

2015 SOUTH RIVER REPORT CARD



The South River Federation, Inc. is a membership organization dedicated to protecting, preserving, restoring and celebrating the South River and its interdependent living community.

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HEALING THE SOUTH RIVER IN ONE GENERATION

The South River 10th Annual Report Card On the State of the South River 2015

The South River Federation is delighted to present the **10th Annual South River Report Card**. The past ten years have seen significant gains in water quality punctuated with occasional setbacks. The data from 2015 reflects a continuation of that pattern. Water clarity readings improved, as did pH and chlorophyll. Dissolved oxygen and temperature readings worsened, which is unsurprising in light of record global temperatures in 2015. Nitrogen levels increased but phosphorus went down. Underwater grasses remained the same.



Despite the departure of Capt. Diana Muller, the monitoring program continued the tradition of robust and scientifically rigorous data collection and analysis to develop this Report Card. That same data is integrated into the models of the Chesapeake Bay Program and the State of Maryland, helping inform policy and restoration efforts across

the Bay. No other non-profit organization shares this distinction. A large part of the monitoring program's successful transition in 2015 is due to the skills and enthusiasm of our volunteers and citizen scientists, which is second to none. In September that excellence was recognized with a cover story in the international technical magazine *Chemical and Engineering News*.

The past ten years of compiling and analyzing data on our River teach us that progress is challenging, but achievable. We consistently push forward to deliver a cleaner, healthier South River. The Federation is more capable than ever to do this; we now have eight passionate staff, a new office space, and a supportive board of directors. The Restoration Program has grown from a portfolio of eight projects in 2002 to 63 completed projects in 2015. The Scientific Monitoring Program maintains a level of discipline and scientific rigor rarely seen in the non-profit sector, and continues to inform our strategy for protecting, preserving, restoring and celebrating the South River and its interdependent living communities.

Sincerely,

Jesse Lee Iloff
South RIVERKEEPER®

South River Federation Scientific Monitoring Program

South River Federation's Scientific Monitoring Program implements Environmental Protection Agency's Scientific Integrity Policy to ensure that all data collection and analysis is performed and communicated with integrity. All tidal water quality data is reported to the EPA's Chesapeake Bay Program and Maryland Department of Environment on a regular basis for inclusion in Bay-wide modeling and data reporting. All data collection is performed according to a Quality Assurance Project Plan which is reviewed and verified by the Maryland Department of Natural Resources and independent third parties.

In 2015 the South River Federation engaged 1,003 volunteers and students, and enjoyed over 2,800 volunteer hours assisting with various restoration, clean-up, and water monitoring projects. In September the Federation organized a BioBlitz event with 30 volunteers identifying over 100 animal and 60 plant species in the Church Creek watershed alone.

In addition, SRF managed over 60 oyster growers and 360 oyster cages and helped Chesapeake Bay Foundation to plant over 200,000 oyster spat-on-shell in Duvall Creek. The Federation mobilized volunteers for 17 tree planting events, including a massive effort in the Flat Creek watershed planting with over 1,200 trees. In addition, the Federation began an education and outreach program with the predominantly African-American community of Bywater in Annapolis.

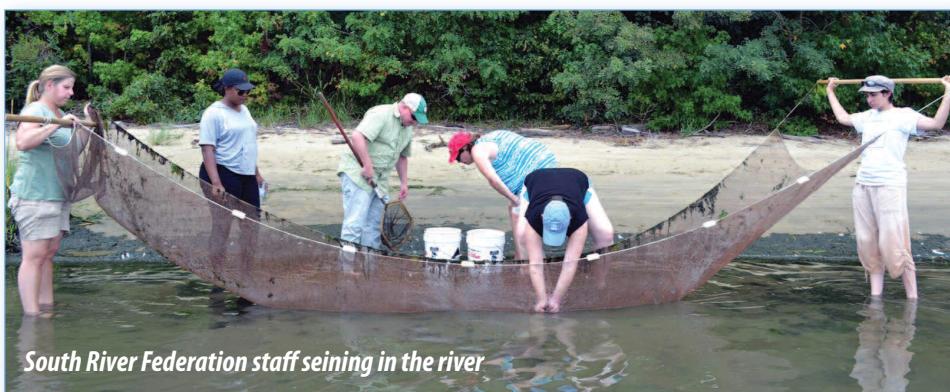
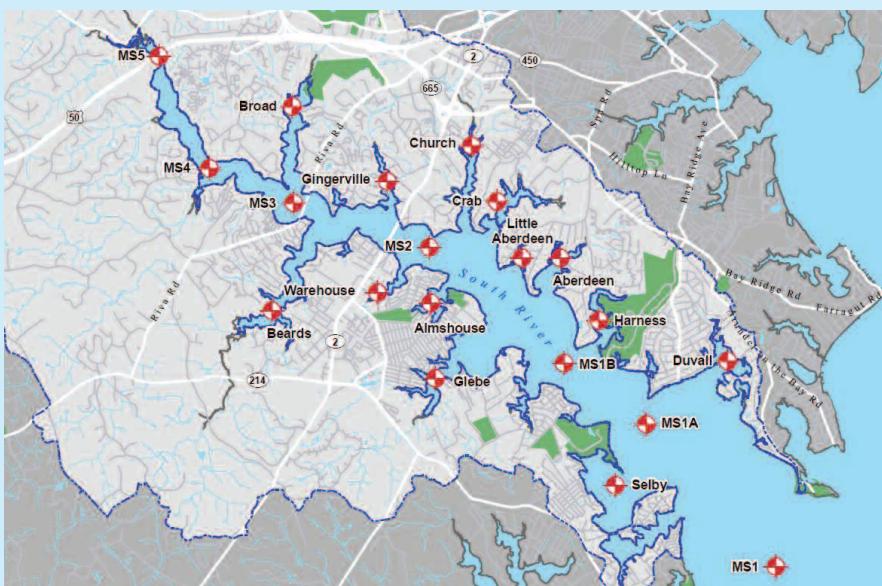
If you or your organization are looking for volunteer or educational opportunities, please contact our office at 410-224-3802.



About the Report Card

The **10th Annual South River Report Card** assesses the River's health based on eight water quality indicators: water clarity, dissolved oxygen, nutrients, chlorophyll *a* (spring/summer), pH (surface/bottom), temperature (surface/bottom), bacteria, and underwater grasses. This data is collected by the South RIVERKEEPER® from 21 stations in the tidal portion of the South River and is supplemented by data from Maryland Department of Natural Resources (DNR).

South River Watershed and Tidal Monitoring Stations



Report Card Grades 2015

Water Quality Indicators	Percent Passing	Grade	Change from 2014
Water Clarity	38%	E	better
Dissolved Oxygen	41%	E	worse
Nutrients			
Nitrogen	51%	E	worse
Phosphorus	59%	E	better
Chlorophyll <i>a</i> , Spring			
Surface	62%	D	better
Bottom	50%	E	better
Chlorophyll <i>a</i> , Summer			
Surface	36%	E	better
Bottom	38%	E	better
pH (surface)	94%	A	better
pH (bottom)	98%	A	better
Temperature (surface)	25%	E	worse
Temperature (bottom)	26%	E	worse
Underwater Grasses	2%	E	same
Human Health Indicator			
Bacteria	65%	D	worse

What Do the Grades Mean?

- A** 90-100% These regions of the South River are considered in "healthy" condition. This means there is water quality capable of sustaining fish and other aquatic life.
- B** 80-89% These are areas with "good" water quality
- C** 70-79% These areas are in "fair" condition.
- D** 60-69% These areas are considered "degraded", which causes stress to aquatic organisms, but may not be lethal.
- E** <59% These are "highly degraded" areas, which means aquatic organisms are stressed and often cannot survive.

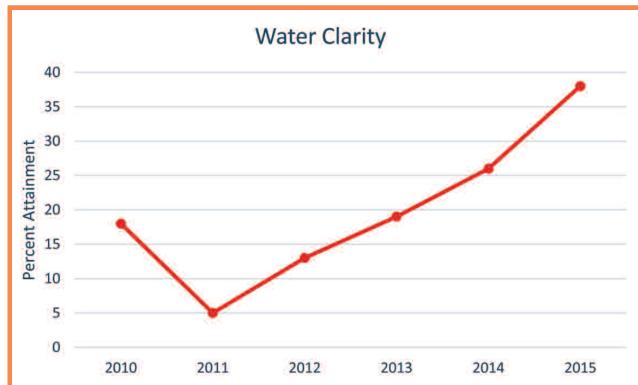
Water Clarity

Score: Out of 204 observations using a Secchi Disk between April 29 and August 18 at our 21 tidal monitoring stations, 38% passed the criteria of 1 meter, with a median depth of 0.7 meters. This marks a dramatic improvement from the 26% clarity attainment in 2014, although a 38% is technically still a failing grade.

Results: The challenges to the South River's water clarity continue to be high sediment loads and nutrient-fueled algae blooms. Poor sediment control at construction sites, rushing stormwater that erodes stream banks, animal waste, as well as septic and sewer effluent all contribute to poor water clarity.

Part of the improvement in water quality can be attributed to drier weather in late summer and fall of 2015. In fact, record water clarity was reported throughout the Chesapeake Bay. Data from the USGS showed discharge from the Susquehanna River in September and October 2015 at 2/3 of the 125-year average.

Percent Passing: 38%
Grade: E



Intern Chelsea Diedrich using Secchi Disk



Partly, this improvement may be the result of our numerous and large scale restoration projects, which show promising preliminary results for filtering sediment and preventing its introduction into tidal waters.

Criterion: The criterion for water clarity in the South River requires that an observer clearly see a Secchi Disk at 1 meter of depth, which represents 22% light penetration into the water column, as required for viability of most underwater vegetation.

*Code of Maryland Regulations
§26.08.02.03-3(C)(9)(b).*

Dissolved Oxygen

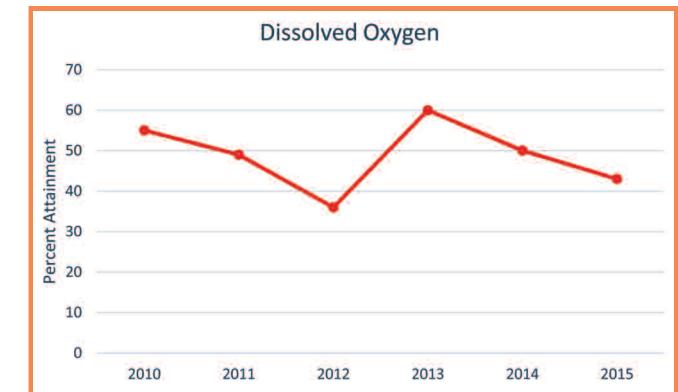
Score: Of the 204 observations of the South River's bottom dissolved oxygen in 2015, 43.78% were above the criterion of 5 mg/l, a decrease from last year's score of 50%.

Results: In 2015 the entire planet experienced the highest average temperatures on record. In addition, an El Nino event beginning over the summer brought torrential rain in June, but a drier-than-average late summer and fall. The combination of elevated temperatures and nutrient enriched waters help drive algae

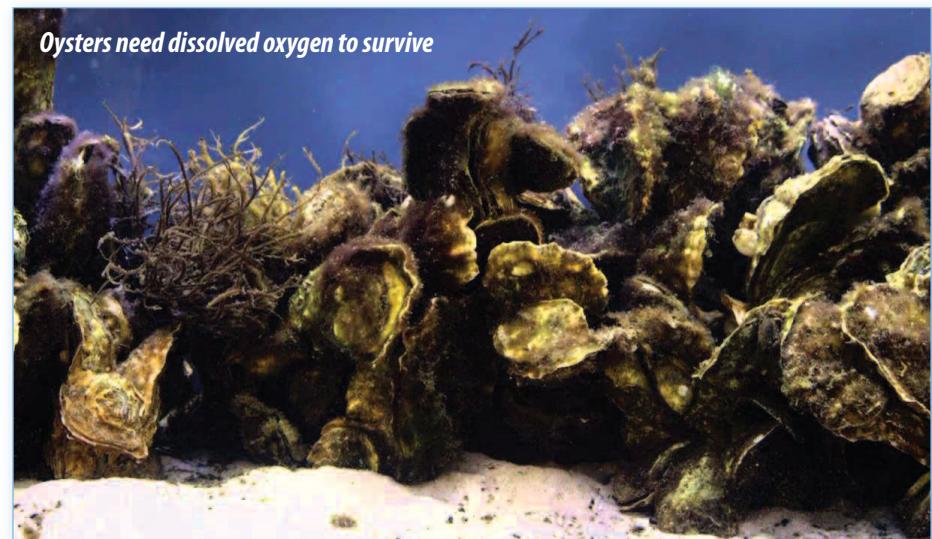
blooms that consume available dissolved oxygen, and can create "dead zones" in the river.

Criterion: The criterion for bottom dissolved oxygen is 5mg/l or greater, the level of oxygen most likely to ensure survival for a variety of aquatic organisms, as determined by the Chesapeake Bay Program.

Percent Passing: 41%
Grade: E



Oysters need dissolved oxygen to survive



Nutrients

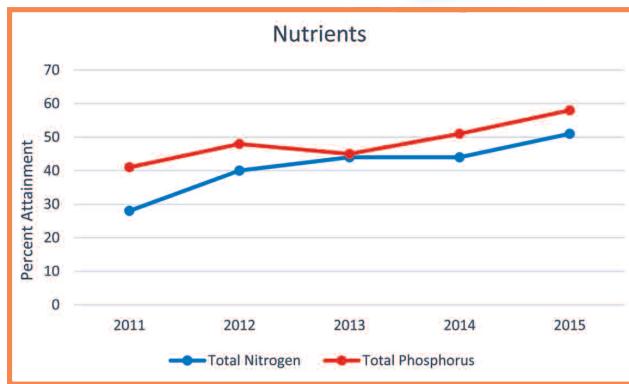
Score: Total Nitrogen (TN): In 2015, the River scored 51% for Total Nitrogen with 14 observations at one station (DNR WT8.1) and a median concentration of 0.719 mg/l.

Total Phosphorus (TP): In 2015, the River scored 59% for Total Phosphorus with 14 observations at 1 station, (DNR WT 8.1) and a median of 0.0498 mg/l.



Total Phosphorus: 59%
Grade: E

Total Nitrogen: 51%
Grade: E



Results: Our monitoring program suffered a significant setback in 2015 when the U.S. Naval Academy lost its ability to provide nutrient analysis for the Federation. As a result, we analyzed nutrient data from the MD Department of Natural Resources monitoring station on the river. In the past, the Federation collected slightly different nutrient constituents (i.e. nitrite, nitrate and phosphate rather than total nitrogen and total phosphorus). For comparison purposes, above are trend graphs based on historical DNR data.

Chlorophyll a

Chlorophyll a: Spring

Surface: 62%
Grade: D

Bottom: 50%
Grade: E

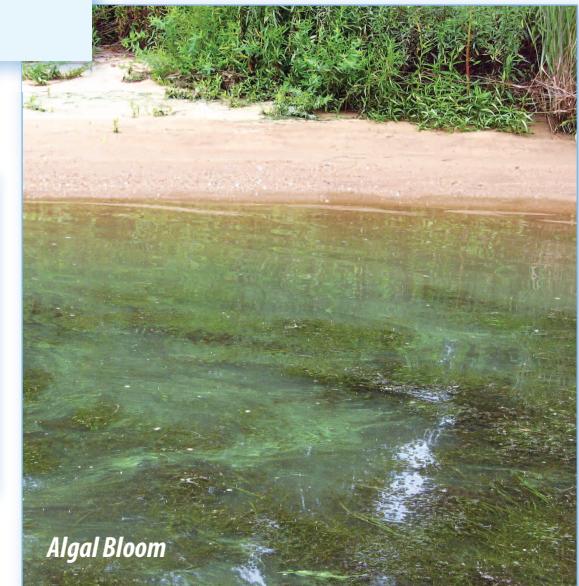
Chlorophyll a: Summer

Surface: 36%
Grade: E

Bottom: 38%
Grade: E

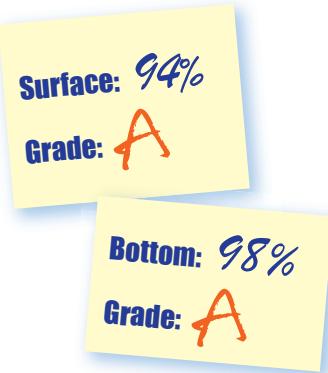
The Good: Algae and phytoplankton are tiny, often microscopic plants found in the water column. Algae and phytoplankton are an important food source for species in the South River and Chesapeake Bay such as zooplankton, oysters, clams, mussels and menhaden. To measure the amount of algae and phytoplankton in the water, scientists measure Chlorophyll a, a green pigment found in the tiny plants, which serves as a measuring indicator to estimate their concentration.

The Bad: Excessive nitrogen and phosphorus in the River can lead to the explosive growths of algae and phytoplankton known as algal blooms. As the algae die, the bacteria that decompose them consume oxygen quickly. This diminishes the oxygen available for other organisms in the water, causing what are known as Dead Zones.



pH

Score: Of the 204 measurements of surface water, 94.66% fell within the criterion range of 6.5 – 8.5 set by the Code of Maryland Regulations, with a median of 8.0. The bottom pH had a score of 98.05% passing and a median of 7.42.



Results:

The acidity or alkalinity of the water is measured by pH. Sudden changes in pH or a pH reading that is out of normal range usually indicates that a natural system is out of balance and can serve as an important warning bell.

The surface pH was notably higher than the bottom pH. When algae naturally begin to increase in estuaries during the spring, pH levels tend to rise. An overabundance of algae (called an algal bloom) may cause pH levels in the river to rise significantly, and this can be lethal to aquatic animals. The increase in pH peaks shortly after blue-green algae blooms.

These increases in pH generally occur in late spring through summer. However, high nutrient concentrations and warmer temperatures in the past several years have resulted in blooms occurring in the fall and early winter, which can stress or kill some aquatic organisms.

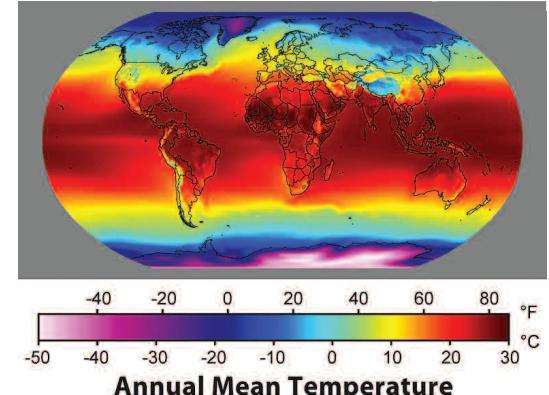


Temperature

Score: Out of 204 observations for surface temperature, only 25% of the measurements were within the tolerance criterion with a median temperature at 1 meter of 28.37°C (82.6°F). The observations for the bottom water temperature passed the criterion 26% of the time, with a median bottom temperature of 27.63°C (81.7°F).

Results: 2015 was the hottest globally and second hottest year for the continental United States in recorded history, according to the National Aeronautics and Space Administration (NASA). When water temperatures become too hot and exceed the median thermal tolerance, animal and plant species become stressed and can be killed. Temperature also affects the solubility of oxygen in water. The higher the temperature, the less oxygen water can hold. The combination of nutrient enriched water and elevated temperatures fuels the algae blooms and causes dissolved oxygen in the water to decrease.

Criterion: The median thermal tolerance is 25°C for aquatic species in the South River.



Underwater Grasses

Method: The underwater grass also known as submerged aquatic vegetation (SAV) survey in 2015 was performed by the South River Federation's trained SAV team. The SAV team uses kayaks in order to survey the shoreline, then Global Positioning System (GPS) units are used to mark the locations of the underwater grass beds. The grasses are identified by family and/or species. The use of Geographic Information Systems (GIS) is used to calculate the acreage.

Score: In 2015, the SAV team plotted **8.02** acres of Widgeon Grass (*Ruppia maritima*) in a single section of the river main stem. Historically the River enjoyed a greater variety and amount of SAV. In 1952 the River held **552** acres of SAV.

The South River also supports several beds of Horned Pondweed *Zannichellia palustris* in the spring, but the plant dies back in early June providing only limited habitat value.

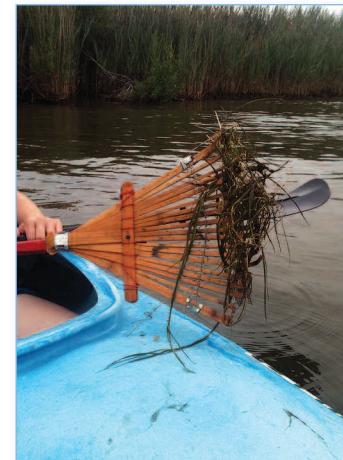
How to Help

Please report any sightings of underwater grasses to the Riverkeeper. If possible, plot GPS points and/or provide photographs of the shoreline to help us locate the bed.



Widgeon grass grows in the South River from June through October

Percent Passing: 2%
Grade: E



Results:

Underwater grasses provide an array of benefits to the South River. They provide dissolved oxygen through photosynthesis, help filter the water, and serve as an excellent habitat for fish, blue crabs, mollusks, and birds. High concentrations of sediment and nutrients coming off the land cause the water to be cloudy and prevent sunlight from reaching the bottom of the shallows. Without sunlight, the grasses cannot grow, and if the grasses do not grow, then there is not enough oxygen or habitat. Poor water quality conditions contribute to such low amounts of SAV.

Criterion The Maryland Code of Regulations sets the restoration goal for SAV in the South River at 479 acres.

Bacteria

Where Can I Go Swimming?

Score: Out of 138 observations, 65% of the measurements were within the criterion.

Results: As part of South River Federation's "Operation Clearwater", bacteria samples are collected every week from Memorial Day through Labor Day. The results are available to the public within 24-36 hours of collection. In 2015, bacteria concentrations increased dramatically after rain events in June and July.

Criterion: The EPA has established a limit of 104 colony-forming units (CFU) per 100 mL of water for recreational contact.

Residents can help reduce bacteria by picking up pet waste, keeping Canada Geese off shorelines/beaches and maintaining septic systems. This really helps to keep the bacteria out of the South River, especially after a heavy rainstorm.

Percent Passing: 65%
Grade: D



How to Receive the Bacteria information

SwimGuide: www.swimguide.org There is also an app!

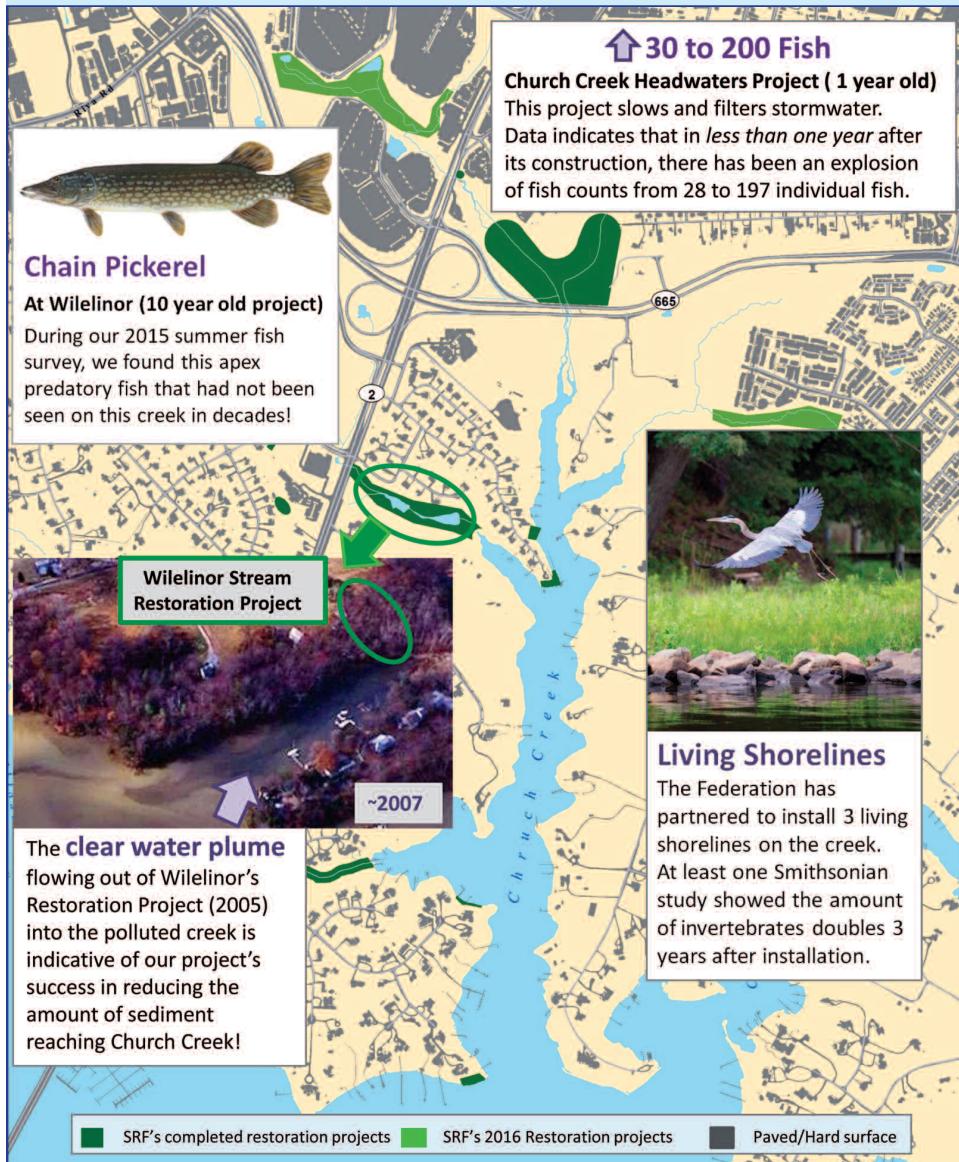
Website: www.southriverfederation.net

Facebook: www.facebook.com/SouthRiverFederation

Operation Clearwater

To sign up to have your waterfront community's recreational area tested, please contact our office at **410-224-3802**.

Restoration Success in Church Creek, Annapolis



Acknowledgments

We would like to thank the following individuals and organizations for their support in furthering the mission of the South River Federation and this annual Report Card. Their continued contribution and support is greatly appreciated.

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