



STATE OF THE JAMES

2021

SCORE | GRADE

RIVER HEALTH 64% **B-**

RIVER RESTORATION EFFORTS 58% **C+**

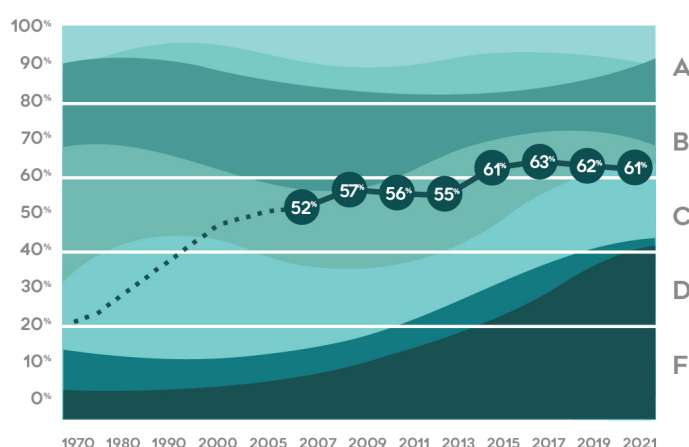
OVERALL 61% **B-**

GRADING SCALE: **A** 80%-100% **B** 60%-79%

C 40%-59% **D** 20%-39% **F** LESS THAN 20%

Key Conclusions:

- The overall score remained a B- but dropped 1 point from 2019.
- The full impact of 2018's heavier than normal downpours can now be seen through stalled progress toward phosphorus, nitrogen, and sediment pollution reductions.
- Some indicators such as oysters and tidal water quality showed resilience by bouncing back from the surge of rainwater and pollution.
- Looking ahead, climate change presents many challenges, including heavier and more frequent rainfall, that will increasingly impact the overall health of the James River. We must adapt to our changing climate by investing in and strengthening protection and restoration actions that promote resilience.
- American Shad fell to an alarming 0%, a dangerous sign for the iconic species so integral to the history and culture of the region. Virginia must develop an emergency recovery plan for American Shad in the James River because there is no current plan for managing the threats they face.



STATE OF THE JAMES
SHOWS A RESILIENT RIVER

2021 Benefits of a Healthy River:



Drinking Water

2.7 million people rely on the James River for water, making it Virginia's largest source of drinking water.



Seafood Production

4.6 million pounds of commercial fish and shellfish were landed from the James in 2020, a total dockside value of \$14.4 million. The James is home to some of the largest oyster reefs in the world - 754,650 pounds of oysters were harvested in 2020, a total value of \$9.4 million and more than 24% of Virginia's total oyster harvest.



Riverside Park Visitation

Riverside parks along the James and its tributaries saw **6.2 million visitors** in 2020 - an increase from the 5 million visits counted in 2018. Richmond's James River Park System saw the most visitation in 2020 with 2.1 million visits counted.



Public River Access

There are hundreds of places to enjoy the James and its tributaries. **47 public access sites** have been added in the watershed since 2013.



Hunting, Fishing & Boat Licenses

590,043 people registered boats and purchased hunting and fishing licenses in the watershed in 2020.

Change the James and the James Will Change You:

A 2017 survey measured how engaged residents across the Chesapeake Bay watershed are in individual stewardship. Residents of the James River watershed scored just above average at 40%. Imagine the state of the James when we are all doing what we can to protect our river. Learn more about how your decisions can change the James by visiting

www.thejamesriver.org/what-you-can-do/.



American Shad: The Founding Fish on the Brink of Collapse on America's Founding River

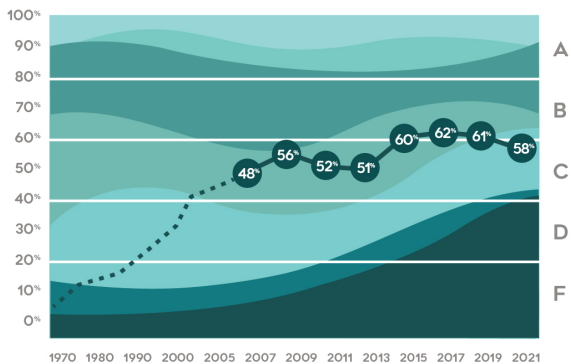
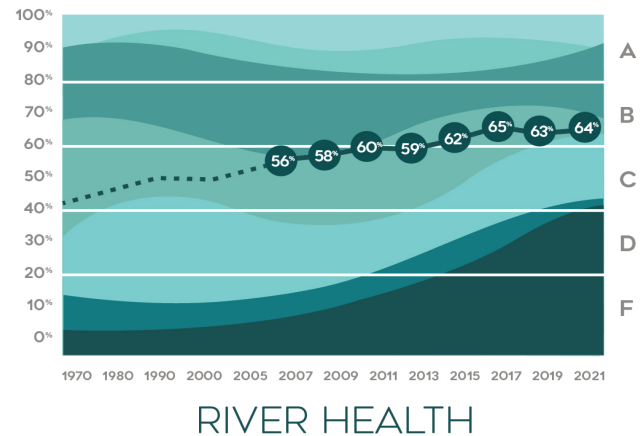
American shad, often called America's Founding Fish because of their important historical and cultural role, face a gauntlet of threats during their migrations to and from spawning grounds in the James River. In each round trip to their home river, these intrepid swimmers are blocked by dams, sucked up in water withdrawals, preyed on by invasive catfish, and caught in nets set for other species. These overwhelming threats have brought American shad to an all-time low and our first ever 0% score in the history of the State of the James Report. Given the dire situation, Virginia must develop an emergency recovery plan that clearly identifies immediate restoration actions, but it will take a long-term and sustained effort to bring American shad back from the brink of collapse in the James.

To truly understand what it means to have a Grade A James River, we invite you to take an underwater video journey, including more than 400 years of the river in less than four minutes! Use your phone's camera to access our James River Virtual Reality Experience through the QR Code:



River Health

The River Health score consists of ten indicators, identified in blue, related to the ecological health of the James. They include fish and wildlife species native to the river as well as the habitat features that help these species thrive. Overall, the River Health score rose one point to 64%. Several indicators showed remarkable resilience in the face of heavy downpours throughout the watershed during 2018, and we remain at a grade of B-, a full letter grade above where we were in the 1970s. However, the troubling news continues for American shad, which hit an all-time low score of 0%. Responsible management decisions will be critically important for restoring this foundational species.



River Restoration Progress

The River Restoration Progress score suffered a significant setback, falling 3 points to 58% and a C+. The eight River Restoration indicators, identified in green, track our progress as a watershed to complete the restoration actions outlined in Virginia's Chesapeake Bay Cleanup Plan and reduce the amount of pollution entering the James River by 2025. New data since 2019 show the full impact of 2018's record rainfall on our nitrogen, phosphorus, and sediment pollution reduction scores. With heavier and more frequent downpours on the horizon as a consequence of climate change, it is important that we adopt stronger restoration goals and invest in conservation practices like forested riparian buffers and urban stormwater treatment.

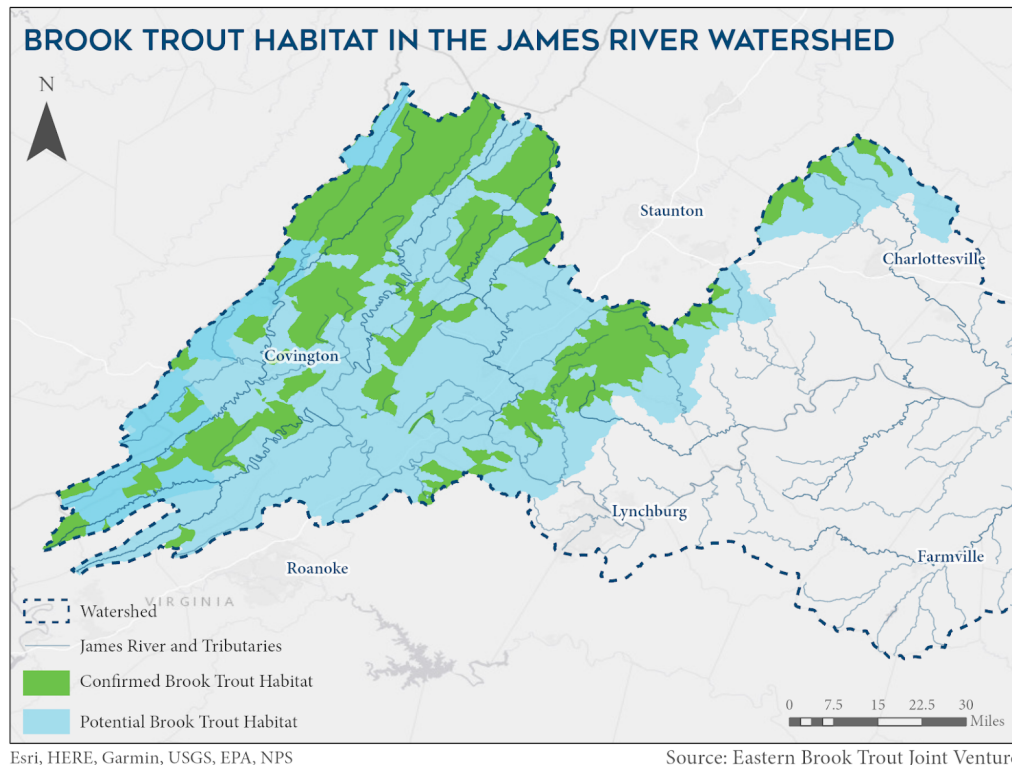
Fish and Wildlife

Brook Trout: 74% ⇒ ±0%

This vividly pigmented member of the salmon family is Virginia's official freshwater fish and once thrived in dozens of cold headwater streams in the watershed. Extremely sensitive to water quality and rising temperatures, the brook trout's range has been reduced due to changes in land use, competition with non-native fish species, warming streams, and acid rain. Brook trout currently occupy 74% of the desired habitat targeted by the Chesapeake Bay Program. In the face of future threats posed by climate change and land use disturbances, we must invest in riparian buffers to keep our streams cool, and advocate for sufficient state-level funding to build resiliency into remaining brook trout populations.

Be a James Changer:

- [Tell your elected representatives to make funding for natural resources a priority.](#)
- [Apply for a forested buffer on your property or volunteer to plant trees at \[JamesRiverBuffers.org\]\(https://jamesriverbuffers.org\).](#)



Smallmouth Bass: 85% ↓ -15%

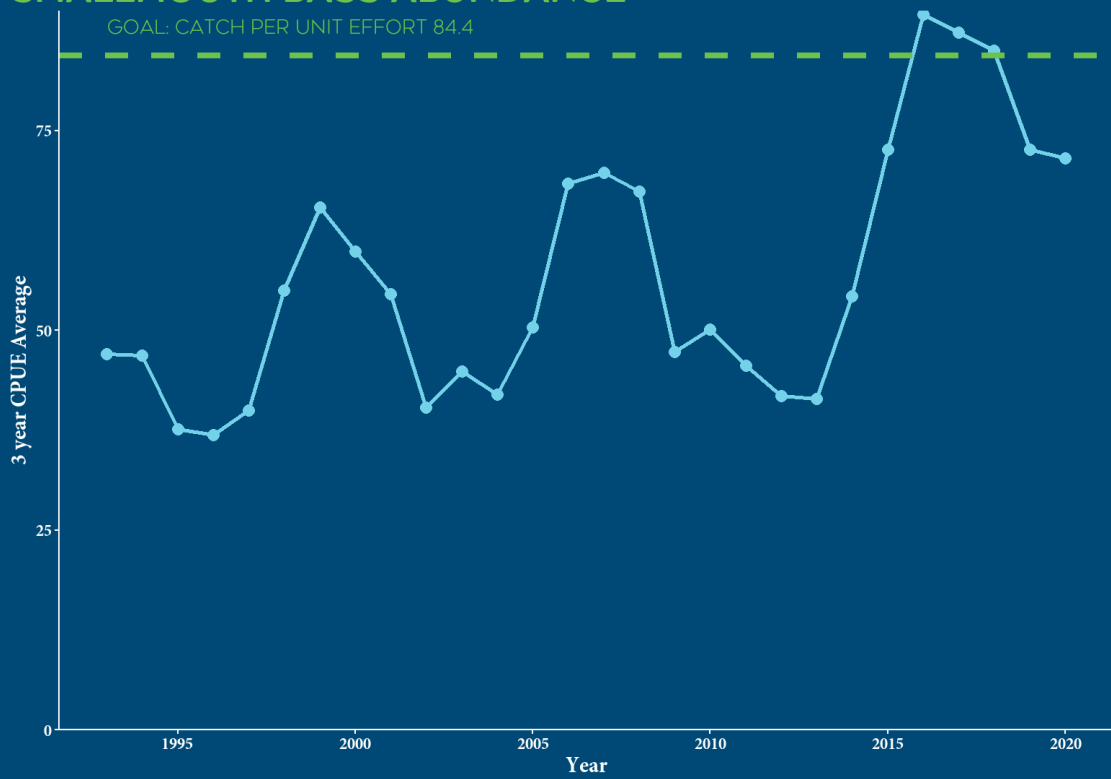
This lively sport fish entertains anglers across the Mountains and Piedmont, with the highest surveyed abundances on the Jackson and Maury Rivers. Overall the smallmouth population seems to be holding steady, but populations in the Middle James have seen lower numbers in recent years. While some population fluctuations can be expected due to natural conditions, it's possible that the declining numbers in the Middle James reaches are related to warming water temperatures. Tools like riparian buffers, agriculture best practices, and robust state-level funding for these practices are needed to protect water quality, shade and cool the riverbanks, and make sure that smallmouth numbers stay consistently high. We also need anglers to be vigilant in preventing the spread and reporting sightings of invasive Alabama bass. Alabama bass outcompete smallmouth bass, and their establishment is very likely to result in further declines of smallmouth abundance in the river.

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- [Help prevent the spread of invasive Alabama bass.](#)

SMALLMOUTH BASS ABUNDANCE

GOAL: CATCH PER UNIT EFFORT 84.4

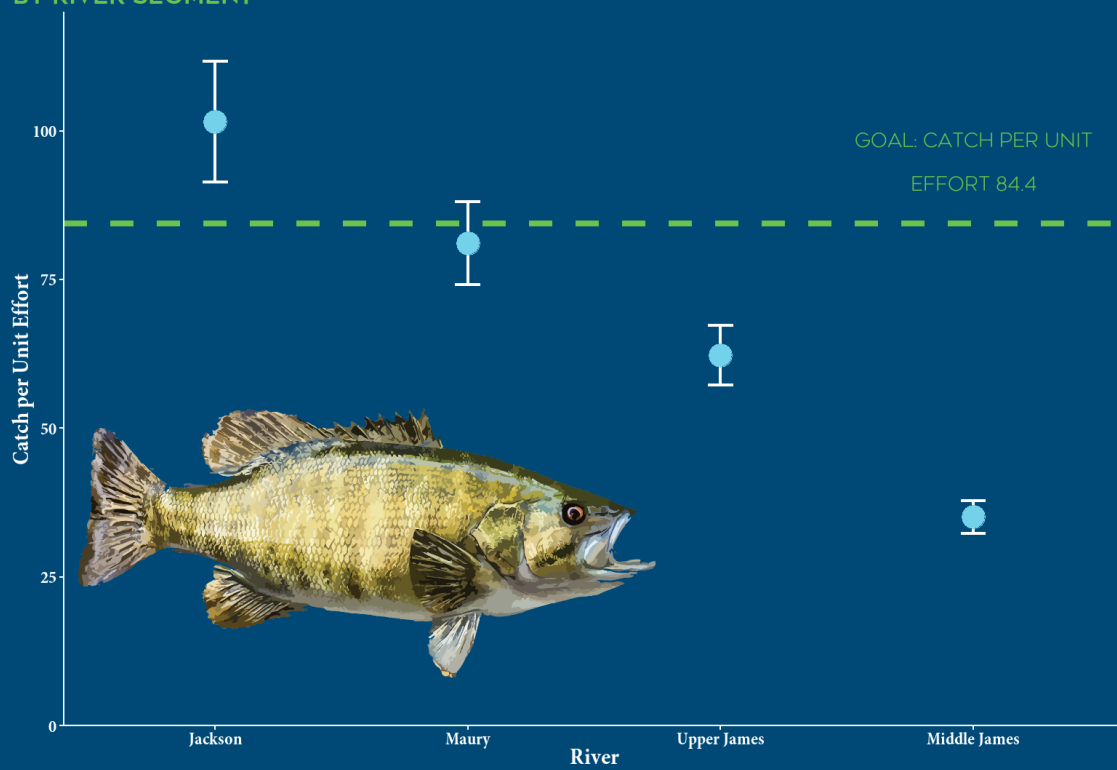


Data provided by Virginia Department of Wildlife Resources

SMALLMOUTH BASS ABUNDANCE BY RIVER SEGMENT

GOAL: CATCH PER UNIT

EFFORT 84.4



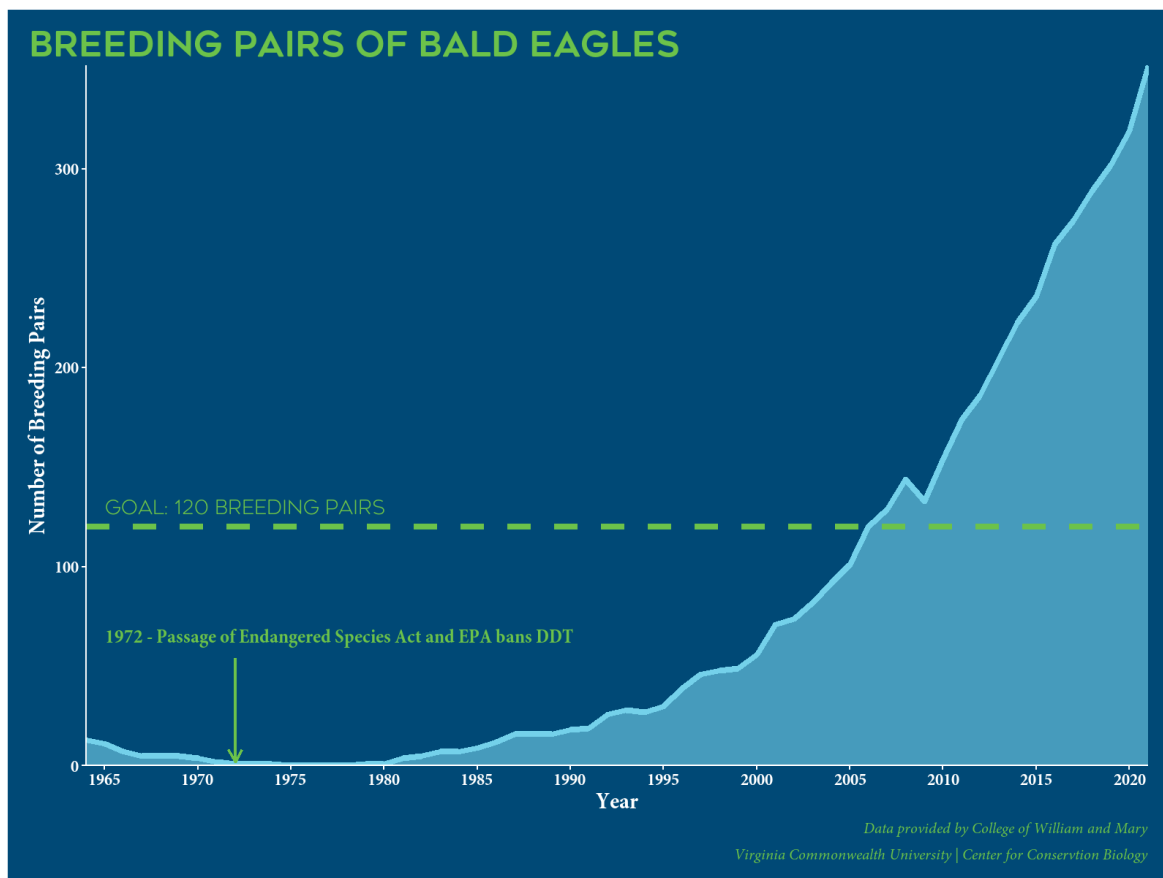
Data provided by Virginia Department of Wildlife Resources

Bald Eagle: 100% \Rightarrow $\pm 0\%$

Since the ban of the pesticide DDT and the passage of the Endangered Species Act in the 1970s, bald eagles have made a dramatic comeback. The James River was the only major tributary to the Chesapeake Bay to have its eagle population drop to zero, and today has one of the densest eagle populations in all of North America. The number of breeding pairs in the James River watershed rose to 352 in 2021 - a 17% increase from 2019. Eagles require large mature trees for roosting, perching and foraging. Protecting riparian buffers and planting new riverside forests is an essential action to aid in the continued eagle resurgence.

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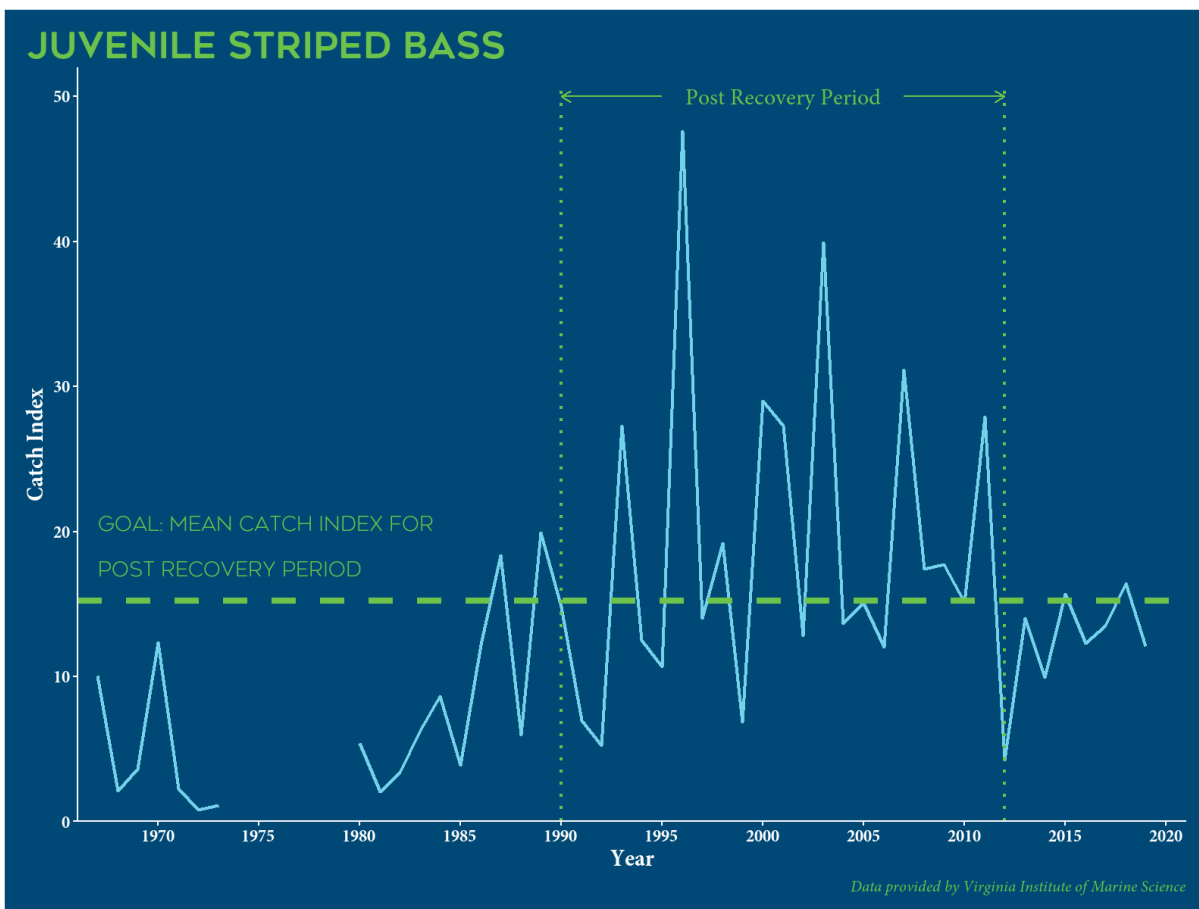
Juvenile Striped Bass: 92% $\uparrow +6\%$

Striped bass are a favorite recreational sportfish and one of the most valuable commercial fisheries in the Chesapeake Bay. Overfishing, habitat loss and pollution caused a significant population decrease during the 1970s and 1980s, but a fishing moratorium helped the population rebound by 1995 and in the following decade. The Atlantic States 2018 stock assessment concluded that the striped bass stock was overfished. The James acts as a nursery for juvenile striped bass populations and data indicates

that there is an average number of fish reaching the juvenile stage. Protecting nursery habitat and careful management is necessary to protect striped bass and ensure populations have the opportunity to recover again. Forage fish like menhaden are an essential food source for striped bass, but Virginia needs strong limits in place for the commercial menhaden fishery to preserve a balanced food chain and healthy striped bass population.

Be a James Changer:

- [Support responsible wildlife management by purchasing a license or membership through the Department of Game and Inland Fisheries.](#)



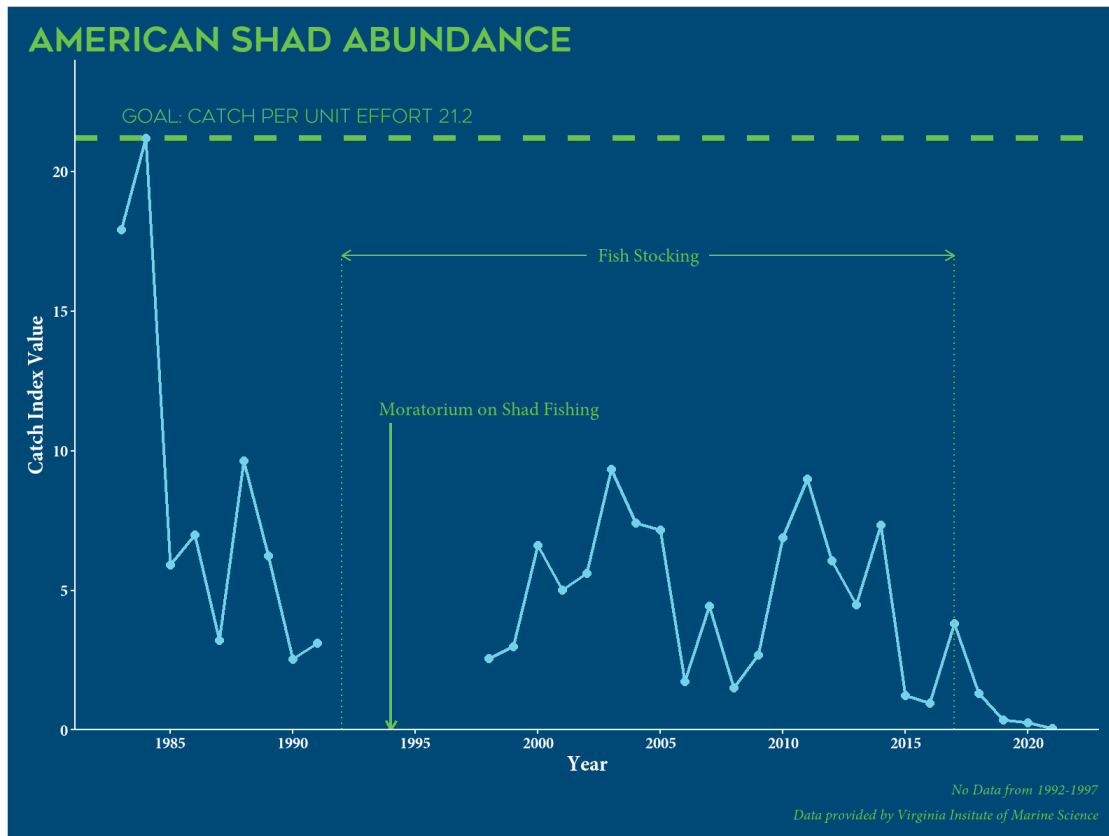
American Shad: 0% ↓ -1%

American shad, often called America's Founding Fish because of their important historical and cultural role, face a gauntlet of threats during their migrations to and from spawning grounds in the James River. These intrepid swimmers are blocked by dams, sucked up in water withdrawals, preyed on by invasive catfish, and caught in nets set for other species. Virginia has long tried to restore shad in river systems across the Chesapeake Bay. From 1992 to 2017 Virginia stocked nearly 126 million hatchery shad to give the species a leg up. A fishing moratorium has been in place in Virginia since 1994, and significant work has taken place to provide fish passage at existing dams, or to remove dams entirely. Despite these efforts, the James River shad population reached an all-time low of 0% in 2020. Given the dire situation, Virginia must develop an emergency recovery plan that clearly identifies immediate restoration actions,

but it will take a long-term and sustained effort to bring American shad back from the brink of collapse in the James.

Be a James Changer:

- [Join JRA's Action Network or RiverReps program to help us advocate for an American shad recovery plan.](#)
- [Support responsible wildlife management by purchasing a license or membership through the Department of Game and Inland Fisheries.](#)

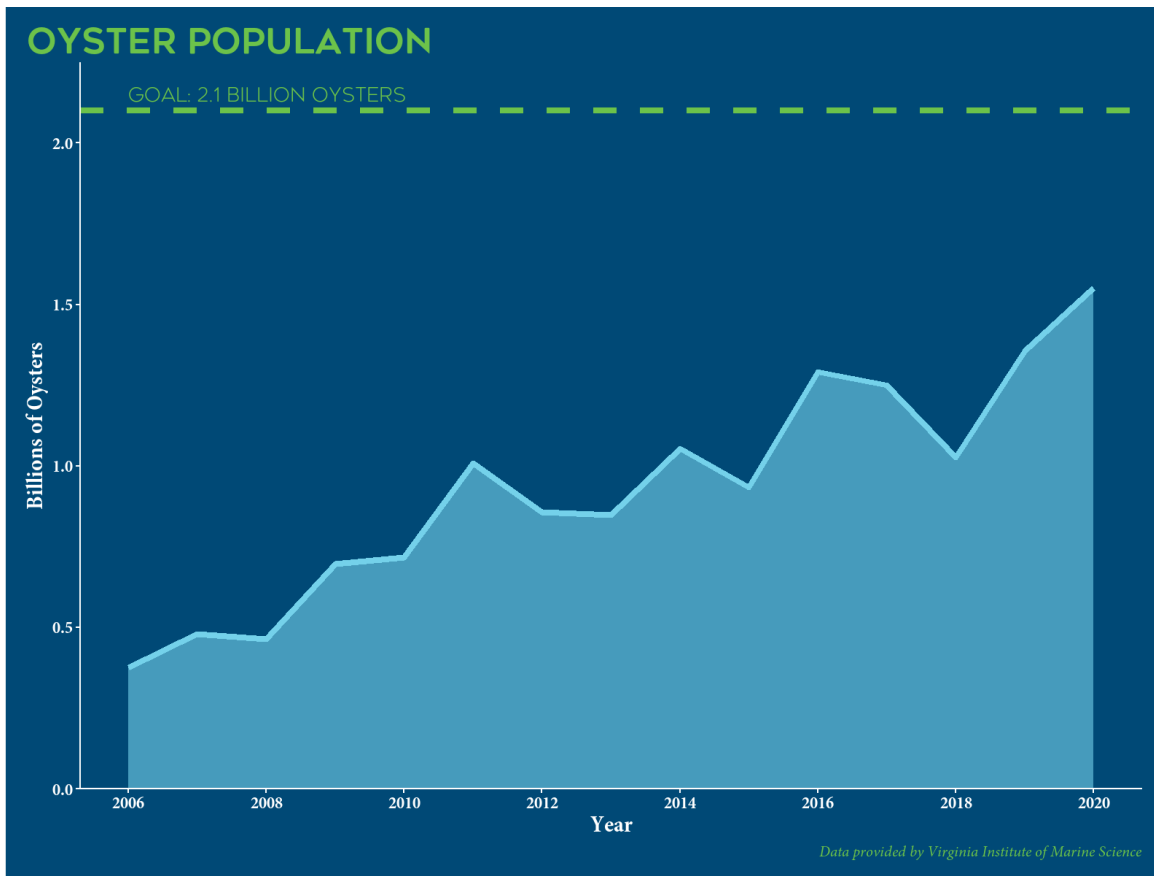


Oysters: 74% ↑+25

Oyster reefs provide valuable structure and habitat for a wide variety of aquatic organisms, and an adult oyster can filter 50 gallons of water per day. With a fully healthy oyster population, these bivalves would filter the entire volume of the James River estuary every six days. In the 1960s the public oyster fishery collapsed in the James River, as a result of a decimated population affected by overharvest, pollution and disease. With time, improvements to water quality, and disease resistance in wild stocks, the James River has seen a remarkable comeback with marked population increases from 2006-2020. Careful fishery management, including the establishment of a 585-acre oyster sanctuary in 2009, has also helped buffer the James River from some of the more dramatic population losses seen elsewhere in the Chesapeake Bay. In 2018, record precipitation sent a surge of freshwater into the river that ultimately caused significant oyster die-offs. However, in just two years the James River public oyster grounds grew by 25% reaching a new record high for this recovery period. Strong management of the James River public oyster grounds remains critical to restoring a fully healthy oyster population that benefits overall water quality and biodiversity in the James River estuary.

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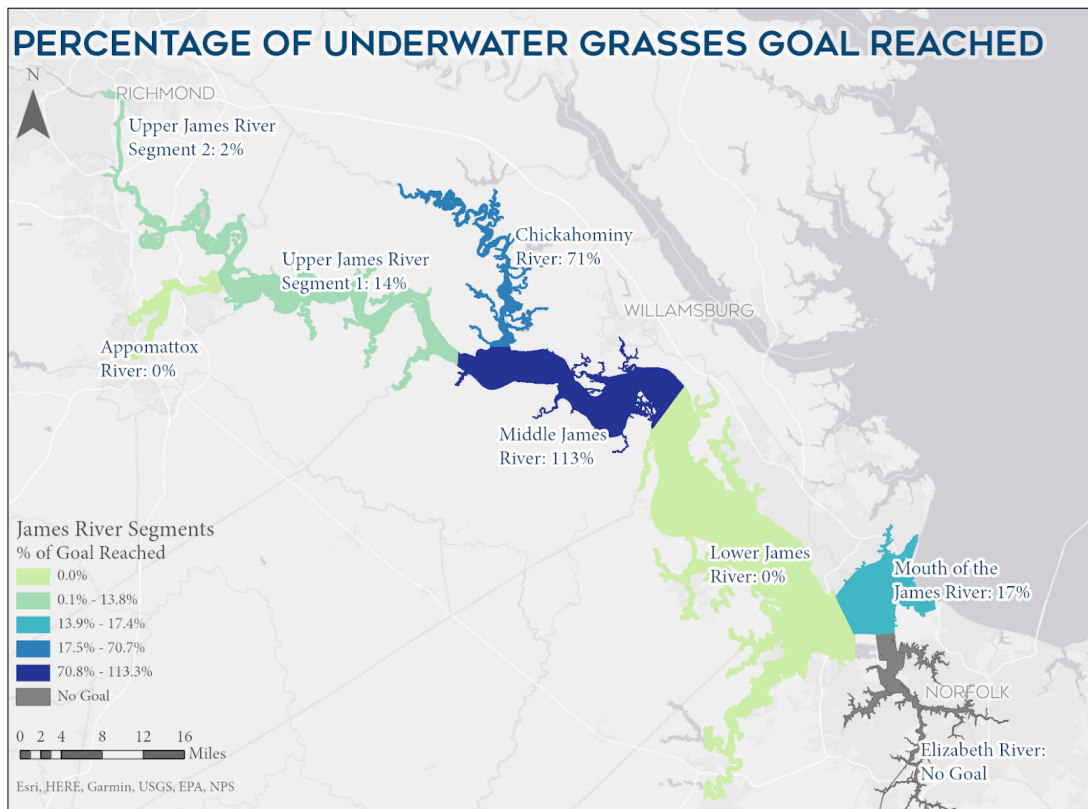
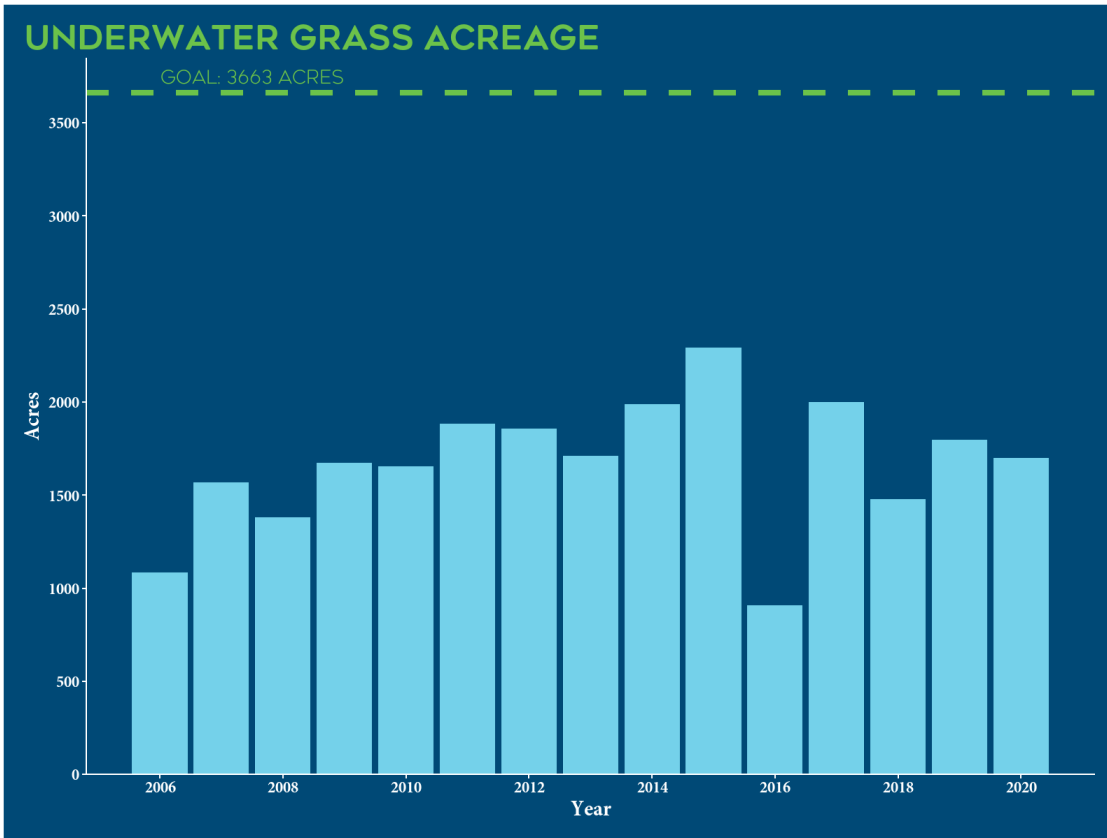
Habitat

Underwater Grasses: 46% ↑+6%

Underwater grasses have increased in parts of the James River, now covering 46% of the goal set for the James. The presence of these grasses, which provide essential habitat for juvenile fish, crabs and waterfowl, is a positive sign that water quality is improving. Because sunlight is the most important factor in the growth of underwater grasses, improving water clarity is a key step in reaching the goal of 3,663 acres of underwater grasses in the James River. Continued restoration of streamside buffers and reductions in sediment and nutrient runoff from agriculture and development are needed in order to meet this goal.

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- [Apply for a forested buffer on your property or volunteer to plant trees at \[JamesRiverBuffers.org\]\(#\).](#)
- [Help us monitor underwater grasses in the James.](#)



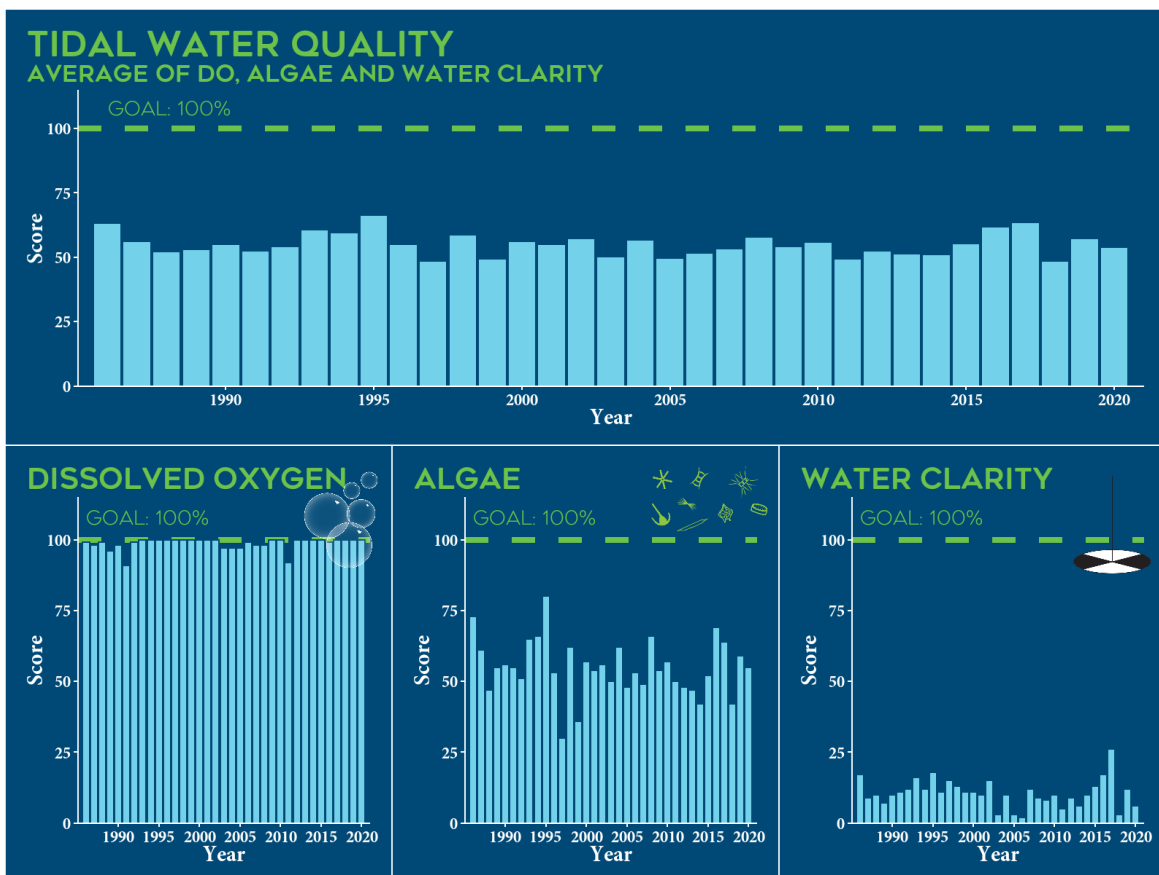
Source: Virginia Institute of Marine Science

Tidal Water Quality: 54% ↑+6%

Dissolved oxygen, algae levels and water clarity are important indicators that each tell an important story about tidal water quality. Dissolved oxygen is essential for the survival of fish and other aquatic organisms and is typically at a healthy level in the James. However, algae growth and water clarity remain problematic within much of the tidal James. Both algae growth and poor water clarity are the result of excessive nutrient and sediment pollution in the water, which can occur during especially rainy years like those experienced in 2018 and 2020. Still, overall tidal water quality scores improved in 2021 and shows a long-term improving trend. More focus on reducing nitrogen, phosphorus and sediment pollution is needed to maintain progress for this indicator.

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- [Help us monitor underwater grasses in the James.](#)
- [Check the water quality conditions at JamesRiversWatch.org](#)



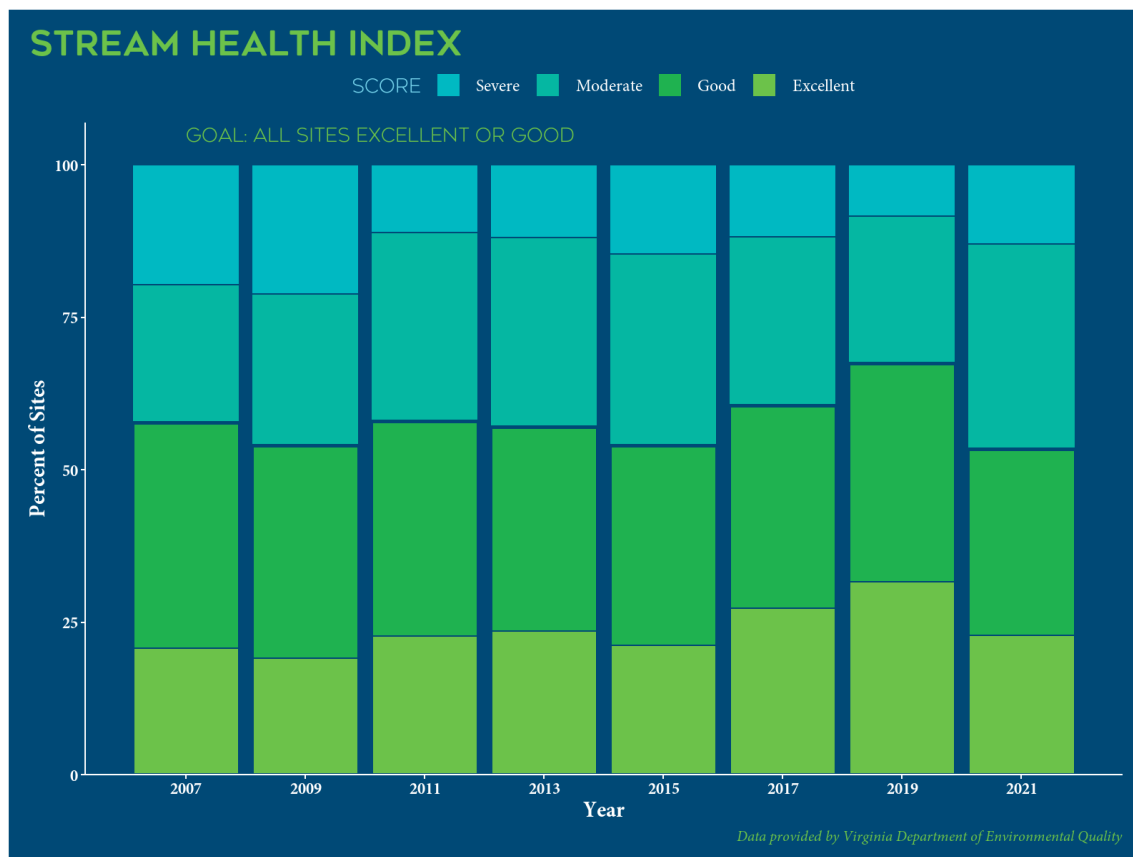
Stream Health: 54% ↓-11%

As of 2021, 54% of the surveyed streams and creeks in the James River watershed were classified as being in good or excellent condition. You can't protect a river without protecting its tributaries, and the health of the James depends directly on the health of the 25,000 miles of streams that flow into it. The Clean Water Act, which celebrates its 50th anniversary in 2022, has been vital in protecting these creeks and streams. It sets limits on the amount of pollution released by wastewater facilities and requires municipal stormwater systems to reduce polluted runoff. However, our existing water infrastructure and

regulatory requirements are not designed to handle climate change along with increased development. To return all the James River's tributaries to good health and prepare for our changing environment, we need to strengthen our regulatory protections, like our stormwater pollution controls. We need to implement more restoration actions, like healthy riparian buffers. And we must promote better stewardship of our natural resources by providing the local, state, and federal funding needed to support these efforts.

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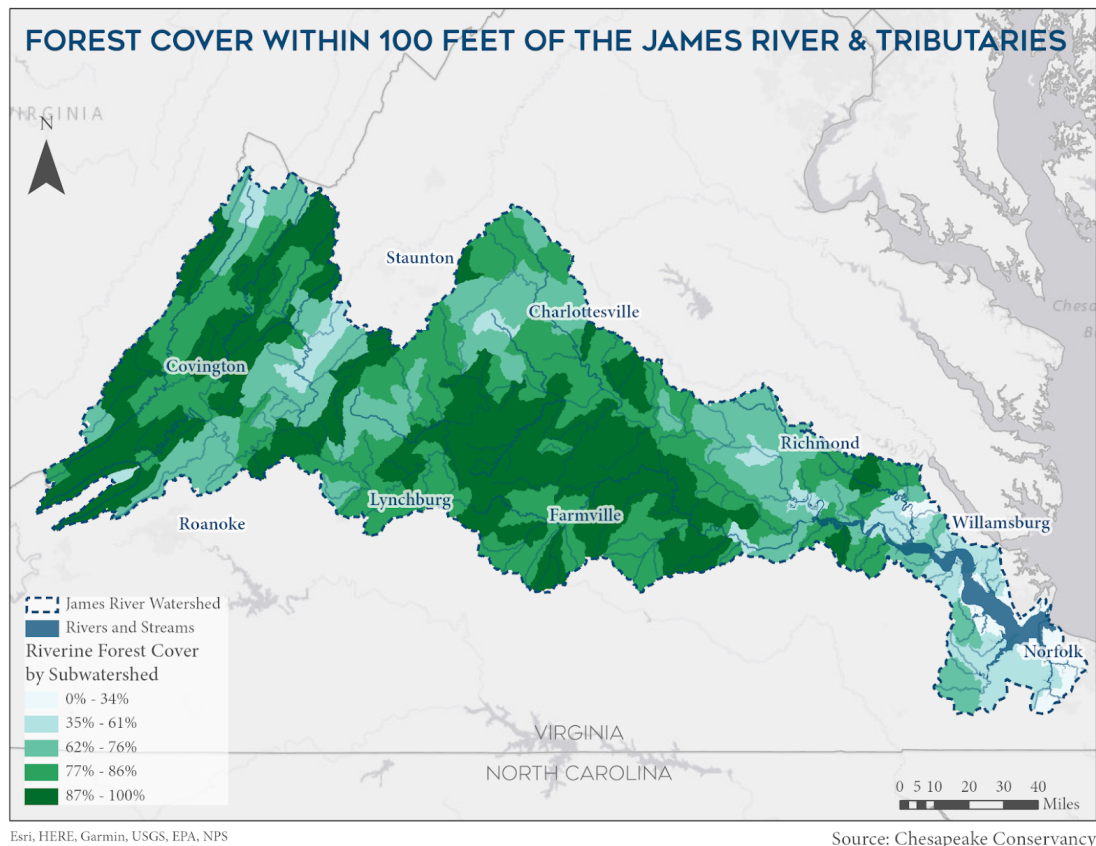
Riparian Forests: 78% ⇒ ±0%

Riparian forests are forested areas within 100 feet of the James River and its tributaries. These areas play an important role in streambank stabilization, erosion control, and pollution reduction. They also provide important habitat for wildlife. An analysis of high-resolution land cover data conducted by the Chesapeake Conservancy in 2021 indicates 78% of riparian areas in the watershed are forested with trees and shrubs. Virginia's Cleanup Plan calls for an additional 27,000 documented acres of forested riparian buffers across our watershed by 2025. Through restoring and conserving riparian buffers, the James River Association and its partners across the watershed are working together through the Upper

& Middle James Riparian Consortium to help reach this goal through the [Upper and Middle James River Consortium](#).

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Pollution Reductions

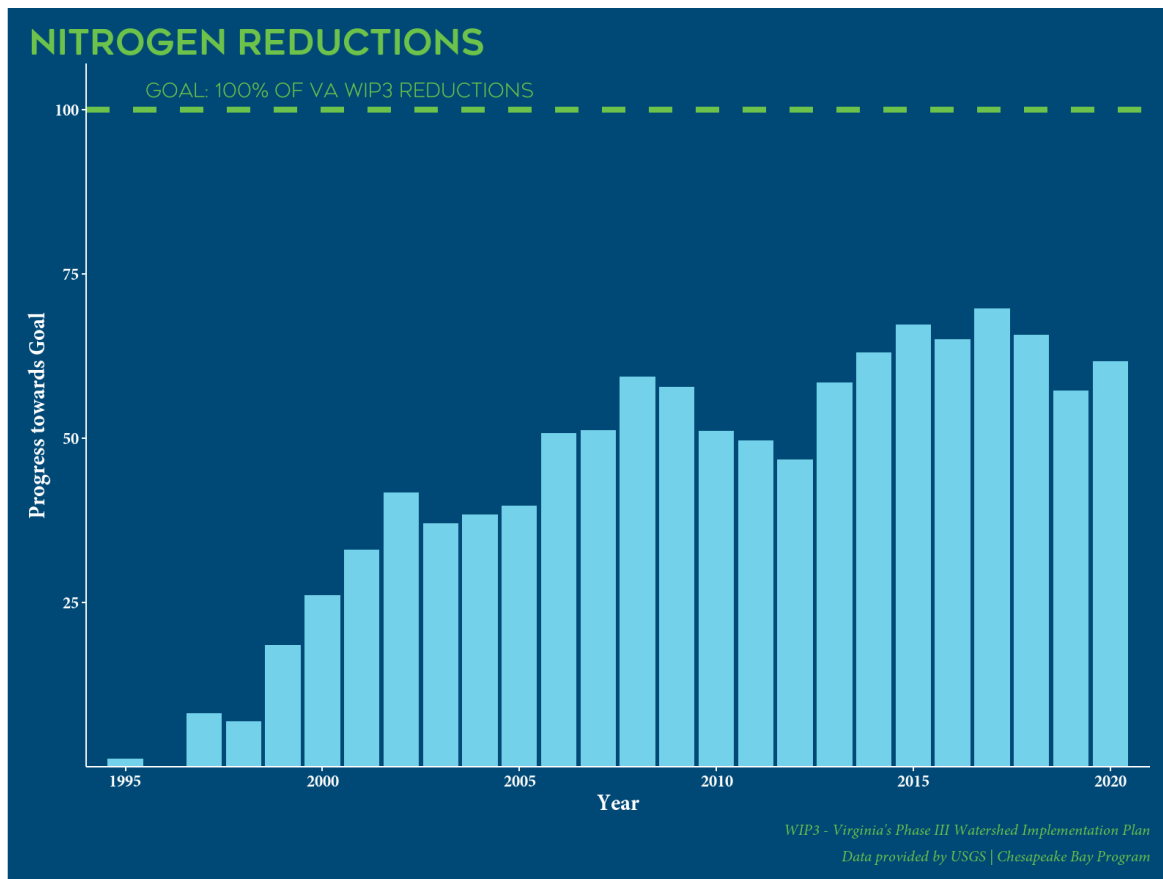
Nitrogen Reductions: 62% ↓-4%

Major sources of nitrogen include wastewater, agricultural runoff, and urban stormwater. Excess nitrogen and phosphorus in the water can lead to algal growth, which decreases water clarity, lowers dissolved oxygen, and harms critical habitats for fish and aquatic life. As of 2020, we are at 62% of Virginia's Chesapeake Bay Cleanup Plan nitrogen pollution target. Recent progress has declined due to heavy rainfall in 2018 resulting in more polluted runoff. The good news is that long term levels of nitrogen are decreasing, helping us get closer to our pollution reduction goals in the James River. Wastewater treatment plant upgrades have benefited the James, but more work remains. Moving

forward we need to secure additional funding for upgrading our outdated stormwater and wastewater infrastructure and implementing agricultural BMPs.

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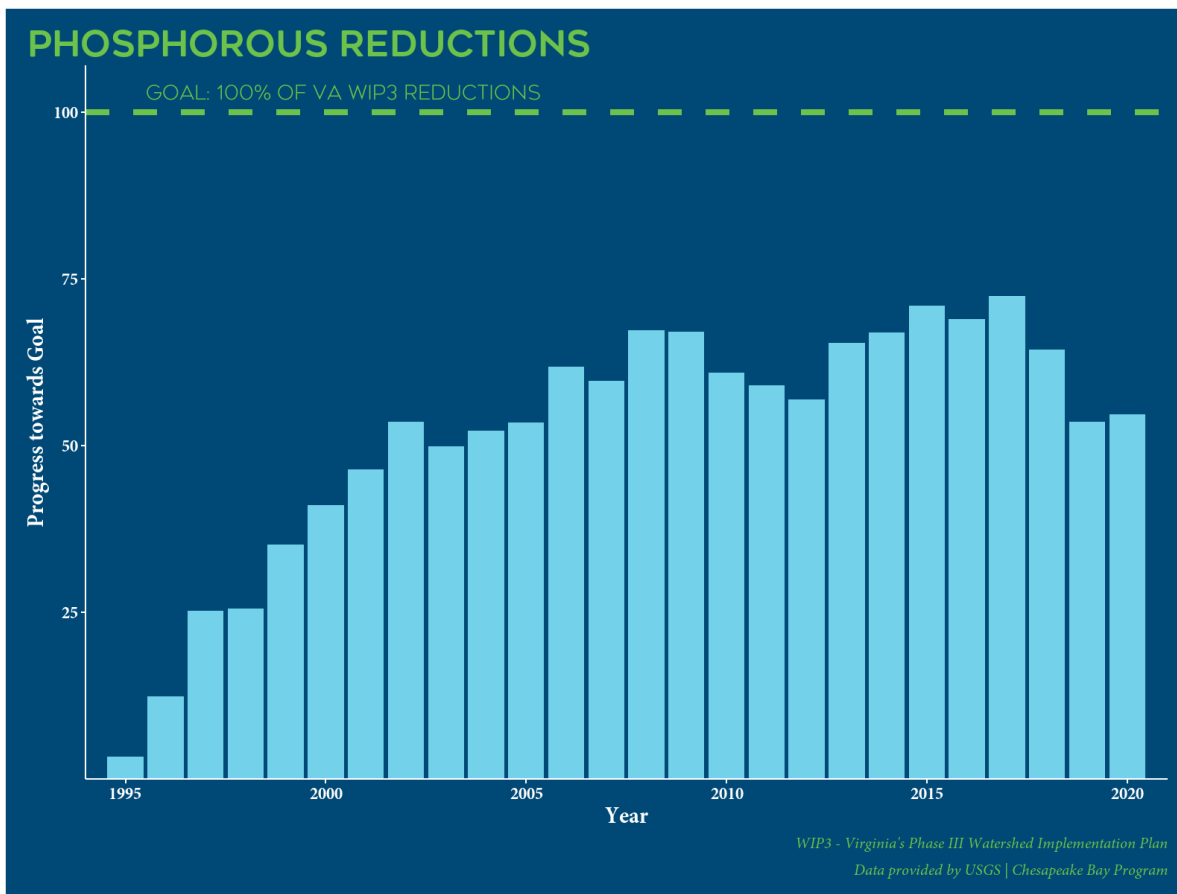


Phosphorus Reductions: 55% ↓ -9%

Phosphorus levels in the James River have fallen since the 1980s due to wastewater treatment plant upgrades, fertilizer management plans, and bans on phosphates in detergents and other products. Similar to nitrogen, elevated phosphorus levels can lead to algae blooms which cause poor water clarity, fish kills, and habitat reductions for many aquatic organisms. Rapid phosphorus reductions were seen in the late 1990s and early 2000s, though reductions have slowed since. Record rainfall in 2018 caused further setbacks. Pound-for-pound, phosphorus is the most impactful source of nutrient pollution, and it is critical that the James River and other Virginia waterways reach the targets identified in the Chesapeake Bay Cleanup Plan. To reach these goals, we must plant more riparian buffers and implement more best management practices on agricultural and developed land.

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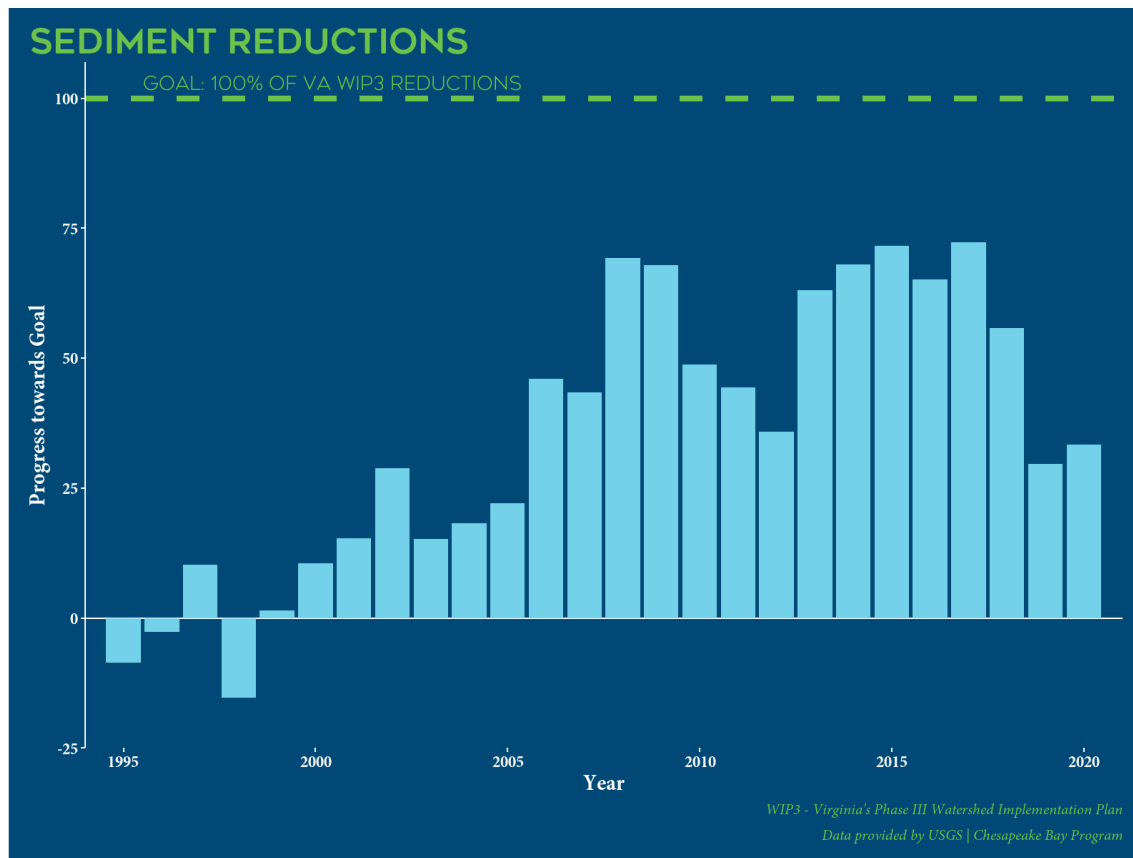


Sediment Reductions: 33% ↓ -23%

Sediment poses a significant and long-term threat to water quality on the James River. Agricultural practices and land development are the two main sources of sediment in the James. Regulations for development and construction and agricultural best management practices have helped to address sediment issues, however sediment remains the greatest ongoing pollution problem in the James. This year sediment saw the largest decrease in progress of any single indicator in our 2021 report. The record rainfall of 2018 and the resulting loss of progress also suggest that our current regulations are not strong enough to keep pace with climate change. The lack of overall improvement in sediment pollution indicates that more investments must be made and stronger measures taken to target the primary sources of sediment. And these measures serve the additional purpose of reducing nutrient and bacterial pollution, creating a healthier, more diverse James River.

Be a James Changer:

- [Tell your elected representatives to make funding for natural resources a priority.](#)
- [Check the water quality conditions at JamesRiverWatch.org](#)
- [Patrol the river with our RiverRats program.](#)
- [Prevent stormwater pollution at home with our River Hero Home program.](#)

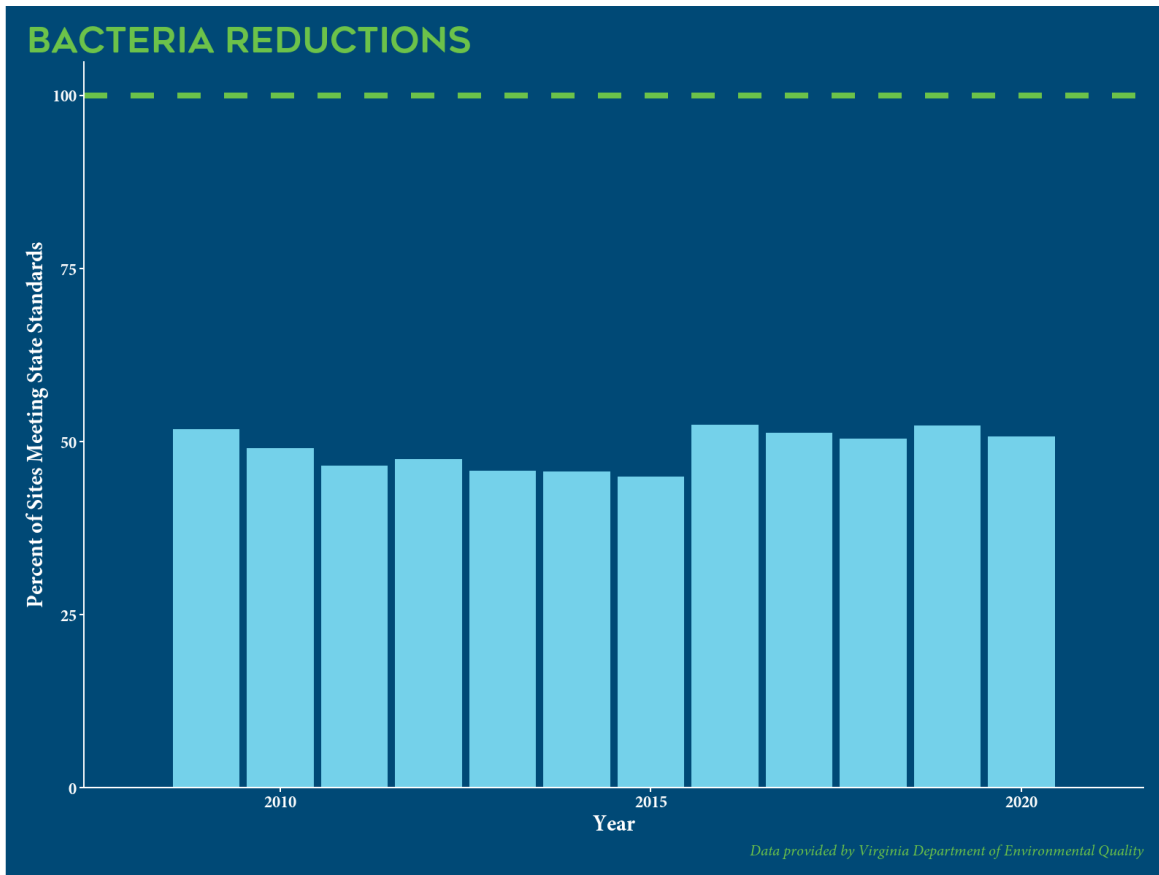


Bacteria Reductions: 51% ↑+1

Bacteria levels in the James River can fluctuate quickly, but they are consistently highest during and just after heavy rain, when *E. coli* and other fecal bacteria can pose a significant health risk to swimmers. Major sources of bacteria include unfenced livestock, combined sewer overflows, and pet waste. Bacteria testing has been consistent in the past few years, but only 51% of our sites meet state standards. To raise this score we need investments on many levels. This includes major actions, such as additional funding for livestock fencing and increased investments in our sewer and stormwater infrastructure, as well as individual actions, like regular septic inspections and picking up after your pet.

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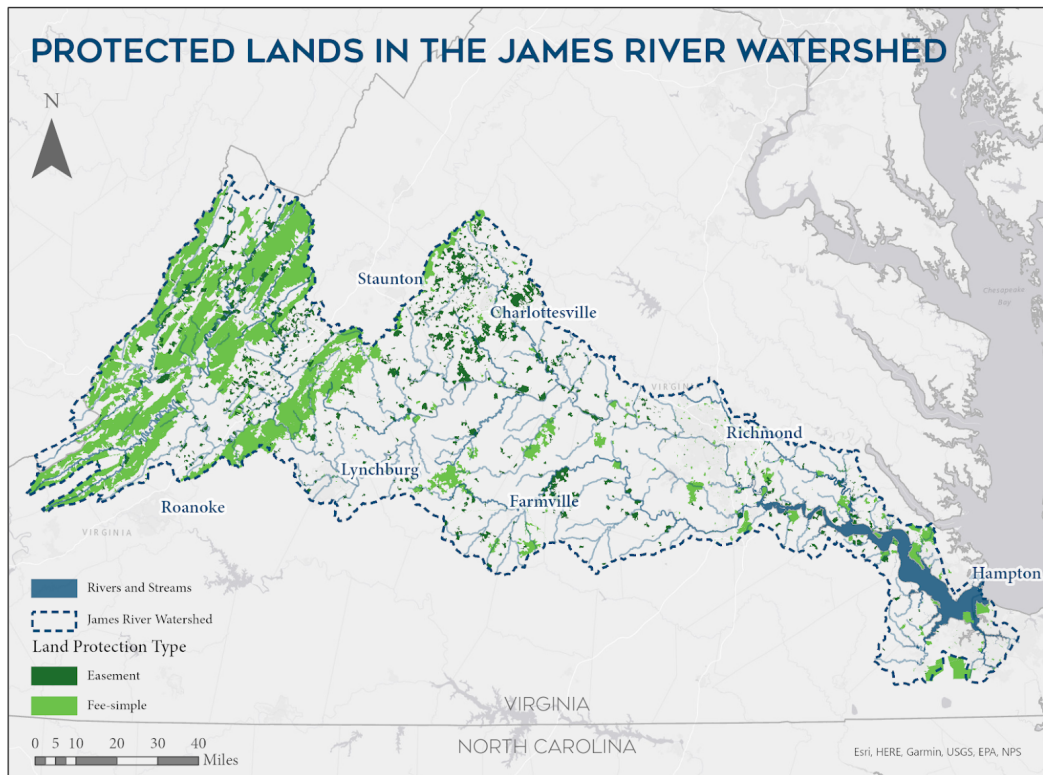
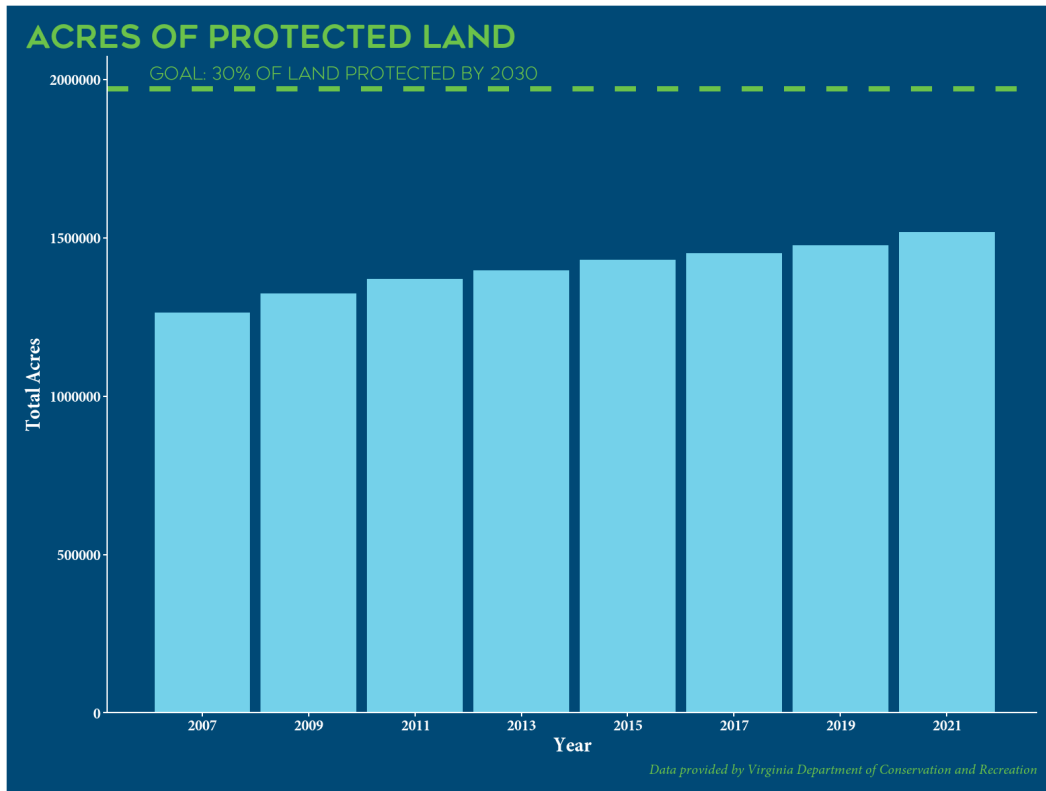
Protection and Restoration Actions

Land Protection: 77% ↑ +2%

Land protection actions in the James River watershed ensure natural and cultural resources are protected in perpetuity and provide us with spaces, such as public lands and parks, in which to recreate. The acreage of public lands in protective management and private lands in conservation easements in the James River watershed has consistently increased since the release of the first State of the James in 2007. For the 2021 State of the James, the James River Association adopted a more ambitious land protection benchmark that is consistent with the 30 by 30 initiative announced by President Biden shortly after he took office. 30 by 30 is an initiative to protect 30 percent of lands and waters in the United States and around the world by 2030. As of 2021, 1,517,662.01 acres of 6,569,707.53 acres in the James River watershed are protected. This is 77% of the new 30 by 30 benchmark, which is 1,970,912.26 acres.

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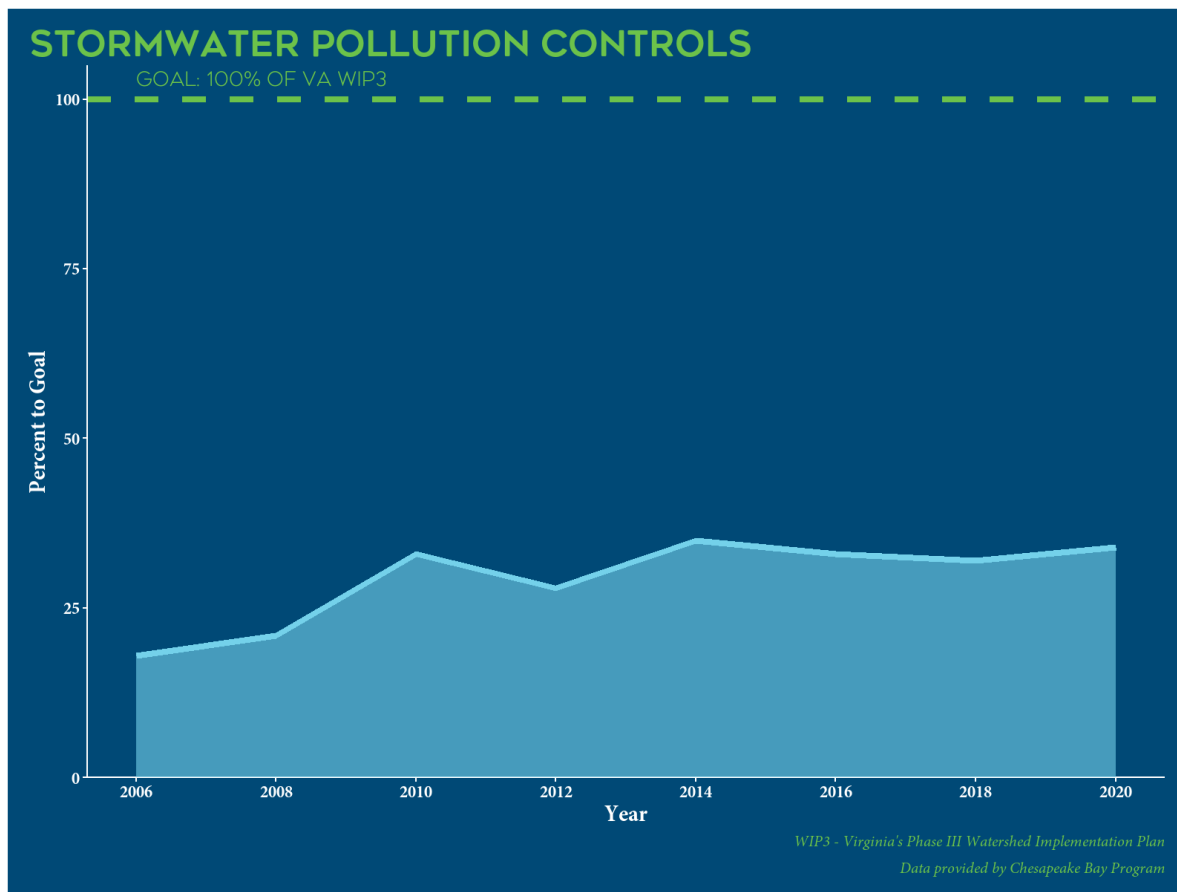


Source: Department of Conservation and Recreation

Stormwater Pollution Controls: 34% ↑ +2%

Stormwater runoff from construction sites, city scapes, and streets can carry substantial amounts of pollution to our rivers and streams. That includes contaminants like bacteria, sediment, oil, pesticides, fertilizer, and other chemicals. Communities can and should install management practices that temporarily store the stormwater and let it soak into the ground, reducing pollution and the risk of flooding. We are 34% of the way to meeting our pollution plan for stormwater, which we measure by the amount of pollution reaching the river from each acre of developed land. Unfortunately, new development is outpacing the installation of stormwater management practices, complicating the work. Climate change will continue to make progress more challenging because our regulations have not been updated to account for heavier and more frequent rainfall. As a consequence, stormwater is not consistently improving at the pace needed to reach success by 2025 as the Chesapeake Bay Cleanup effort requires. Bold investments in stormwater treatment, like those that we have secured for wastewater, can help boost our score, improve water quality, and mitigate flooding.

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- [Prevent stormwater pollution at home with our River Hero Home program.](#)



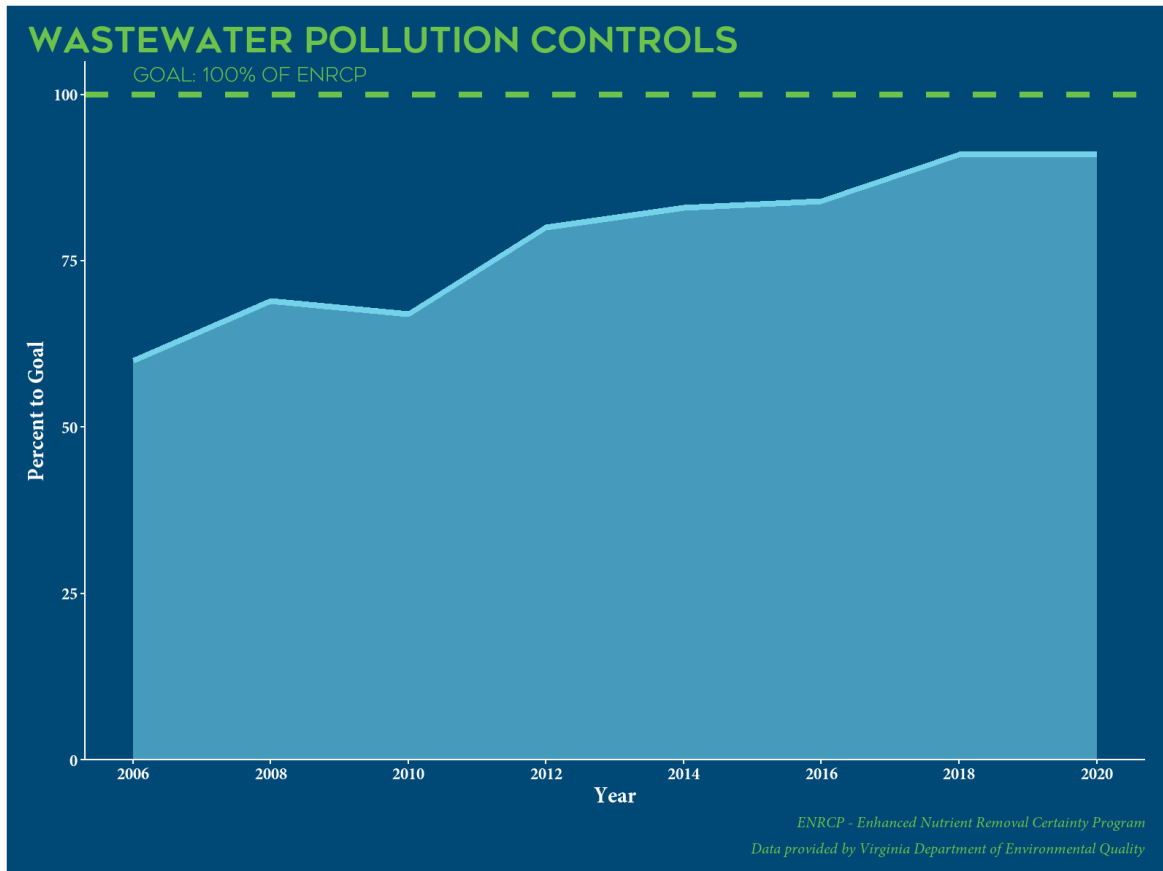
Wastewater Pollution Controls: 91% +/-0

Since 1985, wastewater treatment plants have cut their nitrogen pollution by almost two-thirds thanks to significant investments by the state, the industry, and rate-payers. But to keep pace with our growing population and prevent harmful algal blooms in the James River, we need to make sure our wastewater

treatment plants are using the latest technology. On average, each liter of wastewater released into the James River carries more nitrogen pollution than wastewater entering Virginia's other Chesapeake Bay tributaries. In 2021, JRA helped negotiate the Enhanced Nutrient Removal Certainty Program, which requires scheduled upgrades aimed at meeting more stringent treatment technology standards across facilities primarily located in the James River basin. With adequate funding, these upgrades will deliver cleaner water to the James and help Virginia meet its Chesapeake Bay goals.

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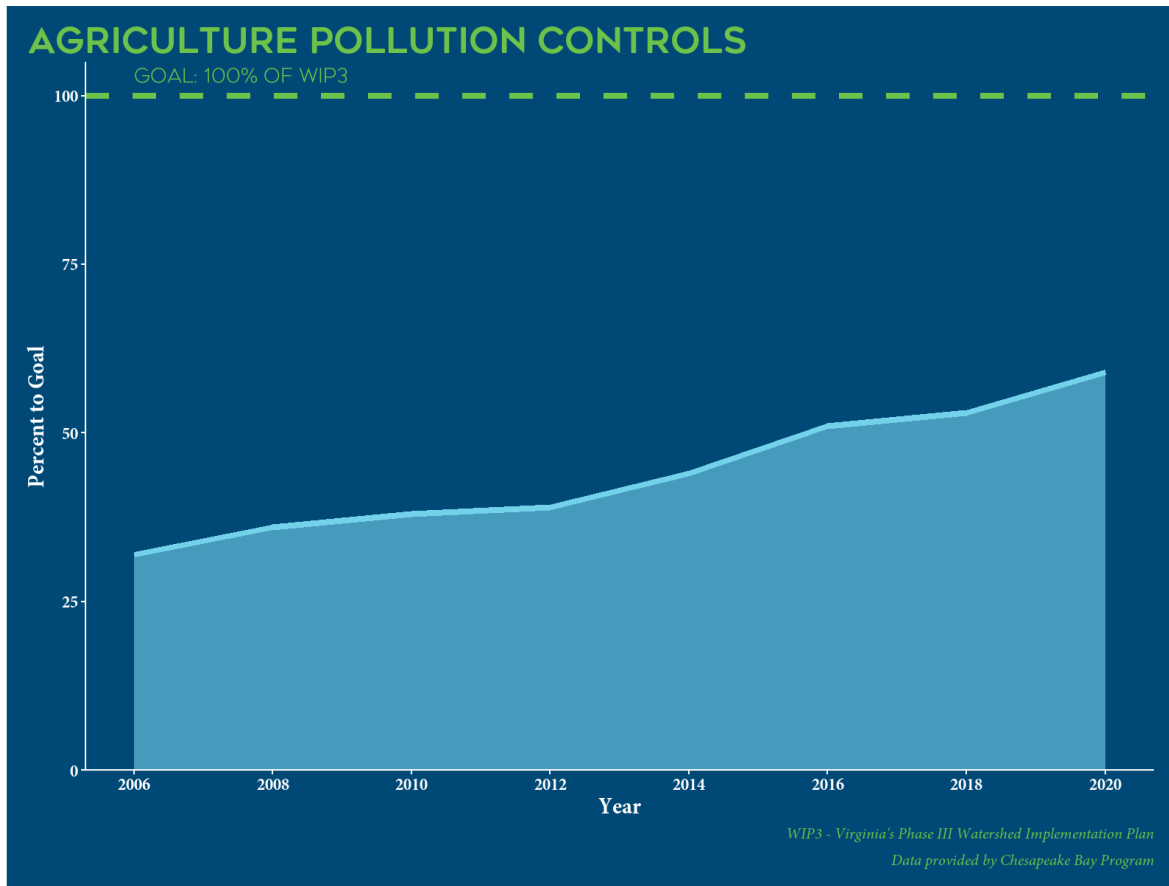


Agricultural Pollution Controls: 59% ↑ +6%

Farmland covers almost 12% of the James River watershed and is one of the largest sources of pollution runoff. Fortunately, agricultural pollution controls are among the most impactful and cost-effective improvements available. With technical assistance from Virginia's Soil and Water Conservation Districts, farmers have made substantial progress installing conservation practices and reducing agricultural runoff to the James River through the Virginia Agricultural Cost-Share Program. Unfortunately, this program has not received reliable levels of funding for cost-share or technical assistance. Our James River Buffer Program, in partnership with Virginia's Department of Forestry and the Chesapeake Bay Foundation, helps interested landowners install and monitor forested buffers to slow agricultural runoff and take up excess nutrient pollution. But time is of the essence as the 2025 Chesapeake Bay Cleanup deadline fast approaches.

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Acknowledgements

The James River Association would like to thank the following organizations for their contributions to this report: Chesapeake Conservancy, College of William and Mary – Virginia Commonwealth University Center for Conservation Biology, Eastern Brook Trout Joint Venture, Virginia Department of Conservation and Recreation, Virginia Department of Environmental Quality, Virginia Department of Wildlife Resources, Virginia Environmental Endowment, Virginia Institute of Marine Science, University of Maryland Center for Environmental Science, Integration and Application Network, United States Environmental Protection Agency Chesapeake Bay Program, and United States Geological Survey.

About the James River Association

The James River Association is a member-supported nonprofit organization founded in 1976 to serve as a guardian and voice for the James River. Throughout the James River's 10,000 square mile watershed, the James River Association works toward its vision of a fully healthy James River supporting thriving communities. The James River Association believes that "when you change the James, the James changes you". With offices in Lynchburg, Scottsville, Richmond, and Williamsburg, the James River Association is committed to protecting the James River and connecting people to it.