



2016 STATE OF THE NANSEMOND RIVER AND ITS TRIBUTARIES REPORT

**An Analysis and Discussion of Suffolk's
Waterways Sampling Data
Period: January 2015 – December 2016**



**NRPA Water Quality Committee
Suffolk, Virginia
Published April 2017**

Nansemond River Preservation Alliance

2016 State of the Nansemond Report Card

	Parameter	2010	2012	2014	2016	Where We Are in 2016	Where We Want to Be
P O L L U T I O N	Bacteria						
	Upper Nans.	F	D-	D-	F	Bacteria tracking shows level increase.	100% of waters meeting recreation standards.
	Lower Nans.	B+	B+	C	C-	Periodic closure of Nansemond River to Godwin Bridge.	Open all waters for shellfish harvesting.
	Total Nitrogen	D	C+	C+	C+	Slight decrease in Total Nitrogen	Levels << algal bloom thresh.
	Phosphorus	D	D+	D+	D+	Target levels far exceeded creating algal bloom conditions	Levels << algal bloom thresh.
	Dissolved Oxygen	B	B	B	B	Average over two years show incremental improvements	Sufficient for abundant aquatic life (>>5.0mg/L).
	Water Clarity	Data-poor	D	D	D	General trend shows slight improvement. Seasonal variability.	Clarity sufficient for SAV growth. Secchi Disk reading >1.0m
H A B I T A T	Wetlands						
	Shoreline Buffer	B-	C+	C+	C+	NRPA/ City Parks & Rec new Riparian Buffer Projects. Living Shoreline projects	Community-wide Buffer sites No further encroachment in RPA buffer.
	Oyster Restoration	Start-up mode	B-	B-	B-	Establishment of two oyster sanctuaries. Need to increase # homeowner participation. Watermen continue their efforts.	Significant restoration of oyster reefs, Nansemond R. and Chuckatuck Creek.
	Open Space & Public Access	D	C+	C+	C+	City opened 300 ft pier/kayak launch at Sleepy Hole Park. City opened kayak launch at Contants Wharf.	Public access points every three miles along waterways. Wildlife Sanctuary (radio transm. site) open to public.
P O C L O L N U T R I O N	Storm Water Improvements	C+	C+	C+	C+	Public Works meeting TMDL Plan. Need to enforce CBPA. Stormwater runoff an issue	Meet EPA requirements through TMDL plan for reduction in pollutants.
	Sewer System Improvements	C+	C	C+	C+	City upgrading some pumping stations. Faulty pipes due to breaks continue.	Meet EPA/DEQ requirements. Replace faulty pump stations - 100% integrity.
	Clean Boating	B	B+	B+	B+	HRSD has a program to pump out boats at citizen's pier.	100% compliance with clean boating standards.
EDU	Education & Awareness	Start-up mode	A	A	A	Increase # NRPA's programs. Increase in # collaborations.	All residents are environmental stewards

2016 State of the Nansemond and Its' Tributaries Report

Published by the Nansemond River Preservation Alliance (NRPA) Water Quality Committee

EXECUTIVE SUMMARY

The 2016 State of the Nansemond River Report and Report Card is released bi-annually by NRPA to inform citizens and elected officials about the status of Suffolk's waterways. The overarching goal of the report is to educate and encourage all members of the Suffolk community to be environmental stewards. By implementing best practices in their daily lives residents and businesses can help restore Suffolk's once thriving oyster harvesting industry and ensure that future generations may have the same – if not better opportunities – than we have today for swimming, fishing and kayaking along our beautiful waterways.

Sampling data for the Report was collected during 2015 and 2016 by the following agencies and organizations: Virginia Department of Health, Division of Shellfish Sanitation (VDH DSS), City of Suffolk Public Works and NRPA. The sampling data reviewed by the Committee was collected at the same sites during different periods of the month. Since the waterways are tidal, this approach helps to understand the state of the waterways. The data shows the chronic coliform bacteria issue impairing Suffolk's waterways is getting worse in some sites. NRPA is able to report some progress in several parameter areas. The trend of average dissolved oxygen and water clarity has improved slowly, however, there are times during the year when dissolved oxygen falls below critical threshold levels and water clarity is poor. Unfortunately, the majority of the health indicators remain relatively unchanged from the 2014 report. Incremental progress is noted in the Wetlands and Public Access categories with the establishment of 100 ft. Riparian Buffer Demonstration Site Projects at two city parks and the opening of two kayak launches at city-owned property. These projects reflect the city's commitment to educate citizens and increase public access to waterways.

While the sampling data continues to show little improvement, the Committee is pleased to report that during 2016 new collaborative activities, NRPA, VDH DSS and the city of Suffolk Public Works were launched. Components of the collaboration include coordinating each organization's sampling efforts and expanding the program to include bacterial tracking. Beginning in 2017 the Hampton Roads Sanitation District will join the collaboration.

State Legislative Activities during the 2015 cycle were the catalyst for the new collaboration. As a result of these Actions the VDH DSS received funding to hire three Marine Scientists to expand the microbiological tracking and marine research operations across the state. The scientists are now working with communities designing and implementing strategic plans to identify coliform bacteria source "hot spots". The team also works with local municipalities to take corrective actions to eliminate these more serious sources of contamination. The identification and eradication of "hot spots" are important components in restoring the waterways to full health. However, much of the pollution impairing our waterways comes from sources such as animal waste, lawn and agricultural chemical use, and real estate development (impervious surfaces) proximal to waterways. The abatement of these chronic and recalcitrant problems cannot be achieved without sound environmental practices embraced and undertaken by all citizens in the context of their daily lives. The city government needs to continue working in collaboration with like-minded organizations to educate citizens and to properly enforce all applicable laws, regulations and land use permits. The full report includes a narrative summary of the data and graphs.

NRPA WATER QUALITY COMMITTEE

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NANSEMOND RIVER PRESERVATION ALLIANCE (NRPA) MISSION STATEMENT

The mission of the Nansemond River Preservation Alliance is to raise public awareness and encourage environmental stewardship of the Nansemond River, Suffolk's creeks and tributaries and their 27,000 acres of tidal wetlands. NRPA creates and implements programs and projects for the community by working in collaboration with non-profit organizations, local, regional, statewide and national government departments, businesses and universities. NRPA is a donation-supported, 501 c 3 non-profit organization.

NRPA ORGANIZATION AND PROGRAM SUMMARY

The Nansemond River Preservation Alliance (NRPA) is an environmental organization created in 2009 by seventeen concerned Suffolk residents committed to protecting and preserving the history and rich ecology of the waterways of the city and the surrounding Nansemond Watershed for current and future generations. According to the Virginia Department of Environmental Quality (DEQ), the River and creeks are impaired and the contaminants are non-point source. The Virginia Department of Health Division of Shellfish Sanitation (VDH DSS) has closed a majority of Suffolk's waterways to shellfish harvesting. NRPA's mission is to work towards reversing the trend of chronic waterway impairments by educating and encouraging all of Suffolk's 91,000 residents to be environmental stewards. NRPA firmly believes the River and creeks belong to everyone, provide great meaning to people's lives and multi-faceted River and creek focused programs can enhance the quality of life for all residents, especially our children, and encourage them to be lifelong environmental stewards. We believe that all families regardless of their socioeconomic level can make a difference in restoring the health of "their" waterways. NRPA's driving force is the citizen volunteers who live or work in the city of Suffolk and surrounding areas. NRPA is led by a President/CEO, a 22 member board, and four operating committees: Water Quality, Shoreline, Environmental Education and Public Access. NRPA has over 250 volunteers and is supported through the donations of 350 donors including: individuals, families, foundations, businesses, VA DEQ Citizen Monitoring Program and Chesapeake Bay Restoration Grant Fund (VA DMV – Save the Bay license plates).

Over the past six years NRPA's programs and projects educated and encouraged over 6,500 citizens to be environmental stewards. NRPA's activities include:

- 1) Conducting the approved VA Department of Environmental Quality Citizen Water Sampling program;
- 2) Collaborating with the Virginia Department of Health Division of Shellfish Sanitation and city of Suffolk on waterway bacterial tracking. Developing and publishing the Bi-Annual Suffolk State of the Nansemond and its Tributaries Report and Report Card;
- 3) Advising and providing materials for citizens to participate in the oyster gardening program;
- 4) Educating the next generation by annually teaching 1,200 City of Suffolk Kindergarten, 4th grade, 7th grade and high school students through the NRPA Nansemond Watershed Initiative: "Connecting the Classroom with the Environment" program (NWI);
- 5) Educating citizens about environmental regulations and laws related to the 100 ft. Riparian Buffer by providing information to the public via the NRPA Resource Center and programs. Collaborating with Suffolk Parks & Recreation on the development of 100 ft. Riparian Buffer and Arboretum Demonstration Sites at city parks; and
- 6) Presenting the Environmental – *River Talk* program designed to educate the community on best practices by bringing experts to the community.



ABOUT THE NANSEMOND RIVER

The Nansemond River was named for the Native American tribe that fished its waters for thousands of years before European settlers arrived. In 1608 Capt. John Smith sailed into the Nansemond River and in 1642, Anglican settlers formed a Parish near the shores of the Nansemond, known today as St. John's Church.

The Nansemond River originates in downtown Suffolk (upper Nansemond). Lakes Cahoon, Kilby and Meade were once streams which were the headwaters of the Nansemond. They have since been separated from the River by dams and are now owned by the City of Portsmouth. Lakes Burnt Mills and Prince were once streams which were the headwaters of the Western Branch but were also impounded by dams and are now owned by the City of Norfolk. Except for lake overflow, the River has no significant source of fresh water except for storm water runoff from rain events.

The Nansemond River runs more than 20 miles from downtown Suffolk to its confluence with the James River and is home to US Fish and Wildlife Preserve. Bennett's Creek, which feeds into the Nansemond downstream of the Rt. 17 Bridge, is a major tributary. The Nansemond Watershed drains 161,358 acres of land in Suffolk and Isle of Wight County. However, a significant portion of the rain water drains into the aforementioned lakes. Salinity at the mouth of the Nansemond averages 15 parts per thousand (brackish) and due to tidal flow decreases to nearly negligible in downtown Suffolk. Much of the River, outside of the navigation channel, is of shoal depth and is bordered with numerous wetlands.

Chuckatuck Creek, which parallels the Nansemond River for a portion of its length, feeds into the James just north of the Nansemond. Upper Chuckatuck Creek is connected to Crane Lake, one of the 12 Lone Star Lakes, which originated as marl mining pits. The remaining lakes are isolated from Chuckatuck Creek and several serve as part of the Suffolk municipal water supply. Shingle Creek flows into the Nansemond River in downtown Suffolk. Knott's and Hoffer and Streeter Creeks are located east of the Nansemond River.

The Nansemond Watershed has a legacy of livestock and agriculture, from tobacco in the 18th century to peanuts, soybeans and cotton today. But the real legacy of the Nansemond stems from its once thriving oyster, crab and shad fisheries that are all but gone today as the result of pollution, impervious surfaces from development and loss of habitat. Major activities on the River today include shellfish harvesting in the lower Nansemond, waterfowl hunting, recreational fishing, swimming and boating along the length of the River.

The Nansemond River Preservation Alliance supports the Environmental Protection Agency in its efforts to restore our waterways to full health. Specifically, NRPA supports the City of Suffolk’s Watershed Implementation Plan to significantly reduce pollution in the Nansemond River. NRPA is an advocate for protection of wetlands and maintenance of forested areas in the watershed and advocates for the proper enforcement of the Chesapeake Bay Preservation Act.

PURPOSE OF REPORT

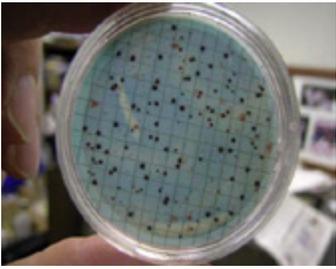
An important tenet of the NRPA philosophy is to educate citizens about the current status of our waterways and encourage them to be environmental stewards. The 2016 State of the Nansemond River and its Tributaries Report and Card is the fourth report released by the NRPA Water Quality Committee on the status of Suffolk’s waterways. The 2016 Report is an analysis and narrative of data collected from several sources including: NRPA, Virginia Department of Health Division of Shellfish Sanitation, Virginia Department of Environmental Quality and Suffolk Public Works Department. Background of the Report: The first report, published in 2011, was a compilation and analysis of 30 years of Virginia Department of Environmental Quality (DEQ) data. The 2012 Report released in 2013 was an analysis of data provided by the DEQ, City of Suffolk Public Work’s and sampling data collected by the NRPA Water Quality Committee in 2012 – the first year NRPA began to collect its own data in cooperation with the State’s Department of Environmental Quality citizen science program. The 2014 Report applied the same methodology as in previous years and expanded the supporting data graph section.

METHODOLOGY

The NRPA Water Quality Committee when preparing the report reviewed and analyzed monthly sampling data from the following sources: NRPA, Virginia Department of Environmental Quality, Virginia Department of Health Division of Shellfish Sanitation and the City of Suffolk Public Works Department. NRPA also reviewed information provided by the Environmental Protection Agency, Chesapeake Bay Foundation, Lynnhaven Now, W&M Virginia Institute for Marine Sciences (VIMS) and the United States Geological Survey (USGS).



REPORT CARD



POLLUTION

GRADE, LOWER NANSEMOND: C-

GRADE, UPPER NANSEMOND: F

A prominent indicator of the high-levels of pollution is that the Virginia Department of Health, Division of Shellfish Sanitation (VDH DSS) has closed a majority of the Nansemond River and all of Bennett's, Bleakhorn and Knott's Creeks and several smaller tributaries to shellfish harvesting due to high levels of coliform bacteria. The VDH DSS on an annual basis reviews thirty months of data the agency collects, applies national guideline metrics to open or close waterways to shellfish harvesting to protect the health of the food supply.

BACTERIA

High levels of coliform bacteria in the River result from storm water runoff, animal and pet droppings, faults in sanitary sewer pump stations and lines and improperly maintained septic systems. The Virginia Department of Health Division Shellfish Sanitation annually analyzes their sampling data according to national standards and guidelines. NRPA's sampling data helps support the VA DEQ and VDH DSS in understanding trends and locating "hot spots". The data reveals that significant portions of the Nansemond River and Chuckatuck Creek and all of Bennett's, Bleakhorn and Knott's Creeks are closed to shellfish harvesting. After major rainfalls significant spikes in bacteria levels were observed. As a result of these spikes VDH DSS closed additional acres of the Nansemond River all the way to the Godwin Bridge (Rt. 17/Bridge Road). The additional closures due to major rainfall events are temporary, however, significant portions of the waterways remain closed during dry periods. Because there are no public beaches, there is no requirement to report high-bacteria counts to the citizens of Suffolk. The ongoing degradation of the waterways is a clear signal that the City of Suffolk must properly enforce the Chesapeake Bay Preservation Act to stem the rise in non-point source pollution.

The EPA, under a consent decree, ordered all jurisdictions bordering the Chesapeake Bay and tributaries to submit Watershed Implementation Plans (WIPs) for significant reductions in pollutants discharged into the Bay. The consent decree is based upon the science of total maximum daily loads (TMDLs), the levels that waterways can absorb and dissipate. However, much work remains to restore the Nansemond River, creeks and tributaries to full health. Citizens can help.

NITROGEN AND PHOSPHORUS

GRADE, NANSEMOND: (NITROGEN) C+

GRADE, NANSEMOND: (PHOSPHORUS) D+

Nitrogen and phosphorus pollution result primarily from use of fertilizers on agricultural and suburban lands. Runoff during rains carries pollution-bearing sediment into the River, either directly or via the storm water system. These nutrients promote the growth of algae that consume the dissolved oxygen necessary to support marine life and reduce water clarity. In 2015-16 nitrogen and phosphorus levels in much of the upper Nansemond exceeded algae bloom thresholds. City monitoring conducted from 2015 through 2016 showed slight decrease in nitrogen levels. However, phosphorus levels still exceeded algae bloom threshold levels for much of the River.

DISSOLVED OXYGEN

GRADE, NANSEMOND: B

Marine animals suffocate without sufficient levels of dissolved oxygen. Dissolved oxygen is produced by underwater plants through photosynthesis. Reducing nutrients will reduce algae and increase dissolved oxygen. In 2015-16, average dissolved oxygen levels in the Nansemond River were sufficient to support marine life, but during the summer months when algae thrive dissolved oxygen levels fell below critical levels. Averaged over two years dissolved oxygen levels are showing a slight improvement.

WATER CLARITY

GRADE, NANSEMOND: D

Underwater grasses (Submerged Aquatic Vegetation) provide water filtration and produce dissolved oxygen. In addition, they provide food for aquatic animals such as Blue Crabs. SAVs depend on relatively clear water for sunlight to enable photosynthesis. In 2015-16, water clarity in the Nansemond River continues to be less than 1 meter (poor). The general trend is slight improvement, seasonal variability must be considered along with the past two year increase in major rain fall events which increase storm water runoff from the land.



OYSTER RESTORATION

GRADE, NANSEMOND: B-

One adult oyster can filter 50 gallons of water/day. Therefore, oysters play a significant part in helping to rid the river of waterborne pollutants – oysters must be given a chance to survive and prosper. The regional goal is to restore the oyster population to 1608 levels when Captain John Smith arrived in the region. This is an ambitious goal since according to recent reports, the oyster population is currently at 3% of the 1608 level. Watermen make their livelihood in Suffolk by harvesting oysters and bringing them to the marketplace. The watermen industry is highly dependent on the health of the River and creeks and have for years deposited oyster shells on their leased acres to help increase the size of the oyster population. . Several NRPA members are gardening oysters with the intent to deposit the mature oysters at the NRPA Oyster Sanctuary that was opened in 2015. More citizens who have shoreline property need to consider oyster gardening with the intent to deposit the mature oysters in established sanctuaries.



HABITAT

GRADE, NANSEMOND: C+

Wetlands, including the shoreline buffer, comprise the interface between the Nansemond River, creeks and its shoreline. This interface acts as a filter to help remove pollutants such as bacteria, nitrogen, phosphorus and sediment that might otherwise enter the waterways from storm water runoff. Wetlands also provide a critical barrier to help prevent erosion and a habitat for waterfowl and other marine life. The Nansemond River and its tributaries are bestowed with more than 27,000 acres of tidal wetlands. (Virginia Institute of Marine Sciences, 2013 Report). The community can help protect the wetlands by complying with environmental regulations and planting native plants, trees and shrubs on their property. Information about environmental regulations, native plants, trees and shrubs are available through the NRPA Resource Center.

In 1988, the Virginia General Assembly enacted the Chesapeake Bay Preservation Act (the “Bay Act”) designed to preserve its wetlands in order to protect the Bay from pollution due to storm water runoff. The key provisions of the Act were the

establishment of a Resource Protection Area (RPA, a defined shoreline boundary) together with a 100 ft. vegetated riparian buffer adjacent to the shoreline. NRPA has taken actions to educate individuals, businesses and elected officials about the Bay Act and has also recommended best-practices used in other communities to protect the waterways for current and future generations.

New community programs/projects: Since 2015 NRPA has been working in collaboration with Suffolk Parks & Recreation Department to create 100 ft. Riparian Buffer Restoration Demonstration Sites at Bennett's Creek and Sleepy Hole Parks. The Demonstration sites are locations where citizens can tour the area, receive information and consider replicating the sites on their property. In 2016 NRPA also opened the NRPA Resource Center making resources readily available to the public. Citizens can contact the NRPA office for access to the printed information or review the links posted at www.nansemondriverpreservationalliance.org, Resource Center link.



OPEN SPACE AND PUBLIC ACCESS

GRADE, SUFFOLK WATERWAYS: C

The Nansemond River and its tributaries are surrounded by nearly 35,000 acres of forested land - that land is slowly giving way to development. The city needs to ensure that development projects along the waterways incorporate best practices that preserve and protect the important 100 ft. Riparian Buffer.

The City of Suffolk maintains several public parks with water access or views, including Bennett's Creek Park, Sleepy Hole Park, Constant's Wharf Park and Lone Star Lakes Park. Bennett's Creek Park has a boat ramp with access to the Nansemond River. In 2016 the City of Suffolk opened two kayak launches, one at Sleepy Hole Park and the other at Constant's Wharf. These new launch sites have increased public access to the waterways for Suffolk citizens and visitors for short excursions. This is a good start; many more sites need to be opened to truly access the waterways. Healthy waterways and increasing the number of public access points are key economic drivers that will have a positive impact on tourism and the quality of life in Suffolk.

POLLUTION CONTROL EFFORTS

GRADE, SUFFOLK'S WATERWAYS: C

Suffolk Public Works Department created and periodically revises the city's Total Maximum Daily Load Program (TMDL) to reduce storm water runoff and plan to address the 'impaired' status of the Nansemond River and creeks. Sewer systems are replacing septic systems in communities located near the waterways. Installing sewer systems are costly and take time. Properly enforcing the Chesapeake Bay Preservation Act, which means maintaining the 100 ft. buffer, is a scientifically proven method to reduce storm water runoff. The City of Suffolk produced its' third comprehensive annual report for Virginia Storm water Management Plan (VSMP) with regards to the City's General Permit for Municipal Separate Storm Sewer Systems. These reports are required under The Clean Water Act and Virginia Law. The reports can be found at:

http://www.suffolkva.us/files/4214/7569/5561/Annual_Report_PY3_Complete_Report.pdf

NRPA commends the city on these reports and the list of actions to be taken to mitigate non-point source pollution from entering the watershed. The six primary goals are: 1) Public Outreach and Education; 2) Public Involvement/Participation; 3) Illicit Discharge and Elimination; and 4) Construction Site Storm water Runoff Control; 5) Post Construction Storm water Management in New Development and Redevelopment; and 6) Pollution Prevention/ Good Housekeeping for Municipal Operations. The goal of these plans is to reduce the amount of pollutants entering the watershed and waters of Suffolk. **As evidenced by the continuing closures of shellfish leased waters in the portions of the Nansemond River and all of**

Bennett's, Bleakhorn and Knott's Creeks, NRPA recommends that the programs must carry out these actions be fully funded and supported at all levels of city leadership to restore Suffolk's' watershed. Bacteria monitoring and taking corrective actions are needed reopen to shellfish growing areas that have been condemned and prevent future condemnations.

CLEAN BOATING

GRADE, SUFFOLK'S WATERWAYS: B+

A majority of boating activity on the Nansemond River and its tributaries are recreational boating. Currently boaters have three options within the city limits to comply with pump out regulations: 1) A highly visible public pump out station located at Constant's Wharf, 2) A less visible pump out station located at Bennett's Creek Landing, 3) The Hampton Roads Sanitation District has a pump out program for boaters where HRSD staff will travel to your dock and pump out your boat.



EDUCATION AND PUBLIC AWARENESS

GRADE, 5 YEAR PERIOD: A

NRPA believes that all families regardless of their socioeconomic level can make a difference in restoring the health of "their" waterways. NRPA's programs and activities are successful because of the dedicated volunteers and collaborations with local, regional and statewide non-profit organizations, Suffolk Parks & Recreation and Suffolk Public Works Department, Suffolk Public Schools, Nansemond Suffolk Academy, College of William & Mary Law School Virginia Coastal Policy Center, Old Dominion University and Virginia Department of Environmental Quality and Virginia Department of Health. NRPA's environmental education programs, projects and activities take a multi-faceted approach to engage all citizens to apply best practices in their daily lives to restore and protect Suffolk's beautiful natural resources for future generations. Examples of NRPA programs and projects:

- NRPA, Virginia Department of Health, Division of Shellfish Sanitation and city of Suffolk Bacterial Tracking Collaborative Program
- NRPA Resource Center (In Office and Website) for citizens and schools
- NRPA Shoreline Property Owners Information Packet
- Nansemond Watershed Initiative: *Connecting the Classroom with the Environment* Program
- Science Fair for Suffolk Boys & Girls Club
- BioBlitz Program at Bennett's Creek Park.
- Oyster reef sanctuaries along the Chuckatuck Creek
- Monthly Water Quality Sampling and Monitoring Program at 18 sites along Suffolk waterways
- River Talk – Environmental Topic examples include: Living Shorelines, regulations and policies.
- 100 ft. Riparian Buffer Restoration Demonstration Site Projects in collaboration with the Suffolk Parks & Recreation.
- Released NRPA Birds of Suffolk's Waterways Brochure – Student and Adult version
- Citizen oyster gardening program
- Clean the Banks of the River and creeks Program in collaboration with like-minded organizations

Supporting Data and Graphs Levels of Pollution in the Nansemond River Period: January 2015 – December 2016

INTRODUCTION

The Report serves as supporting documentation for the *2016 State of the Nansemond River and its Tributaries Report*. Specifically, the statistics in this Report served as the basis for the letter grades (A – F) assigned by the NRPA Water Quality Committee to each parameter in the Report. The statistics in this report are based on sampling measurements performed January 2015 – December 2016 by NRPA, Virginia Department of Health Division of Shellfish Sanitation and the city of Suffolk Public Works.

The graphs on the following pages compare measured pollution levels and measured dissolved oxygen levels with National Shellfish Sanitation Program and Virginia Department of Environmental Quality (DEQ) water quality standards or with widely accepted stress threshold levels. Parameters reported include: 1) fecal coliform and enterococcus bacteria, 2) total nitrogen (ammonia, nitrates and nitrites), 3) total phosphorus, 4) dissolved oxygen, and 5) water clarity.

WATER QUALITY STANDARDS AND LEVELS FOR MINIMALLY IMPAIRED STREAMS

1. Bacteria

The Virginia Department of Health Division of Shellfish Sanitation (VDH DSS) classifies shellfish waters using the requirements and standards of the National Shellfish Sanitation Program (NSSP). Virginia's shellfish program must conform to NSSP in order for its shellfish industry to engage in interstate commerce. For a detailed explanation of the guidelines review National Shellfish Sanitation Program Control of Molluscan Shellfish 2015 Revision: Updated February 2017. Note: Shellfish harvesting

NSSP and VA DEQ impairment threshold levels for fecal coliform bacteria (stated as geometric means) and enterococcus are listed below for the following designated uses:

- Fecal coliform (E. Coli) NSSP standards for Shellfish Growing Areas: Geometric mean ≤ 14 CFU/100mL¹ and the estimated 90th percentile ≤ 31 CFU/100 mL. Classification for shellfish growing areas only uses fecal coliform concentrations, not enterococcus.
- Enterococcus: Recreational Use: VA Water Quality Standard 9 VAC 25-260-170 standard states no single sample shall exceed 104 CFU/100 mL.

Waters with fecal coliform or enterococcus levels above these thresholds (Fecal coliform 14 CFU/100 mL and Enterococci 104 CFU/100 mL) are deemed impaired.

¹ CFU stands for colony forming units.

2. Total Nitrogen (Ammonia, Nitrates, Nitrites), Total Phosphorus

Nutrient related problems such as algae blooms may start when total nitrogen levels exceed 1 mg/L (a common guideline). Minimally impaired streams have typical nitrogen levels of < 0.07 mg/L. Nutrient related problems such as algae blooms may start when total phosphorus levels exceed 0.1 mg/L (a common guideline). Minimally impaired streams have typical phosphorus levels of <0.03 mg/L.

3. Dissolved Oxygen

Dissolved oxygen levels below 5 mg/L stress fish and other marine life. Minimally impaired streams have significantly higher levels of dissolved oxygen.

4. Water Clarity

Another important metric in assessing water quality is water clarity, typically measured visually using a Secchi Disk. Water clarity (Secchi Disk) readings for minimally impaired streams typically exceed 1.0 meters, allowing sunlight for photosynthesis in oxygen producing underwater grasses.

RESULTS

BACTERIA IN THE NANSEMOND RIVER

Shown in **Figure 1** are samples analyzed for fecal coliform (E.Coli) bacteria levels taken by the city at sites along the Nansemond River. The Hampton Roads Sanitation District conducts the analysis of the city samples. Figure 1 clearly shows an increase from the mouth of the Nansemond to downtown Suffolk.

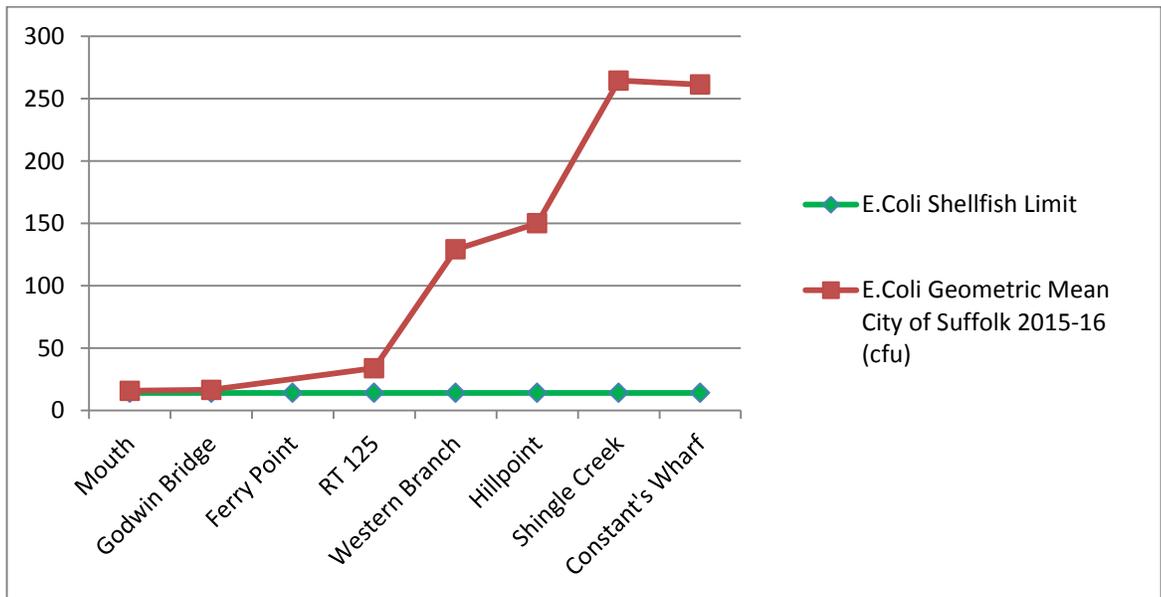


Figure 1

It is important to note that salinity levels in the upper half of the Nansemond (Rt. 58 and towards downtown) are typically too low to support shellfish growing. However, since the Nansemond River is tidal, bacteria found throughout the waterway are not static and flows with the tides.

Shown in **Figure 2** are samples analyzed for enterococcus bacteria levels taken by the city at sites along the Nansemond River. The Hampton Roads Sanitation District conducts the analysis of the city samples. Figure 2 clearly shows an increase from the mouth of the Nansemond to downtown Suffolk. Local health departments need to report high bacteria levels if the community has public beaches. Since Suffolk does not have any public beaches high bacteria levels for recreational uses are not monitored.

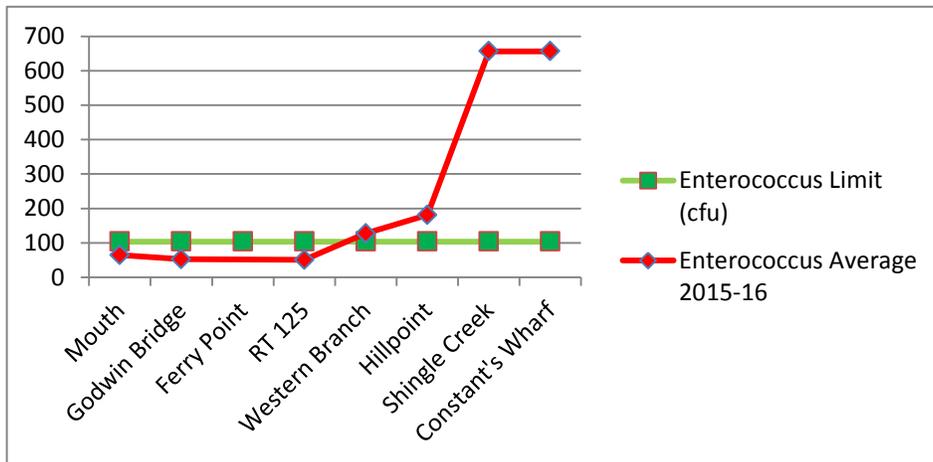


Figure 2

BACTERIA IN BENNETT'S CREEK

Shown in **Figure 3** are samples analyzed for fecal coliform bacteria levels taken by NRPA at sites along Bennett's Creek. Figure 3 clearly shows an increase especially during warm weather months. Note: NRPA uses the Coliscan Easygel method to culture samples.

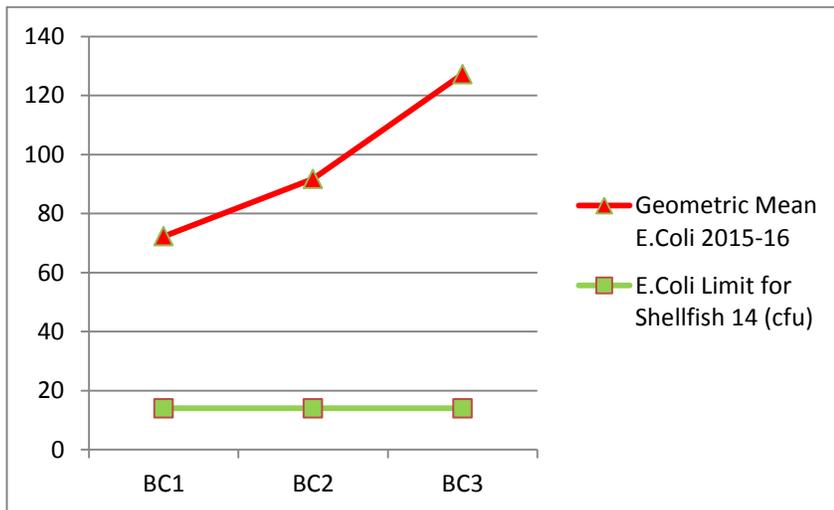


Figure 3

TOTAL NITROGEN (AMMONIA, NITRATES, NITRITES) AND PHOSPHORUS

Shown in **Figure 4** are Total Nitrogen levels from city sampling at sites along the Nansemond. The general trend is a slight net decrease in Total Nitrogen at levels below those that would contribute to an algal bloom (1mg/mL).

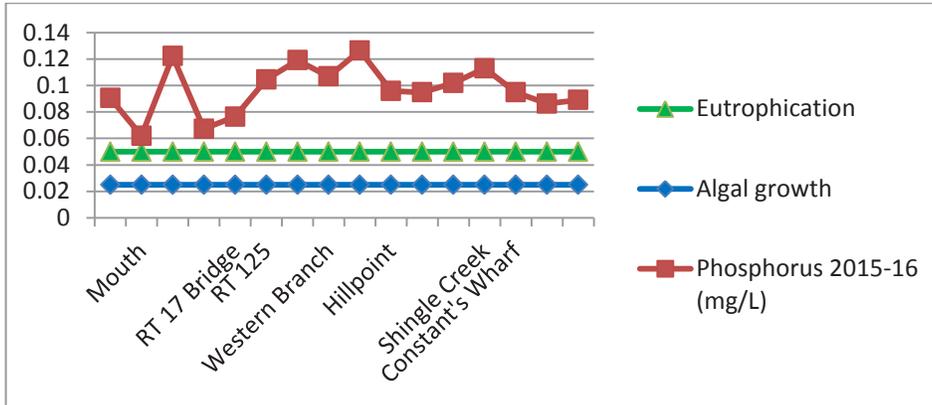


Figure 4

DISSOLVED OXYGEN

Shown in **Figure 5** are dissolved oxygen levels from city sampling along the Nansemond River. Levels have generally improved and are above levels considered for a healthy ecosystem.

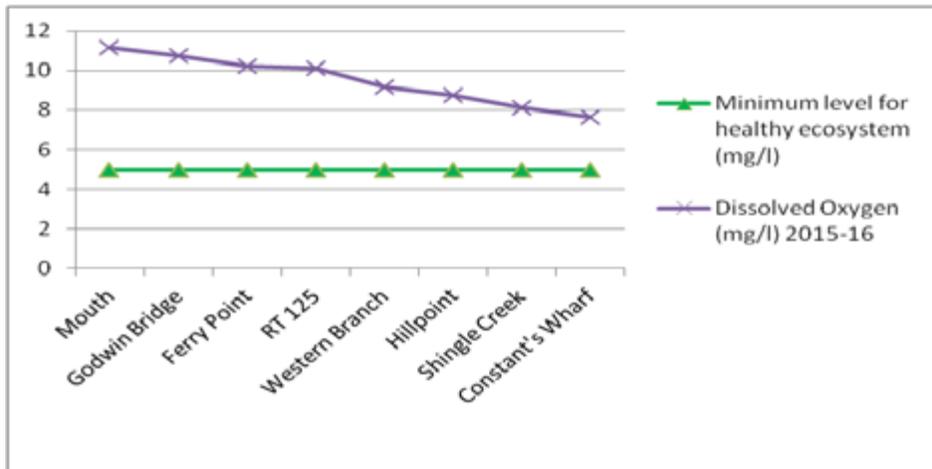


Figure 5

WATER CLARITY

Shown in **Figure 6** are water clarity readings from. These levels remain relatively the same and are below levels considered for healthy sea-grass growth (> 1 meter). The high concentration of the dissolved nutrient phosphorus is highly suspect as the largest contributing factor to low water clarity.

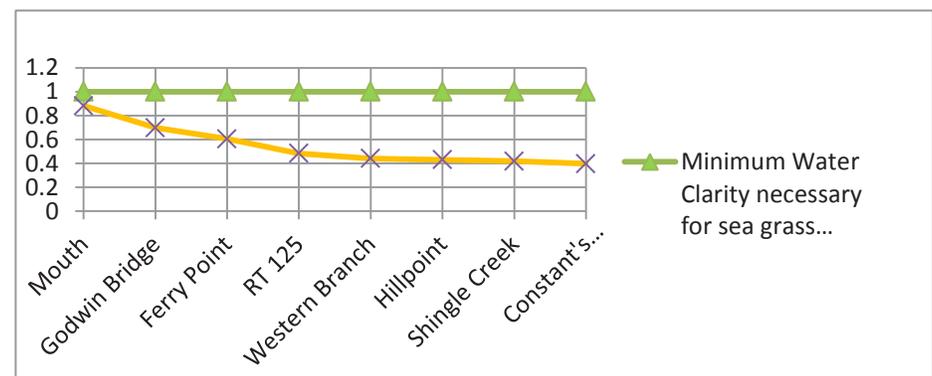


Figure 6

Examples - Ways You Can Help Restore and Protect the Waterways

- ✓ Join your neighbors by participating in the Water Wise Homes Program launched in 2017.
- ✓ Visit the 100 ft. Buffer Demonstration Site and Mini-Arboretum at Sleepy Hole Park. Learn about native plants, shrubs and trees and best planting practices.
- ✓ Participate in the monthly Water Sampling and Monitoring sessions.
- ✓ Participate in Clean the River Days.
- ✓ Attend River Talk Programs with your neighbors.

**Contact the NRPA Office at 757-745-7447 or access the website
for project and program dates.
www.nansemondriverpreservationalliance.org.**



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