

South Carolina Department of Health and Environmental Control

ENVIRONMENTAL AFFAIRS

SHELLFISH MANAGEMENT AREA 09B

2019 ANNUAL UPDATE

**Shellfish Sanitation Section
Environmental Affairs
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Columbia, SC 29201**

November 2019



WEB ADDRESS
<http://www.scdhec.gov/FoodSafety/ShellfishMonitoring/>

SHELLFISH MANAGEMENT AREA 09B 2019 ANNUAL UPDATE

[Data Through December 2018]



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2019 ANNUAL UPDATE
Shellfish Management Area 09B

Data Inclusive Dates:

01 / 01 / 16 thru 12 / 31 / 18

Classification Change:

X Yes No

Shoreline Survey Completed: Yes

(I)ncreased/(D)ecreased/(N)one:

 D Approved

 N Conditionally Approved

 I Restricted

 N Prohibited

Prior Report & Date: 2018 Annual Update

SUMMARY

Based on reviews of fecal coliform bacteriological data and a pollution source survey, Area 09B is impacted by a single primary pollution source. Nonpoint source runoff appears to be the primary source of fecal coliform bacteria concentrations throughout the area. Development within the management area continues at a rapid pace. Impervious surfaces typically result in increased volumes of stormwater runoff and a more rapid movement of stormwater into adjacent shellfish harvesting waters. Additionally, a substantial portion of the Francis Marion National Forest drains to Area 09B.

Area 09B also was impacted in October of 2016 from heavy rains and wind associated with Hurricane Matthew. Area 09B received excessive amounts of rain during the storm event. This excessive rainfall required a closure and subsequent sampling to reopen the area.

Water quality within Shellfish Growing Area 09B requires one classification change for this Annual Update. Wando River at Guerin Creek (Station 09B-11) to Guerin Creek at Old House Creek (Station 09B-12) will be downgraded to Restricted.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47, which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The United States Food and Drug Administration (USFDA) uses The National Shellfish Sanitation Program's (NSSP) *Guide for the Control of Molluscan Shellfish* to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in

place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria, consistent with the NSSP Model Ordinance, are used by SC Regulation 61-47, Shellfish (2017, pp.9-12) in establishing shellfish harvesting classifications:

Approved Area - Growing areas shall be classified approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations that would render shellfish unsafe for human consumption. Approved classifications shall be determined upon a sanitary survey that includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, nor shall more than ten percent of the samples exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform MPN shall not exceed fourteen per one hundred milliliters, nor shall the estimated ninetieth percentile exceed an MPN of forty three per one hundred milliliters (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be determined using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Conditionally Approved Area - Growing areas may be classified conditionally approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in non-point source pollution from rainfall runoff or discharge of a major river, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as conditionally approved. Where appropriate, the management plan for each conditionally approved area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems), evaluation of each source of pollution, and means of rapidly closing and subsequently reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish shall not be directly marketed from a conditionally approved area until conditions for an approved classification have been met for a period of time likely to ensure the shellfish are safe for consumption. Shellstock from conditionally approved areas that have been subjected to temporary conditions of actual or potential pollution may be relayed to approved areas for purification or deperated through controlled purification operations only by special permit issued by the Department.

Restricted Area - Growing areas shall be classified restricted when sanitary survey data show a moderate degree of pollution or the presence of deleterious or poisonous substances

to a degree that may cause the water quality to fluctuate unpredictably or at such a frequency that a conditionally approved classification is not feasible. Shellfish may be harvested from areas classified as restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. The suitability of restricted areas for harvesting of shellstock for relay or depuration purposes may be determined through the use of comparison studies of background tissue samples with post-process tissue samples, as well as other process verification techniques deemed appropriate by the Department. For restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters nor shall more than ten percent of the samples exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters nor shall the estimated ninetieth percentile exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Conditionally Restricted Area - Growing areas may be classified conditionally restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as conditionally restricted. Where appropriate, the management plan for each conditionally restricted area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems and an evaluation of each source of pollution, and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as conditionally restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For conditionally restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of conditionally restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters nor shall more than ten percent of the samples exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters nor shall the estimated ninetieth percentile exceed an MPN of two hundred and sixty per one hundred milliliters (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

Prohibited Area - Growing areas shall be classified prohibited if there is no current sanitary survey report or if the sanitary survey report or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or otherwise indicate that such substances could potentially reach quantities that could

render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvest classification of shellfish growing waters designated as Shellfish Management Area 09B (Area 09B). Area 09B consists of approximately 17,105 acres of shellfish growing area habitat located in Berkeley and Charleston Counties, South Carolina. Area 09B extends from the headwaters of the Wando River, located within the Francis Marion National Forest at Ion Swamp, 19 miles southwest to the Wando River's confluence with the Cooper River. Area 09B consists entirely of the Wando River and all of its tributaries, including Alston, Boone Hall, Darrell, Deep, Foster, Guerin, Hobcaw, Horlbeck, Nowell, Toomer and Wagner Creeks.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina, primarily on a small scale by the general public for recreational harvest. Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, Culture permits, Mariculture permits and Kings Grant areas. The South Carolina Department of Health and Environmental Control will disallow the harvesting of shellfish within Area 09B, for direct marketing purposes, from the restricted waters listed below in the recommendations.

There are three State Shellfish Grounds (S) located within Area 09B: S237, S238 and S248. There are no other shellfish harvesting areas in Area 09B.

The wild-stock shellfish harvesting season in South Carolina extends from October through May **of** the following year. The SCDNR has the authority to alter the shellfish-harvesting season for resource management purposes and grant permits for year-round mariculture operations.

Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

The harvesting classifications of Area 09B **prior** to this sanitary survey were as follows:

PROHIBITED

1. Seaward portions of the Wando River (and adjacent tributaries and marshland), from Remley's Point to Station 09B-15, including all of Hobcaw and Molasses Creek;
2. Southwestern portions of Beresford Creek and adjacent marsh near Thomas Island, extending to the Area 10B boundary;
3. The Wando River, within approximately 1,000 feet Detyen's Shipyard;
4. The Wando River, within approximately 1,000 feet of Detyen's Shipyard NPDES discharge outfall.
5. The Wando River within approximately 200 feet of the Charleston City Boatyard.

RESTRICTED

1. Horlbeck Creek, Boone Hall Creek and their tributaries from their headwaters to Station 09B-21.
2. The Wando River from Station 09B-11 to its headwaters. This includes the tributaries of Alston, Darrell, Wagner, Deep, and Toomer creeks.
3. Guerin Creek and adjacent marshlands from its headwaters to Station 09B-12.

CONDITIONALLY APPROVED

None

APPROVED

All other waters of Area 09B.

Station Additions/Deactivations/Modifications: None

POLLUTION SOURCE SURVEY

CHANGES IN POLLUTION SOURCES

No substantial changes in pollution sources have occurred in Area 09B since the 2018 Annual Report.

SURVEY PROCEDURES

Shoreline surveys of Area 09B are conducted by the Lowcountry- Charleston Shellfish Program staff, by watercraft, vehicle, and on foot, during the survey period and are ongoing. Previous shoreline survey efforts conducted by the Office of Coastal Resource Management (OCRM) as well as the thermal imaging project will continue to be documented.

OCRM developed GIS shapefiles documenting rural, non-MS4 (Municipal separate storm sewer system) areas in Charleston County on septic tanks. A one-mile buffer was drawn around all impaired shellfish water bodies in the county. County parcel data was cross referenced with Department septic tank permit data in those areas to develop shapefiles of all parcels on septic tanks, to include the number of tanks on the property and the property owner's names(s) and address(s). A physical shoreline survey of these same areas was conducted, taking GPS coordinates of any observed animal farms, to include the parcel information of the farm, the type and number of animals observed, and their distance from shellfish harvesting waters. Together, the septic data and animal farm data should provide focus for future shoreline survey efforts in locating and evaluating potential non-point source impacts near impaired shellfish harvesting waters.

POINT SOURCE POLLUTION

A. Municipal and Community Waste Treatment Facilities

Detyens Shipyards (SC0033022) operates a wastewater treatment plant (WWTP) located on their Wando Yard property adjacent to the Wando River and Highway 41. The plant receives wastewater generated onsite as well as wastewater from a convenience store located across Highway 41. The treated effluent discharges into the Wando River adjacent to the shipyard. Detyens Shipyard had no Discharge Monitoring Report (DMR) violations for fecal coliform for the reporting years 2016-2018. Detyens Shipyard last discharged from their wastewater pond in August of 1996 and since has been in recirculation mode. Detyens Shipyard is currently in the process of closing their Wando Yard location and it is uncertain what the future use of the site will be. Mount Pleasant Waterworks (SC0043273) operates a reverse osmosis (RO) water treatment plant located in Area 09A. The facility discharges into the Lower Wando in Area 09B, however, the effluent has no fecal coliform component. Refer to the Potential Pollution Sources map included in this report.

National Pollutant Discharge Elimination System (NPDES) Permitted Facilities		
Permit #	Facility	Outfalls
SC0033022	Detyens Shipyards / Wando Yard WWTP	001-Tidal Marsh to Wando River
SC0043273	Mt. Pleasant Water Works Reverse Osmosis	001-Unnamed tributary to Cooper River in Area 10B

Portions of Area 09B are serviced by two wastewater collection systems. Charleston Water Systems operates a collection system on Daniel Island and Clements Ferry Road. Its wastewater is sent to the Plum Island WWTP (SC0021229); however, Plum Island is located on the Ashley River adjacent to Dill Creek, and discharges treated wastewater into the Charleston Harbor (Area 10B). Daniel Island also has its own WWTP (SC0047074) however at present it is only being used to remove debris from the wastewater, the wastewater itself is sent to the Plum Island WWTP for treatment. The outfall for the Daniel Island WWTP, if ever used, is to the waters of the Cooper River (Area 10B). The town of Mt. Pleasant also operates a collection system which services Mt. Pleasant in the southeastern portion of Area 09B. The Town of Mount Pleasant had fifteen reported SSO's for 2016-2018. Charleston Water Systems had two reported SSO's on Daniel Island/Clements Ferry Road Area.

Sanitary Sewer Overflows 2016-2018				
Mt. Pleasant				
Date	Location	Gallons	Water body Entered	Growing Area
2/21/2016	3157 Hwy 17 N	200	Retention pond	N/A

3/5/2016	Hubbell Dr.	Unknown	Retention Pond	N/A
6/6/2016	Whipple Rd.	4000	Retention Pond	N/A
6/10/2016	Bessemer Rd.	200	Retention pond	N/A
6/11/2016	526 Stratton Ferry Ct.	2000	Retention pond	N/A
10/8/2016	660 Pawley Rd	Unknown	Shem Creek	10B
10/8/2016	Cottingham Drive	Unknown	Shem Creek	10B
10/8/2016	Center St	Unknown	S of Ben Sawyer Bridge	9A (prohibited)
10/8/2016	481 Long Point Road	Unknown	Hobcaw/Wando	10B
7/13/2017	Long Pt. Road & Spann St.	3000	Retention Pond	9B
8/28/2017	PS#47 Whipple Rd	5,000	Retention Pond to Hobcaw Creek	9B
10/13/2017	Wando Park Blvd	2,000	Retention Pond	9B
3/31/2018	Rice Hope Dr	4,081	Boone Hall Creek	10B
4/3/2018	Corner Of Darrell Creek Trail And Commonwealth Rd	800	Alston Creek	9B
9/28/2018	1054 Anna Knapp Blvd	360	Shem Creek	10B
Daniel Island/Clements Ferry Road – 2016-2018				
Date	Location	Gallons	Water body Entered	Comments
1/26/2016	255 Nellefield Creek Dr.	500	Wando River	9B (Prohibited)
10/8/2016	Rivers Reach Drive	Unknown	Creek to Wando River	9B (Closure)

B. Industrial Waste (Discharges)

There is one permitted industrial discharge located within the boundaries of Area 09B. The French Quarter Group (SCG730086) operates a borrow pit located along the northern portion of the area, adjacent to Highway 41. The permit was issued for de-watering activities that may be necessary during normal operations. However, their discharge is to French Quarter Creek and the Cooper River (Area 10B).

National Pollutant Discharge Elimination System (NPDES) Permitted Facilities		
Permit #	Facility Name	Facility Type – Outfall Type
SCG730086	French Quarter Group L.P Mine	Borrow Pit –Discharge to French Quarter Creek

C. Marinas

In 2007, prompted by a SCDHEC Office of Coastal Resource Management (OCRM) marina definition change, SCDHEC Shellfish adopted the following marina definition. S.C. Regulation 61-47, Shellfish defines *Marina* as any of the following: 1) locked harbor facility; 2) any facility which provides fueling, pump-out, maintenance or repair services (regardless of length); or, 3) any facility which has permanent docking space of 250 linear feet or greater. 4) Any water area with a structure which is used for docking or otherwise mooring vessels and constructed to provide temporary or permanent docking space for more than ten boats. 5) A dry stack facility.

Prior to the 2007 definition change, a wide variety of boating facilities were located in Area 09B. Hobcaw Creek Docks, formerly misidentified as Hobcaw View Marina, is a recreational marina located on Hobcaw Creek, providing dockage for approximately 30 boats. An additional 10 moorings not associated with the marina are located in Hobcaw Creek. No fueling or pump-out facilities are provided and no live-aboards are allowed. Two marine repair facilities are located on the Wando River: Detyens Shipyard-Wando Yard and Charleston City Boatyard. The Detyens Shipyard (Wando Yard) is located on the south side of the Wando River, adjacent to the SC Hwy 41 Bridge. The Wando Yard has three large dry docks and serves as a vessel repair facility. Currently the Wando Yard is inactive as all ship repairs are being conducted at Detyens main location on the former Naval shipyard in North Charleston. The owner of the Wando Yard is cleaning up the site, and the future use of the site is uncertain. Charleston City Boatyard, formerly Halsey Cannon Boatyard, located across the river from the Wando Yard, provides repairs to recreational boats ranging in size from 15 to 30+ feet. It has approximately 1,000 feet of dockage, used exclusively for boats awaiting haul-out for land-based repair. Neither facility has fueling or pump-out services, and no liveboards are allowed. The combined Administratively Prohibited closure zone for both these facilities was established based upon a sizing determination conducted by the Bureau of Water's Division of Water Quality, 401 Certification section. Additionally, the S.C. Ports Authority operates the Wando-Welch Terminal located on the eastern shore of the Wando River approximately three miles from the Wando and Cooper River confluence. The terminal has 3,800 linear feet of continuous docking space and loads/unloads intercontinental transport cargo vessels. The Administratively Prohibited waters of the Lower Wando and Charleston Harbor encompass this facility. There are no commercial fisheries docks within Area 09B. Table #7 is included at the end of this report, providing additional detail on Area 09B boat docking facilities. An additional facility, Atlantis Marine, is listed in this table, and while not meeting the definition of a marina, is still included for informational purposes, as they sought in 2007 to expand their facility to a 40-slip marina.

As of yet, SCDHEC has not identified any other facilities meeting the new marina definition. If identified, they will be mapped and adequate closure zones established to protect public health.

- D. Radionuclides** - Sources of radionuclides have not been identified within Area 09B, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** – Previous shoreline surveys conducted in Area 09B revealed the highest concentration of homes to be along the Mount Pleasant side of the Wando River. Single-family homes continue to be built along the south side of the Wando River between Guerin Creek and the Paradise Island Boat Landing. Multiple housing developments are being built from Station 09B-08 up to Station 09B-17. Residential subdivisions start at the Wando Terminal and continue northward along the Wando River.

New homes and docks are continually under construction in Alston, Boone Hall, Guerin, Nowell and Rat Hall Creeks. Stormwater runoff adversely impacts water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

A dredge spoil area is located on the southern most portion of Daniel Island, located at the mouth of the Wando River. The Army Corps of Engineers and the State Ports Authority both utilize this spoil area. The Army Corps of Engineers has not conducted any dredging projects in the area recently. The South Carolina State Ports Authority conducts its own maintenance dredging directly in front of the Wando Terminal on an “as needed” basis.

The uplands surrounding the shellfish growing waters of Area 09B consist of various soil textures defined by the United States Department of Agriculture (USDA), Soil Conservation Service (Berkeley Co.1980 & Charleston Co.1971) utilizing general classifications and descriptions. Although lands within Area 09B, along the Berkeley County side of the river, consist of numerous soil types, the area is generally comprised of Chipley-Echaw-Pickney soils, made up of nearly level soils on long, narrow to broad ridges in areas roughly parallel with the coastline. The USDA (1980) further describes these soils as "Moderately well drained and very poorly drained soils that are sandy throughout." The upland area along the Charleston County side of the river consists of numerous soil types, however the area is generally comprised of soils in the Yonges series. Soils of this series typically occur on a low, swamp-like plain and on islands of higher areas that separate and parallel major streams. The USDA (1971) further describes these soils as “Poorly drained to very poorly drained, level to nearly level soils that have a loamy to sandy surface layer and a loamy to clayey subsoil.”

- B. Agricultural Runoff** - There are no permitted agricultural facilities located in Area 09B. Previous shoreline surveys found a residence adjacent to Station 09B-05 that has a pasture that occasionally contains two to four horses. There were also approximately eight cows one to two miles upstream from Station 09B-06. Area 09B serves as a drainage basin for southwestern portions of the Francis Marion National Forest.
- C. Individual Sewage Treatment and Disposal Systems** – The uplands bordering the Wando River and its tributaries, upstream of Station 09B-05, continue to be served exclusively by individual septic systems. Development in Paradise Island has continued to increase the number of residences served by septic systems. Each system requires inspection and approval by the Bureau of Environmental Health Services, Lowcountry EQC, On-site Wastewater section, prior to final installation.
- D. Wildlife and Domestic Animals** - Area 09B supports a large population of domestic animals attributable to a number of private residences along the shores of the Wando River. The area supports a moderate amount of wildlife along the northern border that extends into the Francis Marion Forest. The area has many small tidal creeks. This creek system provides a possible conduit for animal fecal coliform bacteria to be transported to the adjacent growing waters.

- E. Boat Traffic** - Recreational boat traffic is moderate throughout the area between the months of November and April and heavy between the months of May and October. Commercial boat traffic ranges from fisherman collecting blue crabs to large commercial cargo vessels utilizing the S.C. Ports Authority Wando Terminal.
- F. Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the Wando River from the Charleston Harbor to the I-526 Bridge require regular maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the Cooper River as dredge spoil sites.

NATURALLY OCCURRING PATHOGENS

- A. Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 09B. During the winter and spring of 1988, South Carolina experienced an occurrence of "Red Tide", specifically *Ptychodiscus brevis* (K. brevis), which affected water quality in Area 01. There has been no documented reoccurrences of this organism at levels requiring emergency response in South Carolina waters subsequent to the 1988 event. Due to the vast media coverage of events related to *Pfiesteria piscicida*, the Department participates in a State Task Group on Toxic Algae and operates a toxic algae emergency response team.
- B. *Vibrio parahaemolyticus*** - Because State water temperatures exceed 81 degrees Fahrenheit (F) during June through September, *Vibrio parahaemolyticus* (Vp) management controls must be implemented during these months. Management controls for permitted Aquaculture facilities are specifically addressed in R.61-47. The season for wild-stock harvest is currently closed from May 16 through September 30. The Department is currently opposed to issuance of special wild-stock harvest permits to Certified Shippers during the closed season. Special permit conditions for maricultured triploid oysters during the vibrio control months must include current R.61-47 and NSSP temperature control requirements to be included in the Certified Shipper's HACCP plan.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 09B is comprised of the Wando River and associated deep-water tributaries and marshlands. The creeks within the area range from 30 to 450 feet in width and average 5 to 25 feet in depth. The shipping channel near the Wando Terminal is maintained at a mean low water depth between 37 and 40 feet by the U.S. Army Corps of Engineers. Freshwater flows into the area from the Francis Marion National Forest and associated creeks. Higher salinity ocean water enters the area from the Charleston Harbor. Freshwater also has the potential to enter the area from the Cooper River by way of Charleston Harbor. The entire management area is approximately eight miles wide (northwest to southeast) and nineteen miles long (southwest to northeast).

Tides in Area 09B are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in the Wando River at the Highway 41 Bridge are 6.2 feet during normal tides and 8.0 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Precipitation in Area 09B is heaviest during late summer and early autumn. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. During winter months heavy rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low-pressure systems generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns may be dynamic with associated thunderstorms and severe weather conditions.

On October 8, 2016, Hurricane Matthew made landfall southeast of McClellanville, SC. Shellfish harvest was closed by SC DHEC prior to the arrival of the storm. Hurricane Matthew dropped considerable amounts of precipitation in the Charleston area and had a storm surge that caused extensive flooding. SC DHEC reassessed the closures after the storm and conducted sampling prior to reopening the growing areas. Water sampling was used to reopen the beds once fecal coliform concentration levels were low enough to permit harvest. The widespread flooding also caused sanitary sewer overflows into harvestable shellfish areas, requiring 21 day closures and additional tissue samples prior to reopening. The 2018 precipitation total recorded in Mount Pleasant was 62.27 inches.

In 2017, the collection of rainfall data has been improved for a more consistent, accurate, and reliable data set that can be accessed directly from a shellfish staff member's computer or phone. With assistance from the National Weather Service's, Southeastern River Forecast Center, the development of the South Carolina Shellfish Rainfall Program was introduced and utilized. This new technology provides shellfish program staff with real-time daily updates for rainfall accumulation in each of the South Carolina shellfish growing management areas, as well as providing critical triggers that alert staff to when rainfall thresholds for closures are exceeded.

Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

The Wando River receives freshwater from two primary sources, freshwater flowing into the mouth of the Wando River from the Cooper River and runoff from the Wando River watershed.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 09B in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day

of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated shellfish water quality data scheduling and collection procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station, yet provides a six-sample cushion (above the NSSP required 30 minimum) for broken sample bottles, lab error, breakdowns, etc. This also allows each annual report's water quality data to meet the requirements for the NSSP Triennial Review sampling criteria.

Six hundred twelve (612) surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from eighteen (18) active water quality sampling stations in Area 09B during the period 01/01/16 through 12/31/18. Multiple bacteriological samples were collected during the review period for non-classification purposes, associated with reopening the area following a precautionary closure. The samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Affairs Lowcountry Environmental Quality Charleston laboratory at North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. At the laboratory, sample sets exceeding a 30-hour holding time or containing a temperature control in excess of 10 degrees C. were discarded (APHA, 1970).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using an automatic temperature compensated refractometer. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling.

MONITORING RESULTS

Station 09B-05, 09B-07 and 09B-09 exceeded the fecal coliform geometric mean MPN value of 14. The stations that exceed a fecal coliform MPN estimated 90th percentile value of 43 are 09B-04, 09B-05, 09B-07, 09B-09 and 09B-12. No Station exceeds a fecal coliform MPN estimated 90th percentile value of 260.

Area 09B was closed on 10/07/2016 prior to landfall of Hurricane Matthew. Tissue sampling was conducted on 11/01/16 to reopen the Area on 11/04/16.

Area 09B received 4.98 inches of rainfall on 9/12/17. The area was already closed at this time, as there are no DNR designated Mariculture areas in Area 09B and the wild shellfish harvest season was closed for summer. This storm event moved the opening day of Shellfish Season to 10/15/2017.

CONCLUSIONS

Based on review of fecal coliform bacteriological data and a pollution source survey, Area 09B is impacted by one primary source of actual or potential pollution. Nonpoint source runoff appears to be a major source of fecal coliform bacteria concentrations throughout the area. Development within the management area continues at a rapid pace.

RECOMMENDATIONS

Shellfish growing area water quality within Area 09B has slightly changed with one classification change recommended for this Annual Update. The following harvesting classification of Area 09B is recommended:

PROHIBITED

1. Seaward portions of the Wando River (and adjacent tributaries and marshland), from Remley's Point to Station 09B-15, including all of Hobcaw and Molasses Creek;
2. Southwestern portions of Beresford Creek and adjacent marsh near Thomas Island, extending to the Area 10B boundary;
3. The Wando River, within approximately 1,000 feet Detyen's Shipyard;
4. The Wando River, within approximately 1,000 feet of Detyen's Shipyard NPDES discharge outfall.
5. The Wando River within approximately 200 feet of the Charleston City Boatyard.

RESTRICTED

1. Horlbeck Creek, Boone Hall Creek and their tributaries from their headwaters to Station 09B-21.
2. The Wando River from Station 09B-11 to its headwaters. This includes the tributaries of Alston, Darrell, Wagner, Deep, and Toomer creeks.
3. Guerin Creek and adjacent marshlands from its headwaters to Station 09B-12.
4. Wando River at Guerin Creek (Station 09B-11) to Guerin Creek at Old House Creek (Station 09B-12);

CONDITIONALLY APPROVED

None

APPROVED

All other waters of Area 09B.

Station Additions/Deactivations/Modifications: None

Analysis of sampling data for Area 09B demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 09B will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured by the NWS, Southeastern River Forecast Center. This methodology is associated with the

concept of the Probable Maximum Precipitation (PMP). The National Weather Service publishes PMP estimates for the coastal United States in a series of hydro-meteorological reports (HMRs) (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52 and 53 (*National Research Council, 1985*).

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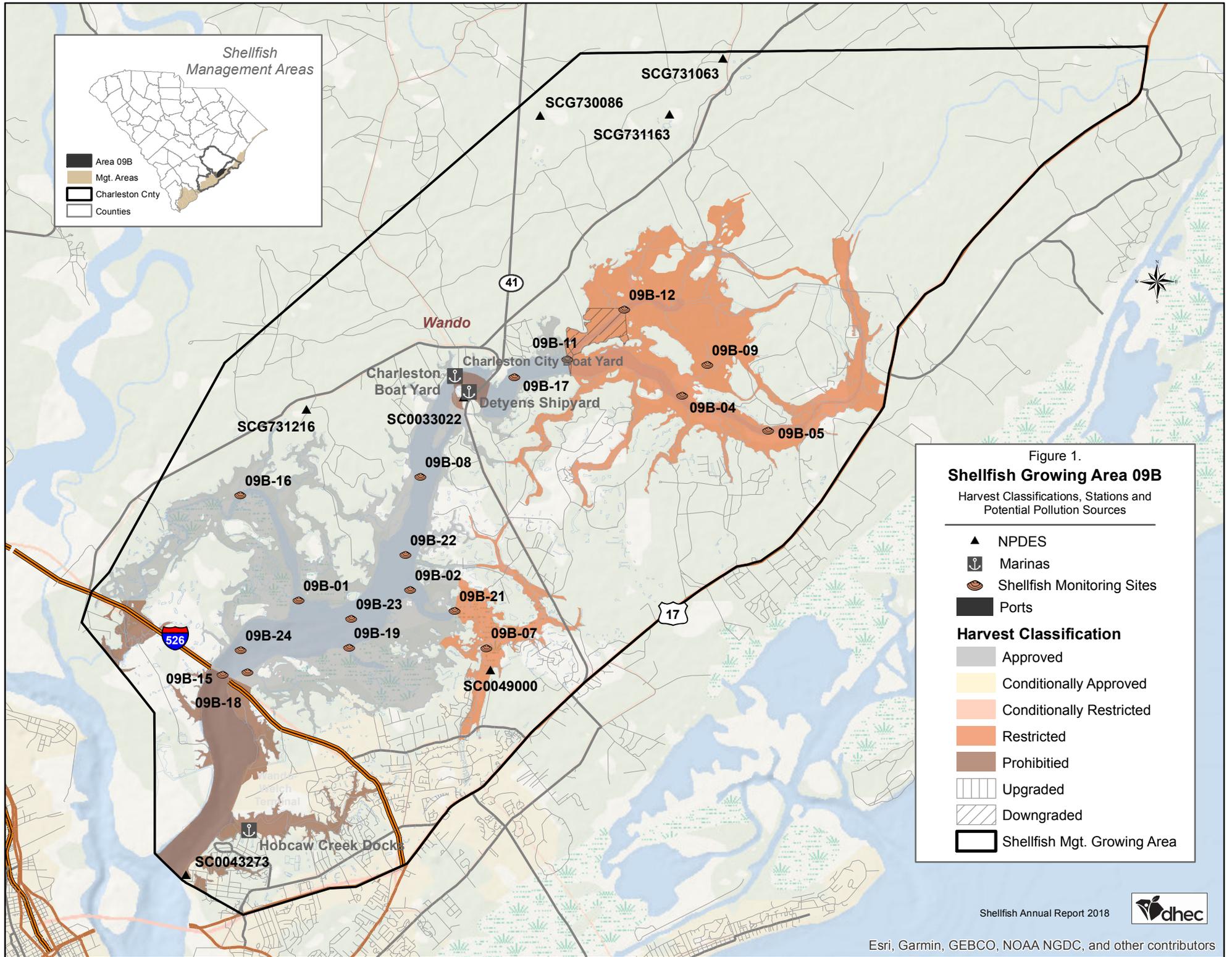


TABLE #1
Shellfish Management Area 09B
Water Quality Sampling Stations Description

<u>Station</u>	<u>Description</u>
9B-01.....	Wando River at Nowell Creek
9B-02.....	Wando River at Horlbeck Creek
9B-04.....	Wando River at Deep Creek
9B-05.....	Wando River at Big Paradise Island
9B-07.....	Boone Hall Creek at County Recreation Area
9B-08.....	Wando River at Marker #29
9B-09.....	Deep Creek - 1 mile from confluence with Wando River
9B-11.....	Wando River at Guerin Creek
9B-12.....	Guerin Creek at Old House Creek
9B-15.....	Wando River at I-526 bridge
9B-16.....	Nowell Creek at Martin Creek
9B-17.....	Wando River midway between Detyens and Station 9B-11 (at old dry dock)
9B-18.....	Wando River at Rat Hall Creek
9B-19.....	Wando River at Foster Creek
9B-21.....	Horlbeck Creek at the power line crossing
9B-22.....	Wando River at Marker #27
9B-23.....	Wando River at Marker #20
9B-24.....	Wando River at Marker #13

(Total Active – 18)

TABLE #2

**Shellfish Management Area 09B
FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
From Shellfish Water Quality Sampling Stations Between
January 1, 2016 and December 31, 2018**

Station #	01	02	04	05	07	08	09	11	12	15
SAMPLES	34	34	34	34	34	34	34	34	34	34
GEOMEAN	4.2	4.5	12.2	21.2	15.2	4.2	23.1	6.9	9	4.2
90TH %ILE	15	19	113	184	116	15	183	43	56	14
WATER QLTY	A	A	R	R	R	A	R	A	R	A
CLASSIFICATION	A	A	R	R	R	A	R	R	R	P

Station #	16	17	18	19	21	22	23	24
SAMPLES	34	34	34	34	34	34	34	34
GEOMEAN	5.6	7.5	7.3	4.3	6.7	3	3.6	5.2
90TH %ILE	29	39	42	14	37	8	11	20
WATER QLTY	A	A	A	A	A	A	A	A
Classification	A	A	A	A	R	A	A	A

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

Table #3											
Fecal Coliform Historical Trend Sheet											
Area 09B Stations 90 th ile Values for Annual Updates Related to Rainfall											
Station #	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
9B-01	15	17	19	20	13	10	12	15	19	15	18
9B-02	19	13	14	17	21	20	27	32	26	23	31
9B-04	113	105	49	47	34	53	85	135	97	86	190
9B-05	184	151	61	63	53	60	94	118	109	68	119
9B-07	116	94	50	75	74	100	114	166	113	80	84
9B-08	15	14	10	10	10	10	12	16	15	14	12
9B-09	183	137	92	108	103	92	128	258	233	189	266
9B-11	43	33	19	20	18	25	28	47	43	36	29
9B-12	56	40	32	42	41	47	53	88	80	61	74
9B-15	14	11	8	15	17	17	16	17	21	17	15
9B-16	29	24	26	37	28	17	27	67	82	69	53
9B-17	39	29	20	19	19	21	27	34	28	24	21
9B-18	42	28	34	50	36	45	50	87	100	77	72
9B-19	14	22	21	23	15	21	19	31	27	34	36
9B-21	37	37	26	35	32	44	51	73	46	31	21
9B-22	8	9	13	13	12	15	16	20	12	13	10
9B-23	11	12	12	11	11	16	19	20	14	13	6
9B-24	20	18	14	12	9	9	14	18	17	14	6
Annual Rainfall (in inches)	62.27	63.61	41.47	72.27	50.65	61.14	34.45	31.89	50.1	59.5	47.7
ND = No Data Red = Impaired Water Quality											

TABLE #4

**WATER QUALITY
SAMPLING STATIONS DATA**

Shellfish Management Area 09B

Detailed data for each shellfish monitoring station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained by writing South Carolina's Department of Health and Environmental Control – Freedom of Information office at the address below.

Freedom of Information
SC Dept. of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

TABLE #5

RAINFALL DATA

Shellfish Management Area 09B

Source:

2016 Data:

SCDHEC Mount Pleasant Monitoring Gauge

Location: Mount Pleasant, South Carolina

2017-2018 Data:

National Weather Service, Southeastern River Forecast Center

Location: Mount Pleasant, South Carolina

2016 Annual Rainfall Summary
Source: South Carolina Department of Health and Environmental Control
Data Logger Location: Mt. Pleasant, S.C.

2016	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	0.39	0	0	0.35	0	0	1.31	0.13	0.13	0	0	0.07
2	0	0	0	0.23	0	0	0	0	0	0	0	0
3	0	1.08	0.46	0	0.47	0	0	2.11	0	0	0	0
4	0	1.93	0.7	0	0.02	0	0	0	0	0	0	0
5	0	0	0	0	0	0.02	0	0	0	0	0	0.22
6	0	0.41	0	0	0	1.75	0.57	0	0	0	0	0.28
7	0	0.92	0	0	0	0.67	0	0	0	3.2	0	0.23
8	0.03	0.07	0	0	0	0	0	0.15	0	0	0	0.18
9	0	0	0	0	0	0	0	0	0	0	0	0.04
10	0.01	0	0	0	0	0	0	0.01	0	0	0	0.13
11	0	0	0	0	0	0	0	0	0	0	0	0.25
12	0	0	0	0.06	0	0	0	0	0	0	0	0.08
13	0	0	0	0	0.05	0	0	0	0.87	0	0.18	0.01
14	0	0	0	0	0	0	0	0	0.02	0	0	0.03
15	1.18	0.43	0	0.51	0	0	0	0	0.11	0	0	0.02
16	0	0.66	0	0.01	0	0.01	0	0	0	0	0	0.02
17	0.72	0	0	0	0.54	0.55	0.71	0	0	0	0	0.01
18	0	0	0.11	0	0.01	0.01	1.08	0.16	0	0	0	0.09
19	0	0	0	0	0.19	0	0.01	0	0	0	0	0.06
20	0	0	0.04	0	0.08	0	0	0.01	0	0	0	0.03
21	0	0	0	0	0.01	0	0	0	0	0	0	0.02
22	1.74	0	0	0.09	0	0	0	0	0	0	0	0.03
23	0.01	0.36	0	0	0	0	0	0	0.58	0	0	0
24	0	0.07	0	0	0	0	0	0	0	0	0	0
25	0	0.01	0	0	0	0	0	0	0	0	0	0
26	0	0	1	0	0	0	0	0	1.41	0	0.01	0.01
27	0	0	1.64	0	0	0	0	0	0.09	0	0	0.01
28	0.17	0	0.04	0.05	2.67	0.25	0	0.01	0	0	0	0.01
29	0.01	0	0	0	0.8	2.14	0	0.03	0	0	0.02	0.02
30	0		0	0	0.17	0	0	0.14	1.21	0	0	0
31	0		0.08		0.04		0	0.84		0		0.18
Total	4.26	5.94	4.07	1.30	5.05	5.4	3.68	3.59	3.01	3.2	.21	2.03
*Days highlighted indicate 4 or more inches of rain in a 24 hour period.												
* Sample dates are indicated in blue.									ANNUAL RAINFALL		41.74	

2017 Annual Rainfall Summary

Source: National Weather Service, Southeastern River Forecast Center

Location: Mount Pleasant, S.C.

2017	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	0.39	0	0	0	0	0.01	1.15	0	0.23	0	0	0
2	0.04	0	0.12	0	0.52	0.83	0	0	1.05	0	0	0
3	0.21	0	0.08	0	0	0	0.12	1.33	1.36	0	0	0
4	0.3	0	0	1.01	0	0	0.12	0.33	0	0	0	0
5	0	0	0	0	0.21	0	0	0.81	0.04	0	0	0
6	0	0	0	2.15	0.06	1.36	0	0.15	0.43	0	0	0
7	0.33	0	0	0	0	1.36	0	0	0.87	0.15	0	0.3
8	0	0.25	0	0	0	1.32	0.08	0.01	0	0.02	0	0.79
9	0	0.07	0	0	0	0.06	0.41	1.48	0	0.13	0	0.68
10	0	0	0	0	0	0	0.24	1.43	0.01	0.67	0.52	0
11	0	0	0	0	0	0	0.68	0.48	0.3	0.01	0	0
12	0	ND	0.03	0	0	0	0	ND	4.98	0	0	0
13	0	0	0.03	0	0	0	0	0.22	0	0	0	0
14	0	0	0.43	0	0.76	0.01	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0.15	0	0	0	0
16	0	0.13	0	0	0	1.05	0.07	ND	0	0	0	0
17	0	0	0	0	0	0.1	1.17	ND	0	0.15	0	0
18	0	0	0	0	0	0.91	0.49	ND	0	0	0	0
19	0	0	0	0.11	0	0.01	0.04	ND	0	0	0	0
20	0	0	0	0.48	0	0.54	0.74	ND	0	0	0	0
21	0.01	0	0	0	0	0.46	0	0.35	0	0	0	0.46
22	1.25	0.01	0.28	0	0.02	0.35	0	ND	0.01	0	0.26	0
23	1.43	0	0	0	1.01	0	0	0.02	0.21	0.8	0	0
24	0.05	0	0	2.31	3.1	0	0.07	0.01	0	1.37	0.34	0
25	0	0	0	1.57	0.16	0.37	0.7	0.54	0	0	0	0
26	0	0	0	0	0	0.42	0.05	0.1	0	0	0	0
27	0.01	0	0	0	0	0	0.66	0.16	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0.03
29	0		0.01	0	0	0	0.53	3.01	0	0.06	0	0.05
30	0		0	0	0	0.21	0.89	0	0.14	0	0	0
31	0		0.1		0		0	0		0		0
Total	4.02	0.46	1.08	7.63	5.84	9.37	8.21	10.58	9.63	3.36	1.12	2.31
*Days highlighted indicate 4 or more inches of rain in a 24 hour period.												
* Sample dates are indicated in blue.									ANNUAL RAINFALL		63.61	

2018 Annual Rainfall Summary

Source: National Weather Service, Southeastern River Forecast Center

Location: Mount Pleasant, S.C.

2018	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1		0.00	0.04	0.00	0.00	1.12	0.16	0.36	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.17	0.06	0.00	0.05	0.88
3	0.00	0.00	0.00	0.00	0.00	0.58	0.01	0.29	0.05	0.00	0.02	1.59
4	0.81	0.00	0.00	0.00	0.00	0.00	0.44	0.75	0.00	0.00	0.00	0.02
5	0.00	0.43	0.00	0.00	0.00	0.00	0.74	0.95	0.00	0.00	1.10	0.00
6	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.08	0.14	0.00
7	0.00	0.00	0.26	0.00	0.00	0.00	0.48	0.05	0.01	0.00	0.16	0.00
8	0.00	0.30	0.00	0.54	0.00	0.00	1.22	0.00	0.17	0.04	0.23	0.03
9	0.00	0.00	0.00	0.01	0.00	1.30	0.00	0.12	0.21	0.16	0.00	1.18
10	0.00	0.51	0.00	0.03	0.00	0.20	0.00	0.34	0.12	1.17	0.11	0.71
11	0.00	0.00	0.00	0.10	0.00	0.48	0.00	0.00	0.10	0.28	0.00	0.00
12	0.10	0.05	0.21	0.00	0.00	0.13	0.00	0.32	0.02	0.01	0.00	0.00
13	0.19	0.02	0.33	0.00	0.00	0.96	0.13	0.11	0.20	0.00	0.81	0.00
14	0.00	0.00	0.00	0.00	0.00	0.01	0.78	0.00	0.00	0.00	0.15	1.19
15	0.00	0.00	0.00	0.01	0.00	0.28	0.01	0.07	0.55	0.00	1.09	2.97
16	0.00	0.00	0.00	0.81	0.02	0.72	0.00	0.00	0.23	0.00	0.00	0.07
17	0.00	0.00	0.00	0.00	0.52	0.00	0.16	0.57	0.16	0.00	0.00	0.00
18	0.00	0.00	0.09	0.00	0.10	0.00	0.06	0.00	0.33	0.00	0.00	0.00
19	0.00	0.00	0.49	0.00	1.00	0.00	0.74	0.36	0.00	0.00	0.09	0.00
20	0.00	0.00	0.15	0.00	0.44	0.00	2.93	0.01	0.00	0.00	0.00	0.38
21	0.00	0.00	0.58	0.00	0.01	0.03	0.48	0.00	0.00	0.12	0.02	0.73
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.20	0.00	0.00	0.18	0.00	0.00	0.74	0.16	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	2.66	0.01	0.00	0.84	0.00	0.01	0.00	0.47	0.00
25	0.00	0.00	0.05	0.00	0.47	0.67	0.32	0.00	0.06	0.00	0.15	0.00
26	0.00	0.13	0.02	0.00	0.10	0.28	0.23	0.07	0.05	0.01	0.02	0.00
27	0.00	0.00	0.00	0.00	0.01	0.00	0.96	0.21	0.00	0.22	0.05	0.00
28	0.01	0.00	0.00	0.00	1.10	0.52	0.41	0.07	0.36	0.00	0.00	0.19
29	0.90		0.00	0.00	0.28	0.00	0.03	0.52	0.03	0.00	0.00	0.44
30	0.00		0.00	0.00	0.49	0.00	1.61	0.00	0.15	0.00	0.00	0.00
31	0.00		0.10		0.60		0.47	0.00		0.00		0.00
Total	2.21	1.44	2.32	4.34	5.16	7.28	13.99	5.51	2.89	2.09	4.66	10.38
*Days highlighted indicate 4 or more inches of rain in a 24 hour period.												
* Sample dates are indicated in blue.									ANNUAL RAINFALL		62.27	

TABLE #6

**SHELLFISH MANAGEMENT AREA 09B
Pollution Event Closures
2016-2018**

Event	Date(s)	Sample Date(s)	Opening Date	Comments
Hurricane Matthew/ SSO's	10/07/2016	11/01/2016	11/04/2016	Growing Areas closed prior to Hurricane Matthew. Remained closed due to SSO's
Hurricane Irma	09/12/2017	10/4/2017	10/15/2017	The 2017 shellfish season was delayed two weeks due to water quality impacts from Hurricane Irma

TABLE #7
Shellfish Management Area 09B
MARINA INVENTORY

Marina	Total Slips/Linear Feet	Pump-out Facility	Fuel Dock
State Ports Authority Wando Welch Terminal	3,800 ft	Port Terminal	Port Terminal
Hobcaw Creek Docks	30 slips	No	No
Charleston City Boatyard	1000 ft	No	No
Wando River Marine	82 slips	Yes	No