threatening to the resources.
elevation	Height above a base point, generally sea level.
emergent marsh	A more or less permanently wet area of mineral soil that contains plants which jut above the water level. Considered *robust* if plants persist above water levels during the non-growing season.
endangered	A classification given to a species that has a low relative abundance and therefore high probability of extinction.
erosion	The movement of soil and rock material by running water, wind, or other natural forces.
eutrophic (eutrophication)	Eutrophication is the process of nutrient enrichment in aquatic ecosystems, particularly lakes. This usually occurs from increasing the supply of nitrogen and phosphorus levels dissolved in water beyond what might be expected from the lake's geological setting, alone.
exotic species	An introduced, non-native species. May be invasive if able to out-compete native species for resources.

extant	Applied to a group of related organisms (taxon), some members of which are still living.
extirpate	To bring a species to extinction in at least part of its range.
fauna	Animal life
fecal coliforms	Gut bacteria common to all warm-blooded animals, including geese and livestock, as well as human sewage.
fen	An area of wet peat that is typically alkaline to only slightly acidic, normally receives mineral-rich groundwater, and gives rise to a unique plant community.
floodplain	The area of a stream or river valley, adjacent to the waterway, that is made up of unconsolidated sediments deposited by the waterway and is periodically flooded.
flora	Plant life
flow regime	The natural processes the govern the movement of a stream or river. Includes water inputs, channel morphology, ground conditions, groundwater, etc.
fluvial geomorphology	The study of how flowing water impacts the land surface.
food web (food chain)	The feeding relationships of organisms within an ecosystem. A food web depicts numerous interconnected pathways for energy flow between an organism and several others. A food chain depicts only a single energy pathway from primary producers (green plants) through a chain of organisms that eat the previous organism and get eaten by the next.
FPOM	Fine particulate organic matter; comprised of organic matter that has been broken down into smaller pieces than CPOM but not yet dissolved.
geology	The study earth's crust development. Rocks, fossils, etc.
glacial drift	Any rock material deposited by an ice sheet of by meltwaters of that ice sheet.
glacial lake	A natural lake formed from glacial processes. Often referred to as a *kettle lake*, however not all glacial lakes are kettle lakes. Kettle lake refers to a lake that was formed when a large block of ice broke off an ice sheet and lay on the ground. The resulting depression after the ice melted filled to form a kettle lake. Lakes may be formed from other glacial processes including gouging

	of the bedrock, blockage of a stream valley, and filling in behind a moraine.
glacial outwash (plain)	Stratified drift deposited by meltwater streams. The outwash plain refers to the deposit of outwash whose surface is a broad, very gently sloping plan.
glacial till	A non-sorted, non-stratified sediment carried or deposited by a glacier.
glaciation	The covering of a large region by ice; ice age.
glacier	A large mass of ice that rests on a land surface and moves through sliding or growing and melting.
glochidia	Young, larval-stage freshwater mussels.
gradient (streams)	Refers to the amount of elevational drop over a stream's course. High gradient streams are fast flowing, typically characterized by rapid sections. Low gradient streams are slow, characterized by pools.
graminoid-forb	Describes a plant community comprised largely of grasses, sedges, rushes (graminoid) and other non-woody species like ferns (forb).
G Rank	A relative scale that describes a species' conservation status throughout the country or world. G1 signifies a species is critically imperiled and a G5 species is secure.
greenspace	An undeveloped area or open space
greenway	Corridor of open space
groundwater	Water that occurs below the Earth's surface; found in pore spaces in rock material. Source of drinking/domestic water for many; also contributes to surface waterways.
Growing Greener	Pennsylvania Legislation recommended by the 21st Century Environment Commission to Governor Tom Ridge in 1998. Invests nearly $650 million between 2000 and 2004 to preserve farmland and protect open space; eliminate the maintenance backlog in State Parks; clean up abandoned mines and restore watersheds; and provide new and upgraded water and sewer systems.

habitat	The place where an organism or biological community lives; usually has physical or biological properties that the organism or community can't exist without.
headwater	Refers to upstream reaches of a stream or river.
heavy metals	Metallic elements on the periodic table with greater molecular weight than iron that can contaminate water and soils and prove toxic to organisms, especially in solution.
hummocky topography	A strongly undulating land surface
hydric	Wet (often used to describe soils)
hydrologic cycle (water cycle)	The flow of water in various states through the atmospheric and terrestrial environments.
hydrologic model (water budget)	A simulation of the hydrologic cycle for a particular waterway that attempts to identify and quantify gains and losses of water.
hydrology	The study of the movement of water (hydrologic cycle) on the Earth; includes surface water and groundwater.
hydrophyte	A plant that is adapted to grow in water or very wet environments.
ichthyofauna	Fish life
impervious surface	Material that water can not penetrate. Refers to concrete surfaces, rooftops, and roadways in urbanized areas. Increased percentages of impervious surfaces increase run-off.
impoundment	Usually refers to a man-made body of water, often through damming a stream or river.
inter-basin transfer	The movement, by human activity, of water from one watershed or drainage to another.
invasive species	A species (often exotic) that is capable of aggressively out competing other species (often native) for resources. Usually results in a monoculture of the invasive species.
kame	A mound composed chiefly of sand and gravel deposited in contact with the ice by meltwaters of glaciers.

karst	Describes an area underlain by limestone and prone to caves, channels, and other voids left from the dissolution of the limestone by water.
lentic	Describes a freshwater habitat of calm or standing water (e.g. lakes, ponds, swamp, and bogs).
limestone	A sedimentary type of rock comprised largely of calcium carbonate and/or dolomite, another carbonate bearing rock. Good buffering capabilities against acidification.
lotic	Describes a freshwater habitat of running water (e.g. springs, streams, and rivers).
macroinvertebrate	Refers to organisms without backbones that are large enough to be seen without magnification and are generally associated with soil or stream substrate.
macrophytes	Rooted plants
marsh	A more or less permanently wet area of mineral soil, as opposed to peat.
mesotrophic	Describes freshwater environments that have nutrient levels mid-way between oligotrophic and eutrophic.
mixing zone	The length of a stream below an input, such as a pipe discharge, where the input mixes with the stream water and becomes diluted.
moraine	An accumulation of till deposited by a glacier.
native	Indigenous; a species that occurs naturally in an area, not introduced by human activity
natural resources	Attributes of an area that occur naturally and provide a benefit to humans. These may be geological, chemical, biological, etc.
nitrogen	An element essential to all plant and animal life. One of the two most important nutrients to the eutrophication of surface waters.
non-point source pollution	Pollution that emanates from various points on the landscape and can not be traced to a single pipe, ditch, or

	discharge. Typically involves run-off from fields, urban areas, mines, etc.
nutrient loading	The input of excessive nutrients like nitrogen and phosphorus to aquatic systems.
oligotrophic	Describes waters that are poor in nutrients and have low primary productivity.
ordinance	A municipal regulation; ordinances can be used to describe zoning, subdivision, and other land use issues within a municipality.
organic enrichment	Refers to excessive organic materials being introduced to a waterway. Organic compounds typically break down into component nutrients, so this process produces similar results to nutrient enrichment.
ornithology	The study of birds
peat	An organic soil or deposit formed when decomposition of organic material is slowed due to anaerobic conditions usually in a waterlogged environment.
periphyton	Organisms attached to or clinging to the stems and leaves of plants or other objects projecting above the bottom sediments of freshwater ecosystems.
pH	pH gives a measure of acidity or basicity.
phosphorus	An element essential to all plant and animal life. One of the two most important nutrients to the eutrophication of surface waters.
physiographic	A term used to describe the physical relatedness of all areas within a given region.
phytoplankton	The plant plankton and primary producers of aquatic ecosystems, typically diatoms and dinoflagellates. Also chlorophyta, chrysophyta, cryptophyta, and cyanobacteria.
point source pollution	Pollution that can be traced to a particular pipe, ditch, or discharge.

pollutant	A by-product of human activities which enters or becomes concentrated in the environment, where it may cause injury to humans or desirable species.
primary producers	Photosynthetic and chemosynthetic autotrophs (mainly green plants including algae and phytoplankton) that utilize nutrients and energy from the sun or chemical reactions to produce organic compounds. These organisms form the beginning of all food chains. Also includes bacteria in anoxic areas (lake sediments, waterlogged soils) that reduce oxidized iron, sulfur, nitrogen and organic compounds liberating ferrous iron, H2S, ammonia, and methane, respectively.
put-and-take fishery	Fish are stocked solely for angling purposes usually because water conditions are only habitable for the stocked species part of the year. Describes most of the trout stocked waters in Pennsylvania.
recharge area	The area that acts as a catchment for any particular aquifer.
relief	Describes the relative degree of elevation change in any given area. Flat areas have low relief as opposed to mountainous areas, which tend to have high relief. Not to be confused with elevation that only measures the height above a certain point, typically sea level.
riparian buffer, zone, or area	Refers to the area of land immediately adjacent to a waterway that acts as a buffer against pollutants running off the land. A variety of plants in the riparian buffer act like a sponge, taking up nutrients and other pollutants from surface and shallow sub-surface flows that could degrade the waterway. Buffer, zone, and area are used interchangeably.
rip-rap	A loose foundation layer of irregular rock fragments or other material used to prevent stream banks from eroding. Usually less desirable than utilizing vegetative stabilization techniques but sometimes required for severe erosion problems.
river mile	A term used in the DEP Pennsylvania Stream Gazetteer to identify distances on a stream or river. River miles are measured from the mouth of the stream or river, which is designated river mile 0 for that waterway.

runoff	Water from wet deposition (rain or snow melt) that flows over the surface of the ground to a receiving waterway. May carry high levels of sediment, nutrients, and other pollutants.
sandstone	A type of sedimentary rock, formed of a lithified sand bound together with a mud matrix and a mineral cement. Contains little or no natural buffering capabilities against acidification.
scrub-shrub wetland	A more or less permanently wet area where the water table is low enough to allow woody shrubs to dominate.
sedimentation	The build up of detached soil particles in nearby waterways.
sedimentary	Describes rock formed by the deposition and compression of mineral and rock particles, and often including organic material. This is the rock type that would have been laid down layer after layer on the bottom of ancient seabeds.
sediment deposition	Laying down of detached particles, including soil Dead plant and animal remains, chemical precipitants, pollen, inorganic road dust, etc., from the watershed or formed within the waterbody.
seep wetland	A dispersed flow of water above ground level that occurs where the water table intercepts the ground surface. Similar to a spring with no obvious flow. Often gives rise to unique plant communities depending on the groundwater chemistry.
shale	Fine-grained, fissile, sedimentary rock composed of clay-sized and silt-sized particles of unspecified mineral composition.
silt	Class of finest-grained mineral soil particles.
siltstone	A lithified silt
silviculture	The management of forests or woodlands for the benefit of the entire ecosystem. More comprehensive than forestry.
siphon (incurrent, excurrent)	Refers to the appendages used by freshwater mussels for drawing water into their bodies (incurrent) for the purpose of food and oxygen extraction and expelling water from their bodies (excurrent).

Smart Growth	A current movement that focuses on redevelopment of established urban areas and other ways to reduce sprawl pressures on undeveloped countrysides.
species	A taxonomic group of individuals that can interbreed within the group but not with members outside the group (i.e. other species).
species of concern	An organism considered rare, threatened, or endangered at the state or federal level and tracked by the Pennsylvania Natural Diversity Inventory Program.
specific conductance	Specific conductance measures ionic material dissolved in the water.
S Rank	A relative scale that describes a species' conservation status throughout the state. S1 signifies a species is critically imperiled and a S5 species is secure.
stormwater management	A program designed to preserve and restore the flood-carrying capacity of Commonwealth streams; to preserve, to the maximum extent practicable, natural stormwater runoff regimes and natural course, current, and cross section of water of the Commonwealth; and to protect and conserve ground waters and ground water recharge areas.
stratification	In aquatic terms, refers to the arrangement of lake water into layers. The upper layer, or epilimnion, is generally warmer, oxygen-rich, and contains the bulk of primary production. The bottom layer, or hypolimnion, is generally colder, oxygen-depleted, and low in primary production. The area in between is known as the mesolimnion. Stratified lakes mix twice yearly, known as turnover, and replenish nutrients and oxygen to the hypolimnion.
sub-basin	*See* **sub-watershed**
subdivision and land development regulation	Subdivision is the creation of new property lines, while land development involves the construction of public or private improvements. The major purposes of subdivision and land development regulations are: to provide adequate sites for development and public use; to maintain reasonable and acceptable design standards; and to coordinate public improvements with private development interests.

substrate	The layer of material on the bottom of a stream, river, or lake utilized as habitat by benthic organisms.
sub-watershed	The watershed of a tributary stream; it is a sub-unit of the receiving stream, river, or lake's watershed.
successional stages	Sequential changes in vegetation and the animals associated with it, either in response to an environmental change or induced by the intrinsic properties of the organisms themselves.
Superfund site	A hazardous waste site placed on the Superfund National Priorities List and financed for clean up by the U.S. EPA.
suspended solids	Material retained on a filter after passing a water sample. In lakes and streams this would include phytoplankton and bacterial cells, fecal pellets from zooplankton and seston (non-living particles). Elevated levels of suspended solids may indicate erosion upstream.
swamp	A shallow wet area that is usually covered by standing water all year.
taxon (pl. taxa)	A group of related organisms of a taxonomic rank (e.g. family, genus, or species).
terrestrial	Pertaining to dry land
terminal moraine	A deposit of till at the front end of a glacier signifying the furthest advance of the glacier.
threatened	A classification given to a species that could potentially go endangered.
TMDL	Total maximum daily load; a limit for pollutant load placed on a waterway by DEP. TMDLs are determined for a waterway based on how much pollutant it is determined that the waterway can assimilate. TMDLs will be used to regulate the percentage of total pollutant load that each source in a watershed can contribute.
topography	Describes landscape features of an area.
transpiration	The loss of water vapor from plants to the atmosphere.
tributary	A stream that feeds into another (receiving) stream, river, lake, or ocean.

turbidity	The presence of suspended sediments in water that causes a loss of transparency.
turnover	Mixing of lake waters during the spring warm-up and autumn cool down. Once stratified layers in a lake reach equal temperatures, wind causes the layers to mix. Turnover replenishes oxygen to the lower lake levels.
Unassessed Waters Program	U.S. EPA mandated program requiring states to assess all streams for pollutants. Pennsylvania DEP administers the PA Unassessed Waters Program.
unconsolidated	Loosely occurring, not bound together or formed from solid rock.
upland	Higher elevation areas, usually away from waterways.
veligers	Young larval-stage zebra mussels
watershed	The area from which a surface watercourse or groundwater system derives its water. The area is usually bound by high points and all water within the area runs downhill to a common receiving body of water. This term can be applied to any scale; a tiny stream has its own watershed but that stream and many other streams are part of a larger river system's watershed.
water table	The upper surface of groundwater; or the area below which the soil or rock interstices are saturated.
wellhead protection area	Wellhead is the well location and the recharge area for the well is designated as a protection area. Threats to the groundwater are identified within the protection area and measures are taken to remove the threats.
wetland	Variously defined but generally can be described as all open water habitats and seasonally or permanently waterlogged land areas.
zoning ordinance	A municipal ordinance that divides all land within the municipality into districts, and creates regulations that apply generally to the municipality as a whole as well as specifically to individual districts.

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Appendix A

French Creek Conservation Consortium
Organized by French Creek Valley Conservancy

Prominent partners collaborating to address conservation needs in the French Creek watershed

Allegheny College ~ Creek Connections ~ Watershed Conservation Research Center
Allegheny Valley Conservancy
Chautauqua County Soil & Water Conservation District
Chautauqua Watershed Conservancy
City of Meadville
Crawford County Conservation District
Crawford County Planning Commission
Ducks Unlimited
Edinboro Lake Association
Erie Bird Observatory
Erie County Conservation District
Erie County Planning & Community Development
Findlay Lake Nature Center
Foundation for Sustainable Forests
French Creek Valley Conservancy
Friends of Erie National Wildlife Refuge
Mercer County Conservation District
Mercyhurst University
Penn State Extension
Pennsylvania Department of Conservation & Natural Resources
Pennsylvania Department of Environmental Protection
Pennsylvania Fish & Boat Commission
Pennsylvania Game Commission
Pennsylvania Organization for Watersheds and Rivers
PennWest University Edinboro
Richard King Mellon Foundation
Seneca Nation of Indians
Sherman (NY) Chamber of Commerce
The Nature Conservancy
Tom Ridge Environmental Center
Trout Unlimited
Union City Borough
U.S. Army Corps of Engineers
U.S. Department of Agriculture ~ Natural Resources Conservation Service
U.S. Fish & Wildlife Service ~ Erie National Wildlife Refuge
Venango County Conservation District
Western Pennsylvania Conservancy

Appendix B

Public Comments Received Throughout the French Creek Watershed Conservation Planning Process

From: Brenda Costa <brenda@frenchcreekconservancy.org>
Sent: Tuesday, October 22, 2024 12:17 PM

Cover Photo- Should be of French Creek and not Lake Pleasant

Page 2- some FCVC activities are outlined, but not a mention of the school programming, and other programs. Is the purpose of this text to explain our programs or something else? Odd reference to the Foundation for Sustainable Forests (regarding Woods & Waters) and not elsewhere in the plan.

Page 8- the map does not have Little Sugar as a sub-basin but lists Wheeler Creek. Map does not show French Creek in NY'

Page 10- Does not show creek in NY

Page 17- The community groups section does not include CARE- Cochranton Area Redevelopment Authority, CREATE Cambridge Springs. Are others missing?

Pages 19, 21- Creek in NY not shown.

Page 22- Fens- Harmonsburg Fen in Crawford County, designated as an exceptionally significant biodiversity area by PNHP, conserved by FCVC. Also, no mention of Conneaut March, the largest marsh complex in Pennsylvania and designated as an exceptionally significant biodiversity area by PNHP. The entirety of the marsh is designated as an Audubon Important Bird Area.

Page 24, 25, 28, 30, 33, 34, 37, 42, 44, 46, 62, 66, 80- Maps exclude NY section of creek

Page 37- Little Sugar not shown or listed as sub-basin. Wheeler Creek listed.

Page 57- What is that photo?

Page 68- what is this photo? Looks like a lake.

Page 78- Vegetation- listing of invasive species does not include Japanese knotweed, multiflora rose, hydrilla, etc. which are significant issues in the watershed.

Page 89- why a picture of school ballfield?

Page 95- Invasive Species- Plants. Not a comprehensive list and doesn't highlight the most pervasive species.

From: Annie Maloney <amaloney@foundationforsustainableforests.org>
Sent: Wednesday, October 16, 2024 11:42 AM

Executive Summary

- **Page 4, Land Resources:** You give due attention to agricultural activities on the land, but it feels like two important components are missing: 1) the role of the forested

watershed in stream health, and 2) the role of the forest products industry in the economy within the watershed. I do see mention of BMPs in logging at other points in the summary, but it feels like they are not grounded with a solid introduction to the lay of the land when it comes to the watershed's forest ecosystem and economy. I see the overview on page 11 of the full Plan draft, but I think it warrants more mention in the Executive summary, particularly since forests comprise the majority of the watershed area. Similarly, I see specific goals around preserving the agricultural character of the region in the full report, but I don't see the same for forestry.

Full Summary

- With respect to alternative energy sources, I am curious about what conversations have been had about naming solar installations in the watershed as a potential threat to French Creek? The clear-cutting of forests in the watershed for solar should be a concern to the watershed's integrity. This one is tricky; there is no doubt that solar installations are a net positive for the global carbon picture, but *locally* we should be concerned about the loss of diverse habitat within natural lands to those installations.

- I see mention of threats to forest regeneration, and threats of invasives, mentioned in the plan with respect to forests. That is great and important. However, I think equally important is identifying that the lack of forest age diversity poses a threat to the upper watershed. This vein of thought would introduce a rich discussion about the role of sustainable forest management in cultivating forest age diversity and thus ecosystem/watershed resilience.

- This is a bit nuanced, but Crawford County houses some critically important low-grade timber operations (ex. Jacob Weaver company, large pallet manufacturer), which makes ecological forestry possible. Without those markets, there is no immediate economic incentive to practice sustainable forestry. Encouraging the persistence and improvement of a robust low-grade timber industry in the region is part of encouraging long-term health and resilience in the forested watershed.

- **Goal 4-B** - I think it would help all of us (especially with respect to grant-seeking) if this section acknowledged the scarcity of forest (or ag) management plan writers, and the need to cultivate a pipeline of certified plan-writers to unlock federal funds.

- **Goal 4-C,#5** - minor typo, I think you main "by maintain**ing**"

- **Goal 4-C, in general:** I would love to see, in addition to "discouraging", a more positive twist in which the goal includes ***encouraging*** forest managers to enhance the age and structural diversity of the region's forests, which would by proxy also improve tree species diversity. This suite of "diversities" would contribute to overall ecological/climate resilience in the watershed.

- I don't see any mention of forest carbon offsets in the Plan, yet there is the potential for those markets to establish a presence in the watershed which (bear with me) could impact the forest landscape in terms of management, harvest cycles, etc. I ask this question without a, agenda and with genuine curiosity: Like solar installations on the landscape, should this plan address the availability of carbon programs for private forest

landowners, their potential impacts on the landscape, and set a goal or two around landowner outreach and education?

From: Ann Sand
Sent: Tuesday, September 10, 2024 4:20 PM

- FCVC is missing a vision / mission or goals. I suppose they will fill that in?

- On the list of FC Consortium partners, the Friends of the ENWR is mentioned. This friends group is no longer active and hasn't been for more than 5 years that I know of. DU = DU, Inc., PA Environmental Council (PEC) was missing from the list.
- P. 1 –You may want to consider removing the reference to "the masses" although I know what you are getting at, it may offend the local citizens.
- P. 41 – WPC's work at Lake Pleasant pre-dates the FC Collaborative or FC Consortium.
- P. 48 – you may want to check with Dan Brumagin on uses allowed at Union City Reservoir. It is not as open to the public as it once was. P. 65 Are the number of bird species the same as in the 1st FC Watershed Plan? Since there is a decline in birds overall, I would be surprised if it is.
- P. 77 bald eagle was removed from the federal End. Species list. **Current Status:** In Pennsylvania, the bald eagle is protected under the Game and Wildlife Code. Although no longer listed as endangered or threatened, the bald eagle is protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Protection Treaty Act. P. 83 paragraph 2 – the "FC Canoe & Kayak" hasn't been in business for many years. The land is privately owned and not open to the public.

From: Andrew Zadnik
Sent: Tuesday, September 10, 2024 2:05 PM

- Page 6: It is stated that the report disputes a theory attempting to explain the high biodiversity of French Creek. It's an interesting statement, and I'm not familiar with the background or potential controversy. I wonder if more explanation is warranted later in the report.
- Page 13: There's reference to community revitalization, but it's not clear what is being revitalized or why it's needed. Do you mean to compare examples of what could be considered poor land-use planning (or a lack thereof) with the efforts of Union City and Waterford that you go on to describe?
- Page 18 (and 39): Titus and Wattsburg Bogs is still the name of the National Natural Landmark. It's comprised of a portion of our Wattsburg Fen Natural Area as well as Titus Bog, which is jointly owned by Presque Isle Audubon and the Botanical Society of Western PA.
- Page 23: Does the acreage of WPC land available to the public include those easements that require public access? I didn't double-check the acreage, but am just wondering.
- We have easements on a few Gamelands, but I wouldn't worry about double-counting. There's also the Bentley Run Wetlands easement, which is almost 350 acres. You could consider mentioning that easement on Page 48, since it's adjacent to Union City Reservoir.
- Page 24: Could the map be revised to include all protected lands, or at least those protected lands that are open to the public? Also, I wonder if the trout streams would be more appropriate to show on another map, maybe in the Water Resources chapter.

- Page 25: There's reference to accredited land trusts. You may want to explain what that means – (accredited through the Land Trust Alliance Accreditation Commission).
- Page 43: Note that WPC owns approx. 70% of the Lake Pleasant shoreline and over 500 acres of the surrounding watershed. Public access is maintained on the eastern shoreline via a cooperative license agreement between PFBC and WPC, and on the western shoreline via a WPC-maintained dock and canoe launch. Also, to help reduce the risk of invasive species introduction, the use of live fish as bait is now prohibited.
- Page 56, Monitoring: The USEPA has added Lake Pleasant to its Regional Monitoring Network for freshwater inland lakes. In 2022, it set up a weather station on WPC's property, and it has proposed installing continuous water sampling sensors in the lake. I don't know what the current status is.
- Page 65, Mammals: River otter and fisher have been confirmed along Cussewago Creek, and otters are likely in Lake Pleasant. You may want to update Appendix F to include fisher. Also, the rare least weasel has been confirmed in the watershed (Charlie E. would have more info.).
- Page 67: the Pennsylvania Amphibian and Reptile Survey began in 2013.
- Page 69, Fish: Do you want to mention round goby as a threat, and list it in Appendix G?
- Page 73: Perhaps under Mussels or Others, do you want to mention the invasive Chinese mysterysnail? It could also be mentioned on Page 97.
- Page 106: Will there be an attempt to complete the Priority column in Table 12?

From: avcinfo <avcinfo@windstream.net>
Sent: Thursday, October 31, 2024 2:25 PM

Page 261 – Please revise Debbie Frawley's comments to read:

……They also got a donation of 23 acres ~~east of Sandy Creek~~ along East Sandy Creek east of the Rockland Cranberry Road that is open to the public near the bike trail with camping and good trout fishing.

Page 291 – Protected Lands

Buttermilk Bluffs – please also add a link to the AVC website: avc-pa.org

Stanley-Goodblood – please also add a link to the AVC website: avc-pa.org

Page 310 – Allegheny Valley Conservancy contact information

Please delete the phone number. It is no longer active. AVC does not have a public phone number.

From: Brian Pilarcik <brian@crawfordconservation.org>
Sent: Thursday, October 3, 2024 2:54 PM

"The French Creek Cooperative Weed Management Area was formed as a coalition of state, federal, and private resource managers to work together in the French Creek watershed to reduce the presence of invasive plants. They developed a Cooperative Weed Management Plan for French Creek in 2019. Now, the Crawford County Invasive Species Advisory Council plays

this role. They share information about the identification and management of invasive weed species, educational opportunities for landowners and land managers, develop common management objectives, set realistic management priorities, facilitate effective treatment, and coordinate efforts over geographical and municipal boundaries with similar land types, use patterns, and problem species."

That is not entirely accurate. FCCWMA is loose coalition of local organizations that currently informally share resources and information on invasive species in the watershed. FCCWMA does conduct active management projects, but rather acts as a way to foster collaboration among those interested in common goals. FCCWMA is not especially active. The PACD Partnership for Invasive Species Management (PRISM) Pilot Project is active https://pacd.org/?page_id=25429 Erie, Crawford, Mercer, and Venango counties within the French Creek watershed are participating in the pilot project with both outreach and active management. The Crawford County Invasive Species Advisory Council is just the designated PRISM advisory group in the county. Each of the other counties in the watershed has a similar advisory council.

There are a couple newer invasive species infestations that are not mentioned in the documents that are especially concerning. Conneaut Lake now has Cabomba, Zebra Mussels and Hydrilla infestations. Zebra Mussels and cabomba are established, but hydrilla is currently in the EDRR stage. Conneaut Lake Aquatic Management Association is coordinating the EDRR activities related to hydrilla in the lake. State Game lands 213 (Conneaut Outlet) is infested with European Frogbit (EFB) and Cabomba. European Frogbit is fairly new to PA and has the potential to have a significant negative impact on native plant and animal communities in the watershed. To my knowledge there is currently no active response to EFB or Cabomba in SGL 213. You would have to confirm that with PGC.

From: Charles Bier
Sent: Friday, November 22, 2024 12:17 PM

I thought it might be good to have something said about the brook trout in the plan. If you agree . . . I talked to John Berger about the French Creek drainage. He provided me with the attached 3-column spreadsheet (not the one with "edited" in the title) and attached map. I revised the spreadsheet into the attached one (labeled "edited") and used it in the Word document. For the Word document, I wrote up some information and inserted the edited table and a clipped version of the map.

the name "Pennsylvania Natural Diversity Inventory" and "PNDI" should be replaced everywhere with "Pennsylvania Natural Heritage Program" and "PNHP", beginning in the Table of Contents, on page 78, and elsewhere.

From: Charles Bier
Sent: Friday, November 01, 2024 9:49 AM

on pages 73 and 247, I noticed this interesting species: Tippepaddlecraft darter, *Etheostoma tippepaddlecraft*. Of course, this is referring to the Tippecanoe darter, *Etheostoma Tippecanoe*

From: Casey BradshawWilson <cbradshawwilson@allegheny.edu>
Sent: Thursday, October 3, 2024 2:26 PM

1. Table 5 is inaccurate with regard to some of the darter conservation statuses, common/latin names. For example, it's Tippecanoe darter (not Tippepaddlecraft). And as far as I know, many of the darters were delisted in 2015 and have remained delisted.
2. Zebra mussels are also in Conneaut Lake and in higher concentrations than Edinboro. I think getting the ranges correct is really important.
3. Longnose Gar is still in Conneaut Lake today (you have that it was last documented in 1938).
4. I'm pretty sure that the Blackchin shiner is still found in Lake LeBoeuf and Lake Pleasant. It would be important to ask Doug Fischer (PFBC) this question.
5. A colleague of mine at Allegheny College found the blacknose shiner in 2014 and 2015 (near West Branch). Research scientist for WCRC, Mark Kirk; PFBC confirmed.
6. Redfin shiner is still found too (Cussewago Creek).
7. Warmouth is still found.. I just caught one in July. LeBoeuf Lake, Conneaut Lake, etc..
8. I already commented on the round goby paragraph. But the second paragraph reads "They outcompete native darters and fresh mussels, threatening their populations." This should be changed to "They may outcompete native darters and affect freshwater mussels both directly through consumption and indirectly through impacts to host species."

This section really should be verified by Doug Fischer (PFBC) before publication and the Fishes of Pennsylvania book is another good place to start (published in 2016 by Doug Fischer, Jay Stauffer and Rob Criswell).

On Thu, Oct 3, 2024 at 12:16 PM Casey BradshawWilson <cbradshawwilson@allegheny.edu> wrote:

Round goby: Another relatively new invasive species that has been documented in the French Creek watershed is the Round Goby (Neogobius melanostomus), a benthic species that is a small fish, feeding on mussels (or you could just say bivalves b/c they'll eat Asian clams, etc...), aquatic insects and fish eggs. In the French Creek watershed, Round Goby may outcompete a vast number of native species such as darters, sculpins, and catfish. It was first introduced into the Great Lakes around 1990 by being released through the ballast waters on large freighter ships where it was picked up most likely from its native range in Eurasia. The high adaptability to a variety of habitat has led to an extremely high abundance and distribution within the Great Lakes, greatly changing the ecosystem. Negative economic and ecological impacts have been a constant issue since its introduction. It was first noted within the French Creek watershed in 2013 in LeBeouf Lake, and by 2016 had made its way to the mainstem of French Creek. This introduction likely occurred through bait bucket transfer.

French Creek Watershed Conservation Plan Update 2024 – Draft

Comments from Crawford County Planning

Please update Table 1 page 15 – List of Municipal Planning and Development Controls for Municipalities with the attached list updated in 2024.

Goal 1-B 5. – Not sure what you mean by this. Make it more specific and related to the watershed.
Goal 1-C – Is a very good goal, but why is it in a watershed conservation plan?
Goal 1-E 2. – Be more specific; what type of non-road issues?
Goal 1-K – Also a very good goal but why is it in a watershed conservation plan?
Goal 2-C 2. – is not worded well. Possibly re-word to:
"Assist property owners to research mineral rights and encourage the purchase of these rights if feasible."

Goal 2-E 2. Is a repeat of 2-E 1.
Goal 2-H 3. – Gas well brine and AMD are different things.
Goal 2-J – add PA Fish and Boat Commission to the possible funders
Goal 2-J 2. – spelling of word work
Goal 2-L can be combined with Goal 2-F
Goal 3-B 3. and 4. repeat 1.
Goal 3-H 6. – spelling of word free
Goal 4-C 5. – wording – use maintaining
Goal 5-A 2. – wording – use tourists
Goal 5-A 8 – wording – use breakfasts
Goal 5-B 6 – wording – use multiple
Goal 5-E 3. – wording – use free
Goal 5-H 1. – wording ?
Goal 5-L 6. – wording – use French Creek
Page 291 Protected Lands – Crawford County Fairgrounds website is:
https://www.crawfordcountyfairpa.com/
Page 310 Crawford County Planning Office is no longer on the third floor. Just remove that part.

From: Wendy Kedzierski <wkedzier@allegheny.edu>
Sent: Monday, October 21, 2024 10:46 AM

I appreciate the inclusion of Creek Connections in the Water Quality section, but I want it to be clear that our monitoring is for EDUCATIONAL purposes and we work with lots of schools outside of the weatershed. It's probably most appropriate to put the WCRC paragraph above ours because they are the research project and we are the education project.

Here are my edits to the paragraph about Creek Connections

Creek Connections is an environmental education outreach project operated from of Allegheny College in Meadville that works with ~~French Creek elementary,~~ middle~~,~~ and high school classes to monitor stream sites near their respective schools. Sites are regularly monitored by students and the data is obtainable online at http://creekconnections.allegheny.edu/. The program has been working with students on using water quality monitoring as the basis of watershed education for students ~~in French Creek~~ since 1995. It was originally called the French Creek Environmental Education Project. The students routinely perform field analyses for temperature, pH, total dissolved solids, dissolved oxygen, nitrogen, phosphorus, alkalinity, and turbidity~~, sulfates, and iron, as well as, doing visual assessments of the stream conditions~~.

At the end where all partners are listed with contact information - our website incorrect so the link doesn't work it should be: http://creekconnections.allegheny.edu/

From: Laskaris, John (Yianni) <john_laskaris@fws.gov>
Sent: Tuesday, October 15, 2024 12:24 PM

Erie NWR Comments – French Creek Watershed Conservation Plan Update 2024

Executive Summary Comments

- Page 5 – Erie NWR's total acreage is 8,959 acres.

- Page 5 – No mention of public scoping efforts taken by the USFWS in 2023 to potentially establish new refuge in the French Creek Watershed
    - https://www.fws.gov/project/evaluating-new-refuge-lands-french-creek-watershed
    - Consider speaking with our Refuge Manager, Vicki Muller, about noting this.

- Page 6 – Erie NWR boundary layer is not updated, large parcel ~150 acres in size in middle of Seneca Division acquired in 2021 is missing. I can share a SHP with you if you need access to this updated layer.

- Page 10 – As of 2022, the refuge conducts water quality monitoring as part of its inventory and monitoring program, predominantly focused along Muddy Creek and its tributaries, as part of monitoring for stream health and T&E freshwater mussel populations.

- Page 12 – Was Tippecanoe darter's common/scientific name changed to Tippepaddlecraft recently? Not seeing any resources pointing to this, so if you have a resource I could look to, that would be awesome.

- Page 27 – Erie's new office number is 814-580-9983, and Erie's homepage updated in 2022 is https://www.fws.gov/refuge/erie , so not the old link (www.erie.fws.gov).

Full Plan Comments

- Page 75, Table 7: Freshwater Mussel Species Recorded from the French Creek Watershed
    - Longsolid is federally threatened as of March 9, 2023
        - https://www.fws.gov/species-publication-action/threatened-species-status-section-4d-rule-longsolid-and-round-hickorynut
    - Salamander mussel is proposed for listing as Endangered, proposed on 8/22/23. https://www.fws.gov/sites/default/files/federal_register_document/2023-17668.pdf

- Page 79 - Freshwater Mussel Species of Concern
    - 6 species are currently listed as threatened or endangered under the ESA, with salamander mussel currently in proposed status.

From: Luke Brooks <luke@frenchcreekconservancy.org>
Sent: Wednesday, October 9, 2024 11:03 AM

Looking through the list of FCVC's properties in appendix K, there are a few newly acquired properties missing and a couple that we renamed. Most of the acreages are off as well. I've attached a spreadsheet that has the correct properties, names and acreages.

Aikin Easement	15.6
Bemus Mill	17.783
Black Bridge	49
Brock's Lookout	9.88

Buttermilk Bluffs	191
Cambridge Landing	0.22
Concilus	147.19
Conneaut Lake Wetlands	76.76
Culbertson	3.7
Cussewago Bottoms	*100*
Cussewago Meanders	191
Fette Island	42
Firth Easement	63.5
Forrest Acres	80
Greendale Cemetery	75.15
Harmonsburg Fen*	33
Hayfield Hollow	41.013
Hemlock Bend	28.75
Hickory Flats (Rename of Huber)	101.3
Jane and Gene Morton	350
Kayden's Landing	15.796
Lavier	60
Lew's Land	47.5
Lobdell	17.63
Logue Island	5
Lunger	0.85
Lupher's Landing	4
Lutz	13
Mammoth Run	86.19
Marsh Easement	41.4
Merritt's Landing	0.845
Moss	5.47
Moss Woods	65
Old Stone Quarry	5.5
Raup Wildlife Sanctuary	31
Robert Brace Nature Reserve	21.267
Rocky Run Ravine	8.26
Scarlett Spring Run conservation area	111
Shryock Bailey Connector	17
Smith Tract	45
Smock Riverwalk	6
Spring Street Management Area	51
Stanley Goodblood	458
State Easement	19.07
State South	100.62
Stull Cunningham	20
Sugar Creek Landing Holden	126.6

Sugar Creek Landing VNA	40.78
Venango Woods	14.1
Vernal Pool Preserve	21
Walkers Landing	60.19
Wolf Run Farm	134
Weyel	42.45
Burkholder Easement	87.174
Round Top Forest	97.196
	3,497

P. 1

French Creek Valley Conservancy serves as the regional coordinator and liaison for watershed conservation actions, advocation, education and outreach. Since 2009, they have moderated the

If the antecedent in the second sentence is French Creek Conservancy then the subject should be “it” not “they”.

annual French Creek Conservation Consortium, which brings together public, private, and non-profit conservation stakeholders from throughout the watershed to update each other on their current projects, identify new sources of funds or partners, avoid the duplication of efforts, and

“its” not “their”.

P. 2

The update to this watershed conservation plan was completed in 2024 with the purpose to serve as a current reference to information about the region, to catalog up-to-date resources and data, highlight accomplishments realized over the past two decades, identify continuing and immerging challenges, and list potential partners who may support fundraising for natural resources conservation and community revitalization initiatives in French Creek. The primary

Lack or parallelism (…purpose to serve,…to catalog,…to highlight,…to identify,… and to list)

P. 3

sections of the watershed. Vertical relief increases from the northwest to the east, the southwest, and the south.

Specify “topographic relief”

P. 4

Little Sugar Creek, Conneauttee Creek, and Woodcock Creek are missing from map although they are listed among the “Major Tributaries” on P. 7

P. 7

Natural resources pressures and species distribution may differ significantly between sub-basins, requiring different solutions to natural resource restoration, maintenance, and enhancement needs.

When comparing more than two, use “among” not “between”.

P. 8

Again, the three watersheds missing from the map on P. 4 and also missing from this map.

P. 9

The northern portion of the French Creek watershed is a changing landscape. The watershed is seeing increasing suburban development from the city of Erie. This trend brings about an increase of impervious material as parking lots and roadways increase thus increasing the

Impervious surfaces, not impervious material

Compared to 2012 data, this data represented a 19% decrease in the number of farms, a 15% decrease in the overall acreage of farmed lands in the county, and a 6% increase in the average size of farm.

and,

area of 53,338 acres. Compared to 2012 data, this data represented a 12% decrease in the number of farms, a 13% decrease in the overall acreage of farmed lands in the county, and a 2% decrease in the average size of farm.

"data" is the plural of datum. So," these" data, not "this" data.

P. 17

Waterford Economic Community Action Network (W.E.C.A.N.) is a volunteer-supported, nonprofit civic organization working closely with Waterford Borough and Waterford Township that has come together to make a positive impact on their community. Their mission is to support the efforts of other nonprofits, help promote local businesses and engage with others in a way that will help their community thrive. Their volunteer committees focus on revitalizing different parts of their community, including outdoor recreation and artistic beautification projects. They highlight local businesses, kayaking, fishing, and boating opportunities on Waterford's various waterways, including the French Creek Water Trail.

If the antecedent is the paragraph is the Network, then "its" mission, not "their" mission. Ditto "its" volunteer committees, not "their" volunteer committees. And "It" highlights local businesses, not "they".

P. 20

Conneaut Lake, the largest natural lake in the Commonwealth, is located in western Crawford County. Just east of

Conneaut Lake is the largest by area only. Harvey's Lake in Luzern County is larger by volume. Also on P. 49.

P. 47

Lake Pleasant faces many threats within its roughly 2.7-square-mile watershed. Mineral extraction in the form of sand and gravel mining pose threats to groundwater levels and chemistry. The lake is fairly nutrient-rich and faces the threat of over-eutrophication by the influx of nutrients, primarily nitrogen and phosphorous, from runoff associated with climate

The correct spelling of the element is "phosphorus". Phosphorous is a adjective (analogous to nitrogen and nitrogenous.

P. 55

plant and animal communities that rely on the flow of high quality groundwater. Nutrients, such as nitrogen and phosphorous, and other pollutants such as herbicides and pesticides, can infiltrate

Again, phosphorus misspelled.

P. 56

watershed is high in calcium carbonate ($CaCO_3$), as well as dolomite, another carbonate-rich material. This leads to the alkaline nature of water in the French Creek watershed.

You want the word “alkalinity” here, NOT “alkaline”. Alkalinity refers to the buffering capacity of water, largely through the effects of both bicarbonate (HCO3) and carbonate (CO3). Alkaline refers to pH. Most of the lakes and streams in the FC basin have circumneutral pH yet have very high alkalinity due to dissolved bicarbonate. Carbonate is not present below pH 8.3.

P. 57

1995). Lakes within the watershed, which are lentic (standing water) environments, rely much more heavily on primary production by autotrophs. In these instances, the limiting nutrients for primary production are usually nitrogen and phosphorous.

Phosphorus, NOT phosphorous.

Eutrophication is the process of nutrient enrichment in aquatic ecosystems. This usually occurs with rising nitrogen and phosphorous levels, two of the most important nutrients in an aquatic system. This process occurs naturally over time and is especially evident in lakes.

Phosphorus misspelled again.
Eutrophication has nothing to do with time. Lakes in granitic basins will remain oligotrophic indefinitely without anthropogenic loading of P. Nearby lakes of the same age, but in sedimentary or metamorphic basins will naturally have higher P concentrations. Eutrophication is caused by nutrients, NOT time. Paleolimnological analyses of lakes have demonstrated that P concentrations actually DECREASE with time in the absence of human activities. I will attach an essay with further information.

P. 58

dissolved oxygen. These lakes are generally considered geologically young with little exposure to

All lakes in the FC basin are essentially the same age, about 12.5K years old formed by the most recent glacial retreat. How can relatively mesotrophic Conneaut Lake be geologically younger than eutrophic Edinboro Lake?

As lakes age, they collect sediments through run off. These sediments carry nutrients that provide for the growth of primary producers like photosynthetic aquatic plants and algae. As nutrient levels rise, lakes become mesotrophic, or midway through the eutrophication process. At some point, nutrients are so plentiful that they no longer become the limiting factor for plant growth in an aquatic system. These aquatic systems are said to be eutrophic and may continue to the point of being hypereutrophic. When this occurs, plant production becomes so high that the water is depleted of oxygen during plant respiration and

This paragraph is inaccurate and needs to be rewritten. It leaves the impression that eutrophication is inevitable and will occur in all lakes with sufficient time. See the linked essay mentioned above.

Portions of French Creek have been historically degraded by sewage discharges from Meadville, West Mead Township, and Cambridge Springs' sewage treatment plants. Portions of French Creek have been listed as impaired in the PA 303(d) list of impaired waterways.

Also sewage treatment plant discharges (without tertiary treatment) from Saegertown, Waterford, Union City, Cochranton, Edinboro and Conneaut Lake. All of these discharges are rich in phosphorus and nitrogen.

P.61

Allegheny and Monongahela rivers basins was discontinued in 1998. Water quality parameters monitored included pH, temperature, specific conductance, dissolved oxygen, hardness, alkalinity, nitrogen, phosphorous, solids, and many major anions and cations. As part of the

students in French Creek since 1995. The students routinely perform field analyses for temperature, pH, total dissolved solids, dissolved oxygen, nitrogen, phosphorous, alkalinity, and

Phosphorus misspelled

P. 63

Public/Private

Approximately 67 percent of watershed residents receive drinking water from a community or public water supply. Approximately 17 percent of those

"Drinking/domestic water" only, or domestic water (to include washing, cooking, bathing, waste disposal)?

P. 67

Withdrawals of both groundwater and surface water within the French Creek basin were estimated by USGS in 1990. These figures do not include withdrawal for public drinking water, which was already discussed.

County uses Eaton Reservoir (French Creek watershed) for their drinking water supply and the water is transported to the Lake Erie basin via pipes, resulting in a net loss of water for French Creek. Currently, North East is in the process of installing an intake pipe from Lake Erie to their water filtration plant to supply drinking water. This will significantly decrease the need for the borough to utilize Eaton Reservoir for their drinking water supply.

"public drinking/domestic water" only, or "domestic water" to include washing, cooking, bathing, waste disposal.

P. 77

The zebra mussel (*Dreissena polymorpha*), a non-native freshwater bivalve, was first discovered in the French Creek watershed in October 2000 when it was discovered in Edinboro Lake in Erie County. The zebra mussel is a pervasive exotic species that first came to North American waters

Currently found in Conneaut Lake. Nearby, a few individuals were collected in Canadohta Lake in 2004, and a major infestation in Sandy Lake that has since declined.

mid-1980s where it quickly increased in numbers to the point of clogging power plant, industrial and public drinking water intakes, fouling boat hauls, and disrupting the aquatic ecosystem of the Great Lakes.

boat hulls?

P. 78

in disturbed areas and once established, can quickly out-compete native plants. Native aquatic plant communities are also at risk from the introduction of invasive Eurasian water-milfoil to lakes and streams in the watershed. This plant, found in many French Creek lakes, is a continuing threat to those lakes that contain many rare, threatened, and endangered native aquatic plants. Spread primarily by pieces attached to boat hulls, trailers, and propellers, once introduced, this plant can spread rapidly and out-compete native flora.

The invasive plant *Hydrilla* has become established in Conneaut Lake. *Potamogeton crispus* has been established in most FC lake for some time. *Cabomba caroliniana* is working its way north due to climate change and is a problem in Conneaut Lake.

P. 82

The French Creek watershed is home to 97 vascular plant species of concern. Many of these are fully aquatic or wetland species associated with calcareous, alkaline water chemistry. The overall alkaline water quality in the watershed's lakes, streams, and wetlands has allowed unique, alkaline-loving plant communities to thrive. Many of these species are found at very few locations outside of the French Creek basin.

FC lakes are circumneutral ($6 \leq pH \leq 8$) with high alkalinity. They are not alkaline.

p. 86

horsepower and these see extensive powerboat and jet ski usage. Powerboats used in Lake Erie and then brought to Edinboro Lake are believed to be the cause of the introduction of zebra mussels to Edinboro Lake. This mode of potentially transporting a number of exotic species into the watershed is a constant threat.

And, the current establishment of *Hydrilla* in Conneaut Lake is most likely due to boat/trailer traffic from Pymatuning Reservoir where *Hydrilla* has been growing for several years.

P. 87

The main stem of French Creek is navigable by paddle craft for its entire length from the Union City Dam to its confluence with the Allegheny River at Franklin, with the exception of Saegertown Dam. Some paddling is also possible upstream from the Union City Dam when

At low water the Saegertown low-head dam is readily passible on river left where a gap exists. At high water levels, paddlers can cross the dam anywhere with little trouble. More likely areas requiring caution include the rapids just upstream from the Cochranton access and Polly's Rapids between Sugar Creek and Rocky Grove.

P. 91

PA DEP biologists have noted nutrients as the leading cause of stream impairment in the French Creek watershed. The primary nutrients affecting aquatic ecosystems are nitrogen and phosphorous. Although important for plant growth and primary production in ecosystems, excess

"phosphorus" misspelled, again.

P. 92

Nitrogen and phosphorous cycle through the environment in similar continuous cycles, including via the growth, death and decay of plants and animals. Natural levels of these nutrients are

"phosphorus" misspelled

P. 93

acidification of surface waters, acid precipitation carries various chemical pollutants, including nitrogen and phosphorous that impact streams, lakes, rivers, and ultimately groundwater.

"phosphorus" misspelled

Best Management Practices are not utilized. Livestock are also direct contributors of nutrients, particularly nitrogen, to surface waters. Livestock that have direct access to streams in pasture

Actually, phosphorus is much more important than nitrogen. If the N:P molar ratio is in excess of 16, phosphorus is the limiting factor for algal and plant growth in aquatic systems. Research has convincingly shown that biomass is determined by P concentrations. If N concentrations are low, the biomass will be limited to nitrogen fixing organisms (cyanobacteria in aquatic systems, legumes and alders in terrestrial systems), but the ultimate biomass is still a function of P alone.

from food processing plants and other industries. Organic wastes breakdown into nitrogen and phosphorous constituents and further contribute to profuse plant growth and low dissolved

"phosphorus" misspelled

periods of overload. Some municipalities have constructed larger sewage treatment plants that incorporate ultraviolet treatment of wastewater instead of traditional chlorination techniques.

UV treatment may kill pathogenic organisms in untreated sewage, but does nothing to reduce nutrients in the effluent.

P. 97

throughout Pennsylvania and New York State, and the emerald ash borer is becoming a serious threat in both states.

This statement is dated. I would say that the emerald ash borer has already led to the near extinction of the white ash trees.

P. 98

high adaptability to a various habitat has led to an extremely high abundance and distribution within the Great Lakes causing a has greatly changed the ecosystem. Negative economic and

Strike out "has"

With French Creek recognized as being extremely diverse with 80 species of fishes and 29 native mussel species, the potential threat that the round goby presents is of high importance. Round

I don't think we have enough data to say that FC is diverse. Ecological diversity has two components: richness (the number of species) and equitability (the evenness of allocation of individuals within those species). Your own data (WPC mussel survey done by Smith and Crabtree) identified 7,746 mussels from FC from 24 species. Yet 45% of these mussels were from a single species (common mucket) and 13 other species accounted for less than 1% of the total number of individuals. The mathematical formula for calculating diversity (Shannon Weiner function) takes both richness and equability into account. Let's just say that FC has high species richness, with 80 species of fish and 29 species of mussels, and not conflate this measure with diversity.

P. 99

The zebra mussel, a small black and white striped bivalve mollusk, was discovered in Edinboro Lake in 2000. Since its discovery in Edinboro Lake, the zebra mussel has also been documented in Sandy Lake and Canadohta Lake, two glacial lakes just outside of the French Creek watershed.

Zebra mussels are widespread in Conneaut Lake. Affecting boat hulls, docks and natural hard surfaces.

P. 102

sedimentation control plans to ensure sediments are prevented from running off site. These permits are issued by the County Conservation District, who may not have authority or adequate

FC spans several counties (Erie, Crawford, Venango, Mercer, Chautauqua) so "District" should be plural. And, Districts are not a "who". Use "that" instead.

P. 110

The following management options are organized in Tables 10–14, consistent with the main sections of the plan. During the public survey and draft plan comment period throughout October 2024, the public has the opportunity to add or amend these recommendations by visiting the draft plan review webpage at . After the

So, how may we visit the draft plan webpage. URL not given.

P. 167

carbonate (CO_3)	A substance that bonds to hydrogen ions in carbonic acid, and forms bicarbonate. This reaction reduces acidity and raises alkalinity.

CO3 can bond to the hydrogen ion from ANY acid to form bicarbonate. That is why PA may have had the lowest pH rainfall due to sulfuric and nitric acids of industrial and vehicle origins yet did not have significant acidification of waters in areas with carbonate-rich tills, outwash, or bedrock.

P. 168

dissolved solids	Mineral particles held in solution in water; usually reaches a threshold before particles begin to precipitate out of solution. Important indicator of water quality as high dissolved solids indicate an inflow of sediments or other pollutants.

Dissolved solids are dissolved, NOT particles. Particles are either CPOM or FPOM.

P. 169

eutrophic (eutrophication)	Describes nutrient-rich waters with high primary productivity. May result in depleted dissolved oxygen levels. Eutrophication is the process by which a water body moves from nutrient-poor to nutrient-rich. This is a natural process that is often sped up by human influences.

No, no, no. There is nothing natural about eutrophication in the absence of human influence. See attached essay.

P. 170

fecal coliforms	Harmful bacteria normally associated with raw sewage.

Gut bacteria common to all warm-blooded animals, including geese and livestock, not just human sewage. Edinboro Lake's beach has periodically been closed to swimmers due to high coliform counts caused by resident Canada geese.

P. 172

heavy metals	Refers to a group of metals that can contaminate water and soils and prove toxic to organisms, especially in solution.

Metallic elements on the periodic table with greater molecular weight than iron.

P. 173

nutrient loading	The input of excessive nutrients like nitrogen and phosphorous to aquatic systems.

Phosphorus misspelled

P.174

pH	A value on a scale of 0-14 that gives a measure of the acidity or alkalinity of a medium (e.g. water or soil). A pH of 7 is neutral; less than 7 is acidic and more than 7 is basic or alkaline.

pH gives a measure of acidity or basicity. Alkalinity is completely independent of pH.

phosphorous	An element essential to all plant and animal life. One of the two most important nutrients to the eutrophication of surface waters.

Phosphorus misspelled

phytoplankton	The plant plankton and primary producers of aquatic ecosystems, typically diatoms and dinoflagellates.

Also chlorophyta, chrysophyta, cryptophyta, and cyanobacteria.

P. 175

primary producers	Photosynthetic and chemosynthetic autotrophs (mainly green plants including algae and phytoplankton) that utilize nutrients and energy from the sun or chemical reactions to produce organic compounds. These organisms form the beginning of all food chains.

Also includes bacteria in anoxic areas (lake sediments, waterlogged soils) that reduce oxidized iron, sulfur, nitrogen and organic compounds liberating ferrous iron, H2S, ammonia, and methane, respectively.

P. 176

sedimentation	The build up of detached soil particles in nearby waterways.
sediment deposition	Laying down of detached soil particles on the bottoms of streams, lakes, and rivers.

Not just soils, but any particles from the watershed or formed within the waterbody. Dead plant and animal remains, chemical precipitants, pollen, inorganic road dust, etc.

P. 177

specific conductance	Refers to the measurable potential of water to conduct an electric current. A higher specific conductance signifies more dissolved and suspended matter in the water. This is an indication of sedimentation or other pollution.

Specific conductance measures ONLY ionic material dissolved in the water, NOT particles and not non-ionic materials (e. g. dissolved organics).

stratification	In aquatic terms, refers to the arrangement of lake water into layers. The upper layer, or epilimnion, is generally warmer, oxygen-rich, and contains the bulk of primary production. The bottom layer, or hypolimnion, is generally colder, oxygen-depleted, and low in primary production. The area in between is known as the mesolimnion.

Metalimnion, not mesolimnion

P. 178

suspended solids	The part of a total load of a stream or river that is carried in suspension. Elevated levels of suspended solids indicates erosion upstream.

Material retained on a filter after passing a water sample. In lakes and streams this would include phytoplankton and bacterial cells, fecal pellets from zooplankton and seston (non-living particles).

Eutrophication vs. Lake Aging

By

Milt Ostrofsky
Conneaut Lake Aquatic Management Association,
and
Allegheny College Biology Department
Meadville, PA, 16335

When I started teaching college-level limnology and ecology over 30 years ago I was deluged with free-sample textbooks from numerous publishers who hoped I would adopt their product for use by my students. It was quite a daunting task to read through 8 – 10 texts to select the one that most closely anticipated the organization I would favor and the emphasis I would place on various topics. One of my shortcut strategies to assess the currency or "up-to-dateness" of texts was to look up "eutrophication" and see how the author defined and used the term. Thirty years ago it was quite common to see a phrase like "eutrophication is related to the aging of lakes, and is a natural process that may be accelerated by man". Any college level text with such a phrase would be dismissed out of hand – and not considered further for adoption.

You can imagine my dismay when at the last annual PALMS conference I noted some fact sheets on one of the display tables that still confused lake aging and eutrophication, and asserted that eutrophication was a natural process. The two fact sheets I refer to are:

1. Natural Resource Facts, Fact Sheet No. 96-2, Phosphorus and Lake Aging, by the University of Rhode Island, College of Resource Development, Department of Natural Resources Science, Cooperative Extension, May, 1996, and
2. Nutrients in Water, by Manitoba Environment, Water Quality Management Section, March 1997 taken from their webpage: http://www.gov.mb.ca/environ/pages/publs97/cwgtest/nutrient.html

I have two objections to such statements. The first is that they are wrong. Much worse than simply being wrong, however, is that they may mislead lake residents into thinking that lake eutrophication must be inevitable and lake restoration efforts are futile.

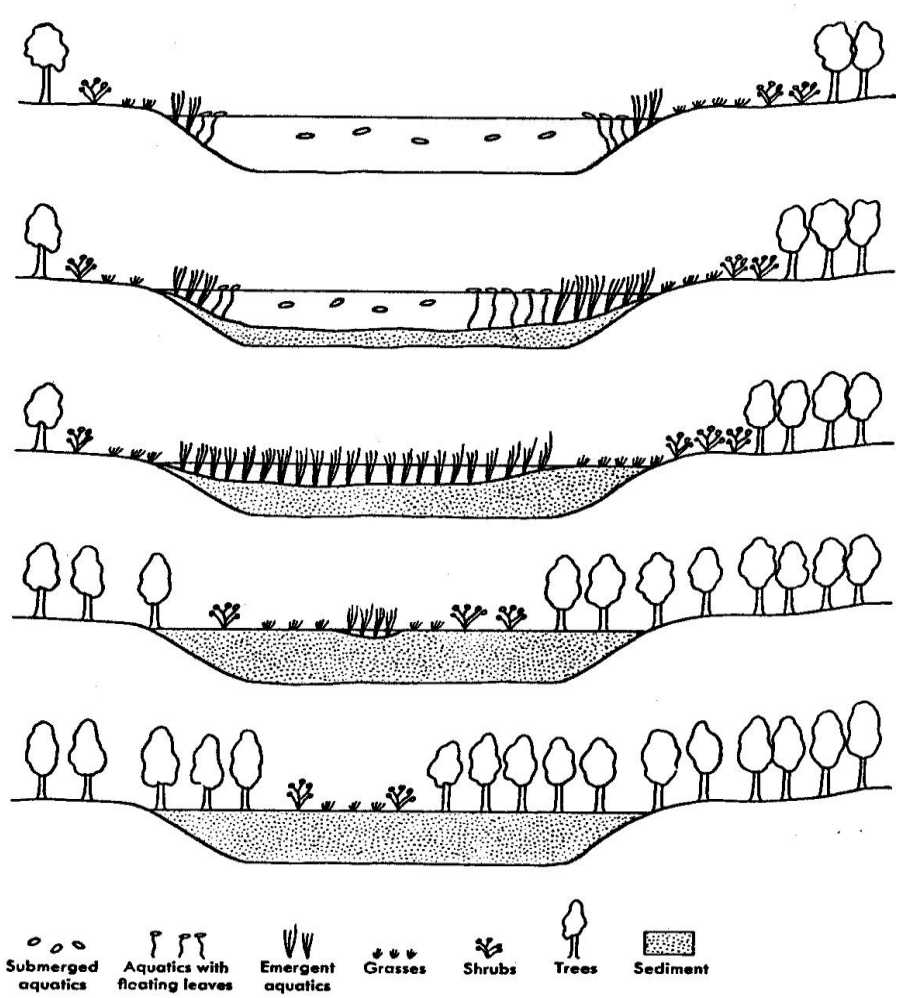
Let me start by first making a case for the difference between aging and eutrophication.

Lakes have a limited lifespan. Basins are formed naturally, usually through some catastrophic event such as glaciation, volcanism, meteoric impact or tectonic movements, or by the activities of man. The late limnologist G. E. Hutchinson described 76 processes that result in basin formation – all but two of these processes are natural. If the basin created is deeper than the water table, the basin will fill and a lake is the result. As soon as a lake is formed, it starts to

age. The deepest part of any lake basin is, of course, the lowest point in the entire catchment. Any solids that are suspended in inflowing streams (from soil erosion, for example), any particles that are generated within the lake (settling plankton and aquatic plant remains, for example) will naturally be deposited in the deepest area of the lake. The lakes are slowly filling in. You can see evidence for this yourself by dredging sediments from the deep area of the lake. The material you collect is very fine and rich in organic material. It may also be many meters deep, depending on the morphometry of the lake and the land use in the drainage basin.

In addition to filling in, water leaving the lake via the outlet is continually eroding the outlet channel, making it deeper. A deeper outlet channel lowers the water level in the lake.

Now both of these processes – sediment accumulation and erosion of the outlet channel – are very slow processes. But, they are continuous processes. Given enough time, both will guarantee that the lake has a finite lifespan. The lake will get shallower and shallower, and aquatic plants will grow further out into the lake basin each year. The end result is that the lake will completely fill in and disappear. An illustration of the process is shown below.



Conneaut Lake, one lake that I am particularly familiar with, is approximately 12,000 years old, its basin having been excavated by the retreating Wisconsin glacier. Its accumulated sediments are perhaps 5 meters thick in the deepest part of the basin. Yet the lake is still a bit over 20 meters deep, so although its life is finite, it is not going to disappear soon. In fact, if sediments accumulate at the same rate they have for the past 12,000 years, the lake should last another 50,000 years or so.

Lake eutrophication is another matter entirely. First, let's make sure we agree on the definitions of both "eutrophic" and "eutrophication". Early in the last century lakes were forced to fit into one of several categories based on the quality and quantity of algal populations. Lakes that had small populations of algae were said to be "oligotrophic", literally poorly nourished. Lakes with large populations of algae were said to be "eutrophic", or well nourished. Lakes that fit somewhere in the middle were mesotrophic, and lakes that were stained with humic compounds and with low pH were "dystrophic". Since the mid-1970s we have recognized that phosphorus is usually the limiting nutrient in lakes so well- or poorly-nourished may be best indicated by phosphorus concentration.

Now, lakes that are imbedded in a geological setting rich in minerals will naturally have more phosphorus than will lakes imbedded in a geological setting poor in minerals. For example, glacially formed lakes in the Midwest are in a setting dominated by sedimentary and metamorphic rock that is naturally richer in phosphorus and other nutritive elements. Glacially formed lakes in the Adirondacks, on the other hand, are in a setting dominated by igneous rock that is mineral poor and weathers only very slowly. So, depending on bedrock geochemistry, lakes may be naturally eutrophic, and naturally oligotrophic. The very productive prairie pothole lakes in Minnesota and the Dakotas would have been categorized as eutrophic before the pioneers ever arrived on their shores. Many Adirondack lakes – formed by the retreat of the same glacier that formed the prairie lakes, and therefore the same age – remain oligotrophic. My point is that age and trophic status are unconnected, and refer to different lake characteristics.

Eutrophication refers to the enrichment of lakes - increasing the supply of nutrients dissolved in the water beyond what might be expected from the lakes geological setting alone. Common activities that lead to eutrophication include deforestation, agricultural development and urbanization. Both oligotrophic and eutrophic lakes can be further enriched by human activities. Certainly, the prairie lakes described above have higher nutrient concentrations now that their catchments are developed for intensive agriculture, and many of the Adirondack lakes have higher nutrient concentrations as a consequence of on-lot septic systems of vacation homes.

So what about eutrophication as a "natural" process? Might lakes accumulate nutrients as they age even in the absence of human impact? This question is difficult to answer directly. After all, none of us is long lived enough to watch how a lake changes from the time of its initial formation, and historical water quality records are non-existent, of short duration, or relied on less sensitive techniques than we have today. However, paleolimnologists have reconstructed past lake conditions from analyses of sediment characteristics. Lake sediments accumulate in chronological layers, and a cross section of these layers often provides chemical and biological evidence that may be useful in reconstructing past trophic status. When these reconstructions are done, there is little evidence that lake productivity increases with age. In fact, in the absence of human impact most lakes show the opposite trend by becoming more dilute and unproductive over time.

An example of this kind of analysis was recently reported in the journal Nature. Paleolimnologist Daniel Engstrom and colleagues examined 33 lakes in Glacier Bay, Alaska. These lakes were created by a retreating glacier and range in age from only 10 to over 13,000 years. All lakes are unaffected by human development, all are in the same geological matrix and all experience the same climate. Essentially, the lakes differ from each other in age only. They found that the lake water concentrations of all major cations and anions decreased with age. Phosphorus concentrations showed no trend, either positive or negative. Core samples collected from the older lakes indicated a progressive loss in the concentrations of dissolved materials with increasing age.

These results should come as no surprise. Immediately after a glacier scours out a lake basin, the concentration of dissolved materials in the lake water should be relatively high. The watershed, after all, was only recently deglaciated and is not yet stabilized by vegetation. The effect on the lake might be very much the same as if it were receiving runoff from cultivated agricultural land. As the glacier continues to retreat, and the climate becomes less severe, the development of vegetation in the watershed will decrease erosion and nutrient delivery to the lake. Consequently, concentrations of dissolved minerals will decrease in the lake water, and will continue to decrease until the watershed is disturbed and erosion increases – say by agricultural activity or urbanization.

So, all lakes are aging, growing older. As they do, sediments are accumulating in their basins, and water depth is slowly decreasing. Some lakes are naturally mineral-rich (eutrophic) as a consequence of their geologic setting. Other lakes may be naturally mineral-poor (oligotrophic) as a consequence of a different geological setting. Any lake may experience eutrophication if human activities increase nutrient concentrations beyond what might be expected from natural processes in the watershed. Where human impact has increased nutrient concentrations in any lake, eutrophication may be arrested or reversed by good lake management practices. There is nothing inevitable about it.

Diversity vs Richness of Species

by Milt Ostrofsky

There are many words that have very different meanings depending on context in which they are used. One such example is the word "significant". In common speech, "significant" might mean *important*. In a scientific context, "significant" describes results that are contrary to expectations derived from starting assumptions–shorthand for "significant departure from expectations". Another word is "**diversity**". It is often claimed that various species residing in French Creek have high "diversity", and while some maybe do--often we do not have the data to support this claim. Let me explain.

In the context of ecological science, "diversity" has two coequal components: **richness and equitability** (or evenness.) In common speech, "diversity" suggests a large number of different species, so the claim is that French Creek has a high "diversity" of freshwater mussels (27 species) and fish (more than 80 species). But those numbers actually reflect species "richness", not "diversity" in the ecological sense.

Greenside Darter
(Etheostoma blennioides)

Let me give an example from a college Ecology text: A modest-sized forest plot contains 24 species of trees–relatively high species richness for the temperate zone. However, two species combined represent 43.8% of all the individuals, and there are 11 species contributing less than 2% of the individuals each. In other words, the individual trees are not equally distributed among the species present. This pattern is generally universal in biological communities. In any taxonomic category; trees, birds, amphibians, lichens, mammals, etc. – there's a small number of species that are represented by many individuals and a large number of species represented by very few individuals each. So, the ecological wit is to say that common species are rare (few in number) and rare species are common (numerous).

To emphasize the importance of *evenness* in determining "diversity", consider two hypothetical forest plots. Each has three tree species. But in one plot there are 98 maples and a single individual each of beech and hemlock. In the second plot there are 34 maples, 33 beeches and 33 hemlocks. Intuitively, we feel that the second plot is more "diverse" than the first even though species "richness" is the same in each plot. The result is that communities with high species "richness" may actually have low "diversity" if most of the individuals in that community belong to a small number of species. Remember that *evenness* is measured as the ratio of calculated "diversity" to theoretical maximum diversity for a community of a given species "richness" when individuals are evenly distributed among the species present.

45% of mussels found were the Mucket-(*Actininaias ligamentina)*

So, let's examine some data from French Creek. In 2005, Smith and Crabtree (Western PA Conservancy and The Nature Conservancy, respectively) published an exhaustive analysis of both freshwater mussels and fish in French Creek. Sampling sites were approximately evenly distributed along the creek from the NY/PA border to the confluence with the Allegheny River at Franklin. At each of 29 sites, mussels were collected from 2,500 m2 plots for 5 hours (5 observers for 60 minutes each). On average, almost 300 mussels were collected and identified from each site (range: 0– 946). A total of 7,746 mussels were tallied belonging to 24 species (*richness*). However, equitability of species was quite low. The common Mucket made up 45% of all the individuals collected, and 13 species made up less than 1% each. The calculated "diversity" is only a fraction of what it would be if the individuals were more evenly distributed among the species categories.

Variegate Darter
(Etheostoma veriatum)

The French Creek fish tell a similar story. Fish were sampled by electrofishing at 26 sites. A total of 4,030 fish were collected, identified, and returned to the water. A total of 58 species were collected, with an average of 155 individuals at each site (range: 50 – 340). Two species, the Greenside Darter and the Variegate Darter combined made up 28% of the catch, and 21 of the species were represented by fewer than 10 individuals each. Again, "diversity" is lower than it would be with a more equitable allocation of individuals among the species.

So—perhaps when we refer to French Creek's **"diversity"** of species, we should be using the word **"richness"** of species instead to be more scientifically accurate.

3

From: rfgilson@windstream.net <rfgilson@windstream.net>
Sent: Saturday, October 19, 2024 6:32 PM

On behalf of the Northwest Pennsylvania Chapter of Trout Unlimited we are offering comment on the French Creek Watershed Conservation Plan. Our comments are attached.

The Northwest Pennsylvania Chapter of Trout Unlimited, is hereby offering comment on the Western Pennsylvania Conservancy's draft French Creek Watershed Conservation Plan. Our comments are divided between specific comments relating to cold water fisheries and Trout Unlimited "TU," and general suggestions.

Page 74

Table 6 lists the Class A Trout Streams within the Watershed Conservation Plan; however, the Table leaves out the word "Trout." Inserting Trout into the title will clarify what the Table lists. Below the Table, the narrative reports that water surveys have found 24 naturally reproducing wild populations of trout. Are the 8 Class A Streams a subset of the 24, or in addition to? Need to clarify. Need to double check to see if DEP and the F&BC conducted unassessed water surveys in the Watershed.

Page 109

Table 9. lists Commonly Used Acronyms and we suggest Trout Unlimited ("TU") be added.

Page 127

Table 12. Water Resources Management Options, Goal 3-A lists methods to achieve the goal of protecting area waterways while increasing wildlife habitat opportunities. The first method listed is to install fish habitat structures, etc. TU certainly agrees and suggests that assessments be made that would look at which naturally reproducing wild, non-Class A trout streams, could benefit from habitat work that would push those streams from naturally reproducing to Class A. Since some of those naturally reproducing, non-Class A Streams flow through public lands, including State Game Lands and the Erie National Wildlife Refuge, you may consider starting there first. In Table 12 under Potential Partners consider adding TU, the Game Commission, and the Erie National Wildlife Refuge.

Pages 146-47

Goal 4-F; Enhance aquatic habitats, lists potential partners and we suggest that TU be added.

Page 152

Goal 5-B: Enhance recreational opportunities for sportsmen and outdoor enthusiasts, list methods to achieve the goal including Method 11 that states "Work with private landowners to provide access to waterways for anglers and non-powered watercraft" We suggest that the method include acquiring easements to help meet that goal. Method 9 discusses designating a section of French Creek for delayed harvest or fly-fishing only. If that is for trout fishing, then we suggest the plan be that specific. Finally, we suggest that TU be added as a potential partner for Methods 9,11, and 14.

Page 161

Goal 5-K includes Method 5 that references TU's Trout in the Classroom ("TIC") relative to a forestry program, but TIC is not listed specifically mentioned elsewhere to achieve Goal 5-K, we suggest that TIC be a stand-alone method.

TU also has some general comments for your consideration.

Page viii

Table 6 should read "Class A Trout Streams in the French Creek Watershed."

Page 1

The Introduction could use a few more words explaining what the French Creek Consortium is.

Page 2

The paragraph explaining the update to the watershed plan should go to the top of the Introduction. It should be clear that this update is updating what plan from what year, and this update is expected to be completed in 2024.

Page 35

Consider including the fact that Benson Run, a tributary of LeBoeuf Creek, is a Class A Trout Stream.

The Northwest Pennsylvania Chapter of Trout Unlimited appreciates the opportunity to comment on the Conservancy's French Creek Conservation Plan Update 2024 and looks forward to working with the Conservancy, and its partners in the future.

Sincerely,
Rick Gilson
Chapter Member
Cc: Jim Head, Bill Eckert

From: Sanjeev Karki
Sent: Thursday, October 10, 2024 11:29 AM

I have organized the French Creek data including all of WPC properties also including the properties closed after 2022. You can see some additional acreage.

From: Ann Sand
Sent: Thursday, October 10, 2024 9:02 AM

Attached is an updated list of FCW WPC protected lands. I wasn't able to identify the conservation easements that were numbered. Are they on private property? I added a 2nd column of our easements beside these easements. Some are not open to the public and are on private property.

From: Wendy Kedzierski <wkedzier@allegheny.edu>
Sent: Wednesday, October 30, 2024 3:27 PM

1-G 2 - lots of studies have been done on road salt impacts

1-K - seem like a lot for a watershed conservation plan - where do we draw the line on what the plan covers?

2-B 2 - I think use of brine was outlawed in 2017, but should check!
2-B 5 - alternative to what? brine?
2-J 2 - change "wok" to "work" in last sentence
2-F and L seem like repeats - good reason to separate?
2-F 4 instead of "citizens" should it be "manufacturers"?

2-C 3 lots of research on this already exists - is more needed?
3-C 7 is this still needed? i though USACE method was standard
3-D 1 and 2 - why are bogs specifically called out? they are also wetlands
3-D 3 educate them about avoiding impacts rather than mitigating?
3-G using brine as road treatment was outlawed in 2017 - please check
3-M this is new to me - would love to learn more - is this a "thing" in our area?
3-P 4 why call out Union City dam? seems like all should be considered. Is Tamarack really needed?

3-S here or somewhere else - add about supporting watershed stewards program

4-F 4 this one seems oddly specific - why at all? why volunteers?
4-H 8 what activities
4-H 10 within watershed? is project area = watershed? maybe just use watershed throughout so there isn't confusion

5-A 8 no thanks. determine if more are needed before using a watershed conservation plan to establish more.
5-A 12 why call out geocaching? just seems oddly specific
5-B 3 sunday hunting has been established, do we really need to expand? no thanks
5-B 9 is this appropriate for French Creek? would it be more appropriate on a tributary?
5-B 12 if something is going to be called out - saegertown dam would be one to specify here
5-C 1 & 5 seems a bit much for a watershed conservation plan - I dont think organized sports have anything to do with this
5-D 2 &8 not part of a watershed conservation plan - seems well beyond scope
5-E goes back and forth in being positive and negative in regards to ATVs & snowmobiles - they impact the watershed - seems like they are an impact. period.
5-G 3 no thanks
5-G 4 no such thing. punny use of "sound".
5-H beyond scope of watershed conservation plan?
5-K 10 misspelled litter

From: Hill, Ryan Joseph CIV (USA) <Ryan.J.Hill@usace.army.mil>
Sent: Tuesday, October 29, 2024 10:48 AM

French Creek Watershed Conservation Plan, 2024
In general, maps are figures and should have the label underneath (e.g. Figure 1) with a short, concise description
Page 2

Within the fourth passage, the word “immerging” is used but should be “emerging”.

Page 7

There is no description provided on where / what the photo is trying to display. Recommend adding photo credit and a short description.
Consider adding an additional bullet point for Union City Dam for USACE or perhaps joining it in with one of the existing descriptions for Erie County, Pennsylvania. If that is the case, additional similar edits may need captured starting on page 35 regarding Major Tributaries.
Not all of the bullet points provide clarity on which county the major tributary may be within, but some do. Recommend considering adding, if possible, county and state location for each bullet point for consistency.

Page 9

The land use estimated percentages total 101% when it should likely be 100%. Recommend revisiting.

Page 20

No photo credit or description of the image that is shown. Recommend adding.

Page 23

It looks like the first paragraph may actually be two separate ones and just need spaced apart where the sentence starts with “Crawford County portions of the watershed also contain sandstones…”. Consider taking a look and adjusting.
Spacing issue in last paragraph where the sentence starts “Although many farms still exist…”. Consider taking a look and adjusting.

Page 26

Consider providing photo credit for the cow image.

Page 27

For The USACE, please change “Union City Dam Reservoir” to “Union City Dam”. This may help alleviate confusion between the federal Union City Dam and the non-federal, but nearby, Union City Reservoir.

Page 28

Figure 9 identifies Woodcock Creek Lake but not Union City Dam. Recommend including Union City Dam in the legend and mapping as it is public land within the watershed.

Page 38

Regarding the sentence that reads “Woodcock Creek was dammed in 1973 by the U. S. Army Corps of Engineers, creating Woodcock Creek Lake.”
Suggest changing it to now read: “Construction of the Woodcock Creek Lake dam was completed in July 1973.”
Regarding the sentence that reads “The dam was designed as a triple use dam: recreation, flood control, and low water augmentation.”
Suggest changing it to now read: “The congressionally authorized purposes for Woodcock Creek Lake are flood control, low flow augmentation for water quality, fish and wildlife enhancement, and recreation. Of these project purposes, only flood control and low flow augmentation for water quality have storage allocated for their operation.”

Page 40

No photo credit or description provided of the wetland image. Consider including photo credit and a description.

Page 41

No photo credit or description provided of the water/duck image. Consider including photo credit and a description.

Page 43

Where it currently reads “This pattern of development increased following the construction of a flood control dam on French Creek near Union City and a triple-use dam (flood control, water supply, and recreation) on Woodcock Creek.

Suggest changing it to now read: “This pattern of development increased following construction completion of the Union City Dam in 1971 and Woodcock Creek Lake dam in 1973 for flood risk management.”

Page 48

Marsh Bedstraw and Red-Head Pondweed are mentioned but did not have their respective scientific names provided. Recommend identifying the scientific names as other flora and fauna have throughout the plan for consistency.

Page 51

For Woodcock Creek Lake, please change the construction completion date from 1974 to 1973.
Regarding the sentence that reads “The lake is under USACE ownership with a public recreational area leased and operated by Crawford County.”
Suggest changing it to now read: “The dam, its appurtenant works, and several adjacent recreational day use areas are operated and maintained by USACE. Portions of federal land located both to the west and east of the dam are leased to the Crawford County Conservation District and the PGC, respectively.”
Regarding the sentence that reads “Woodcock Creek Lake serves three main purposes: recreation, the reduction of flood stages in the French Creek and Allegheny River Valleys, and low-flow augmentation and water quality control at Meadville.”
Suggest changing it to now read: “The congressionally authorized purposes for Woodcock Creek Lake are flood control, low flow augmentation for water quality, fish and wildlife enhancement, and recreation. Of these project purposes, only flood control and low flow augmentation for water quality have storage allocated for their operation.”
Regarding the sentence that reads “The PFBC also stocks Woodcock Creek Lake with trout as a put-and-take fishery.”
Suggest changing it to now read: “The PFBC also stocks woodcock creek above the lake, and woodcock creek below the dam with trout as a put-and-take fishery.”
Please remove “Reservoir” from after “Union City Dam” where mentioned.

Page 53

No photo credit or description on the image that is provided. Consider adding photo credit and description.

Page 56

No photo credit or description on the image that is provided. Consider adding photo credit and description.
The scientific symbol for calcium carbonate was provided but the scientific symbol for dolomite (CaMg(CO3)2) was not. Recommend either providing the symbols for both materials or not providing them at all as it seems strange to provide one but not the other.

Page 57

No photo credit or description on the image that is provided. Consider adding photo credit and description.

Page 59

No photo credit or description on the image that is provided. Consider adding photo credit and description.

Page 60

The passage that starts off with “in 2021, The USACE completed a Planning Assistance to States (PAS) study…”
PAS studies are coordinated through our Planning section. I did NOT have time to review that study or document as we don’t seem to have a copy here in Water Quality. We only have copies of older studies from 2002 and 2009

Page 61

Where it reads “U.S. Army Corps of Engineers has monitored the water quality at several points around Woodcock Creek Lake monthly since the reservoir was formed in 1974. There is also water level monitoring done at both Woodcock Creek Lake and the Union City Reservoir Dam.”
Suggest changing it to now read: “USACE policies mandate the implementation of a watershed scale monitoring program that includes the collection of hydrologic and water quality data. The Pittsburgh District Water Quality Unit, along with the Water Management and Hydrology and Hydraulics Units, is one of three units in the Water Resources Section. Routine annual water quality surveys are performed at both the Woodcock Creek Lake dam and the Union City Dam to monitor watershed trends and concerns, optimize reservoir operations, document compliance with Federal and State water quality standards and provide data for water control manual updates.”

Page 63

No photo credit or description on the image that is provided. Consider adding photo credit and description.

Page 64

Where it currently reads “There is a major dam on the main stem of French Creek is the Union City Dam in Erie County. Built in 1971, this dam is a flood control dam that has reportedly saved millions of dollars in flood damages since its installation (U. S. Army Corps of Engineers, 2000). Another USACE dam in the watershed is the Woodcock Creek Dam on Woodcock Creek in Crawford County. Built in 1974, this dam was a multi-use dam (flood control, recreation, and water supply control).”
Suggest changing it to now read “Construction completion of the Union City Dam occurred in 1971 and has yielded cumulative damage prevention totaling more than $108 million through fiscal year 2022. Construction of the Woodcock Creek Lake dam was completed in 1973 and is congressionally authorized for flood control, low flow augmentation for water quality, fish and wildlife enhancement, and recreation. Of these project purposes, only flood control and low flow augmentation for water quality have storage allocated for their operation.”

Page 68

No photo credit or description on the image that is provided. Consider adding photo credit and description.

Page 69

Looks like a spacing/indentation issue with the Bats section. Consider revisiting/editing.

Page 70

No photo credit or description on the image that is provided. Consider adding photo credit and description.

Page 71

No scientific names were provided for the black tern, American bittern, or least bittern but there are scientific names provided for other flora and fauna throughout the plan. Consider including scientific names for these ones for consistency.
Appears to be underscores present on either side of the scientific name for the eastern hellbender, consider removing.

Page 72

As mentioned in the executive summary comments for fish naming/capitalization standards

Page 73

Table 5. Using an outdated list of endangered and threatened fish species for PA. The Bluebreast, Gilt, Spotted, and Tippecanoe Darters are no longer listed species in PA. See updated regulations in PA State Code Chapter 75, §75.1 and 75.2
There is an obvious typo with the Tippecanoe Darter – it's NOT the "Tippecanoepaddlecraft" Darter, same issue with the scientific name

Pages 76-77

The WQ team has macro data going back to the early 1970s for the French Creek watershed. We were never consulted for this data or a summary. See: https://lrp.maps.arcgis.com/apps/dashboards/b9ac098f50324ebea3ab5e53c86bd61c
We collect macroinvertebrates annually every spring from multiple locations within the French Creek and Woodcock Creek Lake watershed.

Page 78

For the paragraph about invasive exotic plants, scientific names are not provided for common reed, purple loosestrife, and hybrid cattail. Recommend providing scientific names for all for consistency.

Page 81

Consider changing the section heading "Other Species of concern" to "Other Species of Concern"

Page 98

Round Goby – there are several major papers not cited in this section that documented the Round Goby's presence in LeBeouf Lake/French Creek and the

paper that documented gobies feeding on freshwater mussels (Stauffer etal., 2016, Clark etal., 2021 and Bradshaw-Wilson etal., 2019)

Page 127

Goal 3-A: the Corps works in this arena but is not listed as a potential partner. We can't fund but can assist in other ways

Page 134/135

Goal 3-J: the Corps also works with and assists communities with local flood control/stormwater management. We are a potential partner

Page 140

Goal 3-P: the Corps owns and operates two major impoundments within the watershed but we are not listed as a stakeholder or potential partner
In general, many of the goals listed should have the Corps listed as a potential partner and stakeholder

Appendix G – Table of Fish Species

Switch to American Fisheries Society naming conventions, fix "Tippepaddlecraft"

Appendix H – Update/Cross-reference the list with most up-to-date publications for species listings.

Change status on Bluebreast, Gilt, Spotted, and Tippecanoe Darters

Page 314

List the contact for USACE Woodcock Creek Lake with the District Office contact info – should be updated to local project

Public Survey

Western Pennsylvania Conservancy

French Creek Watershed Conservation Plan

Community Survey

Thank you for completing this important survey, conducted by the Western Pennsylvania Conservancy.

You can help us understand what residents within the French Creek Watershed think of current conditions. Your answers will help us make recommendations in the plan.

Survey results are anonymous. You have the option at the end to provide your contact information if you would like to be informed of public meetings regarding the project.

Have questions? Call Kylie Maland, Watershed Manager, Western Pennsylvania Conservancy, at (814) 776-1114 or email kmaland@paconserve.org.

1. In what county do you reside?

Other (please specify)

2. In what municipality do you reside?

3. In what watershed do you reside?

Other (please specify)

4. Please rank the importance of the following watershed values.

- Attractive Natural Settings
- Community Activities
- Educational Opportunities
- New Business/Jobs
- Preserving History/Culture
- Recreation Opportunities
- Residential Development
- Water Quality
- Other

5. Of the following watershed issues, please check the ones you think are important to address. Choose all that apply.

- [ ] Preserving Agricultural Lands
- [ ] Eliminating Illegal ATV/Snowmobile Use and Conflicts
- [ ] Providing ATV/Snowmobile Recreation Facilities
- [ ] Improving Infrastructure (i.e. roads, water, sewage, etc.)
- [ ] Enhancing Economic Development
- [ ] Increasing Environmental Education
- [ ] Reducing Erosion & Sedimentation
- [ ] Reducing Flooding
- [ ] Improving Forestry Techniques
- [ ] Preserving Historical & Cultural Heritage
- [ ] Preventing Illegal Dumping & Clean up Litter
- [ ] Controlling Invasive Species

- [ ] Reclamation of Mine Drainage/Mine Lands
- [ ] Reducing Stormwater Runoff
- [ ] Addressing Tourism Impacts
- [ ] Managing Waste Sites/Hazardous Spills
- [ ] Improving Water Quality
- [ ] Ensuring Adequate Water Quantity
- [ ] Improving Wildlife/Fisheries Habitats
- [ ] Other (please specify)

6. Of the following outdoor recreational opportunities, please check the ones y think are important to French Creek watershed. Choose all that apply.

- [ ] ATV Riding
- [ ] Biking
- [ ] Bird/Wildlife Watching
- [ ] Boating
- [ ] Canoeing/Kayaking
- [ ] Fishing
- [ ] Hiking
- [ ] Horseback Riding
- [ ] Hunting
- [ ] Organized Sports
- [ ] Photography
- [ ] Picnicking
- [ ] Snowmobiles
- [ ] Swimming
- [ ] Visiting Public Parks
- [ ] Visiting/Viewing Public Vistas

☐ Other (please specify)

7. Other comments or concerns.

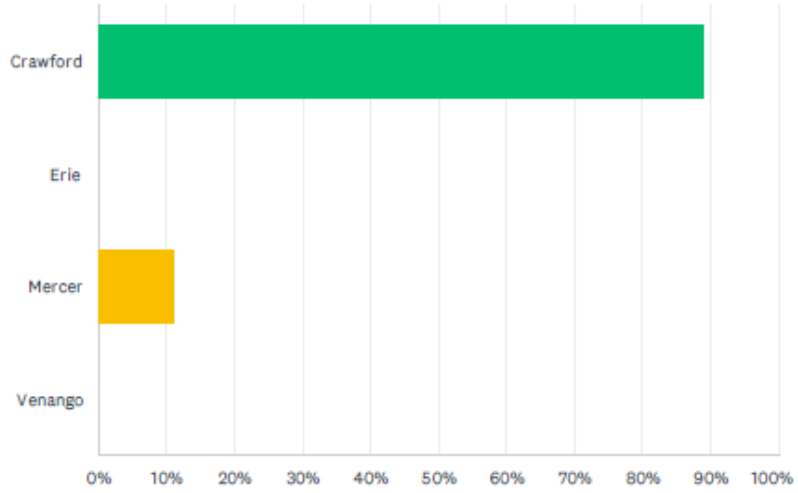
8. If you would like to be informed of public meetings regarding the French Creek Watershed Conservation Plan, please complete the information below.

Name	
Address	
Address 2	
City/Town	
State/Province	
ZIP/Postal Code	
Email Address	
Phone Number	

Done

Q1 In what county do you reside?

Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES	
Crawford	88.89%	8
Erie	0.00%	0
Mercer	11.11%	1
Venango	0.00%	0
TOTAL		9

French Creek Watershed Conservation Plan

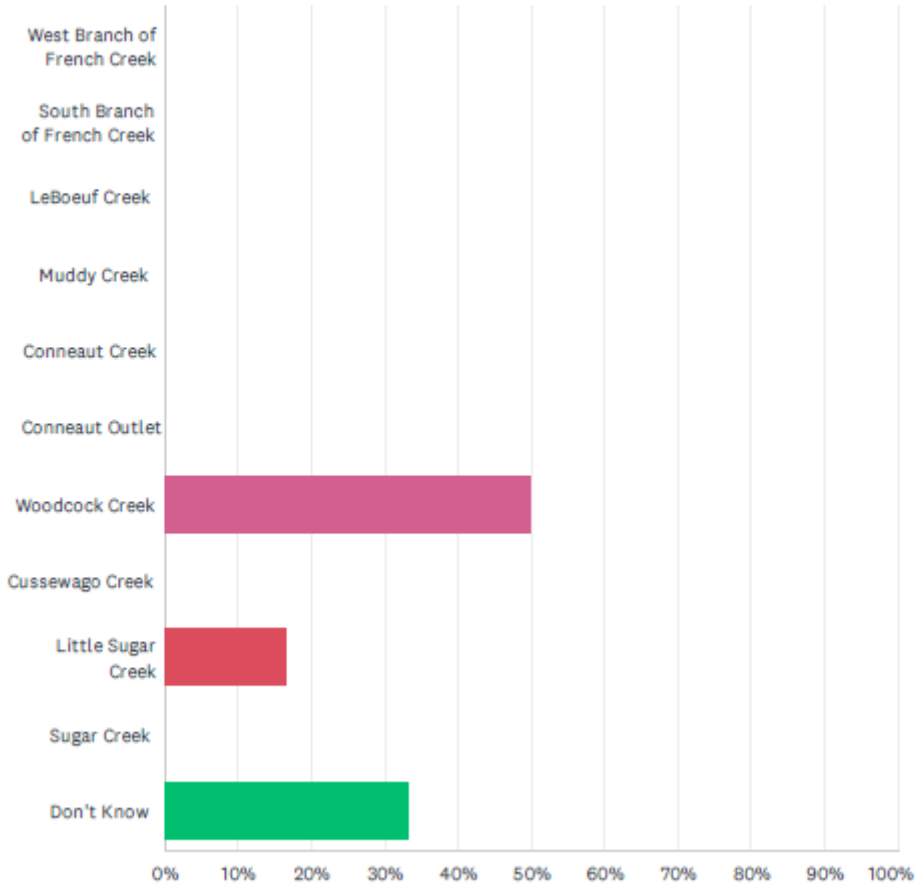
Q2 In what municipality do you reside?

Answered: 8 Skipped: 1

In what municipality do you reside?
Open-Ended Response
Cussewago
Meadville
Meadville
Saegertown
Linesville
Randolph
East Mead Township
Woodcock Township

Q3 In what watershed do you reside?

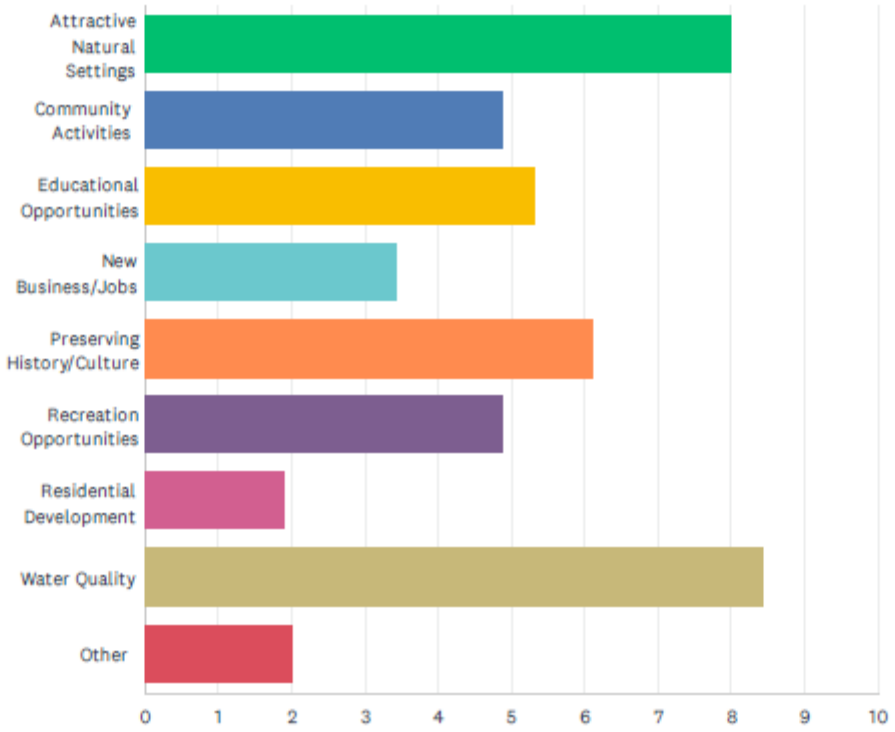
Answered: 6 Skipped: 3



ANSWER CHOICES	RESPONSES	
West Branch of French Creek	0.00%	0
South Branch of French Creek	0.00%	0
LeBoeuf Creek	0.00%	0
Muddy Creek	0.00%	0
Conneaut Creek	0.00%	0
Conneaut Outlet	0.00%	0
Woodcock Creek	50.00%	3
Cussewago Creek	0.00%	0
Little Sugar Creek	16.67%	1
Sugar Creek	0.00%	0
Don't Know	33.33%	2
TOTAL		6

Q4 Please rank the importance of the following watershed values.

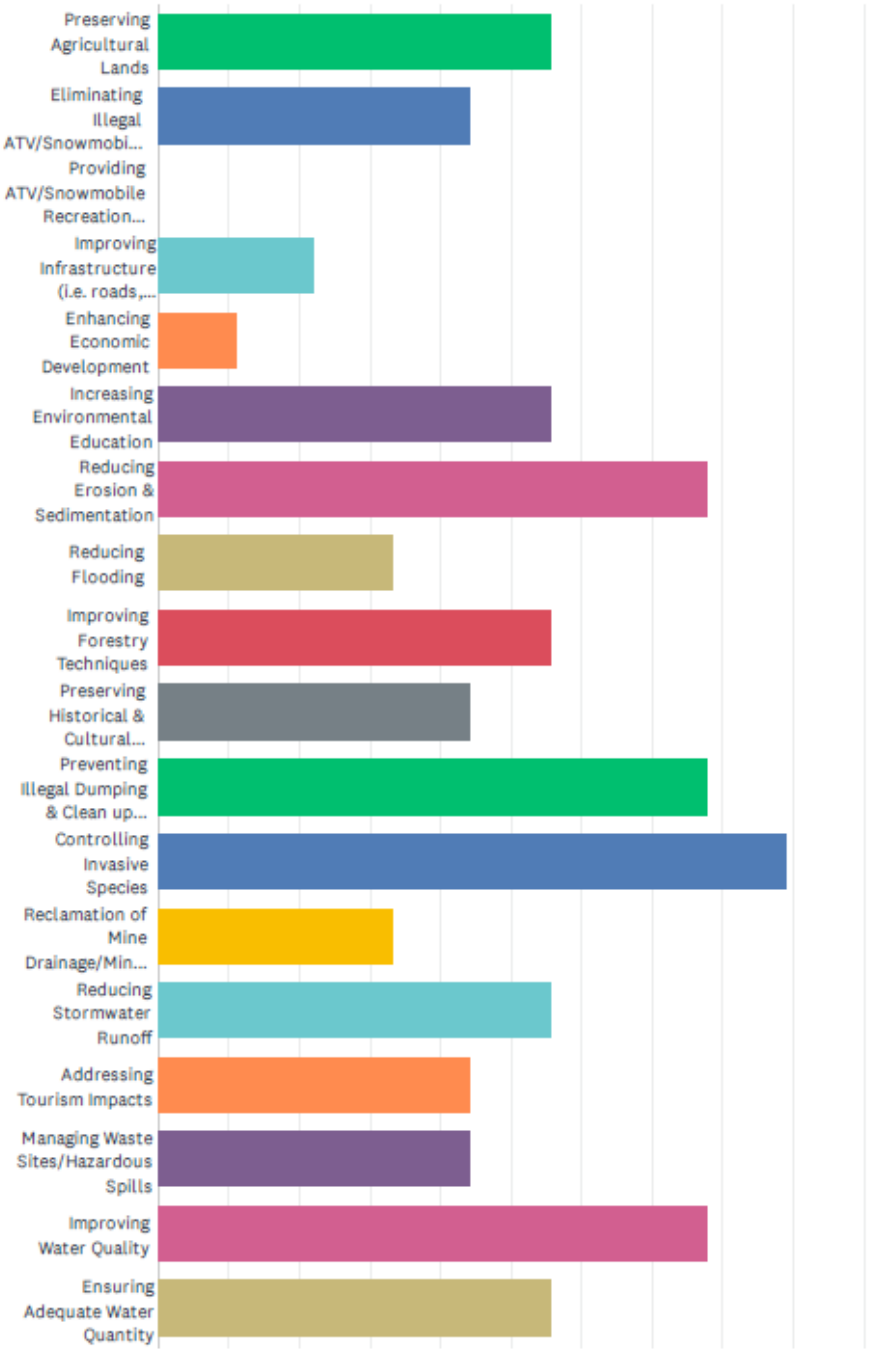
Answered: 9 Skipped: 0



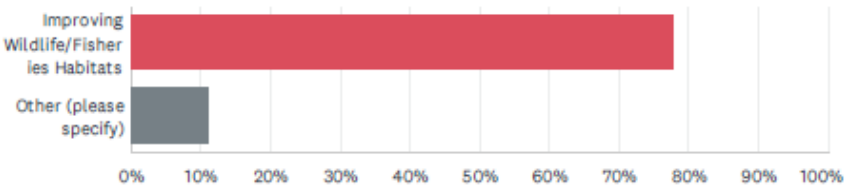
	1	2	3	4	5	6	7	8	9	TOTAL	SCORE
Attractive Natural Settings	11.11% 1	77.78% 7	11.11% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	9	8.00
Community Activities	0.00% 0	0.00% 0	11.11% 1	22.22% 2	22.22% 2	33.33% 3	11.11% 1	0.00% 0	0.00% 0	9	4.89
Educational Opportunities	0.00% 0	0.00% 0	22.22% 2	33.33% 3	11.11% 1	22.22% 2	11.11% 1	0.00% 0	0.00% 0	9	5.33
New Business/Jobs	0.00% 0	0.00% 0	0.00% 0	11.11% 1	11.11% 1	11.11% 1	44.44% 4	22.22% 2	0.00% 0	9	3.44
Preserving History/Culture	11.11% 1	11.11% 1	22.22% 2	0.00% 0	44.44% 4	11.11% 1	0.00% 0	0.00% 0	0.00% 0	9	6.11
Recreation Opportunities	0.00% 0	0.00% 0	11.11% 1	33.33% 3	11.11% 1	22.22% 2	22.22% 2	0.00% 0	0.00% 0	9	4.89
Residential Development	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	11.11% 1	66.67% 6	22.22% 2	9	1.89
Water Quality	66.67% 6	11.11% 1	22.22% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	9	8.44
Other	11.11% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	11.11% 1	77.78% 7	9	2.00

Q5 Of the following watershed issues, please check the ones you think are important to address. Choose all that apply.

Answered: 9 Skipped: 0



French Creek Watershed Conservation Plan

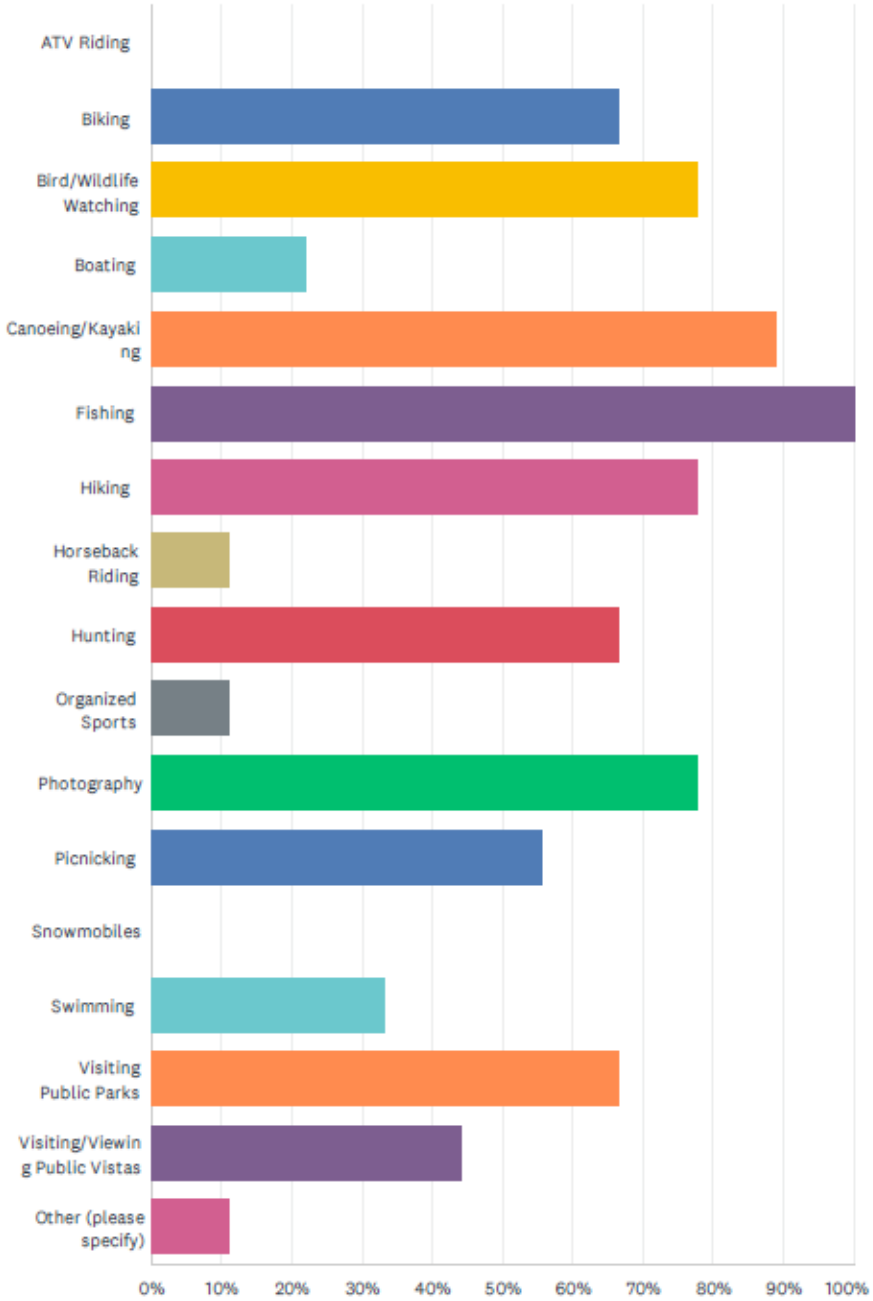


ANSWER CHOICES	RESPONSES	
Preserving Agricultural Lands	55.56%	5
Eliminating Illegal ATV/Snowmobile Use and Conflicts	44.44%	4
Providing ATV/Snowmobile Recreation Facilities	0.00%	0
Improving Infrastructure (i.e. roads, water, sewage, etc.)	22.22%	2
Enhancing Economic Development	11.11%	1
Increasing Environmental Education	55.56%	5
Reducing Erosion & Sedimentation	77.78%	7
Reducing Flooding	33.33%	3
Improving Forestry Techniques	55.56%	5
Preserving Historical & Cultural Heritage	44.44%	4
Preventing Illegal Dumping & Clean up Litter	77.78%	7
Controlling Invasive Species	88.89%	8
Reclamation of Mine Drainage/Mine Lands	33.33%	3
Reducing Stormwater Runoff	55.56%	5
Addressing Tourism Impacts	44.44%	4
Managing Waste Sites/Hazardous Spills	44.44%	4
Improving Water Quality	77.78%	7
Ensuring Adequate Water Quantity	55.56%	5
Improving Wildlife/Fisheries Habitats	77.78%	7
Other (please specify)	11.11%	1
Total Respondents: 9		

Q6 Of the following outdoor recreational opportunities, please check the ones you think are important to French Creek watershed. Choose all that apply.

Answered: 9 Skipped: 0

French Creek Watershed Conservation Plan



ANSWER CHOICES	RESPONSES	
ATV Riding	0.00%	0
Biking	66.67%	6
Bird/Wildlife Watching	77.78%	7
Boating	22.22%	2
Canoeing/Kayaking	88.89%	8
Fishing	100.00%	9
Hiking	77.78%	7
Horseback Riding	11.11%	1
Hunting	66.67%	6
Organized Sports	11.11%	1
Photography	77.78%	7
Picnicking	55.56%	5
Snowmobiles	0.00%	0
Swimming	33.33%	3
Visiting Public Parks	66.67%	6
Visiting/Viewing Public Vistas	44.44%	4
Other (please specify)	11.11%	1
Total Respondents: 9		

French Creek Watershed Conservation Plan

Q7 Other comments or concerns.

Answered: 4 Skipped: 5

Other comments or concerns.
Open-Ended Response
some of the goals and strategies seem overreaching for a watershed conservation plan such as economic development and supporting community libraries and arts, etc.
I'm concerned about storm water runoff in Saegertown and the foam that floats down the river from the Cambridge Springs sewer plant.
Public land is owned by the people of the Commonwealth, not by DCNR, for example. All projects must protect all aspects of private land ownership.
I don’t think we need residential development in our area. There’s too many houses to begin with.

Q8 If you would like to be informed of public meetings regarding the French Creek Watershed Conservation Plan, please complete the information below.

Answered: 1 Skipped: 8

Appendix C

Potential Hazardous Sites in the French Creek Watershed

Site Name	Municipality	County
SCHILLER SITE	RICHMOND TWP	CRAWFORD
Source: PA DEP HSCA Remedial Sites Listing and De-listing Dates		

Appendix D

PA DEP Permitted Mining Sites

Crawford County

Company	Permit	Site Name	Permit Acres	Total Tons Production	Mineral
Conneaut Lake Sand & Gravel	3076SM4	CLSG Mine	107.0	0	Sand & Gravel
Conneaut Lake Sand & Gravel	3076SM8	Foust Mine	32.0	0	Sand & Gravel
Don & Randy Ferris Inc	20910303	Ferris 1 Mine	38.2	5,180	Sand & Gravel
Donald L Merrit	20022804	Plank Road Grave Mine	5.0	320	Sand & Gravel
Elden L Miller	20992803	Miller 1 Mine	6.0	235	Sand & Gravel
Frank Tucci	20900302	Orr 2 Mine	24.0	17,518	Sand & Gravel
Hasbrouck Sand & Gravel Inc	20090303	Hydetown 3 Mine	57.0	4,000	Sand & Gravel
Hasbrouck Sand & Gravel Inc	20020303	Hydetown 2 Mine	59.9	140,000	Sand & Gravel
Hasbrouck Sand & Gravel Inc	3075SM16	Hasbrouck 1 Mine	185.0	130,000	Sand & Gravel
Hillside Stone LLC	20062801	Hillside Stone 1 Mine	5.0	97,000	Sandstone
Hillside Stone LLC	20870305	Bly Mine	38.0	500	Sand & Gravel
Hillside Stone LLC	20940304	Fritz Mine	44.0	2,500	Sand & Gravel
Kosturick Constr LLC	20080301	Mullet Mine	42.0	5,920	Sandstone
Lakeland Agg Inc	20200301	Pine Road 2 Mine	85.0	87,200	Sand & Gravel
Larry G Temple	20082804	East Mead Mine	5.0	2,000	Sand & Gravel
LR Grover Gravel	20800302	Glover Mine	62.0	15,950	Sand & Gravel
R Hunter Inc	20072801	Infield Mine	10.0	3,693	Sand & Gravel
R Hunter Inc	20860301	Donovan Ston Co Mine	14.0	10,947	Sandstone
R Hunter Inc	20890304	2 Mine	22.0	8,446	Sand & Gravel
R Hunter Inc	20910306	3 Mine	8.0	7,029	Sand & Gravel
R Hunter Inc	20950301	Miller Mine	30.0	16,915	Sand & Gravel
Robert C See	20022802	1 Mine	5.0	200	Sand & Gravel
Robert E & Ruth Ann Watson	20982801	Watson 5 Mine	5.0	9,500	Sand & Gravel
Robert E & Ruth Ann Watson	20840301	Gravel Mine	9.0	6,500	Sand & Gravel
Sam H Barnhart & Son	20122802	Barnhart 2 Mine	5.0	528	Sand & Gravel
William J & Sue A Thompson	20062806	Thompson 2 Mine	7.0	6,200	Sand & Gravel
William J & Sue A Thompson	2079301	Thompson Mine	36.0	5,800	Sand & Gravel
Crawford County Total	**27**		**946.1**	**584,081**	

Erie County

Company	Permit	Site Name	Permit Acres	Total Tons Production	Mineral
ACA Sand & Gravel LLC	25010302	Niemeyer 5 Mine	121.0	156,835	Sand & Gravel
Ben Kosienski	25202801	Burawa Mine	5.0	2,000	Sand & Gravel
CB Fenton	25860802	CB Fenton Mine	1.0	6,925	Sand & Gravel
Dean Glover Trucking	4878SM1	Union City 3 Mine	65.0	6,254	Sand & Gravel
Erie Aggregates Inc	25020305	Troyer Mine	97.4	151,736	Sand & Gravel Topsoil
Fiesler Sand & Gravel LLC	25030302	Fourmile Gravel 2 Mine	53.0	27,953	Sand & Gravel
Fiesler Sand & Gravel LLC	2579301	fourmile Gravel Mine	46.0	0	Sand & Gravel
Hanas Gravel Co	25880305	1 Mine	20.0	4,447	Sand & Gravel
Hull Excav Inc	25122802	Little Hope 1 Mine	5.0	200	Sand & Gravel
Hull Excav Inc	25122803	Wildman Rd Mine	5.0	660	Sand & Gravel
James H Glover	25870302	1 Mine	48.0	297	Sand & Gravel
Martha L Brown & Timothy B Grits	25800303	Grits Mine	36.0	15,000	Sand & Gravel
McDonald Sand & Gravel Inc	25100303	JD Diversified Large Noncoal Mine	43.0	40,871	Sand & Gravel
Mervin Troyer	25042802	2 Mine	5.0	4,200	Sand & Gravel
Northwest Gravel Co	4876SM8	Northwest Gravel Mine	84.0	17,700	Sand & Gravel
Ray Showman Jr Excav Inc	25070303	Port Showman 3 Mine	30.0	32,700	Sand & Gravel Topsoil
Waste Mgmt Dspl Svc	25990303	Held II Mine	78.0	0	Shale
West Ridge Gravel Co	3075SM14	West Ridge Mine	258.0	0	Sand & Gravel
West Ridge Gravel Co	25212801	Divine Mine	5.0	1,238	Sand & Gravel
Wilkinson Aggregates Inc	25130303	Wise Mine	156.0	123,478	Sand & Gravel
William M & Eileen C Richter	25810303	Richter 2 Mine	16.0	4,800	Sand & Gravel
Wroblewski Sand & Gravel Inc	25930305	Wroblewski 2 Mine	36.0	0	Sand & Gravel
Wroblewski Sand & Gravel Inc	4876SM6	Maybro Lowville Mine	32.0	4,780	Sand & Gravel
Wroblewski Sand & Gravel Inc	25900304	Hoover 10 Mine	49.0	0	Sand & Gravel
Erie County Total	**24**		**1,294.4**	**602,074**	

Mercer County

Company	Permit	Site Name	Permit Acres	Total Tons Production	Mineral
Advanced Contr & Cartag	43182802	Richael Mine	6.0	9,922	Shale
Buckeye Leasing Inc	43010303	City Slag Mine	89.7	961,223	Slag
Custom Crushing Ltd	43910307	Hadley Mine	17.0	529	Sand & Gravel
Dev of Sharpsville Furnace LTD	43020305	Dev of Sharpsville	41.0	8,104	Slag
Donald Lark & Sons Inc	43970302	Lark 1 Mine	9.0	1,060	Sand & Gravel
Doren Inc	43100302	Seidle Mine	52.0	105,475	Sand & Gravel
H & H Materials Inc	43202802	Yokel Mine	5.0	4,850	Sand & Gravel
H & H Materials Inc	4379306	Hutcheson Mine	220.0	514,809	Sand & Gravel
H & H Materials Inc	43202801	Mowry Mine	5.0	8,910	Sand & Gravel
JJ Cline Excav	43992803	1 Mine	10.0	140	Sand & Gravel
Larry G Temple	43970301	Jones Mine	28.0	5,000	Sand & Gravel

Shenango Valley	4379301	1 Mine	440.0	46,009	Sand & Gravel
White Rock Silica Sand Co Inc	3078NC14	McCrady 2 Mine	30.0	0	Sand & Gravel
White Rock Silica Sand Co Inc	3076SM13	McCrady Mine	40.0	0	Sand & Gravel
White Rock Silica Sand Co Inc	43080302	Quarry Hill Mine	76.0	92,150	Sandstone
Mercer County Total	**15**		**1,068.7**	**1,758,181**	

Venango County

Company	Permit	Site Name	Permit Acres	Total Tons Production	Mineral
Bert Klapec Inc	61002803	Bert Klapec Inc Mine	8.0	2,700	Sandstone
Christopher E Moore	61202801	Flint Mine	5.0	8,184	Shale
Christopher E Moore	61162801	Sallew Mine	7.0	1,932	Sandstone
Cooperstown Sand & Gravel	61990301	Karns Mine	40.0	45,000	Sand & Gravel Topsoil
Cooperstown Sand & Gravel	61090301	Miller Mine	26.0	15,000	Sandstone
Cooperstown Sand & Gravel	61200301	Sugar Creek Mine	92.0	88,800	Sand & Gravel
GL Adams Excav Inc	61880806	Adams Mine	4.0	396	Sand & Gravel
GL Adams Excav Inc	61142801	Bear Mine	7.0	3,500	Sandstone
GL Adams Excav Inc	61122803	Adams 2 Mine	5.0	300	Sandstone
Glenn O Hawbaker Inc	61110304	Berg Mine	144.0	87,883	Limestone
Hillside Stone Inc	61120107	Berry Mine	63.0	48,000	Limestone
James T Morrison	61830608	Morrison Mine	12.0	5,200	Sandstone
Joe Klapec & Son Inc	61120306	Tower Mine	23.0	22,938	Sandstone
Louis M Heath Jr	61012801	Gooday 1 Mine	5.0	480	Sandstone
McKissick Trucking	61152801	Tower Mine	5.0	805	Sandstone
Vincent Excav & Gravel	3772SM8	Franklin Opr Mine	37.0	23,000	Sand & Gravel
Venango County Total	**16**		**483.0**	**354,118**	

Source: PA DEP Industrial Minerals Mines - Listed by County

Appendix E

National Pollution Discharge Elimination System (NPDES) Sites

Crawford County

FACILITY ID	FACILITY NAME	PERMIT	FACILITY KIND	FEE CATEGORY	FACILITY STATUS	MAJOR OR MINOR	REGION	COUNTY	MUNICIPALITY	LATEST PERMIT ISSUANCE DATE
857344	CONNEAUT LAKE JMA S8 LINE SEPARATION	PAD200008	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford		08/31/2022
870943	MEADVILLE LOOP PHASE 2	PAD200012	Stormwater-Phased Construction	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford		04/23/2024
824072	DOLLAR GEN 18479 UNION CITY	PA0265721	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active	MINOR	NWRO	Crawford	Bloomfield Twp	06/06/2024
641359	JOHN I GRAHAM SFTF	PAG049569	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Bloomfield Twp	03/23/2010
680042	CHRISTINE A GLASS SFTF	PAG049249	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Bloomfield Twp	05/12/2006
280593	BLOOMFIELD TWP STP	PA0100960	Sewage Publicly Owned (Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Crawford	Bloomfield Twp	09/25/2019
707691	MYRANDA HYDEN SRSTP	PA0240192	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Blooming Valley Boro	03/24/2022
542361	BLOOMING VALLEY UNITED METH CH	PA0222739	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active		NWRO	Crawford	Blooming Valley Boro	11/27/2019

783932	BRITTANY & JOSHUA POLLEY SRSTP	PA0273031	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Blooming Valley Boro	03/24/2022
757171	MEADVILLE FORGING CAMBRIDGE SPRINGS PLT	NOEXNW041	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Cambridge Springs Boro	01/11/2023
567060	CAMBRIDGE AREA JT AUTH STP	PA0023931	Sewage Publicly Owned (Muni)	Major Sewage Facility >=1 and <5 MGD	Active	MAJOR	NWRO	Crawford	Cambridge Springs Boro	12/15/2017
764740	LORD CAMBRIDGE SPRINGS	NOEXNW072	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Cambridge Springs Boro	12/04/2023
244867	BHB PLASTIC MOLDING	PA0101273	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Crawford	Cambridge Springs Boro	12/05/2017
776778	CRAIG NEWELL WELDING	NOEXNW110	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Cambridge Springs Boro	04/13/2023
639505	AA ROBBINS	NNOEXNW39	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Cambridge Springs Boro	10/18/2012
562960	PAUL M HART & DARLENE J & J PATRICK RUSSELL SRSTP	PAG048715	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	03/07/2001
757387	WOLFROM SRSTP	PAG041085	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	10/31/2012
742111	SHEAKLEY SRSTP	PAG041042	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	06/20/2011
738042	PLAVSITY SRSTP	PAG041023	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	01/21/2011

568536	PATRICK BAYHURST SRSTP	PAG048757	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	12/28/2006
745020	SCHOPF SRSTP	PAG041053	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	09/22/2011
630130	24817 RIDGE RD SRSTP	PAG048842	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	10/23/2002
562955	25206 RIDGE RD SRSTP	PAG048711	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	06/16/2009
570017	DEAN L ROGERS SFTF	PAG048769	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cambridge Twp	01/22/2002
547444	RONALD J RILEY SRSTP	PAG048350	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	Cambridge Twp	07/08/2005
680613	COCHRANTON BORO STP	PA0239861	Sewage Publicly Owned (Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Crawford	Cochranton Boro	01/25/2018
565005	TADDEO SRSTP	PAG049304	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	11/29/2006
652750	THOMAS E MOOK SRSTP	PAG049000	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	08/03/2004
254223	BONNIE & RANDY FELTON SRSTP	PAG048321	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	10/26/2001
704723	CURTIS & JENNIFER ALWARD SFTF	PAG049415	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	04/25/2008
831033	18317 IRISH RD SRSTP	PAG041282	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	07/31/2024

654455	RICHARD C BORGESON SRSTP	PAG049012	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	10/20/2004
473332	SHADY ACRES MHP	PA0101117	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active		NWRO	Crawford	Cussewago Twp	08/23/2019
574570	JANET M & RALPH E PAYNE SRSTP	PAG048812	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	04/10/2007
631786	EDWARD M & ELAINE V BERCIK SRSTP	PAG048865	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	06/01/2007
556476	MELANIE AND MICHAEL J HOOKER SFTF	PAG048669	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	03/30/2005
869191	19557 IRISH RD SRSTP	PAG041236	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	04/22/2024
828460	FRY RD SRSTP	PAG041300	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	05/15/2024
573005	DANNY P & SHELLY M FORBES SRSTP	PAG048806	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	04/23/2007
680786	BRIAN A MILLER SFTF	PAG049257	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	06/14/2006
545041	MARCIE W & TIMOTHY J CAMPBELL SRSTP	PAG048444	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	Cussewago Twp	11/06/2006
253690	TAMARA LEE & THOMAS E MOOK SRSTP	PAG048365	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Cussewago Twp	11/23/2005
628174	JULIANNE & TODD SOMMERS SRSTP	PAG048825	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Fairfield Twp	02/16/2007

805719	JAMES R & KAY L MCCARTNEY SRSTP	PAG041199	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Fairfield Twp	02/03/2016
744237	LYLE WILLIAMS SRSTP	PAG041046	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Fairfield Twp	08/22/2011
768591	STATION 4 FIREHOUSE GRILLE	PA0272736	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	East Fairfield Twp	07/14/2020
553278	GEARY D. AND DEBRA L. MEEHAN SFTF	PAG048655	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Fairfield Twp	04/23/2007
875205	AMANDA BROWNLEE & RANDALL MOTZING SRSTP	PAG041331	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Fallowfield Twp	07/12/2024
3020	STAR ROUTE ESTATES	PA0210803	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	East Mead Twp	06/11/2019
270949	PAUL MERCIER	PAG048416	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	East Mead Twp	04/17/2006
2904	COUNTRY ACRES MHP	PA0103608	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	East Mead Twp	12/23/2021
696910	DENNIS E. & SUSAN E. MOTZER SFTF	PAG049367	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	08/28/2007
631173	THERESA J ANTHONY SFTF	PAG048853	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	10/23/2007
544190	MARY A LEWIS SRSTP	PAG048502	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	East Mead Twp	01/29/2009

643965	MICHAEL HAMILTON	PAG048933	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	04/23/2007
696460	MEADVILLE KOA CAMPGROUND	PA0240044	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	East Mead Twp	02/28/2019
847584	23527 STATE HIGHWAY 77 SRSTP	PA0289051	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	East Mead Twp	05/27/2021
802871	LAURIE & MICHAEL SMITH SRSTP	PAG041192	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	09/17/2015
767699	HOSPICE HOUSE SRSTP	PAG041116	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	09/05/2013
640399	KENNETH J DEANE SFTF	PAG048916	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	03/24/2008
780840	DENISE L & JAMES E NICHOLS SRSTP	PAG041176	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	01/13/2015
676874	BRIAN DEANE SFTF	PAG049233	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	02/16/2006
689445	ROBERTA JO DECRAPIO SFTF	PAG049314	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	East Mead Twp	02/13/2007
793980	N WAYLAND RD SFTF	PA0273139	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active	MINOR	NWRO	Crawford	East Mead Twp	04/14/2021
838430	BOYLE RD SRSTP	PA0287873	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Fairfield Twp	04/10/2020
675593	GREGORY AND PATRICA K. FIELDS	PAG049228	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Fairfield Twp	01/18/2006

253679	SHERRY M & WALLACE G MASON II SRSTP	PAG048306	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	Fairfield Twp	12/20/2000
254386	STONE DIVERSIFIED LAUNDROMAT	PA0104558	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Fairfield Twp	04/19/2017
849007	LISA MAILLIARD SRSTP	PA0289337	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Fairfield Twp	08/30/2021
547440	KATHLEEN A & RONALD A SUICH SFTF	PAG048525	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Fairfield Twp	11/19/2007
690084	JUSTIN & LINDSEY WHITE SRSTP	PAG049316	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Fairfield Twp	02/26/2007
635023	CAROL E WALKER SFTF	PAG048888	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Greenwood Twp	12/07/2007
257132	INA B & MICHAEL J MAILLIARD SRSTP	PAG041210	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Greenwood Twp	08/09/2016
282231	KEYSTONE REG IND PARK	PA0030031	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Crawford	Greenwood Twp	08/09/2018
773083	PETER RABBITT SRSTP	PA0272809	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Greenwood Twp	04/16/2020
546817	JEFFREY D KETCHAM SFTF	PAG048610	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Greenwood Twp	05/22/2009
712301	NORRIS VOGAN SFTF	PAG049471	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Greenwood Twp	10/29/2008
648195	ELMER & TRAVIS HOSTETLER SFTF	PAG048958	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Crawford	Greenwood Twp	05/21/2004

1273	VITRO FLAT GLASS	PA0027341	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Crawford	Greenwood Twp	10/12/2016
772023	REASH COMM CH SFTF	PAG041143	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Crawford	Greenwood Twp	03/14/2014
571732	J M MFG MEADVILLE PLT	PAG038510	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	Greenwood Twp	12/13/2023
842420	DARYL & RENEE MILLER SRSTP	PA0288403	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Greenwood Twp	08/21/2020
663892	FLAVIA BEIL PROP	PAG049147	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Greenwood Twp	06/20/2005
639021	MICHAEL ROBEL SRSTP	PAG041151	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	04/10/2014
630847	MARLAN TOOL COMPANY	PAG048976	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	06/21/2004
677668	MELISSA HOCKENBERRY SFTF	PAG049234	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	03/09/2006
630689	MICHAEL B FRAZIER SFTF	PAG048844	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	10/23/2007
642004	MICHAEL PHELAN SRSTP	PAG048925	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	09/09/2008
730872	JOSHUA SMOCK SFTF	PAG049584	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	06/08/2010
556481	RICHARD L VAN BUREN SRSTP	PAG048667	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	01/31/2005

518222	NANETTE L & WILLIAM G BIERY SFTF	PAG048517	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	07/19/2007
545036	DAVID L JR & MARGARET A KRALJ SRSTP	PAG048520	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	08/24/2007
661816	ROSE M FOULK SRSTP	PAG049139	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	12/01/2004
638023	MARK E HOCKENBERRY SFTF	PAG048898	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	04/29/2008
251652	HERBERT E HOCKENBERRY SRSTP	PAG048538	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	10/26/2007
733218	ANDREA & NATHANIEL HOLLAND SRSTP	PAG049600	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	08/30/2010
837936	AMBER & JASON DIGIACOMO SRSTP	PA0287822	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Hayfield Twp	02/13/2020
3001	DENNY RIDGE MHP	PA0033936	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Hayfield Twp	02/26/2024
832024	PHILIP REICHARD SRSTP	PAG041229	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	04/30/2019
542143	JAMES SCHULTZ	PAG049007	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	Hayfield Twp	09/02/2004
692608	MARK J MURPHY SFTF	PAG049331	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	06/06/2007
696741	RONALD E & RUTH E HASKINS	PAG046364	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	08/21/2007

632471	KOEHLER SFTF	PAG048867	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	11/14/2007
630127	DAVID W & MELISSA A BARTHOLOMEW SRSTP	PAG048831	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	10/17/2002
661584	JACOB J & KATHRYN L SCOTT SRSTP	PAG049133	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	11/30/2004
631490	DAVID W ACKER SFTF	PAG048864	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	01/10/2008
696799	JESSICA M AND LARRY D JR POWELL SFTF	PAG049366	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	08/28/2007
750995	BUREK SRSTP	PAG041069	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	04/25/2012
563737	NANCY L OVERMAN SRSTP	PAG048721	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	04/02/2001
660935	LON SIPPY SRSTP	PAG049019	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	10/20/2004
675375	JAMES KOEHLER SRSTP	PA0295230	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Hayfield Twp	10/23/2023
826841	ACUTEC PRECISION MACH	NOEXNW182	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Hayfield Twp	04/25/2023
642005	DAVID J AND LORI L YODER SRSTP	PAG048921	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	09/02/2003

729084	CHRISTINE L & H DEAN EGLEY	PAG049567	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	04/06/2010
626871	KENDRA S & SCOTT T DURFEE SRSTP	PAG048816	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	03/05/2007
874171	JENNAROSE ASAY SRSTP	PAG041313	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	06/11/2024
518118	DWIGHT R & YOLANDA E WILLIAMS SRSTP	PAG048516	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	Hayfield Twp	02/15/2008
541298	WAYNE R SMITH SFTF	PAG048571	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	05/23/2008
638694	KEVIN L SHORTS SRSTP	PAG048904	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	01/29/2008
631659	GREENLEAF MFG	PAG038605	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	Hayfield Twp	03/21/2024
543587	BRUCE E & SUSAN Y KING SFTF	PAG048589	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	03/24/2008
769570	STEPHANIE R & WILLIAM J BURGER SRSTP	PAG041128	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	10/09/2013
549994	MARSHA A FURNO SRSTP	PAG048632	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	07/27/2004
677558	DANEILLE & JUSTIN DRAKES SRSTP	PAG049237	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Hayfield Twp	03/23/2006
824528	CALAMAR MEADVILLE SENIOR HOUSE	PAD200003	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford	Meadville City	02/13/2018

292947	NORFOLK SOUTHERN MEADVILLE YARD	PA0221481	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Crawford	Meadville City	04/23/2021
635647	MEADVILLE CITY CRAWFORD CNTY	PAG138312	Stormwater-Municipal	PAG-13 MS4 General Permit	Active	MINOR	NWRO	Crawford	Meadville City	03/09/2018
627918	CHANNELLOCK PLT 1	PAG038491	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	Meadville City	02/08/2024
487845	MEADVILLE AREA STP	PA0026271	Sewage Publicly Owned (Muni)	Major Sewage Facility >=5 MGD	Active	MAJOR	NWRO	Crawford	Meadville City	01/24/2018
793880	FEDEX EXPRESS MEADVILLE FAC	NOEXNW133	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Meadville City	06/11/2015
639622	LINCOLN RECYCLING MEADVILLE	PAG038583	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	Meadville City	04/26/2024
629999	SECO WARWICK STORM WATER	NOEXNW168	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Meadville City	03/27/2017
769868	PTR TOOL & PLASTICS	NOEXNW087	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Meadville City	10/30/2019
768605	GUYS MILLS WATER ASSN WTP	PA0272744	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Crawford	Randolph Twp	12/06/2019
692996	DON MOSER SFTF	PAG049336	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Randolph Twp	05/07/2007
251824	FAITH BLDR ED PROGRAMS	PA0035505	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Randolph Twp	05/02/2019
247644	MAPLEWOOD HIGH SCHOOL	PA0102768	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Randolph Twp	11/19/2019

642000	ROBERT WAHLMARK SRSTP	PA0239321	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Randolph Twp	11/15/2022
685116	JENNIFER A & PAUL M MOHTASHEMI SRSTP	PA0239925	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Richmond Twp	10/02/2020
860563	AMANDA SPARKS SRSTP	PA0291251	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Richmond Twp	11/07/2022
723350	ADAM HAMILTON SRSTP	PA0263605	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Rockdale Twp	05/12/2021
487819	CONNEAUT LAKE JT MUN AUTH STP	PA0021598	Sewage Publicly Owned (Muni)	Major Sewage Facility >=1 and <5 MGD	Active	MAJOR	NWRO	Crawford	Sadsbury Twp	07/07/2023
857442	REFLECTIONS ON CONNEAUT LAKE DEV	PAD200007	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford	Sadsbury Twp	04/26/2023
642972	10897 STATE HIGHWAY 285 SRSTP	PAG048929	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Sadsbury Twp	10/08/2003
638669	10220 US HIGHWAY 322 SRSTP	PAG041109	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Sadsbury Twp	07/18/2013
545040	KAREN & MARK TEMEL SRSTP	PAG048451	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	Sadsbury Twp	02/17/2015
240887	PINE GROVE CAMPING RESORT	PA0102679	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Sadsbury Twp	05/13/2020
293912	MILLER BROS CAMPGROUND	PA0102911	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Sadsbury Twp	01/19/2021

780592	HARNED OIL	PA0273023	Stormwater-Industrial	IW Stormwater Individual Permit	Active	MINOR	NWRO	Crawford	Sadsbury Twp	06/22/2021
869280	FORMER MERCATORIS OIL SITE	PA0295337	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Crawford	Sadsbury Twp	07/26/2024
283108	SAEGERTOWN AREA STP	PA0101923	Sewage Publicly Owned (Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Crawford	Saegertown Boro	05/02/2019
707864	SAEGERTOWN MANUFACTURING CORP.	001	Stormwater-Industrial		Active	MINOR	NWRO	Crawford	Saegertown Boro	06/23/2008
847397	SWITCH N GO	NOEXNW214	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Saegertown Boro	05/05/2021
764959	MACLEAN SAEGERTOWN	NOEXNW073	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Saegertown Boro	01/30/2023
241567	LORD CORP CHEM PRODUCTS	PA0101800	Industrial Waste	Minor IW Facility without ELG	Active		NWRO	Crawford	Saegertown Boro	04/07/2020
836595	LORD SAEGERTOWN FACILITY MODERNIZATION	PAD200006	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford	Saegertown Boro	09/03/2019
271389	SPRINGHILL ESTATES MHP	PA0034878	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Spring Twp	01/05/2021
725556	APPLE SHAMROCK DAIRY FARMS LLC	PA0263591	Concentrated Animal Feed Operation	CAFO Individual Permit	Active	MINOR	NWRO	Crawford	Steuben Twp	05/29/2020
768986	NEW MANURE STORAGE POND AND NEW BARN	PAI062013001	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford	Steuben Twp	11/04/2013

707912	BRETT A & NICOLE Y NEELY SRSTP	PA0240206	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Steuben Twp	06/29/2020
834053	CAMPERLAND EXPANSION	PAD200005	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford	Summit Twp	04/12/2024
700223	SNOW WATERS ESCF	PAD200002	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford	Summit Twp	11/19/2012
812488	HYDROBLOX TECH	NNOEXNW160	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Summit Twp	12/06/2016
636134	MATTHEW LINCOLN SRSTP	PAG049361	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Summit Twp	08/23/2007
280741	MAPLEWOOD ELEM SCH	PA0101389	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Townville Boro	02/22/2019
858011	MIKE POTOSKY SRSTP	PA0290734	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Townville Boro	09/08/2022
646375	ANDY L ERNST SRSTP	PAG048945	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	02/26/2004
248625	LAKEVIEW MANOR MHP	PA0034720	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Union Twp	03/21/2023
564755	MATHEW D HIGHAM SFTF	PAG048728	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	06/08/2006
638698	TODD CLAYTON SRSTP	PAG048906	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	07/08/2003
574661	JOE E & KATHLEEN M DAVIS SFTF	PAG048815	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	12/04/2007

849239	SUPPORTS INC SRSTP	PA0289434	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Union Twp	09/13/2021
553998	EAGLE CREST MANOR MHP	PA0221945	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Union Twp	04/05/2019
630102	CYNTHIA A & WEBSTER A JONES SRSTP	PAG048847	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	05/03/2007
869804	WHEELER PROP SRSTP	PA0295396	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Union Twp	04/05/2024
685393	CLINTON B WARNER SFTF	PAG049294	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	10/05/2006
714123	9347 MERCER PIKE SRSTP	PAG049486	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	12/30/2008
648258	TAMMY S BRECKENRIDGE SRSTP	PAG048957	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	04/23/2004
689402	KIMBERLY L. WILSON SFTF	PAG049315	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Union Twp	02/08/2007
674125	KELLY N TEMPLE SFTF	PAG049209	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Venango Twp	11/10/2005
253522	CHRISTINE A SHUPENKO SRSTP	PAG048633	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Venango Twp	07/30/2004
809452	JOSEPH M FRENCH SRSTP	PAG041207	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Venango Twp	07/28/2016
563979	GARY D HOPE SFTF	PAG049264	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Venango Twp	06/28/2006

697814	CELESTE DEETS SRSTP	PA0240052	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Venango Twp	06/29/2023
856778	LARRY MAHAN SFTF	PA0290602	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active	MINOR	NWRO	Crawford	Venango Twp	06/09/2022
838885	10611 PINE RD SRSTP	PA0287911	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Vernon Twp	01/29/2020
744384	GOWETSKI SRSTP	PAG041052	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	10/13/2011
701247	HAMILTON SFTF	PAG049387	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	01/16/2008
684748	LILLIS GAW SRSTP	PAG049286	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	10/24/2006
543558	MARVIN N HAMILTON SFTF	PAG048542	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	Vernon Twp	12/14/2007
713406	ACUTEC PRECISION MACH BROADWAY ST	NOEXNW080	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Vernon Twp	04/26/2023
858173	ALEXANDRIA & RANDY BALL SRSTP	PA0290751	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Vernon Twp	09/07/2022
627919	CHANNELLOCK PLT 2	PAG038492	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	Vernon Twp	02/08/2024
272778	FREDERICKSBURG STP	PA0025470	Sewage Publicly Owned (Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Crawford	Vernon Twp	11/14/2018
860281	WILLIAM HOLZER SRSTP	PA0291129	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Vernon Twp	10/31/2022

250119	ADVANCED CAST PRODUCTS	PA0004251	Industrial Waste	Minor IW Facility without ELG	Active		NWRO	Crawford	Vernon Twp	05/23/2022
627841	POST CONSUMER BRANDS MEADVILLE	PAS128301	Stormwater-Industrial	IW Stormwater Individual Permit	Active	MINOR	NWRO	Crawford	Vernon Twp	09/20/2023
639560	PORT MEADVILLE AIRPORT	NOEXNW173	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Vernon Twp	11/17/2023
557806	UPS MEADVILLE DISTR CTR	PAG038564	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	Vernon Twp	04/30/2024
850858	SUSAN & TRACY TOME SRSTP	PA0289779	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Vernon Twp	12/22/2021
680570	DEANNA BUTTRAY SFTF	PAG049255	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	05/30/2006
257891	EDWARD T LONGSTRETH SRSTP	PAG048584	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	04/19/1999
494902	VERNON TWP - S WATSON RUN STP	PA0025461	Sewage Publicly Owned (Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Crawford	Vernon Twp	12/17/2021
717889	SHAUN J MILLIN SFTF	PAG049512	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	04/15/2009
713576	DONNA R. HART SFTF	PAG049472	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	11/21/2008
522328	NANCY J & ROBERT K MAXWELL SRSTP	PAG048545	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	10/30/2003
551895	JAMES C & KATHERINE A ROTHBRUST	PAG048648	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	08/12/2004

	SRSTP									
693150	REBECCA L MAYNARD SFTF	PAG049333	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	05/11/2007
754219	CHIPBLASTER	NOEXNW034	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Crawford	Vernon Twp	01/09/2023
877312	14601 COLEMAN RD SRSTP	PAG041373	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	08/20/2024
875570	14147 HARMONSBURG RD SRSTP	PAG041353	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	07/30/2024
859738	MARK & SALLY HAECK SRSTP	PA0290998	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Vernon Twp	10/19/2022
740313	LAYTON SRSTP	PAG041030	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Vernon Twp	04/04/2011
857423	EDWARD & SUSAN DAVIES SRSTP	PA0290653	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Wayne Twp	08/17/2022
873128	FAY BRINK SRSTP	PAG041277	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Wayne Twp	02/09/2024
557825	FRANK E PASHEL SRSTP	PAG048681	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Wayne Twp	06/09/2005
631468	JAMES O MARBURGER SRSTP	PA0239062	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Wayne Twp	07/13/2022
639701	PATTERSON AUTO WRECKING	PAG038433	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	Wayne Twp	05/22/2024

631469	LAKE CREEK RD SRSTP	PA0239054	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Wayne Twp	08/10/2023
627885	BETTY J BARTOK 2 SFTF	PAG049566	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Wayne Twp	04/29/2010
627889	BETTY J BARTOK NO 1 SFTF	PAG049565	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Wayne Twp	04/26/2010
636960	27692 DECKARDS RD SRSTP	PAG048895	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Wayne Twp	06/09/2003
631782	CURRY SRSTP	PAG048866	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	08/22/2007
683161	FORBES LILLY SFTF	PAG049275	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	08/11/2006
824624	KEBERT HOLDINGS	PAG038367	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	West Mead Twp	08/01/2018
685697	BRONSON D YANC SRSTP	PAG049296	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	10/13/2006
843554	8734 FRANKLIN PIKE SRSTP	PA0288616	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	West Mead Twp	10/09/2020
847184	RYAN PATTON SRSTP	PA0289001	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	West Mead Twp	06/09/2021
768558	SM DEWEY SRSTP	PAG041122	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	11/20/2013
803383	GEORGE H BARICKMAN SRSTP	PAG041194	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	09/24/2015

254115	JEFFREY P LERI SRSTP	PAG041089	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	West Mead Twp	12/20/2012
847818	CHRISTINA & TODD GILBERTO SRSTP	PA0289094	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	West Mead Twp	06/17/2021
260307	9833 TAMARACK DR SRSTP	PAG048355	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	West Mead Twp	04/14/2005
722003	JAMES D & LORI LANG SFTF	PAG049529	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	07/30/2009
854627	LUTICIA & WAYNE LYNN SRSTP	PA0290271	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	West Mead Twp	04/13/2022
636431	BRYAN C BROWN SFTF	PAG048892	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	05/09/2003
654417	RICK MOYER SRSTP	PAG048999	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	West Mead Twp	09/30/2004
254031	TIMOTHY J PANKO JR SRSTP	PAG048410	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Crawford	West Mead Twp	09/13/2006
759315	SUIT KOTE	PAS708328	Stormwater-Industrial	IW Stormwater Individual Permit	Active	MINOR	NWRO	Crawford	West Mead Twp	05/02/2018
627183	MEADVILLE FORGING COMPANY STORMWATER	PAG038521	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Crawford	West Mead Twp	02/06/2024
848415	19126 EAST COLE RD SRSTP	PA0289221	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	08/20/2021

832888	21481 FISHER RD SRSTP	PAG041274	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Woodcock Twp	07/09/2024
785739	CRAIG & JESSICA ERVIN SRSTP	PAG041188	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Woodcock Twp	07/30/2015
571025	GARY GALFORD SFTF	PAG048776	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Woodcock Twp	10/05/2006
866386	RUTH PERRINE SRSTP	PA0293199	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	07/27/2023
859733	EVERETT MCCLINCY SRSTP	PA0290980	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	10/03/2022
749598	BRITTNEY L & TANNER J GOLEMBESKI SRSTP	PA0263940	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	09/12/2022
705495	CHARLES A ADAMS SRSTP	PAG049419	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Crawford	Woodcock Twp	04/29/2008
239249	U.S.BRONZE FOUNDRY & MACHINE	PA0003026	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Crawford	Woodcock Twp	06/14/2024
755644	US BRONZE FOUNDRY & MACH	PAI062012002	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Crawford	Woodcock Twp	09/10/2012
853034	CALDWELL SRSTP	PA0290068	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	01/31/2022
805904	COLLIER DR SRSTP	PA0264253	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	09/28/2021

845585	FRANCES & TIMOTHY MAZIARZ SRSTP	PA0288861	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	03/30/2021
843434	DANIEL DELPRINCIPE SRSTP	PA0288586	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	10/01/2020
708534	MARILYN R & ROBERT E JONES SRSTP	PA0240184	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	08/15/2023
807008	STATE HWY 86 SRSTP	PA0264318	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	01/14/2022
736897	DENTON & TWILA EBY SRSTP	PA0263826	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Crawford	Woodcock Twp	10/06/2021

Erie County

FACILITY ID	FACILITY NAME	PERMIT	FACILITY KIND	FEE CATEGORY	FACILITY STATUS	MAJOR OR MINOR	REGION	COUNTY	MUNICIPALITY	LATEST PERMIT ISSUANCE DATE
809493	PENN UNION NO EXPOSURE	NOEXNW151	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Erie	Edinboro Boro	06/15/2021
258983	EDINBORO MUN AUTH	PA0021792	Sewage Publicly Owned (Muni)	Major Sewage Facility >=1 and <5 MGD	Active	MAJOR	NWRO	Erie	Edinboro Boro	03/30/2022
723198	RONALD W SEVIN SRSTP	PAG049532	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Elk Creek Twp	09/15/2009
682075	JONELLE & MARK PAVKOV SRSTP	PAG049253	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Elk Creek Twp	07/11/2006
772549	MICHAEL A CAHILL SRSTP	PAG041145	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Elk Creek Twp	03/14/2014

631709	MARK A DANIEL SFTF	PAG048845	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Elk Creek Twp	12/04/2002
765998	LUCAS M SILVIS SRSTP	PAG041106	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	08/21/2013
822716	JULIE & TODD DELL SRSTP	PAG041225	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	02/08/2018
864409	DARA & KYLE BUCHOLTZ SRSTP	PA0292931	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	05/02/2023
835043	DAVID & KYLIE BECK SRSTP	PA0272299	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	08/28/2019
825929	CASEY & KRISTIN RAND SRSTP	PA0271454	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	08/28/2023
672607	DIANNA & MICHAEL BUCHOLTZ SRSTP	PAG049198	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	09/28/2005
849882	KERITH BOWMAN SRSTP	PA0289558	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	08/27/2021
856676	7474 NEW RD SRSTP	PA0290556	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	07/29/2022
662540	BROOKS COMMUNITY SFTF	PAG049132	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Erie	Franklin Twp	01/13/2005

672585	THOMAS FOULKROD SRSTP	PAG049199	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	10/03/2005
562202	DAVID M. AND EMILY A. ALLEN COMMUNITY SFTF	PAG048970	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Erie	Franklin Twp	04/04/2012
768714	7233 CRANE RD SRSTP	PAG041124	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	09/27/2013
687291	KEEGAN NICK SRSTP	PAG041117	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	10/29/2013
875199	10873 EUREKA RD SRSTP	PAG041330	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	07/12/2024
866350	KATHRYN & PETER BARRY SRSTP	PA0293181	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	07/27/2023
546954	MARSHALL E TOLLEY SRSTP	PAG048454	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Franklin Twp	08/10/2007
560157	CAROL L & WARD SANDERS SRSTP	PAG048691	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	06/28/2005
648433	STEPHEN G HESS SFTF	PAG048949	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	04/15/2004
784323	DAVID W & PAMELA M MCINTIRE SRSTP	PAG041186	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	06/05/2015

853906	5875 OLD STATE ROAD SRSTP	PA0290165	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	05/18/2022
759590	NICOLE & ROBERT DONIKOWSKI SRSTP	PAG041096	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	01/31/2013
864246	JOSEPH & MILDRED FARRELL SRSTP	PA0292915	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	04/25/2023
783832	RONALD M GRAY SRSTP	PAG041185	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	04/03/2015
874927	10626 ROUTE 98 SRSTP	PAG041333	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	07/09/2024
855116	KATHERINE & MATTHEW RILEY SRSTP	PA0290678	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	04/27/2022
626661	VFW POST 740	PA0222372	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active	MINOR	NWRO	Erie	Franklin Twp	08/27/2020
673970	TIMOTHY BENEDICT SRSTP	PAG049204	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	11/14/2005
569346	JEFFY MCINTYRE SFTF	PAG048768	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Franklin Twp	06/09/2006
742666	TOMCZAK SFTF	PAG041039	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Greene Twp	07/07/2011

841483	SUSAN STROHMEYER LOT 1 SRSTP	PA0288292	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Greene Twp	07/16/2020
828444	10333 LAKE PLEASANT RD SRSTP	PA0271675	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Greene Twp	04/08/2024
874489	ANN & GERALD PITUCH SRSTP	PAG041321	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Greene Twp	07/02/2024
850279	KIM DANIELSON SRSTP	PA0289612	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Greene Twp	11/05/2021
541747	LINDA A & SAMUEL L GEE JR SFTF	PAG041177	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active		NWRO	Erie	Greene Twp	01/23/2015
548667	HEDRICK ROAD ASSOCIATION SFTF	PAG049420	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Greene Twp	05/15/2008
759187	DANIEL NEWCOMER SRSTP	PAG041092	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Greene Twp	03/21/2013
257266	THOMAS F GORNIAK SFTF	PAG048442	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Greene Twp	01/12/2007
842426	DAVID M CARROLL JR SRSTP	PA0288411	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Greene Twp	08/04/2020
841486	SUSAN STROHMEYER LOT 2 SRSTP	PA0288306	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Greene Twp	07/16/2020

280529	ANITA L & BRADLEY G JOHNSON SRSTP	PAG048332	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Greene Twp	12/14/2000
719503	MICHAEL P AND KELLY K ZAZADO SFTF	PAG049518	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	05/22/2009
808468	ROGER SEDOR SRSTP	PA0271357	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Le Boeuf Twp	09/01/2023
808564	RICHARD E HAWLEY SRSTP	PAG041204	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	04/20/2016
725682	JEFF L AND LISA R RINDFUSS SRSTP	PAG049554	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	12/17/2009
690636	LARA DANIELSON SFTF	PAG049318	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	03/02/2007
820570	RUSSELL STD WHEELERTOWN ROAD PLT SALT STORAGE NEC	NOEXNW172	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Erie	Le Boeuf Twp	08/10/2017
565273	HEATHER & NATHAN BOISVERT SRSTP	PAG048732	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	03/27/2009
573369	DIANE S & MATTHEW S JOHNSON	PAG048803	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	02/16/2007
668530	AARON & REBECCA BUTLER SRSTP	PAG049171	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	06/23/2005

253578	GREGOR,DAVID RES SEW	PAG048640	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Le Boeuf Twp	03/02/2005
858918	KATHY & THOMAS WASKIEWICZ SRSTP	PA0290882	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Le Boeuf Twp	10/14/2022
573323	JULIE L SCHWINDT SFTF	PAG048797	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	04/25/2007
558464	EUGENE & VALERIE RIKER SRSTP	PAG048689	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	06/06/2011
808966	LINDY PAVING WHEELERTOWN ASPHALT PLT	PA0271446	Stormwater-Industrial	IW Stormwater Individual Permit	Active	MINOR	NWRO	Erie	Le Boeuf Twp	10/02/2018
696336	TROYER 1 MINE	PA0239828	Industrial Waste	Minor IW Facility with ELG	Active	MINOR	NWRO	Erie	Le Boeuf Twp	02/23/2024
728055	SANDRA L BARTOSEK SFTF	PAG049561	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	03/09/2010
848989	JOSEPH CUNNINGHAM SFTF	PA0289311	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active	MINOR	NWRO	Erie	Le Boeuf Twp	08/03/2021
875911	702 CONNEAUTTEE RD SRSTP	PAG041344	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	08/09/2024
717285	BRADLEY E & DONNA M BOLERATZ DFTF	PAG049498	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	03/12/2009

546959	TIMOTHY D KLEIN SFTF	PAG048540	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Le Boeuf Twp	05/06/2008
711496	ALAN TOMCZAK SFTF	PAG049463	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	10/03/2008
561059	ROBERT OBERLANDER SRSTP	PAG048699	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	06/18/2008
257271	WINFIELD S MCGAHEN SRSTP	PAG048429	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Le Boeuf Twp	10/27/2006
771545	JOSEPH R LESIK SR SRSTP	PAG041137	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	02/14/2014
635172	GERALD S & LORI A ZIMMER SFTF	PAG048885	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Le Boeuf Twp	05/14/2008
850337	14463 GOURLEY RD SRSTP	PA0289639	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Le Boeuf Twp	09/13/2021
865769	JOHN PEARSON SRSTP	PA0293091	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	McKean Twp	06/26/2023
871261	9499 OLIVER RD SRSTP	PAG041397	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	McKean Twp	07/30/2024
661624	SCOTT LITZ SFTF	PAG049120	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	McKean Twp	12/01/2004

733946	STANLEY F. SLABIC SFTF	PAG041002	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	McKean Twp	10/01/2010
810967	DALE HESS SRSTP	PA0264610	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	McKean Twp	09/26/2022
687655	AARON & COLLEEN PRAZER SRSTP	PAG049306	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	McKean Twp	12/01/2006
869049	COREY & KATELYN MORRIS SRSTP	PA0295299	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	McKean Twp	01/24/2024
653053	DONALD G. JR. & STACEY L. MULSON SRSTP	PAG048995	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Mill Village Boro	08/19/2004
769539	ROBERTA A DAVIS SRSTP	PAG041127	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Mill Village Boro	11/20/2013
684976	LORETTA J NELSON SFTF	PAG049287	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Mill Village Boro	09/28/2006
704260	BRIAN & KRISTEN AHL SFTF	PAG049413	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Erie	Mill Village Boro	03/27/2008
833689	KYLE MARINO SRSTP	PAG041230	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	04/09/2019
654730	BRIAN A. AND TIFFANY M. DWYER SRSTP	PAG049008	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	10/18/2004

870321	JACK KINDER SRSTP	PA0295400	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Summit Twp	04/24/2024
661633	MILLER PUMP SUPPLY	PAG049122	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Erie	Summit Twp	12/06/2004
769324	JOSHUA A MEYER SRSTP	PAG041125	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	12/05/2013
828750	AARON & HEATHER SICKLES SRSTP	PAG041243	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	02/08/2024
854918	CHRIS HUNT SRSTP	PA0290343	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Summit Twp	04/11/2022
833499	431 E TOWNHALL RD SRSTP	PA0272124	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Summit Twp	07/09/2019
256399	9451 DONATION RD SRSTP	PAG048434	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	02/06/2007
652846	MICHAEL W ALABRAN SFTF	PAG048964	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	08/10/2004
650497	GERALD & HEATHER HARRINGTON SRSTP	PAG048973	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	06/28/2004
807519	DONATION RD SRSTP	PA0264385	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Summit Twp	09/15/2022

733051	RUSTY C BARNES SFTF	PAG049598	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Summit Twp	08/26/2010
704985	PARKER QUICK COUPLING DIV	NOEXNW055	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Erie	Union City Boro	09/06/2023
568516	MOLDED FIBER GLASS COMPANIES	PAR238317	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Erie	Union City Boro	09/24/2016
639692	NORAM SEATING, INC	NNOEXNW28	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Erie	Union City Boro	06/07/2012
743355	ESPER SRSTP	PAG041044	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Union City Boro	07/29/2011
662327	ALL AMER HOSE UNION CITY	NOEXNW122	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Erie	Union City Boro	07/18/2024
662326	PARKER HANNIFIN	NOEXNW067	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Erie	Union City Boro	12/05/2023
751088	MOSHER SRSTP	PAG041066	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Union Twp	03/28/2012
683763	PETERSON SRSTP	PAG049272	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Union Twp	08/22/2006
268479	UNION CITY BORO MA	PA0020605	Sewage Publicly Owned (Muni)	Major Sewage Facility >=1 and <5 MGD	Active	MAJOR	NWRO	Erie	Union Twp	01/29/2021

569558	UNION CITY MUNI AUTH WTP	PA0101052	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Erie	Union Twp	01/22/2019
553436	JAMES J & NORMA J FIALKOWSKI SRSTP	PAG048652	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Union Twp	10/12/2004
858388	8625 SHREVE RD SRSTP	PA0290807	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Union Twp	07/29/2022
862963	16160 SHREVE RIDGE RD SRSTP	PA0292729	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Union Twp	02/23/2023
631826	JOEL R STOLZ SFTF	PAG048857	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Union Twp	12/10/2002
707789	DALE L COATES SRSTP	PA0240117	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Union Twp	06/22/2023
254132	PA FISH COMM UNION CITY	PA0044067	Industrial Waste	CAAP Individual Permit	Active	MINOR	NWRO	Erie	Union Twp	12/27/2016
554772	9712 MITCHELL RD SRSTP	PA0295761	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Union Twp	08/05/2024
552767	CROSS PAVING	NOEXNW165	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Erie	Venango Twp	06/28/2017
805415	HELEN C KENT SRSTP	PAG041198	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	01/28/2016

667482	MARKIEWICZ SUBDIV LOT 7 SRSTP	PAG049163	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	05/25/2005
667496	MARKIEWICZ SUBDIV LOT 8 SRSTP	PAG049164	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	05/25/2005
572275	SCENIC HEIGHTS GC	PA0222453	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active	MINOR	NWRO	Erie	Venango Twp	06/07/2024
766321	HEIDI HILTON & ROBERT STEPHENSON SRSTP	PAG041110	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	09/13/2013
248190	JEANNINE L & RICHARD L MILLER JR SRSTP	PAG048327	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	02/16/2005
667453	BROOK & TREVOR PHINNEY SRSTP	PAG049162	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	05/27/2005
753970	LARRY MAY SRSTP	PAG041080	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	07/13/2012
753963	JASON TAUBER II SRSTP	PAG041078	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	07/17/2012
829877	KELLY & RONALD GLAS SRSTP	PA0271845	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Venango Twp	12/27/2018
778702	LOWBUCS	PAG038312	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Erie	Venango Twp	01/05/2024

699664	ROGER ROUSE SFTF	PAG049385	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	11/14/2007
546960	JOSHUA D TRAYER SRSTP	PAG048553	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	09/17/2004
719001	ROBERT HANES SFTF	PAG049510	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Venango Twp	05/05/2009
480726	RICHARD S CHAPMAN SRSTP	PAG048310	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/08/2004
630065	DEAN K & PATRICIA B EICHEN SFTF	PAG048828	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/10/2007
723889	ALAN G & HALLIE J CORNELL SFTF	PAG049533	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	10/05/2009
771665	MELANIE L HENTHORN SRSTP	PAG041140	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	02/21/2014
771601	AMANDA COBURN & COREY FERRELL SRSTP	PAG041138	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	03/05/2014
558866	FRANK R JR & THERESA A STEFANO SRSTP	PAG048687	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	06/23/2005
547010	PHILIP A KOWALCZYK SRSTP	PAG048347	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Washington Twp	12/03/2004

782894	AMANDA & STEVE ROBISON SRSTP	PAG041180	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	03/11/2015
729849	COATES NESBITT SFTF	PAG049572	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	04/27/2010
695984	JEFFREY CAVE SFTF	PAG049356	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/10/2007
701568	JOSEPH & MAURA MERCURIO SRSTP	PAG049386	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	01/08/2008
780336	MATTHEW W KUFFER SRSTP	PAG041175	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/12/2014
254991	WASHINGTON TWP SEW AUTH KLINE ROAD STP	PA0037974	Sewage Publicly Owned (Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Erie	Washington Twp	04/12/2024
730741	BRYAN S WINIECKI SRSTP	PAG049579	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	05/26/2010
679876	HAMID TORAB SFTF	PAG049238	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	05/09/2006
702585	ERIC & JANET GADLEY SRSTP	PA0289698	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	10/06/2021
679787	CHRISTOPHER J KOVSKI SFTF	PAG049241	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	05/05/2006

767748	PRESQUE ISLE CHEM	PA0272710	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Erie	Washington Twp	01/08/2021
674404	CHRISTINE AND SCOTT GODMAIRE SFTF	PAG049213	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/30/2005
260232	RICHARD A BENEDICT SRSTP	PAG048344	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Washington Twp	11/01/2004
743128	BETHANY & SEAN CUNNINGHAM SRSTP	PAG041045	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	07/08/2011
762437	ADAM M BOGDA SRSTP	PAG041099	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	04/26/2013
847285	LISA SCHENING SRSTP	PA0289035	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	06/16/2021
571249	MARK & SHARON THEURET SRSTP	PAG048780	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	05/04/2011
544362	JAMES & SAMANTHA YOUNG SRSTP	PAG048506	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/25/2009
254111	EARL J KOON SRSTP	PAG048603	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/12/1999
570589	JAYS AUTO WRECKING	PAG038424	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Erie	Washington Twp	05/14/2024

853012	JULIE & RANDY WHITE SRSTP	PA0290033	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	12/20/2021
626727	BARRY K AND CONNIE L HENDERSON SFTF	PAG048814	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	01/30/2008
810906	SAMUEL K PONSOLL SRSTP	PAG041212	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/12/2016
569427	6821 ROUTE 6N SRSTP	PAG048761	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/07/2013
569411	SMITH DAVID C & VINIA L SRSTP	PAG048762	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	12/28/2006
546961	ROBERT BREST SRSTP	PAG048307	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	12/03/2004
627727	PETER O KROEMER SFTF	PAG048817	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	02/26/2007
671803	ASHLEY WRONA SRSTP	PAG049197	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	09/12/2005
863381	CRANE RD SRSTP	PA0292800	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	06/06/2023
249994	JOHN R SUMINSKI SFTF	PAG048551	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	05/06/2008

557374	ROY C RODGERS SRSTP	PAG048676	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	02/17/2005
569003	ANNE ELIZABETH & CHARLES J WEISS PARCEL A SRSTP	PAG048753	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/28/2006
569202	3050 CRANE RD SRSTP	PAG048754	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	10/25/2006
669659	WILLIAM M FENDYA SFTF	PAG049185	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	07/27/2005
747409	MASONE SRSTP	PAG041061	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/30/2011
742299	LINDSEY & ROCCO TETTIS SRSTP	PAG041038	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	06/14/2011
733099	DONALD & SARA CAMPBELL SRSTP	PAG049599	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/18/2010
821384	13001 KLINE RD SRSTP	PA0265381	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	08/29/2023
562291	BRYAN M. ROCK SRSTP	PAG048707	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	10/12/2006
746099	KIM CLERKIN & RICHARD KIRBY SRSTP	PAG041056	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	10/20/2011

685763	BERNARD W & LINDA L FROHNE SFTF	PAG049295	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	10/18/2006
861798	PATRICK & STEPHANIE HARGEST SRSTP	PA0291382	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	03/31/2023
572635	EDINBORO CONFERENCE GROUNDS	PA0222216	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Erie	Washington Twp	07/23/2024
679839	RICHARD J VERGA SFTF	PAG049242	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	05/08/2006
253689	ROBERT G HORN SFTF	PAG048396	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/15/2006
569233	LUANN M & ROY A STROBEL SFTF	PAG048764	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	06/12/2006
547019	KAREN A & ROBERT J DIBBLE SRSTP	PAG048381	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Washington Twp	10/19/2006
665819	BONNIE & VINCE ROSS SFTF	PAG049153	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	04/13/2005
860442	JOHN & SHARI GOULD SRSTP	PA0291188	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	01/18/2023
555616	FRANK R STEFANO SRSTP	PAG048342	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	01/20/2005

844176	ARNEMAN RD SRSTP	PA0288691	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Washington Twp	10/22/2020
547015	KURT HOPKINS SRSTP	PAG048424	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Washington Twp	10/26/2006
661632	WEST PA UNITED METHODIST CHURCH SRSTP	PAG049126	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Erie	Washington Twp	12/03/2004
714579	CORNELIUS C & SUSAN L BURKELL SFTF	PAG049482	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	12/19/2008
670626	ANTHONY C FOX SRSTP	PAG049189	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/19/2005
547016	MICHAEL D HOLMAN SFTF	PAG048405	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Washington Twp	04/27/2007
249997	CALEB ELDER SRSTP	PAG048987	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Washington Twp	10/01/1998
648026	WILLIAM J. FRICK SRSTP	PAG048952	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	04/15/2004
696166	GARY A & BARBARA E SANTILLO SFTF	PAG049360	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/10/2007
713817	STEVEN C AND CHRISTINA L VOLSTAD	PAG049473	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	11/26/2008

558167	GAYLE S SHEETS SFTF	PAG048686	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	08/29/2005
705959	CYNTHIA R FOWLE SFTF	PAG049424	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	05/08/2008
547012	GERALD J STUBENHOFER SFTF	PAG048441	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active		NWRO	Erie	Washington Twp	02/28/2007
472803	WINDSOR MHP	PA0103594	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Erie	Washington Twp	06/13/2024
707309	MARJORIE A WALLACE SFTF	PAG049433	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	06/10/2008
552222	GEORGE & TONYA WENIG SRSTP	PAG048583	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Washington Twp	04/11/2008
284079	WATERFORD BOROUGH STP	PA0037397	Sewage Publicly Owned (Muni)	Minor Sewage Facility >=0.05 and <1 MGD	Active	MINOR	NWRO	Erie	Waterford Boro	05/09/2018
845285	RGS PRODUCTS	PAD250009	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Erie	Waterford Boro	10/27/2020
864805	THREE ACRE APARTMENTS	PAD250020	Stormwater-Construction (Non-Phased)	Chapter 102 Individual NPDES Permit	Active		NWRO	Erie	Waterford Boro	11/09/2023
273182	RAINBOW VALLEY M H P	PA0102369	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility	Active	MINOR	NWRO	Erie	Waterford Twp	04/29/2020

				>=0.05 and <1 MGD						
747258	JENNIFER L. RICHARDSON SRSTP	PAG041059	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	11/30/2011
747726	LACNY SRSTP	PAG041058	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	12/20/2011
836090	SHARP RD SRSTP	PA0272434	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Waterford Twp	11/08/2019
831773	SHARP RD SRSTP	PA0272019	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Waterford Twp	06/10/2019
638116	FLORY KONDZIELSKI SFTF	PAG048891	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	06/27/2008
825802	563 TALCOTT RD SRSTP	PA0271438	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Waterford Twp	08/25/2023
856716	10564 RTE 19 N SRSTP	PA0290572	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Waterford Twp	06/17/2022
255360	HICKORY HILL COUNTRY VILLAGE MHP	PA0031461	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Erie	Waterford Twp	11/12/2020
547013	JEFFREY M DURFEE SRSTP	PAG048439	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	10/12/2004
863541	DENISE WEIGERT SRSTP	PA0292826	Sewage Non-Publicly Owned	SRSTP Individual	Active	MINOR	NWRO	Erie	Waterford Twp	05/05/2023

			(Non-Muni)	Permit						
820503	SHEARERS FOODS STORMWATER	PAG038360	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Erie	Waterford Twp	07/30/2024
254021	SHERRI ANN KAPALA SRSTP	PAG048367	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	09/09/2005
814178	KIMBERLY COOK SRSTP	PA0264873	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Waterford Twp	09/09/2022
781974	JR STULL SRSTP	PAG041178	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	02/04/2015
526993	MICHAEL P & CHERYL L NASS SFTF	PA0210820	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Waterford Twp	01/27/2021
545318	MELISSA & TIMOTHY RANDALL SRSTP	PAG048592	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	03/12/2008
495863	JAMES A BECKER SFTF	PAG048458	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	02/06/2007
563169	JUSTIN SMITH SRSTP	PAG048712	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	03/14/2001
646663	COVENTINA SPA SFTF	PAG041162	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Erie	Waterford Twp	06/09/2014
729947	TIMOTY S & VALERIE E DRAYER SRSTP	PAG049578	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	04/26/2010

710941	BRIAN E NEWTON SRSTP	PAG049449	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	09/10/2008
556190	BRIAN C & KELLEY C VAN MATRE SRSTP	PAG048671	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	02/04/2005
721787	KENNETH L VANHOOSER SFTF	PAG049528	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	07/30/2009
4646	CHERYL R & WALTER M WILLEY SFTF	PAG048334	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	04/24/2000
546957	ERIC D ENGEL SRSTP	PAG048505	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	08/09/2007
639267	DENNIS & DOROTHY FREEMAN	PAG048893	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	07/01/2003
874594	12807 PLANK RD SRSTP	PAG041323	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	04/17/2024
547018	CONSTANCE & JOHN W LAVERY SRSTP	PAG048423	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	06/21/2007
260157	RIKKI MAY & TIMOTHY QUINN SRSTP	PAG048338	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	04/30/2005
565315	GEORGE BOWDEN JR SRSTP	PAG048733	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	01/09/2006

653619	JOHN C ENGELS JR SRSTP	PAG048997	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	09/17/2004
632180	BRANDON T. SHERWOOD SFTF	PAG048843	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	04/14/2008
776667	SHAUN R BLACK SRSTP	PA0272841	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Erie	Waterford Twp	07/24/2020
572901	RIDGE GOLF CLUB	PAG041248	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SFTF	Active	MINOR	NWRO	Erie	Waterford Twp	02/21/2024
565148	GREGORY G & TAMMY A KIMMY SRSTP	PAG048726	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	12/01/2005
254052	MARK A KAFFERLIN SFTF	PAG048450	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	07/05/2005
683508	DENNIS J FORTIN II SRSTP	PAG041163	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Erie	Waterford Twp	08/28/2014
814569	WATTSBURG SCH BUS DEPOT	PAG038344	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Erie	Wattsburg Boro	05/02/2024
859851	COLLEEN MILLER DONOR SFTF	PA0291056	Sewage Non-Publicly Owned (Non-Muni)	SFTF Individual Permit	Active	MINOR	NWRO	Erie	Wattsburg Boro	11/08/2022

Mercer County

FACILITY ID	FACILITY NAME	PERMIT	FACILITY KIND	FEE CATEGORY	FACILITY STATUS	MAJOR OR MINOR	REGION	COUNTY	MUNICIPALITY	LATEST PERMIT ISSUANCE DATE
874673	4956 SANDY LAKE RD SRSTP	PAG041326	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Mercer	French Creek Twp	06/17/2024
248606	ROUTE 322 MHP	PA0209741	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Mercer	French Creek Twp	02/16/2016
478430	COUNTRY CORNER RV PARK	PA0100757	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Mercer	New Lebanon Boro	08/08/2019

Venango County

FACILITY ID	FACILITY NAME	PERMIT	FACILITY KIND	FEE CATEGORY	FACILITY STATUS	MAJOR OR MINOR	REGION	COUNTY	MUNICIPALITY	LATEST PERMIT ISSUANCE DATE
254247	JANET A FURPAHS SFTF	PAG048404	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Venango	Jackson Twp	08/24/2007
740910	SCHIFFER SRSTP	PAG041035	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Venango	Oakland Twp	04/26/2011
845435	JOHN FORBES SRSTP	PA0288853	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Venango	Oakland Twp	04/05/2021
689849	SPECIALTY FABRICATION AND POWDER COATING	NOEXNW135	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Venango	Sugarcreek Boro	01/28/2020
555811	VENANGO REG AIRPORT	PAG038419	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Venango	Franklin City	11/02/2023
693908	CONAIR GROUP	NOEXNW127	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Venango	Sugarcreek Boro	01/29/2020

282770	FRANKLIN CITY STP	PA0026174	Sewage Publicly Owned	Major Sewage Facility CSO	Active	MAJOR	NWRO	Venango	Franklin City	06/30/2009
873134	SPECIALTY FABRICATION & POWDER COATING PLT 4	NOEXNW238	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Venango	Franklin City	04/29/2024
776761	FRANKLIN BRONZE PRECISION COMPONENTS MACH SHOP FAC	NOEXNW109	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Venango	Franklin City	01/04/2023
776422	FRANKLIN BRONZE PRECISION COMPONENTS	NOEXNW158	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Venango	Franklin City	08/25/2021
772567	FRANKLIN IND	PAG038305	Stormwater-Industrial	PAG-03 Stormwater	Active	MINOR	NWRO	Venango	Franklin City	10/05/2023
543519	AMY L & BOBBY L FULTON SRSTP	PAG048566	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Venango	Sugarcreek Boro	02/02/1999
813821	FEDEX EXPRESS MEJA	NOEXNW161	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Venango	Sugarcreek Boro	01/06/2023
574758	IA CONST FRANKLIN BATCH PLT	PAG038405	Stormwater-Industrial	PAG-03 Stormwater Assoc with IW	Active	MINOR	NWRO	Venango	Sugarcreek Boro	02/05/2024
813831	AM STABILIZERS	NNOEXNW163	Stormwater-Industrial	No Exposure Certification	Active	MINOR	NWRO	Venango	Sugarcreek Boro	01/25/2017
246225	BORCHERS AMER CHEM MFG	PA0002038	Industrial Waste	Minor IW Facility without ELG	Active	MINOR	NWRO	Venango	Sugarcreek Boro	08/02/2023
842909	CANDACE & FRANK REINA SRSTP	PA0288527	Sewage Non-Publicly Owned (Non-Muni)	SRSTP Individual Permit	Active	MINOR	NWRO	Venango	Oakland Twp	10/08/2020
476916	TWO MILE RUN CNTY PARK	PA0102181	Sewage Non-Publicly Owned (Non-Muni)	Minor Sewage Facility <0.05 MGD	Active	MINOR	NWRO	Venango	Sugarcreek Boro	09/16/2020
685412	JAMES L & MARGARET M DEILY SFTF	PAG049288	Sewage Non-Publicly Owned (Non-Muni)	PAG-04 SRSTP	Active	MINOR	NWRO	Venango	Utica Boro	10/05/2006

Source: PA DEP NPDES Permitted Facilities Report

Appendix F
Mammals in the French Creek Watershed

Common Name	Scientific Name
Virginia opossum	*Didelphis virginiana*
masked shrew	*Sorex cinereus*
smoky shrew	*Sorex fumeus*
long-tailed shrew	*Sorex dispar*
pygmy shrew	*Sorex hoyi*
northern short-tailed shrew	*Blarina brevicauda*
least shrew	*Cryptotis parva*
hairy-tailed mole	*Parascalops breweri*
star-nosed mole	*Condylura cristata*
little brown myotis	*Myotis lucifugus*
Keen's myotis	*Myotis keenii*
silver-haired bat	*Lasionycteris noctivagans*
eastern pipistrelle	*Pipistrellus subflavus*
big brown bat	*Eptesicus fuscus*
red bat	*Lasiurus borealis*
hoary bat	*Lasiurus cinereus*
eastern cottontail	*Sylvilagus floridanus*
snowshoe hare	*Lepus americanus*
eastern chipmunk	*Tamias striatus*
woodchuck	*Marmota monax*
gray squirrel	*Sciurus carolinensis*
fox squirrel	*Sciurus niger*
red squirrel	*Tamiasciurus hudsonicus*
southern flying squirrel	*Glaucomys volans*
northern flying squirrel	*Glaucomys sabrinus*
beaver	*Castor canadensis*

Common Name	Scientific Name
deer mouse	*Peromyscus maniculatus*
white-footed mouse	*Peromyscus leucopus*
southern red-backed vole	*Clethrionomys gapperi*
meadow vole	*Microtus pennsylvanicus*
woodland vole	*Microtus pinetorum*
southern bog lemming	*Synaptomys cooperi*
muskrat	*Ondatra zibethicus*
Norway rat	*Rattus norvegicus* (introduced)
house mouse	*Mus musculus* (introduced)
meadow jumping mouse	*Zapus hudsonius*
woodland jumping mouse	*Napaeozapus insignis*
porcupine	*Erethizon dorsatum*
coyote	*Canis latrans*
red fox	*Vulpes vulpes*
gray fox	*Urocyon cinereoargenteus*
black bear	*Ursus americanus*
raccoon	*Procyon lotor*
ermine	*Mustela erminea*
least weasel	*Mustela nivalis*
long-tailed weasel	*Mustela frenata*
mink	*Mustela vison*
striped skunk	*Mephitis mephitis*
river otter	*Lutra canadensis*
bobcat	*Felis rufus*
white-tailed deer	*Odocoileus virginianus*
fisher	*Martes pennant*

Appendix G
Fish in the French Creek Watershed

Common Name	Scientific Name
rock bass	*Ambloplites rupestris*
yellow bullhead	*Ameiurus natalis*
brown bullhead	*Ameiurus nebulosus*
bowfin	*Amia calva*
eastern sand darter	*Ammocrypta pellucida*
central stoneroller	*Campostoma anomalum*
quillback	*Carpiodes cyprinus*
white sucker	*Catostomus commersoni*
redside dace	*Clinostomus elongates*
mottled sculpin	*Cottus bairdi*
brook stickleback	*Culea inconstans*
spotfin shiner	*Cyprinella spiloptera*
common carp	*Cyprinus carpio*
streamline chub	*Erimystax dissimilis*
gravel chub	*Erimystax x-punctatus*
grass pickerel	*Esox americanus vermiculatus*
northern pike	*Esox lucius*
muskellunge	*Esox masquinongy*
greenside darter	*Etheostoma blennoides*
rainbow darter	*Etheostoma caeruleum*
bluebreast darter	*Etheostoma camurum*
lowa darter	*Etheostoma exile*
mimic shiner	*Notropis volucellus*
mountain madtom	*Noturus eleutherus*
stonecat	*Noturus flavus*
brindled madtom	*Noturus miurus*
Tippepaddlecraft darter	*Etheostoma tippepaddlecraft*
variegate darter	*Etheostoma variatum*
banded darter	*Etheostoma zonale*
tonguetied minnow	*Exoglossum laurae*
banded killifish	*Fundulus diaphanus*
brassy minnow	*Hybognathus hankinsoni*
bigeye chub	*Hybopsis amblops*
northern hogsucker	*Hypentilium nigricans*
Ohio lamprey	*Ichthyomyzon bdellium*
mountain brook lamprey	*Ichthyomyzon greeleyi*
brook silverside	*Labidesthes sicculus*
American brook lamprey	*Lampetra appendix*
longear sunfish	*Lepomis megalotis*
green sunfish	*Lepomis cyanellus*
pumpkinseed	*Lepomis gibbosus*
warmouth	*Lepomis gulosus*
bluegill	*Lepomis macrochirus*
longnose gar	*Lepososteus osseus*
striped shiner	*Luxilus chrysocephalus*

Common Name	Scientific Name
fantail darter	*Etheostoma flabellare*
spotted darter	*Etheostoma maculatum*
Johnny darter	*Etheostoma nigrum*
pearl dace	*Margariscus margarita*
smallmouth bass	*Micropterus dolomieu*
largemouth bass	*Micropterus salmoides*
silver redhorse	*Moxostoma anisurum*
river redhorse	*Moxostoma carinatum*
black redhorse	*Moxostoma duquesni*
golden redhorse	*Moxostoma erythrurum*
shorthead redhorse	*Moxostoma macrolepidotum*
hornyhead chub	*Nocomis biggutatus*
river chub	*Nocomis micropogon*
golden shiner	*Notemigonus crysoleucas*
emerald shiner	*Notropis atherinoides*
silverjaw minnow	*Notropis buccatus*
blackchin shiner	*Notropis heterodon*
blacknose shiner	*Notropis heterolepis*
sand shiner	*Notropis ludibundus*
silver shiner	*Notropis photogenis*
rosyface shiner	*Notropis rubellus*
common shiner	*Luxilus cornutus*
redfin shiner	*Lythrurus umbratilis*
northern madtom	*Noturus stigmosus*
rainbow trout	*Onchorhynchus mykiss*
pugnose minnow	*Opsopoeodus emiliae*
yellow perch	*Perca flavescens*
logperch	*Percina caprodes*
gilt darter	*Percina evides*
longhead darter	*Percina macrocephala*
blackside darter	*Percina maculata*
trout-perch	*Percopsis omiscomaycus*
southern redbelly dace	*Phoxinus erythrogaster*
bluntnose minnow	*Pimephales notatus*
fathead minnow	*Pimephales promelas*
white crappie	*Pomoxis annularis*
black crappie	*Pomoxis nigromaculatus*
blacknose dace	*Rhinichthys atratulus*
longnose dace	*Rhinichthys cataractae*
brown trout	*Salmo trutta*
brook trout	*Salvelinus fontinalis*
creek chub	*Semotilus atromaculatus*
walleye	*Stizostedion vitreum*
central mudminnow	Umbra limi
round goby	*Neo*gobius *melanostomus*

Appendix H

Pennsylvania Natural Diversity Inventory (PNDI) Species of Concern in French Creek

Scientific Name	Common Name	Federal Status	State Status	Proposed State Status	G Rank	S Rank
Acorus americanus	Sweet Flag		PE	PE	G5	S1
Actaea rubra	Red Baneberry		N	PT	G5	S2
Aeshna constricta*	Lance-tipped Darner				G5	S3S4
Alasmidonta marginata*	Elktoe				G4	S3S4
Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen	Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen				GNR	S1
Alisma triviale	Northern Water-plantain		PE	PE	G5	S1
Alopecurus aequalis	Short-awn Foxtail		N	PR	G5	S3
Amblema plicata*	Threeridge				G5	S2S3
Ambystoma jeffersonianum*	Jefferson Salamander				G4	S3
Ambystoma opacum*	Marbled Salamander				G5	S3
Amelanchier sanguinea	Roundleaf Serviceberry		TU	PE	G5	S2
Amia calva*	Bowfin		DL		G5	S4
Ammocrypta pellucida*	Eastern Sand Darter		PE		G4	S1
Anas crecca*	Green-winged Teal				G5	S1B,S4N,S3M
Andromeda polifolia	Bog-rosemary		PR	PR	G5	S3
Anodontoides ferussacianus*	Cylindrical Papershell				G5	S2S3
Arctostaphylos uva-ursi	Bearberry Manzanita		PX	PE	G5	S1
Ardea herodias	Great Blue Heron				G5	S5B,S4N,S4M
Arethusa bulbosa	Dragon's Mouth		PE	PE	G5	S1
Arigomphus furcifer*	Lilypad Clubtail				G5	S3S4
Aristida purpurascens	Arrow-feathered Three Awned		PT	PT	G5	S2
Asio flammeus*	Short-eared Owl		PE		G5	S1B,S3N,S2M
Baptisia australis	Blue False-indigo		PT	PT	G3G4	S2

Bartramia longicauda*	Upland Sandpiper		PE		G5	S2B,S2M
Bidens beckii	Beck's Water-marigold		PE	PE	G5	S1
Bidens discoidea	Small Beggar-ticks		N	PR	G5	S3
Bidens laevis	Beggar-ticks		N	PE	G5	S1
Blitum capitatum	Strawberry Goosefoot		TU	PE	G5	SH
Bolboschoenus fluviatilis	River Bulrush		PR	PR	G5	S3
Boloria selene*	Silver-bordered Fritillary				G5	S2S3
Botaurus lentiginosus*	American Bittern		PE		G5	S2B,S3M
Calliergon cordifolium					G5	S3
Calopogon tuberosus			N		G5	S4
Calopteryx aequabilis*	River Jewelwing				G5	S3
Cambarunio iris*	Rainbow				GNR	S3
Capis curvata*	Curved Halter Moth				G5	S3
Cardamine pratensis var. palustris	Cuckooflower		PE	PE	G5T5	S1
Carex alata	Broad-winged Sedge		PT	PT	G5	S2
Carex aurea	Golden-fruited Sedge		PE	PE	G5	S1
Carex bebbii	Bebb's Sedge		PE	PT	G5	S2
Carex buxbaumii	Brown Sedge		PR	PR	G5	S3
Carex cryptolepis	Northeastern Sedge		PT	PE	G4G5	S1
Carex diandra	Lesser Panicled Sedge		PT	PT	G5	S2
Carex disperma	Soft-leaved Sedge		PR	PR	G5	S3
Carex flava	Yellow Sedge		PT	PT	G5	S2
Carex interior	Sedge		N		G5	SNR
Carex limosa	Mud Sedge		TU	PT	G5	S2
Carex lupuliformis	False Hop Sedge		PE	PE	G4	S1
Carex mitchelliana	Mitchell's Sedge		PE	PE	G4	S1
Carex prairea	Prairie Sedge		PT	PT	G5	S2
Carex pseudocyperus	Cyperus-like Sedge		PE	PE	G5	S1
Carex retrorsa	Backward Sedge		PE	PE	G5	S1

Carex sterilis	Sterile Sedge		PE	PE	G4G5	S1
Carex straminea	Sedge		N		G5	S4
Carex tetanica	A Sedge		PT	PT	G4G5	S2
Carex typhina	Cattail Sedge		PE	PT	G5	S2
Carex utriculata - Carex lacustris / Sphagnum spp. Fen	Central Appalachian Montane Sedge Poor Fen				GNR	S3
Carya laciniosa	Shellbark Hickory		N		G5	S3S4
Chamaedaphne calyculata - (Gaylussacia dumosa) - Decodon verticillatus / Woodwardia virginica Acidic Peatland	Southern New England Poor Fen				G5	S2S3
Chlidonias niger*	Black Tern		PE		G4G5	S1B,S3M
Chlosyne harrisii*	Harris' Checkerspot				G4?	S3
Chrosomus eos*	Northern Redbelly Dace		PE		G5	S1
Chrosomus erythrogaster*	Southern Redbelly Dace		PT		G5	S2
Cincinnatia integra	Midland Siltsnail				G5	S2S4
Circus hudsonius*	Northern Harrier		PT		G5	S2B,S3M
Cistothorus palustris*	Marsh Wren				G5	S2B,S3M
Cistothorus stellaris*	Sedge Wren		PE		G5	S1B,S1M
Cladium mariscoides	Twig Rush		PE	PE	G5	S2
Clemmys guttata*	Spotted Turtle				G5	S3S4
Comarum palustre			N		G5	SNR
Corallorhiza trifida			N		G5	S4
Cordulia shurtleffii*	American Emerald				G5	S3S4
Cryptobranchus alleganiensis alleganiensis*	Eastern Hellbender				G3T2	S2S3
Culaea inconstans*	Brook Stickleback		DL		G5	S4
Cyclonaias tuberculata*	Purple Wartyback				G5	SH
Cyperus diandrus	Umbrella Flatsedge		PE	PE	G5	S2

Cypripedium parviflorum var. makasin	Northern Small Yellow Lady's-slipper		PE	PE	G5T4T5	S1
Cypripedium parviflorum var. parviflorum	Southern Small Yellow Lady's-slipper		PE	PV	G5T3T5	S1S2
Cypripedium reginae	Showy Lady's-slipper		PE	PE	G4G5	S1
Decodon verticillatus Shrub Swamp	Swamp-loosestrife Shrub Swamp				GNR	S3
Diplazium pycnocarpon	Glade Fern		N		G5	SNR
Dryopteris clintoniana	Clinton's Wood Fern		N	PT	G5	S2
Echinochloa walteri	Walter's Barnyard-grass		PE	PE	G5	S1
Eleocharis compressa	Flat-stemmed Spike-rush		PE	PE	G4	S1
Eleocharis elliptica	Slender Spike-rush		PE	PE	G5	S2
Eleocharis intermedia	Matted Spike-rush		PT	PT	G5	S2
Eleocharis olivacea	Capitate Spike-Rush		N	DELIST	G5	S4
Emydoidea blandingii*	Blanding's Turtle		PC		G4	S1
Enallagma annexum	Northern Bluet				G5	S4?
Enallagma divagans*	Turquoise Bluet				G5	S3S4
Ephemeral/fluctuating natural pool	Ephemeral/fluctuating Natural Pool				GNR	S3
Epilobium strictum	Downy Willow-herb		PR	PR	G5	S3
Epioblasma rangiana*	Northern Riffleshell	LE	PE		G1	S2
Epioblasma triquetra*	Snuffbox	LE	PE		G3	S2
Equisetum variegatum	Variegated Horsetail		PE	PE	G5	S1
Equisetum x ferrissii	Scouring-rush		N	PE	GNA	S1
Erigenia bulbosa	Harbinger-of-spring		PT	PR	G5	S3
Eriophorum gracile	Slender Cotton-grass		PE	PE	G5	S1
Eriophorum viridicarinatum	Thin-leaved Cotton-grass		PT	PT	G5	S2
Erythronium albidum	White Trout-Lily		PR	PR	G5	S3
Etheostoma camurum	Bluebreast Darter		DL		G4	S4S5
Etheostoma exile*	Iowa Darter		PE		G5	S2
Etheostoma maculatum*	Spotted Darter		DL		G3?	S4

Etheostoma tippepaddlecraft*	Tippepaddlecraft Darter		DL		G3G4	S4
Euconulus fulvus*	Brown Hive				G5	S3
Euphydryas phaeton*	Baltimore Checkerspot				G4	S3
Euphyes conspicua*	Black Dash				G4G5	S3S4
Filipendula rubra	Queen-of-the-prairie		TU	Under Review	G4G5	S1S2
Fraxinus profunda	Pumpkin Ash		PE	PE	G4	S1
Fulica americana*	American Coot				G5	S2B,S4N,S3M
Fuscocephaloziopsis macrostachya					G4	S1S2
Fuscocephaloziopsis pleniceps					G5	S1S2
Fusconaia subrotunda*	Longsolid	LT	PT		G3	S2
Galium boreale			N	Under Review	G5	S3
Galium labradoricum	Labrador Marsh Bedstraw		PE	PE	G5	S1
Galium trifidum	Marsh Bedstraw		N	PR	G5	S2
Gallinago delicata*	Wilson's Snipe				G5	S3B,S4N,S3M
Gallinula galeata*	Common Gallinule				G5	S2B,S2M
Gaultheria hispidula	Creeping Snowberry		PR		G5	S4
Geranium bicknellii	Cranesbill		PE	PE	G5	S1
Geum rivale	Water Avens		N		G5	SNR
Glyptemys insculpta*	Wood Turtle				G3	S3S4
Glyptemys muhlenbergii*	Bog Turtle	LT	PE		G2G3	S2
Golden Saxifrage - Pennsylvania Bitter-cress Spring Run	Golden Saxifrage - Pennsylvania Bitter-cress Spring Run				GNR	S3S4
Golden Saxifrage - Sedge Rich Seep	Golden Saxifrage - Sedge Rich Seep				GNR	S2
Gomphaeschna furcillata*	Harlequin Darner				G5	S3

Gomphurus fraternus*	Midland Clubtail				G5	S2S4
Goodyera repens	Lesser Rattlesnake-plantain		N	PX	G5	S2
Grus canadensis	Sandhill Crane				G5	S3B
Haliaeetus leucocephalus*	Bald Eagle		DL		G5	S4B,S5N,S4M
Helianthus microcephalus	Small Wood Sunflower		N		G5	S4
Hemlock - Mixed Hardwood Palustrine Forest	Hemlock - Mixed Hardwood Palustrine Forest				GNR	S3S4
Hemlock Palustrine Forest	Hemlock Palustrine Forest				GNR	S3
Hesperia leonardus*	Leonard's Skipper				G4	S3S4
Hierochloe hirta	Common Northern Sweet Grass		PE		G5	S1
Hydrastis canadensis	Golden-seal		PV	PV	G3G4	S4
Ichthyomyzon bdellium*	Ohio Lamprey		DL		G3G4	S4
Ichthyomyzon greeleyi*	Mountain Brook Lamprey		DL		G4	S4
Iris virginica	Virginia Blue Flag		N	PE	G5	S2
Ixobrychus exilis*	Least Bittern		PE		G4G5	S2B,S2M
Juncus brachycephalus	Small-headed Rush		PT	PT	G5	S2
Labidesthes sicculus	Brook Silverside		DL		G5	S5
Lampsilis fasciola	Wavyrayed Lampmussel				G5	S3S4
Lanius ludovicianus migrans*	Migrant Loggerhead Shrike		PE		G4T3Q	S1B,S1M
Larix laricina	Tamarack		N		G5	S4S5
Lasmigona complanata*	White Heelsplitter				G5	S1S2
Lasmigona compressa*	Creek Heelsplitter				G5	S2
Lathyrus japonicus	Beach Peavine		PT	PT	G5	S2
Lathyrus ochroleucus	Wild-pea		PT	PT	G5	S1
Lemmeria digitalis*	Fingered Lemmeria Moth				G4	S3
Lemna trisulca			N		G5	SNR
Lemna turionifera	A Duckweed		TU	DELIST	G5	S4
Lepisosteus osseus	Longnose Gar		DL		G5	S5
Lepomis gulosus*	Warmouth		PE		G5	S3
Leptodea fragilis*	Fragile Papershell				G5	S2S3

Lestes eurinus*	Amber-winged Spreadwing				G5	S3S4
Lethenteron appendix	American Brook Lamprey		DL		G4	S4
Ligumia nasuta*	Eastern Pondmussel				G4	S2S3
Linnaea borealis	Twinflower		PT	PE	G5	S1
Lithobates pipiens*	Northern Leopard Frog				G5	S2S3
Lonicera hirsuta	Hairy Honeysuckle		TU	PE	G5	S1
Lonicera oblongifolia	Swamp Fly Honeysuckle		PE	PE	G5	S1
Lupinus perennis	Lupine		PR	PR	G5	S3
Luzula bulbosa	Southern Wood-rush		TU	PT	G5	S2
Lycaena epixanthe*	Bog Copper				G4G5	S2
Lycaena hyllus*	Bronze Copper				G5	S3S4
Lycopodiella margueriteae	Marguerite's Clubmoss		PE	PE	G1G2	S1
Lycopodiella x robusta			N	Under Review	G1G3	S1S2
Lygodium palmatum	Hartford Fern		PR	PR	G4	S3
Lythrurus umbratilis*	Redfin Shiner		PE		G5	S2
Macrochilo hypocritalis*	Twin-dotted Macrochilo Moth				G4	S3
Maianthemum stellatum	Starry False Solomon's-seal		N		G5	S4
Maianthemum trifolium			N		G5	S4
Malaxis monophyllos var. brachypoda	White Adder's-mouth		TU	PE	G5T4T5	S1
Melanerpes erythrocephalus*	Red-headed Woodpecker				G5	S4B,S4N
Menyanthes trifoliata			N		G5	S4
Moxostoma carinatum	River Redhorse		DL		G4	S4
Mustela nivalis	Least Weasel				G5	S5
Myotis lucifugus*	Little Brown Bat		PE		G3G4	S1
Myrica pensylvanica	Northern Bayberry		N		G5	S4
Myriophyllum sibiricum	Northern Water-milfoil		PE	PE	G5	S1
Myriophyllum verticillatum	Whorled Water-milfoil		PE	PE	G5	S1

Nasiaeschna pentacantha*	Cyrano Darner				G5	S2S3
Necturus maculosus maculosus*	Common Mudpuppy				G5	S3
Nocomis biguttatus*	Hornyhead Chub		PE		G5	S1
Northern Hardwood Forest	Northern Hardwood Forest				G5	S4
Notropis heterodon*	Blackchin Shiner		PE		G5	S1
Notropis heterolepis	Blacknose Shiner		PE		G5	S1
Noturus eleutherus*	Mountain Madtom		PE		G4	S4
Noturus miurus*	Brindled Madtom		PT		G5	S2
Noturus stigmosus*	Northern Madtom		PE		G3	S4
Oak - Mixed Hardwood Palustrine Forest	Oak - Mixed Hardwood Palustrine Forest				G3	S2
Odontoschisma fluitans					G5	S1S3
Opheodrys vernalis	Smooth Greensnake				G5	S4
Ophioglossum pycnostichum	Adder's Tongue		PX		G5	S4
Ophiogomphus carolus*	Riffle Snaketail				G5	S3S4
Panax quinquefolius	Wild Ginseng		PV	PV	G3G4	S4
Pandion haliaetus*	Osprey				G5	S3B,S3M
Parahypenodes quadralis*	Masked Parahypenodes Moth				G4	S2S3
Parkesia noveboracensis*	Northern Waterthrush				G5	S2B,S3M
Pedicularis lanceolata	Swamp Lousewort		N	PT	G5	S2
Penstemon laevigatus	Beard-tongue		N	Under Review	G5	S3
Percina evides	Gilt Darter		DL		G4	S4
Percina macrocephala*	Longhead Darter		DL		G3	S4
Persicaria amphibia var. stipulacea	A Water Smartweed		TU	DELIST	G5T5	S4
Persicaria setacea	Bog Smartweed		PE	PT	G5	S2
Phanogomphus quadricolor*	Rapids Clubtail				G3G4	S2S3
Phyciodes cocyta*	Northern Crescent				G5	S3?
Pieris virginiensis*	West Virginia White				G4	S2

Platanthera aquilonis	Northern Green Orchid		PE	PE	G5	S1
Platanthera blephariglottis	White Fringed-orchid		N	PT	G5	S2
Platanthera dilatata	Leafy White Orchid		PE	PE	G5	S1
Platanthera herbiola	Pale-green Orchid		N		G4?T4Q	SNR
Platanthera hookeri	Hooker's Orchid		TU	PE	G4	S1
Platanthera huronensis	Huron Green Orchid		PE	PE	G5T5?	S1
Platanthera leucophaea	Prairie White-fringed Orchid	LT	PX	PX	G2G3	SH
Platanthera macrophylla	Large Roundleaf Orchid		N	Under Review	G5T4	S1
Pleurobema clava*	Clubshell	LE	PE		G1G2	S2
Pleurobema sintoxia*	Round Pigtoe				G4G5	S3S4
Poa languida	Drooping Bluegrass		TU	PT	G5T4Q	S2
Poa paludigena	Bog Bluegrass		PT	PR	G3G4	S3
Poanes viator viator*	Broad-winged Skipper				G5T4	S2S3
Podilymbus podiceps*	Pied-billed Grebe				G5	S2B,S4N,S4M
Podostemum ceratophyllum	Riverweed		TU	DELIST	G5	S4
Pogonia ophioglossoides			N		G5	S4
Polites mystic*	Long Dash				G5	S3S4
Polygala polygama	Racemed Milkwort		TU	PE	G5	S1S2
Porzana carolina*	Sora				G5	S3B,S3M
Potamogeton friesii	Fries' Pondweed		PE	PE	G5	S1
Potamogeton gramineus	Grassy Pondweed		PE	PE	G5	S1
Potamogeton hillii	Hill's Pondweed		PE	PE	G3	S1
Potamogeton illinoensis	Illinois Pondweed		N		G5	S4
Potamogeton praelongus	White-stemmed Pondweed		PX	PE	G5	S1
Potamogeton richardsonii	Red-head Pondweed		PT	PR	G5	S3
Potamogeton robbinsii	Flat-leaved Pondweed		PR		G5	S4
Potamogeton vaseyi	Vasey's Pondweed		PE	PE	G4	S1
Potamogeton zosteriformis	Flat-stem Pondweed		PR	PR	G5	S2S3
Prairie Sedge - Spotted Joe-	Prairie Sedge - Spotted Joe-pye				GNR	S1S2

pye Weed Marsh	Weed Marsh					
Protonotaria citrea*	Prothonotary Warbler				G5	S3B,S2M
Pyrola chlorantha			N	PE	G5	S1
Rallus elegans*	King Rail		PE		G4	S1B,S1M
Rallus limicola*	Virginia Rail				G5	S3?B,S3M
Ranunculus aquatilis var. diffusus	White Water-crowfoot		TU	PR	G5T5	S3
Ranunculus fascicularis	Tufted Buttercup		PE	PE	G5	S1S2
Red Maple - Black Ash Palustrine Forest	Red Maple - Black Ash Palustrine Forest				GNR	S2S3
Regina septemvittata*	Queensnake				G5	S3S4
Rhamnus alnifolia	Alder-leaved Buckthorn		TU	Under Review	G5	S4
Rhionaeschna mutata*	Spatterdock Darner				G4	S3
Ribes triste	Red Currant		PT	PT	G5	S2
Rich Hemlock - Mesic Hardwoods Forest	Rich Hemlock - Mesic Hardwoods Forest				G4	S2S3
Sagittaria cuneata	Wapatum Arrowhead		N	PE	G5	S1
Salix myricoides	Broad-leaved Willow		N	PE	G4	S2
Salix pedicellaris	Bog Willow		N	Under Review	G5	S1
Salix petiolaris	Meadow Willow		N	DELIST	G5	S4
Salix serissima	Autumn Willow		PT	PT	G5	S2
Samolus parviflorus	Pineland Pimpernel		TU	PR	G5	S3
Sarracenia purpurea	Northern Pitcher Plant		N		G5	S4
Satyrium acadica*	Acadian Hairstreak				G5	S2S3
Satyrium titus*	Coral Hairstreak				G5	S3S4
Scheuchzeria palustris	Pod-grass		PE	PE	G5	S1
Schoenoplectus acutus	Hard-stemmed Bulrush		PE	PE	G5	S2
Schoenoplectus subterminalis	Water Bulrush		N	PR	G5	S3

Scirpus pedicellatus	Stalked Bulrush		PT	PT	G4	S1
Sedge - Mixed Forb Fen	Sedge - Mixed Forb Fen				GNR	S1
Simpsonaias ambigua*	Salamander Mussel	PE	PE		G1G2	S1
Sistrurus catenatus*	Eastern Massasauga	LT	PE		G3	S1
Smilax pseudochina	Long-stalked Greenbrier		PX	PX	G4G5	SH
Solidago uliginosa	Bog Goldenrod		PT	PT	G5	S2
Sorbus decora	Showy Mountain-ash		PE	PE	G5	S1
Speyeria atlantis*	Atlantis Fritillary				G5	S3
Sphagnum rubellum					G5	S2S3
Sphagnum russowii					G5	S3
Sphagnum subtile					G5	S2
Sphagnum warnstorfii					G5	S1
Sphinx gordius*	Apple Sphinx Moth				G4G5	S3S4
Spinus pinus*	Pine Siskin				G5	S3B,S5N,S4M
Spiranthes lucida	Shining Ladies'-tresses		N	PT	G4	S3
Spiranthes romanzoffiana	Hooded Ladies'-tresses		PE	PE	G5	S1
Stellaria borealis	Northern Stitchwort		PT	PT	G5	S2
Stenanthium gramineum	Featherbells		N		G4	S4
Sympetrum semicinctum*	Band-winged Meadowhawk				G5	S3S4
Symphyotrichum boreale	Rush Aster		PE	PE	G5	S1
Symphyotrichum firmum	Firm Aster		N		G5	S4
Taxus canadensis	American Yew		TU	DELIST	G5	S3S4
Terrapene carolina carolina*	Woodland Box Turtle				G5T5	S3S4
Thamnophis brachystoma*	Short-headed Gartersnake				G4	S4
Thamnophis saurita*	Eastern Ribbonsnake				G5	S3
Theliderma cylindrica*	Rabbitsfoot	LT	PE		G3G4	S1S2
Toxolasma parvum*	Lilliput				G5	S1S2
Trillium flexipes	Declined Trillium		TU	PT	G5	S2
Trillium x 1	Reserved for Trillium erectum x flexipes		N	Under Review	GNA	S2

Trollius laxus	Spreading Globeflower		PE	PE	G5T3	S1
Tyto alba*	Barn Owl				G5	S2B,S3N
Umbra limi*	Central Mudminnow				G5	S4
Utricularia intermedia	Flat-leaved Bladderwort		PT	PT	G5	S2
Vertigo cristata*	Crested Vertigo				G5	S3
Viburnum trilobum	Highbush-cranberry		TU	PT	G5T5	S1S2
Villosa fabalis*	Rayed Bean	LE	PE		G2	S1S2
Viola appalachiensis	Appalachian Blue Violet		PT	PR	G4	S3S4
Waterfalls and Rapids	Waterfalls and Rapids				GNR	SNR
Wolffia borealis	Dotted Water-meal		TU	DELIST	G5	S4
Zonitoides nitidus*	Black Gloss				G5	S3

Appendix I

National Historic Register Properties in the French Creek Watershed

Crawford County						
Name	**MUNICIPAL**	**Lattitude**	**Longitude**	**Marker_Typ**	**Missing_**	**Categories**
Cambridge Springs	CAMBRIDGE SPRINGS	41.80395	-80.05698	Roadside	No	Business & Industry, Environment, Science & Medicine, Railroads, Inns & Taverns
French Creek	EAST FAIRFIELD	41.55798	-80.1084	Roadside	No	Early Settlement, Environment, French & Indian War, George Washington
Crawford County	MEADVILLE	41.63817	-80.1502	City	No	Business & Industry, Early Settlement, Government & Politics, Government & Politics 19th Century, Oil & Gas
Richard Henderson	MEADVILLE	41.63608	-80.14845	City	No	African American, Professions & Vocations, Underground Railroad
Desegregation of Pennsylvania Schools	MEADVILLE	41.63017	-80.15327	Roadside	No	African American, Education, Government & Politics 19th Century
Birthplace of the Direct Primary	MEADVILLE	41.63878	-80.14943	Roadside	No	Government & Politics, Government & Politics 19th Century
Meadville	MEADVILLE	41.62718	-80.15422	Roadside	No	Business & Industry, Cities & Towns, Early Settlement, Government & Politics 19th Century, Invention
Baldwin House	MEADVILLE	41.64642	-80.14985	Roadside	No	Government & Politics, Government & Politics 19th Century, Houses & Homesteads
Unitarian Church	MEADVILLE	41.63755	-80.15027	City	No	Religion
Raymond Philip Shafer (1917-2006)	MEADVILLE	41.638	-80.1497	Roadside	No	Government & Politics 20th Century, Governors
John Brown Tannery	RICHMOND	41.71892	-79.95073	Roadside	No	African American, Professions & Vocations, Underground Railroad
Conneaut Reservoir	SADSBURY	41.60417	-80.29138	Roadside	Yes	Canals, Navigation, Transportation
Erie Extension Canal	SADSBURY	41.62215	-80.32587	Roadside	No	Canals, Navigation, Transportation
French Creek Feeder	UNION	41.55793	-80.18505	Roadside	No	Canals, Navigation, Transportation

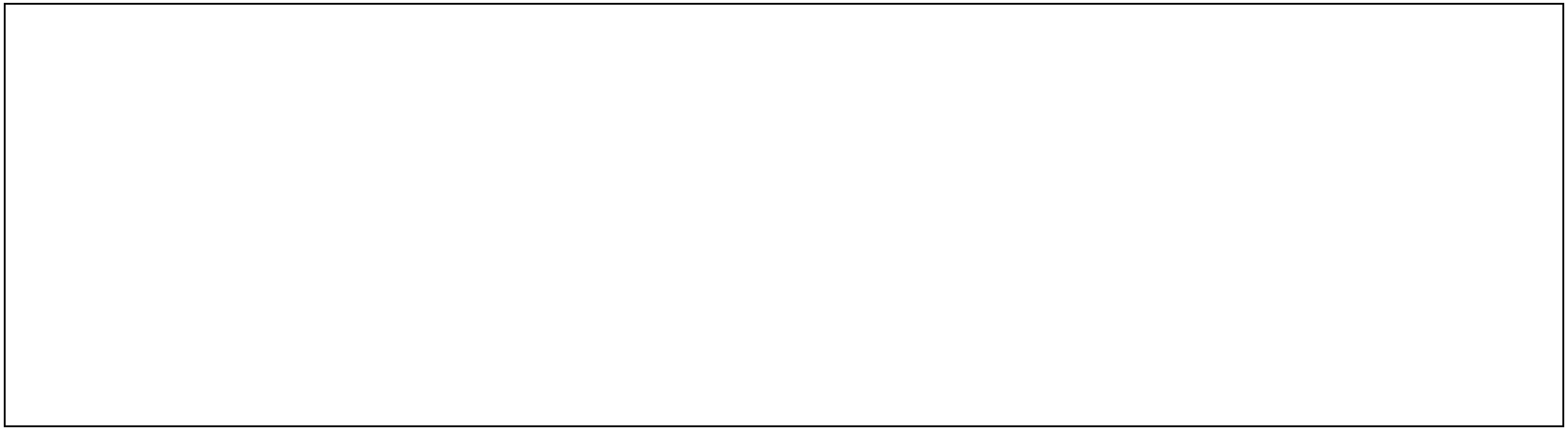
Crawford County						
Name	**MUNICIPAL**	**Lattitude**	**Longitude**	**Marker_Typ**	**Missing_**	**Categories**
Rural Electrification	WOODCOCK	41.70228	-80.10195	Roadside	No	Agriculture, Business & Industry, Electricity
James M. Thoburn	WEST MEAD	41.64402	-80.13117	Roadside	No	Religion
French Creek Feeder	WEST MEAD	41.57863	-80.1254	Roadside	No	Canals, Navigation, Transportation

Erie County						
Name	**MUNICIPAL**	**Lattitude**	**Longitude**	**Marker_Typ**	**Missing_**	**Categories**
Ida M. Tarbell	AMITY	41.9641	-79.85165	Roadside	No	Abraham Lincoln, Oil & Gas, Women, Writers
Edinboro State College	EDINBORO	41.8788	-80.11615	City	No	Education
Colt's Station	GREENFIELD	42.11883	-79.82435	Roadside	No	Government & Politics, Government & Politics 18th Century, Navigation, Transportation
French Creek	LE BOEUF	41.88482	-79.99943	Roadside	No	Early Settlement, Ethnic & Immigration, George Washington, Transportation
Drake Well Park	UNION	41.88953	-79.84715	Roadside	No	Business & Industry, Oil & Gas
Fort Le Boeuf - PLAQUE	WATERFORD	41.94008	-79.98297	Plaque	No	Forts, French & Indian War, George Washington, Military
LP-Gas Industry	WATERFORD	41.942833	-79.984497	Roadside	Yes	Business & Industry, Oil & Gas
Fort LeBoeuf	WATERFORD	41.94015	-79.98262	Roadside	No	Forts, French & Indian War, Military, Native American
Fort LeBoeuf Memorial	WATERFORD	41.94037	-79.98275	Roadside	No	Forts, French & Indian War, George Washington, Military
Old State Line	WATERFORD	41.99864	-80.03197	Roadside	No	Government & Politics, Government & Politics 18th Century
Presque Isle Portage	WATERFORD	41.9807	-80.01542	Roadside	No	Native American, Paths & Trails, Roads, Transportation
Col. Strong Vincent (1837-1863)	WATERFORD	41.94067	-79.98285	Roadside	No	Civil War, Military
George Washington	WATERFORD	41.94007	-79.98282	Roadside	No	French & Indian War, George Washington, Government & Politics, Government & Politics 18th Century, Military

Erie County						
Name	**MUNICIPAL**	**Lattitude**	**Longitude**	**Marker_Typ**	**Missing_**	**Categories**
Old State Line	WATTSBURG	41.99925	-79.81098	Roadside	No	Government & Politics, Government & Politics 18th Century
Corry State Fish Hatchery	WAYNE	41.93089	-79.67114	Roadside	No	Environment, Government & Politics 20th Century, Sports & Recreation

Venango County						
Name	**MUNICIPAL**	**Lattitude**	**Longitude**	**Marker_Typ**	**Missing_**	**Categories**
George Bissell	FRANKLIN	41.3967	-79.82705	Roadside	No	Business & Industry, Oil & Gas, Professions & Vocations
Galena-Signal Oil Company	FRANKLIN	41.39635	-79.82718	Roadside	No	Business & Industry, Oil & Gas, Railroads
Johnny Appleseed	FRANKLIN	41.40052	-79.83092	City	No	Agriculture, Folklore, Professions & Vocations
Fort Franklin	FRANKLIN	41.40067	-79.83112	Roadside	No	American Revolution, Forts, Military
Old Garrison	FRANKLIN	41.393134	-79.825369	Roadside	No	Military, Military Post-Civil War
Venango County	FRANKLIN	41.39742	-79.82758	City	No	Government & Politics, Government & Politics 19th Century
Samuel C. T. Dodd (1837-1907)	FRANKLIN	41.397576	-79.829772	City	No	Government & Politics 20th Century, Oil & Gas, Professions & Vocations, Writers

Pennsylvania Historical and Museum Commission. (2015). *Historical Markers*, (REST version)
https://mapservices.pasda.psu.edu/server/rest/services/pasda/PHMC/MapServer



Appendix J

Summary Notes French Creek Conservation Consortium Meetings 2019–2024

The French Creek Conservation Consortium abbreviated notes provide a record of the active collaboration among conservation groups and agencies of the watershed, highlights important projects and initiatives that were being undertaken as this plan update was being developed, and includes project development and fundraising needs of the active stakeholders of the watershed.

2019 French Creek Conservation Consortium Meeting Report

Judy Acker, French Creek Valley Conservancy (FCVC) Education and Outreach Specialist, organizer of the meeting welcomed everyone

Brenda Costa, Executive Director, FCVC gave an overview of the Conservancy's progress since last meeting in a short PowerPoint presentation. The conservancy had a record year with six new land acquisitions with properties ranging from 1.5-to 77 acres for a total of 191 acres. Brenda said that she got to accompany John Tautin one day during his fish survey work on Cussewago Creek near one of those new properties and they found 150 fish of 25 different species that day. 2019 will be more focused on stewardship and taking care of our current properties as well as pursuing new property leads. For education and outreach—the Woods and Water film series this year was a huge success. Done in cooperation with the Foundation for Sustainable Forests, we held two sessions and both were capacity crowds. Therefore, we are looking for new venues for larger crowds next year if anyone knows of venues that would hold 100 + people, please let FCVC know. Our classroom and community education continue to grow with seven school districts including adding more schools not in the central portion of the watershed and adding a new program for water week started last spring for sixth graders. Brenda said there are several upcoming events planned including the Annual Dinner, a Pop up clean up event, the Summer Sojourn and the annual French Creek Clean up.

Speaker Jay Toth—Tribal Archaeologist, Seneca Nation gave a talk on *"Native landscapes, culture and politics of western Pennsylvania."* In his story telling style, Jay told about giant wooly mammoths roaming the landscape grazing and keeping forest growth at bay. He also highlighted the importance of Tamarack trees (American or Eastern Larch) in constructing wigwams and longhouses for natives. He told about the use of prescribed fire for management of the land and how there didn't used to be so many trees per acre as there is now. White oaks played an important role in native culture. Acorns were a major food source before the use of corn and very important for making flour. Thus, they cultivated and manipulated the trees through these prescribed burns to produce more often and more abundantly as when the trees are threatened, they change how they produce. Also, Chestnuts were very plentiful if managed correctly.

According to Jay, "Human intervention lasts a very, very long time." He said that today if you find land that has Walnut and Oaks growing together, that is from human intervention. Also, things like wild onions growing in the middle of nowhere is a sign of human habitation at one time. Later when the natives grew corn it was black in color and they would eat it green or grind if for flour when mature. In examination of native palisade sites often these unique species of plants are found. Even today Jay said that land needs managed. His advice is to save the oldest and strongest trees—those are the seed trees. Get rid of invasive species and be aware of the unique species of plants that would signal possible native dwellings or mounds. Jay added--If you think there is a possible mound or other native signs, call Annie Marjenin at Mercyhurst University to investigate.

Jay relayed a story of a project he worked on recently where 22 native individuals of the Monongahela people were removed from a mound at McKees Rocks. As Jay said, "The dead never lie." Upon

examination of the skeletal remains, he said that these natives lived a very hard life, most died in their mid-40s, one hundred percent of the women had severe sinus infections, (from smoke in the wigwams and longhouses as there were no smoke holes) many suffered from early blindness, and it was evident from the remains that they led difficult lives. One young woman who was probably out collecting herbs was shot by three arrows, two in the front and one in her back--most likely from a raiding party. Jay said she likely saved lives in her efforts. "There were no modern-day drugs, there was lots of pain and suffering--it was a tough life and there is nothing romantic about it." Jay also stated that doing these reburials is difficult and they take an emotional toll as well.

Jay recounted that as Europeans expanded into the wilderness, Western Pennsylvania was under the jurisdiction of Virginia. With more whites moving in, Natives were displaced, pushed out and often times just eliminated. The Delaware were the last tribe to inhabit Northwestern PA. "Some archaeological sites are basically murder scenes," Jay said. They have found horses shot and tools still out in the field. Racism in history keeps repeating itself, Jay interjected. Even though the Seneca's had a good history with the Quakers, through politics in Philadelphia, natives came out on the short end of the deal. Locally, while the natives were granted the Cornplanter tract of land, the building of the Kinzua Dam flooded hundreds of acres of native land. Jay surmised that the racist culture is still here, its just different people now--but hate groups still exist.

Jay ended his talk with a thought to ponder-- that the types of land that conservation organizations such as those found at the meeting will acquire are not "vacant lands." He pointed out that they are lands that native people used and lived on--lands where natives are potentially buried. He reminded everyone to look for the signs and be respectful. Jay concluded that anyone wanting more information about local native burial mounds can consult the National Park website for details.

Rapid-fire Round Table contributions from members present:

Kevin Boozel—FCVC Land Protection Specialist—Greendale Cemetery project will soon be an easement…77 acres old growth hemlock forest a ravine and trails.

Josh Lewis-- FCVC Conservation Coordinator…FCVC Accreditation and stewardship of 34 properties…gage neighbor relations, sub-basin signage project and clean up event. Josh has also started a FCVC Instagram page and works on updating that weekly.

Annie Marjenin—Archaeologist from Mercyhurst University—working with the Seneca Nation at Custaloga Town in the fourth year of that work. There has been some unexpected finds and she is working cooperatively with many groups on the Nation Register for the preservation and protection of the area and is working to provide education to property owners and users about the finds.

John Tautin—FCVC board, Ag Land Preservation Board—Ag Land Preservation board secured another farm for 600 acres to be preserved in Crawford County and working on a fish survey of Cussewago Creek and has identified approximately 40,000 fish of 50 species. He is currently working on a report of his findings.

Debbie Frawley—Allegheny Valley Conservancy—gained a 16-acre property on the Allegheny river near Emlenton with a kayak access, primitive camping, and a pavilion. Also received donation of 23 acres along East Sandy Creek east of the Rockland Cranberry Road open to the public near the bike trail with camping and good trout fishing.

Johnathan Townsend—Chautauqua Watershed Conservancy—Researching schools in French Creek watershed within Chautauqua County, NY to help FCVC target outreach.

Brian Pilarcik –Crawford County Conservation District—Best Management Practices with farmers and riparian restoration projects through a DEP Growing Greener grant continues. Woodcock Creek Nature Center and Conneaut Lake planning and he is working with the Cooperative Weed management group.

Brian Wolf—NRCS- Brian relayed that land owners can contact NRCS for help with planning for resource concerns, like water, soil erosion, wildlife habitat, etc. The process is voluntary and after a plan is made, landowners can apply for funds through the farm bill's various programs. He reminded everyone that there are offices in each county available to help.

Rick Gilson—Trout Unlimited—TU dates back to the 50s and is a National Organization. Northwestern PA is not a hotbed for trout but there are a few streams that have fairly good habitat such as Sugar Creek and Trout Run where they have done some fish survey work and education of land owners. Edinboro University has a Trout Fishing club with over 50 members of students who are very active.

Vicki Muller—Erie National Wildlife Refuge—summer projects include drone/eagle nest surveys, working with professor Rich Bowden from Allegheny College to get goats to help eliminate multiflora rose instead of using herbicides, continuing bat acoustic monitoring and (hiring) Youth Corps students for trail maintenance and bridge reconstruction, and a biology intern working on a hybrid chestnut tree planning. Holding a young forest workshop and early successional habitat and vernal pool monitoring. Volunteers are always welcome for invasive plant management as well.

Wendy Kedzierski—Creek Connections—works with 50 middle or high schools with water quality monitoring and other environmental education projects. The program is free of charge for schools and looking for more teachers to work with. The annual student research Creek Connections Symposium will be held in April. Creek Camp for students in 9-11th grade has been slightly revamped and now will be eligible for college credits.

Kathy Uglow—Crawford County Conservation District—annual tree sale is coming up and that they procured a grant to expand the Nature Play area. Kathy said she is always looking for speakers and possible programs and activities. School programs for K-grade two continue and spring field trips are scheduled. A REC grant will fund a workshop on stormwater education and a "make your own rain barrel" project.

Joy Knapp—Erie County Planning—working county wide with the parks and recreation plan recommendations to cover 38 municipalities looking at sub watershed needs and challenges to be complied on the Erie County website.

Amy Jewitt—WPC-iMapInvasives—iMapInvasives is an online data base used to track invasive species in PA. April webinar trainings. Volunteers are needed for help with assessments.

Ann Sand—WPC—Land Protection—new property was procured on the South Branch of French Creek includes 193 acres with 1.5 miles of beautiful creek frontage and is open to the public. WPC is closing on 92 acres north of Cambridge Springs routes 6 & 19 on Miller Station Road from the Halliday family.

Scott Wissinger—Allegheny College—33 years working in the watershed with real hands-on projects for students focused on wetlands ecology and invertebrates. He has added fish bio monitoring and has fish community data on 250+ streams to share for conservation (need for restoration, need for preservation). Ernst Trail group to extend the Ernst Trail from Beans Auto to Bicentennial park.

Tim Hummel—Venango County Conservation District—managing the effects of iron and aluminum discharges in county, fish surveys to confirm trout populations, doing stream bank stabilization, well plugging, and habitat improvement.

Joseph Hudson—Erie County Conservation District—multitude of dirt and gravel road projects as well as several watershed agricultural based projects in the French Creek drainage. Also doing in-school programs, field trips and summer camps.

Larissa Cassano Hamilton—Mercer County Conservation District—Growing greener grants in which surveys of invasive species and dirt and gravel roads projects touch on property in the (French Creek) watershed. One project in particular near Custaloga town where erosion of the road is severe is being addressed. FCVC to do French Creek education programming in Mercer county.

Tyson Johnston—WPC—2018 upgrade projects done on the KATZ Natural area property near Meadville including an Eagle Scout project in which a new bench and picnic table were built. The entrance was also redone and widened with a new culvert pipe put in that is designed to be more critter friendly to allow passage through the pipe. Invasive control was done in Erie County, and WPC volunteers helped with the annual FC clean up. There has been some site restoration along the West Brand of FC and on a couple of properties, and on properties--homes will be taken down and the sites restored. Work days for 2019 are being scheduled and Tyson displayed new welcome signs that will go out on each of the WPC properties.

Guy Dunkle—Foundation for Sustainable Forests—144-acre property Northwest of Corry restoration work. They are working on creating a model for climate resilience—species that will tolerate climate change and thrive. noted lack of conversation in the French Creek Watershed about climate change.

Annie Soccie—Foundation for Sustainable Forests—The foundation recently hosted a Penn State webinar –Forestry for Resilience --and it will be available online. Began a new partnership with the city of Erie and Presque Isle Audubon Society on 50 acres of forest for bird habitat. Working with the Army Corps of Engineers at Union City and Woodcock Dams doing assessments.

Mark Lethaby—TREC-Natural History Museum—PA amphibian and reptile surveys, mapping 85 species in the state. There has been a lot of hellbender research going on and said to report hellbender or a mudpuppy findings with a photograph and data to paherp.org. Anglers can also report finds. Because of concern for hellbender safety--reports can be hidden on the site so spots where hellbenders are found will not become public knowledge.

Sarah Sargent—Erie Bird Observatory—Presque Isle birds banding and surveys. In French Creek watershed, they are doing an Osprey nest project relocating nests from powerline poles to nearby platform nesting box poles in conjunction with Fist Energy and REC. Looking at urban Merlin populations as they are increasing their range and so EBO is asking for reports of sightings and nests in back yards. Sarah noted that Merlin like Norway spruce trees in towns and to report known locations.

Judy Acker –FCVC—Doing programs in 7 school districts, updating the upper and lower watershed trail maps, quarterly newsletters, updating the fact sheets, planning the 2019 summer sojourn, creating a land owner brochure on "how to conserve your land" and update FCVC website content.

Casey Bradshaw Wilson—Allegheny College—Working on Round Goby invasion and range expansion monitoring with colleagues from Penn State. Also working on freshwater mussels, their abundance and distribution, so they can be monitored before/after gobies. Paper coming out in April documenting round gobies eating juvenile freshwater mussels. Another paper submitted with regard to freshwater mussel

distribution and population. Another grant is funding work for DNA of round goby stomach contents. This allows us to figure out exactly which species round gobies are consuming because they are too small to identify under a microscope. Lastly, A study going in artificial streams at PSU to determine if round gobies can be used as a host for mussel reproduction.

2020 French Creek Consortium Meeting Notes

Brenda Costa—FCVC—"State of the Conservancy" PowerPoint Report: **FCVC is Growing**: Increased protected lands by over 13%- now 2,318 acres under permanent protection! Expanded the reach of our elementary school programming to the south in Venango County and to the north in Chautauqua County, NY. Allegheny College collaboration- 11 student service-learning projects and two full-class research projects. Adding our 5th employee in April 2020. **6 acquisitions in 2019**: 273 acres total - Greendale Cemetery Ravine- CE 75 acres, Brock's Lookout- Fee 8 acres, Fette Island- Transfer 42 acres, Moss Woods- CE 65 acres, Race Street Lumber- Fee 23 acres, Lavier- CE/LE 60 acres. **2019 Focus on Stewardship**: Pop-up cleanups, Make-a-Difference Day, Invasive species management, Student stewardship projects. **Education and Outreach**: Woods & Waters Film Series with Foundation for Sustainable Forests held two events, Classroom and Community Education, Focus on French Creek Water Trail—more focus and did updated maps.

Roundtable Rapid Reports:
Joseph Hudson—Erie County Conservation District—working on various projects in the watershed and part of the local Cooperative Weed Management Area (CWMA) group.

Jay Gerber—DEP Biologist—mussel survey in the Saegertown area of French Creek looking at possible impacts from the sewage treatment plant. Found 14 species including endangered or threatened species. Surveyed 20 feet upstream from the discharge area near the bridge to 100 ft. below and found no impacts.

Kylie Maland—Western PA Conservancy—Trout Run to LeBeouf Creek restoration plan using DEP macro sampling and water quality monitoring and seeking opportunities for improvements in Erie County. Using US Army Corps of Engineers model to help prioritized restoration projects in the sub watersheds of French Creek that are impaired. DCNR funding for the update for the FC Conservation Plan.

Stacey Wolbert—PA Game Commission—planning projects for the watershed and river otter trapping and surveys. Looking to see if there is a sufficient population to allow a trapping season.

Darin Clark—PA Game Commission—State Game Lands 277 invasive species work; and State Game Lands 69 1,900 acres huge project of habitat work creating early successional habitat.

Rick Gilson—Trout Unlimited—Collaborating with Edinboro University Fly Fishing club holding a fishing derby for kids at Mallory Lake on the Edinboro Campus. Last year over 100 people came with about 40 children fishing. Mallory Lake will be stocked with trout but kids were happy to catch any fish.

Brian Pilarcik—Crawford Conservation District—riparian projects at Conneaut Marsh property, working with students at Tamarack Lake helping to restore aquatic plant revegetation and working on invasive species removal at the Woodcock Creek Nature Center property including some treatment at Stainbrook Park. Worked to help create a Conneaut Lake Watershed Implementation plan.

Kathy Uglow—Crawford Conservation District—district staff have nine funded projects for Dirt and Gravel Roads and five stream crossings and are also working on Growing Greener funded BMP projects

such as barn roof gutters, animal watering systems, heavy use plans, etc. They host an annual tree and seedling sale and the annual Envirothon.

Vicki Muller—Erie National Wildlife Refuge—New land acquisition of 140 acres in the middle of the Seneca Division near Muddy Creek. In the fall ENWR will be working with PA Fish and Wildlife to mussel surveys. All Drone work looking at Eagle nests has been suspended indefinitely due to cyber-security concerns. Spotted and wood turtle surveys will be conducted in the spring and new microphones were purchased for the Bat acoustic monitoring project. The goats will be back for 6-8 weeks to eat multiflora rose in the same area as last year. Great response for the first year, but studies show best results after 4-5 years of goat grazing. Improvements are being made to the Holly trail including bridge reconstruction and adding a polymer coating with grit to help with slippage. Four interns will be working at ENWR for the summer including one focused on visitor services and the eight-week WCC youth program will also be going on. ENWR will be holding a public woodcock workshop on April 18th to help homeowners learn about woodcock habitats. They have also been doing otter surveys on the refuge.

Wendy Kedzierski—Creek Connections—Annual Student Symposium April 17th.

Laura Branby—Creek Connections—The Pittsburgh area Student Symposium is April 3rd. Two weeks of Fresh Water Academy at Allegheny College in July. They are also looking for help and presenters.

Joy Fronzoli—Erie County Planning—Coastal and Greenways projects. Working to assess the health of the watershed by looking at 17 representative tributaries. PA Sea Grant funded restoration projects. Greenways prioritization and plans for Erie county parks, trails and recreator utilizing act 13 funding is almost done. Once formally adopted a new Parks and Rec coordinator will be hired to oversee the three districts of Parks based on regional assets to help leverage funds for more impactful projects like trails.

Michael Guelcher—Erie County Planning—Stormwater systems mapping and GIS support for Erie County. Also working with Union City borough on storm sewer infrastructure. Having a stormwater educational booth at the French Creek Festival to get the message out to homeowners. Helping with funding for a stream bank restoration project behind the municipal parking lot.

Larissa Cassano—**Mercer County Conservation District**—Would like to do French Creek mussel program somewhere in the watershed, but looking for venues. The district is doing dirt and gravel road projects and looking at aquatic invasive such as European Water Milfoil and how to help stop the spread.

Chad Foster—PA Fish and Boat—Linesville fish Hatchery open house April 4th. A bass habitat project at Woodcock lake is scheduled for June 4th at the boat launch with 80 structures. Youth fishing day at Linesville is June 13 & 14. Fish and Boat are working to restore Education Grants that teach fishing and waterways education. Check the website for the application.

Charles Bier—Western PA Conservancy—Reviewing the management plans of 40 WPC properties looking at ecological indictors and updating the plans with more of an ecosystem focus. Also looking at invasive species as well. Assessing aquatic plants at Lake Pleasant and possible effects of gravel mining nearby with potential for invasive plant transfer such as Eurasian water milfoil getting into Lake Pleasant from the gravel pit ponds. Also looking at possible climate change effects in substrate of streams/river systems from excessive erosion from an increase in erratic precipitation events and higher volume and intensity creating bed shearing which is the habitat for many species. Also working on land acquisition planning to protect biodiversity of the watershed in the main stem, major tributaries and wetlands—such as Waitsburg Fen and the West Branch of French Creek—both with high biodiversity.

Guy Dunkle—**Foundation for Sustainable Forests**—Acquired a 55-acre parcel on Sugar Creek near Townville and there is a 15 acre parcel coming up in the same area. Working with Presque Isle Audubon on a property near Federal Run with an Emerald Ash borer problem. Harvesting ash trees and working on invasive species. The annual dinner is May 15th with guest speaker, Doug Tallamy. Doug is the author of Bringing Nature Home and his new book, Natures Best Hope.

Ann Sand—**Western PA Conservancy**—Two new properties on the West Branch totaling almost 1,000 acres were acquired. This closed a large gap in public land in the area. WPC holds 5,500 acres in the watershed currently. Ann passed out brochures and a sheet on the West Branch Conservation Area.

Tyson Johnson—**Western PA Conservancy**—WPC life estate property on Lake Pleasant has 11-12 structures that need removed. Currently six of the buildings were torn down and weather has hampered progress. Working on invasive species near the Venango bridge property. Working on improving access, signage and parking on other properties. On the Katz property, NRCS is helping with wetland monitoring. Cooperative project with Pymatuning Lab of Ecology working with students doing sampling and with schools planting trees and shrubs for riparian restoration.

Jeremy Woolson—Chautauqua Watershed Conservancy—30th year anniversary celebration and including the French Creek Watershed in the strategic plan. Chautauqua Conservancy is one of three land trusts but has no properties currently in the FC watershed.

Brian Ensign –**Pa Fish and Boat**—Covers 13 counties so French Creek is his responsibility. Part of the task force looking at Round Goby invasion in the watershed. Found in 2014 in Lake LeBeouf and 2015 in LeBeouf Creek and working on the state action plan. Been sampling and the increase over six years has not been as quick as expected. Sampling caught two in 2015 and 21 in 2020. Helping with studies for populations in the watershed and effects on mussels and darter species. Will be conducting musky surveys near Saegertown and Cochranton to assess populations. Also conducting sampling in inaccessible tributaries for wild trout. Allegheny college is helping with those projects. Working on a proposal for NO live bait usage in Lake Pleasant proposed to help stop the introduction of invasive species into the lake.

Kevin Boozel—**FCVC**—Working on over a dozen properties constituting approximately 2,000 acres.

Brenda Costa—**FCVC**—Gave an overview of the proposed French Creek Entertainment and Heritage District project. Much confusion publicly as to who is doing what with all the French Creek organizations. FCVC is NOT funding this project or promoting it to add an amphitheater, hotel, restaurants, a boat launch, and cut down all the trees along the Creek for this endeavor.

Judy Acker—**FCVC—**school programs extended the reach into New York in the Sherman Area School District and south in the Rocky Grove School district taking her programs into nine school districts. Collaborative landowner outreach events in the Union city area and Edinboro/Conneauttee/Cussewago drainage area. The cooperative Woods & Water Film Series with the Foundation for Sustainable Forests were moved around the watershed and this year they were held in Edinboro and Venango. Updating seven factsheets, writing the quarterly newsletter and various other publications, update the website, created a landowner outreach brochure and working on sub basin signage in five spots in the watershed.

Josh Lewis—FCVC—created a story map with pop up information for all the public properties on the FCVC website. Working with Allegheny students doing stewardship projects on several properties with native species and invasive species plans, trail and access, signage, etc. The sub basin signage project signs in cooperation with PA Fish and Boat will be ready to install in five weeks. Many other FCVC property signs have been put up and FCVC has received positive comments from that exposure. Several properties are open for hunting and the hunting registration on the website has been very popular. It is just

a way to track who is hunting on the property. Pop up clean up and other stewardship activities were also held and some are planned for spring as well.

Kendra Nemeth—NRCS--Intern working with landowners with the USDA Wetland Reserve Program (WRP) permitting process both on and off site.

Casey Wilson—Guest Speaker—Round Goby research update:
Casey and her team are working on a long-term study of the effects of Round Goby introduction into the French Creek Watershed. Looking at habitat overlap with other species such as sculpins, madtom catfish, juvenile yellow perch and Rainbow, Johnny and Sand Darters for food and habitat competition. Male gobies are aggressive and may be taking prime spawning sites and since what they eat is variable and diverse (such as baby mussels and lots of macroinvertebrates) they compete for food sources. Doing sampling to see where they are and how fast they are moving. Checked Conneaut Lake, South Branch of French Creek and Woodcock lake. Found that they are pretty localized around Lake LeBeouf and LeBeouf Creek and they are not going UP the South Branch—which is good. Worry about bait bucket transfer into other places like Conneaut Lake and Edinboro Lake where resident Zebra mussels would be plentiful for food and the population could explode. Also concern for Pymatuning or Woodcock Creek Lake with bait bucket transfer. A multi-agency task force is looking into making it illegal to transport Round Gobies—making it more difficult to inadvertently add them to other water sources through bait bucket dispersal.

Research methods used are observation, snorkeling, kick seine sampling, looking at micro habitats, placement and position in the stream, distance from banks, water depth, velocity and substrate analysis, flow, and whether they are in a pool, riffle, etc. Casey said a lot can be learned from this information. Casey's research also is looking at what Gobies are eating. Dissected the stomach content of gobies collected and found that they are eating juvenile mussels and fingernail clams in large quantities as well as macroinvertebrates. Found that they eat mostly native mussels when they are small and fingernail clams when they are larger. Now doing genetic work with USGS to see what species of mussels they are eating as you cannot tell just by looking at stomach contents.

Active reproduction has been found in LeBeouf Creek and they breed from April to November with the most found in July but they can have multiple spawns. Males turn black during breeding season and aggressively defend the nests. Females can lay up to 10,000 eggs every 24 days—*they are like cockroaches in this ability to produce offspring so often. It is also being studied to see of Gobies are being distributed by larval drift where they simply get moved by current downstream during the night. Sampling can be affected by weather including storms, water height, velocity, etc. Long term goals are to study distribution, rate dispersal, habitat shifts and diet shifts.

French Creek Conservation Plan Update:
Kylie Maland reported that Western Pennsylvania Conservancy has secured funding from DCNR for $25,000 to update the current plan. The focus will be on the PA portion of the watershed. It will follow the DCNR format and protocols looking at demographics, characteristics, biological and cultural resources, recreations such as parks, trails, etc. Community and municipality involvement, focus groups and will help identify the needs and issues in the watershed as well as make recommendations and possible future funding. Members of The French Creek Conservation Consortium will serve as the steering committee. The grant funding will be for holding outreach meetings and publication of the plan, not the data collection. Through WPC and other partners there is a long list of data sources. Previously, WPC did most of the work, managed volunteers, data review, etc. and again will do a lot of the on the ground work for this version. The former plan was not highly prioritized, there were dozens of issues covered, and so it was determined that this time around, there needs to more prioritization and focus in this version of the plan.

2022 French Creek Consortium Meeting Notes

Overview of FCVC events and last year accomplishments: Brenda Costa

- FCVC 40th Anniversary and 2022 River of the Year
- Properties procured since the last meeting
- NAWCA Standard grant funding; collaboration in the watershed
- Cussewago Dam Removal Project-NFWF grant & partnering with American Rivers
- Upcoming calendar of events:
    - oMay 18–Bird Walk at Morton Forest
    - oJune–40th Anniversary Celebration
    - oJune 11–Summer Sojourn Paddling event
    - oJuly–River Snorkeling Trip
    - oAugust–French Creek Photo Contest: Crawford County Fair
    - oSeptember 10–Annual French Creek Cleanup
    - oOctober 1–Fall Float
    - oOctober 2–Walk in Penn's Woods
    - oNovember-"move"-ember Property walk

Visit our website for information and registration www.frenchcreekconservancy.org

Round table discussion:

Tali MacArthur from PEC & POWR

- May 19th Erie National Wildlife Refuge workshop for Watershed organizations and key partners
- April 28th Wild & Scenic Film Festival "On Tour" –virtual or in person (Laurel Highlands)
- Ohio Basin Water Trail Managers Meeting April 21st tentatively at Cranberry Township YMCA

Kelcy Marini-Environmental Education Coordinator at Mercer County Conservation District

- Envirothon and Seedling sale; Climate & Rural Systems Partnerships (Shenango Climate & Rural Environmental Study Team (CREST)-climate change in rural areas
- Pond health April 12th webinar from 7:30-8:30 pm-sign up on Facebook

Brian Hill-Richard King Mellon Foundation

- Willing to discuss projects on trails or public access related to the French Creek watershed.
- You can contact him at : bhill@rkmf.org

Barb Hauge-Union City Trail feasibility study partner

- working with Union City Borough for trail feasibility study developing trail system along French Creek w/Riparian Buffer enhancement & habitat creation, Fishing access points-improvements, and reconnecting Union City to French Creek-making sure you can view the creek
- No funding yet-this is in the very initial planning stages

Cindy Wells-Union City Borough Secretary

- Working with Barb Hauge for trail feasibility study
- Getting ready to apply for funding to help with the project in Union City
- Parks Comprehensive plan, transportation plan, and trail plan have overlapping features
- https://unioncitypa.us/ 2022 French Creek Trail Feasibility study information

Wendy Kedzierski-Creek Connections

- Creek Connections Virtual Symposium is coming up

Guy Dunkle-Foundation for Sustainable Forests

- Partnering with the Learning Center to build an outdoor learning pavilion (timber frame)
- Educating about forestry
- Stewardship projects --logging w/ horses
- Working with the National Aviary in Pittsburgh to study birds in forests

Stacy Wolbert-PA Game Commission

- Wildlife biologists are Turkey trapping, bear trapping, and other wildlife studies
- Looking for Northern goshawks to create surveys on

Annie Maloney-Foundation for Sustainable Forests

- To date 400 acres protected in the Watershed
- Working with the National Aviary to study birds; about a 3 year process-half of the study sites are in the French Creek Watershed-shows how forest management has affected bird habitat & nesting
- Hired Bennett Gould to the staff
- May 1st Wildflower walk and potluck picnic in Wattsburg, NY.

Kylie Maland-Western PA Conservancy

- French Creek Watershed Management plan updates: GIS data, interactive links and data for stream impairment, species, etc. being created
- Identifying planning tools, money, resources, permitting, etc.

Mark Lewis-Crawford County Service Forester, Bureau of Forestry

- Riparian plantings-Graf planting partnership; more coming in 2022
- Northwest PA Woodland Association June 11th tree planting with Jim Bock
- Walk in Penn's Woods October 2nd with French Creek Valley Conservancy at Greendale

Joy Fronzoli- Environment & Recreation Planning Program-Erie County

- Greenways Trail study showed people want to see the water when they are on a trail
- Working with Parks and Trails
- ARC Funds- studying from Erie to Pittsburgh trail
- https://eriecountypa.gov/departments/planning-and-community-development/programs/parks-trails-and-recreation-plan/

Brian Pilarcik-Crawford County Conservation District-Watershed Specialist

- Stream bank work
- Bathymetric Mapping & other hydro acoustic surveys- on the following lakes or reservoirs: LeBeouf, Conneaut, Canadohta, Mud, Crystal, Dollar. Partial work has been done on: Pymatuning, Woodcock, Sugar.
- These files can be viewed or downloaded onto a Lowrance or Simrad sonar unit.
- https://www.genesismaps.com/SocialMap

Tracey Crawford-Crawford County Conservation District-District Manager

- Ag grant work in the watershed
- Farmland Preservation-working to close on 4 farms-1 in watershed
- NFWF grant partnership
- Working on obtaining no-till equipment and willing to rent out if anyone needs

Jody Lasko –NRCS USDA

- NRCS cost incentive; technical advice available
- Soil health day held
- Summer field days are being planned
- Easement programs and others are available

Ann Sand-Western Pennsylvania Conservancy-Land Protection Manager

- WPC is hiring a Seasonal Field Assistant in the NW Region.
- Franklin Line Canal Natural Area acquisition was completed-33 acres including 9 islands
- Union City 40-acre property to close in May

Tyson Johnson Report given by Ann Sand:

- NRCS Easement on Katz Natural Area and Wetland Restoration
- Invasive Species Management
- Purchasing tractor equipment available if you need to borrow

Sarah Sargent-Erie Bird Observatory

- Most work is in Presque Isle area, banding and monitoring birds
- Monitoring birds at Bousan Forests
- Osprey nest platforms are available to be installed--working cooperatively with Penelec/PennPower/REC/etc. to keep bird nests safe off of power lines.
- Birders have increased significantly during Covid
- Building a better birder experience –program beginning at Presque Isle

Kathy Uglow-Crawford County Conservation District-Environmental Education Coordinator

- Planting herbs event
- Nature Discovery Walk with i-naturalist app
- Scholarship available for students interested in going into a science field-Patty Reynolds Women in Science Scholarship applications until May 6

Vicki Muller-Erie National Wildlife Refuge- manager

- Invasive species management continues
- An increase in woodcock has been noted at ENWR
- Turtle surveys on the refuge
- Funding for E-DNA project and worked with Casey Bradshaw-Wilson for Watershed water sampling to look at mussels, darters, and round goby; waiting for survey results
- Hired a biologist-- John (Yianni) Laskaris

- Hiring summer interns from ages 15-18 years old. Find more details on Facebook page. Also hiring 3 interns, housing is offered.

Rich Bowden-Environmental Science Professor at Allegheny College

- Casey Wilson-Bradshaw has obtained Richard King Mellon Foundation funding to establish Watershed Research Center
- Working with FCVC on tree plantings
- Worked with goats for multiflora rose management at ENWR
- Cussewago Island senior thesis on multifora rose management

Deb Frawley-Allegheny Valley Conservancy President & also works for Crawford County Planning

- A workshop with trail association-Venango Conservation District and Allegheny Valley Trails Association will be held in June
- New AVC property in Venango County
- Community Revitalization Program in Crawford County

2023 French Creek Consortium Meeting

Overview of FCVC events and last year accomplishments

- Properties procured: Spring Street Management Area (Smuckers) 4.85 acres, Kayden's Landing Easement:15.80 acres, Conneaut Headwaters; 33 acres, Lutz Easement; 13 acres
- Total 2022 acreage; 66.65, Total conserved acreage; 3168
- Stewardship events- four major projects- Tree tube maintenance, Tree plantings, Smith Well cleanup, pop up clean ups.
- Cussewago Dam Removal Project - Pre-removal baseline studies freshwater mussels and fish
- Upcoming calendar of events:
    - o March 31-Woods & Waters Film
    - o April 19- Tap Talk at Voodoo; American Chestnuts
    - o April 22-Tree Planting at Brace
    - o May 20– Bird Walk at Morton Forest
    - o June 10– Summer Sojourn
    - o July 14– Member Picnic
    - o August–Crawford County Fair
    - o September 9– Annual French Creek Cleanup
    - o October 1– Walk in Penn's Woods
    - o November 4- Property walk

Visit our website for information and registration www.frenchcreekconservancy.org

Round table discussion:

Bennett Gould--Foundation for Sustainable Forests-Conservation & Outreach Coordinator

- Working on Land Conservation projects, outreach events, engaging landowners

Kathy Uglow-Crawford County Conservation District-Environmental Education Specialist

- Brian Pilarchik has tree planting events going on with local high schools w/ Mark Lewis- DCNR
- Pymatuning habitat building coming up.
- Most education programming has been outdoors.

- In School programs: 3rd Grade Birth of a Tree and Kindergarten Watershed Mural Project
- Working on preparing for the Envirothon-May 3
- Tree sale order online, trees arrive Earth week.

Maille Larmon-Crawford County Conservation District-Resource Conservation Technician

- New employee. Happy to be here!
- Chapter 102/105 permitting, erosion control
- From Tracey Crawford-ACAP-clean stream funding and tech assistance for farms-$2.6 million for Crawford County Farms available.

Joy Fronzoli-Erie County Department of Planning

- Coastal Zone work but also Greenways Program-County under plan adopted in 2020.
- ARC grant for trail work through Erie County
- FC trail plan Erie to Pittsburgh trail route in mind--engaging 11 municipalities along the route-working with stake holders. Route changed to focus on tourism and economic benefits.
- Feasibility study was done in Union City for their trail plan.

Ryan Hill-U.S. Army Corps of Engineers-Union City Dam & Woodcock Creek

- Working on campground area to increase native plants that will use more water to decrease wet areas--Receiving help from Penn State Master Gardeners to plant appropriate plants.
- Working to revamp Bossard Nature Area and update the building. Also replacing signage.
- Fish habitat improvements in collaboration with PA Fish & Boat.
- 50th anniversary of Woodcock this year.

Joe Arnett-U.S. Army Corps of Engineers-Union City Dam & Woodcock Creek

- Sustainable River Programming.
- Dry bed reservoirs-working with NRCS and Foundation for Sustainable Forests.
- Dam water release update—no one is at fault-- a “Perfect storm” of instrument malfunctions caused the drawdown--so they are implementing a triple-backup system to avoid issues in the future. The fish population was minimally impacted.
- Installing new fish habitats—Reef Balls

Joseph Hudson-Erie County Conservation District

- Working on Erie County Envirothon and their tree sale
- ARC ACAP funding-southern part of the county for agriculture
- VESA program-targeted toward Lake Erie Nutrient management
- Working with the French Creek Weed Management as well

Larissa Cassano-Hamilton-Mercer County Conservation District

- Taking over some educator responsibilities for the summer
- Invasive species work for European Water Chestnut—having a “hand pull” event.
- Master Watershed Stewards Earth day with Hermitage event and clean up on Shenango River
- Watershed pledge project—having kids sign a pledge
- Doing erosion work and finishing up the tree sale
- March 30th is their Annual meeting dinner honoring John Oliver and April Klause

Casey Bradshaw Wilson-Allegheny College Watershed Conservation Resource Center

- Co-Director with Kelly Pierce, another professor and ecologist.
- Kelly is working on a watershed-scale river otter study
- Crawford County Conservation District restoration projects pre and post monitoring on Woodcock Creek to French Creek.
- Bird banding and monitoring with Erie Bird Observatory work as well.
- Brook Trout study.
- Mark Kirk is staff Research Scientist and a new assistant will be needed.
- Great opportunity for students to get hands on experience and create watershed stewards.

Guy Dunkle-Foundation for Sustainable Forests

- Most of current projects have been outside of the French Creek watershed.
- 1 mile trail in the works for Caldwell Creek.
- National Aviary of Pittsburgh is continuing field research on migrating songbirds

Tyson Johnston-Western Pennsylvania Conservancy

- Land and stewardship manager for seven counties. Office in Franklin.
- 41 Places Campaign-to help with visitor amenities (signage, facilities, trails, etc.)
- Upcoming volunteer work days.
- Seasonal job opening.
- Katz tree planting—1.6 acres of trees and shrubs and pollinator plantings.
- Conneaut Marsh tree planting is complete.
- Treating for invasives on one of the WPC properties in Waterford.
- Team participated in the French Creek Clean up.
- Newly acquired seed drill available for others to use with permission from WPC.
- Installing a new boat launch on the south branch of French Creek off of Paige Road by the bridge.
- Conducting maintenance on the west side of Lake Pleasant removing old buildings.

Doug Torok-USDA NRCS, Civil Engineer

- Does design work, construction inspection & planning work.
- Three CSP, Equip, WRP programs, 11 CSP projects and pollinator plantings
- Forestry work, Grazing on farmstead properties, Manure storage, heavy use areas, and wetland projects, started three restoration projects.

Jody Lasko-USDA NRCS, District Conservationist

- Serves a four county area—Crawford, Erie, Mercer and Lawrence
- Voluntary conservation for private lands. Technical and financial assistance available
- Possible work on Conneautville dam in 2023
- $1.8 million for new projects--Crop land and no-till incentives, erosion control, grazing practices, protecting riparian areas, revegetating buffers, small scale farming , urban incentives, forest and wildlife enhancements
- Conservation innovation grants

Rick Gilson-Trout Unlimited

- Waterford Township stream bank stabilization project--Trout Run watershed flows into Lake LeBeouf. WPC helped with willow and dogwood cuttings planting. They seem to have successfully established as of August 2022
- "Trout in the Classroom" sponsorship funding schools in Erie County. Watershed schools did not request funding. Schools were raising Brook trout- but moved to raising Rainbow trout which are then released into Lake Pleasant.
- Working with WPC and Game Commission in 2023 to add trout habitat in Benson Run—a Class A Trout Stream.

Annie Maloney-Foundation for Sustainable Forests

- Community Forest project land acquisition project with NWREC and USDA.
- May 4 & 5 will be a roundtable & site visits to the Blooming Valley Forest.
- Blooming Valley Forest and NFWF great partnership.
- Blooming Valley Forest will host the annual "Loving the Land" conference in September 2023
- Invasive Plant management work and Banding Bird Blitz in cooperation with Audubon and the PA Society of Ornithology. Working with Brian Hill and the RK Mellon Foundation, writing forest management plans.

Brian Daggs-Western Pennsylvania Conservancy-Invasive Species Ecologist

- Invasive species monitoring throughout WPC coverage areas.
- Field work and surveying being conducted to track species--Tree of Heaven and Spotted Lantern Fly are the main invasive being studied.
- Also Lesser Celandine plant that make a dense carpet in forests and Hydrilla, an aquatic plant in Conneaut Lake.
- Conneaut Lake and Geneva Marsh—looking for invasives during the survey efforts.
- New project, funded RK Mellon -Working on choosing 10 sites to create a comprehensive management plan. At least one site will be in the French Creek Watershed.
- Brian is willing to be a resource for the biology and ecology of invasive species.

Deb Frawley-Allegheny Valley Conservancy/Crawford County Planning Commission

- Working to update the comprehensive plan in Crawford County—with public engagement, surveys, focus groups and stake holder meetings to be a voice for watershed projects.
- County Forest-April 21, walk through
- Trail head funding for possible Erie to Pittsburgh trail.
- Allegheny Valley Conservancy-- mostly in Venango County—doing cleanup projects and addressing encroachments on their properties. They are in need of new board members as they have a couple of vacancies. (Lance Bowes passed away and one moved to Erie County.) Working with a property owner near Utica on a possible Life Estate.

Sarah Sargent-Erie Bird Observatory

- Much of the work is coastal and being done at Presque Isle but hopes to have the ability to move more into the watershed. Working on building capacity and collaborative partners in the watershed.

- Bird collisions happen frequently during migration due to city lighting at night-Sarah is looking for volunteers to help with study during migration.
- EBO has done some strategic planning and has hired a new outreach coordinator.
- Utilized Bouson forest for a banding station during breeding season.
- Finding ways to increase birding including Ecotourism.
- Bird banding at Fry's Landing at Presque Isle will be starting soon. Check the EBO Facebook page. The public is invited to stop by to observe.

Yianni Laskaris-Erie National Wildlife Refuge-Guest Speaker—
"**Goat Biocontrol of Invasive Multiflora Rose at Erie NWR"**

- ENWR has Muddy Creek, emergent marshes, forests, etc. to manage. Did assessment surveys to determine the highest priorities for work: Water quality monitoring, freshwater mussels, and vegetation surveys and Invasive species management.
- Goat project-Invasive species management project on multiflora rose in a 4.66 acre area. Sectioned into 11 units for rotation. Goats on site for approximately one month to work.
- Hoping for a 60/80% reduction of Multiflora Rose. The site will be used for 5 years, with 12-14 goats of four different breeds and donkey to guard them. (Different breeds have different heights and eating preferences.)
- Allegheny Goat Scape-is the contractor. The project is engaging, educational, eco-friendly, effective, and the goats can get in areas like steep banks where it's hard for people to get to.
- Considerations: Decide what invasives you have and how much, *you should have enough for the goats to eat for 4 weeks. The area also should be dry. Usually this process needs to be repeated for several years to be effective.
- Current costs are $625 a week for the goats but the one time purchase of fencing materials, purchasing feed, staff time, etc. is about $2700 yearly. Approximate startup costs are $7500.00.
- Challenges-must check on goats frequently, make sure area they are in is safe, must move 14 frisky goats to new areas daily. (Thanks to interns and Conservation Corps for that extra help!) ENWR partnered with Allegheny College the first year to do a pre goat study and will repeat the study for year six.

Kylie Maland-Western PA Conservancy

- Watershed Conservation office
- Updating the French Creek Watershed Conservation Plan- survey the public, gather data, analyze geo-spatially for issues in the watershed.
- Trout Run restoration plan-reduce sediment, add BMPS reducing production of dirt, DEP will do monitoring and couple demo sites on Tamarack Road.

Mark Lethaby-Natural History Museum at TREC

- Recent acquisition of a Borescope camera which will allow looking into Hellbender habitat without intrusion.

Yianni Laskaris-Erie National Wildlife Refuge

- Looking for several interns and Conservation Corps students from high school and college.
- Working on a Land protection plan to acquire new lands. Opportunities for stakeholders to connect with the comprehensive conservation plan through the public comment session.

- Conducting mussel surveys, land-bird surveys, enhancing infrastructure such as replacing broken culverts, working on connectivity and other barriers to fish passage and they are restoring some impoundments.

Ann Sand-Western Pennsylvania Conservancy

- Completed three Land Protection projects in 2022. WPC conserved 460 acres, this added to two existing preserves, one with West Branch frontage and two near Union City on the South branch of French Creek. This will give an opportunity for additional study in the future near Bently Run Wetland adjacent to State game lands and the Union City reservoir, and will be open to public.

Charles Bier-Western Pennsylvania Conservancy

- Charles works on conservation science to support the other WPC staff projects. April 10th, another threatened species of mussels will be announced—The Long Solid. That will bring the total to two threatened and four endangered species of mussels in the French Creek watershed.
- French Creek has been designated as critical habitat for these mussels, specifically from the Erie County line to Franklin.

Luke Brooks-French Creek Valley Conservancy

- Started at FCVC in October, Monitoring properties.

2024 French Creek Conservation Consortium

Brenda Costa– Presented the annual "State of the Conservancy" address. Brenda took time and acknowledged Jim Lang, Board President who recently passed away and his many contributions to the Conservancy. She also highlighted the FCVC stewardship projects and the removal of the Cussewago Dam and all the collaboration it took to get it removed. She highlighted our latest protection acquisition of 102 acres on the Cussewago Creek tributary named Hickory Flats. She highlighted FCVC's Education and outreach events and school outreach into 10 different school districts in the watershed, as well as FCVC's annual cleanup and other public events held this last year. Upcoming projects and upcoming events were listed and lastly she spoke about Judy Acker's recent Keystone Award. Acker received this award at the annual PA Environmental Educator conference in the Poconos. The prestigious Keystone Award recognizes an educator who has dedicated their life to advancing the quality and opportunity for environmental education in PA.

Cindy Wells--Union City Borough Manager. Cindy talked about the French Creek Trail feasibility study. They are also working with Pennsylvania Fish and Boat to put in a boat launch on French Creek in Union City. They held a meeting and tour recently with lots of community partners looking at funding, technical help, advice and what everybody can do to help with Union City's trail development. It was both helpful and enlightening. So far they've done some stream bank stabilization with WPC and are working on more projects like that.

Gary Wells--Albion Borough manager & Cindy's husband. Gary is looking to share grants when possible as well as projects. Albion's focus is mainly on Conneaut Creek and a 59 acre park. They've worked to do bank stabilization and some invasive species management. They are always looking for help, Information and expertise.

Luke Brooks—FCVC Stewardship Coordinator, French Creek Valley Conservancy. Luke talked about the upcoming tree plantings for the season. FCVC will be putting in 5/600 trees at three different locations working with the Crawford County Conservation District. FCVC's Black Bridge riparian planting is coming up as well which also includes some invasive species management. The Meadville 5th Ward property of Smock River Walk will also be having some trail enhancement and invasive species management done. The one property that has a fen has a lot of rare species, but it also has a lot of invasive species and so Luke be working on trying to manage those invasives within that delicate ecosystem. He

also has been doing a lot of prep work getting documentation ready for French Creek Valley Conservancy's upcoming Reaccreditation through the Land Trust Alliance.

John Tautin--Crawford County Ag Land Preservation Board. The board does Ag conservation programs. John reported that there's funding from the Board and commissioners set aside to do that. The board tries to preserve one farm per year if possible. Over 1000 acres so far have been preserved in Crawford County thus far. John also is on the Board for FCVC and is still working on bird surveys and fish surveys in the Cussewago Creek.

Milt Ostrofsky– Conneaut Lake Aquatic Management Association—CLAMA. Milt is also on the board of FCVC. Milt gave some insight into the CLAMA history. In 1996 Conneaut Lake was an impaired lake with algae blooms, etc. and so the CLAMA board was formed in 1999 to address that. Members represented all facets of people interested in the lake looking at the algae impacts. From 2000 to 2023, a two-prong approach was used, including herbicides in June and utilizing a weed harvester which takes out several 100 tons of weeds out of the lake which in turn are then composted on area farms. However a new weed is causing problems in the lake. Hydrilla is very, very dense and it creates mats on the surface of the lake and it can't be taken care of by the weed harvester. They think it's been moved to Conneaut Lake from Pymatuning Lake through boat traffic. Because this new invasive increases their budget, and the harvester isn't up for tackling that kind of thing, they need four chemical applications which is costing a lot of money. Therefore, The Hydrilla Fund was put in place in 2023. Their organization is supported strictly by donations and individuals but no grants. CLAMA holds two fundraisers including the CLAMA Bash/Auction and a fundraising dinner in August. For more info on these, please contact Milt

Guy Dunkle- Foundation for Sustainable Forests. The 2023 conservation projects in the watershed include one near Wattsburg, one near Cambridge Springs, one near Elgin and one near Sugar Lake. The Foundation is also doing invasive control near Sugar Creek as well.

John Holden--Allegheny Conservancy. The Conservancy is working with and protecting the Allegheny Watershed. They've also got shared properties with French Creek Valley Conservancy. Because Allegheny River was named river of the year, they're going to be doing a public walk on one of their properties and holding a sojourn on August 2nd. They're also having discussions of doing cleanup in conjunction with associates from Warren County all the way to the Franklin area. John’s 180 acre farm has an easement with FCVC and utilizes BMP’s to protect the riparian areas along French Creek.

Rick Gilson--Northwest Pennsylvania Trout Unlimited. They've been working with local students with the “trout in the classroom” project. There's five schools in Erie County participating, including Fort LeBoeuf and Wattsburg in the watershed. In January the kids received 250 eggs. The teachers and kids are responsible to get the eggs to trout. They study the life history of trout, cold water, clean water, etc. This project helps foster engagement and responsibility. It's a great program, especially for troubled or hard to work with youth. All trout that are raised get released into Lake Pleasant in the watershed. Trout Unlimited has partnered with Western Pennsylvania Conservancy and Pennsylvania Game Commission doing a “chop and drop” project as well on Game lands 109 on Benson Run, near Waterford. They use chainsaws to cut riparian trees/brush and drop them in the stream for habitat. This process slows the water from rain events and helps disperse the water to the floodplain and in turn helps get colder water--In theory. There's grant money to help with that and any data recorded, including pH, water, temperature analysis, etc. that they do gets sent to ALARM.

Ann Sand -- Western Pennsylvania Conservancy. Ann works in the Northwest region as a land protection specialist. She has three properties including about 122 acres that has been procured that will be transferred to the PA Game Commission Game lands 277 eventually. Many Sand Hill Cranes have been

observed! There is also 250 acres in Venango County with one mile of Creek frontage that will soon be a preserve open to the public for recreation.

Twan Leenders-- Chautauqua Watershed Conservancy. CWC has 35 preserves with 1/2 in the hopper. They're working on a GIS project to ID county properties to focus on different things. French Creek is one of the priorities as a lot of the properties in the county are actually in the Allegheny River watershed. CWC is working on restoration projects including dam removals, updating shorelines, and promoting "Living Shorelines." They're also working in all major waterways, collaborating with county leadership on greenways, riparian restorations, looking at log jams with the county to make things safer while still maintaining habitat, looking at invasive species surveys as they are a constant battle. Some of these are large scale projects. They're also working with individual homeowners on creating "lake scapes" especially those having property on the edge of the water to replace "chemlawns" with natives to create more habitat.

Wendy Kedzierski–Creek Connections director, as well as board president for FCVC, and Board member for Crawford County Conservation District. Wendy gave thanks to the FCVC staff for all that they do—and even though FCVC is small, they are a professional organization, fielding all kinds of different calls about French Creek and they do it well. Creek Connections is located at Allegheny College and they go out into schools all year on a monthly basis helping middle schools do water quality testing, and other water related projects. They are gearing up for their annual Symposiums including the April 12th event at the Pittsburgh Creek Symposium and the April 12th Symposium event at Allegheny College. Wendy invited everybody to stop in those mornings to see all the cool stuff with kids do and to check out all the Organizations tabling there. Wendy also invited everybody to make themselves an eco-career card to highlight as many people as possible. There's grants that she is working on to print the cards but in the meantime, there's also a Google Slide presentation with a link that allows people to make their eco card and get it in that slideshow.

Meredith Barney--Watershed Conservation Research Center at Allegheny College. Meredith works with Mark Kirk, Casey Wilson, and Kelly Pierce a WCRC. They've recently reached their two year mark on projects. They have two restorations projects that they've completed in the Woodcock Creek area. They have a third that they're going to be working on this year at Stainbrook Park on Woodcock Creek in June. WCRC has cameras tracking critters and plants at several FCVC properties. Through Sea Grant, they're going to be working on a Round Goby Project, focused on comparing Gobies versus darters, including populations, habitats, food sources, and diet comparisons. They're going to be looking at unassessed waters for trout presence and evaluate fish possibility in culverts. They've participated in the 4th graders as scientists at Allegheny College as well. They've also partnered with several local schools. Meredith and Mark Kirk also led FCVC's recent Vernal Pool Walk at the Vernal Pool Preserve property. WCRC has a Hellbender survey project coming up in French Creek soon and they are also conducting studies on amphibians--especially spotted salamanders and wood frogs during this time of the year.

Annie Maloney–Foundation for Sustainable Forests. The Foundation has completed two feature films. One's is focused on birds and the effects of sustainable forestry. One is a FSF Film focusing on what the foundation does, including utilizing "worse first" harvesting/logging. They're sharing the films widely. Guy has helped organize the Jacob Moore pallet company to do "worst first" forestry to make pallets, it's economical and it's a win-win on both sides. They're also trying to do that kind of thing with more local landowners as well. For more information, contact the Foundation.

Doug Torok--Natural Resources Conservation Service from Crawford County. NRCS has been working with land owners doing BMP's or best management practices to control erosion and control invasives. There's $150,000 for manure storage facilities, updates to heavy use areas including adding a roof, gutters on barns and other wetland restoration projects. They've done some work in Blooming Valley at places

with a lot of damage and did a wetland restoration on an easement, as well as brush management, adding pollinator habitat and other plantings. They've got 67 EQIP applications and 16 for CSP that they need to get through for grazing and wetlands work. They also have a job opening at the Meadville office. If anyone is interested, please check their website and apply if you're interested.

Kathy Uglow–Crawford County Conservation District Environmental Education Specialist. The district has been working on farmland preservation. They've also been working with CLAMA on the Hydrilla survey helping with aquatics ID. And they've been working with WCRC on projects on Woodcock Creek restorations. They'll be working at the Jamestown Campground putting together fish habitats on May 15th—if you are interested in helping let the office know. They're also looking for volunteers for lots of other projects that they're doing. Kathy has been working with Terry Lobdell for a Western PA artifact Program. She's also done projects in kindergarten, 3rd grade and participated with the 4th graders as Scientists at Allegheny College. There's lots of field trips coming up and Kathy could use help with the Crawford County Envirothon. Kathy also works with lots of local individuals, clubs, organizations and libraries to put on her weekly program at the district location near Woodcock Dam. Please check their Facebook page and website for the schedule.

Sydney Holler – Crawford County Conservation District. She's somewhat a new employee. She works on nutrient management, helping farmers with efficient use of manure. There's 25 farmers who currently got a manure management plan. The majority of farmers in watershed need money to help put those plans in action. There's a workshop for farmers that is coming up and CAP funds for conservation to implement BMP's in the watershed that she is working on. For the Dirt and Gravel Roads program, there's about $2,000,000 available to reduce sediment and nutrients in the waterways with between 100 and 205 projects that they're working on and permitting. If anybody has any questions on these issues, please call Maille Larmon at the CCCD office.

Kelly Marini--Mercer Conservation district. Kelly was our guest speaker. She spoke on climate change in rural northwestern Pennsylvania. Kelsey got her start locally attending Allegheny College and working with Wendy at Creek Connections. After procuring her master's degree at Chatham, she did a couple other jobs, but now she's working at Mercer County in her dream job in Environmental Education. Kelcy also serves as the hub coordinator for SCREST (Shenango Climate and Rural Environment Study Team) and she also works with CRSP (Climate and Rural Systems Partnership) which is funded by the National Science Foundation through Carnegie Museum of Natural History in Pittsburgh since 2019. CRSP also works with other organizations in the western half of the state including Pitt and Powder Mill Nature Reserve. Those two are the Southwest version and Mercer is in the Northwest network. Kelcy reiterated that just because the Mercer organization is named SCREST, and the S stands for *Shenango*--that does not exclude other watersheds or other parts of Western Pennsylvania from participating– also--it is not just for Mercer County but all northwest PA. Right now there's about 100/120 members on their e-mail list. There's three subgroups focused on specific topics Including climate gardens, watershed protection and agriculture. Mini grants are offered. There's four to five projects working on including native Wildflowers. Clarion County did an edible rain garden project, and Lawrence County did a "greening your home" initiative. At the 2021 Stoneboro Fair, SCREST had a booth and did their "Take a Stand" activity where they invited people to talk about climate change and tell how they feel about it. They're trying to develop different tools to make people more comfortable with talking about climate change. One of the tools is Climate Cards—Kelcy stressed that they are fluid in production as they are often being updated and tweaked SCREST also has a story map of the climate cards with four categories. The cards include photos, graphics, and information, including science, climate, and climate solutions. The Climate cards are available on their website. Kelcy also had the Take a Stand activity at the meeting and said the results mirrored the Stoneboro Fair numbers. She asked Consortium members about local things they may have noticed that could be affected by climate change. Our group came up with--no winters, ticks, extreme weather events, changes in maple syrup production and differences in salamander populations.

Kelcy said there's more information on their Facebook page where you can also share your events, news, articles, etc. Kelcy also let everyone know of upcoming events at the Mercer Conservation District including a watershed workshop on April 6th to maintain the streams in your community. There is an upcoming workshop in June with Adam Haritin called "Learn your land" about foraging and tree/plant identification. Registration is not even open and the session is almost full.

Joseph Hudson –Erie County Conservation District. Works in the Northwest region of Pennsylvania. He also does species work with WPC. Recommended watching the film—"Seeing the unseen—aquatic invaders and what's at stake." Check out this video. He's also working with the proposed program--PRISM --Partnerships for Regional Invasive Species Management program. If funded there will be six PRISM regions in PA that form a large, diverse partnerships of regional stakeholders to implement invasive species prevention, education, and management.

Ryan Hill--Army core of engineers, Manager, Woodcock and Union City Dams. Working to increase awareness of both dams, especially Union City. They've done some new interpretive signage which they brought out an example to meeting for everyone to see. They are working to better utilize the facility at Union City. They're doing a survey looking for Round Gobies -- none detected so far. And they're also trying to increase recreational opportunities. They've done a sustainable river grant. And they've done some work on wetland potholes. And at Woodcock Dam, they're doing Earth Day and National Volunteer week. They are holding a Cleanup April 21st. On April 13th is the Linesville open house. Doing survey work looking at flood control, and water outflow. Participated in a survey of freshwater sponges in Woodcock Creek. Working on Bioswale projects and adding native plantings in the campground and other stabilization projects. Holding a Beekeeping camp for veterans. Adding large interpretive signage in the park and along the trails. Remodeling Bossard nature centers—gutted it. There is a macro survey coming up and a fish habitat project with Fish and Boat Commission. It's a great Partnership. Ryan attended a partner meeting in Harrisburg. Preparation for the Solar eclipse is planned to address crowds, etc. They're think they are going to be inundated with people. So they're looking at how they're going to handle the traffic, the trash, etc. Ryan introduced Alex who is an area Ranger visiting and **Joe Arnett**, an established Ranger. Joe talked about how the work on the Bossard building and how it's going to be really nice facility for meetings etc. when it's done. They also unveiled one of the large interpretive signs about French Creek.

Kevin Boozel--French Creek Valley Conservancy—Land Protections Specialist. Kevin hopes to close on about 300 acres this year. They are also getting some yellow book appraisals on a couple of potential properties. He mentioned that it's nice to work with people to bring to fruition their views for their property in perpetuity.

Lisa Clark--Ducks Unlimited, biologist. Lisa works with NACA grants and one of their mission spots is the French Creek Watershed. They also work with the game Commission on water control structures, etc. She is currently working out of Delaware County, but was happy to come and meet everyone.

Stacy Beers-(Wobert) -- PA Game Commission. Stacy doesn't really work in the watershed anymore, but Jeremy Stampka who is taking over in the watershed couldn't attend. They're working on some chop and drop projects with WPC. Stacy let everyone know that Jeremy will be the one to talk to after this period.

Zach Norwood--Crawford County Planning Commission. Crawford County- he oversees 51 municipalities. There's grants available, including Act 13 for environmental programs. For recreation and open space activities, the counties separated into three different regions and they close on March 31st.There is a 400 plus acre forest and on April 30th, they're going to be working on for County Forest Day, doing a tree planting with 50 students lined up. They are doing a cleanup as well. The Erie to

Pittsburgh Trail goes to the middle of the forest and there's multiple trail projects going on and they're working with PennDot. Pennsylvania Association of Planning conference is an Erie County this year in October. There will be mobile workshops. The comprehensive plan, which is updated every 10 years will be worked on by key stakeholders, starting next Thursday. Plans for the next 10 years will be done. There's $3.5 million allotted to change the face of Crawford County.

Barb Newcamp--Green Burial Advocate—Barb let everyone know that there is a section of Greendale Cemetery in Meadville that has 60 plots set aside for green burials. She stressed that regular burials have high environmental impacts. With green burials, there is no vault, no metal casket, no embalming -- It's all natural. There are also green burials available in Penn's Forest in Sharon.

George Stable--From Meadville—works with the MARC Garden. Was once Grant funded, but now there's no maintenance funding. And some people grow food there, utilizing regenerative farming, etc. on a small scale. Unfortunately, interest has waned over the years, so he's looking for examples of a new model. He also mentioned that the MARC has been around for 50 years.

Bailey Kozalla -- Watershed Specialist for Franklin County Conservation District doing educational programs, etc. The Conservation District office is no longer a Two Mile County Park. They've done backyard conservation workshops looking at invasives, beekeeping, gardening for birds, rain barrels, and rain gardens. They're doing a family bus tour April 26th around projects in Utica. They are working on an ACAP program in Venango County near Warden Rd. It's a heavy use area so they are adding manure storage, grazing systems and other BMPS. For dirt and gravel roads, they've got two projects, one in Canal Township and one in Oakland on Griffith Rd. They also do the travel classroom with Trout Unlimited. They have several new classrooms in Franklin. Franklin School district has three elementary schools and they do all the three 6th grade classes including Sugar Creek, Central, and Victory. The east branch of Sugar Creek jumped the banks of the stream. So they are working on stabilizing that. They are also doing fish structures along with Western Pennsylvania Conservancy for on a project on the Little sugar in Oakland Township. There's two land owners on Prather Creek that has a lot of overflow and oxbows. It is a stocked Trout stream and they are working on increased public awareness and more fish structures. This is actually a pilot PRISM project for Western PA.

Anne Marjenin--Mercyhurst University--archaeological department. Anne pointed out that working on various properties, you should watch out for cultural significance as well as historic significance and any archaeological sites. There been recent activity in Mercer County. So always keep in mind to preserve the cultural heritage and the integrity of the historical archaeological sites. Anytime you have questions, reach out to Mercyhurst for guidance and documentation for both cultural and historic information.

Amber Stillwell- works for both Sea Grant and Penn State Extension. Through Sea Grant she does a lot of coastal outreach and presentation on Aquatic invasives. She brought a copy of her AIS (Aquatic Invasive Species) book. They'll be available later. She's also been trying to bring a round goby focus for helping people to identify those. Landing blitz is a national effort last week of June to July 4th. They'll be handouts, training stations, etc. looking to grow that effort. She's also the chair of the committee for statewide Education and Outreach for Invasive Species and the Choose Native initiative. She's hoping to spread the word from people and properties to neighboring properties on the Discover native alternatives. It's focused on landscapers and water gardeners, offering resources on invasives and alternatives instead of. Hope you have that copy by the end of June. There's a.PA Boat Guide being created for Anglers and boaters. So that should come out next year? Penn State Extension-- She's the Master Watershed Steward Coordinator. She's had over 550 Volunteers since 2021. Empowers people in the community about all things water. They have to have 40 hours of training, including field days. And 20 hours per year of service hours. But they often exceed that number. They've done a lot of live stake nurseries, Shrub cuttings for restoration projects and camera trapping. They've worked with WCRC, with monitoring,

videos and data. They've helped with cleanups and plantings and they're always available. She'd like to work on some tap talks, some in Erie and Warren and Crawford County. They're working on some storm water projects as well, and they're now working on some hemlock wooly adelgid stuff in Erie County with workshops. And our watershed, friendly properties with the Nurture Nature Center and the Partnership Circle Committee.

Bennett Gould-- Foundation for Sustainable Forests. I've been working with the Northwest RC Community Forest, which is 100 acres near their headquarters in Cambridge. Planning stakeholder future uses and events such as for school groups managing a working forest. Will be doing the Loving the Land Conference there and the dedication of that property on September 21st.

Sarah Sargeant—Erie Bird Observatory --So far, they've been doing most of the work in Erie County, near the Tom Ridge Center at Presque Isle. EBO is now 6 years old. They're doing bird conservation, bird banding, monitoring bird populations, especially the piping plover. They do bird banding April through May, which is open to the public. They also are working on some bird walks. One is the Woodcock Walk at Rock Lake coming up soon. They publish a monthly newsletter. They're also always doing fundraising and on April 20th there will be a reception and will be showing the film- Wings over the Water about bird migration. Contact Sarah for more information. She would like to expand into northwestern Pennsylvania more and let people know where to go to see certain birds, where to park, how to find the trails, suggested routes, etc. The birding festival that's currently held at Presque Isle, they want to expand that to cover more area and focus more on ecotourism efforts over the next couple of years.

Yianni Laskaris –Erie National Wildlife Refuge—Yianni wasn't able to attend the meeting but sent a written report:
ENWR wanted to highlight some funding coming to northwest Pennsylvania for aquatic connectivity and to improve flooding for the community. Erie NWR has received $1.5 million though funding from the Bipartisan Infrastructure Law and Inflation Reduction Act to work with partners on two stream road crossings and to restore 6.4 river miles for providing safe wildlife crossings and reducing potential flooding to Johnstown Road in Rockdale Township. Please email Vicki Muller for more information. They'll be doing a follow-up study this upcoming fall with Rich Bowden's forestry class at Allegheny College to determine the effectiveness of 5 years of goat biocontrol within a 5-acre forested site that was heavily infested with multiflora rose. We're very excited for this continued collaborative effort! If anyone wants more information on the project, please check out our Facebook page an amazing video developed by Rich's class and Allegheny student, Anna Westbrook. Summer projects from last year that will be continued this year include: Freshwater mussel surveys on Muddy Creek, Water quality monitoring, DNA sampling in the watershed for Round Goby-partnering with Watershed Conservation Research Center, Breeding Landbird surveys, Wetland vegetation surveys, Invasive species mapping and control. ENWR is Hiring!! --Youth Conservation Corps Program hiring 15-18 year olds, 8 week summer program, see our Facebook page for details. ACE Invasive Species Member - 12 weeks - https://usaconservation.applicantpool.com/jobs/1064816 See our Facebook page for details- stipend and housing provided.

Judy Acker—Thank you to everyone that took the time to come and share all the good works being done in the French Creek

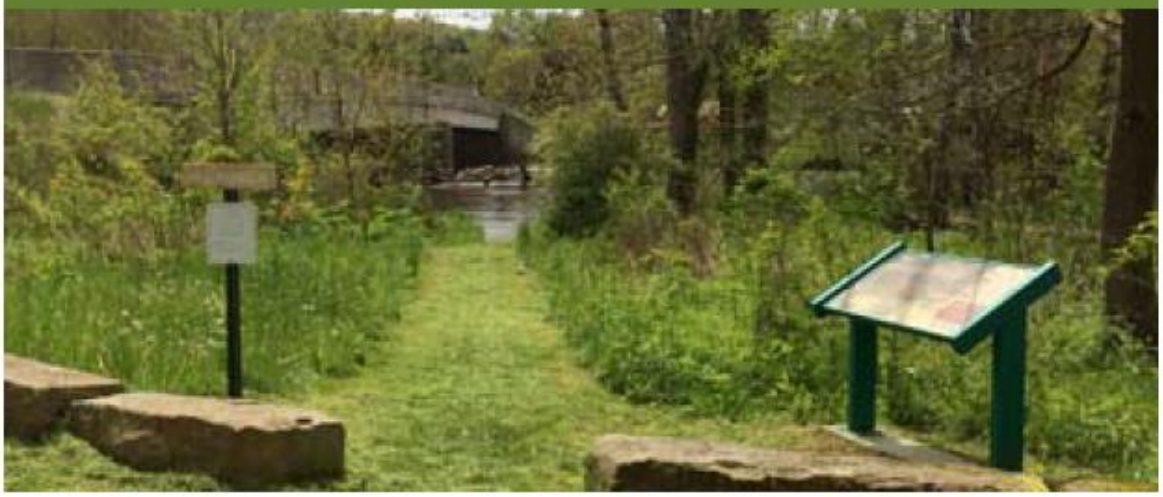
Public Meeting on Draft French Creek Conservation Plan

Western Pennsylvania Conservancy
water, land, life.

French Creek:

Building on 22 Years of Conservation

ACTION ALERT: Your Voice Matters!



The Western Pennsylvania Conservancy and partners are updating the

French Creek Watershed Conservation Plan

and we need your help!

What do you think of current conditions of the watershed?
What would you like to see for the future of the watershed?

Visit https://www.surveymonkey.com/r/WPC-FCWatershed
or scan this QR code to take a short survey.

Questions? Contact Kylie Maland at 814-776-1114.

JOIN US FOR DISCUSSION 7 – 8:30 p.m.

- **Oct 22** **Saegertown American Legion, 755 South St., Saegertown, Pa., 16433**

French Creek Watershed Conservation Plan Update ~ Public Meeting
October 22, 2024 - Saegertown, PA
Please Print to Sign In

Name	Address	Phone	Email
Kevin Tommaney			
BRENDA COSTA			
Wendy Kedzierski			
Casey Bradshaw Wilson			
Amy Albrecht			
Kelly Pearce			
Gene + LESLIE SOLTESZ			

Species list w/ footnotes w/ date data pulled + suggest checking source for most up to date info.

Public Land conservation options

Solar farms – arrays surrounding university 10's

Δ to letters to seem less "weighted"

Reccs #ing + ordering
↳ Also Conservation Consortium will be asked to prioritize reccs. w/ easy survey monkey once edited for completion

Incl. NY data on maps

What's diff. about this plan
– update data w/ links
– improved GIS technology to make maps

Asked about Federal Land aquisition
BC explained USFWS attempt to roll out C.A.-type of new "French Creek" Wildlife Refuge

me:
This plan does not i.d. target restoration/protection lands, but offers voluntary land conservation options

This plan seeks to highlight opportunities for improvement the wants + needs of the communities of the watershed + make recommendations to help conservation partners get money to accomplish goals.

Protecting prime Ag. Land vs. solar arrays that power/benefit offsite cities (Cleveland/Erie)

Flood control

mngmt. reccs. ~ some copied from similar plans (ex. BS, Yough) that are general to be relevant to FC
If some seem irrelevant = okay to say so + we can strike from final version.

Some specific projs. like
"X Borough needs playground park to attract young families to live there.
or specific illegal dump or sb stab. site.

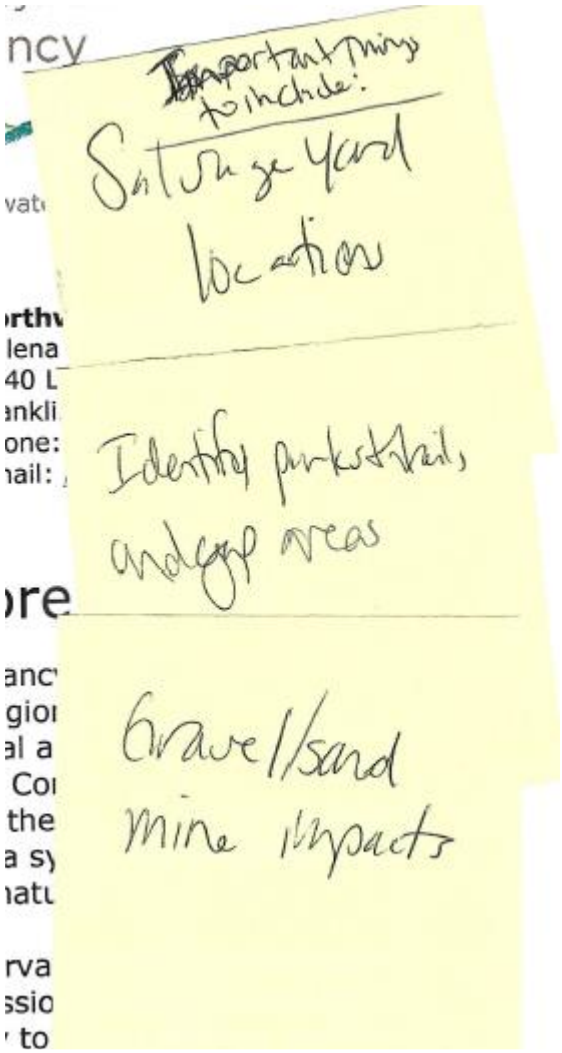
work collab.

action items. w/ goals.

joint prot. priorities statement from collab.

★ salvage yards + located in critical areas

Conrail yard in Meadville
Seepage to Stream
booms to absorb oil


Important things to include:
Satisfy gravel location
Identify parks trails, and gap areas
Gravel/sand mine impacts

French Creek Valley Conserva ringing together hundreds of volunteers of all ag has included participants on foot and by boat or tributaries, and conserved lands throughout the cts including tree plantings and trail maintenance

Where

French Creek is an official Penn ey Conservancy is the designated Water Trail Mana approximately 78 navigable miles from the Union City Dam to the City of Franklin, ~~when~~ French Creek joins the Allegheny River. Providing Water Trail maps, access information, launch ownership, and paddling events are part of the Conservancy's water trail program. The PA Water Trail Program is managed by the Pennsylvania Environmental Council.

Foundation for Sustainable Forests and French Creek Valley Conservancy have hosted Woods & Waters Film Series since 2017. It serves as an opportunity to gather friends of both organizations to view environmentally themed films and share conversation. The gatherings are now hosted both remotely and in person.

The update to this watershed conservation plan was completed in 2024 with the purpose to serve as a current reference to information about the region, to catalog up-to-date resources and data, highlight accomplishments realized over the past two decades, identify continuing and immerging challenges, and list potential partners who may support fundraising for natural resources conservation and community revitalization initiatives in French Creek. The primary goal of the plan is to identify problems and opportunities throughout the region and encourage voluntary cooperation among landowners and partners to achieve mutually-beneficial conservation outcomes. Through these partnerships, natural solutions can be accomplished to protect the natural beauty and bounty that French Creek provides its communities for generations to come. Partner and public surveys were used to highlight accomplishments of the past 20 years since the first plan was completed and to capture the special or unique concerns for this region. Local responses to those surveys will help develop additional, specific management options to achieve the goals of this plan. The plan provides new mapping of the French Creek watershed and discusses management options, which along with references to the plan, will be used in the future to support the need for funding and implementation of projects to conserve French Creek. Hyperlinks (blue-underlined font) will allow users to access current, accurate data and explore topics further.

French Creek cleanup volunteers (credit: FCVC)

pollutants from inadequately maintain ; in hydrology
are a threat to wetland and aquatic org mes.

Oil and gas drilling also occurs throug). Areas in
southeastern Crawford and Venango c ction.
Presently, gas wells are much more cc il wells. Many
areas throughout the watershed have a wells also
exist. Abandoned oil and gas wells ha ter and surface
water. Aside from high salt concentrat her pollutants
that can seriously degrade water quality. Funding is available to plug abandoned wells. All mining operations in the French Creek watershed are permitted and monitored by DEP Bureau of Mining in Knox, Pennsylvania (Appendix D).

Natural Erosion and Depositional Patterns

The relatively-young stream valleys of the French Creek watershed are a result of glaciation filling in original stream valleys with till, and modern streams now re-cutting these areas. Much of French Creek and its tributaries are low to medium-gradient streams that tend to meander across wide, shallow stream valleys following the least-resistant pathway through the gravelly till, often coinciding with the location of original stream valleys. This natural tendency to meander is often compounded by human impacts on the landscape. Loss of riparian zones and alterations in flow regimes due to loss of wetlands, increases in impervious surfaces, removing forests, and damming waterways, all have the compounding potential to increase erosive forces in flowing streams. Much of the work currently being done in the watershed to address these problems only attempts to fix the symptoms of erosion problems instead of looking for the causes and nature-based stormwater solutions that can be implemented on a watershed scale. It is imperative to gain a better understanding of the natural flow patterns of French Creek in order to more effectively control erosion and sediment deposition on a watershed scale. Coordinating cooperation from many private landowners is more complicated and difficult to achieve on a large scale and the French Creek watershed lacks large, contiguous tracts of protected or public lands on which to demonstrate wholistic implementation.

Best management practices (BMPs) for waterfront landowners seeking assistance with erosion control concerns, including natural and engineered structures, may be recommended based on site consultations from your county conservation district and a number of agencies and organizations that provide free technical assistance services. Service providers also consult on forest management issues and riparian forest buffer establishment along streams to control erosion. The PA Fish and Boat Commission works in collaboration with conservation districts and other consultants to design stream-bank stabilization structures that also provide habitat for aquatic species and can be permitted in PA with a General Permit – 01 for Fish Habitat Structures. Other primarily-stabilization designs may be permitted as General Permit – 03 for Stream Bank Stabilization. Larger sites and more extensive designs and earth disturbance limits may require Joint Permits or a Restoration Waiver & Environmental Assessment. The local county conservation district is the best first point of contact to assist the landowner with scheduling the appropriate partners for site consultation, planning, design, permitting, and construction assistance for their property and potential project.

Natural stream movement often causes problems for roads and railways that are built too close to streams or with constricting infrastructure (culverts) at road-stream intersections. There are many areas in the French Creek watershed where travel corridors were built along stream banks and probably continue to be built too close to streams. The result of natural stream movement is erosion of roads and rail beds necessitating the use of stone "ripprapping" to reinforce these areas. Ripprapping is often done when emergency subsidence demands immediate attention. Normally rock is used to stop further streambank erosion. Ripprapping tends to transfer the stream's energy to other locations downstream where increased erosion may occur. Often these projects are undertaken without thought to the impacts to downstream areas. Best management practices for restrictive road-stream crossings include replacing the structure with adequately-sized infrastructure and reconstructing a simulated stream channel, stable bed, and stream banks through the crossing to accommodate increased flows expected with climate change and improve aquatic organism passage (AOP). County conservation districts should work with municipalities and road managers and the Penn State Center for Dirt and Gravel Road Studies for technical assistance, training, and funding to c

Currently there is one permitted landf Redi-Mix Landfill is a demolition landfill south rford County. Landfill permits are granted and moni the Pennsylvania Department of Environm

Pot

Hazardous Waste Sites

There is one Superfund site within the National Priorities List maintained by the U. S. e Saegertown Industrial Area Superfund site in Crawford County was decided upon in 1993. These sites are regulated under Section 111 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Under this legislation, EPA also identifies potential hazardous waste sites, which pose a threat of release of hazardous substances, pollutants, or contaminants. There are several potential hazardous sites in the French Creek watershed (Appendix C).

Mining Operations

Due to a lack of coal deposits, the French Creek watershed has escaped the degradation from abandoned coal mine drainage that has claimed the biological integrity of many Pennsylvania waterways. However, the glacial processes that shaped the northwestern Pennsylvania landscape left the area rich in sand and gravel deposits. These deposits are actively mined to provide material for roadways and other construction projects. Sand and gravel mining occurs throughout the French Creek watershed (Figure 11). Open-pit gravel mining has the potential to alter the chemical properties of groundwater by exposing it to acid deposition and/or removing the alkaline bearing material. Surface runoff may also see an increase in sediment loads and

warm water predator, and the muskellunge the primary cool water predator (PA Fish & Boat Commission, 2017). Sugar Lake is used as a brood lake for muskellunge by the PFBC.

Woodcock Creek Lake

Woodcock Creek Lake was formed by a USACE dam project on Woodcock Creek completed in 1974. It was one of three flood-control reservoirs authorized for the French Creek basin by the Omnibus Rivers and Flood Control Act of 1962. The three-reservoir system consisted of Union City Reservoir, Woodcock Creek Lake, and Muddy Creek Reservoir. The Union City Reservoir was completed in 1971, but the Muddy Creek Reservoir was not approved for construction. Woodcock Creek Lake serves three main purposes: recreation, the reduction of flood stages in the French Creek and Allegheny River Valleys, and low-flow augmentation and water quality control at Meadville (U. S. Army Corps of Engineers).

Woodcock Creek Lake lies in Woodcock Township, Crawford
Woodcock Creek Lake covers 775 acres with a surfac
summer pool covers 333 acres with a surface
depth of 72 feet at full pool. The drainage ba
the drainage basin has historically been in agr
in the lake. The lake is under USACE ownersh
operated by Crawford County.

Woodcock Creek Lake supports fair populations
stocks walleye, muskellunge, and channel catfish (
low in the lake because the lake experiences annual
habitat needed for breeding and congregates fish mak
The PFBC also stocks Woodcock Creek Lake with tro
is designated as a HQ-CWF.

Union City Dam Reservoir

Considered a dry dam due to its singular purpose of flood control, the Union City Dam was completed in 1971. Dry dams allow normal flows to pass through unhindered, but during periods of heavy rainfall or snow melt, higher flows are retained by the dam. During these periods of heavy flow, the reservoir behind the dam will fill up and the dam releases the water at a controlled rate. Situated on French Creek in Waterford Township, Erie County, the Union City Dam, under normal flow conditions, creates no impoundment. During high flow periods, the surface area of the impoundment can cover 2290 acres. The surface elevation of the full pool is 1278 feet.

The effects of this dam on the ecological health of French Creek are de
points out that the dam has saved millions of dollars in flood d
French Creek system is difficult to quantify. One pote
flooding regimes. Flooding serves to inundat
groundwater in some areas. The Uni

While the USACE
tial impact to the
on of natural
ay recharge
rocess. Also,

holding French Creek at bank-full conditions for longer periods via retention and release from the dam may increase erosive forces to areas downstream.

Union City Reservoir

Not to be confused with the USACE Union City 'Dam' Reservoir, the Union City Reservoir is a small (25 acres) manmade impoundment that serves as a water supply for Union City Borough. Located in Union Township, Erie County, the reservoir has a surface elevation of 1394 feet and a maximum depth of approximately 23 feet. Bentley Run, a tributary to the South Branch of French Creek, drains Union City Reservoir. Union City Borough owns the impoundment and public access area. The reservoir provides good fishing for largemouth bass and other panfish and is utilized by the PFBC as a brood lake for muskellunge. Only non-motor boats are permitted on the reservoir. The Bentley Run Wetlands easement, which WPC holds on almost 350 acres of State Game Lands 102 adjacent to the reservoir, is open to public recreation and access.

Tamarack Lake

Tamarack Lake, a man-made impoundment a few miles southeast of Meadville, Crawford County, is unique in that it was formed across a watershed divide by the damming of two neighboring streams. Tamarack Lake was constructed in 1963 by the USDA Soil Conservation Service by damming Mill Run, a tributary of French Creek, and Mud Run, a tributary of Little Sugar Creek. The lake covers 562 acres and has a normal pool elevation of 1216 feet. Because the lake is situated on a saddle between two drainages, it is relatively shallow with a mean depth of 4.3 f[illegible]13 feet. This has led to excessive aquatic vegetation that [illegible]drawdowns.

[illegible]C and maintains seven public access points. The lake is [illegible]e fingerling. There is an electric-motors-only restriction for [illegible]at the excessive vegetation in the lake may contribute to [illegible]ass and panfish (PA Fish & Boat Commission, 2024).

[illegible]ndment on a tributary to the West Branch of French Creek [illegible]d in 1941. It is owned by the borough of North East and [illegible], though the borough has used Lake Erie for the majority [illegible]ı Reservoir will only be used for drinking water in [illegible]use.

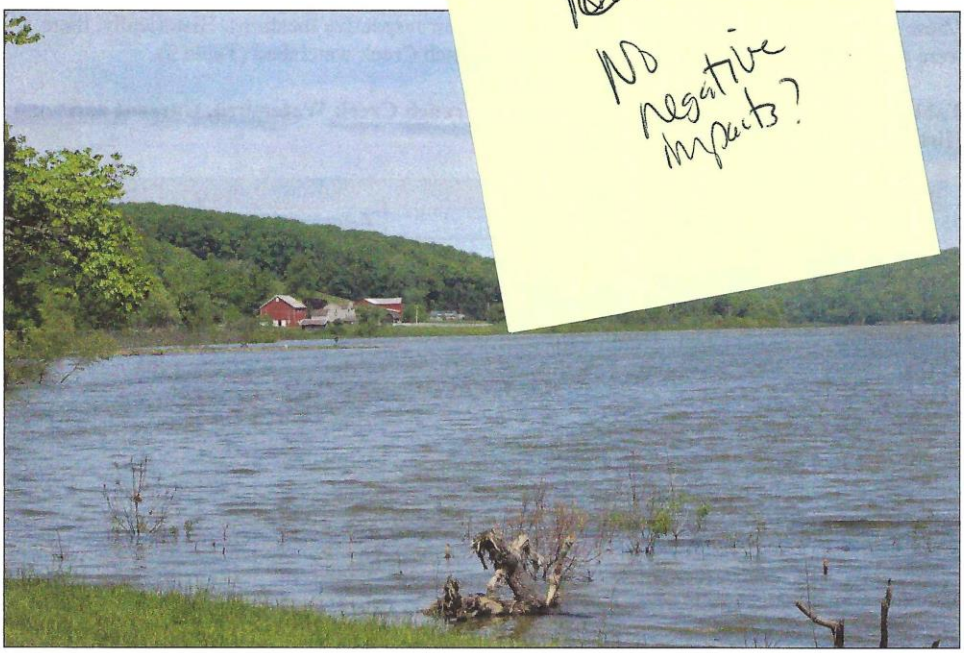
Eaton

Easton Reservoir has a surface area of 244 acres and a surface elevation of 1422 feet. Its maximum depth is 15 feet. Eaton Reservoir is open for public fishing with a no-motor regulation for boats. The reservoir has healthy populations of walleye, smallmouth and largemouth bass, and panfish. The PFBC has historically stocked channel catfish, northern pike, and various species of forage fish. Recently it was determined that the northern pike population was stunted due to several possible factors, including warm temperatures and a large recruitment of small individuals. Attempts were made to transplant all northern pike from Eaton Reservoir to Presque

Isle Bay in Lake Erie. The PFBC determined these efforts were futile in attempting to eradicate all northern pike from Eaton Reservoir (PA Fish & Boat Commission, 2008).

Findley Lake, N.Y.

Findley Lake was formed in 1810 by a private landowner who dammed the W... h of French Creek in Chautauqua County, New York. The lake ... and covers 230 acres. Land use in the drainage ... ake is a major tourist attraction and has seen the dev... north end of the lake as well as numerous homes a... lakeshores.



Watershed Hydrology

The hydrologic cycle, or water cycle, describes the flow of water through the aquatic, terrestrial and atmospheric environments. This cycle includes water storage and transportation. Water can be stored as groundwater, surface water, snow and ice, and atmospheric moisture. Water is transported through evaporation and transpiration from the Earth's surface to the atmosphere. Condensation and precipitation bring the moisture back to the earth. Runoff brings the water back to storage areas and the cycle continues. This entire process is driven by energy from the sun.

Land Use

The French Creek watershed is highly rural with a few urban centers. The landscape is a mix of land use classifications, primarily divided between forested and agricultural (Figure 4). The estimated percentages of land cover types of the watershed are as follows:

Mixed forest and evergreen forest	53%
Hay/pasture	23%
Row crops	17%
Open water and wetlands	5%
Urban and lawns	<2%
Surface mine/quarry	<1%

The northern portion of the French Creek watershed is a changing landscape. The watershed is seeing increasing suburban development from the city of Erie. This trend brings about an increase of impervious material as parking lots and roadways increase thus increasing the amount of polluted run-off that reaches th ide farms for development of home sites as well as lopment and large-scale farming operations genera lth of a stream than smaller farms and open areas unty totaling 153,403 acres, for an average size ata represented an 18% decrease in the numb age of farmed lands in the county, and an 11% in esentative loss of small farming operations in favor ural land in Erie County is a trend observed throughou culture, U.S. Summary and State Data, for data pe ns, definitions, commodity descriptions, and

The middle portion of the French Creek w pressures from the urbanized areas surrounding Me nt discharges from industries and municipal ville have negatively affected the water quality of se ous surfaces due to urban development have increased the incident of flash flooding and disturbances to the streambed. The rural portions of the watershed in Crawford County also face suburban sprawl and home site development. Additionally, much of the riparian buffers to streams in the watershed have been fragmented. In 2017, there were 1,091 farms in Crawford County, with an average size of 178 acres, for a total farmed area of 194,447 acres. Compared to 2012 data, this data represented a 19% decrease in the number of farms, a 15% decrease in the overall acreage of farmed lands in the county, and a 6% increase in the average size of farm.

The lower portion of the watershed, largely in southeastern Crawford and northern Venango counties, has limited agriculture and a steeper, more forested terrain. Land use in this part of the watershed reflects the unglaciated nature of the landscape. Failing septic systems associated with streamside cottages and older homes are suspected of impacting these and other sections of French Creek. Venango County, where most of the southern, unglaciated portion of the watershed is found, had 409 farms in 2017, with an average size of 130 acres, for a total farmed area of 53,338 acres. Compared to 2012 data, this data represented a 12% decrease in the number of farms, a 13% decrease in the overall acreage of farmed lands in the county, and a 2% decrease in the average size of farm.

Ernst Trail is on old rail bed -noted somewhere?

Railroads

The French Creek corridor, v al route for railroads (Figure 5). Allegheny and Ea Erie to Corry, through Union City. The Allegheny a and Pittsburgh Railroad a subsidiary of Gen City, Oil Creek and Titusville Railroad follows F lway Historical Society operates a nearby tou and Oil Creek. Norfolk Southern Railroad o Oil City, Venango County. These tracks follow eadville, a Norfolk Southern line runs southwest t.

The Bessemer and Lake Erie Railway runs through an extreme western portion of the French Creek watershed in western Crawford County. Inactive rail beds run from Corry to Titusville, Union City to Cambridge Springs, Meadville to Conneaut Lake, and a section of the Penn Central Railway near Franklin.

Airports

No major airports exist within the French Creek watershed. Erie International Airport lies to the north in Erie. Other major international airports within an hour drive of the watershed include Pittsburgh, Cleveland, and Buffalo. Several small airports within the French Creek watershed include: Corry-Lawrence Airport in Corry, Port Meadville Airport in Meadville, and Venango Regional Airport in Franklin. The Erie County Airport in Wattsburg is currently listed as abandoned.

Demographics

Population Centers

Population centers with greater than 1000 people per square mile include: the city of Corry, Edinboro Borough, Union City Borough, Waterford Borough, and Wattsburg Borough in Erie County; Cambridge Springs Borough, Conneaut Lake Borough, the city of Meadville, and Venango Borough in Crawford County; and the city of Franklin in Venango County. These population centers account for nearly one-third of the entire watershed population and all are either located on the main stem or a major branch of French Creek or center around one of the glacial lakes within the watershed. The remainder of the population exists in more sparsely populated centers or scattered throughout the highly rural watershed.

All of the municipalities within the French Creek watershed are considered 100 percent rural by the U.S. Department of Commerce with the exception of McKean and Summit Townships, both suburbs of the city of Erie, Sugarcreek Borough, the city of Corry, Edinboro Borough, Union City Borough, the city of Meadville, and the city of Franklin. Only the last five municipalities are considered 100 percent urban. Across the four-county region, the average population by race is approximately 90.7 percent white, 3.8 percent black, 2.2 percent Hispanic, and 5.5 percent other minorities.

LAND RESOURCES

Geology and Soil Characteristics

The uppermost bedrock of the French Creek watershed is derived from sedimentary materials laid down during the Devonian Period and the younger Mississippian and Pennsylvanian Periods (Figure 7). Shales and siltstones of the Devonian Canadaway and Conneaut Formations underlie the northernmost sections of the watershed. The Cattaraugus shales, sandstones, and redbeds also of Devonian age underlie most of southern Erie County and northern Crawford County. Crawford County portions of the watershed also contain sandstones and shales of the Pocono Formation (Mississippian Period) and southern Crawford County uplands are associated with the Pottsville Group (Pennsylvanian Period). Pottsville shales and sandstones, along with those from the Pocono Group, make up the bedrock of the Mercer and Venango County portions of the watershed as well (Shepps *et al.*, 1959).

An important note for the water quality of French Creek is the absence of the coal-containing Allegheny Group (Pennsylvanian Period). This fact has allowed French Creek to escape the fate of coal mining and associated abandoned mine drainage, which has decimated streams to the south and east.

Soils are formed through the interaction of five major factors. These soil-forming factors are: (1) parent material, (2) climate, (3) relief, (4) living organisms, and (5) time. The degree to which the soils are influenced by the individual factors of soil formation varies from place to place (U. S. Department of Agriculture, 1960). Soils of the French Creek watershed have been forming from glacial material (till and outwash) for only appr glaciation (Figure 8). This relatively young soil has n primarily assumes its characteristics from glacial pare organic material.

Soils in the glaciated French Creek watershed are gen

- Gravelly soils of outwash terraces, floodplai stream deposits and glacial outwash.
- Soils of upland areas formed from the weath

The outwash terraces are associated with the lowlands comprised of gravelly and sandy soils. Glacial outwas from glaciers by meltwater. These soils may range fro level of the water table and the percent slope. The stee in depressions are very poorly drained. These soil type peat producing areas northwest of Corry where bog an this general area were historically used for intensive farming. Potatoes were the principal cash crop. Corn, small grains, and alfalfa were grown on the well-drained and moderately drained soils (U. S. Department of Agriculture, 1960). Dairy farming was the most common type of farming on the more poorly-drained soils. Although many farms still exist, including some dairy operations, much of the agriculture in the watershed has been lost and portions of this land have reverted to forests or meadows. The better-draining, sloping and moderately-steep soils are used as a source of sand and gravel.

WATER RESOURCES

Major Tributaries

The French Creek watershed has ten [illegible] least 50 square miles (Figure 3). In addition, those n[illegible] into the Pennsylvania State Water Plan desig[illegible] portion of the main stem of French Creek is classif[illegible] A Department of Environmental Protection's Wate[illegible].

West Branch of French Creek

The West Branch of French Creek o[illegible] nd flows southwest into Erie County, Pennsyl[illegible] eek near Wattsburg, draining approximately 7[illegible] nfield, and Venango townships and Wattsburg B[illegible] /est Branch and all of its tributaries are classified as [illegible]

The West Branch sub-basin contains[illegible] fens, of any Pennsylvania headwater area. Althou[illegible] tiguous forest and undeveloped riparian areas, it is beginning to see development pressure from the city of Erie and North East.

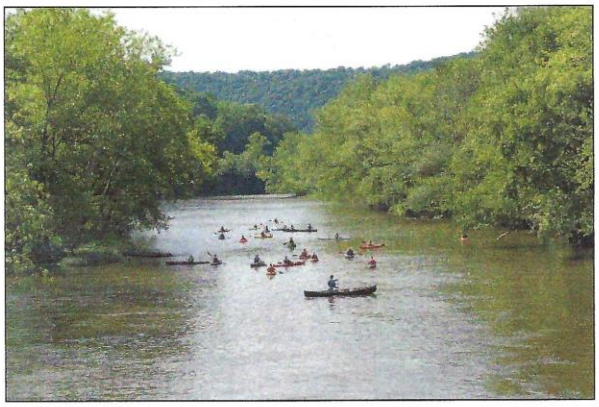
South Branch of French Creek

The South Branch of French Creek originates in Concord Township, Erie County and flows westward to its confluence with French Creek just west of Union City, draining approximately 80 square miles. It drains portions of Concord, Wayne, Amity, Union, and LeBoeuf townships, the City of Corry, and Elgin and Union City boroughs in Erie County, as well as small portions of Sparta and Bloomfield townships in Crawford County. The South Branch basin is classified as a Cold Water Fishery (CWF) with the exception of one tributary, Beaver Run, one of two Exceptional Value (EV) streams in the French Creek watershed. Beaver Run contains a Class A naturally reproducing wild brown trout (*Salmo trutta*), population.

The South Branch sub-basin contains the largest bottomland forest area in the Pennsylvania headwater area. There are also extensive wetlands associated with the section of the South Branch sub-basin between Corry and Union City. Tributaries in this section have rare fens and calcareous seep wetlands associated with them. Much of the riparian areas of the South Branch are intact but the basin supports a high degree of agriculture that could potentially threaten these sensitive areas.

LeBoeuf Creek

LeBoeuf Creek forms from two major branches. The East Branch originates in Venango and Greene townships just north of Lake Pleasant in Erie County. The main branch originates in Summit Township, Erie County. The two branches flow southward to their confluence in



French Creek Sojourn (credit: FCVC)

Conneauttee Creek joins French Creek from the right at river mile 48.02, northwest of Cambridge Springs, Crawford County, and drains a total of 60.8 square miles. Conneauttee Creek is classified as a WWF with the exception of the segment between Edinboro Lake and the Erie-Crawford County border, which is a TSF. Little Conneauttee Creek and its tributaries are classified as a CWF.

The Conneauttee Creek sub-basin is extensively farmed and offers plenty of restoration opportunities for degraded riparian areas. This sub-basin has been targeted by conservation partners for agricultural BMP outreach and implementation. The Conneauttee Creek sub-basin has some wetlands including a calcareous fen associated with Edinboro Lake.

Woodcock Creek

Woodcock Creek drains portions of Randolph, Richmond, Woodcock, East Mead, and West Mead townships and the boroughs of Blooming Valley and Saegertown, all in Crawford County. Flowing generally westward, Woodcock Creek joins French Creek from the left at river mile 37.84, just south of Saegertown, and drains 50.5 square mile[illegible]dcock Creek was dammed in 1973 by the U. S. Army Corps of Engineers, creating W[illegible]k Lake. The dam was designed as a triple use dam: recreation, flood co[illegible]ugmentation. Woodcock Creek, from its headwaters to the reservoir d[illegible]VF. From the reservoir dam to its mouth, Woodcock Creek is [illegible]

Cussewago Creek

Cussewago Creek is a south-f[illegible]es. The West Branch originates in Elk Creek [illegible]ing and Cussewago townships in Crawfo[illegible]nch. The main branch drains portions of Franklin, [illegible]unty before its confluence with the West Branch[illegible]ewago Creek and its tributaries also drain po[illegible]hips in Crawford County. Cussewago Creek j[illegible]e 31.38, at the city of Meadville, and drains 96.9 squar[illegible]d as a WWF.

Dam was removed - monitored the

Cussewago Creek has extensive wetlands a[illegible]areas associated with it. The entire stream corridor has been designated b[illegible]an Important Bird Area (IBA) and provides habitat for nesting bald eagles (*Halia[illegible]eucocephalus*). The sub-basin does have extensive farming in some areas with opportunities for riparian restoration.

those resources. By taking a sub-basin approach, streams receiving conservation and restoration programs can be prioritized depending upon measurable negative contributions by each sub-basin to the overall water quality of French Creek. In addition, high quality sub-basins that contribute positively to the overall water quality of French Creek can be recognized and protected.

Wetlands

Definition and Types

Wetlands exist in a variety of different forms and are thus, sometimes difficult to define. Generally, wetland definitions are comprised of descriptions of three general characteristics: 1) the presence of water for a significant period of time during the year, 2) unique soils that differ from uplands, and 3) vegetation that is adapted to wet [illegible] hydrophytes), and an absence of flooding-intolerant vegetation (Mitsch [illegible] cause the study of wetlands is growing in importance and th[illegible] to protect these ecosystems for their benefits to w[illegible] is increasing, it becomes necessary to adequatel[illegible] ted definition by wetland scientists and managers [illegible] vice in 1979 and is described in a report ent[illegible] *r Habitats of the United States* (Cowardin *et al.*, [illegible]

This section is repetetive

Wetlands are land[illegible] systems where the water table is usually at o[illegible] allow water…Wetlands must have one or m[illegible] st periodically, the land supports predo[illegible] ominantly undrained hydric soil, and (3) th[illegible] ter or covered by shallow water at some[illegible]

The Pennsylvania portion of the French Creek watershed contains a wid
types. The largest wetland systems are on glacial
many smaller wetlands formed in the irregular, hu
moraines (Kline, 1993). Vast marsh and swamp w
and tributaries. In particular, Lake Pleasant Outlet
Crawford County support extensive marshes. Man
Creek and Muddy Creek, have extensive floodplair
importance are the rare glacial bog and alkaline fen
home to the Wattsburg Fen Natural Area, part of the
Landmark. Other small fen and bog wetlands occur

Tamarack Swamp
Would have been
a great example
before it was made
into a lake spanning
& unrelated sub watersheds

Wetland Benefits

Wetlands are integral parts of the watershed ecosyster
benefit humans as well as wildlife. Wetland
stabili
nu
Wetland
ways.
excessive

I agree they
are super important
but this seems
repetetive

W
hig
floc
esp
ity in a watershed. They retain waters during
tlands can cause a dramatic increase in flash
tant recharge areas for groundwater. This is
or streams and rivers.

Add
upor
envi
Lastl
Boati
many species of plants and animals that depend
as a link between terrestrial and aquatic
animal diversity for both environments.
and aesthetic values they provide to humans.
w of the activities provided by wetlands.

ains

Many of French Creek's floodplains lie in broad, low relief valleys (Figure 15). Historically, the floodplains in the watershed would have been forested with silver maple (*Acer saccharinum*), eastern sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and several other species. These forested valleys and the streamside buffers that they furnished have been lost in many areas to agriculture, transportation routes and development. In better draining soils of the stream valleys, potatoes, corn, and other grains are grown in the fertile floodplains. Many population centers within the watershed are located in and around floodplains. This pattern of development increased following the construction of a flood control dam on French Creek near Union City and a triple-use dam (flood control, water supply, and recreation) on Woodcock Creek.

French Creek is considered a relatively-young stream that meanders through gravel-filled streambeds with wide floodplains. The coarse-gravelly soils laid down by glacial events tend to be highly erodible. Many areas along French Creek have experienced extensive erosion due, in part, to a stream's natural tendency to meander as it cuts its way through the gravelly outwash plains of the former glacial advances.

Settlement and development have led to the loss of riparian buffers, draining and filling of wetlands, and increased impervious surfaces in the watershed, exacerbating the erosive forces of French Creek. Compounded with the increase in impervious surfaces due to roadway construction, these alterations to the watershed hydrology have significantly changed the stream channel and floodplain characteristics further downstream.

While many sections of French Creek's natural floodplain have been lost to development, transportation routes, agriculture, and erosion, other areas remain intact. Some sections of French Creek and its tributary sub-basins have large sections of intact floodplain forests and wetlands. These areas should be protected as other areas of degraded floodplains and riparian areas are restored.

Lakes and Ponds

The French Creek watershed has a number of natural lake
made impoundments and beaver ponds. Five of northweste
acres) inland glacially-formed lakes are located within the
critically imperiled in Pennsylvania due to their unique char
These water bodies are generally characterized by alkaline w
systems, and habitat for many plant and animal species of co
are several man-made reservoirs, which serve flood control, v
augmentation, and recreational purposes. These man-made res
same characteristics or qualities of natural lakes, such as water
unique natural communities.

info on Lakes is not consistent for each one

Lake Pleasant

Lake Pleasant is an oval-shaped natural, glacial lake covering ap
2560') located in southwest Venango Township, Erie County, wh
by the Lake Pleasant Outlet tributary to French Creek. The lake's surface elevation is approximately 1300 feet, with the surrounding hillsides rising another 250 feet above the lake surface. The lake is 40–45 feet deep with a gravelly bottom covered with silt. Widely accepted as the best example of an intact glacial lake ecosystem in northwest Pennsylvania, protection of this lake has long-been a focus for Western Pennsylvania Conservancy, French Creek Valley Conservancy and other regional conservation organzations.

Lake Pleasant has good water quality with neutral to slightly-basic pH and relatively-high alkalinity. No motors are allowed on boats on the lake and minimal surface runoff flows into it, helping to protect its good water quality. Most of the water recharge to Lake Pleasant arrives via subsurface flow channels. The exclusion of boat motors helps minimize introductions of invasive-aquatic plants and animals, like Eurasian water-milfoil (*Myriophyllum spicatum*) and zebra mussel (*Dreissena polymorpha*), which often travel on hulls, trailers, and boat motors. There have been introductions of invasive wetland plants, like common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and hybrid cattail (*Typha X glauca*) to some wetland areas within the watershed.

In 2000, WPC completed a two-year assessm… Edinboro Lake. It was
determined that Edinboro Lake is in the … ication with water quality rated
as poor to fair (Western Pennsylv… shows strong stratification
for temperature and dissolved … high and lead to excessive
algal and plant growth. … tributing nutrients and
sediments via surface … opment. Other nutrient
sources include septic s… sewage treatment plant
discharge. There is also … *sis*, associated with
the lake that contributes so… ediments on the
lake bottom and are released … rophication
problem.

Update? Contact Edinboro Lake Assoc.

Other problems a… hea… erosion and
sedimentation … opment, and no limitations
on outboard r…

Recently, … was discovered. Th… built
up a sub… effect of t…
lake e… ses
to F… d
Ed…
… ng

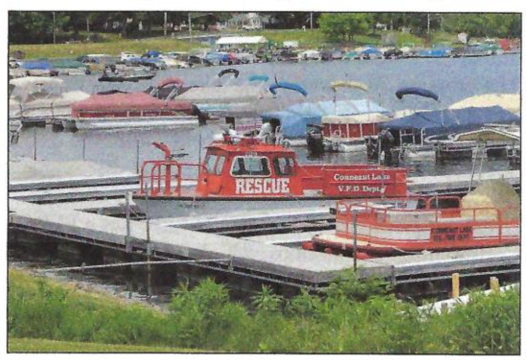
… qu…
unde… e occu…
Edinboro … cently-es…
profit organiz… ess the pres…
Edinboro Lake.

↑ date

Rather than these "time words" – put years

This is old news
are zebra mussels still a problem

Edinboro Lake is a WWF s… populations of larg…
(*Micropterus dolomieu*), blueg… *Lepomis macrochirus*… others. It is
utilized as a brood lake by the PFBC for muskellunge and … yearly with walleye
fingerlings. Aside from fishing, the lake is utilized by a large number of powerboats and jet skis
for skiing, tubing, and other recreational
activities. A public access area is owned
by the borough of Edinboro on the west
side of the lake.



Conneaut Lake

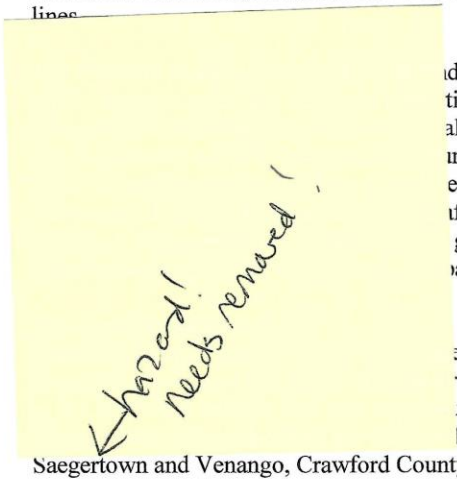
Conneaut Lake, the largest natural lake in
the Commonwealth, is found in Summit
and Sadsbury townships, Crawford County
and borders the Borough of Conneaut
Lake. The lake surface covers 929 acres

French Creek Conservation Plan 49 DRAFT Update 2024

Cambridge Springs Borough is the only municipality in the French Creek watershed that has its public water supplied directly by a surface water intake from French Creek. Other public surface water supplies include 2600 acres of reservoirs in the watershed with the remainder of public water supply sources being wells and springs (Figure 18).

Well Head Protection Areas

States are required to establish wellhead protection programs by the Safe Drinking Water Act. Pennsylvania's wellhead protection program is administered by DEP and is intended to protect groundwater supplies from contamination. Major sources of groundwater contamination as listed by DEP include: pesticides, leaking storage tanks, surface impoundments, landfills, hazardous waste sites, industrial facilities, spills, mining and mine drainage, pipelines, and sewer lines.



d the area in the immediate vicinity that makes up the
tion program works by establishing buffer areas
ally, the buffer areas are laid out in three zones. Zone
nd the wellhead. Zone two is up to a half mile radius
ea outside of one half mile that contributes to the well.
fforded through assessments and monitoring,
gas) in the vicinity, education of local water users,
ality with establishing zoning regulations.

ed to have many small dams associated with mills
uctures have long since vanished but some dams built
ted Findley Lake in the New York headwaters of the
1810. There are also the remains of dams built at Saegertown and Venango, Crawford County.

There is a major dam on the main stem of French Creek is the Union City Dam in Erie County. Built in 1971, this dam is a flood control dam that has reportedly saved millions of dollars in flood damages since its installation (U. S. Army Corps of Engineers, 2000). Another USACE dam in the watershed is the Woodcock Creek Dam on Woodcock Creek in Crawford County. Built in 1974, this dam was a multi-use dam (flood control, recreation, and water supply control).

Tamarack Lake was formed by the construction of two dams on neighboring streams. Mill Run and Mud Run, in Crawford County, were dammed by the USDA to form Tamarack Lake.

PGC constructed dams in two SGLs within the French Creek watershed. Conneaut (Geneva) Marsh has a dam built on Conneaut Outlet to provide approximately 1,400 acres of habitat for waterfowl in SGL-213. Siegel Marsh Dam was built on a tributary of LeBoeuf Creek to form a 150-acre impoundment in SGL-218 for waterfowl habitat.

BIOLOGICAL RESOURCES

Wildlife

The French Creek watershed contains a wealth of wildlife resources, both aquatic and terrestrial. There is an abundance of species of concern, considered rare, threatened, or endangered in the state and in the nation, and also numerous game and non-game species. This amazing biodiversity leads to an enormous array of wildlife viewing and outdoor recreation opportunities. Perhaps more importantly, is the significance and importance this exceptional biodiversity places on conservation initiatives in the French Creek watershed.

Terrestrial

Mammals

There are 63 extant species of mammals in the Commonwealth with another 10 species considered either uncertain or extirpated within Pennsylvania (Merritt, 1987). Fifty species of mammals have ranges that overlap with the French Creek watershed (Appendix F). No rare, threatened, or endangered mammals are listed for the French Creek watershed, although a few have general ranges that include the watershed. There have now been confirmed reports of river otters (*Lutra canadensis*) seen on French Creek and Cussewago Creek, and they are likely in Lake Pleasant. These individuals, once common in the watershed, may be making their way back to French Creek due to reintroduction efforts in western New York and on the Allegheny River in Pennsylvania.

Many of the mammals once common in the watershed and in other areas of the state have been lost due to the decline of large expanses of forested areas, these include the marten (*Martes americana*), fisher (*Martes pennanti*), and mountain lion (*Felis concolor*). The white-tailed deer (*Odocoileus virginianus*), eastern chipmunk (*Tamias striatus*), woodchuck (*Marmota monax*), striped skunk (*Mephitis mephitis*), porcupine (*Erethizon dorsatum*), eastern cottontail rabbit (*Sylvilagus floridanus*), short-tailed shrew (*Blarina brevicauda*), little brown bat (*Myotis lucifugus*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethica*), opossum (*Didelphis marsupialis*), and beaver (*Castor canadensis*), are some of the more common mammals found in the French Creek watershed.

Bats

Bats are common throughout Pe… …hs and common misperceptions, they do not read… …lves in human hair. On the contrary, bats are both e… …particularly in controlling insect populations. Ho… …ite-nose syndrome (WNS), which is devast… …nnsylvania, New York, and the northeast. First d… …06 and 2007, WNS is named for the white fungu… …exact cause of WNS is still unknown.

Update?

Depending on the species, ba… …avities, mines, or caves. These habitats are highl… …activities can

disrupt and displace an entire colony of bats.
endangered or threatened species, disturbances
implications to the species as a whole. Gates con
caves allow for the passage of bats and exclusion o
Bat conservation is especially important now with the
sites—should not be disturbed for any reason, in order
to avoid further distressing already sick bats (USFWS, 20

Caves and mines in watershed?

WNS and

Birds

There are at least 379 bird species that nest, winter, or migrate throughout Pennsylvania. Many of these can be found in the French Creek watershed for at least part of the year. French Creek is located near the convergence of major migratory routes for songbirds and waterfowl that are traveling to the Atlantic coast and the Mississippi River and Gulf of Mexico from areas in the northeast U.S. and Canada during the fall and back to northern areas in the spring. Its location along these migratory routes and its diversity of habitats, including a wealth of wetlands, lakes, and streams, affords year-round birding opportunities in the French Creek watershed.

The Audubon Society has designated four Important Bird Areas within the French Creek watershed:

IBA Site Number	Name	Reference
4	Cussewago Bottom	Link
7	Conneaut Marsh - Geneva Marsh	Link
5	Hemlock Hill Research Area	Link
6	Erie National Wildlife Refuge	Link

The Audubon Society defines an IBA as:

> *A site of special significance to breeding or non-breeding birds, which, on some basis, can be distinguished from surrounding areas. (Boundaries may be natural, such as watersheds, or man-made, such as roads and property boundaries.) In general, an IBA should exist as an actual or potential protected area, or it should have the potential to be managed in some way for the benefit of birds and other wildlife. There is no minimum or maximum size for an IBA, but whenever possible, an IBA should be large enough to supply all or most of the requirements of the birds during the season for which it is important.*

The Cussewago Bottom IBA is an area of riparian and bottomland habitats running along Cussewago Creek from Meadville to the headwaters of the stream. It is comprised of public State

Game Lands #152 and #269 and privately-owned land. Habitat includes high-quality wetlands, bottom land and hardwood forest (Crossley, 1999). More than 200 species of birds probably occur on this IBA on a regular basis, including nesting bald eagles.

The Hemlock Hill Research Area IBA is a privately owned site, protected by a conservation easement with FCVC, adjacent to the Erie National Wildlife Refuge in Crawford County. It is comprised of habitat ranging from mixed woodlands to open fields in varying successional stages. It has been designated an IBA due to ongoing ornithological research at the site as well as the diverse avifauna raging from Carolinian to Boreal species that are found there (Crossley, 1999).

The Erie National Wildlife Refuge in Crawford County was established in 1959 primarily as waterfowl habitat and has been designated an IBA. This refuge has a variety of habitats ranging from mixed forest to fields with large areas of wetlands. Muddy Creek flows through a portion of the refuge. Over 236 species of birds have been recorded from the site, with at least 112 species breeding there (Crossley, 1999). There are large numbers of migratory waterfowl, songbirds, and shorebirds that inhabit the refuge during various times of the year. Nesting bald eagles are also in the area.

Conneaut (Geneva) Marsh is the final IBA in the French Creek watershed. The largest marsh system in Pennsylvania, Conneaut Marsh is owned entirely by the PA Game Commission. It is one of the most important IBAs in the state for wetland species. The habitat varies from forested wetland to scrub-shrub wetland to open, emergent marsh wetlands. It supports large numbers of waterfowl, shorebirds, and songbirds that prefer wetland habitats. The state endangered black tern, American bittern, and least bittern nest in Conneaut Marsh, as well as bald eagles.

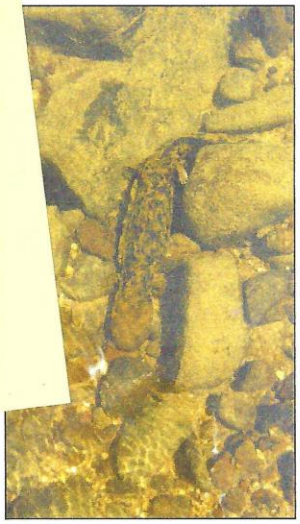
Reptiles and Amphibians

Studies of the amphibian
portions of the French Cr
during 1994-1995, includ
frogs, two turtles and six s
The most abundant specie
dusky salamanders (*Desm*
toads (*Bufo americanus*). T
Reptile Survey began in 20

Update?

Eastern Hellbender

The eastern hellbend
species of salamande
watershed, is consider
It is completely aquati
are cool and clear, con
ge rocks. The
hellbender, which has been designated Pennsylvania's State Amphibian, is one of the largest salamanders in the world and the largest salamander in North America, reaching lengths of over two feet and weighing up to five



Eastern hellbender salamander (photo by WPC)

The unique and complex lifestyle of freshwater mussels makes them extremely vulnerable to pollution and habitat degradation. These organisms lead a relatively sessile existence as adults. They burrow into the stream bottom with a muscular foot and rarely move more than a few hundred feet during their lifetimes, which can sometimes be 50 or more years. They siphon water into their bodies using incurrent and excurrent siphons. The water then passes through their gills where oxygen is extracted for breathing and then through their gut where microorganisms and other material are filtered for food.

Pollutants in the water can be taken up in the mussels' body tissue making many species extremely susceptible. Siltation caused by excessive erosion can smother entire mussel beds. In addition, excessive nutrients can deplete the oxygen levels in the water. All of these conditions are potential threats in the French Creek watershed as improper agricultural practices contribute nutrients, sediments, and pesticides to the water, improper timbering increases nutrient runoff and erosion, and riparian areas continue to be lost to timbering ulture, and development. Freshwater mussels are also extremely susceptible to nly used in treating wastewater and discharged into the stream

Despite these threats, onl st from the watershed in recent times. However, re rsity have been noted downstream of urban areas vancy, 1993) and near the mouth of French Creek y, 1994). More research is needed to fully u lity, and existing threats.

recent? Where? Update

Macroinvertebrates

Aquatic insects and other macro of water quality. Many studies by PA Department s of Engineers, U. S. Geological Survey, universi mpled the aquatic macroinvertebrates in area ure Conservancy has also monitored aquatic macroinvert waters of French Creek.

The most comprehensive macroinver mpling to date has been done through the DEP's Unassessed Waters Program. State water pollution biologists perform qualitative sampling of macroinvertebrates and identify specimens to the family level in the field.
A high of 25 families have been found at several of over 250 sampling sites throughout the watershed.

Between 1987 and 1999 the USACE studied adult aquatic insects at the Corps' 16 flood control structures in Ohio, West Virginia, and Pennsylvania. They sampled the inflows, outflows, and tributaries to each of the impoundments using light traps. Included in the study were the Union City Reservoir Dam and Woodcock Creek Lake within the French Creek drainage. Nine insect orders were documented: mayflies (Ephemeroptera), damselflies (Odonata), stoneflies (Plecoptera), true bugs (Hemiptera), dobsonflies (Megaloptera), beetles (Coleoptera), caddisflies (Trichoptera), moths (Lepidoptera), and true flies (Diptera), with caddisflies being the most important in terms of numbers and diversity of species collected and the only order for which

lower taxa information was provided in this summary report (Fowles, 2000). The most important note from this study was that the West Branch of French Creek had the highest diversity (49 taxa) of caddisflies out of all streams sampled in Ohio, West Virginia, and Pennsylvania. In addition, a caddisfly belonging to the Genus *Cernotina* was collected from the inflow of Union City Reservoir and represents the first record of this genus in Pennsylvania (Fowles, 2000).

In general, aquatic insects and other macroinvertebrates densities and diversity in the French Creek watershed appear to be very good. Some areas where impairments have been noted due to several possible factors have shown depressed densities or diversity or both. Often, when pollution impacts sensitive macroinvertebrate species, an increase in tolerant species will be noted due to a lack of competition for resources. Benthic (bottom dwelling) macroinvertebrates are often the first to show signs of problems with water quality and should be monitored carefully and comprehensively throughout the watershed. Many fish and other higher aquatic organisms rely on macroinvertebrates for food and the macroinvertebrates themselves play an important role in breaking down organic material to add energy to the aquatic food web.

One of the major obstacles in assessing macroinvertebrate information for French Creek is the lack of genus and species level identification at sampling sites. Often, aquatic macroinvertebrates are identified to the order and family, but due to the time and/or expense required to perform genus or species level identification, this information is typically missing.

Others

The zebra mussel (*Dreissena polymorpha*), a non-native freshwater bivalve, was first discovered in the French Creek watershed in October 2000 when it was discovered in Edinboro Lake in Erie County. The zebra mussel is a pervasive exotic species that first came to North American waters from Europe in international shipping ballast water. It was introduced to the Great Lakes in the mid-1980s where it quickly increased in numbers to the point of clogging power plant, industrial and public drinking water intakes, fouling boat hauls, and disrupting the aquatic ecosystem of the Great Lakes.

Zebra mussels are transported between waterw… of boats, in scuba equipment, and in bait bucket… high numbers, they filter large quantities of water … ally provide food for native organisms. Zebra mu… and other benthic substrates and impact the nati… d close its shell. Severe freshwater mussel kills h… ace established, there is no proven way to r… zebra mussel has been unsuccessful at establis… s. If it is able to establish itself in French Creek th… boro Lake), it could prove devastating to the na…

update

Who? "to date"

Another introduced mollusk in the French … *fluminea*). This widespread and common spe… 1990s after surveys showed no sign of it in the 198… the Conneaut Lake Borough sewage treatment plant and res… lorination by the sewage treatment plant discharge may have kept it fro… stream (personal communication).

considered in environmental review. All species and communities subject to the environmental review process can be found on the Conservation Explorer Environmental Review Species List.

The Pennsylvania Conservation Explorer tool provides conservation planning reports that compile names, descriptions, maps, locations, measurements, links and references for Natural Heritage Areas (core and supporting habitats), Important Bird Areas, State Lands, and agency-designated water resources that coincide with an area of interest defined by the user. For an overview and additional details, please visit the Pennsylvania Natural Heritage Program website and download the applicable County Natural Heritage Inventory report(s).

Species of Concern

A total of 302 PNDI elements are reported from the French Creek watershed and buffered locations are shown in Figure 19 and listed in Appendix H (PNHP 2024). These include two mammal species, 26 bird species, 26 fish species, 15 reptile and amphibian species, 33 insect species, 19 unionid (mussel) species, four land snails, 15 natural communities, one unique geological feature, and 153 plant species.

Mammal Species of Concern

The least weasel (*Mustela nivalis*) is the world's smallest carnivore. They prey on small amphibians. They are voracious predators, eating each day.

The little brown bat (*Myotis lucifugus*) populations are severely declining due to a spreading fungal disease (white-nose syndrome) and wind-energy facilities.

Freshwater Mussel Species of Concern

Five of the mussels found in French Creek are listed as Threatened under the U.S. Endangered Species Act. Five other mussel species are considered rare, threatened, or endangered according to PNHP (Table 7). One species, the purple wartyback, is extirpated from Pennsylvania, but was recorded from French Creek in the early 190[illegible].

Fish Species of Concern

Twelve of the 26 fish species of concern found in the French Creek watershed are considered threatened or endangered in the Commonwealth (Appendix H).

There are three special concern species of lamprey in the French Creek watershed. These ancient fish resemble eels and are related to the parasitic sea lampreys that have invaded the Great Lakes, but do not represent the same threat to fishes that the sea lamprey does. The mountain brook lamprey, Ohio lamprey, and American brook lamprey (*Lampetra appendix*), are all threatened in Pennsylvania.

Three madtom species within the watershed are considered species of concern. The mountain madtom (*Noturus eleutherus*) and northern madtom (*Noturus stigmosus*) are endangered in Pennsylvania and the brindled madtom (*Noturus miurus*) is considered threatened in the state.

Fish & Boat Commission program and is managed locally by the French Creek Valley Conservancy. Under this program, public access points are mapped at various locations throughout the French Creek watershed for paddle sports and fishing access. Outreach and educational programming and signage help increase awareness of the trail and program. FCVC coordinates efforts to reduce gaps in public access along the French Creek Water Trail and coordinate volunteer stewardship efforts to maintain it. Some concerns have been raised over the impacts to freshwater mussel beds and other aquatic life if access points are located in sensitive areas or if boating traffic increases significantly on French Creek; recreational pressure should be monitored and managed, particularly at sites harboring sensitive species and habitats.

Today, many people are turning to alternative forms of transportation for travel, recreation, and fitness. Specifically, walking and biking have grown in popularity throughout the region. This resurgence has led to increased interest in walking and biking trails and greenways. These projects can benefit the individuals using them, the com… n which they are located or link together, and the environment through protecti… l natural resource buffering. In response to this demand, several o… l implementing trail and greenway development thro… ge from preserved green space and paved walki… n-road bike routes. Other forms of recreational tr… wmobiles. Presently, snowmobiling and ATV … both forms of recreational transportatio… hese motorized forms of off-road transportation ca… region when done irresponsibly. Statewide, e… e ATV riding and snowmobiling can occur wi…

Conflicting information between developing trails for ATVs and saying they impact the watershed negatively

Power boating and jet skiing a… within the French Creek watershed. Although ma… es occur on the lower reaches of French Creek … e launched and the creek is large enough to allo… e lakes and reservoirs in the watershed have motor or horsepo… oats. However, Conneaut Lake and Edinboro Lake are two of the glaci… atershed that have no restrictions on horsepower and these see extensive … oat and jet ski usage. Powerboats used in Lake Erie and then brought to Edinboro Lake are believed to be the cause of the introduction of zebra mussels to Edinboro Lake. This mode of potentially transporting a number of exotic species into the watershed is a constant threat.

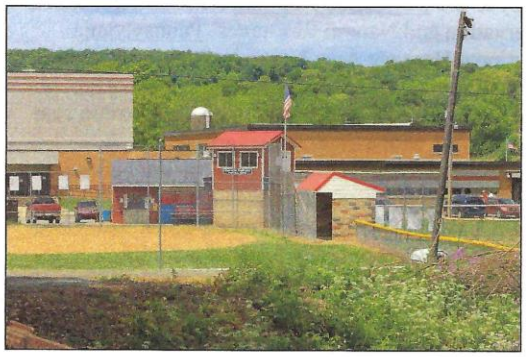
There is also demand for many other types of outdoor recreation. Hunting, fishing, ice-fishing, hiking, bird watching, and cross-country skiing are a few of the many activities that are enjoyed throughout the French Creek watershed.

Supply

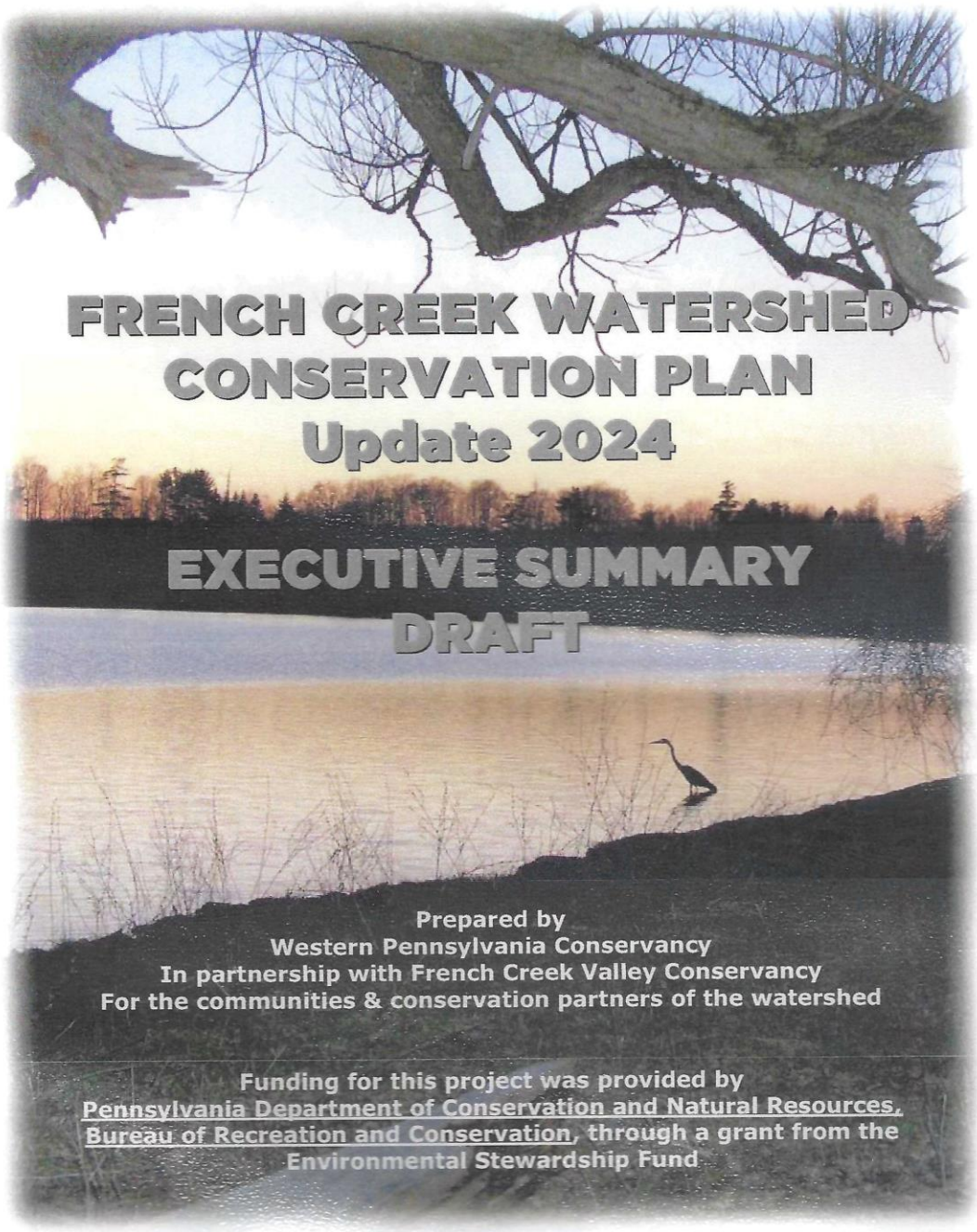
The French Creek watershed offers the outdoor enthusiast a good supply of outdoor recreational amenities. Public facilities offer access to French Creek, area lakes and reservoirs, natural areas, wildlife refuges, and hunting land (Figure 9).

- Edinboro Univ … University faculty, student …
- Erie National W…
- French Creek Va… cluding:
  - Brock's Lookout
  - Lew's Land Trail
  - Smock Riverwalk
- Routes 6 and 6N in … s an on-road National Recreation …
- South Branch Frenc…
- State Game Lands tra…
- The Ernst Bike Trail f… …meaut Lake
- …rea north of Lowville
- …
- …ct public properties)
- …

The Northwest… …opted in 2009, is a multi-county planning effort… …ning and Development Commission (Northwest Co… …erves: Clarion, Crawford, Erie, Forest, Lawren… …o capture efforts to conserve and enhance natura… …w recreation and transportation corridors to cre… …ince 2009, efforts have continued throughout the … …greenways and trail network. To guide these ong… …nsylvania Greenways Plan was completed in 2022. This plan will also inform the Greenways Block Grant Program, which has funded more than 100 related projects since 2009.



French Creek Recreational Trails (FCRT) and Economic Progress Alliance of Crawford County (EPACC) are Crawford County organizations with existing trails that are working on additional trails and closing gaps in the region. The Erie County Greenways Program improved the quality of life in Erie County through the preservation and enhancement of the region's natural, scenic and recreational resources for public use. Erie County created the Greenways program to fund eligible projects throughout the county, using its allocations from the state Marcellus Legacy Fund. Through the Greenways program, a total of 36 projects have been funded in Erie County from 2013 through

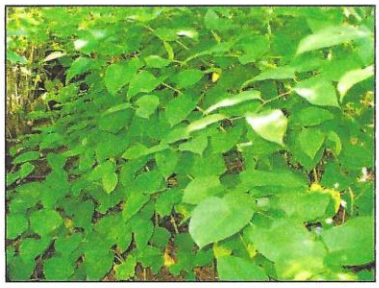

FRENCH CREEK WATERSHED
CONSERVATION PLAN
Update 2024
EXECUTIVE SUMMARY
DRAFT
Prepared by
Western Pennsylvania Conservancy
In partnership with French Creek Valley Conservancy
For the communities & conservation partners of the watershed
Funding for this project was provided by
Pennsylvania Department of Conservation and Natural Resources,
Bureau of Recreation and Conservation, through a grant from the
Environmental Stewardship Fund

activities contain substances that rarely occur in nature, or not high concentrations. Toxic wastes, such as heavy metals, hydrocarbons of petroleum origin, pesticides, organic poisons, like PCBs and inorganic poisons, like chlorine and ammonia, are not readily biodegradable.

Toxins have the ability to severely impact water quality and can cause rapid mortality for large numbers of aquatic organisms. In other cases, toxins may not kill aquatic organisms, but may build up in their body tissue and affect physiological functions and reproductive success. Build-up of toxins can also be harmful to human health and lead to fish consumption advisories.

Invasive Exotic Species

Exotic species are introduced, non-native species. They are considered invasive if able to out-compete native species for resources. In some cases, these species have the potential to drastically alter the ecosystem itself with severe consequences to native species.



Japanese knotweed grows and spreads aggressively; it is costly to control once it becomes established

Invasive Plants

Invasive plants in the French Creek watershed include common reed, purple loosestrife, and hybrid cattails. These species all invade wetlands, especially those that have recently been disturbed either by natural processes (e.g. severe flooding) or human activity. Plant species of special concern, due to their needs for specialized habitats and low-competition environments, are perhaps more susceptible to the threats posed by aggressive exotic species. Other invasive plant species prevalent in the French Creek watershed include multiflora rose (*Rosa multiflora*), Tartarian honeysuckle (*Lonicera tatarica*), Japanese knotweed (*Polygonum cuspidatum*), giant hogweed (*Heracleum mantegazzianum*), common privet (*Ligustrum vulgare*) and reed canary grass (*Phalaris arundinacea*). Experts believe these to be serious threats to our nati ecosystems and many have been designated "Noxious Weeds" by the Pennsylvania D t of Agriculture.

Invasive Animals

The zebra mussel, a small black and white striped h ered in Edinboro Lake in 2000. Once established, zebra mussels d substrate on lake bottoms, outcompeting native organis ke pipes for drinking water and industries. They, al an clam and Chinese mystery snail, continue to s of French Creek.

Need to include Latin names

This hemlock woolly adelgid is a tiny 20th century and was first discovered in hemlocks, but can also affect spruce trees. adult sucks sap from twigs, which causes h ecies prefers mild conditions and cold weather may ikely limit expansion of this pest. Chemical pesticides seen gement tool.

nutrient levels, and high levels of dissolved oxygen. These lakes are generally considered geologically young with little exposure to sediments from the weathering of surrounding rock and soil.

As lakes age, they collect sediments through run off. These sediments carry nutrients that provide for the growth of primary producers like photosynthetic aquatic plants and algae. As nutrient levels rise, lakes become mesotrophic, or midway through the eutrophication process. At some point, nutrients are so plentiful that they no longer become the limiting factor for plant growth in an aquatic system. These aquatic systems are said to be eutrophic and may continue to the point of being hypereutrophic. When this occurs, plant production becomes so high that the water is depleted of oxygen during plant respiration and decaying plant matter further depletes oxygen levels. This leads to the death of aquatic organisms, which can further deplete oxygen levels as the organic tissue decays. The lakes in the French Creek watershed are all fairly productive and in various stages between mesotrophic and eutrophic, possibly even hypereutrophic during the summer months.

Can you give examples of which lakes?

Nutrient enrichment is occurring in French Creek and many of its tributaries. This is evident by summer algal blooms and excessive aquatic weed growth. Eutrophication may not be as pronounced in the moving stream environment where oxygen levels are constantly replenished by flowing water, but excessive nutrients can still have a negative effect on aquatic organisms as nutrient levels build up and oxygen levels are sometimes critically depleted during warmer summer months when flows are reduced. This is especially problematic for French Creek's freshwater mussel species, which depend on oxygenated water and cannot move to find more suitable conditions. Excessive aquatic weed growth may also reduce aesthetic and recreational opportunities in the French Creek watershed.

Point Sources

Portions of French Creek have been historically degraded by sewage discharges from Meadville, West Mead Township, and Cambridge Springs' sewage treatment plants. Portions of French Creek have been listed as impaired in the PA 303(d) list of impaired waterways.

All industrial, commercial, and municipal discharges are authorized by EPA to be permitted by DEP in Pennsylvania under the National Pollutant Discharge Elimination System (NPDES) (Appendix E). DEP's NPDES Permitted Facilities Report can be used to identify facilities with NPDES and WQM permits issued by the Clean Water Program.

pounds. Finding this [illegible] ealthy stream ecosystem. Hellbender populations have declin[illegible] marily due to human misperceptions and [illegible] restoring stream habitats that have become [illegible] of hellbenders and other salamanders, as well [illegible]bution. Studies are underway and should be [illegible] population status of hellbenders throughout [illegible]n made to elevate hellbender protection [illegible]d be employed when potential threat to [illegible]isburbances.

Fishes of PA Book will help here

Game Sp[illegible]
There are [illegible] shed. Some of the more important game species inc[illegible] *gris gallopavo*), ruffed grouse (*Bonasa umbellus*), [illegible] introduced ring-necked pheasant (*Phasianus* [illegible] ing species include coyote (*Canis latrans*), red fox (*Vulp*[illegible] *cinereoargenteus*), beaver, muskrat, mink (*Mustela vison*), and ra[illegible]

Aquatic

Fish

French Creek has gained national attention for its diversity of aquatic life. Eighty-eight species of fish have been recorded in the French Creek drainage prior to 1999. This is more species than any other comparably sized stream in Pennsylvania and anywhere north and east of Pennsylvania (Stauffer, 2000). In 2000, another species, the pugnose minnow (*Opsopoeodus emiliae*), was documented by the PA Fish & Boat Commission and verified by Penn State University fish biologists. These species totals probably closely represent the ichthyofauna present in French Creek prior to European settlement. A complete list of the fishes of the French Creek drainage is given in Appendix G.

Log perch (photo by WPC)

Biodiversity in French Creek is perhaps best represented by a group of fish known as darters. There are 15 species of darters in the French Creek watershed (Table 5) with as many as 13 collected from a single riffle area by researchers. Eight of the 15 French Creek darter species are listed as threatened or endangered in Pennsylvania.

These small fish, ranging from about 1.5 inches to 7 inches in length, are related to perch and walleye. Darters get their name from their behavior of darting around the stream bottom in search of prey or to avoid predators.

need to all be italicized

Table 7. Freshwater Mussel Species Recorded from the Fr

Common Name	Scientific Name	G Rank			
mucket	*Actinonaias ligamentina*	G5			
elktoe	*Alasmidonta marginata*	G4			
three-ridge	Amblema plicata	G5	S2S3		
cylindrical papershell	Anodontoides ferussacianus	G5	S2S3		
purple wartyback[1]	Cyclonaias tuberculata	G5	SH		PX
spike	Elliptio dilatata	G5	S4		
northern riffleshell	Epioblasma torulosa rangiana	G1	S2	LE	PE
snuffbox	Epioblasma triquetra	G3	S2	LE	PE
long-solid	Fusconaia subrotunda	G3	S2		PE
plain pocketbook	Lampsilis cardium	G5	S4		
wavy-rayed lampmussel	Lampsilis fasciola	G4	S4		
pocketbook	Lampsilis ovata	G5	S3S4		
fatmucket	Lampsilis siliquoidea	G5	S4		
white heelsplitter	Lasmigona complanata	G5	S1S2		
creek heelsplitter	Lasmigona compressa	G5	S2		
fluted-shell	Lasmigona costata	G5	S4		
eastern pondmussel[2]	Ligumia nasuta	G4	S1		
black sandshell	Ligumia recta	G5	S3S4		
clubshell	Pleurobema clava	G1G2	S2	LE	PE
round pigtoe	Pleurobema coccineum	G4G5	S3S4		
kidneyshell	Ptychobranchus fasciolaris	G4	S4		
giant floater	Pyganodon grandis	G5	S4		
rabbitsfoot	Quadrula cylindrica	G3G4	S1S2	LT	PE
salamander mussel	Simpsonaias ambigua	G3	S1		PE
creeper	Strophitus undulatus	G5	S4S5		
lilliput[3]	Toxolasma parvus	G5	S1S2		
paper pondshell	Utterbackia imbecillis	G5	S3S4		
rayed bean mussel	Villosa fabalis	G2	S1S2	LE	PE
rainbow mussel	Villosa iris	G5	S3		

Notes:
[1] The only species apparently extirpated from the French Creek watershed. Once recorded from French Creek proper in the lower reaches.
[2] This species is believed to have been introduced to the French Creek drainage, probably through the introduction of certain fish carrying larval mussels.
[3] Historically recorded from a tributary to French Creek. Although not recently verified, this species probably still exists.

Source: PNHP

3.	Develop forest and wildlife management plans.	Conservation Groups, Landowners, PA DCNR, PGC, NY DEC	Private Sources, PA DCNR, PGC, NY DEC
4.	Develop wildlife management plan on private forestland properties.	Landowners, PGC, NY DEC	Private Sources, PA PGC, NY DEC
5.	Develop detailed management plans for landowners of biologically diverse areas, including inventories of natural features and invasive or exotic species monitoring plans.	Conservation Groups, Landowners, PA DCNR, PGC, NY DEC	Private Sources, PA PGC, NY DEC
6.	Conduct studies in conjunction with Natural Heritage Programs to monitor biodiversity, including surveys for historical species of concern for which the current status is unknown.	Conservation Groups, Sportsman Groups, PA DCNR, PNHP, PGC, NY DEC, NYNHP	Foundations, Priv Sources, PA DC
7.	Educate the public about the use and purpose of Natural Heritage Inventories in planning, with an additional focus on understanding the importance of the natural resources that exist.	Conservation Groups, Municipalities, Counties, PNHP, NYSNHP	Private Sources NY DEC
8.	Provide educational field trips to elected officials emphasizing natural resources and the value of those resources to the region.	Conservation Groups, Elected Officials, NY DEC, USFWS, PGC, PA DCNR	Foundations, Private Sources, PA DCNR

Universities w/i Watershed should be included as Potential Partners. Especially Allegheny College (AWCRC) and Creek Connections

Goal 4-C: Implement best management practices to protect forest resources.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Promote tree plantings, sustainable harvesting, and other best management practices	Conservation Groups, Landowners, Civic Groups, PA DCNR	Foundations, Private Sources, PA DCNR, NY DEC	
2. Work with Woodland Owner Associations to educate the public, restore degraded areas, and develop demonstration areas.	Conservation Groups, Landowners, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	

Goal 4-E: Identify and protect biologically diverse areas.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Update County Natural Heritage Inventories to document species of concern, their critical habitat areas, and biological diversity areas within the French Creek watershed to monitor, protect, and conserve.	Conservation Groups, Landowners, PA DCNR, PGC, PFBC, NY DEC, State Heritage Programs	Foundations, Private Sources, PA DCNR, NY DEC	
2. Develop a land steward program for Biological Diversity Areas through which volunteers would be responsible for regular monitoring of these areas and educating landowners.	Conservation Groups, Landowners, PA DCNR, PGC, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC	
3. Develop new biotic study areas throughout the watershed and encourage local schools to utilize this resource, thereby fulfillin state curriculum requirements and broadening educational understanding of ecological resources.		ions, Private PA DCNR, NY	
4. Protect biological diversity areas though collaborative partnersh among the present owner, citizens, local organization, and Departments of Transportation.		ions, Private PA DCNR	
5. Restrict activities, such as grazing and off-road vehicles, and control invasive species within biological diversity areas.		ions, Private PA DCNR, NY	
6. Limit herbicide use and utilize alternative management techniq in rights-of-way by working with utility companies.	Utility Companies	Sources, PA DCNR, C	
7. Refine information on Biological Diversity Areas contained in Natural Heritage Inventories.	Conservation Groups, Counties, PA DCNR, PFBC, PGC, NY DEC, PNHP, NYNHP	Foundations, Private Sources, PA DCNR, NY DEC	

I don't think this is feasible or a good idea to have volunteers educate landowners.

8.	Implement strategies to improve habitat within Biological Diversity Areas.	Conservation Groups, Landowners, PA DCNR, NY DEC	Foundations, Private Sources, PA DCNR, NY DEC
9.	Establish biodiversity indices for selected stream segments to document the current status of biodiversity and to track changes over time as management recommendations are implemented.	Conservation Groups, Sportsman Groups, PA DCNR, PA DEP, NY DEC, PFBC, USFWS	Foundations, Private Sources, PA DEP, NY DEC, PA DCNR, PFBC, PGC, USFWS
10.	Develop an incentive program to encourage and reward landowners who develop management plans, decrease development, and employ other conservation practices in and around riparian corridors and biologically diverse areas.	Conservation Groups, Sportsmen Groups, Landowners, PA DCNR, PGC, PA DEP, NY DEC	Foundations, Private Sources, Cost-Share Programs, PA DCNR, PA DEP, PGC, NY DEC

Goal 4-F: Enhance aquatic habitats.

Method to Achieve Goal:	*Potential Partners*	*Potential Funding*	*Priority*
1. Improve aquatic habitat for fish, mussels, and other organisms by implementing best management practices and other restoration activities.	Conservation Groups, Landowners, PNHP, NYNHP, PA DCNR, NY DEC, PFBC	Foundations, Private Sources, PA DCNR, PFBC	
2. Increase habitat and passage for fish, mussels, and other aquatic ving dams on small tributaries and maintaining s downstream.	Conservation Groups, Landowners, PNHP, NYNHP, NY DEC, PFBC, PA DCNR	Foundations, Private Sources, American Rivers, PA DEP, NY DEC, PFBC	
habitat improvements into streambank ter quality remediation projects.	Conservation Groups, Landowners, PA DEP, PFBC, NY DEC	Foundations, Private Sources, PA DEP, NY DEC, PFBC	
quantify the amount of large wood debris, in and headwater areas.	Conservation Groups, Conservation Districts, Sportsmen Groups, PFBC, PA DEP, NY DEC	Foundations, Private Sources, PFBC, PA DEP, NY DEC	

use NAAC database to identify priority culverts

North Atlantic Aquatic Connectivity Collaborative has identified culvert priority

Appendix K

Public and Protected Lands

Source: PA Natural Heritage Program Conservation Explorer Report for HUC 8 – French Creek generated on 02/19/2024.

State Lands

These include lands managed by the Department of Natural Resources (DCNR) Bureau of Forestry (BOF) for long-term forest health and native plant conservation; and Pennsylvania Game Commission (PGC) for hunting, trapping and fishing.

Name	Wild Area Type/ Wild Area Name	Manager	Total Acres
Cornplanter State Forest	None/NA	DCNR-BOF	128.55
State Gameland 102	None/NA	PGC	383.74
State Gameland 109	None/NA	PGC	1969.82
State Gameland 122	None/NA	PGC	1520.40
State Gameland 144	None/NA	PGC	648.48
State Gameland 146	None/NA	PGC	531.22
State Gameland 152	None/NA	PGC	641.15
State Gameland 154	None/NA	PGC	1418.41
State Gameland 155	None/NA	PGC	392.86
State Gameland 161	None/NA	PGC	232.42
State Gameland 162	None/NA	PGC	1072.58
State Gameland 163	None/NA	PGC	333.18
State Gameland 167	None/NA	PGC	628.49
State Gameland 190	None/NA	PGC	394.60
State Gameland 191	None/NA	PGC	1223.43
State Gameland 192	None/NA	PGC	334.66
State Gameland 199	None/NA	PGC	1129.34
State Gameland 200	None/NA	PGC	154.73
State Gameland 213	None/NA	PGC	5603.81
State Gameland 218	None/NA	PGC	1338.92
State Gameland 269	None/NA	PGC	678.09
State Gameland 270	None/NA	PGC	159.04
State Gameland 277	None/NA	PGC	1074.06
State Gameland 69	None/NA	PGC	4475.56
State Gameland 85	None/NA	PGC	672.92
State Gameland 96	None/NA	PGC	4954.39

Protected Lands
Protected lands or conservation areas are locations, which receive protection, through legal or other means, because of their recognized natural, ecological and/or cultural values. Not all protected lands are open to the public. Please contact the appropriate owner to ensure public access permission.

Name	Description	Owner	Website	Total Acres
White		Allegheny Valley Conservancy	Link	157.00
Buttermilk Bluffs	Keystone Fund	Allegheny Valley Conservancy + French Creek Valley Conservancy	Link Link	190.00
Stanley-Goodblood		Allegheny Valley Conservancy + French Creek Valley Conservancy	Link Link	455.00
Franklin		Allegheny Valley Trails Association	Link	0.00
Frenchcreek		Allegheny Valley Trails Association	Link	1.00
Union City Lake	Federal	Army Corps of Engineers	Link	1509.00
Woodcock Creek Lake	Federal	Army Corps of Engineers	Link	1576.00
Cambridge Springs Recreation Area	Local	Cambridge Springs Borough	Link	9.00
Church St Triangle Park	Local	Cambridge Springs Borough		0.00
Cambridge Area Recreation Park	Local	Cambridge Township	Link	36.00
Cochranton Lions Community Park	Local	Cochranton Borough	Link	14.00
Cooperstown Ball	Local	Cooperstown Borough		11.00
Bertram Park	Local	Crawford County		16.00
Conneaut Lake Park	Local	Crawford County		9.00
Cora Clark Park	Local	Crawford County	Link	18.00
Crawford County Agricultural Easement #003		Crawford County	Link	135.00
Crawford County Agricultural Easement #004		Crawford County	Link	449.00
Crawford County Fairgrounds	Local	Crawford County	Link	75.00

Name	Description	Owner	Website	Total Acres
Crawford County Youth Soccer Association	Local	Crawford County		95.00
De Arment Park	Local	Crawford County	Link	1.00
Diamond Park	Local	Crawford County	Link	4.00
Elizabeth Park	Local	Crawford County	Link	3.00
Fireman's Beach Park	Local	Crawford County		5.00
Gibson Park	Local	Crawford County		59.00
Green Mountain Park	Local	Crawford County	Link	9.00
H P Way Park	Local	Crawford County	Link	6.00
Hillcrest Park	Local	Crawford County	Link	14.00
Huidekoper Park	Local	Crawford County	Link	10.00
Ice House Park	Local	Crawford County	Link	1.00
Kenneth A Beers Jr Bicentennial Park	Local	Crawford County	Link	3.00
Meade Road Park	Local	Crawford County		11.00
Oakgrove Park	Local	Crawford County	Link	27.00
Pamona Park	Local	Crawford County	Link	0.00
Roche Park	Local	Crawford County		53.00
Shady Brook Park	Local	Crawford County	Link	22.00
Woodcock Lake Park	Local	Crawford County		250.00
National Guard Cambridge Springs		Federal Department of Defense	Link	79.00
Edinboro Softball Field	Local	Edinboro Borough		2.00
Elgin Community Park	Local	Elgin Borough		4.00
American Legion Little League	Local	Erie County		16.00
Conneauttee Park	Local	Erie County	Link	1.00
Corry Beaver Complex	Local	Erie County		16.00
Erie ALP #002		Erie County	Link	160.00
Erie ALP #028		Erie County	Link	179.00
Erie ALP #029		Erie County	Link	306.00
Erie ALP #043		Erie County	Link	100.00
Erie ALP #045		Erie County	Link	447.00
Erie ALP #047		Erie County	Link	109.00
Erie ALP #050		Erie County	Link	186.00
Erie ALP #051		Erie County	Link	421.00
Erie ALP #057		Erie County	Link	178.00

Name	Description	Owner	Website	Total Acres
Erie ALP #061		Erie County	Link	65.00
Erie ALP #062		Erie County	Link	110.00
Erie ALP #064		Erie County	Link	270.00
Erie ALP #065		Erie County	Link	124.00
Erie ALP #066		Erie County	Link	60.00
Erie ALP #067		Erie County	Link	149.00
Erie ALP #069		Erie County	Link	210.00
Erie ALP #074		Erie County	Link	312.00
Erie ALP #075		Erie County	Link	56.00
Erie ALP #081		Erie County	Link	10.00
Erie ALP #082		Erie County	Link	105.00
Inspiration Park	Local	Erie County		66.00
Lakeside Drive Park	Local	Erie County		3.00
Nature's Outlet	Local	Erie County		1.00
North Route 97 Park	Local	Erie County		49.00
Peninsula Park	Local	Erie County	Link	4.00
Picnicana Park	Local	Erie County	Link	24.00
Point Park	Local	Erie County	Link	1.00
Thompson Park	Local	Erie County		4.00
Wainer Park	Local	Erie County	Link	16.00
Blooming Valley Forest		Foundation for Sustainable Forests	Link	126.00
Culbertson Forest		Foundation for Sustainable Forests	Link	42.00
Ewing Family Woods		Foundation for Sustainable Forests	Link	143.00
Thompsons' Wood		Foundation for Sustainable Forests	Link	169.00
Waterfall Hollow		Foundation for Sustainable Forests	Link	81.00
Miller-Sibley	Local	Franklin City		13.00
Aikin Easement		French Creek Valley Conservancy	Link	15.6
Bemus Mill		French Creek Valley Conservancy	Link	17.783
Black Bridge		French Creek Valley Conservancy	Link	49
Brock's Lookout		French Creek Valley Conservancy	Link	9.88
Buttermilk Bluffs		French Creek Valley Conservancy	Link	191

Name	Description	Owner	Website	Total Acres
Cambridge Landing		French Creek Valley Conservancy	Link	0.22
Concilus		French Creek Valley Conservancy	Link	147.19
Conneaut Lake Wetlands		French Creek Valley Conservancy	Link	76.76
Culbertson		French Creek Valley Conservancy	Link	3.7
Cussewago Bottoms		French Creek Valley Conservancy	Link	*100*
Cussewago Meanders		French Creek Valley Conservancy	Link	191
Fette Island		French Creek Valley Conservancy	Link	42
Firth Easement				63.5
Forrest Acres		French Creek Valley Conservancy	Link	80
Greendale Cemetery		French Creek Valley Conservancy	Link	75.15
Harmonsburg Fen*		French Creek Valley Conservancy	Link	33
Hayfield Hollow		French Creek Valley Conservancy	Link	41.013
Hemlock Bend		French Creek Valley Conservancy	Link	28.75
Hickory Flats (Rename of Huber)		French Creek Valley Conservancy	Link	101.3
Jane and Gene Morton		French Creek Valley Conservancy	Link	350
Kayden's Landing		French Creek Valley Conservancy	Link	15.796
Lavier		French Creek Valley Conservancy	Link	60
Lew's Land		French Creek Valley Conservancy	Link	47.5
Lobdell		French Creek Valley Conservancy	Link	17.63
Logue Island		French Creek Valley Conservancy	Link	5
Lunger		French Creek Valley Conservancy	Link	0.85
Lupher's Landing		French Creek Valley Conservancy	Link	4
Lutz		French Creek Valley Conservancy	Link	13

Name	Description	Owner	Website	Total Acres
Mammoth Run		French Creek Valley Conservancy	Link	86.19
Marsh Easement		French Creek Valley Conservancy	Link	41.4
Merritt's Landing		French Creek Valley Conservancy	Link	0.845
Moss		French Creek Valley Conservancy	Link	5.47
Moss Woods		French Creek Valley Conservancy	Link	65
Old Stone Quarry		French Creek Valley Conservancy	Link	5.5
Raup Wildlife Sanctuary		French Creek Valley Conservancy	Link	31
Robert Brace Nature Reserve		French Creek Valley Conservancy	Link	21.267
Rocky Run Ravine		French Creek Valley Conservancy	Link	8.26
Scarlett Spring Run conservation area		French Creek Valley Conservancy	Link	111
Shryock Bailey Connector		French Creek Valley Conservancy	Link	17
Smith Tract		French Creek Valley Conservancy	Link	45
Smock Riverwalk		French Creek Valley Conservancy	Link	6
Spring Street Management Area		French Creek Valley Conservancy	Link	51
Stanley Goodblood		French Creek Valley Conservancy	Link	458
State Easement		French Creek Valley Conservancy	Link	19.07
State South		French Creek Valley Conservancy	Link	100.62
Stull Cunningham		French Creek Valley Conservancy	Link	20
Sugar Creek Landing Holden		French Creek Valley Conservancy	Link	126.6
Sugar Creek Landing VNA		French Creek Valley Conservancy	Link	40.78
Venango Woods	Keystone Fund	French Creek Valley Conservancy	Link	14.1
Vernal Pool Preserve		French Creek Valley Conservancy	Link	21

Name	Description	Owner	Website	Total Acres
Walkers Landing		French Creek Valley Conservancy	Link	60.19
Wolf Run Farm		French Creek Valley Conservancy	Link	134
Weyel		French Creek Valley Conservancy	Link	42.45
Burkholder Easement		French Creek Valley Conservancy	Link	87.174
Round Top Forest		French Creek Valley Conservancy	Link	97.196
Greene Township Paradise Park	Local	Greene Township		28.00
Greenfield Community Park	Local	Greenfield Township	Link	14.00
Greenwood Township Park	Local	Greenwood Township		20.00
Fifth Ward Playground	Local	Meadville, City of	Link	0.00
Sunbeam Field	Local	Meadville, City of		7.00
Mercer County Agricultural Easement #021		Mercer County	Link	190.00
Mercer County Agricultural Easement #046		Mercer County	Link	468.00
Mercer County Agricultural Easement #046 (2021)		Mercer County	Link	237.00
Cambridge Springs Access	State	PA Fish & Boat Commission	Link	10.00
Conneaut Lake Access	State	PA Fish & Boat Commission	Link	2.00
Corry State Fish Hatchery	State	PA Fish & Boat Commission	Link	315.00
Cussewago Creek Access	State	PA Fish & Boat Commission	Link	6.00
French Creek-South Branch/ Fenno and Gates Access Easement		PA Fish & Boat Commission	Link	2.00
French Creek-South Branch/Fenno Access	State	PA Fish & Boat Commission	Link	6.00
Meadville Access	State	PA Fish & Boat Commission		17.00
Northwest LE Office	State	PA Fish & Boat Commission		3.00

Name	Description	Owner	Website	Total Acres
Saegertown Access	State	PA Fish & Boat Commission		1.00
Shaw's Landing	State	PA Fish & Boat Commission		5.00
South Branch French Creek-Cox/McCray		PA Fish & Boat Commission	Link	21.00
South Branch French Creek-Seifert Easement		PA Fish & Boat Commission	Link	6.00
Sugar Lake Access	State	PA Fish & Boat Commission		1.00
Tamarack Lake	State	PA Fish & Boat Commission	Link	822.00
Tamarack Lake (Flowage)		PA Fish & Boat Commission	Link	6.00
Union City Fish Culture Station	State	PA Fish & Boat Commission	Link	88.00
Randolph Recreation Complex	Local	Randolph Township		13.00
Richmond Township Baseball Field	Local	Richmond Township		14.00
Erie Street Baseball/Softball Field	Local	Saegertown Borough		13.00
South St Ballfield	Local	Saegertown Borough		5.00
Summit Community Park	Local	Summit Township		14.00
Erie National Wildlife Refuge		U.S. Fish and Wildlife Service	Link	0.00
Erie National Wildlife Refuge	Federal	U.S. Fish and Wildlife Service	Link	9010.00
Emergency Watershed Protection Program - Floodplain Easement (EWPP-FPE)		USDA Natural Resources Conservation Service	Link	36.00
Wetland Reserve Easement		USDA Natural Resources Conservation Service	Link	31.00
Wetlands Reserve Program Easement		USDA Natural Resources Conservation Service	Link	1653.00
1st Avenue Tot Lot	Local	Union City Borough		1.00
Atlantic Street Tot Lot	Local	Union City Borough		0.00
Caflisch Memorial Park	Local	Union City Borough		11.00
Second Street Playground	Local	Utica Borough		1.00
Atlantic Avenue Park	Local	Venango County	Link	1.00
Bandstand Park	Local	Venango County	Link	2.00
Cooper Park	Local	Venango County	Link	14.00

Name	Description	Owner	Website	Total Acres
Fifteenth Street Park	Local	Venango County	Link	2.00
Fountain Park	Local	Venango County	Link	3.00
Fourteenth Street Park	Local	Venango County	Link	1.00
Oak Hill Park	Local	Venango County	Link	3.00
Riverfront Park	Local	Venango County	Link	10.00
Two Mile Run County Park	Local	Venango County	Link	2669.00
Harwood Tri-Community Park	Local	Venango Township		15.00
Vernon TWP Recreation Association	Local	Vernon Township		2.00
Vernon Township Ball Fields	Local	Vernon Township		35.00
Veterans Memorial Park	Local	Washington Township	Link	5.00
Meadville Area	Local	West Mead Township	Link	53.00
Meadville Area Youth Baseball Fields	Local	West Mead Township		21.00
Bentley Run Wetlands		Western Pennsylvania Conservancy	Link	348
Conneaut Marsh Natural Area	Keystone Fund	Western Pennsylvania Conservancy	Link	167.47
Cussewago Bottom Conservation Area	Keystone Fund	Western Pennsylvania Conservancy	Link	119.72
Franklin Line Canal Natural Area	Keystone Fund	Western Pennsylvania Conservancy	Link	30.462
French Creek Hemlocks		Western Pennsylvania Conservancy	Link	250
French Creek Flats		Western Pennsylvania Conservancy	Link	16.83
Helen B. Katz Natural Area		Western Pennsylvania Conservancy	Link	551.92
Lake Pleasant Conservation Area	Keystone Fund	Western Pennsylvania Conservancy	Link	581.5
LeBoeuf Wetlands Conservation Area	Keystone Fund	Western Pennsylvania Conservancy	Link	35
Mystic Valley Conservation Area	Keystone Fund	Western Pennsylvania Conservancy	Link	70
Shaw's Landing Floodplain		Western Pennsylvania Conservancy	Link	9
South Branch French Creek Conservation Area	Keystone Fund	Western Pennsylvania Conservancy	Link	234

Name	Description	Owner	Website	Total Acres
Utica Access		Western Pennsylvania Conservancy	Link	2.00
Venango Riffle Natural Area		Western Pennsylvania Conservancy	Link	8.46
WPC Easement		Western Pennsylvania Conservancy	Link	45.4
WPC Easement		Western Pennsylvania Conservancy	Link	95.7
WPC Easement		Western Pennsylvania Conservancy	Link	399
WPC Easement		Western Pennsylvania Conservancy	Link	91.409
WPC Easement	Keystone Fund	Western Pennsylvania Conservancy	Link	143.3
WPC Easement		Western Pennsylvania Conservancy	Link	80.7
WPC Easement		Western Pennsylvania Conservancy	Link	0.84
WPC Easement		Western Pennsylvania Conservancy	Link	47.8
WPC Easement		Western Pennsylvania Conservancy	Link	424.84
WPC Easement		Western Pennsylvania Conservancy	Link	122.86
Wattsburg Fen Natural Area		Western Pennsylvania Conservancy	Link	298.7
West Branch French Creek Conservation Area	Keystone Fund	Western Pennsylvania Conservancy	Link	1063.68
Wheelertown Flats		Western Pennsylvania Conservancy	Link	27
Heist Park	Local	Woodcock Borough		42.00

Local Parks

A local park is a publicly owned and publicly accessible park or natural area that engages participants of all ages in outdoor recreational experiences. Local parks and open spaces connect citizens to close-to-home outdoor recreation opportunities for play and physical activities; promote health and wellness, and environmental stewardship.

Local Park	Park Type	County	Grant Funding State or Federal
Richmond Township Baseball Field	Neighborhood Parks	Crawford	Yes, click here for more information
Cochranton Junior/Senior High School	School Parks	Crawford	Yes, click here for more information

Local Park	Park Type	County	Grant Funding State or Federal
Cooper Park	Single Purpose/Special Use Parks	Venango	Yes, click here for more information
Erie Street Baseball/Softball Field	Single Purpose/Special Use Parks	Crawford	Yes, click here for more information
Oakland Elementary School	School Parks	Venango	No
Cora Clark Park	Neighborhood Parks	Crawford	No
Cooperstown Ball Fields	Single Purpose/Special Use Parks	Venango	No
Kenneth A Beers Jr Bicentennial Park	Neighborhood Parks	Crawford	No
Pamona Park	Mini-Parks	Crawford	No
Ice House Park	Neighborhood Parks	Crawford	Yes, click here for more information
Meadville Area Senior High	School Parks	Crawford	No
Colonel Crawford Park	County Parks	Crawford	Yes, click here for more information
General McLane High Schools	School Parks	Erie	No
North Route 97 Park	Community Parks	Erie	No
Caflisch Memorial Park	Neighborhood Parks	Erie	Yes, click here for more information
Harwood Tri-Community Park	Community Parks	Erie	Yes, click here for more information
Wainer Park	Neighborhood Parks	Erie	Yes, click here for more information
Conelway Elementary School	School Parks	Erie	No
Union City High School	School Parks	Erie	No
Greene Township Paradise Park	Community Parks	Erie	Yes, click here for more information.
Thompson Park	Neighborhood Parks	Erie	No
Conneauttee Park	Mini-Parks	Erie	No
Peninsula Park	Neighborhood Parks	Erie	No
Saegertown High School	School Parks	Crawford	No
Central Elementary School	School Parks	Venango	No
Meadville Area Youth Baseball Fields	Single Purpose/Special Use Parks	Crawford	No
Maplewood Junior Senior High School	School Parks	Crawford	No
Conneaut Lake-Sadsbury Elementary School	School Parks	Crawford	No
Bertram Park	Neighborhood Parks	Crawford	Yes, click here for more information.
Cambridge Springs High School	School Parks	Crawford	No
Crawford County Fairgrounds	County Parks	Crawford	No

Local Park	Park Type	County	Grant Funding State or Federal
Conneaut Lake High School	School Parks	Crawford	No
Neason Hill Elementary School	School Parks	Crawford	No
Maplewood Elementary School	School Parks	Crawford	No
Gibson Park	Large Urban Parks	Crawford	Yes, click here for more information.
Greenwood Township Park	Community Parks	Crawford	Yes, click here for more information.
Huidekoper Park	Neighborhood Parks	Crawford	Yes, click here for more information.
Roche Park	Large Urban Parks	Crawford	Yes, click here for more information.
Riverfront Park Sunbeam Field	Neighborhood Parks	Venango	Yes, click here for more information.
Sunbeam Field	Neighborhood Parks	Crawford	No
Cochranton Lions Community Park	Neighborhood Parks	Crawford	No
Crawford County Youth Soccer Association	Large Urban Parks	Crawford	No
Second District Elementary School	School Parks	Crawford	No
Valley Grove Elementary School	School Parks	Venango	Yes, click here more information.
Fifth Ward Playground	Mini-Parks	Crawford	No
Diamond Park	Neighborhood Parks	Crawford	No
Fireman's Beach Park	Neighborhood Parks	Crawford	Yes, click here for more information.
Vernon Township Ball Fields	Community Parks	Crawford	Yes, click here for more information.
Cochranton Elementary School	School Parks	Crawford	No
Utica Elementary School	School Parks	Venango	No
Second Street Playground	Mini-Parks	Venango	Yes, click here for more information.
South St Ballfield	Neighborhood Parks	Crawford	No
Meade Road Park	Neighborhood Parks	Crawford	Yes, click here for more information.
Cambridge Springs Recreation Area	Neighborhood Parks	Crawford	No
Elizabeth Park	Mini-Parks	Crawford	No
Vernon TWP Recreation Association	Neighborhood Parks	Crawford	No
H P Way Park	Neighborhood Parks	Crawford	Yes, click here for more information.
Meadville Area Recreation Complex	Large Urban Parks	Crawford	Yes, click here for more information.
West End Elementary School	School Parks	Crawford	No

Local Park	Park Type	County	Grant Funding State or Federal
Miller-Sibley Recreational Complex	Neighborhood Parks	Venango	Yes, click here for more information.
Lakeside Drive Park	Neighborhood Parks	Erie	Yes, click here for more information.
1st Avenue Tot Lot	Mini-Parks	Erie	Yes, click here for more information.
Atlantic Street Tot Lot	Mini-Parks	Erie	Yes, click here for more information.
Greenfield Township Elementary	School Parks	Erie	No
Picnicana Park	Community Parks	Erie	Yes, click here for more information.
Summit Community Park	Neighborhood Parks	Erie	No
Edinboro Elementary School	School Parks	Erie	No
Fort LeBoeuf Senior High School	School Parks	Erie	No
Union City Public Golf Course	Large Urban Parks	Erie	No
Edinboro Softball Field	Neighborhood Parks	Erie	No
Oakgrove Park	Community Parks	Crawford	No
Green Mountain Park	Neighborhood Parks	Crawford	No
Cambridge Area Recreation Park	Community Park	Crawford	Yes, click here
Greenfield Community Park	Community Parks	Erie	Yes, click here for more information.
Venango Township Community Park	Community Parks	Erie	Yes, click here for more information.
Seneca High School	School Parks	Erie	No
Shady Brook Park	Community Parks	Crawford	Yes, click here for more information.
Point Park	Community Parks	Erie	No
Veterans Memorial Park	Community Parks	Erie	Yes, click here for more information.
Elgin Community Park	Community Parks	Erie	No
Randolph Recreation Complex	Sports Complexes	Crawford	No
Fourteenth Street Playground	Mini-Parks	Venango	No
Fifteenth Street Park	Mini-Parks	Venango	No
Atlantic Avenue Park	Mini-Parks	Venango	No
Oak Hill Park	Mini-Parks	Venango	No
Fountain Park	Mini-Parks	Venango	No
Bandstand Park	Mini-Parks	Venango	No
Corry Beaver Complex	Community Parks	Erie	No
American Legion Little League	Community Parks	Erie	No

Appendix L

Natural Heritage Areas

Source: PA Natural Heritage Program Conservation Explorer Report for HUC 8 – French Creek generated on 02/19/2024.

Natural Heritage Site Name	Description	Reference
Alder & Bentley Run Kame Field	This highly diverse forested site includes at least 6 state rare natural communities. Several of these are species rich fen wetlands which support more than 20 species of concern in PA.	Link
Alder Brook	Wet thickets along this tributary to the West Branch of French Creek support PA endangered showy mountain ash and PA threatened highbush cranberry.	Link
Allegheny River from Reno to Franklin	Fourteen species of concern have been documented in this area.	Link
Baldwin Flats	The wetlands along Alder Run support three butterfly species that are rare in PA.	Link
Beatty Run Headwaters	This area consists of a large complex of wetlands at the divide of Deckard Run and Beatty Run, and the forest surrounding these wetlands. Two unique natural communities and two species of concern were documented during recent surveys.	Link
Beaver Run	Forested wetlands at this site support populations of three palustrine plants of special concern.	Link
Benson Road Fen	This site is a small complex of beaver pond wetlands which includes an Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen, critically imperiled in PA, and it supports three plant species of concern.	Link
Boleratz Fen	Fed by alkaline groundwater, this wetland complex includes two rare plant community types and supports 9 plant species of concern. Among these is the PA endangered hooded ladies'-tresses orchid.	Link
Cambridge Springs Swamp	Swampy area that provides nesting habitat to a species that is being considered for tracking.	Link
Carr Run	Meandering portion of creek, upstream from Cussewago Creek that supports two aquatic species of concern.	Link
Circuit Street Fen	Riparian forest at this site supports three plant species of concern, including the PA threatened Bebb's sedge.	Link
Conneaut Creek - French Creek Confluence	Small wooded riparian area near confluence that supports a plant species of concern.	Link
Conneaut Lake	Manmade lake with 13 species of concern occur along the lake edge and in adjoining wetlands.	Link
Conneaut Lake Outlet	Stream and wetlands at the outflow of Conneaut Lake that support several species of concern.	Link
Conneaut Marsh Complex Central	Central portion of a large emergent marsh along Conneaut Outlet, which provides habitat to five species of concern.	Link
Conneaut Marsh Complex North	Northern portion of a large emergent marsh along Conneaut Outlet, which provides habitat to seventeen species of concern.	Link

Natural Heritage Site Name	Description	Reference
Conneaut Marsh Complex South	Southern portion of a large emergent marsh along Conneaut Outlet, which provides habitat to several animal and plant species of concern.	Link
Conneauttee Creek	Floodplain forests along Conneauttee Creek support a population of red currant, a PA threatened plant species.	Link
Cornplanter SF-Ingram Vernal Pools	This site supports more than 25 vernal pool wetlands and provides habitat for significant populations of breeding amphibians.	Link
Cornplanter SF-Sugarbush Vernal Pools	This site supports two vernal pool wetlands which provide habitat for breeding amphibians and other specialized animal and plant species.	Link
Cranberry Swamp-Mercer Co	Wetland complex at the headwaters of Black Run that is the location of two important natural communities.	Link
Cussewago Creek	Wetlands along Cussewago Creek provide breeding habitat for Virginia rail, a bird species of concern in PA.	Link
Cussewago Creek – Coons Valley	Relatively large riparian wetland that provides habitat to nine species of concern.	Link
Cussewago Creek Central Riparian Corridor	Riparian corridor of a large stretch of creek that supports four plant species of concern and numerous natural communities.	Link
Cussewago Creek at Crossingville	Portion of the stream and an unnamed tributary that provides habitat for a species of concern.	Link
Cussewago Creek at Dennys Corners	Forested stream with one plant species of concern.	Link
Dead Creek	Slightly disturbed upland ridge of stream channel that provides habitat to a plant species of concern.	Link
Deer Creek	South-facing slope that is the location of a county significant natural community.	Link
East Branch LeBoeuf Creek	Aquatic habitat along the East Branch of LeBeouf Creek supports a population of the cylindrical papershell mussel, imperiled in PA.	Link
Edinboro Lake	This calcareous glacial lake is rich with important elements of biodiversity. This site supports numerous aquatic plants of concern.	Link
Edinboro Lake Fen	This species-rich wetland bordering Edinboro Lake supports PA rare Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen and Golden Saxifrage-Sedge Rich Seep communities and 31 species of concern.	Link
Falls Run - Shenango Creek Headwaters	Riparian forest habitat along the Falls Run gorge supports populations of the globally vulnerable West Virginia white butterfly, three state rare plant species, and a sensitive species of concern.	Link
Firth Fen	Forested wetlands along this tributary to Hubbel Run support two plant species of concern, PA vulnerable Baltimore butterfly, and the PA critically imperiled Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen community.	Link

Natural Heritage Site Name	Description	Reference
French Creek - Erie County	One of the most ecologically significant waterways in PA, French Creek supports 53 species and one natural community of concern. Included in this diverse group of mussels, fish, plants, birds, and herps are 16 PA endangered and 15 PA threatened species.	Link
French Creek Floodplain Forest	Small patch of bottomland riparian forest providing habitat to a plant species of concern.	Link
French Creek-Lower	Riverine community supporting many species of concern.	Link
French Creek-Middle	High quality river with numerous species of concern present.	Link
Greenlee Road	Diverse wetland types support two plant species of concern at this site. These include PA threatened prairie sedge and highbush cranberry.	Link
Hannasville Wetlands	A complex of small streams, glacial wetlands, beaver marshes, and temporary vernal pools suport two species of concern.	Link
Harmonsburg Wetlands	Mixed-forb Swamp and fen supporting ten plant species and a natural community of concern.	Link
Hell's Half Acre	This small wetland is a glacial kettlehole bog that supports two state vulnerable plant communities: Leatherleaf - Cranberry Peatland and Hemlock - Mixed Hardwood Palustrine Forest. This NHA provides habitat for six additional species of concern.	Link
Hemlock Natural Area	Wooded bottomland wetland area that is a Rich hemlock - mesic hardwoods forest Natural Community.	Link
Howard Eaton Reservoir	This site provides important habitat for two insects of special concern: bronze copper (butterfly) and white-faced meadowhawk (dragonfly).	Link
Hubbel Run - North	The peatland at this site provides habitat for a population of the PA imperiled lesser panicled sedge.	Link
Hubbel Run Fen	Aquatic habitat at this site supports two species of concern, including state endangered Hill's pondweed.	Link
Hubbel Run Vernal Pools	Forests and wetlands at this site support three rare natural communities, including several Herbaceous Vernal Ponds and a Golden Saxifrage - Sedge Rich Seep. Three species of concern are also found here.	Link
Kirik Fen	This alkaline seepage wetland has two state rare natural community types and supports one dragonfly species and 7 plant species of concern. Among these are state endangered hooded ladies' tresses orchid, Bebb's sedge, and Hill's pondweed.	Link
Klemmer Road	Forested and aquatic habitats at this site support a sensitive species of concern.	Link

Natural Heritage Site Name	Description	Reference
Koochogey Wetlands	Meandering stream and large surrounding wetland complex provides habitat for 18 species of concern, as well as two natural communities of conservation concern.	Link
Lake Creek Valley	Extensive emergent marsh surrounding Lake Creek as it flows into Sugar Lake, which provides habitat to numerous species of concern. Two natural communities of concern are also located here.	Link
Lake LeBoeuf	Created by three overlapping glacial lakes, Lake LeBoeuf- and its forested wetlands support populations of 10 plant species of concern. Among these, marsh bedstraw and red-head pondweed are state endangered.	Link
Lake Pleasant	Lake Pleasant is a rare pristine calcareous glacial lake which supports 36 species and natural communities of special concern. Among this diversity of rare plants and animals are 16 state endangered species.	Link
Lake Pleasant Eastern Slopes	This site hosts a state rare Hemlock - Mixed Hardwood Palustrine Forest and provides habitat for six species of concern.	Link
Lake Pleasant Western Slopes	Moist forested slopes on the western side of Lake Pleasant Valley provide habitat for a population of the globally vulnerable West Virginia white butterfly.	Link
LeBeouf Township Woods	Forest and aquatic habitats at this site support a sensitive species of concern.	Link
LeBoeuf Creek at Waterford	This stretch of LeBoeuf Creek supports five species of concern.	Link
Little Conneautte Creek - South	The site’s riparian forest, wetlands, and adjacent agricultural lands support a sensitive species of concern.	Link
Little Conneautte Creek Tributary Wetlands	Several beaver pond forested wetlands support two dragonfly and one plant species of concern.	Link
Little Conneauttee Floodplain	A "Bottomland oak - hardwood palustrine forest Natural Community" along Little Conneauttee Creek supports two species of concern.	Link
Little Federal Run Headwaters Wetland	A wetland community of concern that supports two plant species of concern.	Link
Little Sugar Creek at Blooming Valley	Large forested block containing three natural communities of conservation concern.	Link
Little Sugar Creek at Pettis Corners	Stretch of stream providing appropriate habitat conditions to support two species of concern.	Link
Lowville Fen	This calcareous seepage wetland includes a state rare Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen, and supports 19 additional species of concern.	Link
McCune Run Vernal Pools	A cluster of ephemeral fluctuating natural pools, which provide critical breeding habitat for a suite of amphibians adapted to these temporary wetlands because of their periodic drying which excludes fish populations. These pools were not surveyed during the inventory and future survey work should focus on this area to determine the quality of these wetlands.	Link
Meadville Junction	Wetlands near railroad canal support eight species of concern.	Link

Natural Heritage Site Name	Description	Reference
Mitchell Road Fen - Erie County	This site supports two state rare natural communities, including the Golden Saxifrage - Pennsylvania Bitter-Cress - Spring Run community, and four plant species of concern.	Link
Mohawk Run Fen	A rare wetland community that supports several plant species of concern.	Link
Muddy Creek Wetland	A large stream channel wetland that provides habitat to numerous plants, animals, and a natural community of conservation concern.	Link
Muddy Creek Crawford Co	Meandering section of the creek with shallow runs and riffles and a cobble substrate supporting three species of concern.	Link
Navy Run Tributary Wetland	Moist, wooded forest supports a plant species of concern.	Link
Owen's Boggy Woods	A degraded fen at this site still supports several species of concern.	Link
Pine Knoll	Rich mesic forest supporting a diversity of spring wildflowers.	Link
Pleasant Divide Swamp	Diverse wetlands along this stream support a state rare Buckthorn-Sedge -Golden Ragwort Fen community and 16 species of concern. Included in this group of species are five PA endangered plants and the globally vulnerable West Virginia white butterfly.	Link
Pont Road Wetlands	Wetland community providing habitat to two species of concern.	Link
Puckerbush Lake Tributary	Small wetland community supporting a plant species of concern.	Link
Reynolds Church Vernal Pools	A cluster of vernal pools, critical wetlands for a host of amphibian, invertebrate, and plant species.	Link
South Branch French Creek Lilley Run	Aquatic habitats at this site support the state rare cylindrical papershell mussel and three sensitive species of concern.	Link
South Branch French Creek -West	Aquatic habitats at this site support populations of two state rare mussels: wavy-rayed lampmussel and creek heelsplitter.	Link
South Branch French Creek Headwaters	Wetland and aquatic habitats support a population of PA threatened lesser panicled sedge and two sensitive species of concern.	Link
State Game Lands #154 Pools - East	This forested site contains several ephemeral pool wetlands, considered vulnerable in PA. These vernal pools vary in wetness throughout the year, and provide critical spring time breeding habitat for amphibians like spotted salamander and wood frog.	Link
State Game Lands #154 Pools - West	This site supports several state rare sparsely vegetated seasonal pools wetland communities which support a specialized suite of amphibians which depend on these ephemeral wetlands for breeding.	Link
State Game Lands #191	Emergent marsh and open water habitat at this site supports the PA rare sweetflag spreadwing dragonfly and a sensitive species of concern.	Link
State Game Lands #192 Ponds	At least 10 dragonfly, damselfly, and butterfly species of concern have been recorded at these impoundments and forested wetlands. Among these are the PA critically imperiled Cyrano darner and spatterdock darner.	Link

Natural Heritage Site Name	Description	Reference
State Game Lands #192 Valleys	High quality forests and streams at this site provide habitat for the globally vulnerable West Virginia white butterfly and the state rare ocellated darner, a dragonfly species of concern in PA.	Link
State Game Lands #218	This site has a mix of forested and emergent wetlands that support 16 species of concern. Among these are the globally vulnerable Hill's pondweed, PA critically imperiled spatterdock darner, and state rare breeding common gallinule.	Link
State Game Lands #277	Wetland community adjacent to French Creek that provides habitat for several species of concern.	Link
State Game Lands #69	Large wetland complex containing numerous odonate species of concern.	Link
Sugar Creek at Wyattville	This site contains habitat for two species of concern.	Link
Sugar Lake	Glacial lake and surrounding marshy shoreline that supports an animal species of concern.	Link
Tarbell Road	Forested wetlands on these headwaters tributary to Beaver Run support two plant species of concern: Clinton's wood fern and showy mountain-ash.	Link
Titus Bog	This site is a high quality example of a glacial kettlehole bog that has a state rare Leatherleaf - Cranberry Bog community and supports nine additional species of concern. Among these is the globally rare Marguerite’s club moss.	Link
Torry Run	Small meandering stream that supports a species of concern.	Link
Tracy Road	Forested seepage wetlands at this site provide habitat for the globally vulnerable West Virginia white butterfly.	Link
Union City Hatchery Fen	This site supports a Sedge - Mixed Forb Fen natural community, critically imperiled in PA, and 11 species of concern. Four of these species are state rare butterflies: Baltimore checkerspot, Acadian hairstreak, coral hairstreak, and West Virginia white.	Link
Union City Reservoir	This constructed reservoir and its surrounding forest, wetlands, and meadows support 12 species of concern, nine of which are insects. Among these is the globally vulnerable West Virginia white butterfly and state vulnerable claybank tiger beetle.	Link
Upper French Creek	Aquatic and riparian habitats along meandering stream support numerous aquatic species of concern.	Link
Urey Swamp	Headwater swamp of Mill Creek contains a "Hemlock palustrine forest Natural Community".	Link
Vernal Pools west of Utica	This site contains a cluster of vernal pools, temporary wetlands that provide critical breeding habitat for many amphibians. Because the pools dry down, predatory fish populations are excluded, allowing the larval amphibians to thrive. The forest surrounding the vernal pools is equally important to the amphibians during the rest of the year, and some species are known to move several hundred meters away from these breeding pools.	Link

Natural Heritage Site Name	Description	Reference
Warden Run Headwaters	Warden Run Headwaters is a glacial peatland, containing an occurrence of a plant species of concern.	Link
Waterford Wetlands - North	Diverse and extensive wetlands at this site support three natural communities and at least 24 species of concern	Link
Waterford Wetlands - South	Aquatic and forested habitats along this LeBoeuf Creek valley support state imperiled highbush-cranberry and fragile papershell mussel, as well as 4 state rare butterflies and 6 dragonflies.	Link
Wattsburg Fen	This diverse wetland complex supports a state rare Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen and populations of 13 species of concern. Included among these is PA endangered downy willow-herb and PA threatened yellow sedge.	Link
Wattsburg Kettles	Near the headwaters of Hubbel Run there are 4 glacial kettle pools which comprise a state vulnerable Hemlock Palustrine Forest community.	Link
West Greene Wet Meadow	Wet meadows at this site provide breeding habitat for a sensitive species of concern.	Link
Woodcock Creek	Habitat for a species of concern.	Link
Woodcock Lake	Aquatic and riparian habitats of man-made lake supports two species of concern.	Link
Yoset Lake Palustrine Forest	Wetland complex south of Yoset Lake that supports two natural communities of concern and a plant species of concern.	Link

Appendix M
Directory of Watershed Resources

Allegheny College
520 N. Main Street
Meadville, PA 16335
(814) 332-4351
info@allegheny.edu
www.allegheny.edu

Allegheny College - Creek Connections
(814) 332-5351
creek@allegheny.edu
http://creekconnections.allegheny.edu/

Allegheny College - Watershed Conservation Research Center
www.sites.allegheny.edu/wcrc

Allegheny Valley Conservancy
PO Box 96
Franklin, PA, 16323
http://www.avc-pa.org

Allegheny Valley Trails Association
Box 264
Franklin, PA 16323
(814) 432-5823 (Franklin Area Chamber of Commerce)
www.avta-trails.org

Bartramian Audubon Society
P.O. Box 315
Slippery Rock, PA 16057
bartramianaudubon@gmail.com
www.bartramianaudubonsociety.org

Cambridge Revitalization Economic and Tourism Expansion
161 Carringer St.
Cambridge Springs, PA 16403
(804) 396-5428
info@createcambridge.com

Chautauqua County Soil & Water Conservation District
220 Fluvanna Avenue, Suite 600
Jamestown, NY 14701
(716) 664-2351 Ext 5
Chaut-Co@soilwater.org
www.soilwater.org

Chautauqua Watershed Conservancy
71 East Fairmount Avenue, PO Box 45
Lakewood, NY 14750
(716) 664-2166
info@chautauquawatershed.org
www.chautauquawatershed.org

City of Meadville
894 Diamond Park
Meadville, PA 16335
(814) 724-6000
https://www.cityofmeadville.org

Cochranton Area Redevelopment Effort
102 Roche Lane
PO Box 552
Cochranton, PA 16314
814-425-7700
cochrantoncare@gmail.com

Conneaut Lake Aquatic Management Association
P.O. Box 49
Conneaut Lake, PA 16316
www.facebook.com/people/Conneaut-Lake-Aquatic-Management-Association

Council on Greenways & Trails
P.O. Box 32
Oil City, PA 16301
http://www.nwpagreenways.org

Crawford County Conservation District
Woodcock Creek Nature Center
21742 German Road
Meadville, PA 16335
(814) 763-5269
www.crawfordconservation.com

Crawford County Planning Commission
903 Diamond Park Courthouse
Meadville, PA 16335
(814) 333-7341
www.crawfordcountypa.net/Planning/Pages/Planning-Commission.aspx

Ducks Unlimited
One Waterfowl Way
Memphis, TN 38120
(901) 758-3825
www.ducks.org

Edinboro Lake Association
(814)460-7976
edinborolakesideassociation@gmail.com
www.edinborolakeside.com

Erie Bird Observatory
301 Peninsula Drive, Suite 12
Erie, PA 16505
(814) 580-8311
info@eriebirds.org
www.eriebirdobservatory.org

Erie County Conservation District
1927 Wager Road
Erie, PA 16509
(814) 825-6403
eriecons@erieconservation.com
www.erieconservation.com

Erie County Department of Health
606 West 2nd Street
Erie, PA 16507
(814) 451-6700
ecdhinfo@eriecountypa.gov
www.eriecountypa.gov/departments/health

Erie County Department of Planning & Community Development
150 East Front Street, Suite 300
Erie, PA 16507
(814) 451-6336
pcdinfo@eriecountypa.gov
http://www.eriecountypa.gov/departments/planning-and-community-development/

Erie National Wildlife Refuge (USFWS)
11296 Wood Duck Lane
Guy Mills, PA 16327
814-580-9983
https://www.fws.gov/refuge/erie

Ernst Conservation Seeds
8884 Mercer Pike
Meadville, PA 16335
(800) 873-3321
http://www.ernstseed.com

Findley Lake Nature Center
www.facebook.com/FindleyLakeNatureCenter

Findley Lake Nature Trails Network
https://www.facebook.com/FindleyLakeNatureCenter/about

Findley Lake Watershed Foundation
P.O. Box 125
Findley Lake, NY 14736
www.findleylakewf.org

Foundation for Sustainable Forests
P.O. Box 146
Spartansburg, PA 16434
(814) 694-5830
http://www.foundationforsustainableforests.org

French Creek Cooperative Weed Management Area
https://www.facebook.com/FCCWMA

French Creek Valley Conservancy
411 Chestnut Street, P.O. BOX 434
Meadville, PA 16335
(814) 337-4321
www.frenchcreekconservancy.org/

Mercer Co. Conservation District
24 Avalon Court, Suite 300
Mercer, PA 16137
(724) 662-2242
http://www.mercercountycd.com

Mercer Co. Regional Planning Commission
2491 Highland Road
Hermitage, PA 16148
(724) 981-2412
mail@mcrpc.com

Mercyhurst University
501 East 38th Street
Erie, Pennsylvania 16546
(814) 824-2000
http://www.mercyhurst.edu

Natural Resources Conservation Service (USDA)
14699 N. Main Street Extension
Meadville, PA 16335
(814) 547-5962
http://www.nrcs.usda.gov

Northwest PA Duck Hunters Association
P.O. Box 8073
Erie, PA 16505
(814) 882-3473
http://www.paduck.com

Northwest Pennsylvania Woodland Association
NWPAwoods@gmail.com

Oil Heritage Region, Inc.
217 Elm Street
Oil City, PA 16301
(800) 483-6264
info@oilregion.org
http://www.oilregion.org

PA DCNR Bureau of Forestry – Cornplanter Region
323 North State Street
North Warren, PA 16365
(814) 723-0262
http://www.dcnr.pa.gov/about/Pages/Forestry.aspx

PA CleanWays of Venango County
1168 Liberty Street
PO Box 831
Franklin, PA 16323
(814) 432-9684

PA Department of Agriculture
Region 1
13410 Dunham Road
Meadville, PA 16335
(814) 332-6890
http://www.agriculture.pa.gov

PA Department of Conservation and Natural Resources
Bureau of Rec and Conservation
Region 6
http://www.dcnr.pa.gov

PA Department of Environmental Protection
Northwest Region
230 Chestnut Street
Meadville, PA 16335
(814) 332-6945
http://www.dep.pa.gov

PA Department of Transportation
Engineering District 1-0
P.O. Box 398
255 Elm Street
Oil City, PA 16301
(814) 678-7085
http://www.penndot.pa.gov

PA Environmental Council
810 River Avenue, Suite 201
Pittsburgh, PA 15212
(412) 481-9400
http://www.pecpa.org

PA Fish & Boat Commission
Northwest Region
11528 State Highway 98
Meadville, PA 16335
(814) 336-2426
http://www.fishandboat.com

PA Game Commission
Northwest Region
1509 Pittsburgh Road
Franklin, PA 16323
(833) 742-4868
http://www.pgc.pa.gov

Penn State Crawford Co. Cooperative Extension
1099 Morgan Village Road, Suite A
Meadville, PA 16335
(814) 333-7460
CrawfordExt@psu.edu
http://www.extension.psu.edu/crawford-county

Penn State Extension
The Pennsylvania State University
323 Agricultural Admin. Building
University Park, PA 16802
http://www.extension.psu.edu

Penn State Erie Co. Cooperative Extension
Summit Township Building, Suite 400
1230 Townhall Road West
Erie, Pennsylvania 16509
(814) 825-0900
ErieExt@psu.edu
http://www.extension.psu.edu/erie-county

Penn State Master Watershed Stewards
Erie, Crawford, & Warren Counties
(814) 898-7086
http://www.extension.psu.edu/programs/watershed-stewards

Penn State Mercer Co. Cooperative Extension
463 North Perry Highway
Mercer, PA 16137
(724) 662-3141
MercerExt@psu.edu
http://www.extension.psu.edu/mercer-county

Penn State Venango Co. Cooperative Extension
867 Mercer Road
Franklin, PA 16323
(814) 437-7607
VenangoExt@psu.edu
http://www.extension.psu.edu/venango-county

Pennsylvania Landowners' Association
palandowners@outlook.com
http://www.palandowners.com

Pennsylvania Organization for Watersheds and Rivers (POWR)
105 Lt Michael Cleary Drive
Dallas, PA 18612
(570) 718-6507
http://www.pawatersheds.org

Pennsylvania Sea Grant (PSU)
Tom Ridge Environmental Center
301 Peninsula Drive
Erie, PA 16505
http://www.seagrant.psu.edu

PennWest Edinboro University
219 Meadville Street
Edinboro, Pennsylvania 16444
(814) 732-2000
http://www.edinboro.edu

Presque Isle Audubon Society
Tom Ridge Environmental Center
301 Peninsula Drive, Suite 8
Erie, PA 16505
info@presqueisleaudubon.org
http://www.presqueisleaudubon.org

Purple Martin Conservation Association
Tom Ridge Environmental Center
301 Peninsula Drive, Suite 8
Erie, PA 16505
http://www.purplemartin.org

Richard King Mellon Foundation
500 Grant Street, Suite 4106
Pittsburgh, PA 15219
(412) 392-2800
http://www.rkmf.org

Seneca Nation of Indians
90 Ohi:yo' Way
Salamanca, NY 14779
(716) 945-1790
http://www.sni.org

Sherman Chamber of Commerce
111 Mill Street, P O Box 629
Sherman, NY 14781
(716) 761-6781
http://www.shermanny.org

The Nature Conservancy - PA
2101 North Front Street
Building #1, Suite 200
Harrisburg, PA 17110
(866) 298-1267
http://www.nature.org

Tom Ridge Environmental Center
301 Peninsula, Drive Suite 1
Erie, PA 16505
(814) 835-1384
info@trecf.org
http://www.trecf.org

Trout Unlimited
Northwest PA Chapter #41
Erie, PA 16501
http://www.nwpatrout.org

Union City Borough
13 South Main Street
Union City, PA 16438
(814) 438-2331
http://www.unioncitypa.us

U. S. Army Corps of Engineers
Pittsburgh District
2200 William S. Moorhead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222
(412) 395-7103
http://www.lrd.usace.army.mil

U. S. Army Corps of Engineers
Woodcock Creek Lake
22079 State Highway 198
Saegertown, PA 16433-6213
(814) 763-4422/4477
https://geospatial-lrp.usace.army.mil/projects/reservoirs/woodcock/data/Woodcock2014b.pdf

Venango Co. Conservation District
4871 US 322
Franklin, PA 16323
(814) 676-2832
http://www.venangocd.org

Venango Co. Planning Commission
1168 Liberty Street
Courthouse, 1st Floor
Franklin, PA 16323
(814) 432-9689
http://www.venangocountypa.gov/452/Planning-Commission

Venango Museum/Allegheny River Support Groups
270 Seneca Street
Oil City, PA 16323
(814) 676-2007
venangomuseum@gmail.com
http://www.venangomuseum.org

WECAN Waterford
(814) 440-3044
info@wecanwaterford.org

Western Pennsylvania Conservancy
800 Waterfront Drive
Pittsburgh, PA 15222
(412) 288-2777
http://www.waterlandlife.org

Western Pennsylvania Conservancy - Northwest Regional Office
Galena Building, Suite 100
1140 Liberty Street
Franklin, PA 16323
814-346-0377
northwest@paconserve.org

Western Pennsylvania Conservancy - Watershed Conservation Office
1067 Philadelphia Street
Suite 101
Indiana, PA 15701
724-471-7202
water@paconserve.org