



## COMMONWEALTH of VIRGINIA

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### **ELIZABETH RIVER: LAFAYETTE RIVER Cities of Norfolk and Portsmouth Shoreline Sanitary Survey Growing Area # 065**

**Date:** 28 April 2023

**Survey Period:** November 2022 – March 2023

#### **SECTION A: GENERAL**

This document comprises a shoreline survey report for the portions of the Lafayette and Elizabeth Rivers that allow for a Restricted harvest of shellfish and a review of the current and historical management decisions that have led to the waters upstream of this area to be classified as Prohibited for the harvest of molluscan shellfish under the National Shellfish Sanitation Program (NSSP).

The survey area extends in a triangle from Reference Point 66A at the end of Pier 6 in Lamberts Point Railroad Terminal to Reference Point 67 at Tanner Point at the southeast end of the Norfolk International Terminals to reference point 66A across the Elizabeth River on the Northeast end of Craney Island Fuel Depot.

The fieldwork component of the 2023 survey consisted of a visual inspection of the shoreline and seawater sampling for microbial indicators of sewage contamination in the water column. In conjunction with a routine seawater collection in January 2023, the shoreline along the Restricted waters of the Elizabeth River Channel were examined with binoculars. Seawater was collected near the wastewater treatment plant outfall and near the Prohibited-Restricted closure line. Fecal Indicator Bacteria numbers were at or below the level of detection. However, the human-associated *Bacteroides* molecular marker HF183 was present at low levels in the vicinity of the Virginia Initiative Wastewater Treatment Plant outfall and near a stormwater outfall in the Lafayette. These tests were repeated on the next routine seawater collection (February 2023) with similar results. The NSSP requires a dilution buffer of the waters in the vicinity of a point source of pollution such as a WWTP outfall. The results of these samples support the Restricted buffer extending to the survey boundaries.

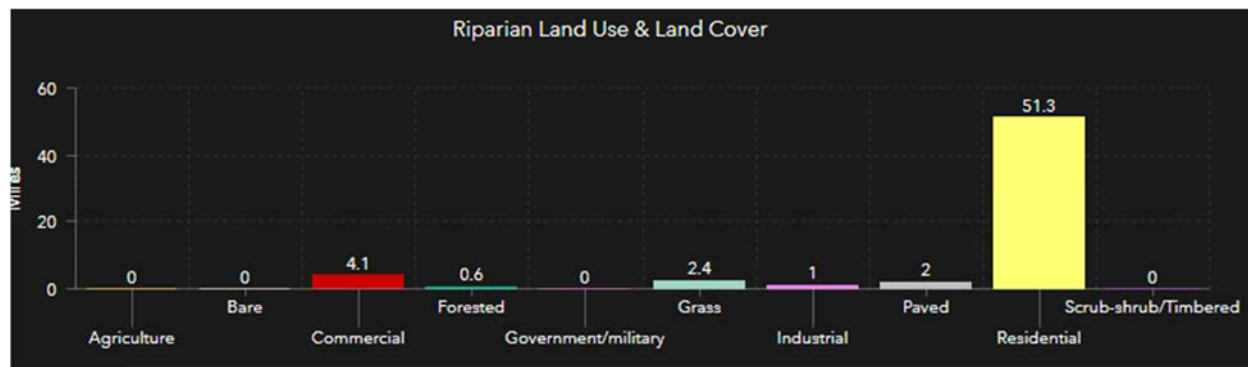
#### **Characterization of the Watershed:**

The area includes residential, commercial and industrial portions of the Cities of Norfolk and Portsmouth. The area is urban with a large population density. Norfolk is one of the largest cities in Virginia with a population of over 238,000 ( $>4400/\text{mi}^2$ ) and Portsmouth has an additional 98,000 people ( $>2900/\text{mi}^2$ ) as of the 2020 census. Topography of the area is characterized by low and flat elevations ranging from 0-20'. The entire shoreline and large

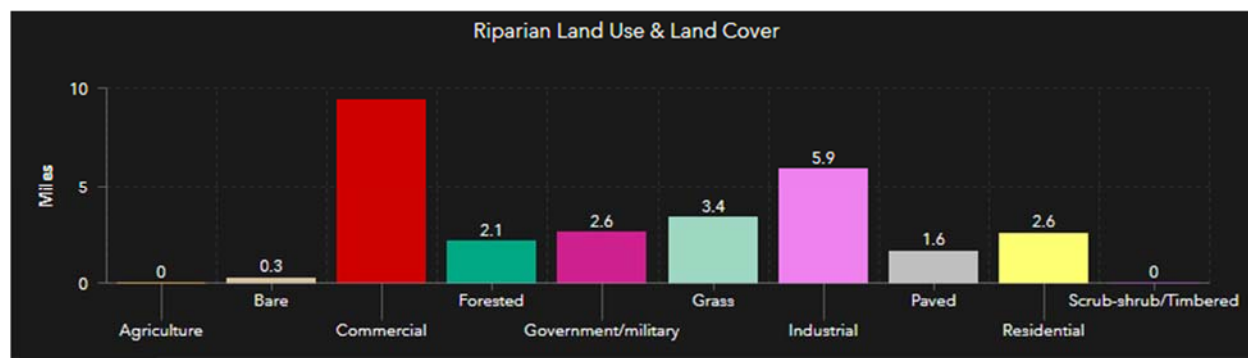
sections of the inland area are low lying and within the Zone AE (1% annual chance of flood hazard) or Zone X (0.2 % annual chance). These flood prone areas include residential neighborhoods, commercial districts and industrial manufacturing and military facilities. (<https://gisshare.norfolk.gov/mapgallery/pdf/Flood%20Insurance%20Rate%20Map.pdf>)

### Virginia Coastal Resources Tool:

The Lafayette River and its coves and inlets has approximately 65 miles of shoreline, 41% of which has hardened with bulkhead, riprap or other structures ([VIMS Coastal Resources Tool](#)). The riparian land use is predominantly (84%) residential. 3% of the riparian land is paved, while 5% is either grass or forested.



The mainstem of the Elizabeth River and its inlets (exclusive of the Western, Eastern and Southern Branches) has approximately 28 shoreline miles, 62% of which are hardened by wharf, bulkhead, riprap or other structures. The riparian land use is predominantly (64%) commercial/industrial/military. 6% of the riparian land is paved, while 20% is either grass or forested.

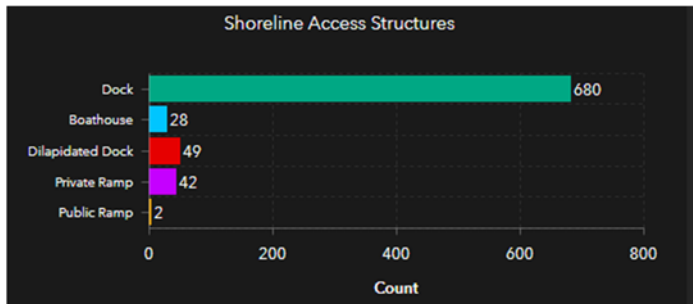


### Boating activity:

The Elizabeth River is dominated by recreational, commercial, and military boat activity throughout the year. It contains the third largest port on the US East Coast for container freight (Norfolk International Terminals, Portsmouth Marine Terminal, and Virginia International Gateway), the largest coal export port in North America (Lamberts Point Coal Terminal), and the largest naval station in the world (Naval Station Norfolk) (HRTPO 2017).

Boating activity within the Lafayette River is predominately recreational with a light amount of commercial activity from marine construction and maintenance vessels and commercial and recreational crabbing. Private piers are common along waterfront residential property.

A total of 801 shoreline access structures were identified as part of the CCRM inventory, predominantly single-family docks. A number of boats are moored in the Edgewater Haven vicinity located near the mouth of the river.

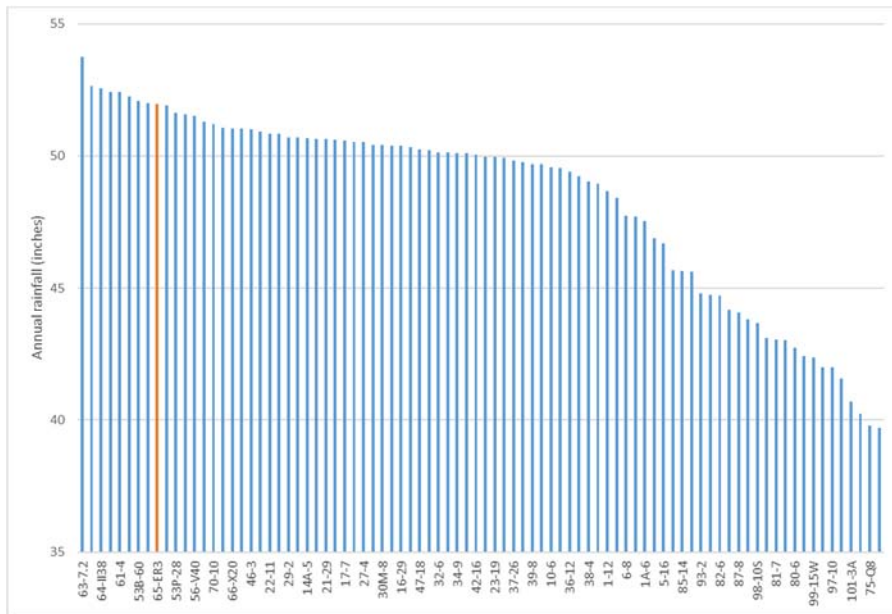


This area is served by the Hampton Roads Sanitation District public sewer system including the Public Utilities infrastructures of both Norfolk and Portsmouth.

### Meteorological Data:

The Elizabeth and Lafayette Rivers receive an average rainfall of between 2.7-5.9" per month following a seasonal pattern that is shared with the majority of other growing areas in coastal Virginia, with highest precipitation between June – September. The area receives an average annual rainfall of 51.98" and is in the top 10% of all Virginia growing areas.





### **Condemnation History, Wastewater/ microbiological:**

Hampton Roads is the name for the body of water in Southeast Virginia that is the mouth of the James River where it flows into Chesapeake Bay (NOAA Chart 12245). Additionally, it is the colloquial name for the confluence of smaller tributaries including the Nansemond, Elizabeth, Lafayette and Hampton Rivers. Prior to the development of wastewater treatment plants, up to 25 million gallons of raw sewage per day was released directly into the waterways. Due to continued ongoing concern regarding sewage pollution, in the protection of public health, Virginia has maintained a shellfish harvest closure of Hampton Roads since 1925. This closure is identified by DSSWH as Condemnation Area # 056-007. This closure has remained in place but changed in size over the decades based on water quality and management decisions. To allow for clear enforcement, the Condemnation boundaries have been largely identified by the Hampton Roads Bridge Tunnel since its construction in 1957 and the Monitor-Merrimac Bridge Tunnel since 1992.

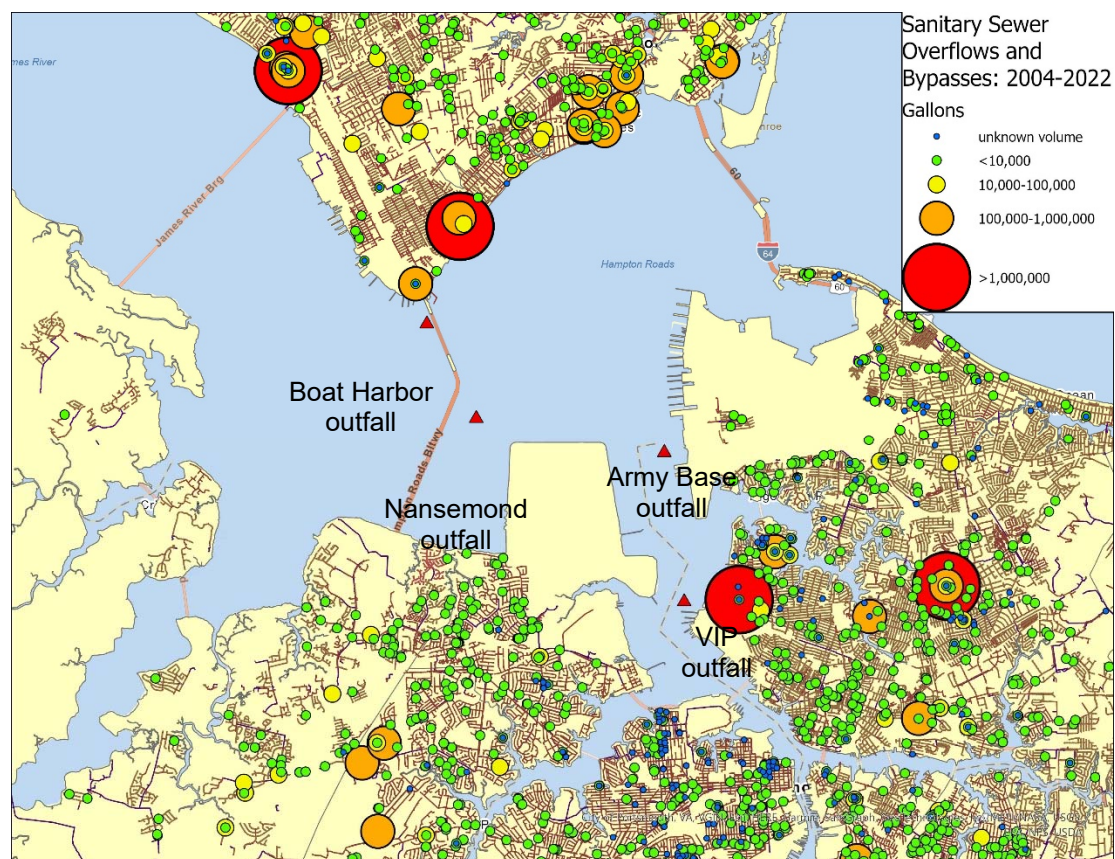
HRSD established the Army Base Wastewater Treatment Plant in Norfolk in 1947. Since then, HRSD has grown to build and manage 13 wastewater treatment plants. During this time, the population served by HRSD plants has grown from ~288,000 to over 1.9 million (HRSD 2022). Specific to this immediate area, there are two 2 plants that discharge directly into the Elizabeth River with a combined treatment capacity of 58 million gallons per day (Army Base, 18 MGD and Virginia Initiative Plant, 40 MGD).

However, sewage spills continue to occur in Hampton Roads and elsewhere due to multiple factors including aging infrastructure, construction accidents, fats/oils/grease blockages, inflow and infiltration during high precipitation events and other causes. These spills include wet weather events where stormwater runoff enters the sanitary sewer and exceeds the capacity of the infrastructure causing overflows through bypasses or broken pipes. Climate change is thought to lead to increases in coastal flooding and more severe precipitation events that could further contribute to these sewage overflows.

To address continued wet weather related sewer overflows in Hampton Roads that violate the US Clean Water Act, HRSD and the localities that manage the sewer infrastructure, entered into a Consent Decree with the US EPA in 2010 to implement a wet weather management plan to reduce overflows. This includes projects to increase sanitary sewer capacity through replacing pipes, pumpstations and upgrades to treatment plants and the installation of wastewater storage facilities (EPA 2013, DOJ 2021).

The map below represents the location of ~1900 SSOs within this spatial extent since the reporting system was established in 2004 through June 2022. Many of these occurrences are small and flow into impoundments. However, some flow into Hampton Roads directly or through tributaries. 189 of these SSO events reported a sewage release of over 10,000 gallons, 56 events released each over 100,000 gallons and eight events reported a release of greater than 1 million gallons.

This total includes three events since 2016 where each released more than 1 million gallons released into the Elizabeth / Lafayette Rivers. These events occurred once at the Virginia Initiative Plant during Hurricane Matthew in 2016, and twice in the upper Lafayette at the Chesapeake Boulevard pump station in 2020 and 2021 associated with high flows from wet weather.



Ongoing partnerships between HRSD, Hampton Roads cities and counties, locality Public Works and Public Utilities departments and DSSWH aim to identify sources of sewage



pollution and reduce its impacts on shellfish growing areas. Interagency collaborations over the last several years have successfully used molecular source tracking to locate sources of pollution and subsequent repairs of sewer infrastructure in Hampton Roads tributaries (Gonzalez et al. 2020).

### **Condemnation History, *Chemical contaminants:***

The taking of bivalve molluscan shellfish, from the Lafayette and Elizabeth Rivers has been *Restricted* since the 1920's due to microbiological contamination. In 1982, the classification on both rivers changed to *Prohibited* because lead concentrations in the bivalve molluscan shellfish exceeded allowable Food and Drug Safety Administration (FDA) standards.

In 1983, high concentrations of polycyclic aromatic hydrocarbons (PAH) were found in the Elizabeth River. This was due primarily to past industrial use of creosote along the Elizabeth River. By the early 1990's, lead concentrations in shellfish had been greatly reduced and PAH concentrations in much of the Elizabeth River, except the Southern Branch, were reduced due to dredging activities. In 1994, after PAH concentrations in the main stem of the Elizabeth River had improved, clams were collected from the Lafayette and Elizabeth Rivers and analyzed for toxins in an effort to reevaluate the classification status of the Lafayette and part of the Elizabeth Rivers from *Prohibited* to *Restricted*. Clams were analyzed for heavy metals, tributyltin (TBT), chlorinated hydrocarbon, pesticides, and PAHs. In 1996, the Division of Toxic Substances Information reviewed the data and found that "...there are no human health hazards associated with the levels of PAH and TBT reported in the mollusks analyzed..." The concentrations of heavy metals were all within FDA guidance at the time except one clam sample from taken 1.8 miles from the mouth of the Eastern Branch of the Elizabeth River (personal communication from Division Director R. Croonenberghs, 11/03/10). Out of an abundance of caution the two rivers' classification have remained *Prohibited*.

Community efforts to restore the river to a healthy state/clean waterway have been successful in decreasing the concentrations of contaminants in the water and shellfish. To assess the risk of consuming oysters raised in the Lafayette River, the Division of Shellfish Sanitation (DSS) worked with VDH's Division of Environmental Epidemiology (DEE) to conduct special studies and develop a risk-based oyster consumption guideline for PAHs and polychlorinated biphenyls (PCBs) in 2010-2013.

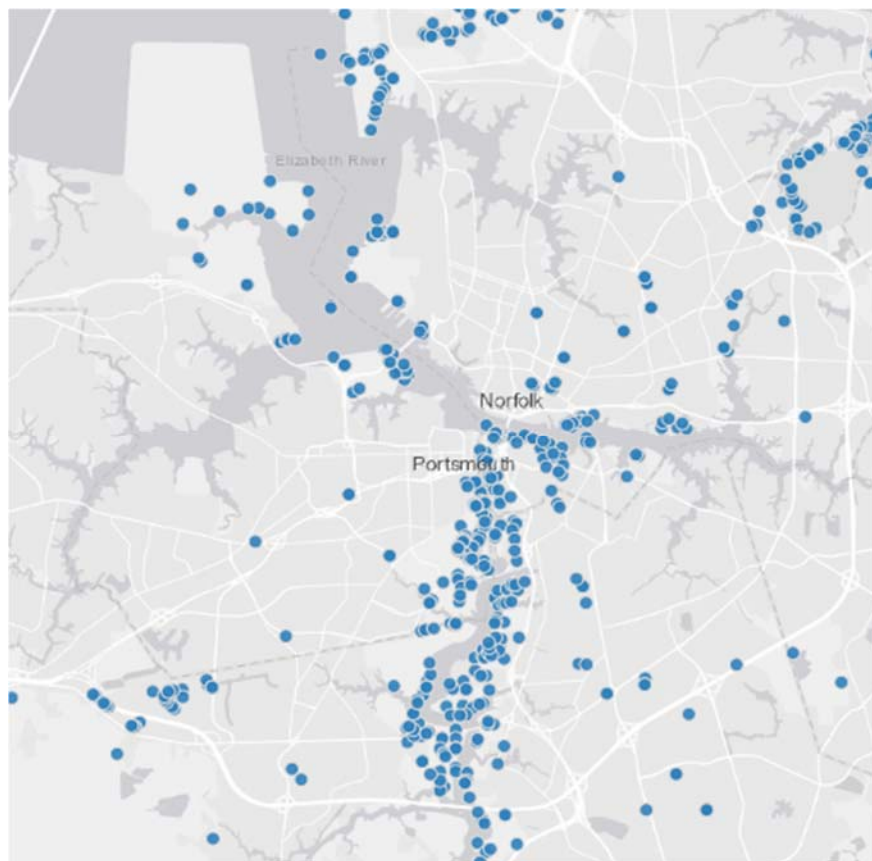
The results of the Lafayette River PAH study indicated that concentrations in oysters varied between the fall and summer sampling periods, with the summer warranting a consumption advisory. Based on the elevated concentrations of PAHs in the summer oysters collected (32.4 ppb); an advisory of consuming no more than two oyster meals a month with each meal consisting of 12 oysters was recommended as safe for most individuals. The risk-based trigger level for issuing an oyster consumption is 25 parts per billion (ppb).

The results of the PCB study also indicated different concentrations in oysters between fall and summer months, with results coming close to, but not exceeding the threshold of a

consumption advisory. DEE recommends limiting the number of oyster meals to two per month when the PCB concentration in oysters is greater than or equal to 85 ppb but less than 200 ppb. The maximum concentrations of PCBs found during the study were 58.5 ppb in fall, and 84.6 ppb in the summer.

Additional hazardous waste sites are also present in the area because of a long history of maritime and manufacturing industries. These include some of the most contaminated areas in the country, which are designated by the [US EPA as Superfund sites](#). There are 12 Superfund sites shown in proximity to the Elizabeth River, mostly located in the Southern Branch. A review of these Superfund Sites can be found on EPA's *Cleanups in My Community* website: <https://www.epa.gov/cleanups/cleanups-my-community>.

Copies of VPDES permits and inspections are available at the Department of Environmental Quality. A directory and interactive map are available via the internet at <https://www.deq.virginia.gov/permits-regulations/permits/water/surface-water-virginia-pollutant-discharge-elimination-system> and <https://geohub-vadeq.hub.arcgis.com/pages/Water%20Datasets>



DEQ VPDES Map as of 11/7/22.