JAMES RIVER ASSOCIATION

2013

State of the James

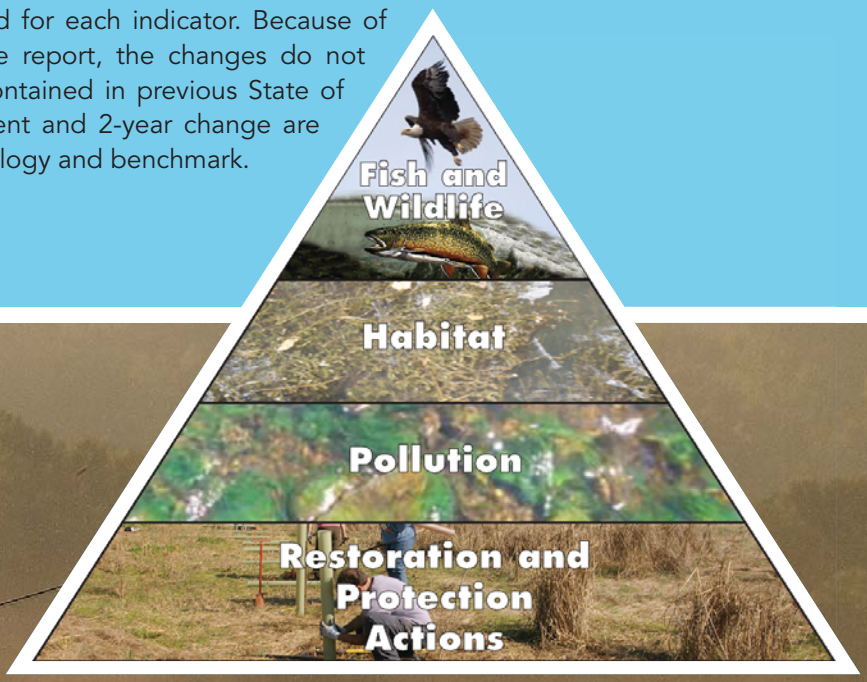
BACKGROUND

Since the founding of the 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 river 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 an authority on a specific indicator. Current progress is compared to this benchmark to calculate a score which is then 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 reports. The scores for current and 2-year change are determined by using the same methodology and benchmark.



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SUMMARY

The 2013 State of the James River report gives the river's health an overall score of 53% and a grade of C. This represents a 2% increase over the past two years. These results underscore two important conclusions. First, we are making progress where Virginia has made significant commitments and investments. Second, there are key factors that remain critically low and must be addressed in order to achieve a fully healthy James River.

REPORT CARD

	2013 Report	2-Year Change	2013 Grade
Wildlife	50%	-4%	C
Habitat	60%	-1%	B-
Pollution	41%	3%	C-
River Protection & Restoration	59%	8%	C+
Overall	53%	2%	C

The modest 2% overall increase reflects progress made in advancing restoration and protection actions and the resulting pollution reductions and habitat improvements. Over the past decade, Virginia has invested significantly in wastewater treatment upgrades at sewage treatment plants and industrial facilities, has increased funding for agricultural conservation practices, and focused more attention on urban stormwater pollution. These actions have resulted in meaningful progress on nitrogen and phosphorus pollution reductions as well as increased growth of underwater grasses.

However, the amount of improvement in the overall score was hampered by several factors where the health of the James River continues to struggle. Most notably, sediment pollution has shown no improvement over the past 20 years and pollution reductions remain below 10% of the goal for the James River. The low score for sediment pollution reductions belies the decreased score for stream health and the river's failing water clarity, to which sediment pollution is the leading cause.

The James River is an excellent demonstration that we can achieve improved environmental health and water quality if we make the necessary commitments and investments, but also that we must strengthen our efforts in order to fully safeguard our most precious natural resource, water, for current and future generations.

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GRADING SCALE

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

WILDLIFE

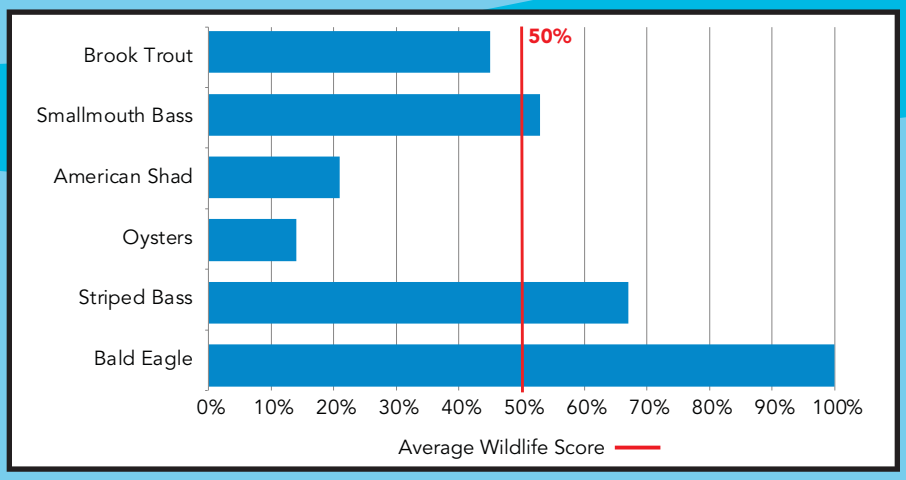
Over the past two years the key wildlife species in the James River have shown mixed results. Bald eagle populations continue to rise, making the James River home to the largest number of bald eagles in the state. Oyster populations, although still low compared to historic levels, have been showing a slow but steady increase, and smallmouth bass populations have also increased recently. After a significant increase in 2011, American shad populations have once again greatly declined, as have striped bass (rockfish).

REPORT CARD

Bald Eagle	*100%*
Striped Bass	*67%*
Oysters	*14%*
Smallmouth Bass	*53%*
American Shad	*21%*
Brook Trout	*45%*
Average	*50%*

C

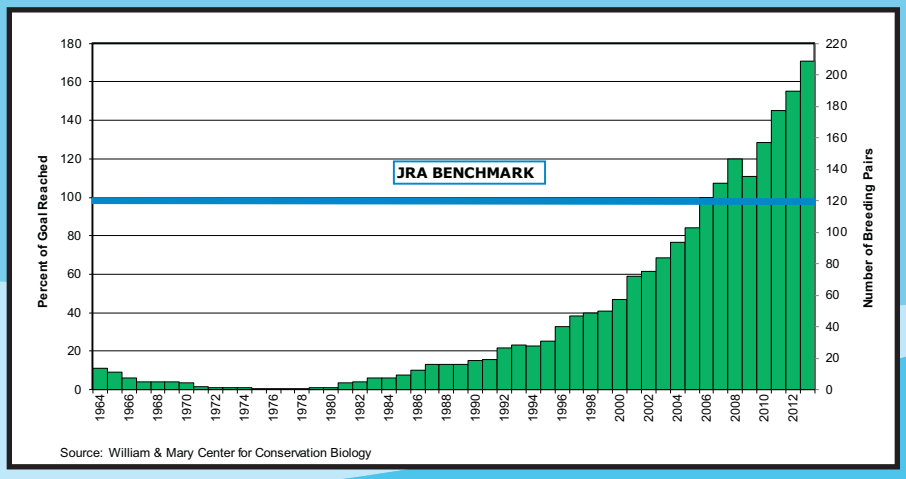
Wildlife Final Scores



Bald Eagle: 100% *(No 2-Year Change)*

In 1977 there were only 33 pairs of bald eagles in all of Virginia, and none in the James River watershed. Since that time the bald eagle has made an amazing comeback. In 2013 there were 205 breeding pairs documented in the James River watershed, a 26% increase from the number reported in 2011. Thanks largely to the ban of the pesticide DDT and the Endangered Species Act, spying a bald eagle along the James River is no longer a rare event.

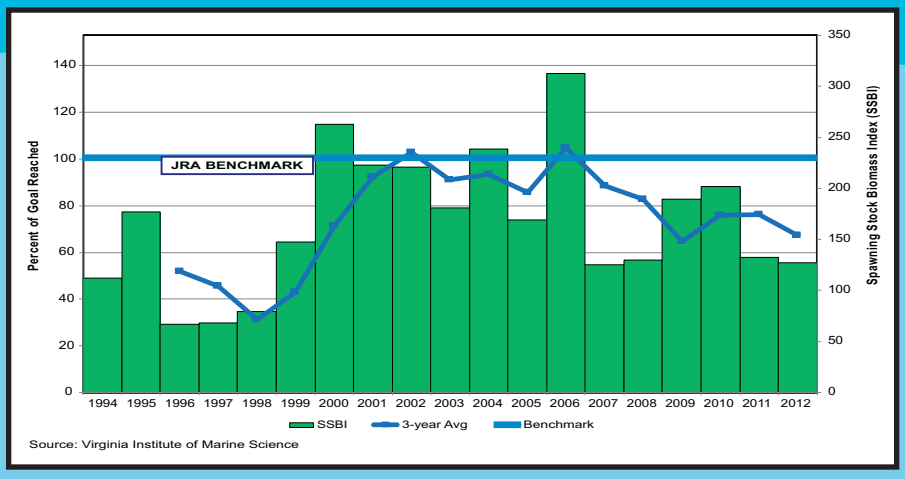
Bald Eagle Breeding Pairs



Striped Bass: 67% *(–9% 2-Year Change)*

During the 1970s and 1980s, pollution, overfishing and habitat loss decimated striped bass (rockfish) populations along the Atlantic coast including those that returned each year to their James River home. Through a fishing moratorium and careful management, rockfish populations rebounded and were declared healthy in 1995. After an increase in the James River spawning stock in 2009 and 2010, populations have again declined to a current score of 67%, a 9% decrease over the past two years. This reflects an overall decline in the abundance of striped bass in the James River primarily as a result of poor spawning years, but fishery management and overall ecological health remain critical concerns for the future population.

Striped Bass Spawning Stock

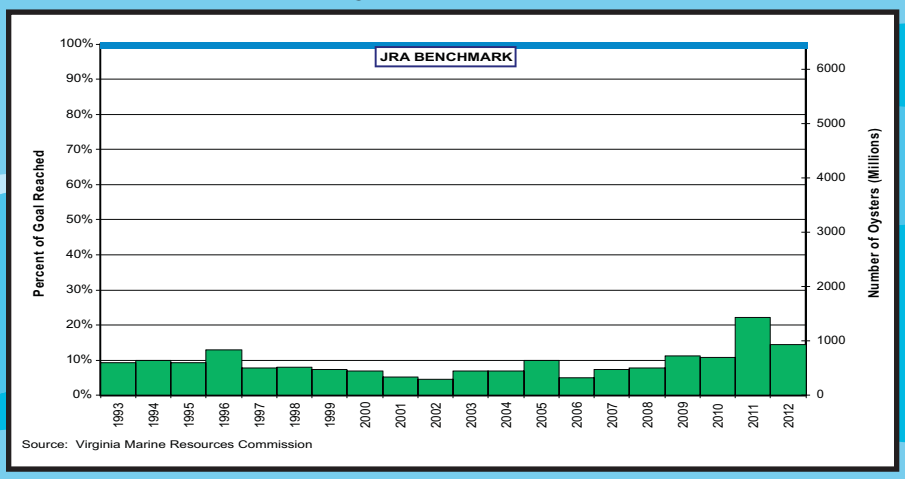


Source: Virginia Institute of Marine Science

Oysters: 14% *(+3% 2-Year Change)*

Oyster reefs provide essential habitat for aquatic plants and animals. They also play an important role in water quality, with the adult oysters filtering an average of 50 gallons of water per day. Unfortunately, oyster populations are still struggling in the sediment-laden waters of the James River. However, disease resistance and oyster restoration efforts have recently shown promise in leading to population increases. Although the current score for oysters increased 3%, it is only at 14% of the James River's goal, leaving a long way to go before reaching the Chesapeake Bay 2000 Agreement's goal of a 10-fold increase from 1994 levels.

Oyster Abundance



Source: Virginia Marine Resources Commission

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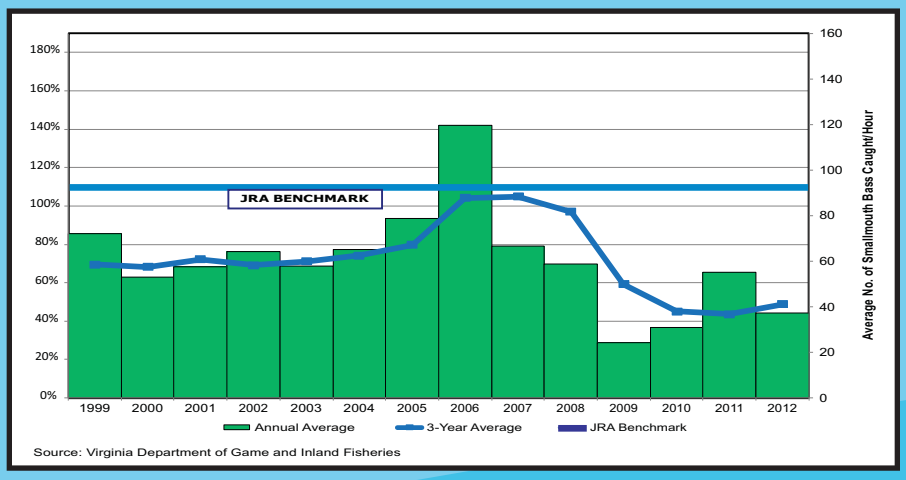
Smallmouth Bass: 53% *(+4% 2-Year Change)*

Studies have shown a marked decline in the populations of this extremely popular recreational fish since the mid-2000s. This decline has been largely due to poor spawning years and was marked by concerns about recurring fish kills and health problems in the upper James. However, data from 2012 shows a slight increase in the 3-year average from 2011 and the reports of fish kills have dropped dramatically. The 2013 smallmouth bass score is at 53% of the benchmark goal.

Smallmouth Bass Abundance

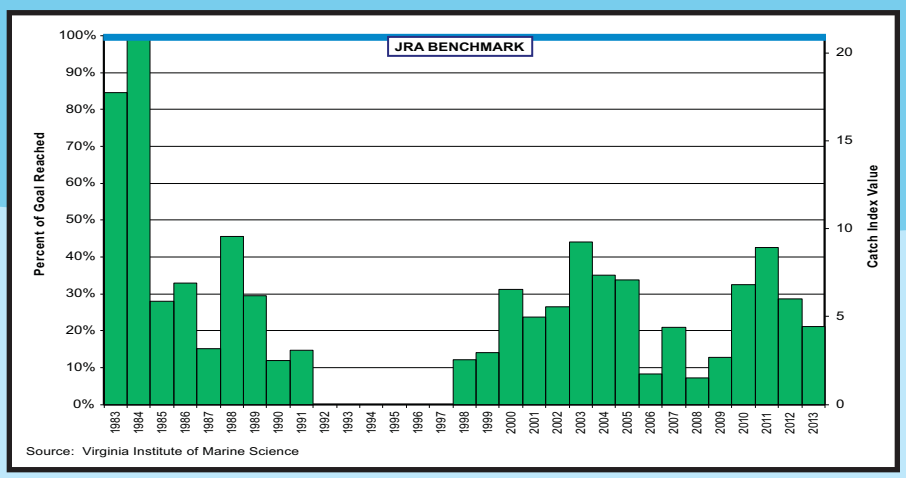


Source: Virginia Department of Game and Inland Fisheries

American Shad: 21% *(–21% 2-Year Change)*

After recent increases in the James River American Shad population, preliminary data for 2013 indicates a substantial decline, putting the population at only 21% of JRA's benchmark, half the 2011 score. Despite expanded access to historic spawning areas and continued restocking efforts, the James River shad population has not rebounded as hoped and impacts from off-shore commercial fishing continue to be of concern. Similar declines have been seen on other rivers along the Atlantic, but some, like the Rappahannock, where the largest dam was completely removed, have seen recent increases.

American Shad Abundance

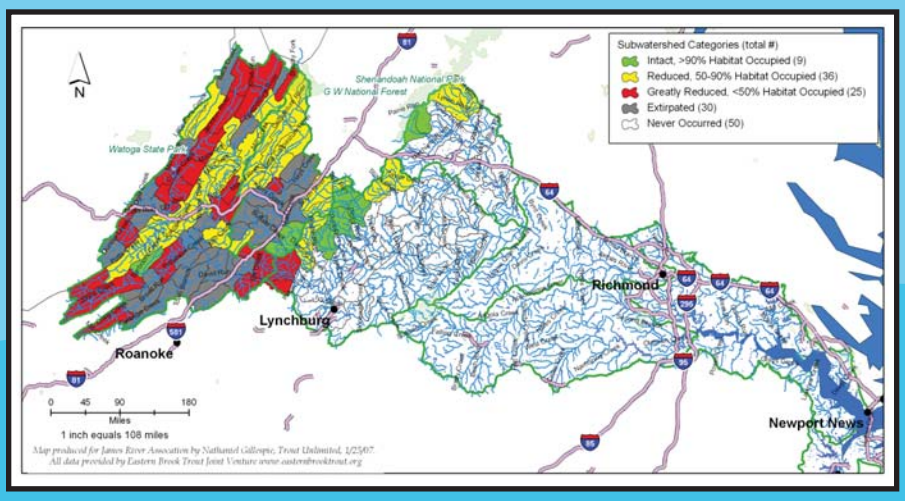


Source: Virginia Institute of Marine Science

Brook Trout: 45% *(No 2-Year Change)*

Brook trout, Virginia's official freshwater fish, were once thriving in over 100 streams in the James River watershed. Extremely sensitive to changes in water quality and temperature, the brook trout's range has been dramatically reduced due to declines in water quality. Today, healthy populations are found in only 9 stream systems and there are 30 streams in which brook trout are no longer found. JRA's benchmark goal, consistent with the Eastern Brook Trout Joint Venture's, is to restore viable populations to 20 streams in the watershed. We are currently at 45% of that goal.

Brook Trout Population



HABITAT

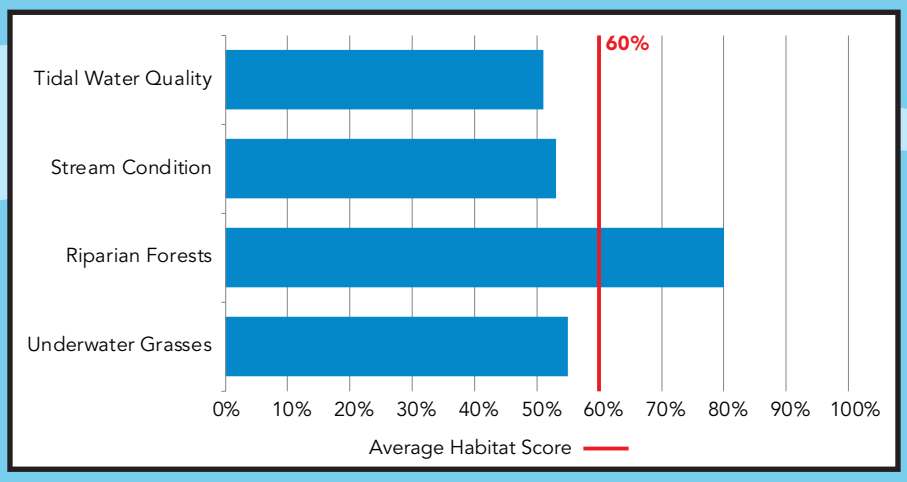
The river's most important habitat indicators have shown some increases and decreases reflecting different stresses and improvements within the James River system. Underwater grasses continue to increase and have been documented in the mainstem of the James for the first time in decades. In order for underwater grass populations to continue to expand, tidal water quality needs to improve. Tidal water quality, specifically water clarity and algal growth, has declined in the past two years, as has the stream condition index. If water quality continues to decline, we run the risk of many of the wildlife and habitat indicators that are currently showing signs of improvement regressing.

REPORT CARD

Underwater Grasses	*55%*
Riparian Forests	*80%*
Stream Condition	*53%*
Tidal Water Quality	*51%*
Average	*60%*

B-

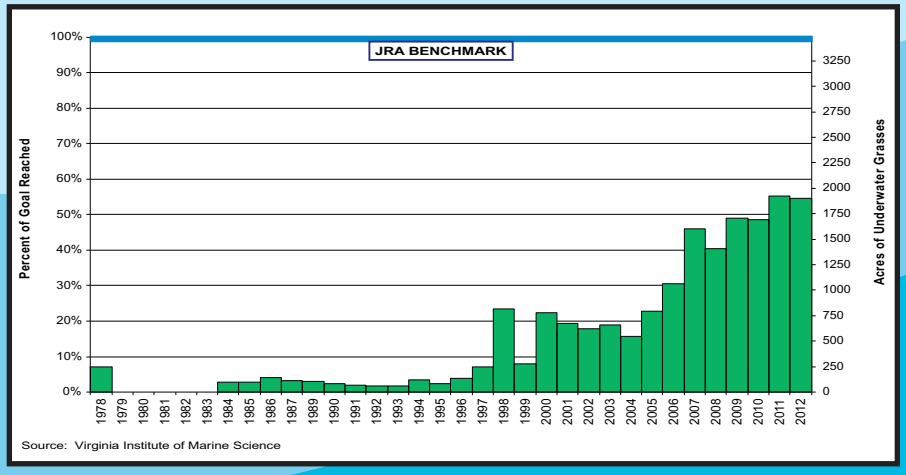
Habitat Final Scores



Underwater Grasses: 55% *(+6% 2-Year Change)*

Underwater grasses are continuing to increase, especially in the tidal tributaries to the James River where they may be buffered from the full impact of the river's pollution. In 2011 and 2012, underwater grass beds were documented in the mainstem of the James for the first time in decades. These grasses, which provide essential habitat for juvenile fish, crabs and waterfowl, now cover 55% of the 3,408-acre goal set for the James. Underwater grasses rely on clear water to get the sunlight they need to grow. Despite the fact that underwater grass beds are expanding, they will never be restored to historic levels until additional pollution reductions are made to improve water clarity. It is also important to note that the existing underwater grass populations are dominated largely by invasive species. Ideally, we would like to see a shift to more native species.

Underwater Grass Abundance



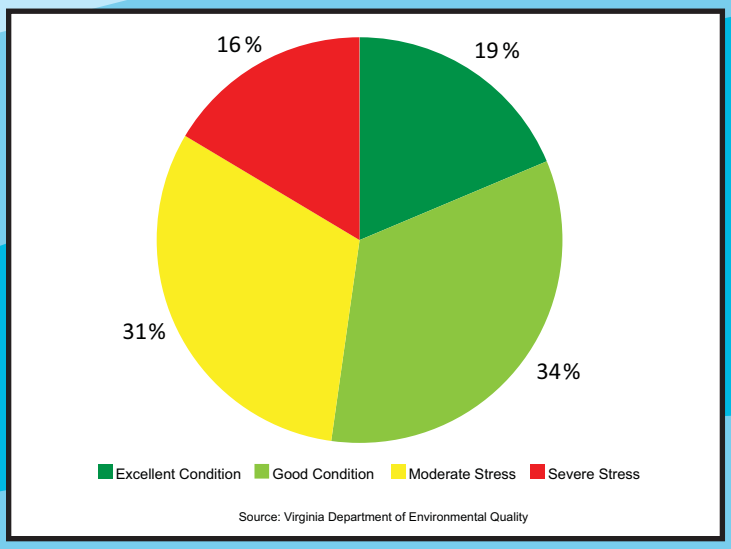
Riparian Forests: 80% *(No 2-Year Change)*

Riparian forests play an important role in streambank stabilization, erosion control and pollution reduction. They are also an integral part of healthy aquatic ecosystems, providing food, habitat and aiding in temperature control. As populations grow and development continues throughout the watershed, so will the threat to riparian forests. JRA's benchmark is for 85% of the streambanks in the watershed to be forested. Current data indicates that approximately 80% of that goal has been reached. Greater protection and restoration efforts will be needed in order to continue to protect the remaining riparian forests and restore those that have already been destroyed.

Stream Condition: 53% *(–7% 2-Year Change)*

In 2012, 53% of the streams and creeks surveyed in the James River watershed were classified as being in good or excellent condition. This is a 7% decrease from two years ago. Although the James River's tributaries are healthier than those in many other river basins in the state, they are still a long way from achieving the goal of having all streams and creeks meeting the criteria for good or excellent condition. The health of the 15,000 miles of tributaries flowing to the James River determines the river's overall health. Continued protection and restoration efforts, along with careful land use planning, education, and behavior changes will be necessary to return all of the James River's tributaries to good health.

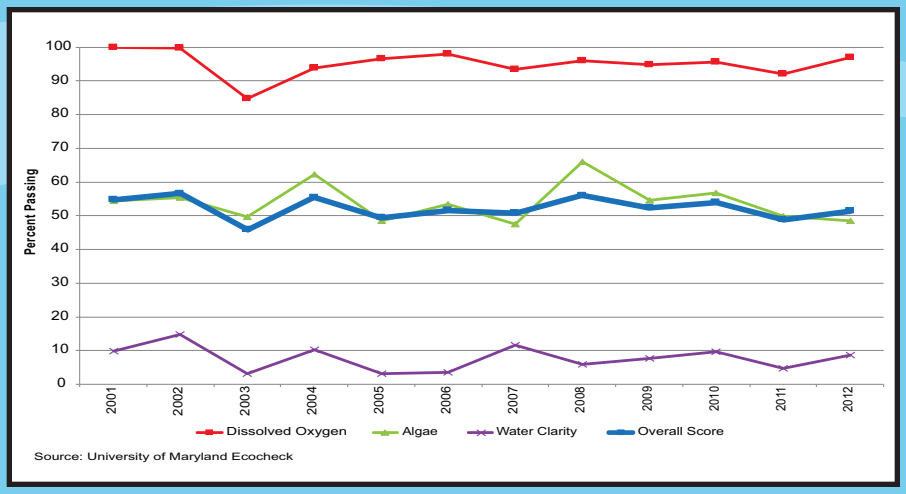
James River Watershed Stream Condition Index



Tidal Water Quality: 51% *(–3% 2-Year Change)*

Tidal water quality is a combination of three critical water conditions: water clarity, dissolved oxygen and algae levels. These criteria are the basis of the entire Chesapeake Bay cleanup effort. On average, the James River is meeting the passing criteria for these parameters only 51% of the time. Dissolved oxygen is essential for the survival of all aquatic animals including fish and oysters. Unlike other rivers in the Chesapeake Bay watershed, the James does not suffer from chronic low dissolved oxygen levels and the associated "dead zones." However, water clarity and algal growth (photo below), both of which are the result of excess nitrogen, phosphorus and sediment in the water, continue to present issues throughout much of the tidal James. Water clarity in the tidal James is of particular concern as it meets the established criteria less than 10% of the time. Recent research in the James indicates that toxins from excess algal growth have been found in crabs and have reduced the filtering capacity of mussels. Increased action needs to be taken in order to reduce pollution to improve water clarity and prevent excess algal growth.

James River Tidal Water Quality



POLLUTION

The greatest threat to the health of the James River and its tributaries is pollution in the forms of excess nitrogen, phosphorus and sediment. These pollutants cause a wide variety of problems in the river and streams and serve as an indicator of other forms of pollution such as bacteria and toxins. All of this pollution contributes to a decline in the health of, and habitat for, aquatic organisms. It can also threaten human health and drinking water supplies. In addition to the more tangible impacts, pollution also results in a general decrease in the aesthetics of the river and in people's ability to enjoy it, which can also have substantial impacts on local economies and jobs in communities that rely on the river.

As part of the multi-state Chesapeake Bay cleanup effort, the U.S. Environmental Protection Agency (EPA) has established specific limits for the amount of nitrogen, phosphorus and sediment pollution that can enter each part of the Chesapeake Bay, including the tidal James River. Accordingly, Virginia has developed a state-specific plan to meet these pollution limits and achieve the water quality standards for the James River.

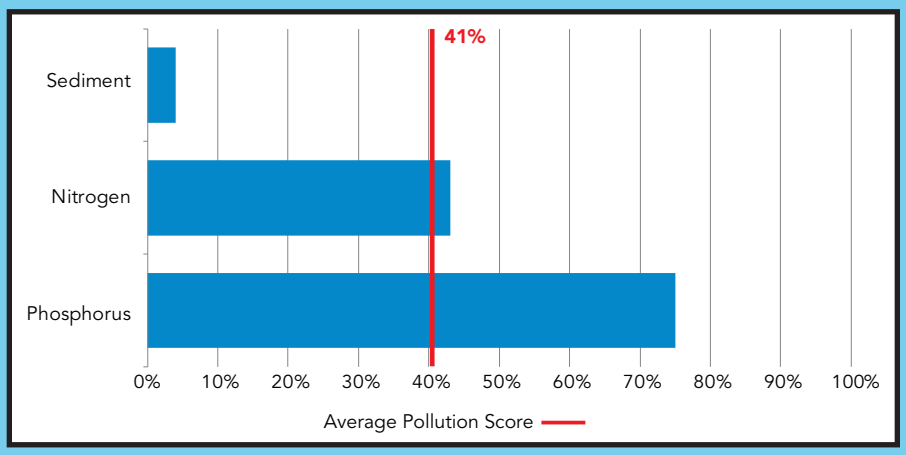
The benchmarks used throughout the pollution section of this report are derived from the pollution limits for the James River that were set forth by Virginia and the EPA. JRA tracks annual monitoring data for nitrogen, phosphorus and sediment pollution. However, progress toward established pollution limits is measured using a 10-year rolling average that eliminates the influence of annual weather variations.

REPORT CARD

Sediment	*4%*
Nitrogen	*43%*
Phosphorus	*75%*
Average	*41%*

C

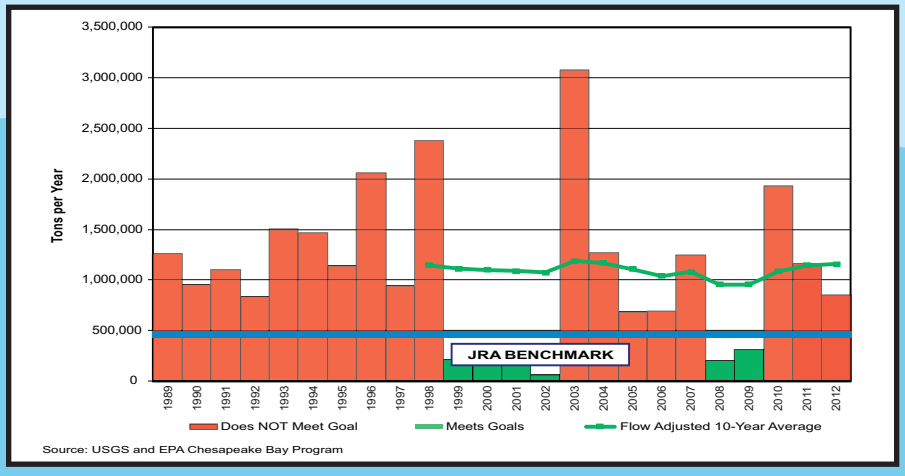
Pollution Final Scores



Sediment Pollution Reduction: 4% *(–2% 2-Year Change)*

Despite erosion control regulations, stormwater management requirements, and investments in soil conservation practices, little to no progress has been achieved toward reaching sediment pollution limits for the James. Sediment plays an important role in the health of the James River's streams as well as its tidal waters. The lack of improvement in sediment pollution indicates that stronger measures need to be taken to restore riparian forests and other natural buffers that help to filter runoff before it enters the river. Virginia has recently passed stronger stormwater management and erosion control regulations that may help, but targeted stream restoration may also be necessary in order to address major sources of sediment pollution.

Sediment Pollution



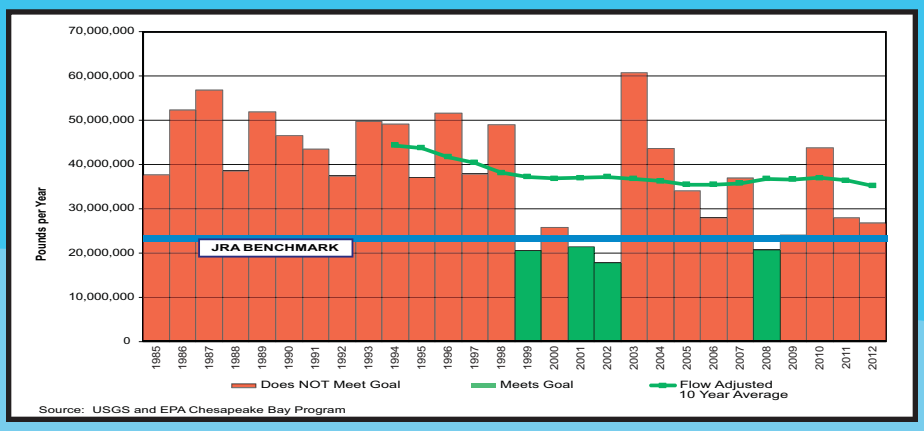
Nitrogen and Phosphorus Pollution

Although nitrogen and phosphorus at healthy levels are essential nutrients for life, the James River is being over fed with too much of these nutrients. These excess nutrients are coming from three dominant sources: wastewater, urban stormwater, and agricultural runoff. Too much nitrogen and phosphorus in the water result in excessive algal growth. This in turn decreases water clarity and prevents essential sunlight from reaching underwater grasses. The increased algae growth often occurs in harmful or nuisance species that out-compete beneficial algal species which are important food sources for fish and other aquatic life. Certain algal species can also be toxic to aquatic life and humans. As these algae die they decrease dissolved oxygen creating "dead zones" or areas where there is not enough dissolved oxygen available to support aquatic life.

Nitrogen Pollution Reduction: 43% *(+8% 2-Year Change)*

Although nitrogen levels are regularly exceeding the annual limits, recent years have shown a slowly decreasing trend in the long-term adjusted average, indicating that some progress is being made. This is supported by the fact that we are currently 43% of the way to reaching target loads, an 8% improvement since the 2011 report. While vast improvements have been made to limit nitrogen pollution from wastewater treatment plants, as populations grow there will be the need for additional work to maintain those levels. More immediately, additional actions need to be taken to reduce nitrogen pollution from agriculture and urban stormwater runoff.

Nitrogen Pollution

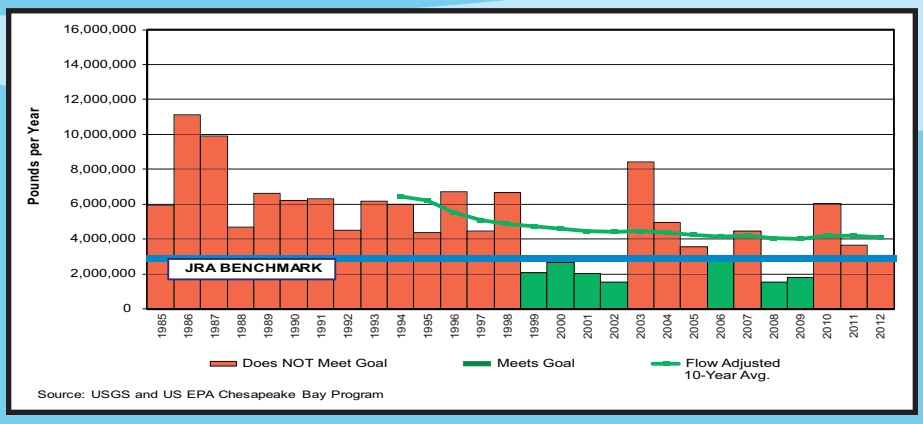


Phosphorus Pollution Reduction: 75%

(+2% 2-Year Change)

Fueled by the 1980's phosphate detergent ban and improvements at wastewater treatment plants over the past several decades, 75% of the phosphorus reductions needed for the James River have been achieved. However, the steady phosphate reductions that were seen in the late 1990s and early 2000s have now plateaued, indicating that additional measures need to be taken in order to reach the goal. Virginia recently passed legislation that removes phosphorus from maintenance lawn fertilizers and improves fertilizer management by golf courses and commercial lawn care companies. There is hope that these measures along with the increased implementation of agricultural and urban stormwater practices called for in Virginia's Chesapeake Bay cleanup plan will be sufficient to reach the goal.

Phosphorus Pollution

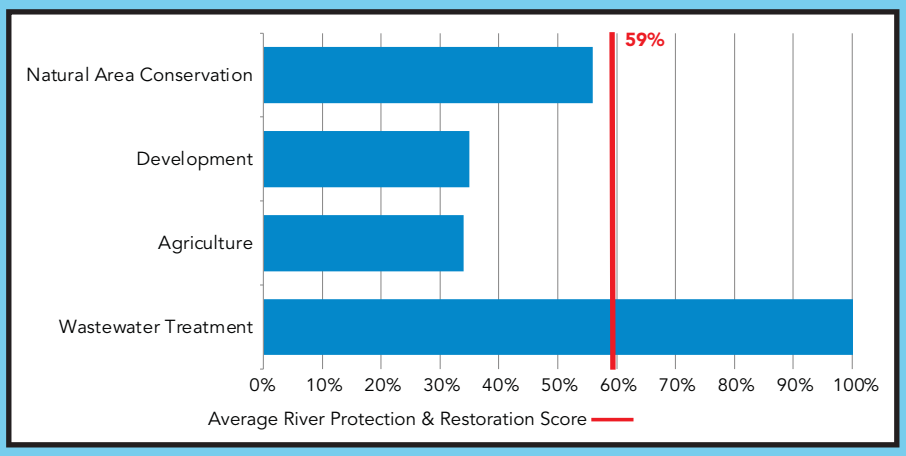


PROTECTION & RESTORATION ACTIONS

As previously mentioned, nitrogen, phosphorus and sediment are the forms of pollution that are currently having the most impact on the health of the James River. The graph below illustrates the largest sources for these types of pollution: wastewater, agriculture and urban stormwater runoff. Despite vast improvements in the treatment process, wastewater from sewage and industrial plants is still the leading source of nitrogen pollution and the second largest source of phosphorus pollution to the James. Agriculture continues to be the largest source of phosphorus and sediment pollution as well as a major source of nitrogen, which comes from fertilizers and animal waste. Urban stormwater pollution results from a multitude of sources including everything from the products we use on our lawns to streambank erosion from overwhelmed urban streams. As land development continues, urban stormwater runoff, which is already a major source of nitrogen, phosphorus and sediment, will continue to be a growing source of pollution to the James River.

There are many approaches that can be used by citizens, businesses and government to reduce the amounts and impacts of these pollution sources. The techniques featured in this report represent the practices that have been identified as having the greatest impact on pollution reduction. The success of these practices to date is varied, however one thing is clear: greater implementation of these as well as other practices is needed to restore the health of the James River.

River Protection & Restoration Final Scores

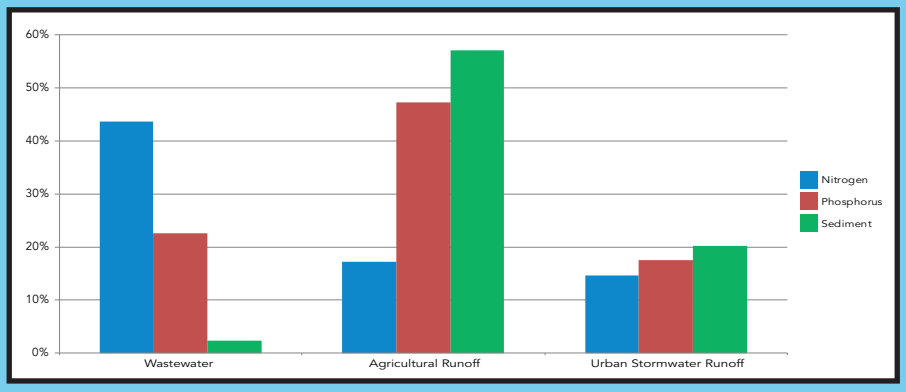


REPORT CARD

Wastewater Treatment	*112%*
Agriculture	*34%*
Development	*35%*
Natural Area Conservation	*56%*
Average	*59%*

C

James River Pollution Sources



Wastewater Treatment Pollution Reduction: 112%

(+22% 2-Year Change)

Tremendous financial investments have been made to upgrade wastewater treatment plants in order to reduce nitrogen and phosphorus pollution. Each treatment plant must maintain a permit that details how much pollution can be in the water that they discharge. These pollution limits are set by the State of Virginia. In 2013, wastewater treatment plants were exceeding the required reductions for both nitrogen and phosphorus, making a significant impact in the amount of nutrient pollution in the James. However, it is important to note that as populations continue to grow, wastewater treatment plants will have to handle larger amounts of waste and additional work will be necessary to maintain these reductions.

AGRICULTURE: 34% *(+6% 2-Year Change)*

Agricultural pollution reduction practices are some of the most cost-effective methods available. As part of Virginia's cleanup plan for the Chesapeake Bay, the state has set goals for agricultural pollution reductions and has identified many practices that can be used to achieve them. The practices listed below represent the most important agricultural pollution reduction practices and the implementation levels reported to the state. Because reporting these practices is only required when state funding is used to implement them, it is likely that there are practices that have not been reported. As most farmers require financial and technical assistance to implement pollution reductions, future progress will depend largely on increased state or federal funding.

Continuous No-till: 44%

Continuous no-till farming helps maintain healthy soil by preventing erosion and reducing fertilizer loss. In 2012, 25,464 acres of cropland were farmed using continuous no-till methods.

Winter Cover Crops: 30%

Winter cover crops prevent erosion by keeping the fields covered in the winter rather than leaving them barren. This technique also reduces fertilizer runoff because the winter crops will take up the leftover fertilizer from the growing season. In 2012, 16,262 acres of winter cover crops were reported.

Farm Nutrient Management: 29%

Nutrient management plans provide farmers with a plan for the amount, type and timing of fertilizer applications. These plans can play a significant role in reducing nitrogen and phosphorus pollution. In 2012, 109,591 acres of farmland were operated using nutrient management plans.

Livestock Fencing

Not only does fencing livestock out of streams and rivers reduce streambank erosion, sediment and pathogen pollution, it has also been shown to improve herd health. In 2012 a total of 9,450 acres of pasture fencing was installed.

DEVELOPMENT: 35% *(+5% 2-Year Change)*

With the addition of more roads, rooftops and other impervious surfaces, development causes dramatic changes to the landscape and can lead to substantial amounts of pollution both during and after construction. There are many practices that can be implemented to reduce the pollution that results from development, several of which are listed below.

Low Impact Development Policies: 31%

Low impact development policies provide localities with ways to reduce the amount of impervious cover (i.e. streets, sidewalks, etc.), preserve vegetation, create green space, and minimize land disturbance. All of these practices aid in reducing pollution. Although there are several localities in the watershed that are strongly encouraging low impact development opportunities, as of 2012, localities in the James River watershed on average had adopted only 31% of the policies recommended by the state.

Urban Stormwater Management Practices: 64%

Urban stormwater management includes practices that filter stormwater runoff, reduce impervious surfaces, collect and store stormwater, and increase infiltration or the ability of rainwater to soak into the ground. These practices are important because they minimize the amount of water that is entering the stormwater system. In 2012 over 19,000 acres of urban stormwater management practices were documented in the James River watershed.

Urban Nutrient Management: 11%

Similar to agricultural nutrient management plans, urban nutrient management plans reduce pollution by ensuring the proper type, amount and timing of fertilizer applications. Urban nutrient management plans are common for businesses that have large amounts of green space or grass, such as golf courses. In 2012 only 11% of the targeted 166,186 acres of urban lands had documented nutrient management plans in place.

NATURAL AREA CONSERVATION: 56%
(+3% 2-Year Change)

The James River watershed is known for the scenic beauty of its natural areas. Not only do these areas provide countless recreational opportunities and critical habitat for wildlife, they also play an important role in filtering pollutants and erosion prevention. Natural area and riparian buffer conservation efforts throughout the watershed continue to be strong. However, development continues to threaten these areas. Conserving and restoring natural areas is an important part of the pollution reduction plan and as populations continue to grow, it becomes increasingly important to find a balance between development and conservation of green spaces.

Riparian Buffer Restoration: 26%

Riparian or streamside buffers are vegetated areas along the banks of rivers and streams. These buffers play an important role in pollution reduction, stream health and provide important wildlife habitat. The James River cleanup plan calls for over 60,000 acres of riparian buffer restoration. In 2012, 16,064 acres of buffer or 26% of this goal were restored.

LAND CONSERVATION: 86%

As part of the Chesapeake Bay 2000 Agreement, Virginia set a goal of protecting 20% (1,337,843 acres) of the land in the James River watershed. Gov. Kaine, Gov. McDonnell and a Presidential Executive Order all established additional goals bringing the total preservation goal to 1.65 million acres. As of 2012, over 1.4 million acres (86%) of this preservation goal was achieved.

The Health of the James River is Up to You

There are many things that individuals can do to help improve water quality and protect our rivers and streams.

- Prevent pollution around the home – Join JRA's River Hero Home program. This program recognizes homeowners that are reducing runoff and pollution through the use of River Friendly Practices such as rain gardens, rain barrels and native plants.

- Take action for the river. JRA is always looking for volunteers to do everything from picking up trash to water quality monitoring to habitat restoration to advocating on the river's behalf.

- Help be the eyes and ears for JRA on the river. If you see a problem such as a fish kill or dumping, please send an email to info@jrava.org and one of the James Riverkeepers will investigate it further. If you want to regularly patrol your own section of river, join JRA's RiverRat program.

- Let your elected officials know that protecting the James River should be a priority. Join JRA's Action Network to find out how to contact your state elected officials and stay abreast of current river policy issues.

- Introduce someone to the James and teach them about being a good river steward. The more people are enjoying the river, the more people will care about its health. JRA offers river outings and education trips through its outreach and education programs.

- Strengthen our collective voice for the James River and support JRA's efforts. Become a JRA member and show your financial commitment to improving the health of the James River.

Visit ***www.thejamesriver.org*** to learn more about these and other JRA programs.

About the 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 five core programs – River Advocacy, James Riverkeeper ® program, Education, Watershed Restoration, and Outreach – to ensure a healthy James River ecosystem for current and future generations. Please visit our website at www.thejamesriver.org for more information about JRA, the State of the James River report and how you can help protect America's Founding River.

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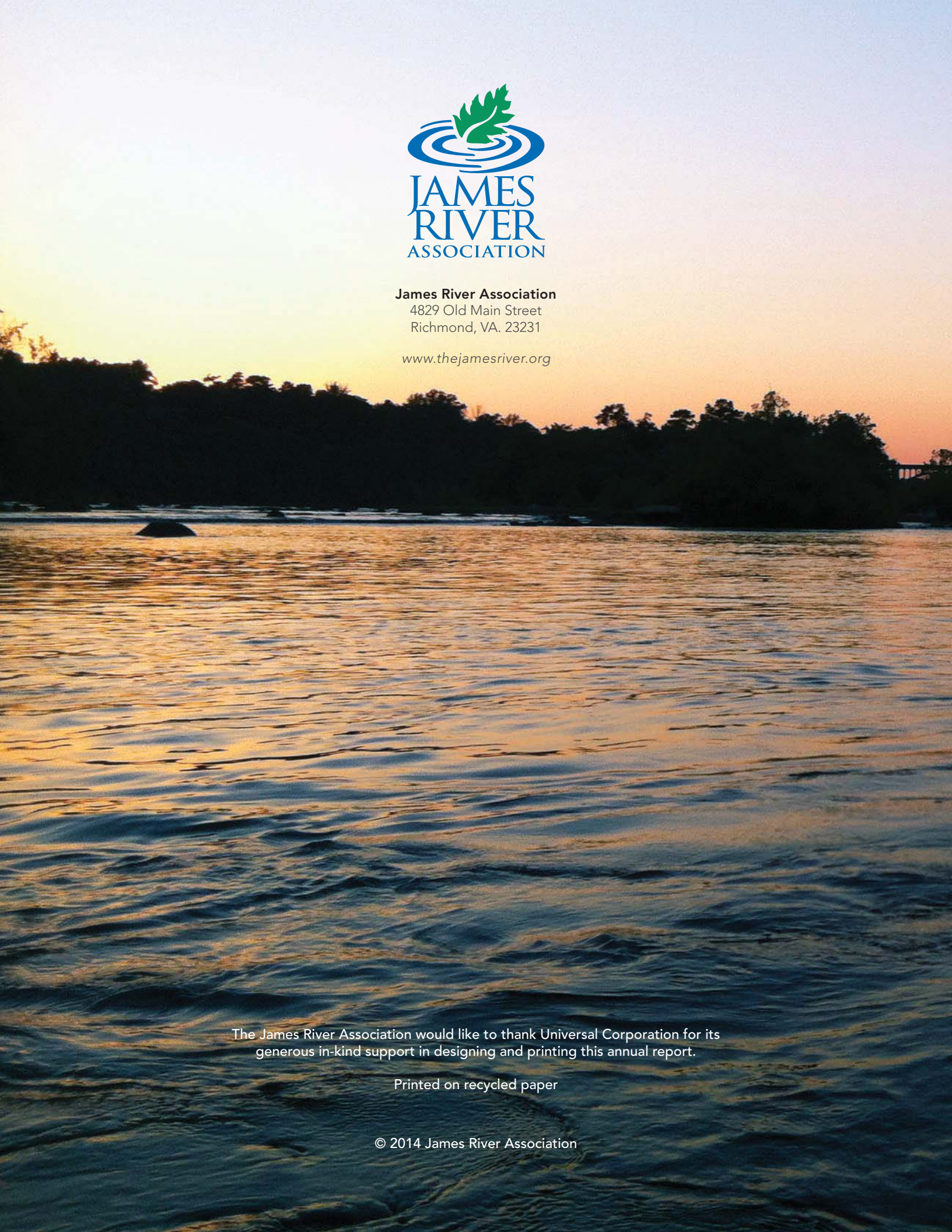

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