



July 22, 2021

Patrick McDonnell, Secretary
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 2063
Harrisburg, PA 17105-2063

Re: Petition to redesignate Angelica Creek, Berks County to EV status

Dear Secretary McDonnell,

The Delaware Riverkeeper Network (DRN) and Angelica Creek Watershed Association (ACWA), a program of Berks Nature, respectfully submit this petition to the Pennsylvania Department of Environmental Protection (PADEP) to request an evaluation to redesignate the Angelica Creek in Berks County from Cold Water Fishery (CWF) to Exceptional Value (EV) status. The headwaters of the Angelica rise near Knauers in Cumru Township. The creek flows northeast approximately 6 miles to its confluence with the Schuylkill River, just within the city limits of Reading. The Angelica Creek Watershed encompasses about 7.5 square miles. The total length of all mapped tributaries in the watershed is approximately 15 miles. Basin elevations range from 200 feet to 1,300 feet, with mean basin elevation at 567.5 feet. Land use within the watershed is currently composed of approximately 57% forest cover (deciduous forest, evergreen forest, mixed forest, and shrub/scrub). Nearly 35% of the watershed is developed,¹ with 7.5% of land in grassland/herbaceous, pasture/hay, and cultivated crops.

Less than 1% of the watershed is open water, wooded wetlands, and emergent herbaceous wetlands.² Industrial development in the watershed is limited and permitted discharges to the Angelica Creek are few and are limited primarily to the lower portion of the watershed near the confluence with the Schuylkill River.³

¹ In the National Land Cover Database, developed lands include: Developed, Open Space, with impervious surfaces accounting for less than 20% of total cover; Developed, Low Intensity, with impervious surfaces accounting for less than 20% to 49% of total cover; Developed, Medium Intensity, with impervious surfaces accounting for less than 50% to 79% of total cover; and Developed, High Intensity, with impervious surfaces accounting for less than 80% to 100% of total cover.

² Stroud Water Research Center. 2017. Model My Watershed Version 1.28.0, online at <https://wikiwatershed.org/>.

³ See attachment 22, "List of Angelica Creek Discharges"

Although urban sprawl has converted some forest and open land to developed land in recent years, the high percentage of forest cover remaining helps protect water quality in the Angelica Creek. Research has shown that there is a positive connection between stream water quality and watershed forest cover.⁴ In fact, water quality is so high that DRN and ACWA believe that the entire Angelica Creek Watershed deserves a greater level of protection and should be redesignated as EV based on several qualifiers.

I. Angelica Creek supports a diverse aquatic community and is a surface water of exceptional ecological significance

Beginning in 1996, the Stroud Water Research Center (SWRC) conducted an 11-year study of benthic macroinvertebrates in the Schuylkill River basin.⁵ SWRC sampled long-term trend sites annually while some sites were sampled just once. This study included sites along the Angelica Creek, one long-term trend, and three other sites sampled just once. Quantitative samples of benthic macroinvertebrates were collected and preserved. At the lab, preserved samples were subsampled and then identified to family (most insects) or order/class (most non-insects). SWRC used the multimetric Macroinvertebrate Aggregated Index for Streams (MAIS)⁶ to analyze the results of sampling. Angelica Creek upstream of Route 724, sampled every year from 1996 through 2007, scored Fair (10.1). Angelica Creek near Ledgerrock Road, Punches Run in Nolde Forest, Angelica Creek in Angelica Park, above the former Angelica Lake site were all sampled once in 2007. These sites scored Fair (7.6), Good (14.3), and Fair (6.1) respectively. DRN also conducted benthic macroinvertebrate sampling at three sites on the Angelica Creek from 2003 through 2006. DRN's sampling was conducted using methodologies modified from the U.S. Environmental Protection Agency's Rapid Bioassessment Protocols and the Volunteer Stream Monitoring Methods Manual. The resulting data were analyzed using metrics recommended by the U.S. EPA. Most sites scored Good or Fair⁷ during the years monitored. From 2013 to 2018, SWRC again undertook a long-term assessment of streams in the Schuylkill River basin, sampling benthic macroinvertebrates at more than 60 locations. This study once again included the Punches Run site from the previous study. The MAIS average for the study period was Good (16.9).⁸

In addition, Dr. David Osgood of Albright College and his students compared the macroinvertebrate community within restored and reference reaches on the Angelica Creek between 2005 and 2020. Between 2006 and 2008, the city of Reading restored a 480 m stretch of Angelica Creek in response to drainage of a lakebed that had been dammed since the 1880s. The restoration had the primary objective of reconnecting the former lakebed reach of Angelica Creek to the adjacent floodplain. The restoration entailed stream relocation, creekbank grading, and creation of a riparian buffer. The purpose of Dr. Osgood's study was to examine changes in the macroinvertebrate community from before, during, and after the restoration and to compare changes to a reference reach located ~3.5 km upstream in Nolde Forest State Park. Data analysis included calculation of a Family Biotic Index (Hilsenhoff, 1988), Shannon Diversity and Simpson

⁴ Jackson, J. K. 2009. Understanding Stream Conditions: Lessons from an 11-Year Study of Macroinvertebrates in Eastern Pennsylvania's Schuylkill River Watershed, with a Focus on Exceptional-Value and High-Quality Streams. Stroud Water Research Center. Online at https://3jgs2o4a02n22u73bi2gnd3l-wpengine.netdna-ssl.com/wp-content/uploads/2016/10/Schuylkill_Summary.pdf

⁵ Stroud Water Research Center. 2016. Schuylkill Project Overview. Online at <https://stroudcenter.org/projects/schuylkill/>.

⁶ MAIS: Poor = 0 – 6; Fair = 6.1 – 13; Good = 13.1 – 20

⁷ U.S. EPA: Poor = <20; Fair = 20 - 40; Good = >40

⁸ Berks Nature. 2018. State of the Environment - Berks County, PA: 10 Year Report for Berks County. Online at https://berksnature.org/wp-content/uploads/2018/11/SOTE_WEB-2-reduced.pdf

Dominance (Brower et al. 1998) in addition to calculation of percentages of given families and other taxonomic groups. The results indicated that the restoration reach became increasingly populated with less stress-tolerant taxa and dominance decreased starting 5 years post-restoration to become more similar in this regard to the reference reach. The communities between both reaches remain distinct with respect to the presence/absence of particular taxa (Plecoptera, Odonata, and free-living Trichoptera) despite the shifts in community metrics toward a healthier community (lower dominance, less stress-tolerant taxa) in the restoration reach starting 5 years post-restoration. However, the Hilsenhoff index indicated that the restoration reach and the reference reach have become statistically identical.⁹ This suggests that even formerly disturbed parts of the watershed, such as the restoration reach in Reading, now support diverse and healthy macroinvertebrate communities. Finally, SWRC sampled Punches Run, a tributary of Angelica Creek, for macroinvertebrates between April 2016 and April 2017. The PA IBI 2012 Small Streams metric showed a mean score of 65.8 + 1.3 in 2016 and 70.2 + 1.4 in 2017. For reference, a score above 63 is considered EV with this metric. Punches Run also exhibited a high MAIS score of 17.3 + 0.3. Again, for reference, any score above 13.1 is considered good on a 20-point scale.¹⁰

In addition to healthy macroinvertebrates, the Angelica Creek also supports diverse fish populations. On November 19, 2015, the Pennsylvania Fish and Boat Commission (PFBC) surveyed for fish in Angelica Creek at Angelica Creek Park. The sampling site was located 13 m downstream from the first footbridge located downstream from St. Bernadine's Street. The sampling site extended 336 m upstream from the footbridge and the entire stretch was surveyed via electrofishing. The PFBC collected 93 wild Brown Trout ranging from 75-349 mm in total length. Sixty-nine were smaller than the statewide legal size limit of seven inches, or roughly 175 mm (rounded to nearest 25 mm). Almost all, if not all, of those smaller fish were young-of-year trout spawned in the fall of 2014 into early 2015. Other species collected were Blacknose Dace, Longnose Dace, White Sucker, Spotfin Shiner, Creek Chub, Tessellated Darter, Rock Bass, and Pumpkinseed Sunfish. Of these additional species, only Blacknose Dace were abundant and White Suckers were common. The total trout biomass for the stretch of sampling sites was estimated to be 26.74 kg/ha¹¹ Shown below are the physical/chemical data collected by the PFBC on November 19, 2015 at 1300 hours:

Time 13:00

Air temp: 17.5 C

Water temp: 12.0 C

Specific Conductivity: 310 micro-mhos

pH 7.8

Total Alkalinity: 102 mg/l

Total Hardness: 140 mg/l

In early September 2017, six staff members of the PFBC again sampled the Angelica for fish in a 250 m stretch beginning 13 m downstream of the first footbridge. The wild trout biomass was estimated to be 25.39 kg/ha.¹² Although these numbers represent healthy Class B trout numbers, there are portions of the

⁹ Dr. David Osgood, Dept of Biology, Albright College (January 2021) Comparison of the Macroinvertebrate Community within restored and reference reaches on Angelica Creek (2005-2020). Data originally collected by Environmental Science and Biology students from the Ecology and Watershed Hydrology classes offered at Albright College

¹⁰ John Jackson, Stroud Water Research Center (2021). Punches Run Macroinvertebrate Data 2016-2017.

¹¹ Email from Michael Kaufmann of the PFBC, dated 3/18/16

¹² Email from Michael Porta of the PFBC, dated 12/23/20

stream that have never been surveyed which would likely result in even higher wild trout biomass numbers. There are excellent pools between the lower footbridge and Route 10, which represents the greatest elevation drop. This is a popular spot where many anglers go to fish because healthy numbers of wild trout congregate there. If PFBC were to sample these pools at the proper time of year, there remains the possibility of a trout biomass of 40 kg/ha, which would meet Class A criteria. In addition, small populations of native brook trout persist in some of the headwater tributaries to the Angelica Creek, which is remarkable given the location of the stream. Ensuring that the water quality of Angelica Creek is maintained at a high level in perpetuity is critical for the protection of the wild trout population. Trout streams in southeastern Pennsylvania are particularly vulnerable to development and loss of watershed quality because of the marginal nature of their thermal habitat. Given the predictions of increased temperatures and increased frequency of storm runoff from climate change, any additional protections from further forest loss or destructive development practices are especially important for preserving this important natural resource. Additional stream improvement projects, particularly in the upstream portions, would also go a long way towards improving instream habitat and water quality that may increase wild trout biomass over time.

II. Angelica Creek is an outstanding local resource water and a surface water of exceptional recreational significance

The Angelica Creek has a long history of being an important resource to local residents. When the Angelica Creek dam breached in 2001 due to Tropical Storm Allison, environmental organizations successfully advocated for the restoration of the stream to a free-flowing condition rather than having the dam rebuilt. This ultimately led to the restoration of the creek within the Angelica Creek Park, which was renamed from Angelica Park, with reestablishment of floodplain habitat, restoration of wetlands and streambanks, and the establishment of an upland meadow. Restoration of Angelica Creek Park began in 2006 and continues today. In 2020 alone, Berks Nature planted over 162 new native trees and shrubs, with the support of the Mid-Atlantic Renewable Energy Association and many volunteers.¹³ The restoration is an ongoing success as the site gradually returns to natural conditions. Upland plant species have ceded to a wetland community of plants as previously dry portions of the drained lakebed have become soggy and saturated.¹⁴ Angelica Creek now flows through this former lakebed, weaving between two wetlands. Cattails and other hydrophytic plants flourish in the saturated soils while native trees and woody shrubs such as sycamore, swamp white oak, and osier dogwood have taken root along Angelica's banks.¹⁵ This diverse wetland community provides vital wildlife habitat, particularly for a variety of bird species. The wetland community also sequesters carbon, acts as a natural filter for rain and stormwater, increases groundwater recharge, and reduces the risk of flooding. The park also features a retention pond with a floating Biohaven wetland island. The floating wetland contains native plants and recycles excess nutrients carried by stormwater that would otherwise negatively affect the stream.¹⁶ All of these ecosystem services are particularly important in the face of climate change where natural resiliency must play a strong role.

The nearly 100-acre Angelica Creek Park is now the home to Berks Nature, a 501 C3 non-profit land trust that manages the natural areas of the park as part of a lease agreement with the City of Reading and

¹³ <https://www.bctv.org/2020/12/14/the-understory-restoration-and-reclamation-for-angelica-creek/>

¹⁴ <https://www.bctv.org/2020/12/14/the-understory-restoration-and-reclamation-for-angelica-creek/>

¹⁵ <https://www.bctv.org/2020/12/14/the-understory-restoration-and-reclamation-for-angelica-creek/>

¹⁶ <https://www.bctv.org/2020/12/14/the-understory-restoration-and-reclamation-for-angelica-creek/>

Alvernia University. In addition to this large-scale restoration project, a number of smaller habitat restoration and watershed improvement projects, from tree plantings to stream stabilization projects, have been implemented in recent years. Recreational opportunities have also been expanded and Angelica is a much-loved place where the community enjoys exercise and the outdoors. At the nexus of recreation and conservation, birdwatching and documentation has a rich history in Berks County dating back to 1897 with a lineage of highly skilled ornithological pioneers to the current Baird Ornithological Club. Both ecological bookends of the Angelica Creek watershed, Nolde Forest and Angelica Creek Park have been Club observation sites for more than 50 years. Of important water quality significance is the presence of the Louisiana Waterthrush, a biological indicator, referred to as the feathered trout at both Nolde Forest and Angelica Creek Park in recent years.¹⁷ Angelica Creek attracts a large number of anglers every year and provides excellent trout fishing. Popular fishing spots include the confluence of the Schuylkill River and Angelica Creek, and below the Nolde Forest Sawmill parking area down to Rt.724. Additionally, the Mohnton Fish and Game Protective Association, which is more than 60 years old with its current moniker and with roots back to 1895, is active in the Angelica Creek Watershed with rainbow trout fish stocking per agreements with PFBC. A one-mile gravel trail now runs along the lower Angelica Creek connecting Kenhorst Borough to Angelica Creek Park and the Schuylkill River Trail. Long-term plans include extending this trail to Nolde Forest. In January 2020, two parcels of land totaling 60 acres were preserved by Natural Lands and Berks Nature and transferred to the Pennsylvania Bureau of State Parks as an addition to Nolde Forest Environmental Education Center.¹⁸ The acquisition brought the total of preserved land at Nolde Forest to 725 acres.

The community greatly values the Angelica Creek, and many volunteers continuously monitor water quality. There are currently three CTD/Turbidity stations implemented and maintained by SWRC and watershed volunteers located upstream of Berks Nature,¹⁹ downstream of Berks Nature,²⁰ and at Punches Run.²¹ Robert Sarnoski, a master naturalist and member of ACWA, has deployed three EnviroDIY temperature loggers that he built himself and deployed on Stillwater Run, a tributary to Angelica.²² Robert has conducted extensive monitoring work (both water chemistry²³ and biological²⁴) on Stillwater Run and has provided his data for this petition.

The townships in the Angelica Creek Watershed also have ordinances and provisions in place to maintain water quality and protect against degradation.

For example, Brecknock Township has an ordinance that states that, “*Within any identified floodplain area, no new construction or development shall be located within the area measured 50 feet landward from the top-of-bank of any watercourse.*”²⁵

¹⁷ A Century of Bird Life in Berks County Pennsylvania, 1997. Published by Reading Public Museum.

¹⁸ Natural Land Trust. 2020. Land Added to Nolde Forest in Berks County. Online at <https://natlands.org/news/land-added-to-nolde-forest-in-berks-county/>

¹⁹ <https://monitormywatershed.org/sites/MSAC1S/>

²⁰ <https://monitormywatershed.org/sites/MSAC2S/>

²¹ <https://monitormywatershed.org/sites/MSPR2S/>

²² <https://monitormywatershed.org/sites/STLWTR1/>

²³ <https://app.simplenote.com/p/FcQntH>

²⁴ <https://photos.app.goo.gl/BSmaXNLEWQgEPXycA>

²⁵ <https://www.brecknockberks.com/code-of-ordinances>

Cumru Township has an ordinance that states that, “*All intensive agricultural uses and facilities shall not be located within the floodplain and shall be located at least two hundred (200) feet from all perennial streams or surface water.*”²⁶

The borough of Kenhorst has an ordinance that states that, “*No encroachment, alteration, or improvement of any kind shall be made to any watercourse unless it can be shown that the activity will not reduce or impede the flood-carrying capacity of the watercourse in any way.*”²⁷

Finally, Reading has an ordinance in place that states that, “*If a perennial or intermittent stream passes through the site, the applicant shall create a stream buffer extending a minimum of fifty (50) feet to either side of the top-of-bank of the channel.*”²⁸ It is clear that the Angelica Creek is an outstanding local resource water to the communities and municipalities in the watershed.

III. Angelica Creek largely flows through a state park and other preserved lands

A large portion of Angelica Creek flows through Nolde Forest State Park, which is owned by DCNR. Beginning as a plantation owned by Jacob Nolde in the early 1900s, the Commonwealth purchased the property in the late 1960s with Project 70 funds. In 1970, federal program grants and the Berks County Intermediate Unit helped establish the Nolde Forest Environmental Education Center as the first environmental education center operated by the Bureau of State Parks. The center has provided a wide variety of activity-oriented programs for students, teachers, adult groups and individuals and the Angelica Creek and its tributaries are a vital resource to the community.²⁹ In the County of Berks Greenway, Park, and Recreation Plan, Nolde Forest is listed as an Ecological Greenway Hub and now encompasses more than 725 acres of diverse woodland habitat.³⁰ The large core forest heavily contributes to the high water quality of the Angelica Creek and its tributaries because it helps maintain cold-water temperatures suitable for trout and other temperature-sensitive aquatic life in addition to providing for runoff abatement. According to Chapter 93 regulations, a water meets EV status if it is, “*...located in a designated State park natural area or State forest natural area, National natural landmark, Federal or State wild river, Federal wilderness area or National recreational area.*”³¹

All portions of Angelica Creek running through Nolde Forest State Park clearly meet this criterion. There are also other privately preserved lands in the vicinity that should be taken into consideration. As DRN has advocated in the past, preserved lands and private easements bring with them real water quality protections and measures that are formal and enforced. Therefore, private eased lands may very well be even more protected than publicly owned lands and adding forested buffers on these lands is often very welcomed if buffers do not currently exist. Immediately east of Nolde is the 76-acre Knipe Woodland conservation easement held by Berks Nature. In addition, there are other preserved lands throughout the watershed from the headwaters to the mouth including a 12.37 acre City of Reading former ice dam property with forested riparian wetlands and floodplain of the Angelica Creek. Near the headwaters are two additional conservation easements held by Berks Nature, the 39-acre Hildreth Woodland and the 42-acre Echo Hollow

²⁶ http://www.cumrutownship.com/images/Zoning_Article_8_-_Non-Residential.pdf

²⁷ <https://ecode360.com/28746201>

²⁸ https://www.readingpa.gov/sites/default/files/council/ordinance/2008/Stormwater_Management_Ordinance.pdf

²⁹ https://stateparks.com/nolde_forest_state_park_in_pennsylvania.html

³⁰ County of Berks Greenway, Park, and Recreation Plan; County of Berks Planning Commission.

³¹ <https://www.epa.gov/sites/production/files/2014-12/documents/pawqs-chapter93.pdf>

Easement. At the confluence of the Angelica Creek and the Schuylkill River is the nearly 100-acre Angelica Creek Park in the city of Reading, which is listed in the Berks County Greenway, Park, and Recreation Plan as an Ecological Destination that connects to the Schuylkill River Trail. In fact, the Angelica Creek Greenway is listed as a number one Priority Greenway Corridor by Berks County and there are plans to connect Angelica Creek Park, Ken Grill Pool, Shillington Park, and Nolde Forest in the future. The Angelica Creek Greenway has forest cover of around 42.77%, and this increases to around 53.2% forest cover at the intersection of Angelica Creek and Rt. 724. As previously described, Angelica Creek Park features a varied assemblage of native wetland and riparian plants that provide rich wildlife habitat as well as assist in the collection and filtration of stormwater.³² To the southwest, the headwaters of a tributary to Angelica Creek called Rabbit Run also originate near the 62-acre Shillington Memorial Park in the Borough of Shillington. Local schools engage in many preservation efforts at Rabbit Run, such as planting trees and native plants while using river-friendly grass mowing practices to leave a wide buffer. Immediately downstream of the Shillington Memorial Park is one of the campuses of the Governor Mifflin School District on which a 35-foot riparian buffer with native trees was installed by students and the Angelica Creek Watershed Association along Rabbit Run. The buffer is managed for wildlife habitat and outdoor educational activities with no mowing. When combined with Nolde Forest State Park and the various township ordinances, all of these preserved lands create a nearly continuous corridor of protection from degradation.

IV. The entire Angelica Creek Watershed warrants Exceptional Value designation

In 1977, Angelica Creek was placed on the Pennsylvania Fish and Boat Commission's list of naturally reproducing trout streams. Since then, environmental conditions have only improved as it is now a free-flowing stream since the Angelica Creek dam was removed. From native vegetation to high trout biomass and pollution-intolerant macroinvertebrates, the evidence is clear that the natural communities have responded to the restoration efforts over the past 15 years and will only continue to improve. Combined with the large portions of preserved lands (both state and privately owned), protective township ordinances, and the recreational and local community significance, it is clear that the Angelica Creek meets several qualifiers to be redesignated from CWF to EV status. DRN and ACWA respectfully ask that this redesignation process begin as soon as possible, as it can take a period of years for changes to come into effect. During this time, the Angelica Creek may be vulnerable to development and other practices that could be harmful to the stream. It is important that the high water quality of Angelica Creek be maintained now and in perpetuity for future generations. The Pennsylvania Environmental Rights Amendment was designed to preserve every Pennsylvanian's right to clean streams and a healthy environment. Redesignating the Angelica Creek to EV status would represent a vital upgrade to the protection of the stream and would more accurately reflect its value to the Commonwealth. Thank you for your time and consideration.

Sincerely,




Maya K. van Rossum
the Delaware Riverkeeper

³² <https://www.bctv.org/2020/12/14/the-understory-restoration-and-reclamation-for-angelica-creek/>



Kimberly J. Murphy
Berks Nature



Mary Kemp
Angelica Creek Watershed Association

Cc: Mark Brickner, DEP, Division of Water Quality, mbrickner@pa.gov
Timothy Schaeffer, PA Fish and Boat Commission, tischaeffe@pa.gov

Attachments: Attachment 1 – Land Use Map
Attachment 2 – Osgood Data
Attachment 3 – Punches Run Data
Attachment 4 – Maps and Additional Data
Attachment 5 – Mayfly Sensor Data Part 1
Attachment 6 – Mayfly Sensor Data Part 2
Attachment 7 – Mayfly Sensor Data Part 3
Attachment 8 – Summary Data 2005 to 2020
Attachment 9 – Sensor Data Part 1
Attachment 10 – Sensor Data Part 2
Attachment 11 – Sensor Data Part 3
Attachment 12 – Sensor Data Part 4
Attachment 13 – Sensor Data Part 5
Attachment 14 – Brecknock Ordinances
Attachment 15 – Cumru Ordinances
Attachment 16 – Kenhorst Ordinances
Attachment 17 – Reading Ordinances
Attachment 18 – Protected Lands Map
Attachment 19 – Forest Cover
Attachment 20 -- E Bird List for Nolde Forest
Attachment 21 – E Bird List for Angelica Creek Park
Attachment 22 – List of Angelica Creek Discharges