Wallace Run

Wallace Run Assessment
October 2008

The Wallace Run Assessment was funded by the Coldwater Heritage Partnership and was a collaborative effort between the Bald Eagle Watershed Association and the Centre County Conservation District. The assessment was conducted by Ed Perry, retired USFWS biologist, assisted by Ann Donovan, Centre County Watershed Specialist. Special thanks to Beth Rider from the Centre County Office of Planning and Community Development for her assistance with mapping for this project. Thanks to Joy Teeter from the Centre County Conservation District for her help with formatting the document. Thank-you to Genie Robine of the Centre County chapter of the Senior Environment Corps for monitoring and to the Centre County Government for providing PSU in kind services for printing. For more information about this assessment contact the Centre County Conservation District at 355-6817.

BEWA

Bald Eagle Watershed Association

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Introduction

In 2007, the Bald Eagle Creek Watershed Association (BEWA) received a grant from the Coldwater Heritage Partnership program to evaluate the Wallace Run watershed located in Union and Boggs Township, Centre County, Pennsylvania.

The mission of the BEWA is to protect the quality and beauty of Bald Eagle Creek and its feeder streams, and to promote actions that would improve the quality of life within the watershed, *"…including those which would help prevent future flooding of the homes, businesses, and agricultural lands through storm water management in the watershed."* Their vision is that the watershed *"…can be restored to the original quality of life by undoing the harmful effects of factors such as chemicals, leachate, siltation, and partnering with community groups, industries, and agencies to help alleviate bank erosion and flooding."* (Cold Water Heritage Grant Application, 2006).

The purpose of the Coldwater Heritage Partnership (CHP) program is to provide leadership, coordination, technical assistance, and funding support for the evaluation, conservation and protection of Pennsylvania's coldwater streams.

The Pennsylvania Trout (PATU) administers the CHP program with oversight and funding by the PA Department of Conservation and Natural Resources (DCNR), the PA Fish and Boat Commission (PFBC), and the Western PA Watershed Program (WPWP).
Goals of the CHP program include:

- foster a greater public understanding of watershed characteristics and how they affect coldwater ecosystems;
- identify special areas of concern, such as areas with exceptional water quality with high potential for impacts;
- produce conservation plans that will lead to additional planning or implementation of projects that protect and enhance our coldwater ecosystems; and
- provide technical assistance and financial opportunities to organizations dedicated to protecting coldwater ecosystems.

To ensure the goals of the CHP we will:

- identify current and potential sources of pollution within the watershed
- report existing water quality, macroinvertebrate and fishery data
- identify opportunities to improve water quality and aquatic habitat

The purpose of this watershed assessment is to provide information to local residents so they can take action to protect and enhance their cold water resources by reducing stream bank erosion.

To evaluate problems and opportunities in the watershed, we walked the length of Wallace Run and most of its tributaries. We used the Environmental Protection Agency's Rapid Bioassessment Protocol (EPA, 1999) to compare and contrast aquatic habitat, including the riparian zone, in reaches upstream and downstream from Gum Stump.

Description of the Watershed

Wallace Run originates on the southern slope of the Allegheny Plateau, approximately ½ mile from the intersection of State Route 504 and the Governor's Road in Union Township. It flows northeast for about eight miles to Gum Stump before heading southeast for another four miles until its confluence with Bald Eagle Creek near the town of Wingate. The stream is about 12.1 miles long, draining a 24 square mile watershed (Figure 1).

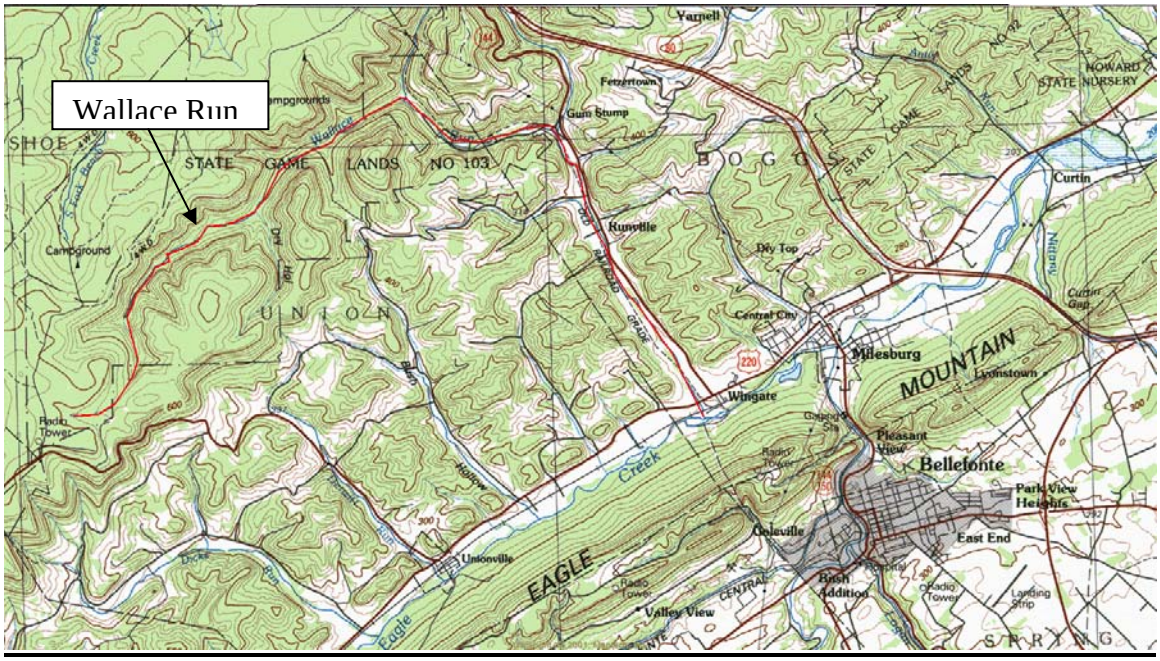


Figure 1. Wallace Run, Union and Boggs Township, Centre County. The stream is shown in red.

For the first eight miles, the stream flows through a forested landscape with only a few cabins at the lower end. The watershed in this reach is almost entirely forested. For the last four miles, downstream from the town of Gum Stump, it flows through a suburban landscape of homes and businesses constructed along the stream with some agricultural fields (Figure 2).

The underlying geology in a watershed influences the quality of a fishery and a stream's water chemistry. For example, streams flowing through, and fed by limestone geology often maintain higher flows during drought conditions and are generally more productive in terms of aquatic life, while streams flowing through shale and sandstone are relatively infertile, and more affected by droughts.

Wallace Run is classified as a low alkalinity, cold water, freestone stream. In the upper eight miles, it flows through gray conglomerate and sandstone, and red to brownish shale and sandstone. As a result, the stream is relatively infertile with a total alkalinity of about 10 ppm in the headwaters to 28 ppm near the mouth (PFBC, 1981; DEP, 1994).

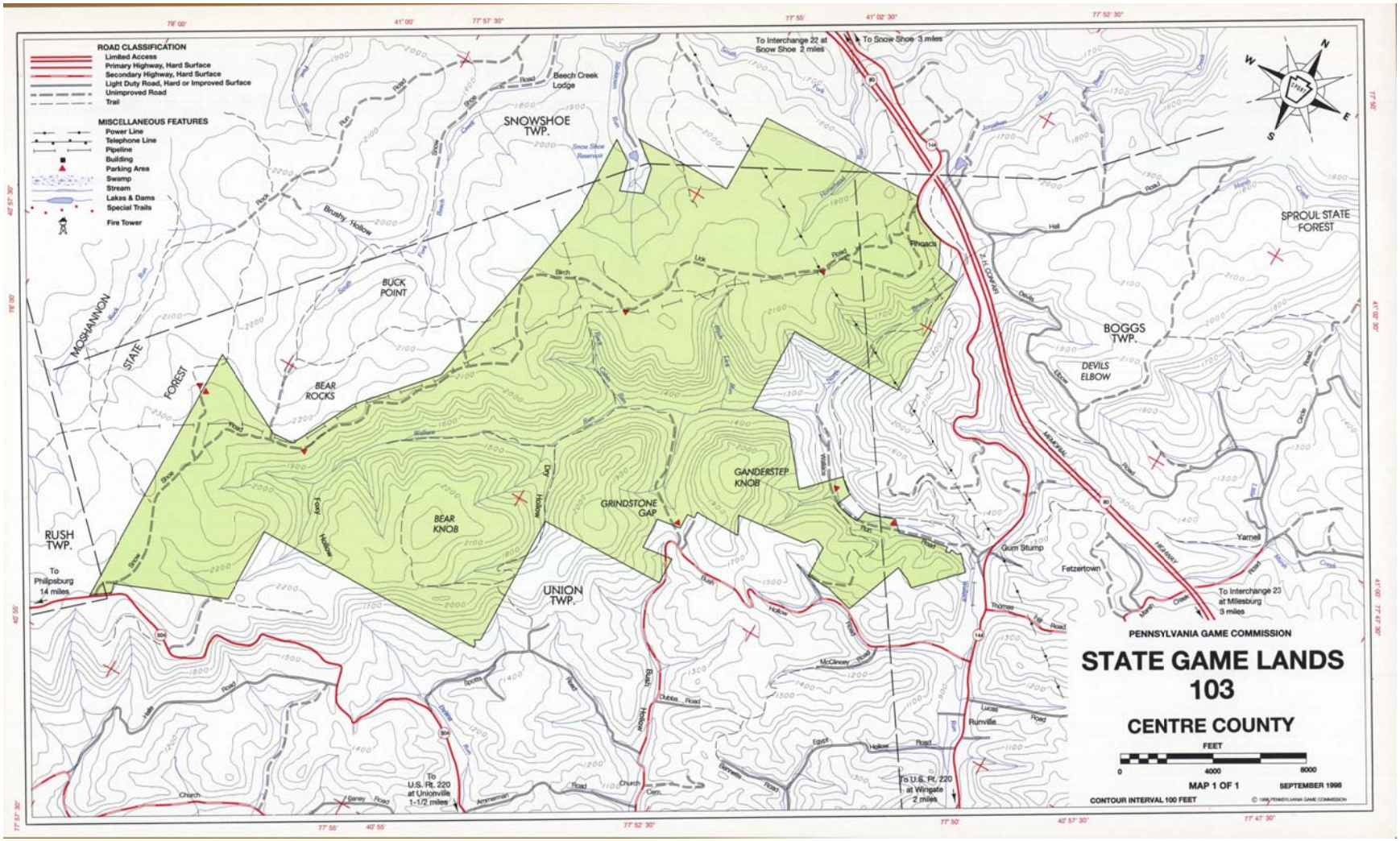
Figure 2. Homes and businesses dominate the landscape along the lower four miles of Wallace Run.

Alkalinity measures a stream's ability to neutralize acid from acid rain, or acid produced from activities in the watershed that expose pyritic material to weathering action that would add acidity to the stream. Streams flowing through limestone geology, like Spring Creek in Centre County, have high alkalinity, while streams like Wallace Run, flowing through shale and sandstone geology have low alkalinity. Streams with low alkalinity are generally less productive in terms of aquatic life. However, streams with low alkalinity can have an excellent fishery if there is an abundance of quality habitat available. In many streams, it is the lack of abundant, quality habitat that can adversely affect a stream's fishery.

The Pennsylvania Fish and Boat Commission (PFBC) has surveyed Wallace Run for fish and macroinvertebrates since the 1930's and in 1981 divided the stream into three sections for fishery management purposes. We will use the PFBC stream reach designations for this report.

Section One - extends from the stream's origin at elevation 2240, 6.1 miles downstream to its confluence with the North Branch of Wallace Run, at elevation 1112. The fall in this reach is 184 feet/mile. The Department of Environmental Protection's (DEP) Chapter 93 Water Quality Standards classifies this reach and its tributaries as Exceptional Value (EV). New, additional or increased discharges to EV waters must go through a stringent review and public notice process; no degradation of water quality is permitted.

Nearly 90% of the stream flows through State Game Lands 103 (Figure 3), with about 12% in private ownership near its confluence with North Branch Wallace Run. The


ROAD CLASSIFICATION
Limited Access
Primary Highway, Hard Surface
Secondary Highway, Hard Surface
Light Duty Road, Hard or Improved Surface
Unimproved Road
Trail
MISCELLANEOUS FEATURES
Power Line
Telephone Line
Pipeline
Building
Parking Area
Swamp
Stream
Lakes & Dams
Special Trails
Fire Tower
SNOWSHOE TWP.
BOGGS TWP.
RUSH TWP.
UNION TWP.
SPROUL STATE FOREST
MOSHANNON STATE FOREST
BUCK POINT
BEAR ROCKS
BEAR KNOB
GRINDSTONE GAP
GANDERSTEP KNOB
DEVILS ELBOW
Pinnacle
Beech Creek Lodge
Brushy Hollow
Fetzertown
Runville
Yarnell
Gum Stump
To Interchange 22 at Snow Shoe 2 miles
To Snow Shoe 3 miles
To Philipsburg 14 miles
To U.S. Rt. 220 at Unionville 1-1/2 miles
To U.S. Rt. 220 at Wingate 2 miles
To Interchange 23 at Milesburg 3 miles
PENNSYLVANIA GAME COMMISSION
STATE GAME LANDS 103
CENTRE COUNTY
FEET
0
4000
8000
MAP 1 OF 1
SEPTEMBER 1998
CONTOUR INTERVAL 100 FEET

stream is fed by springs and coldwater tributaries and shaded by a dense forest canopy. Red and chestnut oaks, red maple, ash, yellow birch, tulip and hemlocks dominate the canopy at the lower end while the upper reach has alternating bands of rhododendron and hemlock bordering the stream. The lower section has more of an open canopy but the stream remains mostly shaded. There are no roads bordering the stream and only a faint fisherman trail along the lower mile. The remnants of an old railroad grade can be occasionally found where it was cut into the sides of the valley, but there is hardly any evidence of human intrusion.

Except for the extreme headwaters, most of this reach supports good habitat for cold water fishes, with the kind of habitat diversity expected in a wilderness setting. The Pennsylvania Fish and Boat Commission's (PFBC) lists this reach in their Wilderness Trout Stream program. According to the PFBC (PFBC web site):

> *Wilderness trout stream management is based upon the provision of a wild trout fishing experience in a remote, natural and unspoiled environment where man's disruptive activities are minimized. Established in 1969, this option was designed to protect and promote native (brook trout) fisheries, the ecological requirements necessary for natural reproduction of trout and wilderness aesthetics. The superior quality of these watersheds is considered an important part of the overall angling experience on wilderness trout streams. Therefore, all stream sections included in this program qualify for the Exceptional Value (EV) special protected water use classification, which represents the highest protection status provided by the Department of Environmental Protection (DEP).*

Despite drought conditions the past few years, the deep, shaded pools enabled trout to hold-over as we saw numerous trout in the deeper pools. This reach had excellent diversity of habitat for coldwater fishes. Trees that had fallen into the stream provided excellent cover and helped to scour deep pools that enabled trout to survive drought conditions. Although there was some minor bank erosion and substantial braiding at some locations, most of the stream was confined to a single channel, had excellent bank stability and riparian cover, and a large quantity of quality habitat.

Section Two - extends from its confluence with the North Branch of Wallace Run at elevation 1112, 2.1 miles downstream to its confluence with an unnamed tributary at Gum Stump, at elevation 958. The fall in this reach is 73 feet/mile. The DEP classifies this reach and its tributaries as EV, requiring a stringent review and public notice process for new, additional or increased discharges.

This reach is also primarily forested, with the normal sequence of pools, riffles and runs that you would expect in a stream flowing through an undisturbed setting. Some minor bank erosion and braiding is present, but in general, there is an abundance of quality habitat for coldwater fishes. There is a dirt road and a few cabins and homes along this reach that add sediment and organic pollution to the stream. The cabins have out-houses, and/or on-lot septic systems, so it is expected that some organic pollution is introduced into the stream. Except for cabins, walking the stream gives one the impression that this reach is in a wilderness setting.

Section Three - extends from its confluence with an unnamed tributary at Gum Stump at elevation 958, four miles downstream to its confluence with Bald Eagle Creek below the town of Wingate in Centre County, at elevation 726. The fall in this reach is 58 feet/mile. The DEP classifies this reach as High Quality-Cold Water Fishes (HQ-CWF). Proposals for new, additional or increased discharges to HQ waters must go through a stringent review and public notice process. However, unlike EV streams where no water quality degradation is permitted, the DEP may allow a reduction in water quality if it finds it *".is necessary to accommodate important economic or social development …" (*Chapter 93 §93.4c(b)(1)(iii)).

In 1999, the PFBC divided Section 3 into two sections: Section 3 now extends from the unnamed tributary at Gum Stump to River Mile 1.41. Section 4 extends from RM 1.41 downstream to its confluence with Bald Eagle Creek (PFBC, 1999).

Their purpose in subdividing Section 3 was to implement a new management strategy for this reach. Section 3 would continue to be stocked with catchable size trout, while Section 4 would be managed as a Class A wild trout fishery with no stocking. The PFBC subdivided this reach because in the past, sampling for this lower four miles occurred at river mile 1.4 (located behind Dolly's Boutique on Route 144). About 600 feet of this reach is good habitat for coldwater fishes (Figure 3), while the remainder of Section 3 is relatively poor habitat. Up until this change in sampling, the PFBC had based their management of this lower four miles on the sampling at river mile 1.4 (RM 1.14).

Figure 3. The only high quality habitat in the lower four miles is a series of four deep pools formed underneath tree roots at river mile 1.14.

In 1999, the PFBC resampled this reach, recognizing that the station at RM 1.4 was not representative of the habitat in Section 3 (the lower four miles). They established a new sampling station at RM 2.76, located at the confluence of two unnamed tributaries near the Wallace Run United Methodist Church. Based on sampling at this new site, the PFBC subdivided Section 3.

PFBC's new Section 3 now extends from the confluence of Wallace Run and an unnamed tributary at Gum Stump, downstream to RM 1.41 (located about ¼ mile upstream from the ball field along Route 144). This section will continue to be planted with catchable size trout. The new Section 4 extends from RM 1.41 downstream to its confluence with Bald Eagle Creek. This section will be managed as a Class A wild trout fishery (PFBC, 1999).

Despite the PFBC subdivision of Section 3 for trout management purposes, we will continue to use the old delineation of Section 3 because there are no differences in land uses between the two new sections.

This reach flows through a significantly different landscape than Section 1 and 2. The stream is bordered by houses, businesses, Route 144, an old railroad bed, and agricultural lands. In most of this of this reach where homes and businesses border the stream, the riparian zone has been eliminated and replaced with lawns (Figure 4).

Figure 4. When riparian vegetation is removed, home owners immediately begin trying to stabilize the bank with rock.

Figure 5. Homes and businesses border the lower four miles of Wallace Run. Much of the riparian vegetation has been replaced with lawn, resulting in substantial bank erosion that needs continuous maintenance.

Because the riparian buffer zone has been removed, severe bank erosion is common in this section. Homeowners have repeatedly had to replace riprap to prevent the stream from cutting into their lawn (Figure 5). Even large concrete blocks were not effective in preventing the stream from eroding the banks (Figure 6).

For long stretches, the stream appears to have been channelized, and the normal ratio of riffles occurring at roughly five to seven stream-widths apart (Hynes, 1972) has been drastically altered (Figure 7), so that most of the this lower four miles is primarily riffle/run habitat. The lack of deep pools significantly reduces the number of larger size trout the stream can support.

The PFBC recognized that the physical habitat was the limiting factor in providing for a quality fishery, stating that "*…trout are probably limited most by poor physical and thermal conditions in this section.*" (PFBC, 2000). A previous PFBC report had also noted that Section 3 was mostly unshaded and comprised of long shallow riffles with few pools or cover for trout (PFBC, 1981).

Figure 6. Even large concrete blocks were not sufficient to stabilize the bank.

Figure 7. Long straight sections of Wallace Run are too wide, lack pool habitat, and are therefore poor quality habitat for larger size trout.

In addition to development along Wallace Run, there are five major tributaries with roads bordering them that have scattered homes or farms all the way to their upper reaches (Figure 8)

Figure 8. Looking west from the headwaters of an unnamed tributary to Wallace Run along Lost Creek Road Section 2 of Wallace Run is the forested valley in the background.

Water Quality

Water quality in Section 1 is of the highest quality. There is no logging, oil and gas wells, or any other development activity in this section. Section 2 has similar water quality as there is very little development. Although there are a few homes and hunting camps in this section, the riparian corridor remains intact, so there is only minor bank erosion in this reach. Water quality in Section 3 is also relatively good, although there is serious bank erosion along most of the developed reach in this section where the riparian vegetation has been removed.

In 1994, the DEP conducted water quality sampling at six locations, extending from the confluence with the North Branch of Wallace Run, six miles upstream to its confluence with Bald Eagle Creek. Water chemistry form their samples found excellent water quality at all stations.

Because of the extensive mining in the area above Wallace Run and because of acid rock drainage from the construction of I-80 is present in Jonathan Run, a stream north of Wallace Run we decided to test pH and conductivity in the unnamed tributary entering Wallace Run below Gum Stump. Genie Robine, a member of the Centre County Senior Environmental Corps used a pH meter and conductivity meter on the afternoon of September 4. The conditions were low flow and we had not had rain for several weeks. Results were 7.9 pH and 387 conductivity for the first test and 8.0 pH and 390 conductivity for the second test. These figures are within the normal range.

Figure 9. Wallace Run in the Gamelands

Habitat Assessment

The biological diversity in a stream is closely linked to the quality of its habitat. Streams having a uniform habitat type, or habitat that has been degraded through dredging or channelization, will likely have lower biological diversity. Therefore, assessing habitat quality is crucial to assessing the biological condition of the stream.

We used EPA's Rapid Bioassessment Protocol to assess instream habitat and the riparian corridor in one, 300-foot long reach in Section 2 and in Section 3 (Barbour et al 1999). We evaluated each reach for the following parameters:

- Epifaunal substrate/available cover – measures the quantity and variety of structures such as boulders, cobbles, branches, logs, undercut banks, etc.
- Embeddedness – measures the degree to which cobble, gravel, branches, etc. are covered with or sunken into silt, sand or mud.
- Velocity/depth combinations – measures the variability of velocity and depth in a given reach.
- Sediment deposition – measures the amount of sediment to evaluate stream stability.
- Channel flow status – measures the degree to which the streambed is covered with water.
- Channel alteration – evaluates whether the channel has been altered with artificial structures, such as riprap.
- Frequency of riffles – measures the variation of habitat within the stream.
- Bank stability – measures whether the banks are eroding or have the potential for erosion.
- Bank vegetation protection – measures the degree to which the vegetation protects the stream bank.
- Riparian vegetative zone width – measures the width of natural vegetation from the edge of the stream bank out through the riparian zone.

The Section 2 sampling station was located upstream from the confluence of Wallace Run with the unnamed tributary at Gum Stump. The Section 3 sampling station began at the Egypt Hollow Road Bridge and extended 300 feet downstream. We selected sample sites that were representative of habitat conditions in each section, recognizing that some small reaches within that section (such as a 600 foot long reach behind Dolly's Boutique in Section 3) were substantially different than the habitat in most of that section.

Physical habitat quality is significantly lower in Section 3 than in Section 2. Section 3 scored lower for every parameter (Table 1); sometimes dramatically lower. The most significant differences were the lack of an adequate riparian buffer, and the lack of quality aquatic habitat. A substantial portion of Section 3 is mostly riffle habitat, while most of Section 2 has the normal pool/riffle/glide sequence.

Given these scores, it is not surprising that Wallace Run in Section 3 does not support a quality cold water fishery.

Parameters Measured	Section 2 Scores	Section 3 Scores
Epifaunal Substrate/ Available Cover	13	11
Embeddedness	16	11
Velocity/Depth Combination	16	9
Sediment Deposition	13	13
Channel Flow Status	16	10
Channel Alteration	20	9
Frequency of Riffles	17	5
Bank Stability	17	9
Bank Vegetative Protection	20	13
Riparian Vegetative Zone Width	20	2
Total Score	168	92

Table 1. Habitat evaluation scores for Section 2 and Section 3 using the Environmental Protection Agency's Rapid Bioassessment Protocol (Barbour et al. 1999).

Watershed Concerns

Although there are erosion problems in Sections 1 and 2, primarily due to braiding, most adverse impacts to Wallace Run occur in Section 3 and are caused by human activities. The principal problems in Section 3 are:

1. Reduced habitat quality and quantity for cold water fishes The stream is too wide in Section 3, and in some sections, so incised in its bed that it has lost contact with its floodplain. Except for large floods, the stream cannot dissipate energy by flowing on to the adjacent floodplain. Therefore, during floods above the bank-full stage, the water velocities are much higher, and much more likely to cause stream bank erosion. In section 3 an old railroad bed on the right descending bank and high banks on the left descending bank confine the stream to its channel for long stretches. It is likely that in the past, the stream has been widened in this area by dredging to remove flood debris in an attempt to provide more storage for high flows. The dredged material was likely used to fill in low areas and construct high banks. In fact, a long-time resident confirmed that the Commonwealth had dredged Wallace Run in the 1990's for about 500 feet below the Peace Bridge and filled in portions of his yard to create a small levee.

   Because the stream has been dredged and straightened in some places, there are long stretches where it lacks the normal pool/ riffle/glide sequence that provides good habitat for a quality fishery. During normal summer low flow periods, the water spreads out over a shallow, unshaded channel, which increases water temperatures. During our August 4, 2008, field evaluation of Sections 2 and 3, the water temperature in Section 3 was 68° F, while just two miles upstream in Section 2, the water temperature was 63°F. Although trout inhabit this reach, they are mostly juvenile fish because most of Section 3 lacks the deep pools necessary to support larger size trout during the critical summer low flow periods.

2. Poor bank stability During normal bank full flows (in this part of Pennsylvania, these are flows having a recurrence interval of abut 1 ½ years), the stream is unable to dissipate energy by overflowing on to the adjacent floodplain because it is so incised in its bed. As a result, even minor floods continually erode the banks. Based on the amount of riprap along the banks, it is clear that most property owners who have cleared the riparian corridor and planted lawns have been fighting bank erosion for many years. Although the normal solution to bank erosion is to reestablish a riparian buffer, this may not be sufficient in reaches where the stream is deeply incised in its channel. In these reaches, the banks are so high, that even if trees and shrubs were planted along in the riparian zone (along the top of bank), the roots would not extend deep enough to prevent normal high water events from eroding the banks. Even so, trees planted along the stream would help keep water temperatures below lethal levels for trout.

3. Lack of riparian buffers The stream lacks an adequate riparian buffer zone in most of Section 3 where development occurs along the stream. In some instances, there is no buffer zone. Many home owners in Section 3 have cleared trees and shrubs from the riparian corridor and mow to the edge of the stream bank. Mowing is especially damaging in areas where the banks are low enough so that roots from trees and shrubs could have stabilized the bank. The roots of lawn grass do not go deep enough to prevent a steam from eroding the bank. It should be no surprise that the best aquatic habitat in the four mile reach below Gum Stump is in an area where there is a substantial riparian buffer.

   Establishing an adequate riparian buffer is one of the best ways to reduce bank failure and the amount of sediment in the stream. Riparian buffers also shade the stream, helping to prevent water temperatures from reaching possible lethal levels for cold water fishes. Trees and shrubs

along the bank slow the movement of water, thereby reducing downstream flooding by desynchronizing flood peaks Studies have shown that watersheds that are heavily vegetated reduce the flow of water downstream when compared to an adjacent watershed where the vegetation had been removed (Novitzki 1978). Therefore, when major rain storms occur over an area, there will be reduced downstream flooding if there is an adequate riparian buffer.

The adverse effects to the aquatic ecosystem, as well as to our downstream neighbors, from eliminating riparian vegetation are so severe that 110 organizations, businesses and municipal organizations from across the state have joined together to ask the Department of Environmental Protection to promulgate regulations requiring a 100-foot wide riparian buffer for all new construction.

4. Sediment and other pollutants As would be expected in a suburban landscape, pollution from fertilizer used on lawns and crops, sediment from construction, gardens and farming, pesticides and herbicides from farming, lawn maintenance and gardening, and nutrients from malfunctioning on-lot septic systems, all find their way into Wallace Run. Some areas that are being farmed are on slopes that are too steep, and therefore have the potential to add significant amounts of sediment and other pollutants to Wallace Run (Figure 9). Most farming on steep slopes is in the tributary valleys. There are several areas along Wallace Run where biosolids from the Bellefonte Sewer Authority are applied. The landowner has complied with current regulations concerning the applications of biosolids.

Figure 10. Farming on steep slopes adds sediment and other pollutants to streams.

Sediment is one of the most significant pollutants in streams. It fills in the spaces in the substrate used by macroinvertebrates, fish, and other prey species, causing the rocks in the stream to become embedded. Embeddedness refers to the degree to which the substrate (boulders, rubble and gravel) and woody debris (branches and logs) are covered with, or submerged in silt. Streams with a high degree of embeddedness have a substrate that is unsuitable for fish to use for spawning or cover, and is less available for macroinvertebrates, fish and other prey that fish feed on.

Many fishery scientists consider sediment to be one of the most important environmental factors contributing to the degradation of stream fisheries (Waters 1995). The principal sources of sediment in Wallace Run are poor land use practices in the watershed; lack of riparian buffer zone

in Section 3; poor bank stability in Section 3; and the braided condition of Wallace Run in parts of Sections 1 and 2. As is typical in high gradient mountain streams, some reaches in Section 1 are highly braided, with anywhere from 2 to 5 or more channels that may only hold water during major storms. Some of these channels are highly unstable, which greatly increases the amount of sediment during high water periods.

Figure 11. Unstable banks and lack of riparian buffer increase the amount of sediment in Wallace Run.

Recommendations

Improve habitat for cold water fishes -- In reaches where the stream has lost connection with its floodplain, the adjacent banks should be lowered to a few inches above bank full stage, and planted with shrubs and trees typically found along streams, such as basket willows, sycamores and alders. The excess material could be used to fill in and reduce the width of the stream, creating a more sinuous shape channel. Cross veins, J hooks, and other stream improvement devices could then be used to improve aquatic habitat.

The problem of a deeply incised channel on Wallace Run is similar to the problem that the Codorus Creek Watershed Association faced when attempting to improve aquatic habitat on Oil Creek in York County. This stream was also deeply incised in its channel and had lost connection with its floodplain. The stream restoration firm, Aquatic Resources Restoration Company, excavated four to six feet of soil from the stream banks so that the stream could flow on to the floodplain during normal high water events and installed habitat improvement devices to improve aquatic habitat.

To reduce erosion and sedimentation in Section 1 and 2, channel blocks that directed all flows into a single channel would have to be constructed at the upstream end of the braided channels. This may be sufficient in some reaches, and for some period of time, but given the steep gradient, it is likely the stream will continue to create new channels. Moreover, Section 1 is in near pristine condition, and moving heavy equipment through this section would cause significant damage, and constructing a channel block would alter the landscape and detract from the natural condition. These factors should be considered before any action is taken.

Stabilize stream banks - According to the narrative the Bald Eagle Creek Watershed Association (BEWA) submitted to the Coldwater Heritage Partnership, the two principal concerns in the watershed (Bald Eagle Creek) are flooding and stream bank erosion. Stream bank erosion is a serious problem in Section 3 (from the unnamed tributary at Gum Stump, four miles downstream to Bald Eagle Creek). Many home owners have cleared the riparian vegetation and mowed to the edge of the stream, which makes the banks susceptible to erosion. In one instance, the Department of Environmental Protection and the U.S. Fish and Wildlife Service had to perform a stream restoration due to the substantial bank erosion that was likely caused, or exacerbated, by removing riparian vegetation, and past dredging and channel straightening operations upstream of the property.

Figure 12. Stream improvement devices stabilize the stream, preventing severe bank erosion behind the Brown home.

Figure 13. Jute matting stabilizes the bank until shrub plantings develop, and cross veins scour deep pools to provide habitat for trout.

To reduce bank erosion and reestablish a normal size channel, the adjacent, steep-sided banks can be graded back to an approximate 8:1 slope and planted with willows. Material removed from reducing the slope can be used to reduce the width of Wallace Run, thereby reestablishing a channel with a normal width.

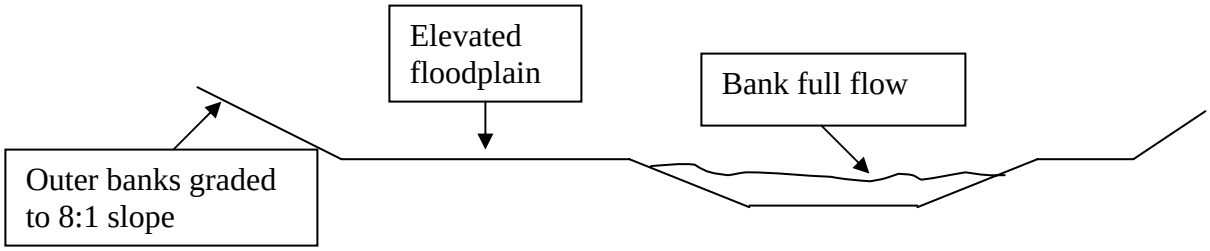


Figure 14. Construct an elevated floodplain by lowering the adjacent banks and using this material to narrow the width of the stream, creating a sinuous shaped channel, with stream improvement devices installed at select locations.

Establish a 50-foot wide riparian buffer The BEWA should require that home owners who request erosion control, or flood control assistance establish and maintain a minimum 50-foot wide buffer per the recommendations of the Centre County Conservation District in exchange for receiving assistance. The BEWA should discuss with Boggs Township the possibility of developing a riparian buffer ordinance in the township. The Centre Region Council of Government is in the process of adopting a model riparian buffer ordinance. This ordinance could be utilized for guidance in assisting Boggs Township in exploring the development of such a document.

The BEWA, in cooperation with the Centre County Conservation District, should develop a public education program to inform land owners along the stream about the benefits of establishing a riparian buffer. The Conservation District may be able to assist in establishing the buffer zone by acquiring and making available suitable plants for the riparian zone. BEWA members should attempt to reach ALL landowners who live along Wallace Run. Landowner addresses have been identified. BEWA should decide how to best make contact with these individuals.

Enforce Best Management Practices within the watershed – The entire Wallace Run Watershed is in the Department of Environmental Protection's Special Protection Program. Special Protection waters receive the highest level of protection. Unfortunately, some landowners along the stream conduct activities, such as dumping lawn waste, burning trash, dumping concrete, etc. that adversely affect water quality. Given the water quality of this stream, it would be helpful for the Conservation District to develop a brochure and disseminate it to landowners along the stream that discusses the quality of the resource and how their activities might adversely affect it.

Erosion and sedimentation problems in tributary valleys can be corrected by eliminating farming on steep slopes and by implementing best management practices with any earth moving activities.

Enhance communication with SEDA-COG (railroad) and Penn Dot (highway) to discuss maintenance issues with bridges and culverts. Cleaning debris from under bridges and culverts is an ongoing issue that must be addressed. Proper maintenance will protect the stream and adjacent property and help to prevent flooding.
Continue dialog with Columbia Gas concerning pipe line right of ways. Two pipe lines are exposed in the stream in a stretch off Fye Road. Columbia Gas is aware of this concern. Members of BEWA should continue to monitor this situation.

Potential Future Problems

Oil and gas exploration has exploded in Pennsylvania. There is great concern that gas well drilling may be permitted in watersheds that DEP has designated as High Quality or Exceptional Value. They have the highest water quality in Pennsylvania and should have the highest degree of protection. Problems associated with oil and gas drilling include:

- Habitat fragmentation – breaking up large blocks of habitat into smaller units creates what is called "edge habitat." Although certain species, such as deer, thrive in this landscape, habitat fragmentation is largely responsible for the continued decline in Pennsylvania's biodiversity.
- Well pads and roads – fragment habitat and cause soil erosion in watersheds that are nearly pristine. These access roads provide access to areas that were once only accessible by foot.
- Water withdrawals - well drillers force water, sand, and chemicals, under very high pressure into the well in order to free up the gas in a process called hydrofracking. Hydrofracking demands a huge amount of water – up to six million gallons per well. Already, some operators have been cited for siphoning water out of streams without the necessary permits.
- Waste water disposal - The US Department of Energy considers the waste water produced in gas drilling to be some of the most toxic of all industrial byproducts. Waster water from hydrofracking is being transported to municipal wastewater facilities, where it is "bled" into the discharge. There is little or no treatment of this wastewater. Dilution is the solution to pollution.

At present, there are three wells in the watershed, and two of those are plugged (Figure 13). However, there is substantial gas well drilling just north of Wallace Run, in the Beech Creek watershed.

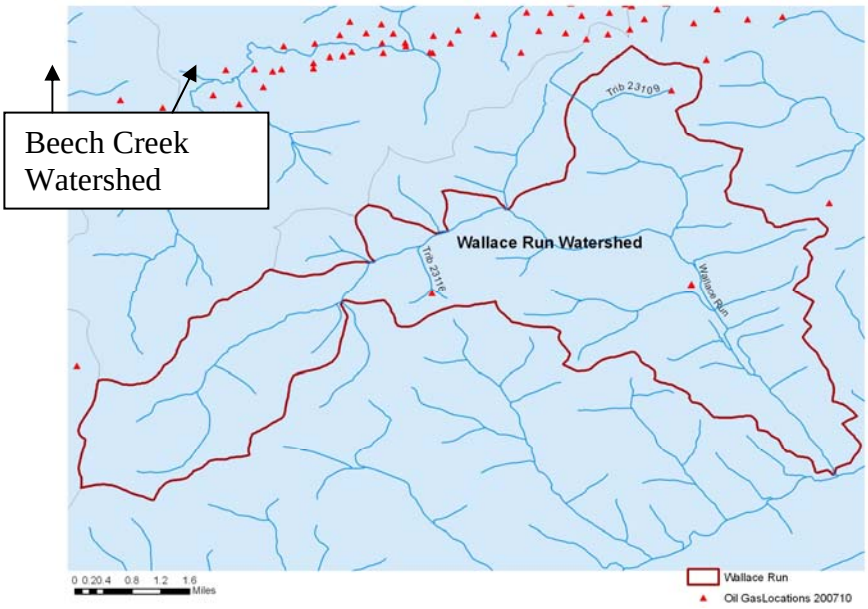


Figure 15. Three gas wells are located in the Wallace Run Watershed; two of these are plugged. Note the number of wells north of the watershed.

Restoration Efforts

In order to address stream degradation and the accompanying threat to property and people it is important to first understand characteristics of streams. The purpose of streams is primarily to carry water and sediment. A healthy stream will meander through the watershed and it is natural that a stream will migrate and change over time. Streams should have a series of pools and riffles. Pools are deep sections with slow waters. These areas provide great hiding areas for fish. Riffles are shallow, steep, and fast. Riffles contain the rocks where the macroinvertebrates live and reproduce**.** A healthy macroinvertebrate population will support a healthy fish population. Conversely, a lack of macroinvertebrate diversity and density will result in a low fish population.

The area adjacent to a stream is called the riparian zone. A beneficial riparian zone is essential to a healthy stream. Trees and shrubs planted along a stream will stabilize the banks and prevent erosion. Large tree roots serve as anchors for the soil, keeping the bank from washing downstream. A canopy of trees will shade the stream, effectively lowering the temperature of the water. Wallace Run would benefit by the establishment of a better riparian zone. Landowners should not mow up to the edge of the stream and they should plant trees and shrubs in the riparian area.

Streams are meant to flood. It is imperative that a stream has an adequate, undisturbed. connected flood plain that can safely accept water during times of high flow. Current laws prohibit building in a flood plain. Some Wallace Run property owners have older homes that have been built too close to the stream before regulations were put in place. However, there are many homes in Runville that are situated out of the flood plain and there is ample area on individual properties that can accept high water in a safe manner. Planting vegetation in these areas will aid in the absorption of the flood water and help to control the overflow.

In the past people have tried to control the stream by straightening it. It appears that Wallace Run has been straightened and lined with heavy rock throughout the middle section of the stream. This has created a sluice like effect, dramatically increasing the velocity of the water. The sinuosity of the stream, which serves to slow the water, has been removed. The proximity to route 144 on one side of the stream and the now unused railroad line on the other side of the stream certainly must have been factors in creating the current detrimental characteristics of Wallace Run.

From visual observation it appears that some landowners have carried out stream restoration efforts resulting in varying degrees of success. Above Peace Bridge there is evidence of large rip rap rock placed on the stream banks. It appears that levees were put in place to mitigate flooding on individual properties. Both of these remedies are short lived and helpful only to the immediate adjacent landowners. In fact “fixes” of this type might even be detrimental to downstream neighbors.

Many landowners and government agencies have made unsuccessful and expensive attempts at restoring streams with rip rap rock and levees. Many of these projects have failed when the first major storm occurs. Because of these failures thinking about stream restoration has changed in recent years. There is a growing movement to attempt to try to replicate nature instead of trying to control it. This philosophy is generally referred to as Natural Stream Design or the more technical term of fluvial geomorphology. It is an effort to restore the stream to a more natural condition. This approach to stream restoration can prove more beneficial to all landowners and to the stream itself. Wallace Run landowners need only to take a walk in the nearby Gamelands in order to see what their section of the stream might look like in a more natural state.

In the winter of 2008 DEP Department of Waterways and Engineering conducted a restoration project on the Brown property along Wallace Run utilizing Natural Stream Design techniques. Landowners Gary and Dolly Brown had tried for years to obtain assistance to repair their property along Wallace Run. Nothing had seemed to work and by 2006 the stream encroachment was threatening their home. DEP Department of Waterways and Engineering personnel visited the site and they were able to put this property on their project list. US Fish and Wildlife Service performed an emergency repair in June of 2007 that successfully prevented additional erosion before the complete restoration took place.

Figure 16: Wallace Run before restoration

Restoration included the installation of rock vanes and one root wad. The rock vanes consist of huge rocks that are placed in the stream that direct the energy of the water to the center of the stream instead of the bank. This effectively protects the bank and prevents erosion. The root wad is a large tree that has been dug up---the tree is placed in the side of the bank with the roots in the stream. Sediment will catch on the roots, build up and eventually result in added vegetation. The rock vanes produce the much needed pools of deeper water that fish like to have. Landowners Dolly and Gary Brown planted hundreds of trees in the riparian area in order to stabilize their new bank and to cool the water. The end result is a stream that both fish and people can enjoy. Wallace Run has become an asset for the Browns, not the menace that it was.

Figure 17: Wallace Run after restoration

Just upstream of the Brown property Mike Davidson has installed a wall in an attempt to prevent his bank from disappearing. That wall appears to be holding, but farther upstream on the opposite side on Mike's property a similar wall that he installed in an emergency fix is now in disrepair. Across from this section is a severely eroded bank on the Lucas property. Both areas are scheduled to be restored in the fall of 2008. The work will be conducted by the US Fish and Wildlife Service employing Natural Stream Design techniques. Funding for this project will come largely from the Centre County Environmental Initiative Growing Greener Grant. Nisource, parent company for Columbia Gas, is contributing to the project since continued erosion on this bank threatens to expose their pipeline. Restoration of these two areas will further protect the Brown property downstream. Rock for the project will be donated by Jeff Confer and logs will be donated by Martin Melville.

Figure 18. Proposed restoration site, Fall 2008

Another area of concern for area residents has been the Columbia Gas pipeline that is exposed at the confluence of Wallace Run and Bald Eagle Creek just below the village of Wingate. Efforts by Columbia Gas to repair this pipe were thwarted by high water two years ago. Members of the Bald Eagle Watershed Association have worked with Columbia Gas and DEP in order to ensure that the repair will take place in 2008. As of this writing, the work has begun on this project.

Figure 19. Exposed pipe at the confluence of Wallace Run and Bald Eagle Creek

The success of this project will enable BEWA members to continue the discussion with Columbia Gas about the gas pipe lines that are exposed in the middle of the stream in an area off Fye Road.

Members of BEWA have discussed the safety of the railroad bridge over Wallace Run just below Wingate. At the request of the Centre County Conservation District SEDA-COG provided a report indicating that the bridge is safe. BEWA members requested that the piece of concrete and rebar be removed before they fall into the stream.

The Pa Fish and Boat Commission install fish habitat structures in streams throughout the Commonwealth. Local watershed groups, Trout Unlimited chapters and streamside landowners cooperate with the Commission by contributing labor and funds to do the work. The habitat for fish in Wallace Run would benefit greatly from some of this important work. As stated before the middle section of the stream is bereft of deep pools. It seems as if the section is one very long riffle. Members of the community of Runville and the Bald Eagle Watershed Association should work together to enlist assistance from the Pa Fish and Boat Commission to improve this stream. The Centre County Conservation District has submitted a Technical Assistance Grant request to Pa Fish and Boat Commission and they are hoping to pursue the possibility of installing fish habitat structures and restoring sinuosity in the section of the stream that flows through the town of Runville. Some of the most beautiful properties in Centre County are located along our streams. Wallace Run residents are fortunate to own their streamside properties. The common goals of BEWA and the Centre County Conservation District should be to instill a sense of stewardship in the residents by providing them with the knowledge of best management practices for their stream and by offering them opportunities to cooperate on restoration projects.

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Bald Eagle Creek Watershed Survey
Wallace Run Draft Flood Mapping

Map Prepared by the Centre County Planning Office
Source: Centre County GIS & Centre County Tax Office (2008)
and the Bald Eagle Creek Watershed Survey (Spring 2008)
All boundaries are approximations and are not intended
for legal purposes
Map Created: February 2008
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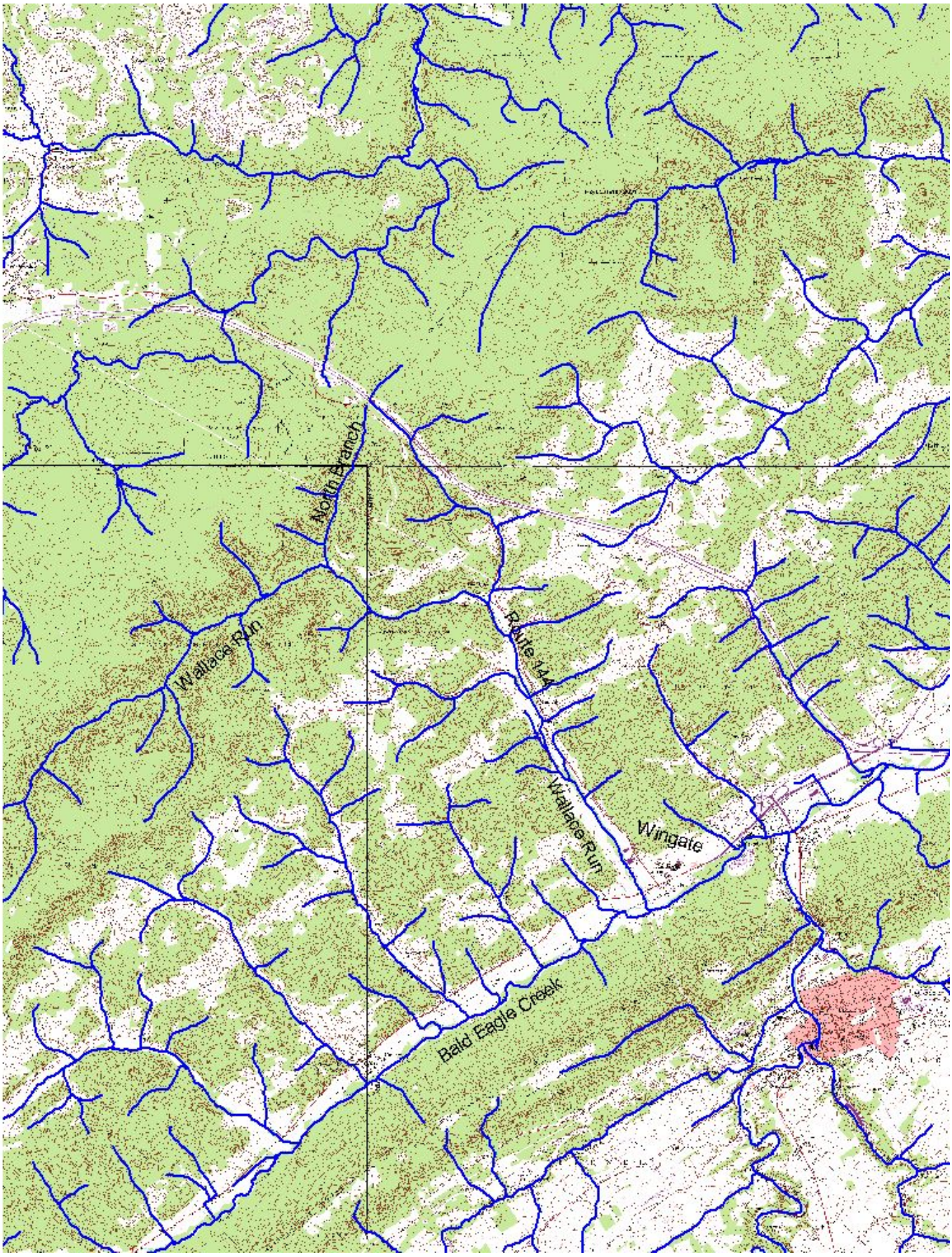
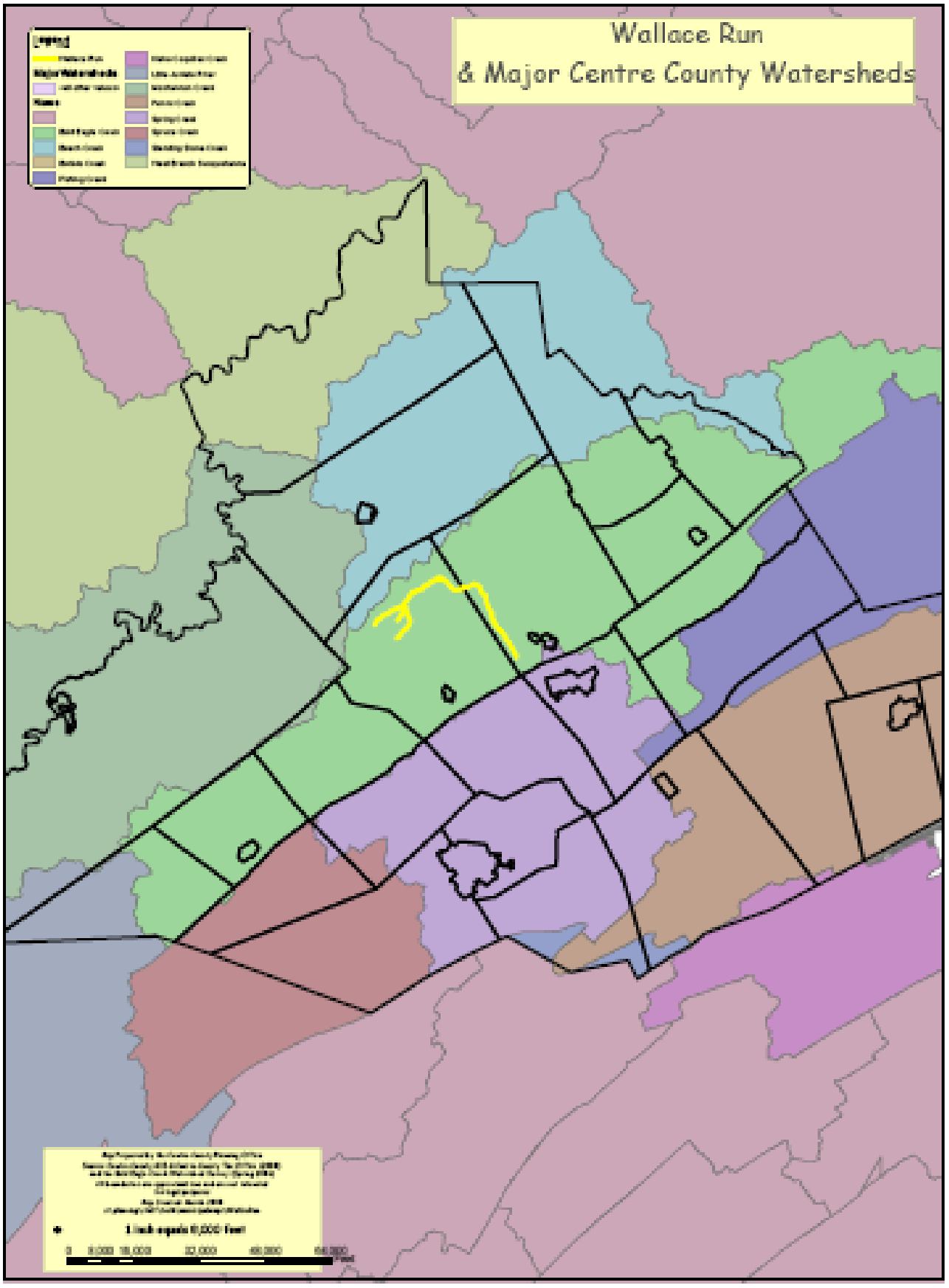
N

1 inch equals 497.942603 feet

0 450 900 1,800 2,700 3,600 Feet


North Branch
Wallace Run
Route 144
Wallace Run
Wingate
Bald Eagle Creek


Wallace Run
& Major Centre County Watersheds


Legend
Wallace Run Headwaters
Bald Eagle Watershed