



# **STATE OF THE JAMES RIVER**

*2011*

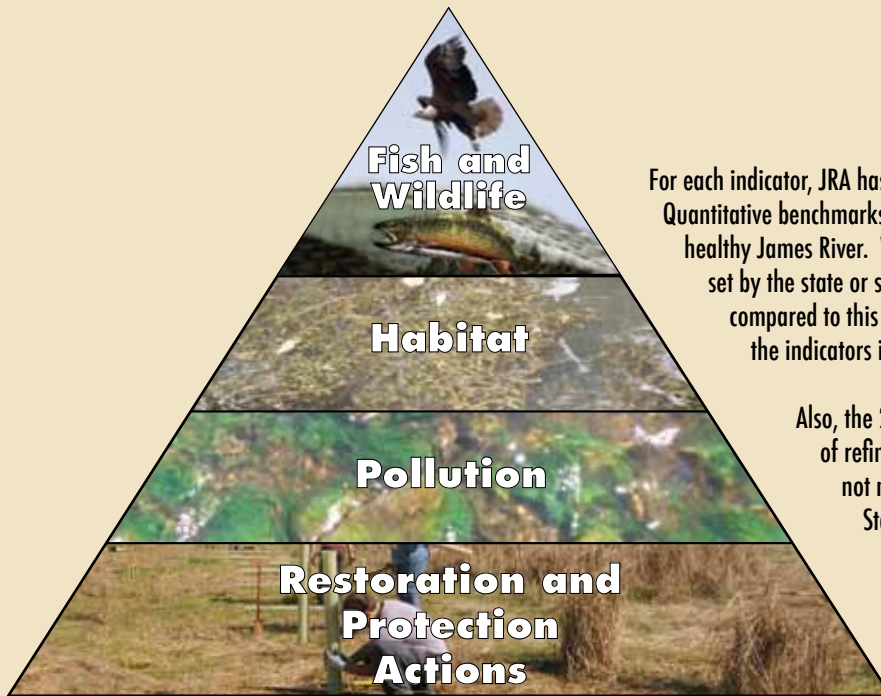




# Background

Since the founding of America on its banks 400 years ago, the James River has played a central and defining role in the development of Virginia. No other natural feature of the New World had more influence on the early colony, and no other natural feature has provided more for Virginia. After 400 years of nurturing us, America's Founding River needs nurturing itself.

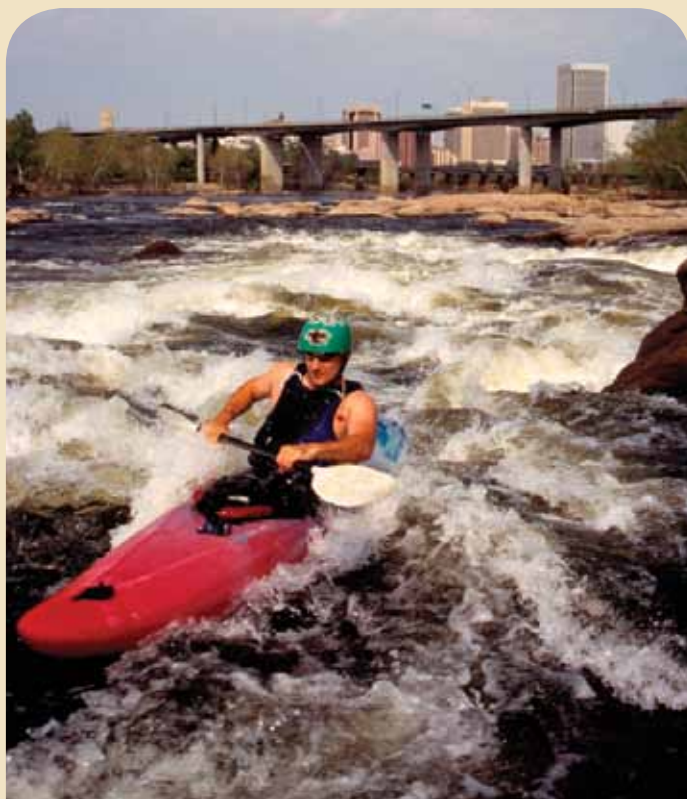
This State of the James River report provides a report card on the effort to bring this shared natural resource back to full health. The report examines the status and trends of indicators in four categories that build on one another. At the top are the fish and wildlife populations that are important to the health of the river and to everyone who enjoys and cares about the river. These wildlife populations depend on habitat to provide their critical needs for life. The greatest factor affecting the quality of habitat in the James River is the amount of pollution that enters our streams and creeks and ultimately flows into the James River. Finally, the report assesses progress on the restoration and protection actions needed to reduce damaging pollution and return the James River to a healthy, diverse ecosystem.



For each indicator, JRA has identified and compiled a key measure of health. Quantitative benchmarks have been set for what we need to achieve to have a healthy James River. When possible, the benchmark is a goal that has been set by the state or some authority on a specific indicator. Current progress is compared to this benchmark to calculate a score which is averaged across the indicators in each category to determine the grade for that category.

Also, the 2-year change has been listed for each indicator. Because of refinements in the methodology of the report, the changes do not necessarily correspond to the scores contained in previous State of the James River reports. The scores for current and two-year change are determined using the same methodology and benchmark.

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Cover Image (Middle)  
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# Summary

REPORT CARD			
	2011 Report	2-Year Change	Grade
Wildlife	54%	-3%	C
Habitat	61%	+1%	B-
Pollution	47%	-11%	C
Restoration and Protection Actions	51%*	-1%	C
Overall	53%	-4%	C

\* Data is incomplete

The 2011 State of the James River report gives the river's health an overall score of 53% and a grade of C. This represents a 4% drop in the overall score over the past 2 years. This reduced score demonstrates that the river remains in a vulnerable state and that progress in restoring the river to full health has stalled. While the James River is certainly in better shape than it was 35 years ago when the James River Association was founded, we risk sliding backward unless the Commonwealth strengthens its commitment and takes additional action to advance the river's health.

**Wildlife:** For the James River's key fish and wildlife species, there were some gains and losses over the past two years. Bald eagle populations continue to increase, making America's Founding River quite fittingly the most significant river in Virginia for our national symbol. Additionally, the American shad population has shown signs of a comeback after an unexplained 3-year decline. Oysters and brook trout continue to struggle at low levels relative to their historical populations. Both rock fish and small mouth bass, which were at very healthy numbers within the past decade, declined over the past 2 years showing that even healthy populations are susceptible when the river ecosystem is out of balance.

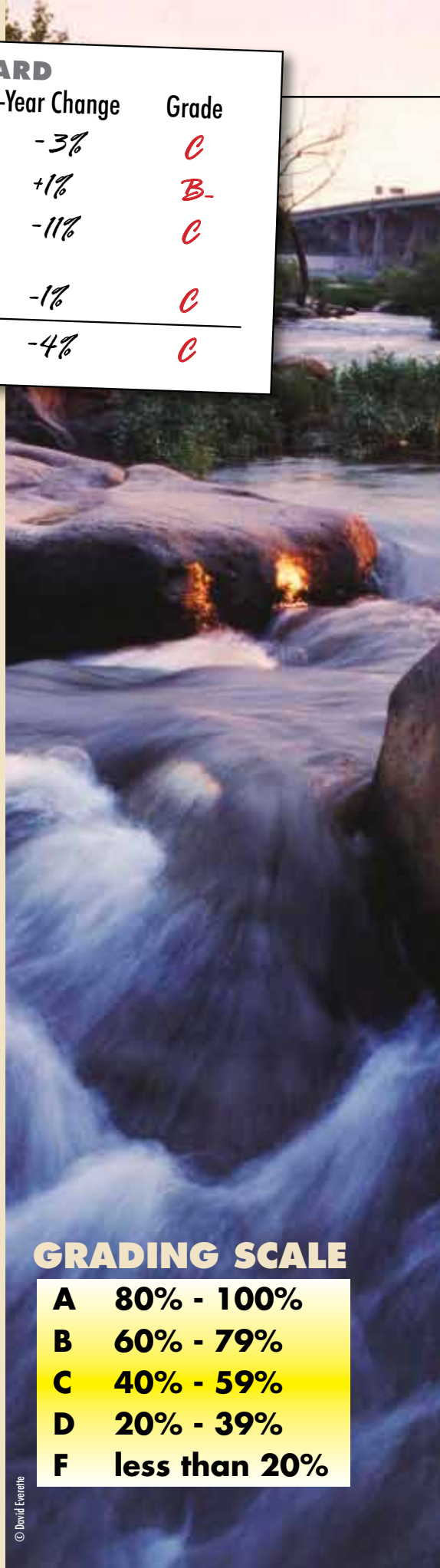
**Habitat:** The river's important habitat indicators also reflected the ongoing challenges and some successes for the river. Both stream health and tidal water quality decreased slightly from 2 years ago. Conversely, underwater grasses, which depend on clean water to get sunlight to grow, continued their increase and for the first time in decades were found in the mainstem of the tidal James above Newport News, in addition to their strong resurgence in some of the James' tidal tributaries.

**Pollution:** Pollution continues to have the greatest impact on the river's health and is a leading cause of the decreased overall score. In particular, nitrogen, phosphorus and sediment pollution cause widespread damage to the river ecosystem. After seeing substantial improvement in pollution reductions in the 1990s, average pollution reductions over the past decade show little additional progress. Progress on sediment pollution controls actually reversed as levels spiked due to large influxes of sediment with major storm events.

**Restoration and Protection Actions:** To date, roughly half of the critical restoration and protection actions called for in Virginia's cleanup plan for the James River are reported as complete. With strong permit limits and hundreds of millions of dollars of investments, wastewater treatment has met its share of the cleanup plan. However, implementation and documentation of practices to control polluted runoff from agriculture and development is much lower. Only 23% of priority agricultural practices and 28% of development pollution controls have been reported as complete. Both of these areas need much greater attention in the future, as well as a comprehensive system to review all implemented projects.

Conservation of natural areas and restoration of riparian buffers throughout the watershed continues to rise, however, so does the amount of land we need to restore and protect. Natural areas and buffers are constantly threatened by expanding development. Finding a balance between development and natural areas represents an important step in the continued progress toward improved water quality.

The stalled pollution reductions for the James River underscore the need for stronger action. Like a boat rowing against the tide, our efforts and investments over the past decade have only kept pace with the growing population and development. Additional progress in reaching a fully healthy river will require a full commitment to Virginia's new cleanup plan for the James River.



## GRADING SCALE

<b>A</b>	<b>80% - 100%</b>
<b>B</b>	<b>60% - 79%</b>
<b>C</b>	<b>40% - 59%</b>
<b>D</b>	<b>20% - 39%</b>
<b>F</b>	<b>less than 20%</b>



## REPORT CARD

Bald Eagle	100%
Rockfish	76%
Oysters	11%
Smallmouth Bass	49%
American Shad	42%
Brook Trout	45%
<b>Average</b>	<b>54%</b>



# Wildlife

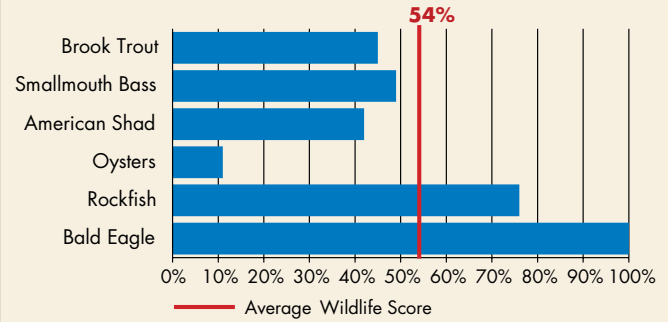
## Bald Eagle - 100% (No 2-Year Change)

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 number of breeding pairs in the James River watershed has risen to 174 in 2011. This represents a 13% increase from 2010 and keeps the population well above JRA's benchmark goal of 120 pairs. The eagle population in the James has surpassed the Rappahannock and Potomac Rivers, making it the most significant river habitat for eagles in Virginia.

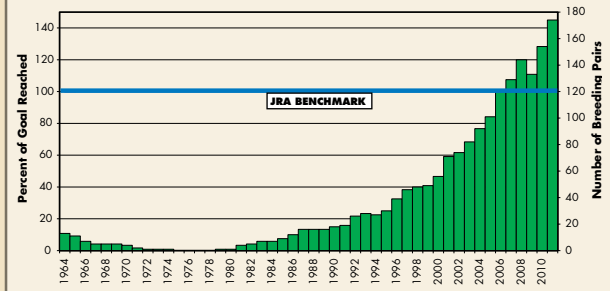
© Charles City County



## Wildlife Final Scores



## Bald Eagle Breeding Pairs



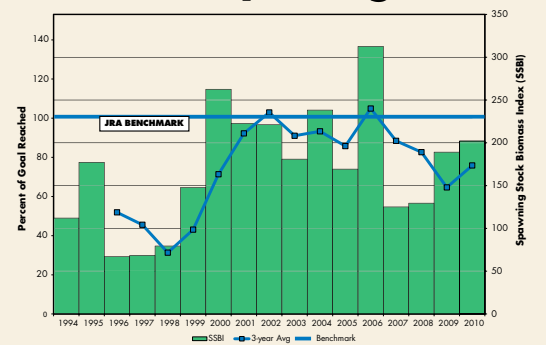
Source: William & Mary Center for Conservation Biology

## Rockfish - 76% (-6% 2-Year Change)

During colonial times, rockfish (striped bass) were plentiful in coastal rivers from Canada to Georgia. Overfishing, habitat loss and pollution resulted in a significant population decrease during the 1970s and 1980s. The population rebounded as a result of a fishing moratorium and careful management and was declared healthy in 1995. After a marked decline in 2007 and 2008, the spawning stock in the James is once again on the rise. The index for the James in 2010 was 20% higher than 2009. However, unusually high bacterial infections and sufficient forage fish are still concerns for the rockfish population. The 3-year average of the James River spawning stock is now at 76% of JRA's benchmark.



## Rockfish Spawning Stock



Source: Virginia Institute of Marine Science

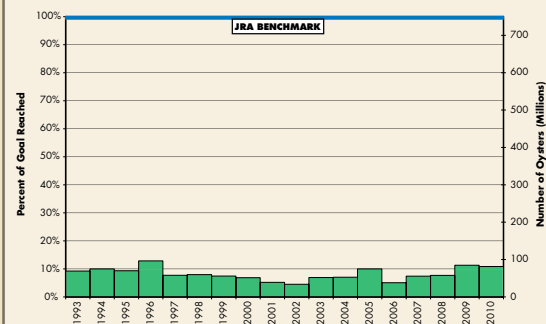
## Oysters - 11% (+3% 2-Year Change)

The Chesapeake Bay 2000 agreement called for a 10-fold increase in oyster populations from the 1994 levels. Despite continued restoration efforts, the 2010 oyster population is only at 11% of the James River's goal. The oyster population is still plagued by disease and poor water quality. Oyster reefs provide important habitat for aquatic plants and animals and one adult oyster can filter 50 gallons of water per day. Ironically, these filter feeders struggle to survive in the murky waters of the James. Restoring a healthy oyster population could have a marked impact on the overall water quality of the bay and help restore essential underwater habitat.



© James Wesson

## Oyster Abundance

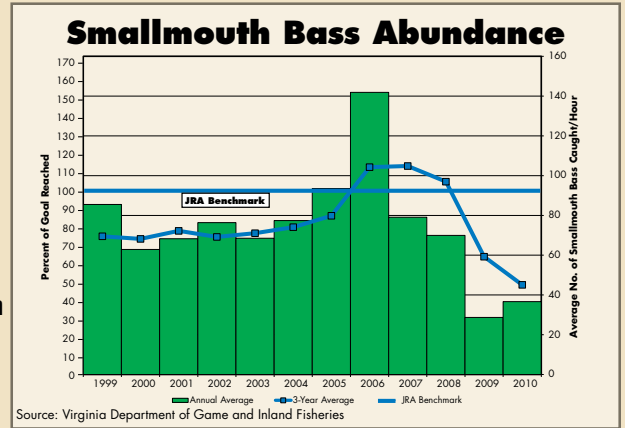


Source: Virginia Marine Resources Commission



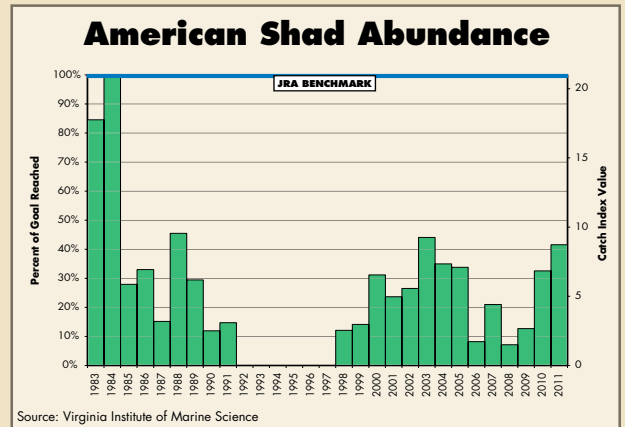
## Smallmouth Bass - 49% (-51% 2-Year Change)

Smallmouth bass fishing is extremely popular in the upper and middle James River. Recent years have shown a population decline in this prized recreational fish. In 2010, studies showed that the smallmouth bass population in the James was only at 49% of the benchmark goal. Several poor spawning years in the recent past are a major reason for the decreased numbers of small mouth bass caught in the annual surveys. Starting in 2007, the James River population has been subject to recurring fish kills in the upper James, although fewer affected fish were found in the last two years. While natural fluctuations affect the small mouth bass reproduction, the continued decline for several years warrants additional investigation. Regardless of the specific cause, better river health would help improve reproductive success and fish health.



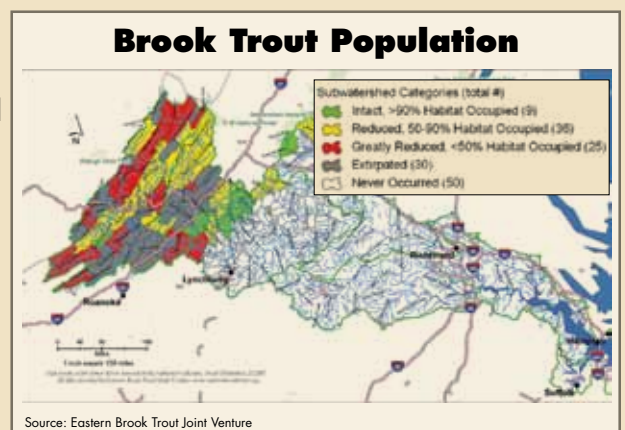
## American Shad - 42% (+29% 2-Year Change)

American shad was once one of the most abundant and important fish species in the James River. In 2008, populations declined to near all-time lows. However, in the past two years there has been a substantial increase in the James River American shad population. Preliminary data for 2011 indicates a 2-year increase of 29%, which puts the population at 42% of JRA's benchmark. While still low compared to historic values, this increase is a positive sign for the American shad population after years of restocking efforts and removal of dams and river blockages.



## Brook Trout - 45% (No 2-Year Change)

Brook trout are Virginia's official freshwater fish and prized by fly-anglers. Because of their sensitivity to changes in water quality and temperature, they are an important indicator of aquatic health. Changes in water quality and competition with other species have dramatically reduced the brook trout's range. Once thriving in 100 streams in the James River basin, they are currently only healthy populations in 9 stream systems and have been completely eliminated from 30 streams. The benchmark for this native species is to restore viable populations in 20 streams consistent with the Brook Trout Joint Venture. Achieving this goal will require protecting forested watersheds, replanting streamside buffers and reducing polluted runoff.



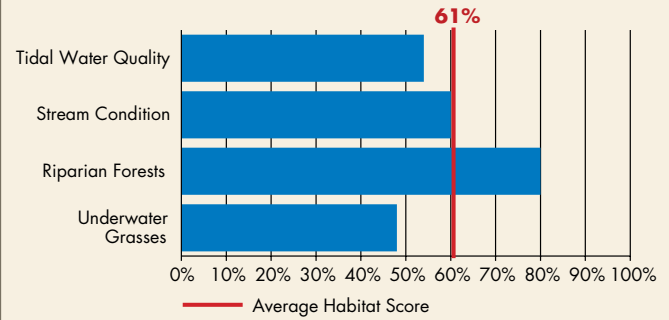


## REPORT CARD

Underwater Grasses	48%
Riparian Forests	80%
Stream Quality	60%
Tidal Water Quality	54%
Average	<b>B-</b> 61%

# Habitat

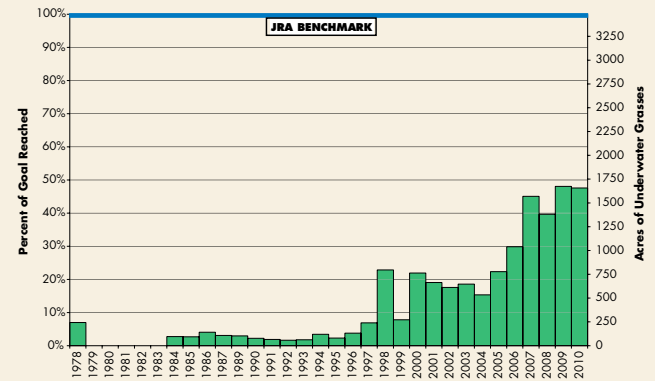
## Habitat Final Scores



## Underwater Grasses - 48% (8% 2-Year Change)

Underwater grasses are continuing to increase in parts of the tidal James River, now covering 48% of the 3,450-acre goal set for the James. The presence of these grasses, which provide essential habitat for juvenile fish, crabs and waterfowl, is a positive sign for river health. Although underwater grasses are thriving above the falls in the James, as well as in some tidal tributaries, as of 2010, there was still an absence of beds in the main stem of the James from Richmond to Newport News. However, aerial photography and ground surveys in 2011 found underwater grasses growing on the main stem tidal James for the first time in decades. In order for underwater grasses to get the sunlight they need to grow, additional pollution reductions are needed to improve water clarity.

## Underwater Grass Abundance

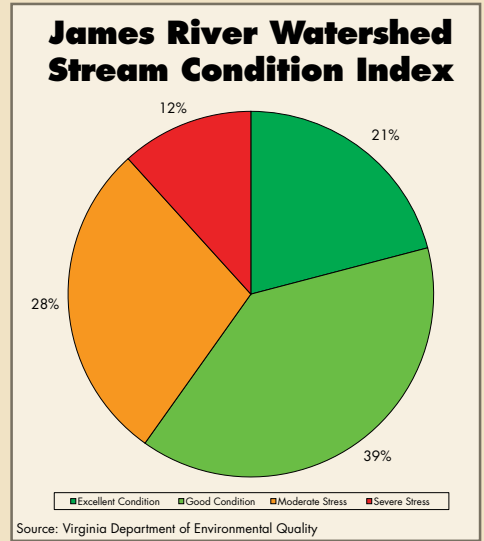


Source: Virginia Institute of Marine Science

## Riparian Forests - 80% (No 2-Year Change)

The JRA benchmark is to have 85% of the streambanks in the watershed to be forested. Available data shows that approximately 80% of that goal has been reached. Riparian forests play a crucial role in aquatic ecosystems, providing food and habitat. They are essential for streambank stabilization, erosion control and filter pollution from runoff before it can enter a water body. As development continues throughout much of the watershed, the threat to riparian forests will also increase. Greater protection and restoration efforts are needed to increase riparian forests along streams, creeks and the James River.



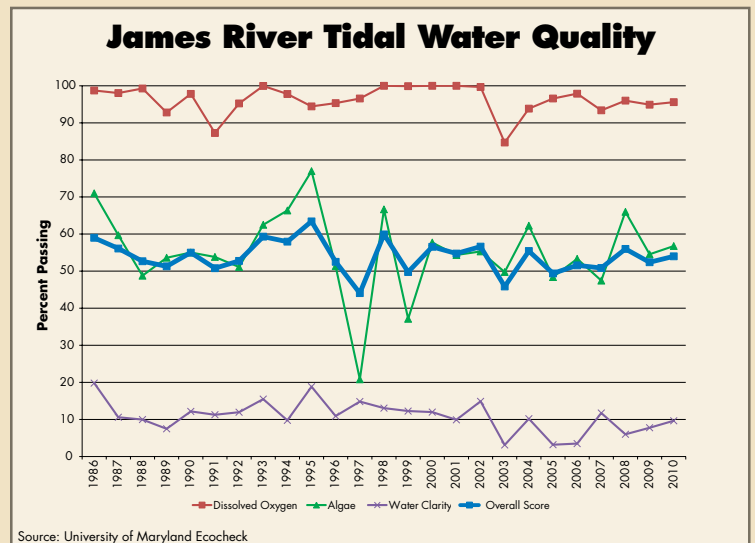


## Stream Condition - 60% (-1% 2-Year Change)

There are 15,000 miles of tributaries that flow into the James River. Unhealthy streams transport nutrients and sediment into the river and play an important role in the overall health of the James. In 2010, 60% of the James River's tributaries were classified as being in good or excellent condition. While better than many other portions of the state, this is still a long way from meeting the goal of having 100% of all streams and creeks classified as being in good or excellent condition. Although many tributaries are in poor condition, recent data has shown a decrease in the number of streams that are severely stressed. Continued restoration efforts, careful land planning and management, education, and behavior changes will be necessary to return all of the James River's tributaries to good health.

## Tidal Water Quality - 54% (-2% 2-Year Change)

Dissolved oxygen, algae levels and water clarity are important factors of overall water quality. On average, the James River meets the water quality criteria for these parameters just 54% of the time. Dissolved oxygen, which is essential for the survival of fish and other aquatic organisms, is typically at a healthy level in the James 96% of the time. However, algae growth and water clarity remain problematic within much of the tidal James. Water clarity, which is essential for the growth of underwater grasses, is of significant concern, meeting the criteria less than 10% of the time. Both algae growth and poor water clarity are the result of excessive nutrient and sediment pollution in the water.





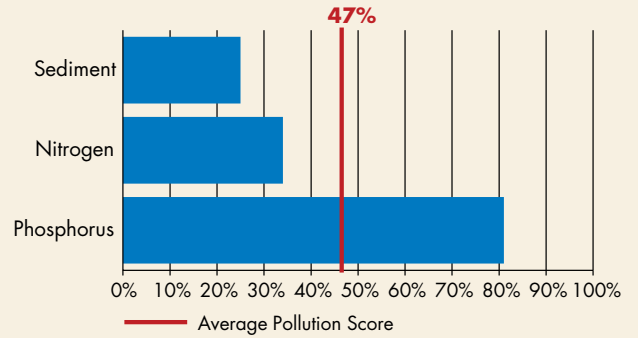
## REPORT CARD

Sediment	25%
Nitrogen	34%
Phosphorus	81%
Average	<b>C</b> 47%

# Pollution

Pollution is the greatest factor affecting the health of the James River. There are many forms of pollution including bacteria, heavy metals and toxins, but the most prevalent forms of pollution affecting the James are sediment, nitrogen and phosphorus. These pollutants cause a variety of problems including decreased water clarity and excessive algae growth, which in turn degrade water clarity, habitat and food sources for many aquatic organisms. Pollution also greatly diminishes people's enjoyment of the river and can be a threat to drinking water supplies and human health.

## Pollution Final Scores



The U.S. Environmental Protection Agency (EPA), as part of the Chesapeake Bay cleanup effort, has established specific limits for the average amount of sediment, nitrogen and phosphorus pollution that the James River can withstand and still be healthy. Pollution reductions throughout the Chesapeake Bay region, including the James River, have not met the goals and as a result, in 2010 the EPA was required by court order to initiate a new cleanup process. In turn, Virginia has developed a new cleanup plan for the James River detailing how it will meet the pollution limits. Virginia is also conducting a more detailed 3-year study on the health of the tidal James River, which may change the pollution limits when the study is completed.

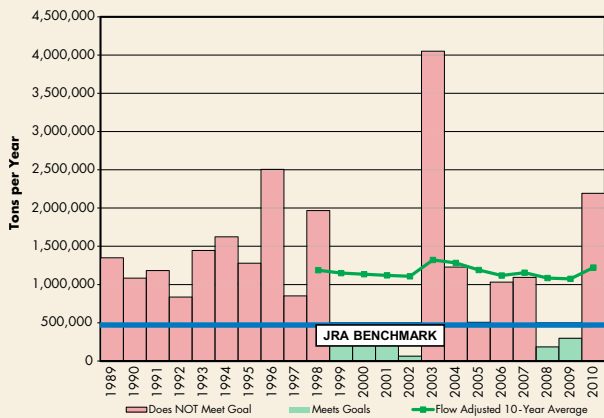
JRA tracks annual monitoring data for pollution levels which have a significant influence on the River's health year to year. However, we measure progress toward the established pollution limits by using a 10-year rolling average that removes the influence of annual weather variations, and reflects progress on actual pollution controls.

## Sediment Pollution Reduction - 25% (-35% 2-Year Change)

Over the past 15 years, although the annual sediment pollution levels were below the target levels roughly 50% of the the time, the long-term average sediment level for the James River has not improved at all. In fact, the 2010 average pollution level is higher than it was in 1998. This lack of progress is largely caused by the extremely high sediment pollution levels in 2003 and 2010 when sediment pollution increased dramatically even when adjusted for the increase runoff volume. This indicates that the James River is still susceptible to high pollution levels during years with heavy rainfall. In order to make stronger progress in protecting the James River from sediment pollution impacts, it is very important to restore the river's natural filters, like riparian forests, wetlands and filter feeders, as well as continued erosion and pollution controls.



## Sediment Pollution



Source: USGS and EPA Chesapeake Bay Program



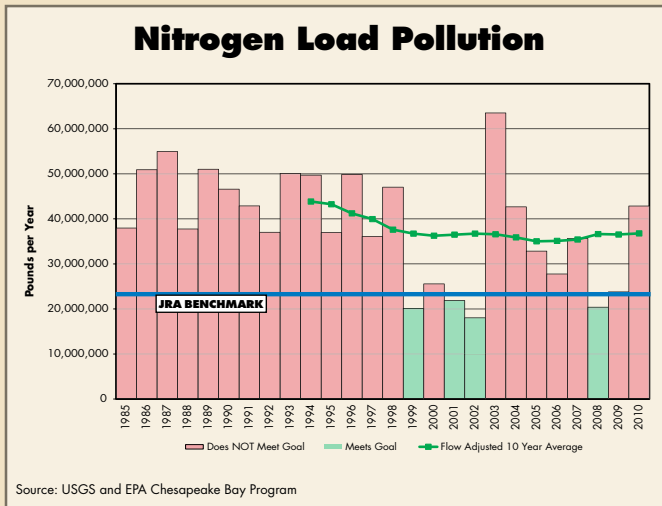


## Nitrogen and Phosphorus Pollution

Nitrogen and phosphorus are nutrients that help plants grow, but the James River is being overfed. Excessive nitrogen and phosphorus pollution from sewage, manure, fertilizer and air pollution fuel algae growth that blocks sunlight from vital underwater grasses and displaces healthy plankton that are critical food for fish and other aquatic life. Some types of algae can also become toxic to aquatic life and even to humans. As algae die and decompose they can create "dead zones" where little oxygen is available to support aquatic life.

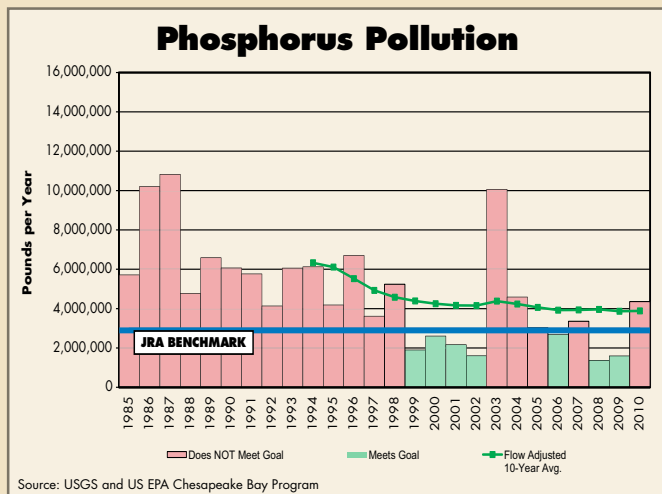
### Nitrogen Pollution Reduction - 34% (-1% 2-Year Change)

Despite ongoing efforts to implement pollution control projects, nitrogen pollution in the James continues to exceed the limits set for the river. The long-term adjusted average shows significant progress made from 1994 to 2000 but since then pollution reductions have leveled off. Since 1985, nitrogen levels have only achieved target levels four times, and based on the long-term adjusted average, only 34% of the goal has been reached. In order to achieve the nitrogen pollution reductions needed for the James, even more care needs to be taken to ensure that nitrogen input is controlled from all sources, including wastewater, development and agriculture.



### Phosphorus Pollution Reductions - 81% (+2% 2-Year Change)

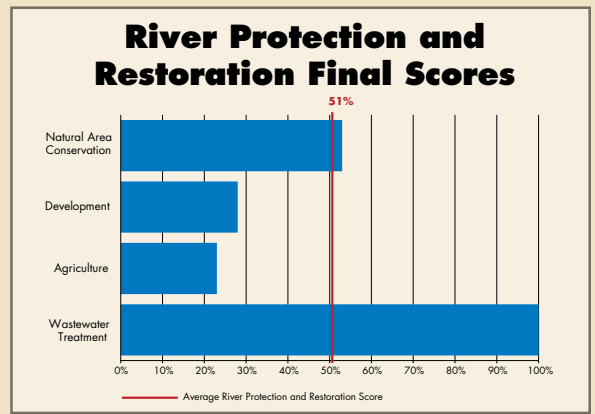
From 1994 to 2002, steady progress was made in reducing phosphorus pollution in the James River. This is largely due to strong actions like the phosphate detergent ban and improvements at wastewater treatment plants. However, similar to nitrogen levels, progress has stalled over the past 10 years. After pollution reductions improved an average of 7% per year from 1994-2002, the improvement over the past 9 years was only 1% per year. In 2010, 81% of the required reductions have been met. The slowing of phosphorus reductions indicates that greater effort will be needed in order to reach the pollution reduction goal for the James River.



REPORT CARD	
Wastewater Treatment	100%
Agriculture	23%
Development	28%
Natural Area Conservation	53%
Average	51%

## Protection and Restoration Actions

There are many actions that citizens, businesses and government can take to reduce pollution and protect or restore habitat. The practices included below represent the most important actions that need to be taken in order to restore the health of the James River.



\*Data for practices controlling polluted runoff from the land is incomplete. This particularly affects the progress reported for agricultural practices, urban stormwater management and nutrient management practices, and riparian buffer restoration.

### Wastewater Treatment Pollution Reduction - 100% (5% 2-Year Change)

Wastewater treatment has received the greatest level of investment by Virginia and individual pollution limits are set in permits for each wastewater discharger. As a result, in 2010 sewage plants and industrial facilities exceeded the reduction goal for phosphorus and achieved 96% of the reduction goal for nitrogen. These reductions were achieved through regulatory requirements and continued investments by the state, local government and private industry in updating pollution treatment systems.



### AGRICULTURE - 23% (-4% 2-Year Change)

Agricultural practices are some of the most cost effective pollution reductions available. The state has set goals for key practices as part of its plan to achieve the pollution limits that have been set for the James. Recent cuts in state funding for agricultural practices have resulted in decreased implementation of some important agricultural practices, but also, information on agricultural practice implementation is incomplete. A more comprehensive tracking system is under development and should provide better information in the future.

#### Continuous No-till - 18%

Since 2009, an average of over 10,740 acres of cropland has enrolled in the state's program for continuous no-till farming. These practices help maintain healthy soil and water by preventing erosion and reducing fertilizer loss.

#### Winter Cover Crops - 40%

In 2009 and 2010, an average of 21,719 acres of farmland has been enrolled in the winter cover crop program. This program helps prevent erosion and fertilizer runoff from fields by keeping them covered in the winter and absorbing unused fertilizer from the previous crop.

#### Farm Nutrient Management - 22%

Over the past 2 years, nutrient management plans were implemented on over 86,117 acres of farmland. These plans minimize fertilizer applications which contain nitrogen and phosphorus, and in turn reduce pollution.

#### Stream Protection - 13%

Farmers have installed 144,285 acres of pasture fencing to exclude livestock from the river and streams. Fencing out livestock helps prevent stream bank erosion and reduces sediment and pathogen pollution.





## **DEVELOPMENT - 28% (-5% 2-Year Change)**

The land changes that occur as a result of development can lead to substantial amounts of pollution. Virginia is in the process of revising its stormwater policies in order to improve pollution controls on new and existing development to minimize the impacts on water quality and meet pollution reduction goals.

### **Low Impact Development Policies - 30%**

By adopting low impact development policies, localities can lessen the impacts of development by reducing the amount of impervious cover, preserving vegetation and minimizing land disturbance. On average, localities in the James River basin have adopted only 30% of the policies recommended by the state.

### **Urban Stormwater Management Practices - 53%**

Over 125,000 acres of urban stormwater management practices have been documented throughout the James River watershed, amounting to 53% of the goal. However, these practices are difficult to track and document, and it is likely that many undocumented practices exist.

### **Urban Nutrient Management - 2%**

Nutrient management plans reduce pollution by ensuring proper fertilizer application rates and timing. Currently, 2% of the targeted 166,186 acres of urban lands have documented nutrient management plans in place, but Virginia's new fertilizer legislation will accelerate implementation in the future.



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## **NATURAL AREA CONSERVATION - 53% (1% 2-Year Change)**

Natural areas play an important role in filtering pollution and preventing erosion. They also provide critical habitat for wildlife and add scenic and recreational opportunities that are prized throughout the watershed.

### **Riparian Buffer Restoration - 21%**

Riparian buffers are forested or vegetated areas along the banks of rivers and streams. They play an important role in filtering polluted runoff and improving stream quality. They also provide important wildlife habitat. Approximately 69,000 acres of riparian buffer restoration are called for in the James River's clean up plan. As of 2010, 14,560 acres or 21% of this goal has been achieved.

### **Land Conservation - 85%**

Over 20% of the James River watershed has been protected from development through public land ownership or private conservation easements, meeting the goal set by Virginia as part of the Chesapeake 2000 Agreement. However, both Gov. Kaine and Gov. McDonnell and a recent Presidential Executive Order set additional goals for land conservation. Based on these goals, land conservation achieved to date within the James River amount to 85% of the 1.65 million acre goal.





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## About James River Association

The James River Association (JRA) is a non-profit organization solely dedicated to the protection and restoration of the James River. The mission of JRA is to provide a voice for the river and take action to promote conservation and responsible stewardship of its natural resources. Founded in 1976, JRA works through its four core programs—River Advocacy, James Riverkeeper® program, Education and Outreach, and Watershed Restoration—to ensure a healthy James River ecosystem for current and future generations. Please visit our website at [www.jamesriverassociation.org](http://www.jamesriverassociation.org) for more information about JRA, the State of the James River report and how you can help protect America's Founding River.

## Acknowledgements

The James River Association would like to thank the following organizations for their contributions to the report: William and Mary Center for Conservation Biology, Virginia Institute for Marine Science, Virginia Marine Resources Commission, Trout Unlimited, U.S. Forest Service, U.S. Geological Survey, U.S. Environmental Protection Agency, Chesapeake Bay Program, University of Maryland, Virginia Department of Conservation and Recreation, Virginia Department of Game and Inland Fisheries, Virginia Department of Environmental Quality. A special thank you goes to Michelle Kokolis for her hours of research and writing for this report.

The James River Watershed

