

A photograph of a forest stream with a white text box overlaid in the center. The stream flows through a dense forest of tall trees with green and yellowing leaves. The water is brown and turbulent, flowing over rocks. The text box is white with green and black text.

BUFFALO CREEK WATERSHED CONSERVATION PLAN 10-YEAR UPDATE

September 2019



Buffalo Creek Watershed Conservation Plan 10-Year Update

Armstrong, Butler, and Allegheny Counties, Pennsylvania

Audubon Society of Western Pennsylvania (ASWP)



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EXECUTIVE SUMMARY

The development of this *Watershed Conservation Plan Update* (Plan Update) for the Buffalo Creek Watershed is an initiative of Audubon Society of Western Pennsylvania (ASWP). ASWP facilitated the development of the initial *Buffalo Creek Watershed Plan Conservation Plan* in 2008 (2008 Plan). Since the issuance of the 2008 Plan, substantial changes have occurred within the watershed. Some of these changes include continued residential and commercial development, extensive Marcellus Shale extraction activities, increased demand for recreational resources, and new pressures on biological resources from invasive species and introduced pests and disease. Through public input and data analysis, the Plan Update focused on identifying major trends and issues with an accompanying updated action plan. ASWP has begun to work to secure funds to lead the formation of a Watershed Coalition and implement some of the priority action items.

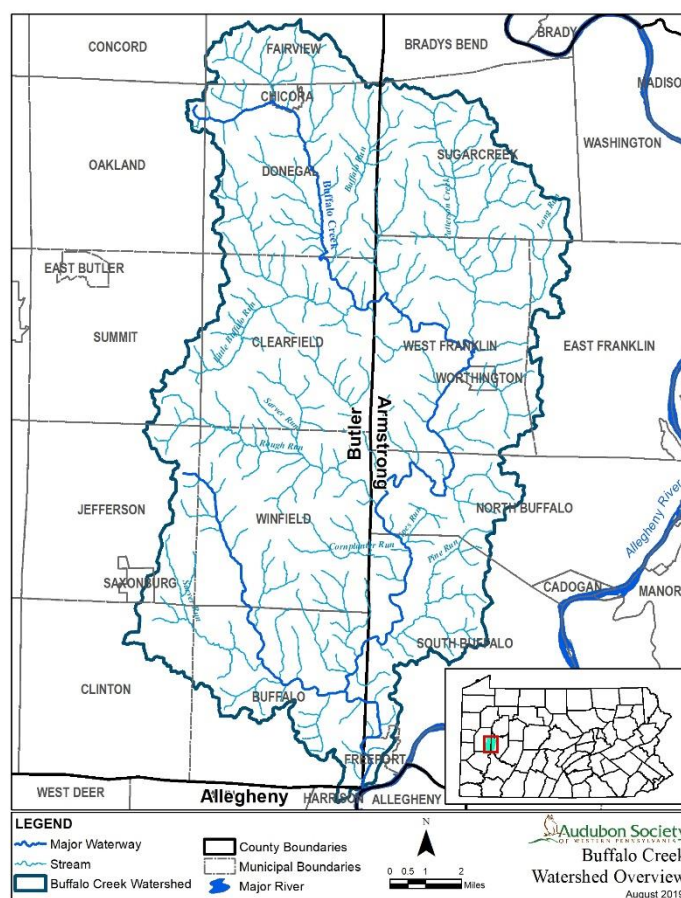
Buffalo Creek is the largest tributary on the west side of the Allegheny River between Franklin (French Creek) and the Ohio. The watershed drains 171 square miles of eastern Butler, western Armstrong, and a very small portion of northern Allegheny Counties in western Pennsylvania. From its headwaters in Fairview Township, Butler County, the stream flows 34.4 miles to the Allegheny River at Freeport, Armstrong County (Figure 1). Twenty-one municipalities across three counties are wholly or partially located within the watershed. The estimated population (2010) of Buffalo Creek is 24,150.

An Audubon-designated Important Bird Area (IBA), the watershed is home to high quality habitat and many species of conservation concern. Birds such as the Louisiana Waterthrush rely on the area's healthy streams and in-tact forest for food and breeding habitat.

The watershed contains streams where trout naturally reproduce. A section of Buffalo Creek is designated by the Pennsylvania Fish and Boat Commission (PAFB) as some of the state's Best Fishing Waters for stocked trout. Of the watershed's 348.7 miles of streams, 93.7 miles are High Quality – Cold Water Fisheries (HQ-CWF) and 250.7 miles are High Quality – Trout Stocking Fisheries (HQ-TSF). The remaining 9.4 miles are Trout Stocking Fisheries (TSF).

Forests and agriculture dominate the watershed, shaping the rural character that is highly valued by residents. The most recent land use data (2010) indicates that the watershed is 48.5% forest and 30.8% agriculture. Urban/built up was the third most extensive land use type, accounting for 14.6% of the

Figure 1: Buffalo Creek Watershed Overview



watershed. Portions of the watershed have experienced significant development since 2010 and therefore many land use changes are not accurately reflected in these land use statistics.

Plan Update Process and Findings

In addition to data review and analysis, a comprehensive approach to public input was used to ensure that the Plan Update reflected the needs and desires of the community. Public input involved the development of a steering committee, 18 stakeholder interviews, a public meeting, surveys, promotion through social media and flyers, mailings to key stakeholders such as watershed municipalities, traditional media coordination, and the creation of a website. A total of 120 surveys were received from people that live, work, attend school, and recreate in the watershed. A draft of the plan was posted for public comment in July 2019 prior to plan finalization.

Through this process, the following major trends and issues were identified:

- Preserving the watershed's natural landscapes (including forest and stream health) and rural character as well as expanding recreation opportunities were top priorities identified by the public. Additional important watershed qualities/activities identified by the public include wildlife, fishing, the Butler-Freeport Trail, agriculture/agricultural preservation, and environmental education opportunities.
- 37% of the watershed's stream miles are now impaired. This is a 10.5% increase (37.7 additional miles) since 2008. 34.6 miles of the additionally impaired streams are impaired due to "source unknown - cause unknown."
- Over 50% of the stream miles in 4 subwatersheds are impaired: Little Buffalo Creek (64.8%), Marrowbone Run (52.5%), Pine Run (92.3%), and Sarver Run (52.2%).
- From 1992 - 2010, land use data shows that agriculture decreased by 5.9 miles² and forest decreased by 24.7 miles² while urban / built up areas increased by 21.9 miles². The most recent land use data available is 2010; much development has occurred in the watershed since 2010 so this data likely underestimates the loss of forest and agriculture to development.
- There are now 229 unconventional shale gas well permits in the watershed; there were approximately 0 wells in the watershed when the original plan was completed.
- Primary watershed challenges identified by the public include residential development / development, litter / garbage, and water quality impacts (e.g. erosion, sedimentation, and acid mine drainage).
- The most frequent watershed needs identified by the public include additional recreation space (i.e. parks, playgrounds, and public greenspace), fishing access, and paddling access. Recreation in the watershed is very popular and existing resources are heavily used.
- In descending order, the public identified the following types of recreation as important for the watershed: hiking/walking, fishing, canoeing/kayaking, birding, biking, photography, hunting, and running.
- The Woolly Hemlock Adelgid has now been identified in the watershed and is a major threat to the health of the forest and water quality.
- Increased coordination to protect, preserve, and improve the watershed was identified as a primary need by the steering committee, stakeholders, and at the public meeting.

Priority projects identified through this process are shown on Figure 12 (p. 50). Critical and High Priority Action Items are included in Table 15 (p. 52). Table 16 (p. 70) includes additional action items and Table 17 (p. 77) includes potential funding sources.

SECTION 1: INTRODUCTION

1.1 Overview



Buffalo Creek in Worthington. Photo: George Reese

The development of this *Watershed Conservation Plan Update* (Plan Update) for the Buffalo Creek Watershed is an initiative of Audubon Society of Western Pennsylvania (ASWP). ASWP facilitated the development of the initial *Buffalo Creek Watershed Plan Conservation Plan* in 2008 (2008 Plan).

The 2008 Plan was a comprehensive study identifying the significant natural, recreational and cultural resources within the watershed. It was prepared in accordance with the guidelines of the Pennsylvania Rivers Conservation Program and funded in part by a grant from the Pennsylvania Department of Conservation and Natural Resources (DCNR) – Community Conservation Partnership Program. As part of the planning process, issues, concerns and

threats to the watershed’s resources and values were determined through an extensive public coordination process. An Action Plan was then developed to promote methods to address those issues and conserve, restore, and enhance resources.

Since the issuance of the 2008 Plan, substantial changes have occurred within the watershed. Some of these changes include continued residential and commercial development, extensive Marcellus Shale extraction activities, increased demand for recreational resources, and new pressures on biological resources from invasive species and introduced pests and disease.

ASWP has recognized that these and other changing conditions warrant reconsideration of the watershed’s action plan. The periodic review of the Plan was a recommended element of the Action Plan. It noted that *“The utility and reach of the plan is highly dependent upon how well the plan serves the current and changing needs of the watershed. Incorporating new and recently completed projects, updating funding sources and programs, and immediately addressing new conservation issues that arise will allow the plan to serve as a living document.”*

As a result, ASWP determined to prepare this 10-year Plan Update utilizing an approach that focuses on the Action Plan component. Much of the data and background information contained within the 2008 Plan document remains valid and extensive reiteration of this information would not be warranted. Therefore, this Update provides an overview of significant changes that have occurred in the watershed (Section 2, p. 15), an overview of findings from the public input and data analysis processes (Section 3, p. 43), and an update of the Action Plan (Section 4, p. 51). This is not a “new” version of the complete document, but rather a streamlined, updated review examining a more limited number of achievable recommendations. It focuses on critical/high priority needs and clearly attainable goals, as well as those efforts for which funding sources are potentially available in the near-term.

Public participation remains a keystone in the development of the Action Plan, as it was with the 2008 Plan. The Plan Update incorporates the involvement of a steering committee, key stakeholder interviews, and a public meeting, and public comment period to solicit input from the community.

1.2 2008 Action Plan Summary

Foremost among the concerns raised during the 2008 public involvement process was the need to retain the rural character and natural landscapes that define quality of life in the watershed. Some of the challenges facing the watershed included water quality degradation from agricultural runoff and malfunctioning septic systems, limited public recreational access and opportunities, need for greenspace preservation, loss of agricultural land, invasive species, need for historic preservation, and a perceived lack of planning. Many stakeholders expressed frustration at a lack of information and coordination among municipalities, organizations, and interested individuals in the watershed.



Preserving the rural landscape and sense of community in the watershed was identified as a top priority in both the 2008 Plan and Plan Update. Photo: George Reese

The primary objectives for the 2008 Plan were developed around four primary themes identified through the planning process:

1. Retain the rural landscape and small-town sense of community that typifies the watershed and attracts people to the area.
2. Conserve and enhance the biological communities present in the watershed, with particular emphasis on the regionally significant forest associations, and reduce potential impact from exotic invasive species introductions.
3. Enhance the regionally significant recreational resources in the watershed in order to provide for increased quality of life for residents as well as to provide increased economic opportunities through tourism.
4. Create a sense of community stewardship. Encourage and enable residents to take active and proactive roles in issues that affect their quality of life.

A total of 81 separate action items were developed to address these themes and were grouped by resource category, including Overall Watershed Issues, Land Resources, Water Resources, Biological Resources, and Cultural Resources.

For each item, potential partners in implementing the recommendation were suggested, potential sources of funding were identified, and a priority level was recommended. Priorities were established recognizing that there are limited resources available, that some items must respond to timetables driven by outside forces, and that some items depend on the successful completion of others. The priorities identified range from critical (those requiring immediate action) to low (those that can be implemented when/ if resources are available).

Two Critical Priority action items were identified: formation of a Watershed Coalition and Japanese Knotweed Control efforts. The Watershed Coalition was a key need in that it was intended to lead or coordinate many of the other items included in the action plan. It was noted that Japanese Knotweed control was needed because this invasive species had already caused significant damage to the forest and riparian ecosystem in the lower watershed and was rapidly spreading upstream. Spread of this species up

the watershed could have potentially severe consequences to a number of other land, water, biological, and recreational resources.

Twenty-six High Priority Action Items were identified. These were actions that were recommended for initiation within three years and for which there was a perceived urgent need, available funding, and/or an interested sponsor.

It was noted that numerous initiatives and opportunities were being pursued by various interests, but there is no centralized source of information, coordination or advocacy for the watershed as a whole. The need for a Watershed Coalition to serve as a central coordinating entity became apparent during preparation of the action plan, and this was identified as a critical priority. Within the **Overall Watershed Issues** category, the high priority action items included:

- Develop a Watershed Website
- Produce an annual State of the Watershed Report
- Organize an annual Watershed Festival



Japanese Knotweed control was identified as a Critical priority item in the Original Plan and Plan Update.

It was envisioned that these efforts would be implemented by or otherwise coordinated by the Watershed Coalition.

During the public involvement process, residents indicated that the current rural and small town atmosphere is a very highly valued quality of the watershed. In fact, the rural character was often identified as a primary reason why people choose to live where they do. Rural character is most threatened by sprawl and the introduction of incompatible land uses, which are direct threats to quality of life enjoyed by residents. At the same time, residents enjoy and value highly their individual prerogatives to determine the best use for their property. High priority items in the **Land Resources** category focused on planning and preservation efforts. These included:

- Enact Zoning Ordinances
- Prepare Municipal Comprehensive Plans
- Incorporate Smart Growth Principles
- Develop Community Greenway Plans
- Develop a program to promote Forest Planning
- Promote Forest Conservation
- Encourage participation in Forest Stewardship Programs
- Promote Agricultural Security Areas
- Promote enrollment in Agricultural Conservation Easements

Planning efforts are generally the responsibility of individual municipalities or county planning departments. The promotion of participation in existing governmental conservation programs was envisioned to rely on partnerships among agencies, municipalities, and the Watershed Coalition.

Water Resource issues expressed during the public involvement process generally focused on potential threats from future development, including direct impacts to water quality as well as increased flooding from stormwater and inappropriate development in floodplains. The three high priority water resources issues included:

- Preparation of a Butler County Watershed assessment
- Promote collaboration to protect Riparian Buffers
- Implement a long-term Monitoring Program

The watershed assessment was anticipated to be an effort of the County Conservation District, and the other items were envisioned as collaborative efforts among the Watershed Coalition, other non-profit and community organizations, the conservation districts, and PA DEP.

Action plan items pertaining to **Biological Resources** largely focus on the maintenance and enhancement of the existing, regionally significant ecological communities. Foremost among these are the extensive forest communities associated with the Buffalo Creek valley and its major tributaries. Six high priority issues were identified including:

- Complete the Armstrong County Natural Heritage Inventory
- Develop a Diversity Area Stewardship Program for Biodiversity Areas identified in the county Natural Heritage Inventories
- Incorporate Natural Heritage Inventory data in municipal planning
- Develop and implement a Massasauga Habitat conservation program
- Implement efforts to control Hemlock Woolly Adelgid
- Support efforts to reduce Deer Populations

These items were envisioned as collaborative efforts among the Watershed Coalition, other non-profit and community organizations, municipal and county government, conservation districts, landowners, and other state agencies.

The **Cultural Resources** category includes issues pertaining to recreational and historic resources. During the public involvement process, considerable desire was expressed for additional and expanded outdoor recreational opportunities in the watershed. Public facilities are generally lacking in most areas of the watershed. Activities that are enjoyed by thousands, such as fishing, rely on the generosity of landowners to allow public access to their properties. Additional support can be offered to landowners to help maintain this access, and to increase access opportunities throughout the watershed. It became apparent during the public involvement process that a number of groups are working very hard to provide recreational activities. Further cooperation and coordination among groups would likely lead to increased success in mobilizing volunteer efforts and in obtaining funding.



A section of Buffalo Creek is designated by PAFB as some of the state's Best Fishing Waters. Photo: George Reese

Five high priority issues were identified:

- Prepare and implement Community Parks/ Recreation Planning
- Provide recreational access and opportunities on Buffalo Creek
- Provide recreational access and opportunities on Little Buffalo Creek
- Complete the Butler – Freeport Trail and provide needed amenities
- Prepare municipal Greenway and Recreation Plans

As with the Biological Resources efforts, these items were envisioned variously as collaborative efforts among the Watershed Coalition, other non-profit and community organizations, municipal and county government, conservation districts, landowners, and other state agencies.

As was noted in the 2008 Plan, the implementation of any of these themes must be consistent with landowner preferences and private property rights. Approximately 99 percent of the watershed is in private ownership. Therefore, nearly all initiatives will depend on private landowners for success. Initiatives need to be consistent with private property rights and landowner preferences, and landowners must be part of any planning process.

1.3 Action Plan Status

A number of items that were identified in or supported by the elements of the Plan have been implemented. These include high-level regulatory changes and planning efforts, as well as local implementation of specific projects. Among these are:

General

- Armstrong Conservation District Mobile Environmental Display (2017)
- ASWP partnership with Freeport Area School District as part of Citizen Science on the Schoolground initiative (2017-current)
- ASWP environmental education activities including weekly naturalist-led walks at Todd Nature Reserve and workshops at Todd Nature Store and Buffalo Creek Nature Center site

Land Resources

- Butler County Comprehensive Plan Update (2017)
- Butler County Subdivision and Land Development Ordinance (2012)
- Armstrong County Subdivision and Land Development Ordinance (2016)
- Armstrong County Municipal Solid Waste Management Plan (2016)
- Butler County Office of Farmland Preservation established
- Implementation of Resource Enhancement and Protection (REAP) Program to provide tax credits for agricultural Best Management Practices (BMPs)
- PA Cleanways Illegal Dump Survey Final Report Armstrong County (2009)



Armstrong and Butler County Conservation Districts work with farmers in the watershed to implement BMPs to support water quality, soil health, and farm productivity.

- ASWP conservation easement on 134 acres of farmland in Buffalo Creek
- Armstrong Conservation District/Trout Unlimited water quality monitoring program implemented on Patterson Run.
- Armstrong Conservation District development of nutrient management plans and installation of agricultural BMPs in partnership with farmers in Patterson Run.
- Armstrong County Agricultural Land Preservation – 1 farm preserved in 2010 and 2 additional farms in progress (2019).
- Butler County Conservation District installation of agricultural BMPs in Buffalo Creek and Little Buffalo Creek.
- Butler County Conservation District storm drain stenciling in Little Buffalo Creek.
- Dirt, Gravel, and Low Volume Road projects in Cornplanter and Rough Runs.

Water Resources

- Butler County Act 167 Countywide Stormwater Management Plan Phase I (2008)
- Butler County Act 167 Countywide Stormwater Management Plan Phase II (2010)
- Armstrong County Act 167 Countywide Stormwater Management Plan Phase I (2017)
- Pa Code Title 25, Chapter 91 updated (2011) to require all farms to have Manure Management Plans (2011)
- Pa Code Title 25, Chapter 102 updated (2011) to requires all farms to implement a written Agricultural and Erosion and Sediment Control Plan
- Water quality sampling of lower Buffalo Creek by Duquesne University as part of 3 Rivers Quest program (2013 – 2014)
- Dirt, Gravel, and Low Volume Roads programs continue to receive strong support from Conservation Districts and Trout Unlimited.

Biological Resources

- Armstrong County Natural Heritage Inventory completed (2010)
- Butler County Natural Heritage Inventory Update (2011)
- Todd Nature Reserve Complex Management Plan completed (2019)
- ASWP Van Tine slopes sensitive habitat (36 acres) acquisition (2017)
- Completion of unassessed waters surveys for 12 streams by Duquesne University for PAFB (2013)
- Buffalo Creek Valley Important Bird Area Comprehensive Vision planning document (2017).



ASWP acquired the Van Tine tract, 36 acres of high ecological value forested slopes, in 2017.

Cultural/Recreational Resources

- Armstrong County Comprehensive Park, Open Space and Greenway Plan (2009)
- Clinton and Buffalo Townships Greenway Plan for Southeast Butler County (2010)
- Butler-Freeport Trail completed (2011)
- Buffalo Creek Nature Center (and Little Buffalo Creek access) planning and acquisition (current)
- Buffalo Township planning and acquisition of Shuster Property (and Buffalo Creek access) (current)

- Winfield Township Community Park (2009)
- Chicora Community Park (2010)
- Emergency stream bank repairs (1/2 mile) along Butler-Freeport Trail from Bear Creek Road south

One notable historic resource was lost during his timeframe. The 2008 Plan included a recommendation for preservation of the Beatty Mill Bridge. It was demolished in 2010.

Initial steps were taken towards creating a Watershed Coalition in 2007-2010. Those efforts were eventually diminished due to lack of funding. In early 2019, ASWP submitted a grant application to **DCNR's C2P2 Partnerships** program to support the creation of a watershed coalition and related activities. Award announcements are expected in late 2019. The funding request included action items from the 2008 Plan as well as the Update to help serve as the foundation for increased stewardship and coordination among partner organizations. The proposed activities for which funding was requested included:

Watershed Coalition

- Creation of coalition, including 3 convening events
- Website, including information about watershed, technical resources for property owners, “who to call when...” resources, etc.

Public Awareness / Education

- 2 watershed festivals (Year 1 in Butler Co. and Year 2 in Armstrong Co.)
- Development of pocket naturalist guide about watershed & IBA; distribution to municipalities and partner organizations
- Stream crossing signage at 8 locations

Landowner Education

- 3 landowner workshops – Focused on riparian and forest landowners as well as stewarding wildlife in the watershed/IBA
- Series of 6 educational events throughout the watershed at locations such as libraries, community centers, etc.

The obtaining of this funding would provide the critical financial resources needed to implement the highest priority recommendations of both the 2008 Plan and this Plan Update. ASWP is continuing to pursue other potential funding sources and partnership opportunities to facilitate the establishment of the Watershed Coalition.



*The Butler-Freeport Trail, completed in 2011, has 100,000 – 150,000 visitors annually.
Photo: George Reese*

SECTION 2: PROJECT AREA OVERVIEW

The following provides a brief overview of the watershed and significant changes since the 2008 Plan. For more detailed watershed information, please see the 2008 Plan, which is available at www.aswp.org.

2.1 Watershed Description

Buffalo Creek is the largest tributary on the west side of the Allegheny River between Franklin (French Creek) and the Ohio. The watershed drains 171 square miles of eastern Butler, western Armstrong, and a very small portion of northern Allegheny Counties in western Pennsylvania. From its headwaters in Fairview Township, Butler County, the stream flows 34.4 miles to the Allegheny River at Freeport, Armstrong County (Figure 2). Twenty-one municipalities across three counties are wholly or partially located within the watershed.

The watershed is typified by rolling uplands dissected by deeply entrenched valleys (Figure 3, p. 17). The largest and deepest of these valleys, created by the lower reaches of Buffalo and Little Buffalo Creeks, form gorges with precipitous slopes and sandstone cliffs. The watershed has a total relief of nearly 800 feet, with elevations ranging from approximately 1,525 feet in Sugarcreek Township to 745 feet at Freeport.

2.2 Demographic Profile

Of the 21 municipalities partially or wholly in the watershed, 17 are townships and 4 are boroughs. The most recent census data is 9 years old. Given the recent residential development in portions of the watershed such as Buffalo Township, the population data is likely not accurate. Estimated 2010 population within the watershed is 24,157 people. Estimated 2000 population within the watershed was 24,174, representing a decrease in watershed population of 17 people. Additional population details are provided in Table 1 on page 18.

Butler, Armstrong, and Allegheny County population densities are 233, 106, and 1,676 people per square mile, respectively. The average population density for the 10-county region is 366 people. Municipal Median Household Income (MHI), adjusted for 2017, ranges from \$42,500 in Saxonburg Borough to \$82,500 in Clinton Township. The MHI for the 10-county region is \$73,425 and \$56,951 for Pennsylvania. Detailed MHI and employment by sector information is included in Table 2 on page 19. Sectors employing the largest percentages of residents within watershed municipalities include Management, Business, Science, and Arts (29.8%) and Sales and Office (21.4%). The sector employing the lowest percentage of residents within watershed municipalities is Farming, Fishing, and Forestry (0.2%).

Figure 2: Buffalo Creek Watershed

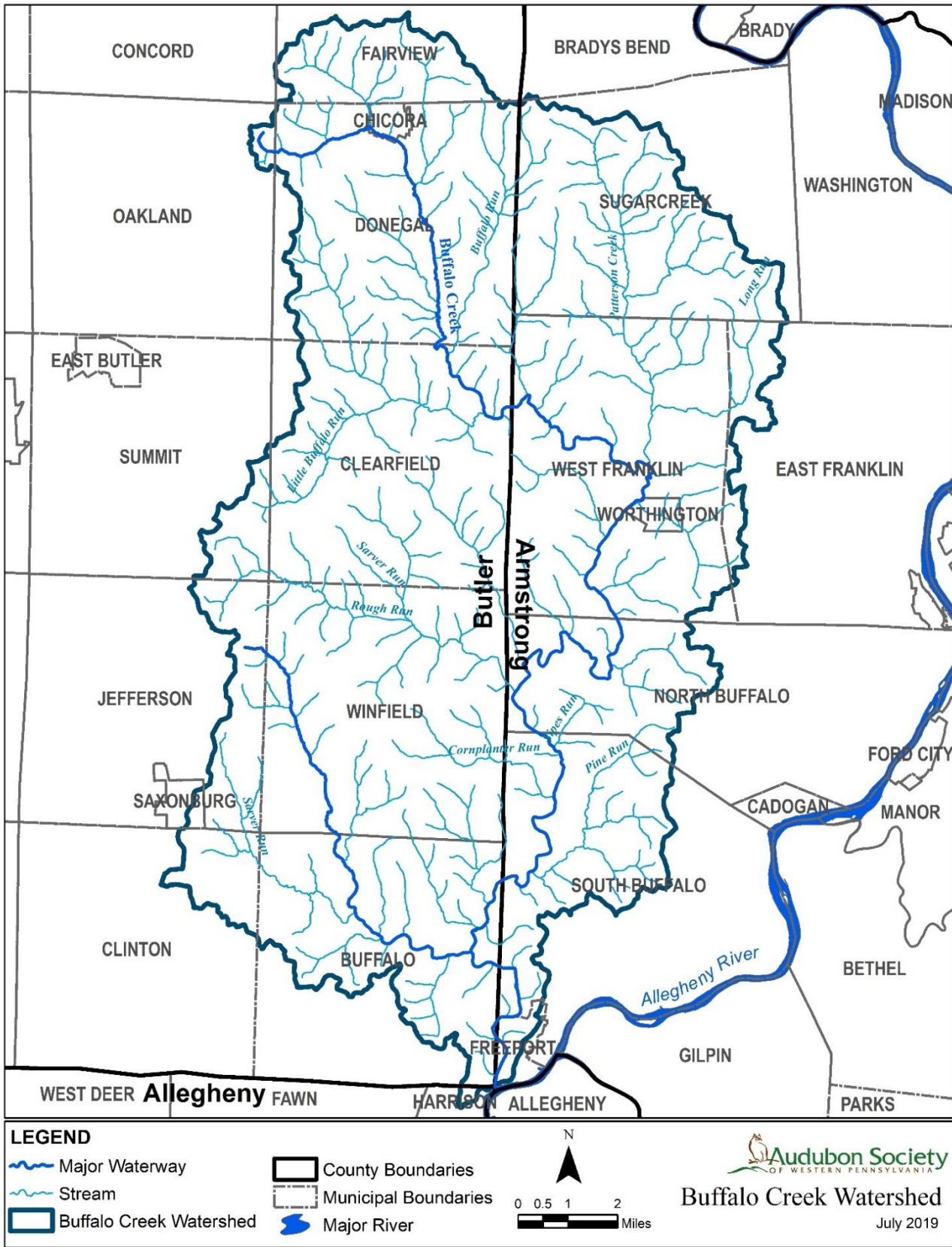


Figure 3: Buffalo Creek Watershed Topography

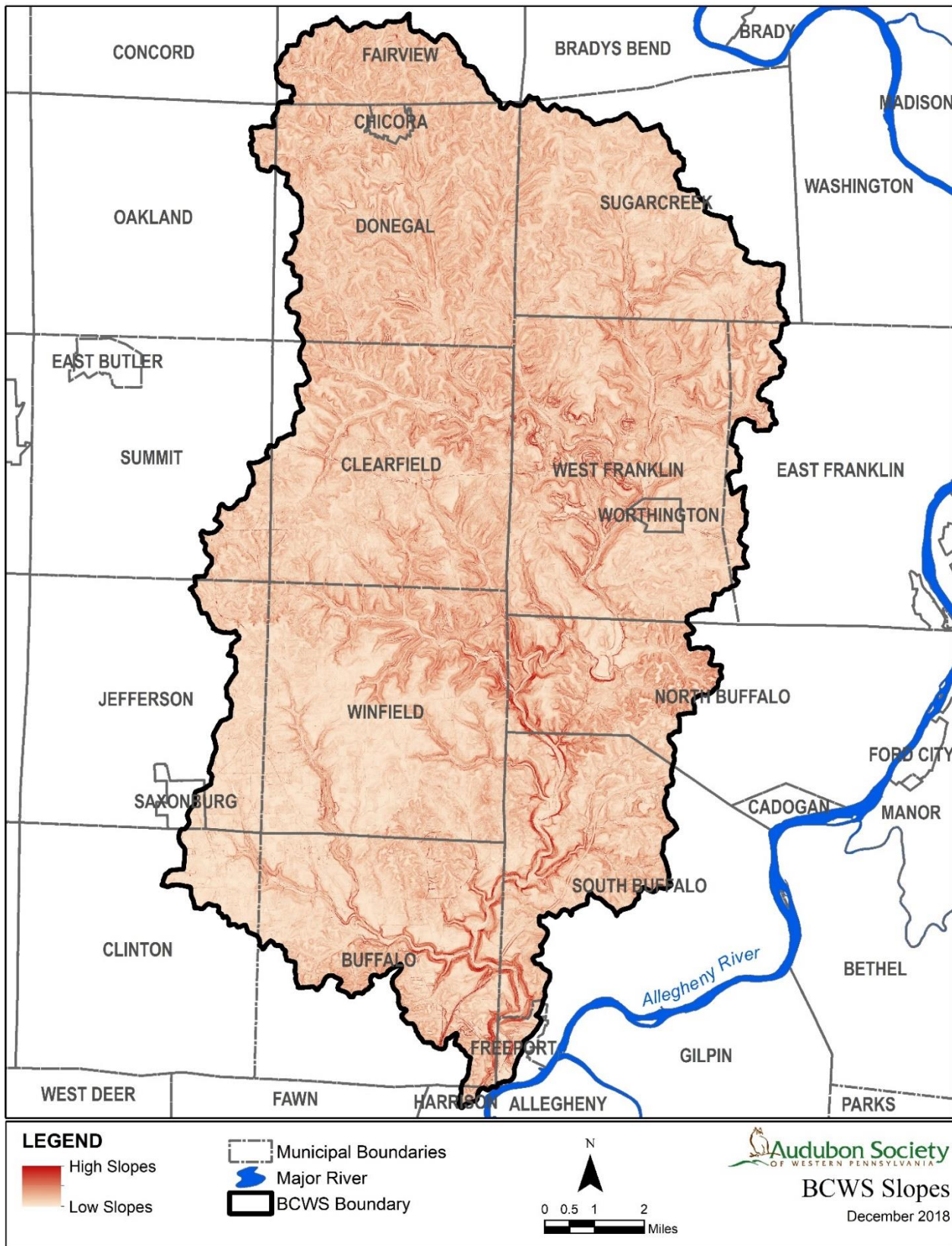


Table 1: Municipal Demographic Summary

Municipality	Area (Miles²)	% of Muni in Watershed	2000 Population (Entire Muni)	Estimated 2000 Population within Watershed*	2010 Population (Entire Muni)	Estimated 2010 Population within Watershed*	Change 2000 - 2010 Watershed Population
Allegheny County							
Harrison Twp	7.8	1.7%	10,934	188	10,461	180	-8
Armstrong County							
Brady's Bend Twp	13.1	0.1%	939	1	773	1	0
East Franklin Twp	31.6	8.6%	3,900	334	4,082	349	16
Freeport Boro	0.9	60.5%	1,962	1,186	1,813	1096	-90
North Buffalo Twp	25.5	36.3%	2,942	1,067	3,011	1092	25
South Buffalo Twp	28.2	46.3%	2,785	1,291	2,636	1222	-69
Sugarcreek Twp	26.5	63.6%	1,557	991	1,539	980	-11
West Franklin Twp	26.0	98.3%	1,935	1,903	1,853	1822	-81
Worthington Boro	0.6	100%	778	778	639	639	-139
Butler County							
Buffalo Twp	24.3	68.7%	6,827	4,690	7,307	5020	330
Chicora Boro	0.6	100%	1,021	1,021	1,043	1043	22
Clearfield Twp	23.5	95.3%	2,705	2,578	2,645	2521	-57
Clinton Twp	23.8	11.5%	2,779	318	2,864	328	10
Concord Twp	24.8	0.01%	1,493	0	1,505	0	0
Donegal Twp	23.0	93.6%	1,722	1,612	1,864	1745	133
Fairview Twp	24.2	23.6%	2,061	487	2,080	491	4
Jefferson Twp	23.3	21.3%	5,690	1,215	5,504	1175	-40
Oakland Twp	23.4	1.7%	3,074	53	2,987	51	-1
Saxonburg Boro	0.9	24.7%	1,629	402	1,525	377	-26
Summit Twp	22.3	10.1%	4,728	477	4,884	493	16
Winfield Twp	24.5	100%	3,585	3,584	3,535	3534	-50
Total			65,046	24,174	64,550	24,157	-17

Source: SPC Municipal Profiles, based on 2010 Census Summary File 1 released June 2011 and 2008 Plan.

*Estimated population = % of municipality in watershed x municipal population

Table 2: Employment by Sector and Median Household Income

Municipality	% Employed by Occupation Sector							Median Household Income
	Employed Pop. 16 & older	Mgmt., business, science, and arts	Service	Sales & office	Farming, fishing, and forestry	Construction, extraction, installation, maint., & repair	Production, transportation, and material moving	
Allegheny County								
Harrison Twp	5,014	35.2%	19.1%	23.1%	0%	5.9%	16.8%	\$53,159
Armstrong County								
Brady's Bend Twp	363	17.4%	28.4%	20.7%	0%	16.0%	17.6%	\$50,625
East Franklin Twp	1,626	46.6%	12.4%	17.4%	0%	12.1%	11.6%	\$62,845
Freeport Boro	892	24.3%	16.7%	28.4%	0%	9.1%	21.5%	\$44,038
North Buffalo Twp	1,266	47.3%	10.9%	18.9%	0%	11.8%	11.1%	\$51,875
South Buffalo Twp	1,393	26.1%	16.2%	25.9%	0%	15.9%	15.9%	\$74,375
Sugarcreek Twp	490	19.4%	16.7%	14.9%	0.6%	20.6%	27.8%	\$43,250
West Franklin Twp	829	29.6%	11.1%	22.9%	1.9%	13.4%	21.1%	\$58,688
Worthington Boro	333	22.8%	26.4%	27.0%	0%	10.2%	13.5%	\$44,676
Butler County								
Buffalo Twp	4,056	39.3%	13.0%	28.3%	0%	9.1%	10.2%	\$80,827
Chicora Boro	423	22.2%	18.7%	30.3%	0%	7.8%	21.0%	\$50,221
Clearfield Twp	1,252	19.2%	23.2%	17.7%	0.9%	18.3%	20.8%	\$52,813
Clinton Twp	1,449	38.9%	15.2%	16.3%	0.3%	10.9%	18.5%	\$82,500
Concord Twp	579	21.6%	19.5%	19.9%	0%	12.3%	26.8%	\$49,375
Donegal Twp	917	29.8%	19.0%	19.6%	0%	11.8%	19.8%	\$64,038
Fairview Twp	978	25.9%	18.0%	20.1%	0%	11.6%	23.9%	\$68,750
Jefferson Twp	2,401	32.5%	19.8%	20.4%	0%	11.9%	15.4%	\$65,367
Oakland Twp	1,519	24.6%	16.5%	21.6%	0.2%	11.5%	25.7%	\$71,902
Saxonburg Boro	629	48.3%	15.6%	16.1%	0%	8.4%	11.6%	\$42,500
Summit Twp	2,152	28.8%	19.2%	22.5%	0%	7.8%	21.7%	\$52,377
Winfield Twp	1,665	27.1%	21.7%	17.4%	1.1%	11.2%	21.4%	\$48,929

Source: SPC Municipal Profiles, based on 2013-2017 American Community Survey 5-year estimates released December 2018

2.3 Land Use and Planning

Land use and land use change in the watershed was analyzed using available data from the Southwestern Pennsylvania Commission (SPC) for 2010, 2006, and 2000 and the U.S Geological Survey for 1992. Given post-2010 residential development in portions of the watershed, many land use changes have occurred that are not captured in the latest available land use data.

Detailed land use data for all years examined is included in Table 3. The most recent land use data (2010) indicates that forest, agriculture, and urban / built up are the dominant watershed land uses at 48.5%, 30.8%, and 14.6%, respectively. 2006 - 2010 land use was relatively stable and is therefore not discussed in detail. From 2000 - 2010, agriculture decreased by 0.6 miles² and forest decreased by 3.2 miles² while urban / built up areas increased by 2 miles². From 1992 - 2010, agriculture decreased by 5.9 miles² and forest decreased by 24.7 miles² while urban / built up areas increased by 21.9 miles². The loss of forests and agriculture to development significantly affects water quality, stormwater, flooding, and habitat as well as the character of the watershed. Figure 4 (p. 21) shows 2010 land use in the watershed.

Table 3: Watershed Land Use Statistics

Land Use	1992		2000		2006		2010	
	Miles ²	% of watershed	Miles ²	% of watershed	Miles ²	% of watershed	Miles ²	% of watershed
Agricultural	58.4	34.21%	53.1	31.13%	52.5	30.74%	52.5	30.77%
Barren Land	1.6	0.94%	1.8	1.06%	1.8	1.07%	1.1	0.63%
Forest	107.5	63.01%	86.1	50.42%	84.9	49.73%	82.8	48.53%
Rangeland		0%	6.1	3.55%	6.2	3.64%	6.5	3.83%
Urban Built-Up	3.0	1.78%	22.9	13.43%	24.6	14.40%	24.9	14.62%
Water	0	0.01%	0.7	0.41%	0.7	0.43%	2.8	1.63%

Data Sources: USGS (1992) and SPC (2000, 2006, and 2010)

Land use in Pennsylvania is primarily controlled through local zoning ordinances. Overall direction is often provided through comprehensive plans that identify county or municipal policies and identify conceptual land use plans. Local subdivision ordinances are used to control and direct development activities and construction methods. Under the Municipalities and Planning Code (MPC), all counties in Pennsylvania are required to develop and adopt a comprehensive plan every 10 years. A detailed list of the presence of County- and Municipal-level Comprehensive Plans, Zoning, and Subdivision Ordinances is available in the 2008 Buffalo Creek Watershed Conservation Plan in Table 1-5. Significant changes since the original plan include:

- Completion of Allegheny County’s comprehensive plan in 2008 and development of a subdivision ordinance.
- Harrison Township developed a new comprehensive plan in 2009.
- Butler County developed a new comprehensive plan in 2017.
- Clinton Township, in partnership with Buffalo Township, updated their comprehensive plan in 2017.

2.3.1 Resource Extraction

Mining and mineral extraction have historically been significant in the economic development of the watershed. Available resource extraction information is shown in Figure 5 (p. 22). Oil fields in the northern portion of the watershed were developed as part of the world’s first oil boom in the 1870s. Coal, limestone, sandstone, and clay have been and continue to be extracted at various locations throughout the watershed. The Abandoned Mine Land Inventory indicates that at least 10 miles² of the watershed have been mined for coal. Of that area, 0.52 miles² is shown as active near Freeport and 0.5 miles² is shown as reclaimed in Clinton and Buffalo Townships.

Figure 4: 2010 Land Use

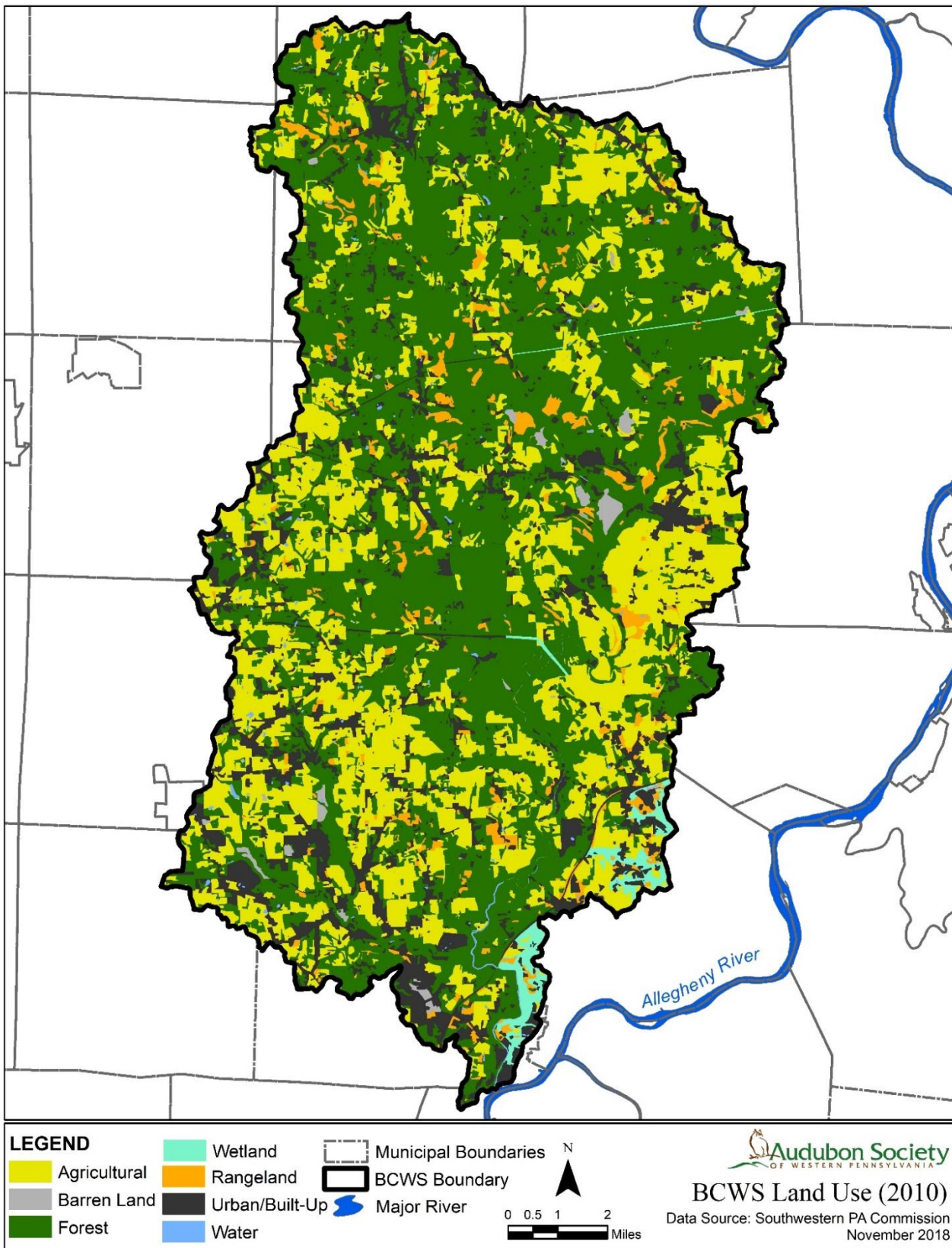
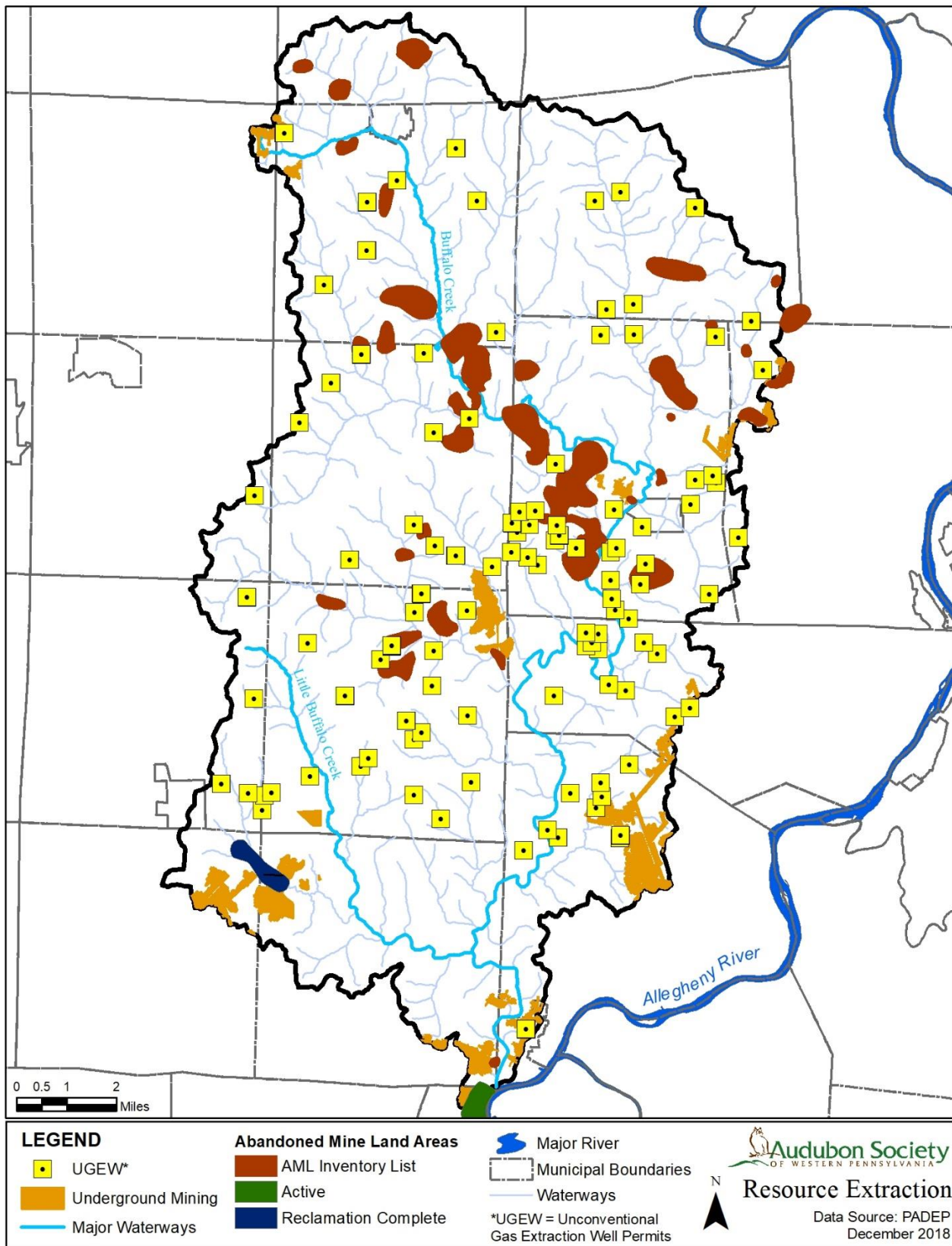


Figure 5: Resource Extraction



Since 2008, there has been extensive development of the Marcellus Shale industry in the region, including in the Buffalo Creek Watershed. Unconventional methods are utilized to extract the Marcellus shale gas; this requires drilling thousands of feet vertically and horizontally, then utilizing hydraulic fracturing to release the gas. PA DEP regulates the various activities associated with Marcellus Shale extraction, including well drilling, earth disturbance, water usage, and wastewater disposal. There are currently 229 permitted Marcellus Shale wells in the watershed (Figure 5, p. 22). It is estimated that there were 0 at the completion of the 2008 Plan.

2.4 Water Resources

Buffalo Creek is the largest tributary on the west side of the Allegheny River between French Creek and the Ohio River. Located within the Ohio River Basin, and considered to be a part of the Lower Allegheny River Subbasin. Buffalo Creek is one of the only free-flowing major Allegheny tributaries. There are 348.7 miles of streams in the watershed. Buffalo Creek is unique among the major tributaries in this area in that it has maintained relatively good water quality through the rise and decline of industry in western Pennsylvania. However, water quality is trending downward in the watershed; between 2008 - 2019, an additional 37.7 miles of stream have become impaired, resulting in 37% of the stream miles in the watershed not meeting water quality requirements.



Sedimentation from causes such as development and loss of riparian buffers has had a negative impact on water quality. Photo: Patrick Shirey

As shown in Figure 6 (p. 24), a majority of the streams in the Buffalo Creek Watershed are designated as High-Quality Coldwater Fisheries (HQ-CWF) and High-Quality Trout Stocking Fisheries (HQ-TSF). Of the watershed's 348.7 miles of streams, 93.7 miles are HQ-CWF and 250.7 miles are HQ-TSF. The remaining 9.4 miles are TSF. HQ streams are defined as "surface waters having quality which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying Title 25 Chapter 93.4b(a)." Along with Exceptional Value (EV) streams, HQ streams are subject to higher levels of protection than other surface waters. CWF are defined as streams that support "maintenance and propagation, or both, of fish species including the family Salmonidae and additional flora and fauna which are indigenous to cold water habitat."

The original plan focused on 7 major subwatersheds for planning and descriptive purposes. To further refine the data and associated action plan, this plan update focuses on 13 subwatersheds as defined by the Pennsylvania Gazetteer of Streams developed by the Water Resources Division of the U.S. Geological Survey. These subwatersheds and their relationship to the original 7 major subwatersheds is depicted on Figure 7 (p. 25). An overview of the 13 subwatersheds is provided in Table 4 (p. 26) and 2010 land use by subwatershed is included in Table 5 (p. 27).

Figure 6: Designated Uses

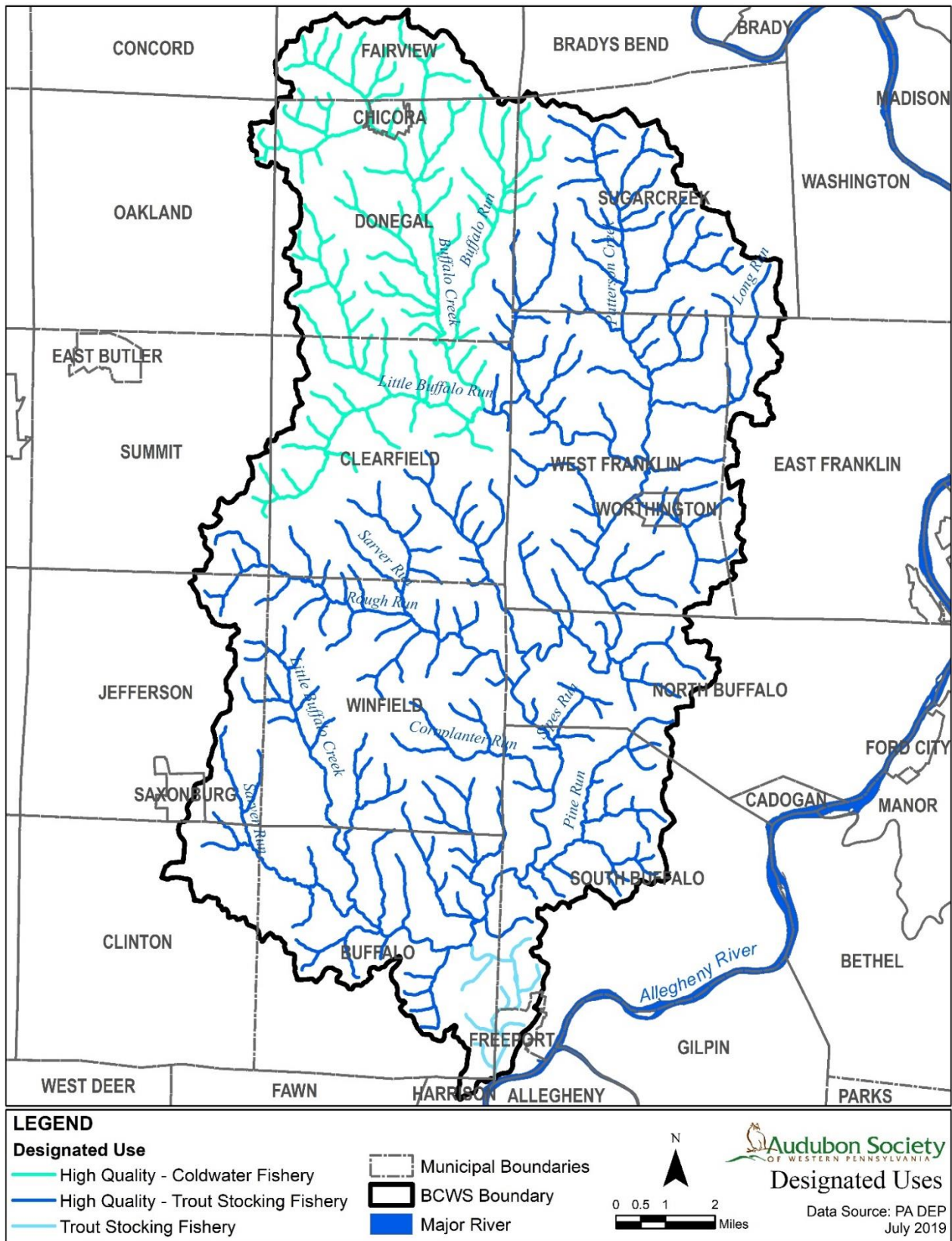


Figure 7: Subwatersheds (Plan Update) and Major Subwatersheds (Original Plan)

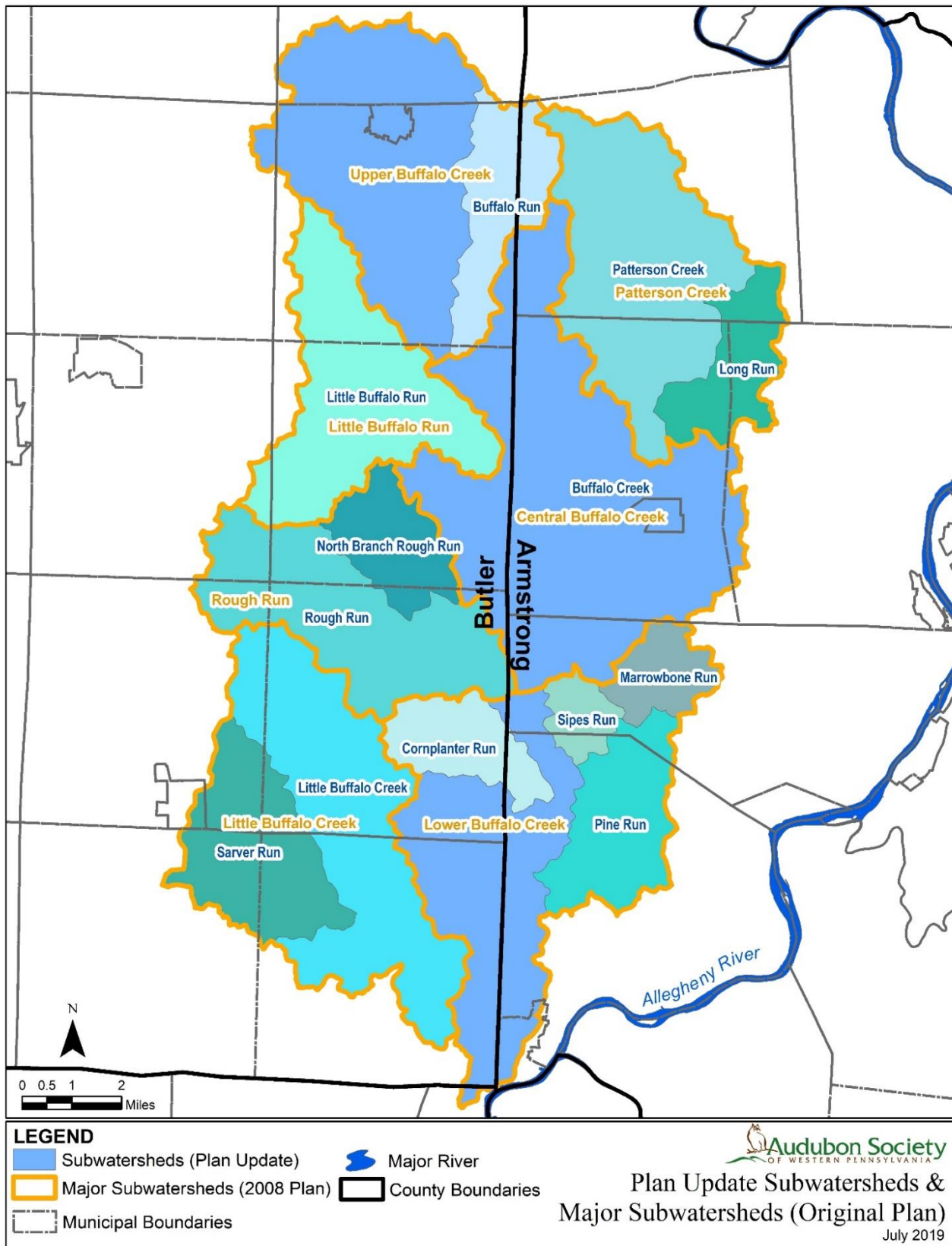


Table 4: Overview of Subwatersheds

Sub-Watershed	Area (Miles ²)	Miles of Stream	County (ies)	Municipalities	Populated Places
Buffalo Creek	66.8	147.5	Allegheny, Armstrong, Butler	Buffalo, Chicora, Clearfield, Concord, Donegal, East Franklin, Fairview, Freeport, Harrison, North Buffalo, Oakland, South Buffalo, Sugarcreek, West Franklin, Winfield, Worthington	Boggsville, Bricker Crossroads, Buffalo Mills, Chicora, Craigsville, Freeport, Harbison, Kepples, Kepples Corners, Laneville, Leasureville, Millerstown, Nichola, Schuster Heights, Shadyside Village, Winfield Junction, Worthington
Buffalo Run	6.3	14.1	Armstrong, Butler	Brady's Bend, Clearfield, Donegal, Fairview, Sugarcreek	Rattigan
Cornplanter Run	4.6	8.4	Armstrong, Butler	North Buffalo, South Buffalo, Winfield	Dennys Mills
Little Buffalo Creek	17.4	32.9	Butler	Buffalo, Jefferson, Winfield	Cabot, Ekastown, Hannahstown, Marwood, Monroe, Sandy Lick, Sarver, Silverville
Little Buffalo Run	14.5	30.7	Butler	Clearfield, Donegal, Summit	Coyleville, Fenelton
Long Run	5.1	7.3	Armstrong	East Franklin, Sugarcreek, West Franklin	Laird Crossing
Marrowbone Run	3.1	5.5	Armstrong	North Buffalo, West Franklin	n/a
North Branch Rough Run	4.7	8.3	Butler	Clearfield, Winfield	n/a
Patterson Creek	16.7	37.8	Armstrong	Sugarcreek, West Franklin	Adams, Browns Crossroads, Fosters Mills, Frogtown
Pine Run	7.2	15.7	Armstrong	North Buffalo, South Buffalo	Great Belt, West Winfield
Rough Run	13.3	25.7	Armstrong, Butler	Clearfield, Jefferson, North Buffalo, Summit, Winfield	n/a
Sarver Run	9.0	11.2	Butler	Buffalo, Clinton, Jefferson, Saxonburg, Winfield	Clinton, Coal Hollow, Lernerville, Mineral Spring, Sarversville, Saxonburg
Sipes Run	1.9	3.6	Armstrong	North Buffalo, South Buffalo	n/a

Table 5, Part 1: Subwatershed Land Use Statistics

Sub-Watershed	Agriculture		Barren Land		Forest		Rangeland	
	Area (Miles ²)	% of watershed	Area (Miles ²)	% of watershed	Area (Miles ²)	% of watershed	Area (Miles ²)	% of watershed
Buffalo Creek	18.4	27.5%	0.6	0.9%	34.5	51.6%	3.4	5.1%
Buffalo Run	1.2	19.7%	0	0	4.2	66.9%	0.2	3.2%
Cornplanter Run	1.9	41.9%	0	0	2.1	46.2%	0.1	1.5%
Little Buffalo Creek	7.1	41.0%	0.2	1.2%	4.9	28.2%	0.3	1.9%
Little Buffalo Run	3.9	26.8%	0	0.1%	8.3	56.9%	0.4	2.8%
Long Run	1.0	19.3%	0	0.5%	3.3	64.5%	0.4	8.6%
Marrowbone Run	1.3	41.4%	0	0	1.5	47.6%	0.1	4.7%
N. Branch Rough Run	1.2	24.9%	0	0	2.7	57.3%	0.2	4.4%
Patterson Creek	5.1	30.4%	0.1	0.4%	9.9	59.5%	0.4	2.3%
Pine Run	2.9	39.6%	0	0.2%	1.1	14.8%	0.6	8.0%
Rough Run	3.9	29.4%	0	0.2%	7.0	52.6%	0.3	2.4%
Sarver Run	3.6	39.7%	0.1	1.5%	2.6	29.1%	0	0.5%
Sipes Run	1.1	55.2%	0	0.3%	0.8	38.7%	0	1.6%
Entire Watershed	52.5	30.8%	1.1	0.6%	82.8	48.5%	6.5	3.8%

Data Source: SPC 2010 Land Use



Forest is the dominant land use in the watershed, covering 82.5 miles², or 48.5% of the watershed. From 1992 -2010, 24.7 miles² of forest was replaced primarily by urban / build up land use. Photo: George Reese

Table 5, Part 2: Subwatershed Land Use Statistics

Sub-Watershed	Urban / Built Up		Water		Wetland	
	Area (Miles ²)	% of watershed	Area (Miles ²)	% of watershed	Area (Miles ²)	% of watershed
Buffalo Creek	8.4	12.6%	0.4	0.6%	1.1	1.6%
Buffalo Run	0.6	10.0%	0	0.2%	0.0	0%
Complanter Run	0.5	10.4%	0	0.0%	0	0%
Little Buffalo Creek	4.8	27.4%	0	0.3%	0	0%
Little Buffalo Run	1.9	13.2%	0	0.3%	0	0%
Long Run	0.3	6.5%	0	0.2%	0.0	0.4%
Marrowbone Run	0.2	6.3%	0	0.0%	0	0%
N. Branch Rough Run	0.6	13.3%	0	0.1%	0	0%
Patterson Creek	1.1	6.9%	0	0.3%	0.1	0.3%
Pine Run	1.8	24.6%	0	0.3%	0.9	12.5%
Rough Run	2.0	15.2%	0	0.3%	0	0%
Sarver Run	2.6	28.4%	0.1	0.7%	0	0%
Sipes Run	0.1	4.0%	0	0.2%	0	0%
Entire Watershed	24.9	14.6%	0.7	0.4%	2.1	1.2%

Data Source: SPC 2010 Land Use



Agriculture is the second most dominant land use in the watershed, covering 52.5 miles², or 30.8% of the watershed. From 1992 -2010, 5.9 miles² of agricultural land was lost.

Photo: George Reese

The Buffalo Creek subwatershed (66.8 miles²) is the largest of all of the subwatersheds, followed by Little Buffalo Creek (17.4 miles²) and Patterson Creek (16.7 miles²). Sipes Run watershed (1.9 miles²) is the smallest of the subwatersheds, followed by Marrowbone Run (3.1 miles²) and Cornplanter Run (4.6 miles²). The following land use statistics are based on SPC's 2010 land use data. The subwatersheds with the highest percentage of urban / built up areas include Sarver Run (28.4%), Little Buffalo Creek (27.4%), Pine Run (24.6%), and Rough Run (15.2%). The least developed watersheds include Sipes Run (4%), Marrowbone Run (6.3%), Long Run (6.5%), and Patterson Creek (6.9%). Agriculture is prevalent throughout the entire watershed; in 2010, this land use accounted for 40% or greater of 6 of the watersheds (Cornplanter Run, Little Buffalo Creek, Marrowbone Run, Pine Run, Sarver Run, and Sipes Run). Forest accounts for 40% or more of 9 of the watersheds; the 4 that have less than 40% forest are Pine Run (14.8%), Little Buffalo Run (28.2%), Sarver Run (29.1%), and Sipes Run (38.7%).

2.4.1 Impaired Waterways

A stream is considered *impaired* if it fails to meet one or more water quality standards. As part of the Federal Clean Water Act, states are required to determine what water bodies are impaired. Examining data for impaired waters is a useful way to understand what portions of a watershed are most impacted by pollution and what the primary causes of pollution are. Impaired Waterways data from the Pennsylvania Department of Environmental Protection (PA DEP) was analyzed from 2019 and compared to 2008 data. Below is a discussion of the findings; more detailed information is provided in Table 6. In order to streamline the data and discussion, impairment sources have been grouped (e.g. *Abandoned Mine Drainage - Metals* and *Abandoned Mine Drainage - Siltation* have been grouped together as *Abandoned Mine Drainage*).

Table 6: Impaired Waterways by Subwatershed, 2008 - 2019

Sub-Watershed	Miles of Streams	2008 Impaired	2008 % impaired	2019 Impaired Miles	2019 % impaired	Increased Miles of Impairment 2008 to 2019	Change in % 2008 to 2019
Buffalo Creek	147.5	43.8	29.7%	64.2	43.5%	20.4	13.9%
Buffalo Run	14.1	1.5	10.6%	1.5	10.6%	0	0%
Cornplanter Run	8.4	0.0	0%	0.0	0%	0	0%
Little Buffalo Creek	32.9	19.5	59.5%	21.3	64.8%	1.8	5.3%
Little Buffalo Run	30.7	2.2	7.2%	10.0	32.7%	7.8	25.5%
Long Run	7.3	0.0	0%	0.0	0%	0	0%
Marrowbone Run	5.5	2.9	52.5%	2.9	52.5%	0	0%
North Branch Rough Run	8.3	0.0	0%	0.0	0%	0	0%
Patterson Creek	37.8	5.5	14.6%	5.6	14.9%	0.1	0.2%
Pine Run	15.7	14.5	92.3%	14.5	92.3%	0	0%
Rough Run	25.7	2.7	10.7%	4.5	17.5%	1.8	6.9%
Sarver Run	11.2	0.0	0%	5.9	52.2%	5.9	52.2%
Sipes Run	3.6	1.0	29.2%	1.0	29.2%	0	0%
Entire Watershed	348.7	93.7	26.9%	131.4	37.7%	37.7	10.8%

Data source: PA DEP Non-Attaining Waterways Data, 2019

2019 data indicates that over 37% of the watershed’s stream miles are impaired. In 2008, that value was 26.5%. Since the original plan was drafted, an additional 37.7 miles of streams have failed to meet water quality standards. The sources and causes of impairment is unknown for nearly all (34.6 miles) of the additionally impaired stream segments. The “source unknown – cause unknown” impairment category accounts for the most stream miles. Additional sources that contribute to the most significant lengths of impairment include agriculture (27.1 miles), on-site wastewater (21.2 miles), natural sources (18.6 miles), acid mine drainage (16.8 miles), and urban runoff/storm sewers (8.1 miles). 2019 impairment details are included in Table 7.

Table 7: Buffalo Creek Impairment Statistics (2019)

Impairment Source	Impaired Miles	% of Impairment
Acid Mine Drainage	16.3	12.4%
Agriculture	22.3	16.9%
Agriculture & Habitat Modification	1.9	1.5%
Agriculture, On site Wastewater, & Removal of Vegetation	2.3	1.7%
Bank Modifications	8.4	6.4%
Erosion from Derelict Land	2.1	1.6%
Hydromodification	1.3	1.0%
Municipal Point Source & Urban Runoff/Storm Sewers	1.8	1.3%
Natural Sources	13.7	10.4%
Natural Sources & On site Wastewater	4.9	3.7%
On-site Wastewater	11.2	8.6%
On-site Wastewater & Removal of Vegetation	0.8	0.6%
Other	1.5	1.1%
Package Plants & Agriculture	0.6	0.5%
Petroleum Activities & Abandoned Mine Drainage	0.6	0.4%
Source Unknown	34.6	26.3%
Upstream Impoundment	0.9	0.7%
Urban Runoff/Storm Sewers & Municipal Point Source	1.2	0.9%
Urban Runoff/Storm Sewers & Removal of Vegetation	3.1	2.4%
Urban Runoff/Storm Sewers & On-site Wastewater	1.9	1.5%
Total	131.4	100.0%

Data Source: PA DEP 2019 Non-Attaining Waterways

Impairment data was also analyzed on a subwatershed level for 2019 and compared to 2008; data is included in Table 6. Figure 8 (p. 31) depicts the 2019 impaired waterways. The most impaired subwatersheds include Pine Run (92.3%), Little Buffalo Creek (64.8%), Marrowbone Run (52.5%), and Sarver Run (52.3%). Cornplanter Run, Long Run, and North Branch Rough Run do not have any impairments and also did not in 2008. Of note, Sarver Run had no impaired stream segments in 2008 and is over half impaired in 2019. Little Buffalo Run and Buffalo Creek also had significant increases in total subwatershed impaired stream segments at 25.5% and 13.9% increases, respectively.

Sources of impairment by subwatershed are included in Table 8 (p. 32). The following is a summary of impairment sources by watershed. As noted above, Cornplanter Run, Long Run, and North Branch Rough Run do have any impaired stream segments.

Figure 8: Impaired Streams

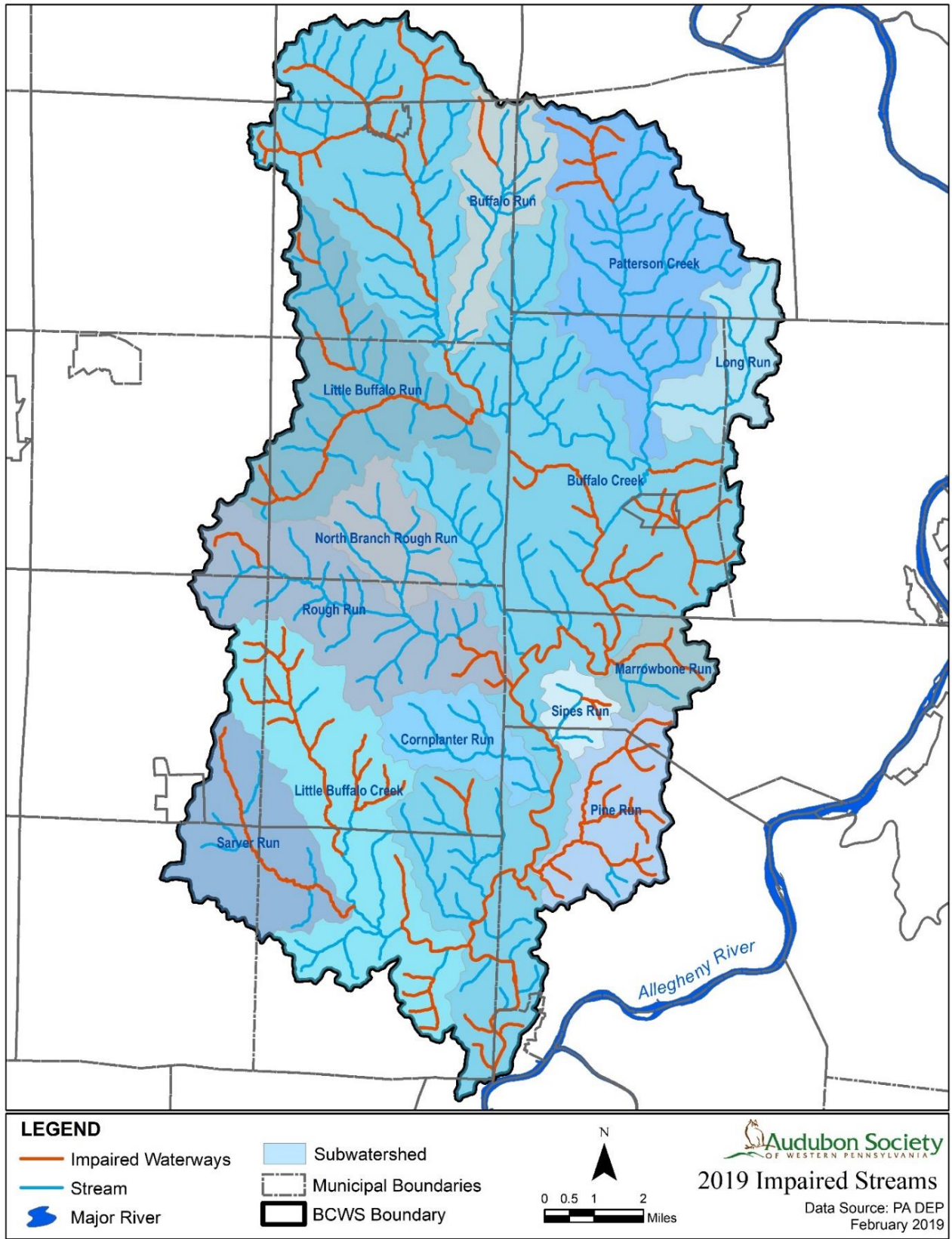


Table 8, Part 1: Impairment Source by Subwatershed (2019)

Impairment Source	Buffalo Creek		Buffalo Run		Little Buffalo Creek		Little Buffalo Run		Marrowbone Run	
	IM*	% OI*	IM*	% OI*	IM*	% OI*	IM*	% OI*	IM*	% OI*
Acid Mine Drainage	13.4	22.6%	0	0%	0	0%	0	0%	2.9	100%
Agriculture	0.0	0%	0	0%	9.4	44%	1.3	13%	0	0%
Agriculture & Habitat Modification	1.9	3.2%	0	0%	0.0	0%	0	0%	0	0%
Agriculture, On-site Wastewater, & Removal of Vegetation	0	0%	0	0%	2.3	11%	0	0%	0	0%
Bank Modifications	3.5	5.9%	0	0%	0	0%	0	0%	0	0%
Erosion from Derelict Land	2.1	3.6%	0	0%	0	0%	0	0%	0	0%
Hydromodification	0	0%	0	0%	0	0%	0	0%	0	0%
Municipal Point Source & Urban Runoff/Storm Sewers	1.8	3.0%	0	0%	0	0%	0	0%	0	0%
Natural Sources	3.3	5.6%	0	0%	0	0%	0.8	8%	0	0%
Natural Sources & On-site Wastewater	4.9	8.3%	0	0%	0	0%	0	0%	0	0%
On-site Wastewater	6.5	10.9%	1.5	100%	3.3	15%	0	0%	0	0%
On-site Wastewater & Removal of Vegetation	0	0%	0.0	0%	0.8	4%	0	0%	0	0%
Other	0	0%	0	0%	0	0%	0	0%	0	0%
Package Plants	0	0%	0	0%	0.6	3%	0	0%	0	0%
Petroleum activities & AMD	0	0%	0	0%	0	0%	0.6	6%	0	0%
Unknown	18.7	31.5%	0	0%	1.8	8%	6.6	66%	0	0%
Upstream Impoundments	0	0%	0	0%	0	0%	0.9	9%	0	0%
Urban Runoff/Storm Sewers	0	0%	0	0%	0.0	0%	0	0%	0	0%
Urban Runoff/Storm Sewers & Municipal Point Source	1.2	2.1%	0	0%	0.0	0%	0	0%	0	0%
Urban Runoff/Storm Sewers & On-site Wastewater	1.9	3.3%	0	0%	0	0%	0	0%	0	0%
Urban Runoff/Storm Sewers & Removal of Vegetation	0	0%	0	0%	3.1	15%	0	0%	0	0%
Total	59.2	-	1.5	-	21.3	-	10	-	2.9	-

*IM = Impaired Miles; % OI = % of Impairment

Data Source: PA DEP 2019 Non-Attaining Waterways

Note: There is no impairment in Cornplanter Run, Long Run, and North Branch Rough Run so they are not included in Table 8.

Table 8, Part 2: Impairment Source by Subwatershed (2019)

Impairment Source	Patterson Creek		Pine Run		Rough Run		Sarver Run		Sipes Run	
	IM*	% OI*	IM*	% OI*	IM*	% OI*	IM*	% OI*	IM*	% OI*
Acid Mine Drainage	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture	5.6	100%	0	0%	0	0%	0	0%	1.0	100%
Agriculture & Habitat Modification	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture, On-site Wastewater, & Removal of Vegetation	0	0%	0	0%	0	0%	0	0%	0	0%
Bank Modifications	0	0%	4.9	34%	0	0%	0	0%	0	0%
Erosion from Derelict Land	0	0%	0	0%	0	0%	0	0%	0	0%
Hydromodification	0	0%	0	0%	1.3	28%	0	0%	0	0%
Municipal Point Source & Urban Runoff/Storm Sewers	0	0%	0	0%	0	0%	0	0%	0	0%
Natural Sources	0	0%	9.6	66%	0	0%	0	0%	0	0%
Natural Sources & On-site Wastewater	0	0%	0	0%	0	0%	0	0%	0	0%
On-site Wastewater	0	0%	0	0%	0	0%	0	0%	0	0%
On-site Wastewater & Removal of Vegetation	0	0%	0	0%	0	0%	0	0%	0	0%
Other	0	0%	0	0%	1.5	33%	0	0%	0	0%
Package Plants	0	0%	0	0%	0	0%	0	0%	0	0%
Petroleum activities & AMD	0	0%	0	0%	0	0%	0	0%	0	0%
Unknown	0	0%	0	0%	1.8	39%	5.9	100%	0	0%
Upstream Impoundments	0	0%	0	0%	0	0%	0	0%	0	0%
Urban Runoff/Storm Sewers	0	0%	0	0%	0	0%	0	0%	0	0%
Urban Runoff/Storm Sewers & Municipal Point Source	0	0%	0	0%	0.0	0%	0.0	0%	0	0%
Urban Runoff/Storm Sewers & On-site Wastewater	0	0%	0	0%	0	0%	0	0%	0	0%
Urban Runoff/Storm Sewers & Removal of Vegetation	0	0%	0	0%	0	0%	0	0%	0	0%
Total	5.6	-	14.5	-	4.5	-	5.9	-	1.0	-

*IM = Impaired Miles; % OI = % of Impairment

Data Source: PA DEP 2019

Note: There is no impairment in Cornplanter Run, Long Run, and North Branch Rough Run so they are not included in Table 8.

2.4.2 Municipal Separate Storm Sewer System (MS4)

The MS4 program is responsible for the stormwater regulations associated with the Clean Water Act. In Pennsylvania, the program is managed by PA DEP and requires that certain cities, counties, and urbanized areas obtain a permit for their stormwater discharges. Each MS4 permittee is required to develop and implement a stormwater management program. Within the watershed, there are 2 municipalities with active MS4 permits, Buffalo and Harrison Townships, and 2 municipalities with MS4 waivers, Winfield and South Buffalo Townships (Figure 9, p. 36).

2.4.3 Floodplain Mapping Updates

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) maps have been updated for the 3 counties within the watershed since the 2008 Plan. Allegheny, Armstrong, and Butler Counties were updated in 2014, 2016, and 2018, respectively. The latest FEMA-mapped floodplains are shown in Figure 10 (p. 37).

2.5 Biological Resources

The Buffalo Creek Watershed is an Audubon-designated Important Bird Area (IBA), an area of high biological diversity, and is home to many species of conservation concern. Additionally, it contains a majority of the Long Run Mine Category 4 Important Mammal Area (IMA) and contains 11 areas designated as biological diversity areas (BDA) through the Natural Heritage Inventory (NHI). An extensive review of the watershed's vast biological resources is included in the 2008 Plan. Some notable features include extensive areas of northern hardwood-conifer forest communities along the steep and narrow ravines of many of the tributary streams and large wetland areas in the central and upper main-stem watersheds and along the floodplain of Little Buffalo Run.

The NHI for Armstrong and Butler Counties have been updated since the original 2008 Plan. Table 9 (p. 38) includes information about the Biological Diversity Areas within the watershed as identified in the Armstrong County NHI (2010, Western Pennsylvania Conservancy) and Butler County NHI (2011, Western Pennsylvania Conservancy).

2.5.1 Buffalo Creek Valley IBA

IBAs are defined as *areas that are vital to birds and other biodiversity*. The IBA program is a global initiative of BirdLife International; Audubon is a leading program partner in the United States. The Buffalo Creek Valley IBA is defined by the boundaries of the Buffalo Creek Watershed and Harrison Hills park in Allegheny County. Harrison Hills serves as important stopover habitat during migration into the Buffalo Creek Valley. Audubon describes the Buffalo Creek Valley as “characterized as a mixing zone between southern (Yellow-throated Warbler, Cerulean Warbler, Yellow-throated Vireo, Acadian Flycatcher) and northern (Magnolia Warbler, Brown Creeper, Purple Finch) fauna. The avifauna mirrors the diversity and intact character of the site.”

According to eBird, a total of 156 bird species have been found in the Buffalo Creek Watershed, including 42 species that have been identified in the Pennsylvania Wildlife Action Plan (2015 – 2025) as Species of Greatest Conservation Need (SGCN). This includes forest interior species such as Hooded Warbler, Kentucky Warbler, Wood Thrush, and Scarlet Tanager that rely on large tracts of mature forest to maintain healthy populations. This also includes species such that rely on the healthy, cool forested streams of the area such as Louisiana Waterthrush and those that rely on the surrounding forested hillsides such as

Cerulean Warbler. Data from the area's 2018 Breeding Bird Survey identified 63 breeding species including 9 SGCN.

2.5.2 Hemlock Woolly Adelgid

Hemlocks are present throughout much of the watershed's ravines and valleys. The hemlock is an important part of the ecosystem, helping to keep streams cool, prevent erosion, provide nesting habitat for birds, support insects, and much more. The Hemlock Woolly Adelgid is an invasive pest from Japan that causes mortality of hemlocks. Although it has been present in Pennsylvania since the 1960s, it wasn't reported in the Buffalo Creek Watershed until very recently. According to DCNR, 64 of Pennsylvania's 67 counties are now infested with Hemlock Woolly Adelgid. Treatment has primarily focused on the use of insecticides; this approach is costly and needs to be repeated every 5 - 7 years for each tree. Research is currently being conducted on the use of predatory beetles and host resistance to mitigate the impacts of this pest.

Figure 9: MS4 Communities

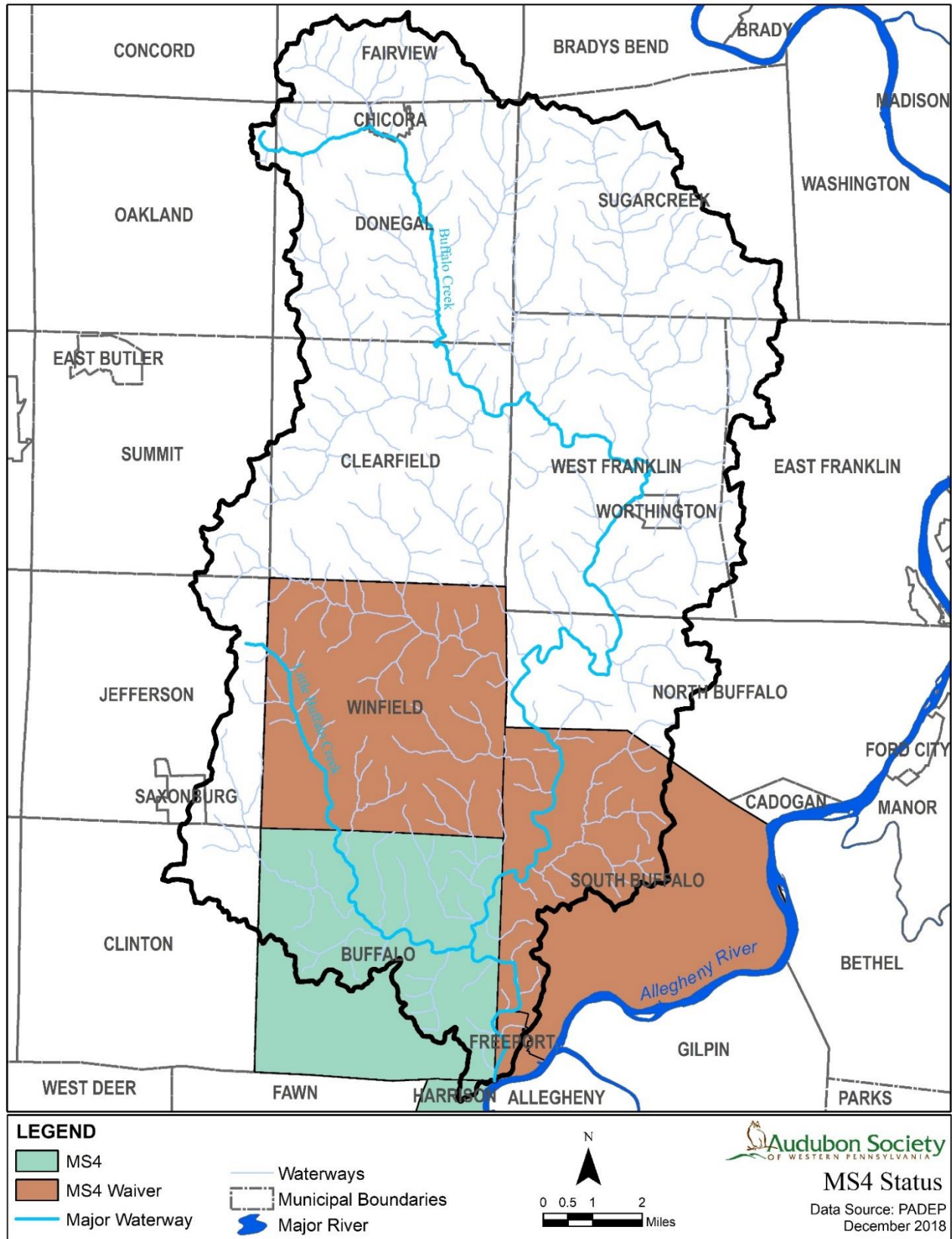


Figure 10: FEMA Floodplains

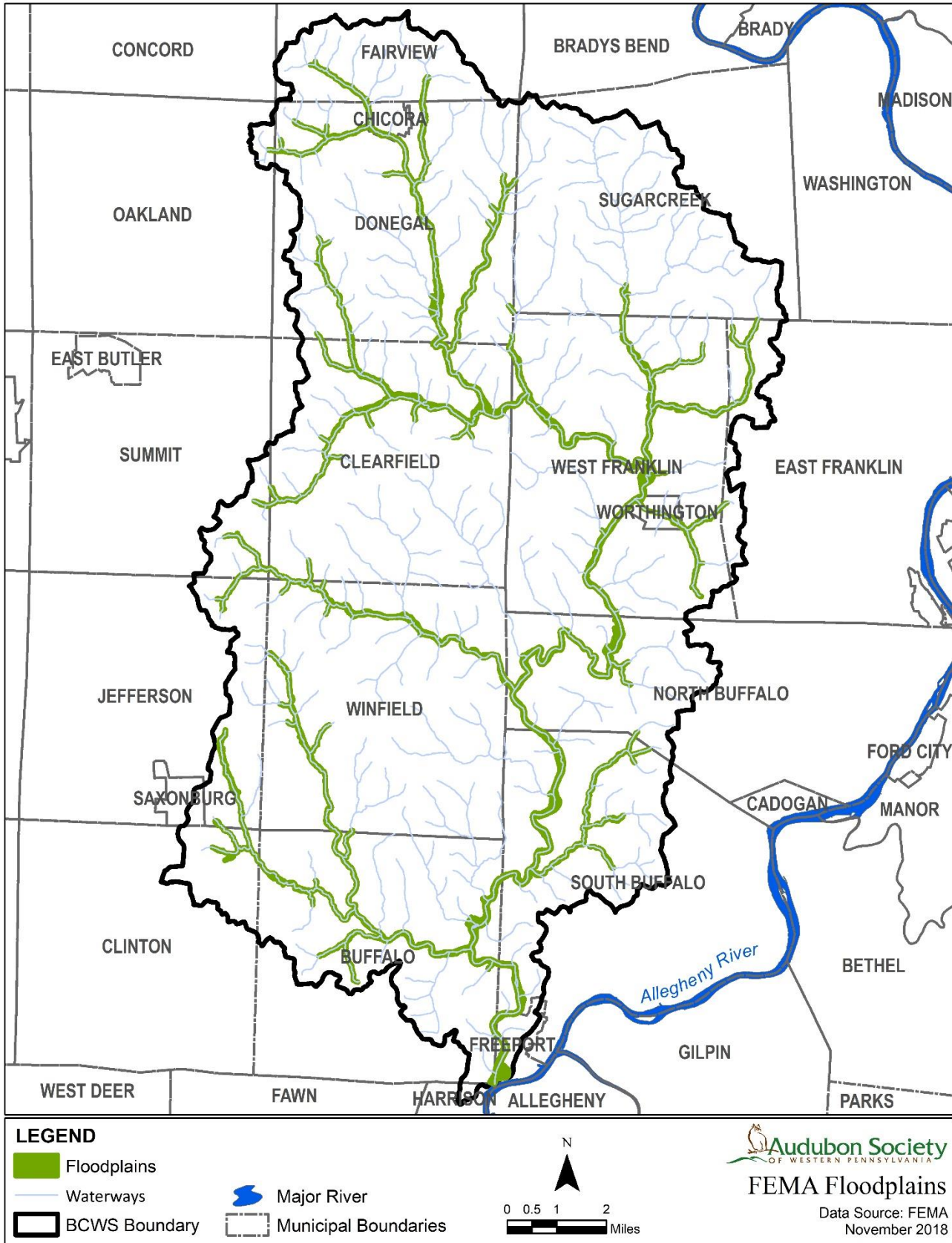


Table 9, Part 1: Biological Diversity Areas

Biological Diversity Area	Significance	Additional Information	Threats
Upper Buffalo Creek	Exceptional	Aquatic and upland habitat for 12 species of concern including: 4 dragonfly species - harpoon clubtail (<i>Gomphus descryptus</i>), sable clubtail (<i>Omphilus rogersi</i>), zebra clubtail (<i>Stylurus scudderi</i>), and northern pygmy clubtail (<i>Ianthis parvulus</i>); 1 butterfly - coral hairstreak (<i>Satyrium titus</i>); 2 rare or endangered plants - Virginia bunchflower (<i>Veratrum virginicum</i>) and featherbells (<i>Stenanthium gramineum</i>); and 5 species of concern that are undisclosed for their protection.	Siltation, loss of forest on hillsides, runoff from dirt and gravel roads, riparian forest fragmentation, predators such as raccoons and dogs, residential development, succession of old fields and shrubs to forest, loss of canopy openings in forest
Rough Run	Notable	Aquatic and creekside habitat for a species of concern. Species is undisclosed for its protection.	Industrial and residential development, roads, runoff, sedimentation, loss of streamside habitat
Cornplanter Run	Notable	Aquatic habitat for a species of concern. Species is undisclosed for its protection.	Residential development, runoff from dirt and gravel roads, absence of riparian buffer
Buffalo Creek and Little Buffalo Creek Valley	High	These creeks and the slopes above them provide habitat for 7 species of concern, including: 1 butterfly - the West Virginia white; 2 mussels - rainbow mussel (<i>Villosa iris</i>) and fragile papershell (<i>Leptodea fragilis</i>); 1 fern that hasn't been documented in area since 1950 - lobed spleenwort (<i>Asplenium pinnatifidum</i>); and 3 species of concern that are undisclosed for their protection.	Sedimentation, forest fragmentation, spread of garlic mustard, deer overbrowse, Japanese Knotweed
Little Buffalo Creek Valley	Local	Relatively undeveloped, mature riparian forest partially underlain by Freeport Limestone, which supports a wide diversity of flora.	Fragmentation, timbering on steep slopes or other intensive land uses, invasive species
Little Buffalo Creek at Sarver	Notable	Habitat for a butterfly species of concern - the harvester.	Loss of riparian buffers, pesticides and herbicides
Little Buffalo Creek at Lernerville	Notable	Upland habitat for American columbo, a plant species of concern.	Forest succession, invasive species
Long Run Mine	High	Abandoned mine and surrounding valley that support 4 species of concern - 3 of which are undisclosed for their protection and 1 butterfly - 1 butterfly - the West Virginia white.	Forest fragmentation, insecticides, trespassing, vandalism, development, spread of garlic mustard, deer overbrowse

Sources: Armstrong County NHI (2010, Western Pennsylvania Conservancy) and Butler County NHI (2011, Western Pennsylvania Conservancy).

Table 9, Part 2: Biological Diversity Areas

Biological Diversity Area	Significance	Additional Information	Threats
Buffalo Creek at Craigsville	Notable	Steep rocky outcrops provide habitat for a fern of concern - lobed spleenwort (<i>Asplenium pinnatifidum</i>)	Unauthorized collection, herbicide, invasive species, habitat degradation by forest fragmentation
Buffalo Creek at Nichola	Notable	Additional details not available.	Additional details not available.
State Game Lands #259	Notable	Floodplain forest supports a plant species of concern - featherbells (<i>Stenanthium gramineum</i>).	Disturbance of population.

Sources: Armstrong County NHI (2010, Western Pennsylvania Conservancy) and Butler County NHI (2011, Western Pennsylvania Conservancy).

2.6 Cultural and Recreational Resources

2.6.1 Recreation

A detailed overview of the watershed’s recreational resources is provided in the original 2008 Plan. Outdoor recreation has long been a vital quality of life issue to watershed residents. Historically, these issues were primarily associated with fishing and hunting opportunities. Most forest and farmland areas, as well as extensive sections of the Buffalo Creek valley, were typically available for these activities. In 1942, Todd Sanctuary (now Todd Nature Reserve) was established as one of the state’s first privately-owned natural areas and introduced formal public access for hiking, birding and other outdoor pursuits. A major regional amenity is the Butler-Freeport Trail, a 20-mile rail trail that has approximately 100,000 – 150,000 visitors annually. The first section of the Butler-Freeport Trail was opened in 1992; in 2011, the trail reached 20 miles. It extends from Butler to Freeport, primarily along Buffalo and Little Buffalo Creeks. Popular activities along the Butler-Freeport Trail include walking, biking, running, geocaching, and cross-country skiing.



Much of the watershed’s recreational activities are centered on its waterways, including fishing, canoeing, and the Butler-Freeport Trail, which follows portions of Buffalo and Little Buffalo Creeks. Photo: George Reese

With the growth of local and regional populations in recent decades, the need for increased recreational opportunities has increased substantially. This pressure has increased further by the broader recognition of the watershed as a regional resource. At the same time, private lands have increasingly excluded recreational use as tracts are divided into increasingly smaller parcels and residential and other non-compatible development increases. As a result, the development of publicly-owned or accessible facilities has become an issue of local as well as regional importance. Popular activities within the watershed today include hiking, fishing, hunting, bird watching, bicycling, canoeing, and golfing.

A brief overview of recreational facilities in the watershed includes (Figure 11, p. 41):

- The BFT is a 20-mile crushed limestone trail that is the largest public recreation facility in the watershed.
- There are 5 community parks wholly or partly within the watershed including Freeport Community Park (South Buffalo Township), Harrison Hills Park (Harrison Township), Laura J. Doerr Memorial Park (Jefferson Township), Worthington Park (Worthington Borough), and Sugarcreek Township Community Park (Sugarcreek Township).
- Nature reserves include Todd Nature Reserve in Buffalo Township and Armstrong County Conservancy property in West Franklin Township.
- Additional public facilities include 9 athletic fields and 4 golf courses.
- The PAFB launch in Freeport is the only public canoe launch in the watershed. The section of Buffalo Creek between Freeport and Worthington is typically canoe-able in late spring and early summer during higher flows.
- The Buffalo Creek Nature Center is a joint initiative of ASWP and Buffalo Township that is in progress. The site, along Little Buffalo Creek and the BFT, will host an environmental education center, accessible fishing, picnic areas, and a nature play area.

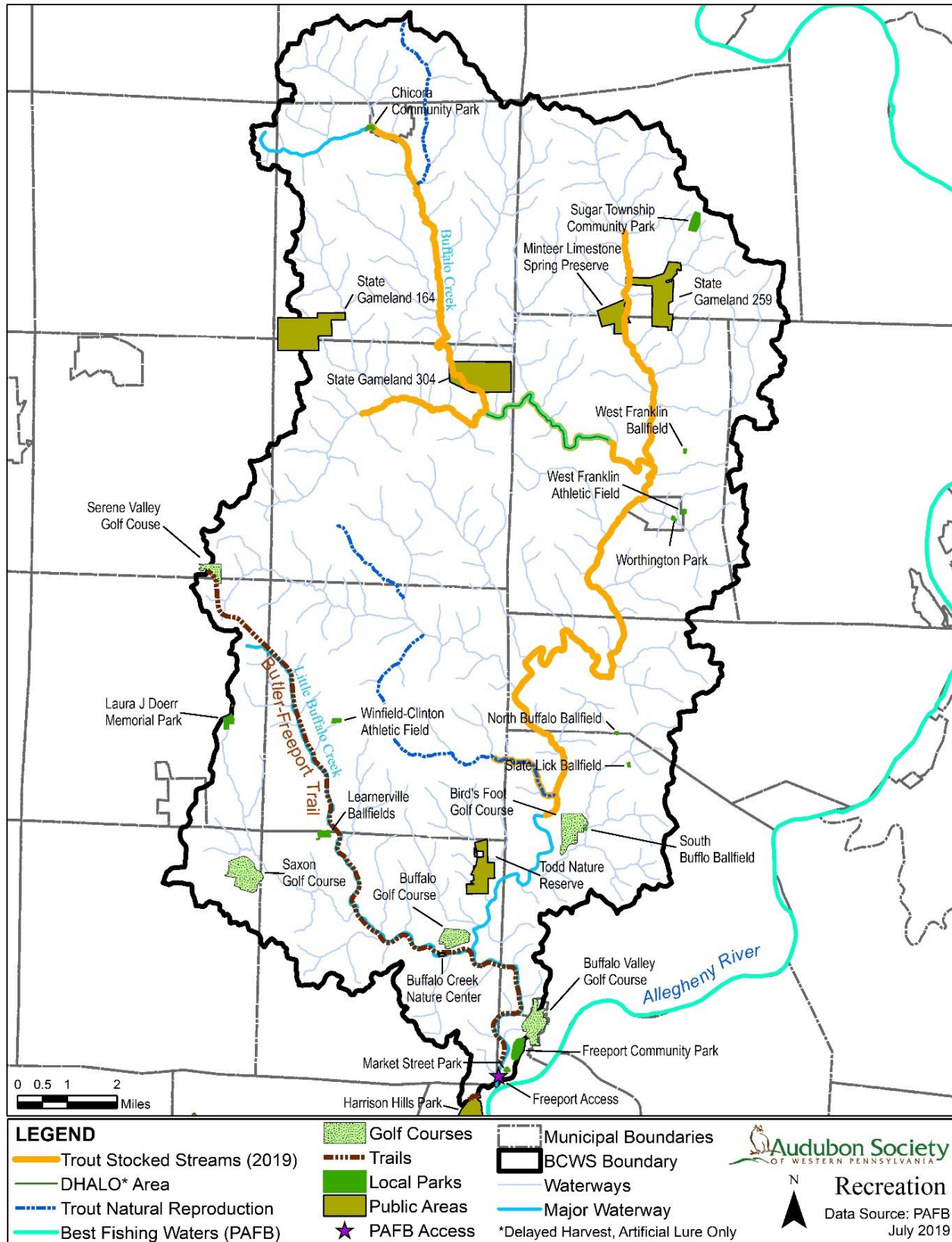
2.6.2 Fishing

Fishing is a major recreational activity and economic activity in the region. The upper and central portions of the watershed are variously classified by PA DEP as HQ-CWF and HQ-TSF waters. A majority of Buffalo Creek, Little Buffalo Creek, and Patterson Creek as well as portions of Little Buffalo Run and Cornplanter Run are stocked for trout. The lower reach of Buffalo Creek and Little Buffalo Creek provide a regionally notable Smallmouth Bass fishery. PAFB has identified 4 stream segments within the watershed where trout naturally reproduce. These include:

- Cornplanter Run - T-658 bridge downstream to mouth
- Unnamed tributary to Rough Run in Winfield - Headwaters to mouth
- Unnamed tributary to Buffalo Creek in Donegal and Fairview - Headwaters to mouth
- Sarver Run - Headwaters to mouth

A 3.7-mile section of Buffalo Creek from Little Buffalo Run downstream to 0.6 mile above S.R. 4035 in Craigsville is regulated as a delayed harvest artificial lure only (DHALO) area by the PFBC. As such, it is open to fishing year-round (no closed season), and fishing may be done with artificial lures only constructed of metal, plastic, rubber, or wood, or with flies and streamers constructed of natural or synthetic materials. This section of Buffalo Creek has been identified by PAFB as some of the state's Best Fishing Waters for stocked trout.

Figure 11: Recreational Resources



Public stream access is generally available throughout the upper subwatersheds through the generosity and cooperation of landowners. Four areas in these subwatersheds are particularly well developed for public access as identified: These include the following:

- The Arrowhead Chapter of Trout Unlimited has adopted the DHALO section of Buffalo Creek and has implemented a number of stream enhancement initiatives. Numerous deflectors, mud sills, and additional enhancements have been installed with state and federal funding. Chapter members also assist in stocking of trout reared by the PFBC.
- The Armstrong County Conservancy owns approximately 0.25 mile of Patterson Creek in West Franklin Township. A number of stream enhancement initiatives have been implemented in this area as well, and the stream is stocked by the PFBC.
- The Buffalo Valley Sportsmens Association, in cooperation with Snyder Holdings, Inc., has developed a handicapped accessible youth fishing area on Buffalo Creek at Shadyside Village. This is the only facility of its kind in the watershed area (and one of only four in Armstrong County) and receives very heavy use during trout season.
- State Game Lands 304 includes 1.0 mile of the Buffalo Creek main stem that is open to hike-in fishing.

Public stream access is essentially unavailable downstream of Boggsville. There is also essentially no public access to Little Buffalo Creek, except hike-in availability from the rail-trail. Private lands throughout these areas are generally posted for no trespassing and the PFBC does not undertake any stocking efforts for this reason. The PFBC maintains a boat launch on Buffalo Creek at Freeport. This facility provides boat access to the inundated portion of the creek near its mouth, but is primarily intended to provide access to the Allegheny River. Bank fishing is available within the launch facility property.



There is one public boat launch in the watershed, located in Freeport.

2.6.3 Hunting

Three State Game Lands totaling approximately 1,080 acres provide public hunting opportunities in the watershed. Important game species in these areas include White-tailed Deer, Eastern Cottontail, squirrels, and Wild Turkey. Hunting is also available to a limited extent on private lands, with landowner permission.

Seven sportsmen's organizations own land within the watershed, including Freeport Sportsmens Club, Saxonburg District Sportsmen, Tarentum District Sportsmens Club, Happy Hunters Sportsmen, Burnt Ridge Bow and Gun Club, Buffalo Valley Sportsmen, and the Buffalo Valley Beagle Club. These properties may be available for hunting access by members. ASWP has made its land available to deer hunting by permit-only. Permits are distributed through a lottery system at no cost to applicants.

SECTION 3: FINDINGS

The following section provides an overview of the public input process and findings, an overview of major changes and key issues identified during data review, and priority projects that were identified through various mechanisms including steering committee input, stakeholder interviews, and data analysis.

3.1 Public Input Process

The following is an overview of the public input process that was used during the plan update:

- Steering Committee coordination
- Stakeholder interviews
- Public meeting
- Surveys
- Social media
- Flyers
- Website
- Mailings to key stakeholders such as watershed municipalities

These efforts are discussed in further detail below.

3.1.1 Steering Committee

ASWP and GAI convened a steering committee at the inception of the project to guide and review the development of the 10-year update to the plan. The steering committee was developed to include broad representation of watershed stakeholders. Steering committee members included:

- Dave Beale, Forester, Surveyor, and Armstrong Conservancy
- Bill Davis, Buffalo Township Parks and Recreation Committee
- Tye Desiderio, Western Pennsylvania Conservancy
- R.W. Grafton, Landowner
- Ryan Harr, Butler County Conservation District
- Chad Hough, Arrowhead Chapter of Trout Unlimited
- Mark Killar, Western Pennsylvania Conservancy
- Dave Rupert, Armstrong County Conservation District
- Maria Sorce, Armstrong County Conservation District
- Tom Swisher, Armstrong County Planning
- Chris Zeigler, Butler-Freeport Trail and Armstrong Conservancy

Two steering committee meetings were held during the 10-year plan update. Additional coordination was done through email. Several additional organizations were invited to be part of the steering committee but were unable to participate.

3.1.2 Stakeholder Interviews

ASWP staff conducted interviews with a number of people identified as key stakeholders or sources of information for the watershed. A total of 18 personal interviews were conducted with the following people:

- Dave Beale, Forester, Surveyor, and Armstrong Conservancy
- Charles Bier, Western Pennsylvania Conservancy, Conservation Science

- Anthony Beers, PAFB Watershed Conservation Officer
- Mark Caruso, Freeport Middle School
- Anne Daymut, Western Pennsylvania Coalition for Abandoned Mine Reclamation
- Tye Desiderio, Western Pennsylvania Conservancy
- Jeff Fliss, PA DEP Southwest Office
- Will Kmetz, Boy Scout Leader
- Virginia Lindsay, Landowner
- Ron Lybrook, PA DEP Northwest Office
- Bob Mikolas, Farmer
- Jeff Miller, Snyder Brothers
- Brad Mooney, Retired PAFB Watershed Conservation Officer and Landowner
- Dr. Brady Porter, Duquesne University
- Jessica Schaub, Armstrong Conservation District
- Patrick Shirey, Ecology Policy LLC and University of Pittsburgh
- Gary A. Smith, PAFB Fisheries
- Lance Welliver, Butler County Parks and Recreation

3.1.3 Media Coordination

ASWP provided notices to local newspapers concerning the 10-year plan update and the public meeting. The plan update was included in the following newspaper stories:

- Audubon Seeks Input on Buffalo Creek Grant, Butler Eagle (12/19/2018)
- Buffalo Creek Watershed Meeting Slated, Butler Eagle (2/22/2019)
- Litter, Declining Water Quality in Buffalo Creek Watershed Among Concerns in Upcoming Report, Valley News (3/3/2019)
- Audubon Society: Water Quality Worsening in Buffalo Creek, Valley News (8/4/2019)

3.1.4 Surveys

A survey was developed to capture input from people who live, work, and recreate in the watershed; a copy is included in Appendix A (p. 73). The survey included questions in 2 formats: free form, narrative and check-boxes as well as a comment section. The survey questions addressed important qualities, important challenges, needs, and important types of recreational opportunities. An electronic version of the survey was hosted on ASWP's website and promoted via social media, ASWP e-blasts, flyers, and cross-posting with partner organizations. Hard copies were distributed in a variety of ways such as at community meetings such as the Buffalo Township meeting and Burnt Ridge Bow and Gun Club meeting and promoted at ASWP's Todd and Beechwood Nature Stores. Lastly, copies of the survey were mailed to each municipality and key stakeholders such as sportsmens' clubs.

A total of 120 surveys were collected, representing the following demographics:

- 72 watershed residents
- 16 people who work in watershed (including 4 non-residents)
- 9 attend school in watershed
- 86 recreate in watershed (including 37 non-residents)

Individuals from the following 25 organizations filled out surveys:

- Armstrong Conservancy
- Birdsfoot Golf Club

- Buffalo Township
- Buffalo Township Parks & Rec Committee
- Burnt Ridge Bow and Gun Club
- Butler-Freeport Trail
- Clearfield Township
- Clinton Township
- Deer Lakes School District
- East Franklin Township
- Energy Policy LLC
- Farm Bureau
- Freeport Borough
- Kiskiminetas Watershed Association
- Lindsay Law Firm
- Penn State Extension Butler County
- Roaring Run Watershed Association
- Saving Dreams Outdoors
- South Buffalo Township
- Tarentum Sportsmens Club
- Tri-County Trout Club
- Trout Unlimited Arrowhead Chapter
- University of Pittsburgh
- VFW
- Worthington West Franklin Community Library

3.1.5 Public Meeting

A public meeting was held on February 27, 2019 at the Worthington West Franklin Memorial Civic Center. The purpose of the meeting was to share preliminary findings and gather additional public input. Approximately 35 people were in attendance. Input gathered at the meeting showed strong public interest in protecting the watershed including forested areas and water quality, increasing access to recreation opportunities, development of a watershed coalition, and increased oversight of development.



A public meeting was held in Worthington part of the comprehensive outreach efforts used for the Plan Update.

3.1.6 Additional Outreach

Additional outreach regarding the plan update and public meeting included:

- Watershed website with information about the watershed, original plan, and the 10-year update: <http://aswp.org/pages/buffalo-creek-valley-iba>
- Two mailings to watershed municipalities. The mailings included copies of the survey, information about the watershed, an invitation to submit additional input, and a flyer for the community meeting.
- Mailing to stakeholders such as Sportsmens Clubs with copy of survey and the community meeting flyer.
- Posting on social media about the plan update, watershed information, and links to the survey.

A draft of the plan was posted for public comment in July 2019 prior to plan finalization in August 2019. Plan content was updated to incorporate public comments received during this process.

3.2 Summary of Survey Results

The following is an overview of the input received from the 120 survey responses (Tables 10 – 14). For the questions with the narrative responses, topics that were included in 5 or more survey responses are included. For the questions with check-box answers, all responses are included.

Q1: What are the most important qualities of this area?

Table 10: Survey Responses – Important Qualities

Important Qualities	Number of Responses
Healthy Forest	23
Rural Environment	21
Clean Water	19
Small Town Feel	18
Wildlife	13
Butler-Freeport Trail	12
Fishing	12
Farmland	12
Beauty	11

Important Qualities	Number of Responses
Outdoor Recreation	10
Biking	10
Natural Habitats	9
Convenient Access to Stores/Services/Cities	7
Trails	7
Hiking	7
Streams	6
Solitude/Remoteness/Quiet	5
Hunting	5

Q2: What are the most important challenges facing this area?

Table 11: Survey Responses – Important Challenges

Important Challenges	Number of Responses
Development/Residential Development	41
Litter/Garbage	25
Erosion/Sedimentation/Water Quality/Acid Mine Drainage	17
Oil/gas development	11
Traffic/Transportation Planning	9
Land use/Land Use Controls	9

Important Challenges	Number of Responses
Lack of stream/fishing access	9
Lack of access	7
Lack of environmental awareness/education/programming	6
Trail maintenance/flooding issues	5
Improper agricultural practices	5

Q3: How can the watershed be improved?

Table 12: Survey Responses – Needs

Needs	Number of Responses
Parks/Playgrounds/Greenspace	18
Fishing Access	14
Paddling Access	12
Public Access	8
Trail Amenities/Parking	7

Needs	Number of Responses
Multi-use Trails	6
Trails	6
Outdoor Recreation Opportunities	6
Stream Access	5
Environmental Education	5

For the following 2 questions, respondents were able to choose as many options as they considered important from pre-defined options.

Q4: Which of the following are important for the watershed? Please check all that apply.

Table 13: Survey Responses – Important for Watershed

Important for Watershed	Number of Responses
Natural Landscapes	102
Outdoor Recreation Opportunities	92
Water Quality Improvement	81
Environmental Education	79
Agricultural Preservation	76
Rural/Small Town Atmosphere	70

Important for Watershed	Number of Responses
Historic Preservation	65
Manage Flooding	59
Job Opportunities	21
Commercial Development	10
Residential Development	10

Q5: Which of the following recreational opportunities are important? Please check all that apply.

Table 14: Survey Responses – Important Recreation

Important for Watershed	Number of Responses
Hiking/Walking	106
Fishing	86
Canoeing/Kayaking	77
Birding	73
Biking	71
Photography	69
Hunting	59

Important for Watershed	Number of Responses
Running	52
Camping	46
Cross-County Skiing	40
Swimming	29
Horseback Riding	23
ATV Riding	14

3.3 Important Issues and Major Trends

The following is a brief summary of major trends and challenges in the watershed that were identified through public input, stakeholders, steering committee members, and data analysis. The high priority action plan detailed in Section 4 addresses these important topics.

- Preserving the watershed’s natural landscapes (including forest and stream health) and rural character as well as expanding recreation opportunities were top priorities identified by the public. Additional important watershed qualities/activities identified by the public include wildlife, fishing, the Butler-Freeport Trail, agriculture/agricultural preservation, and environmental education opportunities.
- Primary watershed challenges identified by the public include residential development / development, litter / garbage, and water quality impacts (e.g. erosion, sedimentation, and acid mine drainage).
- The most frequent watershed needs identified by the public include additional recreation space (i.e. parks, playgrounds, and public greenspace), fishing access, and paddling access. Recreation in the watershed is very popular and existing resources are heavily used.
- In descending order, the public identified the following types of recreation as important for the watershed: hiking/walking, fishing, canoeing/kayaking, birding, biking, photography, hunting, and running.
- 37% of the watershed’s stream miles are now impaired. This is a 10.5% increase (37.7 additional miles) since 2008. 34.6 miles of the additionally impaired streams are impaired due to “source unknown – cause unknown.”
- Over 50% of the stream miles in 4 subwatersheds are impaired: Little Buffalo Creek (64.8%), Marrowbone Run (52.5%), Pine Run (92.3%), and Sarver Run (52.2%).
- From 1992 - 2010, land use data shows that agriculture decreased by 5.9 miles² and forest decreased by 24.7 miles² while urban / built up areas increased by 21.9 miles². The most recent land use data available is 2010; much development has occurred in the watershed since 2010 so this data likely underestimates the loss of forest and agriculture to development.
- There are now 229 unconventional shale gas wells in the watershed; there were approximately 0 wells in the watershed when the original plan was completed.
- The Woolly Hemlock Adelgid has now been identified in the watershed and is a major threat to the health of the forest and water quality.
- Increased coordination to protect, preserve, and improve the watershed was identified as a primary need by the steering committee, stakeholders, and at the public meeting.



An additional 37.7 stream miles became impaired from 2008 – 2019. A total of 37% of the watershed’s streams are now impaired.



The Marcellus Shale unconventional natural gas extraction industry has developed rapidly since the Original Plan. There are now 229 permitted gas wells in the watershed.

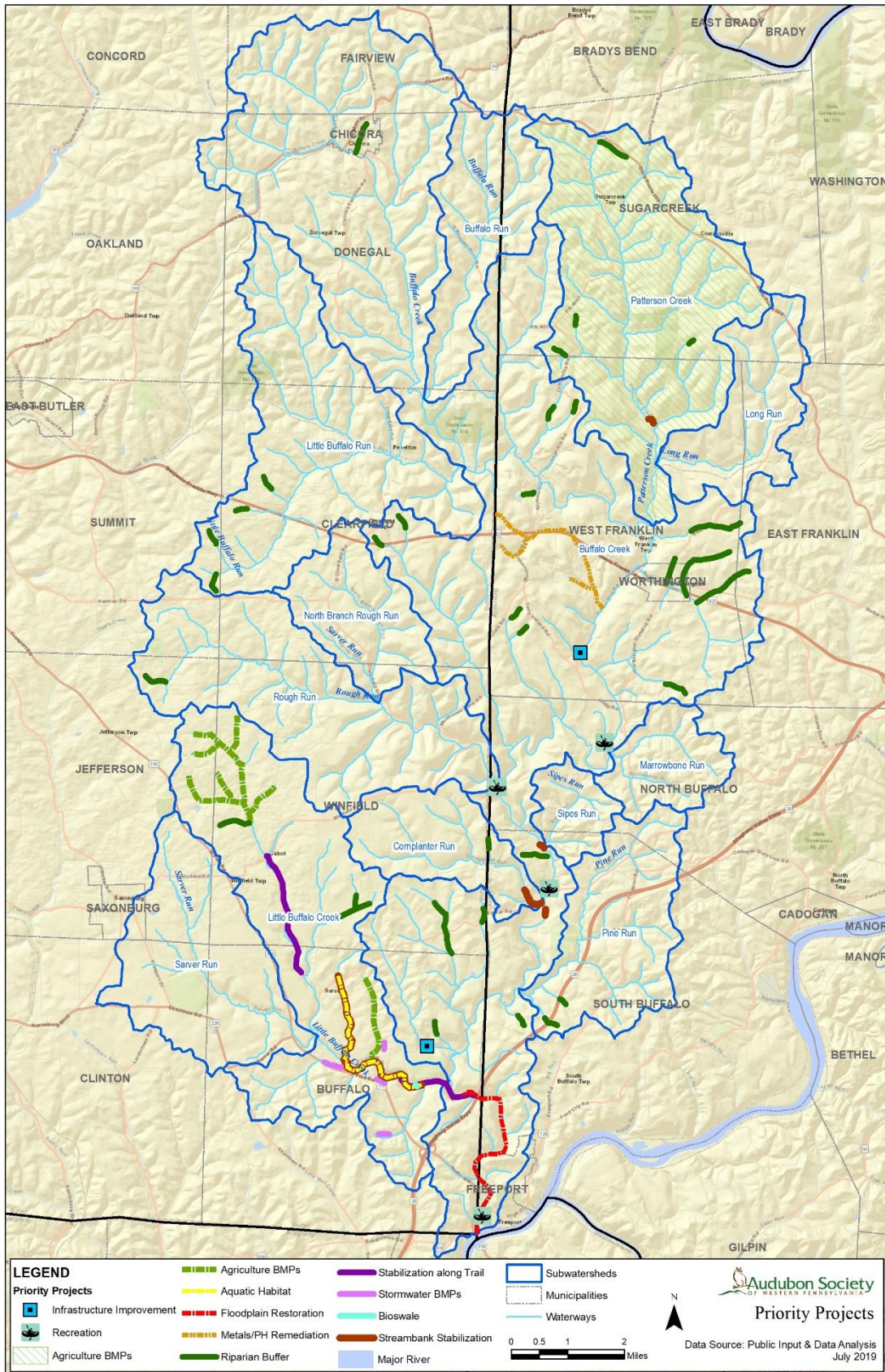
3.3 Priority Projects

Priority projects were identified through stakeholder interviews, steering committee coordination, data analysis, and public input. A total of 70 projects were identified through this process ranging from aquatic habitat improvements, stormwater management, riparian buffers, recreational infrastructure, and more. Figure 12 (p. 50) includes the locations and types of projects. These projects are intended to provide supplementary details for the action plan in Section 4 (p. 51) as well as provide the opportunity for early action projects to be completed.



There are many successful streambank restoration projects that used natural channel design methods throughout the watershed. Additional locations where these projects are needed were identified as priority projects.

Figure 12: Priority Projects



SECTION 4: ACTION PLAN UPDATE

This section presents the actions that are being recommended to address issues, concerns, and opportunities identified through the planning process for the Plan Update. Since the issuance of the original Buffalo Creek Watershed Conservation Plan in 2008, some substantial changes have occurred within the watershed as discussed in Sections 2 and 3. These changes warrant reconsideration in the Action Plan. In addition, ASWP recognized that in light of the limited resources and funding opportunities available, the Action Plan Update would benefit from a more streamlined approach that focuses on a limited number of clearly defined goals and identifies those action items of highest need or greatest opportunity for near-term implementation.

This Action Plan Update reflects these needs by providing detailed Action Item in this section, focusing on critical and high priority issues; a comprehensive list of these action items with additional recommendations for actions contained in a separate summary for use and consideration as warranted.

Results of the public input process reiterated four major goals for the development of the Action Plan Update:

- Retain the rural landscape and small-town sense of community that typifies the watershed.
- Create a sense of community stewardship.
- Conserve and enhance the biological communities.
- Enhance recreational resources in the watershed.

Based upon the input obtained through the planning process and through efforts made under the 2008 Action Plan, the greatest current need is for collaboration and coordination of activities within the watershed. This was recognized as a critical priority in the 2008 Plan but was not fully implemented. Stakeholders continue to express frustration at a perceived lack of information and coordination among municipalities, organizations, and interested individuals in the watershed. While there are numerous initiatives and opportunities being pursued by these various interests, there is no centralized source of information, coordination, or advocacy for the watershed as a whole.

Critical and High Priority Action Plan items are identified in Table 15 (p. 52); a discussion of each priority action items follows the table. Table 16 lists additional action plan recommendations that are less critical, but still very important. These should be implemented as time and resources allow.

For Table 15, examples of partners for each group may include but are not limited to the following:

- Conservation Districts: Armstrong, Butler, and Allegheny County Conservation Districts
- Conservation organizations: ASWP, Western Pennsylvania Conservancy, Armstrong Conservancy
- Outdoors/Recreation organizations: Butler-Freeport Community Trail, Trout Unlimited, Sportsmens Clubs
- Community organizations: Boy Scouts, Girl Scouts, garden clubs, libraries
- Local and regional governments: municipalities, Butler County Council of Governments, SPC, county planning departments, county recreation departments

Table 15: Critical and High Priority Action Items – Organized by Resource Category

Action Item	Description	Potential Partners
Watershed Collaboration		
Watershed Coalition	A. Watershed Coalition	
	Organize a Watershed Coalition to increase awareness, education, protection, stewardship and project implementation throughout the watershed	ASWP, Conservation Districts, conservation organizations, outdoors/recreation groups, community organizations, universities, local and regional governments, public
	B. Develop Citizen Advisory Committee (CAC)	
	Develop a CAC to help guide activities of the Watershed Coalition. Ensure that CAC is connected to resources and tools to foster grassroots protection of resources.	Watershed Coalition and partner organizations, public
Education and Technical Resources		
Watershed Education	A. Watershed Website	
	Develop a watershed website to serve as information clearinghouse and educational tool.	Watershed Coalition
	B. Watershed Educational Materials	
	Develop educational resources for distribution to municipalities, schools, organizations, and landowners presenting the watershed.	Watershed Coalition and partner organizations
	Develop targeted subject matter materials as appropriate for landowners, public, etc.	Watershed Coalition and partner organizations
	Develop Pocket Naturalist Guide for watershed and IBA	Watershed Coalition, ASWP
	Initiate program to provide roadside signage for major streams	Watershed Coalition, local and regional governments
	C. School Outreach	
	Partner with school districts to implement watershed/environmental education efforts.	Watershed Coalition, school districts, ASWP
	D. Watershed Festival	
	Initiate an annual festival celebrating the watershed. Include recreational, educational, and entertainment components.	Watershed Coalition, ASWP, Conservation Districts, conservation organizations, outdoors/recreation organizations, universities, local and regional governments, community organizations
	E. Outreach Events	
	Initiate workshops and educational events for landowners, stakeholders, and public	Watershed Coalition, Conservation Districts, community organizations, local and regional governments, conservation organizations
	F. Social Media and Outreach	

	Establish social media and regular email blasts to promote watershed activities and opportunities to get involved	Watershed Coalition and partner organizations
Land Resources		
<i>Community Planning</i>		
Zoning and Planning	A. Zoning	
	Develop and implement zoning where is not currently in place.	Local and regional governments
	B. Comprehensive Plans	
	Develop individual or joint comprehensive plans where not currently in place; prioritize joint planning efforts where possible. Encourage the development of joint plans to reflect effects over large landscape areas.	Local and regional governments
	C. Smart Growth	
	Utilize smart growth principles in new development. Encourage shift from traditional development to development that focuses on open-space, utilizes non-structural BMPs, and low-impact development principles.	Local and regional governments
	D. Light Pollution Control	
	Incorporate planning and design requirements for outdoor lighting within county and/or municipal regulations.	Local and regional governments
	E. Greenways	
	Develop individual or joint greenway plans.	Local and regional governments, watershed coalition, conservation organizations
F. Agriculture		
Integrate agricultural preservation into municipal planning and zoning	Local and regional governments	
Natural Gas Development	A. Minimize Impacts to Community and Ecosystem	
	Consider sensitive natural, socioeconomic, and visual resources in planning and approval of production, collection, and midstream facilities.	Industry, PA DEP, Conservation Districts, local and regional governments Watershed Coalition
	B. Develop Information Clearinghouse	
	Assemble existing resources data, related legislation, educational opportunities, technical, and regulatory resources so that interested stakeholders can easily access.	Watershed Coalition and partners, PA DEP
C. Improve mitigation / remediation efforts through collaboration		
Explore opportunities to improve mitigation and remediation efforts, including invasive species management, habitat restoration, and land management practices, to minimize environmental impacts and	Watershed Coalition and partners, PA DEP, DCNR, universities	

	improve habitat conditions where Marcellus activities occur or have occurred.	
Transportation Planning	Consider traffic and transportation issues in approval of new developments. Coordinate consistency with zoning and comprehensive plan goals.	PennDOT, local and regional governments
Forest Management		
Forest Conservation	A. Forest Conservation	
	Promote forest conservation and sustainable use in the watershed. Provide education programs and resources to landowners and municipalities.	Watershed Coalition, Conservation Districts, NRCS, DCNR, PFA, Penn State Extension, NWOA, conservation organizations, professional foresters
	B. Large Forest Tracts	
	Promote protection of large forest tracts through landowner education, participation in forest stewardship program, forest legacy program, comprehensive planning, and conservation easements	Watershed Coalition, Conservation Districts, NRCS, DCNR, PFA, Penn State Extension, NWOA, professional foresters
	C. Protect Forested Slopes	
	Analyze land cover, slopes, and property ownership to identify priority forested slopes for preservation. Work with municipalities and conservation districts to consider when permitting development.	Watershed Coalition, local and regional governments, Conservation Districts
D. Forest/Woodland Owners Association		
	Promote efforts of Woodland Owner Association for stewardship, resource sharing and educational opportunities.	Woodland Owners of Clarion-Allegheny Valley, Conservation Districts, Penn State Extension
Agriculture		
Agricultural Preservation	A. Agricultural Security Areas	
	Promote enrollment in existing security areas and creation of additional areas.	Conservation Districts, NRCS, FSA, local and regional governments, Watershed Coalition, conservation organizations
	B. Conservation Easements	
	Promote enrollment in state or private easement programs.	Watershed Coalition, Conservation Districts, NRCS, FSA, local and regional governments
Agricultural Best Management Practices (BMPs)	A. Agricultural BMPs	
	Install BMPs where needed.	Conservation Districts, conservation organizations, and watershed coalition
	B. Nutrient Management in Patterson Run.	

	Explore opportunities to reduce nutrients in Patterson Run; continue BMP implementation	Armstrong County Conservation District, Watershed Coalition and partner organizations
	C. Agricultural Land Owner Outreach and Education.	
	Expand outreach and education about agricultural BMPs to appropriate landowners.	Watershed Coalition and partner organizations, Conservation Districts, Penn State Extension
	D. Implement Priority Projects	
	Identified as part of plan update (see Figure 12 on p.50).	Watershed Coalition and partner organizations
Waste Cleanup		
Waste Cleanup/Litter Control	A. Illegal Dumping	
	Determine status of illegal dump sites identified during Keep PA Beautiful survey. Identify additional sites. Plan for remediation. Mitigate dump sites.	Watershed Coalition, Conservation Districts, Keep Pennsylvania Beautiful, local and regional governments
	B. Litter Control	
	Work with landowners to provide trash cans and garbage collection during first month of trout season in heavily used areas.	Watershed Coalition and partner organizations, PAFB, outdoors/recreation organizations, local and regional governments
	C. Litter Clean Ups	
	Conduct regular litter clean ups, especially in high-use areas.	Watershed Coalition, Business owners, Keep Pennsylvania Beautiful, community organizations, ASWP
Household Hazardous Waste	Sponsor local collection of household hazardous wastes, electronics waste, and unused medications.	Watershed coalition, Conservation Districts, Keep Pennsylvania Beautiful, local and regional governments, PA DEP
Water Resources		
Surface Waters		
Impairment	A. Unknown Impairment Sources	
	Determine sources of impairment for streams that are “impaired – source unknown” and determine appropriate remediation measures.	Watershed Coalition and partner organizations, ASWP, PA DEP, universities
	B. Remediation	
	Identify measures to address known sources of impairment and implement as resources allow.	Watershed Coalition and partner organizations, ASWP
	C. Point Source Analysis and Remediation.	
	Determine where point sources are likely sources of impairment and work with owners to address pollution.	Watershed Coalition and partner organizations
D. Watershed Implementation Plans for Priority Subwatersheds		

	Develop watershed implementation plans for Pine Run, Little Buffalo Creek, Marrowbone Run, and Sarver Run.	ASWP, Watershed Coalition and partner organizations, landowners, municipalities
Riparian Buffers	A. Preserve existing buffers.	
	Work with landowners, municipalities, and other partners to preserve and enhance existing riparian buffers.	Watershed Coalition and partner organizations, Conservation Districts, ASWP, conservation organizations, outdoors/recreation organizations, PA DEP Stream Releaf
	B. Identify priority riparian buffer restoration areas.	
	Analyze existing land cover, slope, and property owners to determine priority and high impact riparian buffer projects.	Watershed Coalition and partner organizations, local and regional governments
	C. Restore riparian buffers.	
	Work with various landowners and partners to restore and enhance riparian buffer areas.	Watershed Coalition and partner organizations, Conservation Districts, ASWP, conservation organizations, outdoors/recreation organizations,
	D. Implement projects identified as part of plan update.	
See Figure 12 (p. 50) for details.	Watershed Coalition and partner organizations, local and regional governments	
Sewage Treatment Facilities	Where municipal facilities are warranted, design facilities to minimize impacts to riparian, wetland and large forest tract habitats. Consider alternative treatment options where feasible.	Local and regional governments, PA DEP
	Explore development of small community-based treatment systems where appropriate as opposed to large-scale municipal systems.	Local and regional governments, PA DEP
	Update Act 537 plans to incorporate changing development patterns and to consider alternative treatment systems in rural areas	Local and regional governments, PA DEP
Erosion Control	A. Dirt, Gravel, and Low Volume Roads Program	
	Continue to work to control erosion, sedimentation, and dust from dirt and gravel roads under the PA Dirt, Gravel, and Low Volume Roads Program.	Conservation Districts, outdoors/recreation organizations, watershed coalition
	B. Streambank Stabilization and Restoration	
	Continue to implement natural stream restoration techniques to control bank erosion.	Watershed Coalition and partner organizations, conservation organizations, outdoors/recreation organizations, Conservation Districts
C. Inventory and conduct maintenance needs to streambank stabilization structures		

	Inventory existing streambank stabilization structures to determine maintenance needs; conduct maintenance where appropriate.	Conservation Districts, Watershed Coalition
	D. Remove debris blockages at bridges and culverts; minimize ecological impacts during process.	
	Work with land owners and partners to minimize ecological impacts when managing debris.	Conservation Districts, Local and regional governments, conservation organizations, Watershed Coalition
	E. Adopt Erosion Control Ordinances	
	Adopt and enforce local erosion and sediment control ordinances.	Local and regional governments
	F. Implement priority projects identified as part of plan update.	
	See Figure 12 (p. 50) for details.	Watershed Coalition and partner organizations
Stormwater		
Stormwater Plans and Ordinances	Prepare/Update Act 167 Plans.	Local and regional governments
	Adopt and enforce stormwater ordinances. Ordinances should be compatible with Phase I and II NPDES regulations for pre- and post-construction discharges.	Local and regional governments
Stormwater Management	Work to alleviate current stormwater discharge problems. Evaluate potential to retrofit existing commercial, industrial, and school facilities.	Local and regional governments, Conservation Districts
Green Stormwater Infrastructure (GSI)	Work with municipalities and large land owners to implement GSI facilities such as rain gardens and bioswales. Prioritize this work in MS4 and other growing communities.	Local and regional governments, Conservation Districts, Watershed Coalition and partner organizations, ASWP
	Implement projects identified as part of plan update. See Figure 12 (p. 50) for details.	Local and regional governments Conservation Districts, Watershed Coalition and partner organizations
Biological Resources		
Invasive Species		
Invasive Species Control	A. Japanese Knotweed	
	Develop and implement plan to prevent spread of knotweed and restore floodplain vegetation in lower Buffalo Creek.	Watershed Coalition and partner organizations, Conservation Districts, Outdoors/Recreation organizations, conservation organizations, community groups, landowners, local and regional governments
	B. Hemlock Woolly Adelgid	
	Distribute educational resources to landowners. Develop and implement comprehensive monitoring program; identify resources and management plan for anchor tracts of forest.	Watershed Coalition, DCNR, conservation organizations, landowners, Foresters, Conservation Districts

	C. Spotted Lantern Fly	
	Provide educational materials and assistance to landowners and municipalities to prevent introduction and spread.	Watershed Coalition, DCNR, conservation organizations, landowners, Conservation Districts
	D. Invasive Plants	
	Provide educational materials and assistance to landowners and municipalities to control established populations and prevent additional introductions of Japanese Stiltgrass, Garlic Mustard, Spindletree, Purple Loosestrife, Tree-of-Heaven and other species as warranted.	Watershed Coalition, DCNR, conservation organizations, landowners, Foresters, Conservation Districts, ASWP
	E. Aquatic Invasive Animals	
	Provide educational materials and assistance to landowners and municipalities to control established populations and prevent additional introductions of Zebra Mussel, and the introduction of Silver Carp and Bighead Carp, and other species as warranted.	Watershed Coalition and Partner organizations, PFBC, Conservation Districts, outdoor/recreation organizations
Habitat Conservation		
Aquatic Habitat	Determine high priority / high impact aquatic habitat projects.	Watershed Coalition and partner organizations, DCNR, outdoor/recreation organizations, conservation districts
	Work with landowners to improve and restore fish habitat.	Watershed Coalition and partner organizations, landowners, DCNR, outdoor/recreation organizations, conservation organizations, Conservation Districts, PFBC
Habitat Management on Private Property	Expand Certified Backyard Habitat Program	ASWP
Bird Friendly Community Recognition Program	Work with municipalities to steward birds, wildlife, and healthy watersheds through the Bird-Friendly Community Recognition Program	ASWP
Lead Awareness & Buy-Back Program	Develop an awareness campaign to educate the public including hunters and the fishing community about the impacts of lead ammunition and tackle on the environment. Explore opportunities to lead buy-back programs.	ASWP, Watershed Coalition, Outdoor/Recreation organizations, Game Commission, PAFB, DCNR
Strategic Conservation Plan	Develop a strategic conservation plan to identify highest ecological value properties within the watershed and identify mechanisms for permanent conservation such as conservation easements and acquisition	ASWP, Watershed Coalition and partner organizations
Recreational Resources		
Community Parks/ Recreation	Prepare recreation plans for those municipalities lacking plans.	Local and regional governments, DCNR, recreation organizations

	Develop municipal recreation facilities in accordance with plans.	Local and regional governments, DCNR, recreation organizations, partner organizations
	Provide for passive outdoor recreation facilities such as trails and provide interconnections between facilities.	Local and regional governments, DCNR, outdoor/recreation organizations, landowners, conservation organizations
Streams	A. Buffalo and Little Buffalo Creeks Access	
	Identify potential stream access opportunities. Work with landowners to develop public access sites for fishing and boating access.	Watershed Coalition and partner organizations, landowners, DCNR, ACC, PFBC, local and regional governments, outdoors/recreation organizations
	Initiate/expand trout stocking and smallmouth bass fishery management as appropriate. Add additional special regulation areas as appropriate.	Outdoors/recreation organizations, DCNR, PFBC, Watershed Coalition and partner organizations
	Work with landowners to develop access site amenities such as parking and restroom facilities at heavily used locations.	Outdoors/recreation organizations, DCNR, PFBC, Watershed Coalition and partner organizations
	B. Youth/Disabled Fishing Areas	
	Work with landowners to develop additional youth and disabled fishing access. Implement special regulations to ensure appropriate use.	Watershed Coalition and partner organizations, landowners, DCNR, PFBC, ACC, outdoor/recreation organizations
Butler-Freeport Trail	Provide amenities such as additional parking, signage, and permanent restroom facilities at key locations. Include educational information about watershed where possible.	BFCT, local and regional governments, watershed coalition
	Continue to address maintenance issues including flooding and erosion.	BFCT, local and regional governments, landowners, Watershed Coalition and partner organizations
	Implement priority projects identified as part of plan update. See Figure 12 (p. 50) for details.	BFCT, local and regional governments, landowners, Watershed Coalition and partner organizations
	Provide connections to nearby recreation facilities/trails.	BFCT, landowners, conservation organizations, watershed coalition, local and regional governments,
Todd Nature Reserve / Todd Complex	Complete Buffalo Creek Nature Center to serve as an environmental education hub and recreational amenity	ASWP and Buffalo Township
	Work with adjacent landowners to conserve forest core and buffer the areas watershed.	ASWP

	Implement a Hemlock Woolly Adelgid Monitoring and Management Plan. Utilize as demonstration for other properties within watershed.	ASWP, Foresters
	Implement habitat restoration, monitoring programs, facility improvements, and user experience enhancements identified in Todd Complex Land Management Plan	ASWP

4.1 Watershed Coalition

Formation of an active, functioning Watershed Coalition is viewed as the critical priority for the implementation of this Plan Update. This coalition is needed to initiate or coordinate many of the items included in this action plan. ASWP has taken initial steps towards creating a watershed coalition which will operate under its auspices, including requests for funding to organize and incorporate this organization. The development of a **Citizen Advisory Committee** to help guide activities of the Watershed Coalition will be a key initial step in the formation of the organization.

Building upon the formation of the Watershed Coalition, the remaining elements of the Action Plan Update were organized according to five Action Item categories:

- Education and Technical Resources
- Land Resources
- Water Resources
- Biological Resources
- Recreational Resources

Within these categories, various action items have been developed to meet the goals, as appropriate. For each action item, potential partners in implementing the recommendation are suggested. Potential partners were identified through the public coordination process, review of organizations present in the watershed with interests consistent with the action plan item, and based upon regulatory provisions or requirements for municipal participation. *These partnerships are merely suggestions and do not represent a commitment by any party to participate.*

Further, the implementation of these themes must be consistent with landowner preferences and private property rights. Approximately 99 percent of the watershed is in private ownership. **Therefore, nearly all initiatives in the watershed will depend on private landowners for success.** Initiatives need to be consistent with private property rights and landowner preferences, and landowners must be part of any planning process.

The regulatory and financial requirements and opportunities, as well as participants available to implement plan components, can be expected to change over time. These changing conditions may modify priorities.

4.2 Educational and Technical Resources

In addition to the overall coordination and implementation of various action plan items, several specific projects have been identified for the Watershed Coalition, some in cooperation with partner organizations, to foster stewardship and promote education. These include:

- Develop a **watershed website**. This website would invite participation in the coalition, serve as information clearinghouse for watershed resources and events, and also function as an information portal for outdoor recreation information.
- Develop **educational materials** to raise awareness about watershed issues and resources.
- Develop a **School Outreach program** to partner with local school districts to implement watershed and environmental education efforts.
- Organize and coordinate an annual **Buffalo Creek Watershed Festival** celebrating the lifestyle, history, biodiversity, and recreation opportunities of the watershed. The festival would serve dual purposes as a means of encouraging and promoting stewardship and of inviting visitors to experience the watershed. It would provide an opportunity for all organizations active in the watershed to meet the public and promote their activities.
- Initiate **Educational & Outreach Events** including workshops and educational events for landowners, stakeholders, and the general public on topics of local or regional interest.
- Implement **Social Media and Outreach** efforts, including the establishment of social media and regular email blasts to promote watershed activities and opportunities to get involved.

4.3 Land Resources

The Land Resources category contains a broad range of issues relating to resource use and protection. Four areas of focus are identified for action items:

- Community Planning
- Forest Resources
- Agriculture
- Waste Cleanup

4.3.1 Community Planning

During the public involvement process, residents indicated that the current rural and small town atmosphere is a very highly valued quality of the watershed. In fact, the rural character was often identified as a primary reason why people choose to live where they do. Rural character is most threatened by sprawl and the introduction of incompatible land uses, which are direct threats to quality of life enjoyed by residents. At the same time, residents enjoy and value highly their individual prerogatives to determine the best use for their property.



The rural and small town atmosphere of the watershed is highly valued by residents.

Photo: George Reese

Planning is needed in order for municipalities to successfully retain the rural and small town atmosphere that the residents value. In the absence of planning, uncontrolled growth leads to sprawl and incompatible uses. The Pennsylvania Municipalities Planning Code requires counties, and enables other municipalities, to prepare

and adopt comprehensive plans for the sound development of communities. To date, some municipalities have often been disinclined to prepare comprehensive plans for a number of reasons. However, planning, and the zoning regulations that are used to implement plans, are the most effective tools available to ensure that the needs and desires of the community, at its most local level, are considered in future development. For this reason, municipalities should consider preparing **comprehensive plans** and enacting **zoning ordinances** to ensure that the needs and desires of their citizens are attained. Where possible, **multi-municipal** and **regional comprehensive plans** should be pursued to ensure regional continuity and maximize resources to support these planning efforts.

In addition, the incorporation of **smart growth principles** in providing for future development can ease the accommodation of new growth while maintaining the overall rural quality of the area. Smart growth has been defined as growth that balances economic, social, and environmental interests to make fair, efficient use of public resources and bring services and amenities closer to people. Smart growth principles include encouraging compact development, protecting open space and farmlands, encouraging partnerships, and reliance on incentives rather than prohibitions to accomplish goals.

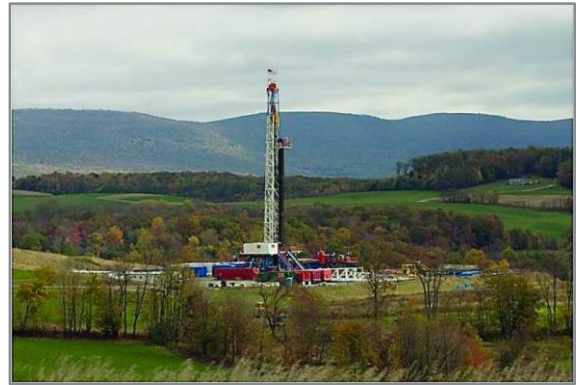
Increasing development is leading to light pollution as a result of excessive or poorly designed outdoor lighting. This reduces the rural character of the landscape as these sources are often visible for many miles at night. In order to address this problem, it is recommended that **planning and design requirements for outdoor lighting** be incorporated into county and/or municipal regulations pertaining to new development. Additionally, minimizing light pollution will support safe avian migration.

The Pennsylvania **Greenways Program** was launched in August 2001 with the completion of a statewide greenways action plan designed to provide a coordinated and strategic approach to creating connections through the establishment of greenways. DCNR has been designated by the Governor as the lead agency for implementation of the greenway plan. The greenways action plan (*Pennsylvania Greenways, An Action Plan for Creating Connections*), sets the direction for a program to establish a statewide network of greenways, with a greenway in every local community by 2020.

As defined by DCNR, *“A greenway is a corridor of open space. Greenways vary greatly in scale, from narrow ribbons of green that run through urban, suburban, and rural areas to wider corridors that incorporate diverse natural, cultural and scenic features. They can incorporate both public and private property, and can be land- or water-based. They may follow old railways, canals, or ridge tops, or they may follow stream corridors, shorelines, or wetlands, and include water trails for non-motorized craft. Some greenways are recreational corridors or scenic byways that may accommodate motorized and non-motorized vehicles. Others function almost exclusively for environmental protection and are not designed for human passage. Greenways differ in their location and function, but overall, a greenway will protect natural, cultural, and scenic resources, provide recreational benefits, enhance natural beauty and quality of life in neighborhoods and communities, and stimulate economic development opportunities.”* Among other greenway activities, DCNR promotes the development of “greenway plans” by county and local governments as an integral part of their comprehensive planning and implementation efforts. DCNR administers grants to fund the preparation of greenway plans and implementation of plan recommendations. Greenways are recommended as a key feature in the preservation of open space within the watershed and should be developed for all watershed municipalities.

The development of **natural gas resources** associated with the Marcellus Shale was identified as a major area of interest in public coordination efforts for the Plan Update. There was little activity associated with this resource in the watershed at the time of the original Plan development, but this rapidly changed in the intervening years. Natural gas represents a significant economic opportunity for the watershed, but it is recognized that development of the resources needs to be conducted in a way to **minimize impacts to the community and ecosystem**.

Industry, regulatory agencies, and municipalities are collectively encouraged to consider sensitive natural, socioeconomic, and visual resources in planning and approval of production, collection, and midstream facilities. One recommended means of facilitating this effort is to develop an **Information Clearinghouse** to provide stakeholders with easy access to resources data, related legislation, educational opportunities, and technical, and regulatory resources.



Marcellus Shale well pad. Photo: Trib Total Media

Opportunities exist to improve **remediation and mitigation activities through collaboration** in order to minimize environmental impacts associated with Marcellus activities. These may include invasive species management, habitat restoration, voluntary stream set-backs, and land management practices for pipe lines and well pads. DCNR has recently conducted some promising research in Tiadaghton State Forest on maximizing habitat value of areas surrounding well pads, pipelines, and other construction areas. Building from this and other related research could be beneficial.

An additional area of concern that was widely expressed in public comments was the need for greater and more effective **transportation planning**. Increasing development within the watershed has resulted in traffic volumes and usage patterns that exceed capacity and design criteria on many area roadways, and creates unsafe conditions for residents and visitors alike. Local municipalities, county planning departments, and PennDOT are urged to consider traffic and transportation issues in the approval of new developments, and to coordinate transportation consistency with zoning and comprehensive plan goals.

4.3.2 Forest Management

Forest resources were identified by many residents as one of the outstanding attributes of the watershed. Almost all forests in the watershed are privately owned. These areas have by and large benefited by the enlightened and dedicated stewardship of landowners, many of whom have owned properties for generations. In order to strengthen and increase stewardship, landowners can be encouraged and supported in a number of ways. As a first step, the watershed coalition could pursue a **Forest Conservation/Sustainable Use Program** to promote these efforts in the watershed. This program would provide educational materials, programs, and resources to landowners and municipalities. The establishment of a **Forest/Woodland Owners' Association** to support stewardship efforts would further facilitate these activities.



Forest management directly impacts the quality of recreational, land, biological, and water resources in the watershed.

Photo: George Reese

Another key element of this effort would be to develop an inventory of **Large Forest Tracts** and **Forested Slopes** in the watershed and to promote protection of these resources. This inventory would include the size, type and ownership of forest tracts; the identification of large forest tracts, slope factors, and identify forest management issues pertaining to these areas that may be of use to landowners. Landowners can be encouraged to participate in the Pennsylvania Forest Stewardship Program, the Forest Legacy Program, the American Tree Farm System, and to prepare conservation plans for their properties with NRCS assistance. In addition, loggers working in the watershed can be encouraged to become certified under the Sustainable Forestry Initiative of Pennsylvania and landowners can be encouraged to engage the services of certified professionals. Public and agency landowners, such as the Pennsylvania Game Commission and municipal parks, are encouraged to further consider forest conservation in planning and management activities, and will be recognized for their contributions. Particularly vulnerable large forest tracts or other sensitive forest communities can be provided with additional protection, with the landowner's consent, through comprehensive planning and through conservation easements. Protecting forested slopes can be considered by municipalities and conservation districts in both land use planning and permitting efforts.

4.3.3 Agriculture

Preserving the rural atmosphere and agricultural heritage of the watershed was identified as an important concern of participants in the public outreach efforts for the plan update. Municipalities are encouraged to integrate agriculture preservation into their planning and zoning efforts. Agriculture is a dominant land use in the watershed (30.8 percent) and is a critical component of the rural landscape. The state has initiated several programs to facilitate **Agricultural Preservation**, including **Agricultural Security Areas (ASAs)**, **agricultural easements**, and the **Clean and Green Program**. Farmers should be further encouraged to participate in these programs and provided with technical assistance as needed to enroll in relevant programs. In addition, other organizations can step in to provide assistance to farmers through purchase of **privately-funded conservation easements**. These arrangements can serve to benefit the farmer and benefit the public at large through retention of the agricultural and rural aspects of the watershed.



Preserving the agricultural heritage of the watershed was identified as important to residents.

A wide variety of other programs are available to help farmers improve their bottom line while enhancing environmental conditions. For example, farmers should be further encouraged to prepare conservation plans and install **Agricultural Best Management Practices (BMPs)** for their properties with NRCS assistance. Substantial progress has been made in implementing BMPs. However, there are still a number of farms could benefit from BMPs with the advice and assistance of the conservation districts. An **Agricultural Land Owner Outreach and Education Effort**, facilitated by the Watershed Coalition, could be used to promote these and other activities. The Patterson Run subwatershed has a TMDL in place as a result of nutrient levels due to improper agricultural practices. Continued implementation of **Agricultural BMPs to reduce nutrients in Patterson Run** provides a near-term opportunity to provide for substantial water quality improvement in the watershed.

4.3.4 Waste Cleanup

Trash and litter were identified as important concerns during the public input process. There are several opportunities to address trash and litter problems in the watershed. These include efforts to address **Illegal Dumping** through development of a site inventory and remediation plans, working with landowners to provide **Litter Control**, and conducting regular **Litter Cleanups**. **Household Hazardous Wastes** have been reported to be substantial components of the illegal dumping problem. There are currently few or no local legal collection opportunities. Therefore, it is recommended that municipalities and other organizations work to organize and sponsor local collection events for household hazardous wastes.

4.4 Water Resources

Based upon the rather limited data available, water resources are currently perceived to be at-risk in many locations. Water resource issues expressed during the public involvement process generally focused on issues associated with increased residential development, including direct impacts to water quality as well as increased flooding from stormwater. Erosion and sedimentation and loss and degradation of riparian buffers also contribute substantially to water quality issues in the watershed. Areas of focus for surface waters are identified for surface water and stormwater action items in the following discussion.

4.4.1 Surface Waters

Approximately 34.6 miles of streams within the watershed are identified by PA DEP as “Impaired – Source Unknown.”

Determining the **sources of impairment** is a key first step in developing appropriate **remediation efforts**. Remediation efforts will need to be directed to broad watershed-based efforts as well as toward **point-source impairment sources**. Acid mine drainage (AMD) discharges are an example of point-source impairments. These can often be controlled by passive treatment systems such as wetland systems. There are three major AMD discharges documented in the Armstrong County portion of the watershed. These include one on Marrowbone Run and two that drain to the impounded portion of Buffalo Creek at Laneville (Freeport). The Marrowbone Run discharge is located in an area that is suitable for construction of a passive treatment wetland system. It is recommended that **Watershed Implementation Plans for Subwatersheds** be developed to implement remediation efforts. In order to initiate this effort, it is recommended that plans be developed initially for the subwatersheds with the highest percentages of impairment. These would include Pine Run, Little Buffalo Creek, Marrowbone Run, and Sarver Run.



Sedimentation and erosion are some of the major sources of non-point source pollution in the watershed. Photo: Patrick Shirey

Riparian buffers are a key component in establishing and maintaining water quality. There is a need to **preserve existing buffers**, and to **restore buffers** where they have been lost. All streams in the watershed should be candidates for buffer protection utilizing an appropriate method. A needed first step is the inventory of existing buffers and the identification of **priority restoration areas**. ASWP has taken initial steps to identify a number of potential **buffer restoration projects**, which are shown on Figure 12. This effort can be transitioned to the Watershed Coalition and its partners in the future. Appropriate riparian buffer protection should be incorporated in county and municipal subdivision ordinances. Greenway protection can also provide protection for riparian vegetation. Riparian buffer protection and greenway planning should be coordinated to achieve maximum effect.

A number of resources and actions are available to control erosion and sedimentation. ASWP has taken initial steps to identify a number of **priority erosion and sediment control projects**, which are shown on Figure 12. This effort can be transitioned to the Watershed Coalition and its partners in the future. It is recommended that the county conservation districts and Trout Unlimited continue to work to control erosion, sedimentation, and dust from dirt and gravel roads under the Pennsylvania **Dirt, Gravel, and Low Volume Roads Program**. **Streambank Stabilization and Restoration** projects have been very successful in a number of locations within the watershed, particularly along Buffalo Creek in Armstrong County. It is recommended that these efforts be expanded to other areas, including those portions of Little Buffalo Creek where erosion threatens stability of the Butler – Freeport Trail. The existing stabilization and restoration project sites should be inventoried to identify and address **maintenance needs**. The **removal of debris blockages** at bridges and culverts will eliminate some of the readily-accessible sources of bank erosion and scouring. Developing resources for managing debris and blockages in an ecologically-friendly way will help minimize impacts to watershed health. Finally, and perhaps most importantly, municipalities should consider adopting and enforcing **local erosion and sediment control ordinances**.

Sewage and sewage treatment issues continue to be of concern in the watershed. Municipal treatment systems are typically considered wherever problems arise and are often dictated by existing regulations. However, these facilities are often very ill-suited to rural environments such as the majority of the Buffalo Creek watershed. Great economic hardship can be imposed on rural communities and residents by the expense of installing and maintaining these facilities. In addition, the installation of public infrastructure such as sewage often creates a stimulus to development by permitting high density uses to occur in areas that were previously limited by provisions of building regulations. Finally, the construction of sewer lines and treatment plants typically occur along streams. These can have substantial adverse impacts on natural communities in the stream valleys. The strong potential exists for sewage facilities to create far greater adverse land use, economic, and ecological impacts than the incremental improvement in water quality obtained by their construction.

Where municipal facilities are warranted, these should be limited to towns rather than extended township areas, and municipal facilities must be **designed to minimize impacts to ecological resources including riparian, wetland and large forest tract habitats**. It is vital that these areas be identified during the project development phase, and the PA DEP and other permitting and review agencies require an environmental assessment of impacts to these areas prior to authorization for construction. **Alternative treatment options should be considered wherever feasible**. PA DEP regulations and procedures may need to be modified to allow for alternative options, such as increased use of low-cost community-based rather than municipal systems, and increased focus on providing for functioning on-lot septic systems. Malfunctioning septic systems are a concern in the watershed. Municipalities can take a proactive role in addressing these problems to avoid the need for more intensive treatment solutions. Many of the local **municipal 537 sewage management plans** are out of date. Municipalities should consider updating their plans to reflect changing development patterns and to consider alternative treatment systems in rural areas.

4.4.2 Stormwater

Stormwater issues also continue to be of concern to watershed residents. Impacts from recent development have created noticeable problems. Because stormwater discharge affects downstream properties irrespective of municipal boundaries, planning for stormwater management is most effective when conducted on a watershed basis. Therefore, it is recommended that watershed municipalities work

together to prepare an **Act 167 Stormwater Management Plan** for the entire watershed. Municipalities also should consider **adopting and enforcing stormwater ordinances** that are compatible with Phase I and II NPDES regulations for pre- and post-construction discharges, if they have not already done so. **Stormwater remediation** efforts should be considered where there are current stormwater discharge problems. For example, the potential to retrofit or redesign existing residential and commercial development, industrial, and school facilities to control discharge could be evaluated. **Green Stormwater Infrastructure (GSI)** facilities are effective in this regard, and would be especially valuable in MS4 and other growing communities. ASWP has taken initial steps to identify a number of potential **GSI Projects**, which are shown on Figure 12 (p. 50).

4.5 Biological Resources

Action plan items pertaining to biological resources largely focus on the control of invasive species that threaten biodiversity, and on the maintenance and enhancement of the existing, regionally significant ecological communities.

4.5.1 Invasive Species

A critical and immediate need is to halt the spread of **Japanese Knotweed** along the main stem of Buffalo Creek. This invasive species has caused significant damage to the forest and riparian ecosystem between the S.R. 28 bridge and the Allegheny River, and it is rapidly spreading upstream to areas just below the Iron Bridge road crossing. Substantial stands are also located in the upper Pine Run subwatershed. Throughout this area it has virtually eliminated all other understory plant communities and is prohibiting the regeneration of canopy tree species. Spread of this species up the watershed could have potentially devastating consequences to land, water, biological, and recreational resources. Eradication of established populations is extremely expensive and labor-intensive. Therefore, containment is the primary



Japanese Stiltgrass is a relatively new invasive species in the watershed and rapidly spreads.

immediate objective throughout the watershed. Damage is so substantial and widespread in the floodplain of lower Buffalo Creek that a partnership effort potentially involving the Watershed Coalition, municipalities, Conservation Districts, the Butler-Freeport Trail Council, and landowners is needed for an **implementation plan** for eradication and control efforts, as well as the restoration of native riparian vegetation. Implementation of the plan would involve providing educational materials to landowners, trail users, and municipalities concerning containment and eradication; providing financial and material assistance to organizations and/or landowners to eradicate populations; and the implementation of additional local regulations to ensure that fill material used in the watershed does not result in additional introductions of knotweed or other invasive or noxious species.

A number of other **invasive plant species** are established in the watershed and warrant efforts to educate and provide assistance in order to limit spread and encourage efforts at elimination. These include Japanese Stiltgrass, Purple Loosestrife, Garlic Mustard, and Tree-of-Heaven. An emerging invasive species, the **Spindletree**, has been identified in and around Todd Nature Reserve. This species is on the invasive plant and/or invasive watch list in several surrounding states but is not yet listed in Pennsylvania. ASWP has enacted a rapid response plan to address this species at Todd Nature Reserve but a more comprehensive approach is needed to address this species on a larger scale.

Several species of invasive insects including the **Hemlock Woolly Adelgid** and the **Spotted Lanternfly** are an increasing threat to biodiversity in the watershed. The Hemlock Woolly Adelgid is, as the name suggests, specific to the Eastern Hemlock as a host and is capable of eliminating the hemlock from the ecosystem within the span of a few years. This could have a devastating impact on the extensive hemlock-white pine-northern hardwood forest ecosystem that is such a characteristic component of the watershed landscape. The adelgid is currently becoming established within the watershed. Therefore, its control is also a critical and immediate need. The Spotted Lanternfly is an impending threat to all trees. In order to address the serious threat to the watershed's forest communities, planning and control efforts are needed in the near future. Proactive planning to control infestations could have a substantial effect in preventing widespread defoliation and death of hemlocks and other species. It is envisioned that this program would include a monitoring program to quickly identify outbreaks and an educational and technical assistance component to assist landowners in initiating effective control measures. For the adelgid, it is also suggested that a management plan for anchor tracts of forest be developed.

In addition, several species of **invasive aquatic animals** have become established or may soon become established in the watershed, including Silver Carp, Bighead Carp, and Zebra Mussel. As with the invasive plant species, efforts to educate and provide assistance in order to limit spread and encourage efforts at elimination are warranted.

4.5.2 Habitat Conservation

Several efforts to provide for inventory and conservation of key habitat areas, or to provide education and landowner support are warranted as high priority items for near-term implementation.

At the highest level, there is a need to develop a **strategic conservation plan** to identify highest ecological value properties within the watershed and identify mechanisms for permanent conservation such as conservation easements and acquisition. It is envisioned that this would be prepared by the Watershed Coalition, with assistance from partner organizations. An element of this effort would be the protection and enhancement of **aquatic habitats**. This task would identify locations with potential for high impact or high priority to implement projects to conserve or enhance aquatic habitats or fishery resources.



Identifying the highest ecological value properties and mechanisms for conservation offers a long-term solution for protecting the health of the watershed. Photo: George Reese

ASWP has several ongoing programs to promote habitat and species conservation efforts. These include the Certified Backyard Habitat Program promoting **habitat stewardship on private property**, and the **Bird-Friendly Community Recognition Program**. Efforts to expand the Certified Backyard Habitat Program with landowners and the Bird-Friendly Community Recognition Program with watershed municipalities will have significant impacts for preserving and enhancing both environmental quality and quality of life for residents.

There are many opportunities to work with hunters and the fishing community to locally address the state-wide crisis of raptor, including Bald Eagle, deaths from lead poisoning. Raptors can be poisoned by eating animals that have been shot and left behind. Smaller animals can be poisoned by lead fishing tackle that

has been lost by the water's edge or snagged. A **lead awareness campaign** to educate the public including hunters and the fishing community about the impacts of lead ammunition and tackle on the environment can help to address these issues within the watershed. Opportunities to develop a **lead buy-back program** should be explored. There are examples of successful lead buy-back programs and complementary initiatives, such as gun recalibration to work with lead-free ammunition, across the country.

4.6 Recreational Resources

As with the development of the original Plan, considerable desire was expressed for additional and expanded outdoor recreational opportunities during the public involvement process. Public facilities are generally lacking in most areas of the watershed. Activities that are enjoyed by thousands, such as fishing, rely primarily on the generosity of landowners to allow public access to their properties. Additional support can be offered to landowners to help maintain this access, and to increase access opportunities throughout the watershed. A number of groups are working very hard to provide recreational activities; further cooperation and coordination among groups would likely lead to increased success in mobilizing volunteer efforts and in obtaining funding. Organizations in the watershed are encouraged to explore partnership opportunities to both ease their individual burdens and increase recreational resources for all.

Community parks are highly desired by residents. Few are available at present; these are not adequate to meet the needs of current, let alone growing populations. Development of community parks is the responsibility of the counties and municipalities. Typically, the initial step in developing park facilities is the preparation of a **community recreation plan**. These can be prepared for a single municipality or can be joint efforts. Those municipalities lacking plans should prepare one. Funding for planning is widely available. Municipal recreation facilities developed in accordance with plans should provide for **passive outdoor recreation facilities** such as trails, and ideally will provide interconnections between facilities. Joint planning is a desirable option in that municipalities can not only share costs and effort, but also plan for more diverse facilities providing for a wider array of opportunities.



Expanding youth and accessible fishing access is important. Photo: George Reese

Buffalo and Little Buffalo Creeks are among the principal recreation resources in the watershed. Upper portions of the Buffalo Creek mainstem watershed have extensive access available on private lands. However, these areas are seeing increasing use and appear to be at or near capacity during the peak fishing season. Extensive unutilized areas are located downstream, including a regionally significant Smallmouth Bass fishery. Although paralleled by the Butler-Freeport Trail for much of its length, Little Buffalo Creek has almost no public access. It is recommended that the Watershed Coalition, in coordination with partner organizations, identify potential stream access opportunities and work with landowners to develop **Buffalo and Little Buffalo Creek access opportunities** for fishing and boating. Some existing fishing and boating access sites would benefit greatly by the addition of **access site user amenities** for comfort and health/ safety issues. The watershed coalition and other interested groups should work with landowners to provide off-road parking and restroom facilities at heavily used locations. Restroom facilities are most needed during the first month of trout season. The deployment of portable restroom facilities with landowner permission would alleviate a number of problems.

Additionally, a formal **litter control program** that is implemented during the first month of trout season would be highly beneficial to landowners. This effort would include the temporary deployment of trash cans and regular garbage collection in heavily used areas to minimizing litter on private property. The PFBC should explore initiating **fishery management efforts** (including trout stocking and Smallmouth Bass fishery management and additional special regulation areas), as appropriate, as access becomes available. The single youth and handicapped accessible fishing site in the watershed is heavily used. More facilities of this type are needed. It is recommended that the watershed coalition and other interested groups work with landowners to develop additional **youth and accessible fishing access**. The PFBC should implement special regulations to ensure appropriate use of these areas, as needed.

The **Butler-Freeport Trail** is an outstanding regional recreation resource. Significant recreational opportunities exist to **connect the trail to other components of the regional trail system**, such as the Baker Trail and Rachel Carson Trail. Connections to other local recreational areas and trails should also be considered in development of municipal greenway and recreation plans. Additional Butler-Freeport Trail **amenities** such as additional parking, signage, and permanent restroom facilities at key locations are needed. Maintenance issues including flooding and erosion continue to be a regular problem in many locations. **Priority projects** to address these various other issues are identified in Figure 12 (p. 50).

ASWP will continue to develop trails and visitor facilities at **Todd Nature Reserve** in Buffalo Township. ASWP has been implementing measures to enhance protection of this important area for much of the past decade. These efforts have included land purchases and obtaining of conservation easements. ASWP will continue these efforts to **enhance protection of the forest core and buffer the watersheds**. ASWP is in the process of completing the **Buffalo Creek Nature Center** to serve as an environmental education hub and recreational amenity. As resources allow, ASWP will continue to implement the recommendations contained in the **Todd Complex Land Management Plan**. In addition, ASWP has the opportunity to take a leading role in controlling the Hemlock Woolly Adelgid. ASWP will work to implement a **Hemlock Woolly Adelgid Monitoring and Management Plan** that can be utilized as a demonstration for other properties within watershed.

4.7 Additional Action Items

Table 16 outlines additional action items to pursue as time and resources allow.

Table 16: Additional Action Items, Organized by Resource Category

Action Items & Description	
Education and Technical Resources	
State of the Watershed Report - Compile a periodic summary of progress and needs.	
Environmental Advisory Committees (EACs) - Establish environmental advisory committees (as authorized under Pennsylvania Municipalities Planning Code) to advise local elected officials on environmental matters.	
Land Resources	
Planning and Zoning	Conservation Plans - Encourage farmers and large landowners to prepare conservation plans for their properties under the NRCS assistance program.
Forest Conservation	Clean and Green Program - Promote enrollment of farmland and forest in the Clean and Green Program.
	Forest Stewardship - Encourage landowner to participate in the PA Forest Stewardship Program and/or American Tree Farm System.

	Bird-Friendly Forestry Training – Develop and implement training program for foresters to conduct bird habitat assessments and how to incorporate bird-friendly practices into forest management plans.
	Urban/Suburban Forestry – Work with municipalities and planned communities to develop and implement forestry management plans for urban and suburban areas.
Agriculture	Local Agriculture Promotion - Promote local agriculture through advertising, cooperative efforts, agro-tourism, and farmers’ markets.
	Conservation Reserve Enhancement Program - Promote enrollment in CREP programs
	Century Farms - Promote enrollment and community recognition.
Historic/Cultural Resources	Data Compilation – Conduct a data review, including crowd-sourcing information, to compile information on the cultural resources of the watershed. Explore creating dedicated programming and materials on the topic.
Mined Lands	Status of Mined Lands – Determine status of mined lands and where additional restoration may be needed. Implement restoration activities where appropriate.
Water Resources	
Watershed Implementation Plans (WIPs) for Subwatersheds – Develop WIPs for all subwatersheds.	
County Watershed Assessment - Prepare and/or update watershed assessments for portions of the watershed in each county.	
Monitoring Program - Implement a long term, comprehensive flow and water quality monitoring program in the watershed. Include sub-watershed and QA/QC components.	
Septic Systems - Implement septic system inspection programs and enforce regulations concerning malfunctioning septic systems. Provide resources to homeowners concerning repair of malfunctioning systems. Establish cost-share program to assist with repairs.	
Stream Corridor Fencing - Provide fencing and livestock crossings to stabilize and restore riparian corridors.	
Nutrient Management Plans - Encourage and assist farmers in developing nutrient management plans.	
AMD Remediation - Identify, rank, and obtain funding to design and implement AMD remediation efforts.	
Landowner Incentives – Identify resources and develop supporting program to incentive landowners to exceed minimum stormwater control measures when developing property in sensitive areas.	
Biological Resources	
Fishing Line Recovery and Recycling – Expand fishing line recovery and recycling program to the watershed to protect wildlife from harm from fishing line and to increase awareness of the hazards of improperly discarded fishing line.	
Biological Diversity Area (BDA) Stewardship Program - Develop a land steward program for BDAs. Volunteers responsible for landowner education and monitoring. Work with landowners to help preserve biodiversity and conservation areas.	
BDA Habitat Management and Protection – Work with landowners, municipalities, and partner organizations to protect habitat in BDAs by managing invasive species and restricting activities such as use of off-road vehicles.	
Massasauga Habitat Program - Inventory massasauga rattlesnake habitat, develop and implement conservation and restoration plans	
Hemlock Wooly Adelgid - Monitor for outbreaks, work with landowners to initiate control measures.	
Deer Population - Support efforts to reduce deer populations. Promote increased hunting access on public and private land. Provide educational materials to landowners and municipalities.	
Chronic Wasting Disease (CWD) – Support efforts to monitor and control CWD. Provide educational materials to landowners.	
Buffalo Creek IBA – Develop management plan for IBA. Develop and implement comprehensive public awareness and education initiative that includes public, municipalities, and schools. Include emphasis on biological diversity, habitat conservation, and protecting forest and water quality to conserve species.	
Grassland Bird Nesting - Encourage farmers to avoid hay harvest until July where feasible. Explore financial incentives under CREP, etc. where species of concern are involved.	
Recreational Resources	
Buffalo Creek Water Trail - Work with landowners and PFBC to incorporate appropriate sections of Buffalo Creek into the PA Water Trails System. Develop mapping, signage, access points as appropriate.	
Minteer Preserve Trails - Develop trails and public access facilities on Armstrong Conservancy property.	
Buffalo Creek Birding Trail - Develop a Buffalo Creek Birding Trail to highlight regional importance of the Buffalo Creek IBA. Coordinate access points, develop guidebook, and create website.	

State Scenic Rivers System - Consider designation in the PA Scenic Rivers System if there is sufficient public and municipal interest.
Camping Opportunities - Work to develop additional camping opportunities by commercial providers and on private land through landowner incentives.
Volunteer Public Access (VPA) Program - Promote increased hunting access and habitat management on private land through the Game Commission's VPA Program.
Historic registration for TNR - Explore historic registration opportunities for TNR.

APPENDIX A: SURVEY

**Buffalo Creek Watershed Conservation Plan 10-Year Update
Survey**

Name: _____

Email: _____

What organization do you represent (if applicable)? _____

Please check all boxes that apply to you:

- Watershed resident
- Work in watershed
- Recreate in watershed
- Attend school in watershed

What are the most important qualities of this area? Examples may include small town feel, healthy forests, etc.

What are the most important challenges facing this area? Examples may include litter, development, lack of public fishing areas, etc.

How can the watershed be improved? Examples may include more parks, more public fishing areas, etc.

Which of the following are important for the watershed? Please check all that apply.

- | | |
|---|--|
| <input type="checkbox"/> Agricultural Preservation | <input type="checkbox"/> Historic preservation |
| <input type="checkbox"/> Natural Landscapes | <input type="checkbox"/> Environmental education |
| <input type="checkbox"/> Outdoor Recreation Opportunities | <input type="checkbox"/> Water quality improvement |
| <input type="checkbox"/> Commercial Development | <input type="checkbox"/> Rural / small town atmosphere |
| <input type="checkbox"/> Residential Development | <input type="checkbox"/> Job Opportunities |
| <input type="checkbox"/> Manage flooding | |

Which of the following recreational opportunities are important? Please check all that apply.

- | | |
|--|---|
| <input type="checkbox"/> ATV riding | <input type="checkbox"/> Horseback riding |
| <input type="checkbox"/> Birding | <input type="checkbox"/> Hunting |
| <input type="checkbox"/> Camping | <input type="checkbox"/> Photography |
| <input type="checkbox"/> Canoeing/Kayaking | <input type="checkbox"/> Running |
| <input type="checkbox"/> Fishing | <input type="checkbox"/> Swimming |
| <input type="checkbox"/> Hiking/walking | <input type="checkbox"/> Cross-country skiing |
| <input type="checkbox"/> Biking | |

Would you be interested in participating in a Buffalo Creek Watershed Coalition? Activities may include stream clean-ups, habitat restoration, environmental education, etc.

- Yes
 No

General Comments

Please return this survey Audubon Society of Western Pennsylvania at either of the following locations or email a scanned copy to skoenig@aswp.org. A digital copy of this survey can be accessed at: <http://aswp.org/pages/buffalo-creek-valley-iba>

Audubon Society of Western Pennsylvania
Sarah Koenig
614 Dorseyville Road
Pittsburgh, PA 15238

Audubon Todd Nature Store
Yellow Jacket Square,
612 South Pike Road,
Sarver, PA 16055

Please contact Sarah Koenig, Conservation Director, with any questions at (412) 963-6100 or skoenig@aswp.org.

APPENDIX B: POTENTIAL FUNDING SOURCES

Table 17: Potential Funding Sources

Potential Funding Sources	Action Item Resource Categories												
	Watershed Collaboration	Education and Technical	Community Planning	Agriculture	Forest Management	Waste Cleanup	Surface Waters	Stormwater	Invasive Species	Habitat Conservation	Recreational Resources	Historic/Cultural Resources	Mined Lands
Appalachian Regional Commission											X	X	
Arbor Day Foundation					X					X			
Corporate Foundations	X	X			X	X	X	X	X	X	X		X
Butler County Recreation Grants											X		
Dirt, Gravel, and Low Volume Roads							X						
Department of Community and Economic Development			X	X			X	X		X	X	X	X
Department of Conservation and Natural Resources	X	X	X	X	X	X	X	X	X	X	X		X
DCNR/Pennvest							X						
PA Department of Environmental Protection		X		X	X	X	X	X	X	X			X
Environmental Protection Agency	X	X					X	X		X			
Foundations	X	X		X	X	X	X	X	X	X	X	X	X
Keep PA Beautiful						X							
National Fish and Wildlife Foundation		X			X		X		X	X			
Northeast Sustainable Agriculture, Research, and Education		X		X									
PA Game Commission										X			
Pennsylvania Association of Conservation Districts		X		X			X						
PA Fish and Boat Commission							X			X			
Pennsylvania Historical and Museum Commission												X	
PennVest							X	X					
Treevitalize					X								
United States of Department of Agriculture		X		X			X						