



## Center for Coldwaters Restoration

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## I. Overview

### Mission:

The Center for Coldwaters Restoration will foster the recovery of mountain streams, spring creeks, the rivers they feed, and the ecosystems they support. The center will accomplish its mission through research, education, and the implementation of best practices in the propagation of native species, recovery of riparian habitat, and campaigns to foster public appreciation for the significance of cold pure water to our health.

### Vision:

Mountain streams, spring creeks, and related ground and surface flows are the source of the waters on which our public health and economic well-being depend. There is no alternative substance for pure water. Climate change; evolutions in land use; and the affects of historic agricultural and mining threaten to further degrade the headwaters of our rivers. Through its focus on restoration of species native to coldwaters and adjacent habitats, the center will ensure that successive generations benefit from ample sources of water of the best possible quality. In addition, location in on the greenway in downtown Waynesboro provides an unparalleled opportunity to develop Virginia's first coldwater aquarium which will attract tourists into the center of the city.

### Location:

- \* Downtown Waynesboro
- \* 3 million gallons per day of spring water
- \* More than 500,000 square feet of empty industrial space suitable for immediate conversion to facilities for propagation of native coldwater species, laboratories, classrooms, aquarium, and offices on the South River.
- \* Close proximity to five universities and colleges and Shenandoah Nat'l Park.



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## Implementation:

The Center for Coldwaters Restoration will achieve its vision by utilizing the unique aggregation of assets at The Mill at South River. The center will initiate its efforts by construction and operation of a facility to propagate brook trout for restoration of spring creeks and mountain headwaters. Use of the facility will grow as knowledge of its unique assets becomes widespread.

## Development of the infrastructure:

- Renovation of existing structures
- Design and installation of electrical, plumbing, climate control, and wastewater systems
- Creation of artificial environments suitable for rearing native brook trout without eroding their genetic integrity
- Construction of offices, laboratories, classrooms, and interpretive features for tourists and visitors to support operations, research, and education

will facilitate the co-location of state natural resource agencies bringing new jobs and vitality to downtown Waynesboro and provide a facility that will allow the state's universities and colleges to successfully attract funding for and conduct coldwater-related research. The center with its coldwater aquarium will complement the southern entrance to Shenandoah National Park as the city's primary tourism asset.

## Management and operation:

Initially the center will be managed by a board comprised of leaders of stakeholder organizations. An interim director will be hired. The Virginia Department of Game and Inland Fisheries will provide oversight of daily operations. Waynesboro Downtown Development, Inc. will serve as fiscal agent until such time as the center becomes established and can be integrated with the operations of a university partner, a state agency, or other existing entity.

## Future endeavors:

Creating the infrastructure to support the center's brook trout restoration program will provide a suite of facilities and processes to accelerate research, species and habitat recovery, and public education on issues relative to:

- Chemical pollution of headwater rivers such as mercury deposition in the South River, nitrate and pharmaceutical loading, and acid deposition from combustion of fossil fuels
- Strategies to address the impacts of climate change on air and water quality and flora and fauna
- Mitigation of the affects of community growth and development on ground and surface water resources
- Integration of land-use and protection strategies designed to conserve and restore native species such as birds, trees and grasses, aquatic amphibians

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## II. Why Begin with Brook Trout

### The Need:

The brook trout is Virginia's state fish. Prior to European settlement, they occupied the state's mountain streams and valley spring creeks. Historic agriculture and development forced them to retreat to the headwaters in the Blue Ridge and western mountains where an eight-inch brookie is considered a large fish. In comparison, the last known native brook trout harvested from a valley spring creek was huge. A four pounder was taken from Mossy Creek in Augusta County in 1965.

From the West Virginia line above Winchester to the Tennessee border at Bristol, the Interstate 81 corridor contains 5,000 miles of streams that once contained brook trout. They are gone now – extirpated. Over the last decade, efforts by the Virginia Outdoors Foundation and other land conservancies, Soil and Water Conservation Districts, the Division of Game and Inland Fisheries, the U.S. Forest Service, and Trout Unlimited and other non-profit groups have improved habitat on more than 100 miles of streams in the I-81 corridor.

Driven by the realization that improved water quality provides significant economic benefit for agriculture; local government, residents, industry, and recovery of Chesapeake Bay, widespread efforts are underway to protect streams with livestock fencing and to restore stream-side vegetation which cools water flows creating an environment suitable for brook trout.

Brook trout are highly prized game fish. Anglers travel to Maine and the provinces of eastern Canada to catch trophy sized brook trout. For local economies, such trips generate \$4,000 to \$8,000 per angler per week. Within the United States, American anglers in search of large brookies spend \$2,000 to \$4,000 per week to fish streams in Maine. With its aggressive campaign to improve water quality and brook trout habitat in the I-81 corridor, Virginia has the opportunity to become a destination for traveling anglers, building on awareness generated by the quality of trout fishing in Mossy Creek, Shenandoah National Park, the Jackson and Smith River tailwaters, and White Top Laurel near Damascus.

The problem is that Virginia has no reliable source of native brook trout available to repopulate streams in the I-81 corridor. Virginia is not alone in this predicament. It is an issue for many of the 17 states in the Eastern Brook Trout Joint Venture – the National Fish Habitat Initiative to restore brook trout throughout its once native range. Because brook trout have been so long isolated in high mountain streams, their genetics have evolved to match their current habitats. One researcher identified more than 100 distinct genetic patterns among different populations of brook trout. Their genetics complicate the production of brook trout that will reproduce naturally in restored streams.

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The Center for Coldwaters Restoration is one of three components that constitute the Upper South River Watershed Improvement Plan. Conceived jointly by community leaders, representatives of state and federal natural resource agencies, and the Virginia Council of Trout Unlimited working over the past two years, the Upper South River Watershed Improvement Plan will:

- Establish the Center for Coldwater Restoration and related research, education, and interpretative facilities.
- Improve water quality to foster increased agricultural productivity and reduce pollution through restoration of riparian zones along approximately 50 miles of degraded tributaries to the South River which feeds the Shenandoah and ultimately Chesapeake Bay.
- Create a trophy brook trout fishery in the South River beginning in Waynesboro and extending 8 to 10 miles upstream.

The Upper South River Watershed Improvement Plan is envisioned as a joint economic development / environmental restoration campaign that will extend over 25 years or more. It is complemented by Trout Unlimited's Shenandoah Headwaters Home Rivers Initiative.

### Meeting the Need:

Brook trout restoration efforts at The Center for Coldwaters Restoration will:

- Build on state-of-the-art fish culture technology pioneered by The Conservation Fund's Freshwater Institute in Shepherdstown, W.V., Conservation Fisheries, Inc. in Knoxville, Tenn., and the Stroud Water Research Center in Avondale, Pa. to develop procedures to raise - in a rigorously controlled and monitored environment - brook trout capable of sustainable repopulation of spring creeks and mountain streams in Virginia and, perhaps, other states in the Southeast.
- Create a source of Virginia brook trout to sustain a trophy trout fishery in the South River above Waynesboro thus providing a new source of tourism income for the city, Augusta County, and the surrounding region.
- Establish an anchor facility that will initiate 1) the co-location of state and potentially federal natural resource agencies involved in natural resource management in the region, 2) the development of living-stream and related water research laboratory space to be used by universities from the region and beyond, 3) an education center for K-12 students and teachers focused on integrating watershed issues with Virginia's Standards of Learning, and 4) Virginia's first public coldwater aquarium.

The establishment of The Center for Coldwaters Restoration has received preliminary endorsement by representatives of the City of Waynesboro; members of the Augusta County Board of Supervisors; Waynesboro Downtown Development Inc.; the Virginia Departments of Game and Inland Fisheries, Environmental Quality, and Conservation and Recreation; the U. S. Fish and Wildlife Service; the U. S. Forest Service; Shenandoah National Park; and the regional higher education community including James Madison University, Virginia Tech, University of Virginia, Mary Baldwin College, Blue Ridge Community College, and Washington and Lee University; DuPont, and Trout Unlimited.

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## Why Waynesboro and Augusta County, Va.:

In the City of Waynesboro and Augusta County, Va. are aggregated an unusual set of assets.

- A 40-acre riverfront brownfield site – the Mill at South River – with several hundred thousand square feet of vacant space under roof suitable for rapid and economical remodeling to accommodate The Center for Coldwaters Restoration. The site has deeded rights to 3 million gallons per day of spring water to support a wild trout propagation facility. The Mill at South River is located in downtown Waynesboro, an enterprise zone. In addition to The Center for Coldwater Restoration, owners of the property plan robust retail, residential, entertainment/hospitality, and artisan facilities. The mill is separated by a parking lot from Waynesboro’s main Constitution Park and located on the city’s planned greenway which when completed will draw hikers and bikers to the river.
- Augusta County is taking into account the need to protect water quality and riparian zones in its land use planning. The upper South River watershed covers much of the southeast section of the county. The area supports a mix of family farms, growing villages and towns, and light industry which all depend on supplies of high quality water for economic viability. In addition, on-going in the county is an aggressive campaign of riparian protection. These streams and those in the nearby George Washington National Forest provide myriad opportunities for real-time field assessment of trout and coldwater restoration processes developed in the laboratories of The Center for Coldwaters Restoration.
- The South River is Virginia’s largest spring-fed river. Its water quality is suitable for the creation of a destination trophy brook trout fishery. Preliminary studies show that once brook trout fingerlings are introduced into the river they will grow rapidly. The fishery will be available for public use within three years of its initial stocking. However, since spawning substrate is severely limited, this economic resource will have to be sustained by subsequent annual stockings until significant riparian restoration is completed in the South River’s headwaters.
- Within an hour’s drive of the Mill at South River are five universities and colleges – James Madison, University of Virginia, Mary Baldwin College, Blue Ridge Community College, and Washington and Lee University – with interests in coldwater aquatic research and environmental education but without space on campus to house such endeavors.
- Waynesboro is the city closest to the southern entrance to Shenandoah National Park. The park, assisted by the Shenandoah National Park Trust, has embarked on an aggressive campaign to improve visitor facilities at Loft Mountain and Rockfish Gap. A trophy brook trout fishery will benefit from tourists drawn to the park and vice versa. Further the potential exists for creating a coldwater aquarium and interpretive center, along the lines of the warmwater museum at Maymont Park in Richmond, will add to tourism-related income for the region.

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## Preliminary Plans for Management, Operation, and Construction:

Initially, oversight for operation and management of The Center for Coldwater Restoration will be provided by Virginia Department of Game and Inland Fisheries. Space in the Mill at South River will be leased with an option to purchase. As in the case of The Stroud Water Research Center, management may evolve over time as activities associated with the center develop. Governance of the Center for Coldwaters Restoration will be provided by a board of directors made up of representatives of partnering agencies, universities, and non-profit entities. In addition to providing guidance for the center's mission and its implementation, the board will be charged with the responsibility of securing long-term funding to sustain the center. Partnering organizations will select an interim director to facilitate the process until which time the center is turned over to the Virginia Department of Game and Inland Fisheries for day-to-day operation.

Because of the nature of brook trout and their genetics, the brook trout restoration program will utilize small circular and rectangular troughs to create a series of discrete environments. Each environment can be tuned – water temperature, pH, alkalinity, dissolved oxygen/nitrogen, water velocity, food, stream-bed structure, day-night period, etc. – to match as nearly as possible the location from which brood adults come and into which specific sets of trout fingerlings will be introduced. Rather than the large production associated with typical hatcheries, the center will propagate small batches of brook trout in artificial environments designed to optimize the trout's abilities to survive and sustain themselves in the wild and maintain their genetic diversity. This will be the first facility in the East to take this enlightened approach to the restoration of wild trout.

Because the space available at the Mill at South River is essentially shell buildings, it offers unlimited opportunity to customize runs and raceways that are not available in traditional hatchery settings. Because ample supplies of Southern Appalachian Brook Trout for restoration have not been successfully produced in artificial environments, fisheries biologists trap brookies in one stream and transfer them to another. Trap and transfer is an effective restoration protocol where significant sources of wild brook trout are available. But in states like Virginia, where brook trout populations are limited and the stream mileage to be restored is extensive, trap and transfer threatens the viability of both the source and transplanted populations. The processes developed at The Center for Coldwater Restoration will relieve pressure on Virginia's wild brook trout populations. Once protocols for propagating wild brook trout strains have been successfully developed, The Center for Coldwater Restoration will be in a position to assist other states in large scale restoration efforts.

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## Projected Costs for Initial Operation:

It is estimated that the initial cost of remodeling space at the Mill at South River, installing appropriate infrastructure, and staffing for the first four years will be about \$3 million. These figures were derived from Virginia Game and Inland Fisheries' experiences in renovating its Coursey Springs Hatchery in Bath County and estimates provided by an engineer familiar with water treatment facilities. Cost estimates need to be refined. Waynesboro Downtown Development, Inc., Trout Unlimited, and their partners are in the process of doing so.

- Construction – retro-fitting shell buildings; purchasing of tanks and equipment; installing plumbing, utilities, mechanical systems = \$1,000,000
- Operation – staffing with one full-time professional and one assistant (graduate student?), supplies, utilities, insurance, transportation = \$200,000/yr X 5 years = \$1,000,000
- Research – initial funding to spawn brook trout related research = \$125,000/yr X 4 years = \$500,000

The costs and benefits of developing Virginia's coldwater aquarium are also under investigation.

## Long-term Economic Benefits:

The Center for Coldwaters Restoration and the Upper South River Watershed Improvement project will provide the following economic benefits:

- Injection of \$3 million in construction and operation costs into the greater Waynesboro economy
- Anchor tenant for the creation of co-located regional offices of state and federal natural resource agencies which will add 50 – 75 professional jobs in downtown Waynesboro
- Potential for increased downtown tourism generated by the Virginia coldwater aquarium
- Development of a trophy brook trout fishery which will generate between \$1 million and \$2 million in tourist related income each year for Waynesboro, Augusta County, and surrounding area
- Opportunity for regional colleges and universities to successfully compete for government grants and contracts and foundation funding associated with Chesapeake Bay restoration and mitigation of chemical pollution such as the mercury issue affecting the South River downstream from Waynesboro
- Increase in agriculture productivity, particularly in cow-calf and dairy operations, by enhancing access to clean water
- Enhanced value of residential property by virtue of its location on or near a trophy trout stream