

South Carolina Department of Health and Environmental Control

ENVIRONMENTAL AFFAIRS

SHELLFISH MANAGEMENT AREA 17

2020 ANNUAL UPDATE

**Shellfish Sanitation Section
Environmental Affairs
2600 Bull Street
Columbia, SC 29201**

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

SHELLFISH MANAGEMENT AREA 17 2020 ANNUAL UPDATE

[Data Through December 2019]



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2020 ANNUAL UPDATE
Shellfish Management Area 17

Data Inclusive Dates:
01/01/17 thru 12/31/19

Classification Change:
X Yes ___ No

Shoreline Survey Completed: Yes

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

Prior Report & Date: 2019 Annual Update

I Approved
N Conditionally Approved
D Restricted
N Prohibited

SUMMARY

For the 2020 Annual Update for Shellfish Management Area (SFMA) 17, water quality during this review period of 2017-2019 remained somewhat consistent with water quality data exhibited in previous annual updates. One classification change will be implemented in SFMA 17 for the 2020-2021 shellfish harvesting season.

During this review period, station 17-21 (Confluence of Middle Creek and Whale Branch) has now met the criteria for an Approved classification and will be upgraded. Also, water quality monitoring station 17-23, located in Euhaw Creek has met the water quality criteria for the Approved classification once again for this year. Water quality monitoring data for stations 17-16A, 17-18, and 17-25 have once again failed to meet the requirement to be classified as Approved and will therefore remain in the Restricted classification.

Three sample stations were added in 2017 to better analyze water quality in the management area. Station 17-22A was added in West Branch Boyd Creek, 17-22B in East Branch Boyd Creek, and 17-26 was added in Euhaw Creek. A minimum of thirty (30) samples will need to be collected in order to properly classify the area that these samples are associated with and currently there are 25 samples in the data set.

Area 17 was impacted from Hurricane Matthew in October 2016 and Hurricane Irma in September 2017. The heavy rains and storm surges resulted in many sewer overflows at lift stations throughout the Lowcountry Region.

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 National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish is used by the United States Food and Drug Administration (USFDA) 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 and S. C. Regulation 61-47 are used 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

Shellfish Management Area 17 (Area 17) consists of approximately 67,015 acres of shellfish growing area habitat located in Beaufort County, South Carolina. Area 17 consists of the Broad River and its tributaries including Whale Branch, East and West branches of Boyd, Euhaw, Hazzard, Habersham, Archer, Ribbon, and Ballast Creeks and the Chechessee River. The headwaters of the Broad River are formed by the confluence of the Coosawhatchie, Pocotaligo, and Tullifinny Rivers, which originate west of Interstate 95 and U.S. Highway 17 as freshwater rivers that drain from areas of the surrounding wetlands.

The area's northern boundary begins at the intersection of State Road 13 and Highway 462 and crosses the Coosawhatchie and Pocotaligo Rivers just upstream of their confluence with the Broad River, then extends to Area 14 boundary (at the railroad trestle). The eastern boundary follows the railroad track and a portion of Highway 21, crossing Port Royal Island and Parris Island. The boundary is established along a "divide" which separates creeks draining into the Broad River from those surrounding the Beaufort River (in Area 15). The southern boundary is the Atlantic Ocean at the mouth of Port Royal Sound. The western boundary commences at the mouth of Port Royal Sound and crosses the mouths of Skull Creek and Mackey Creek, then follows the western shore of Chechessee River to Highway 170. The boundary then extends to and follows Highway 278 and follows Highway 462 to the intersection of State Road 13.

The majority of the shellfish resources and harvesting activity are located from Euhaw Creek and Habersham Creek south to the mouth of Port Royal Sound.

The shellfish industry in South Carolina is based mainly on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*). 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.

There are thirteen (13) shellfish culture permits, three (3) mariculture permit, and four (4) state shellfish grounds available for commercial shellfish harvesting in Area 17. The general public is also allowed to recreationally harvest from any of the state grounds or from the one recreational shellfish harvest ground designated in this management area. The designated public harvesting grounds for this management area are as follows: State Shellfish Ground (SSG) S048, located in Hilton Head, S058 in Chechessee Creek, S068 in the Broad River, and S064 on Parris Island. Recreational harvesting is allowed for clams and oysters in these areas and is subject to seasonal restrictions established by SCDNR. Public Shellfish Ground (PSG) R061 along the Chechessee River is available for recreational harvesting only.

Shellfish harvesting season in South Carolina typically extends from October 1 through May 31, although actual dates may vary. SCDNR has the authority to alter the shellfish-harvesting season for management purposes. The South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that all shellfish harvested in South Carolina waters are safe for human consumption.

The harvesting classifications of Area 17 **prior** to this sanitary survey were as follows:

PROHIBITED

1. Portions of the broad River adjacent to USMC/Laurel Bay WWTP. The closed portion of the Broad River is approximately 1600 meters long by 360 meters wide. Adjacent marshlands are also included.
2. Approximately 1000 meters of Archers Creek and surrounding marshland adjacent to, and west of, the Parris Island Bridge.
3. Portions of Hazzard Creek extending upstream from Station 17-25 to the boundary of Area 17 (including tributaries and adjacent marshlands).

RESTRICTED

1. Habersham Creek, entire waterbody.
2. Hazard Creek from Station 17-25 downstream to its confluence with the Chechessee River at Station 17-17.
3. Whale Branch, from its confluence with Broad River continuing to the boundary line of SFMA 17, located at the Whale Branch Fishing Pier.
4. Haulover Creek, the portion that is south of the Haulover Creek Drive causeway, including all adjacent marshlands.
5. Middle Creek, including all adjacent marshlands, continuing to the boundary of SFMA 17.
6. Big Island Creek, entire waterbody.

CONDITIONALLY APPROVED

None

APPROVED

1. Broad River, entire waterbody excluding the Laurel Bay Prohibited zone.
2. South Haulover Creek, entire waterbody.
3. Coosawhatchie River from the northern boundary of Area 17 to its confluence with Broad River.
4. Pocotaligo River from the northern boundary of Area 17 to its confluence with Broad River.
5. Euhaw Creek, from the headwaters to its confluence with Broad River.
6. Bird Island Creek, entire waterbody.
7. Hazzard Creek, from Sample Station 17-17 continuing northwest to Sample Station 17-09.
8. Boyd Creek, entire waterbody, including both branches and all adjacent marshlands.
9. Chechessee River, entire waterbody
10. Archers Creek, from the Prohibited zone (~1000 ft from the Parris Island Bridge) to its confluence with Broad River.
11. Ribbon Creek, from the Parris Island Bridge to its confluence with Broad River.

Station Addition/Re/Deactivation/Modification: None

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

The South Carolina Department of Health and Environmental Control, Environmental Affairs, Lowcountry – Beaufort, Shellfish Sanitation Staff, routinely conducts shoreline survey activities in Area 17. Extensive visual examination of lands adjacent to the waters of Area 17 was conducted to determine type of activities, location of significant concentrations of domestic animals and other actual and potential sources of pollution entering shellfish growing waters.

POINT SOURCE POLLUTION

A. Municipal and Community Waste Treatment Facilities—The Beaufort Jasper Water and Sewer Authority (BJWSA) is the designated utility that is responsible for public sewer services within the boundaries of Area 17. The BJWSA/Port Royal Plant supplies sewer services to Parris Island, Port Royal, City of Beaufort as well as the surrounding unincorporated areas. This facility is physically located within the Area 17 boundaries, but discharges effluent in Area 15. This plant is a 7.5 mg/d facility consisting of a mechanical bar screen, grit classifier, low and high end anoxic aerated zone activated sludge systems, equalization tank, two secondary clarifiers, two aerobic digesters with a Andritz filter press system, a three set of a twelve-disc Aqua Aerobic membrane filter system, and a Trojan 3000 Plus 3 bank UV disinfection system.

The BJWSA operates one additional facility in the area, which serves the Laurel Bay Housing Area. This is the only domestic point source discharge within the boundaries of Area 17. The plant consists of a bar screen, primary and secondary clarifiers, trickling filters, sludge digester, and post treatment chlorination/de-chlorination. Most homes in the northern quadrant of Area 17 utilize septic tanks for waste disposal.

B. Industrial Waste – Hickory Hill landfill has a stormwater retention pond with a discharge point into a ditch that leads to Hazzard Creek. The actual facility is not physically located within the boundaries of Area 17, but the discharge enters the area. The retention ponds associated with this landfill site store stormwater and infrequently discharge under controlled measures. An NPDES Stormwater Permit has been issued for this site. Best Management Practices are applied and are utilized as per the site's stormwater discharge permit management plan. An administratively Prohibited closure zone is in place at the headwaters of Hazard Creek.

Rea Contracting LLC also operates a sand mining operation in Area 17. The discharge consists of groundwater and rainwater pumped during dewatering operations only. A General Mining NPDES permit has been issued for this site.

- C. Marinas** – In 2007, prompted by the Department’s Office of Coastal Resource Management (OCRM) marina definition change, the Shellfish Sanitation Section incorporated the following 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); (3) any facility which has effective docking space of greater than 250 linear feet or provides moorage for more than 10 boats; (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, such as a mooring field; or (5) a dry stack facility. Currently, there are no marinas in SFMA 17.
- D. Radionuclides** - Sources of radionuclides have not been identified within Area 17, 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** - Stormwater runoff may impact water quality by transporting fecal coliform bacteria (and other pollutants) from land to the shellfish growing area. Stormwater from roads, residences, and agricultural land is directed to the lowest point of elevation - typically the nearest creek or marsh. In addition, there are freshwater wetland areas, ditches, and impoundments that drain into tidal creeks.

Beaufort County enacted a Stormwater Management Utility which was established by county ordinance in 2001 and amended and enacted most recently in 2015. The Stormwater Utility is guided by a Comprehensive Master Plan and a Stormwater Management Utility Board which is dedicated to stormwater-related activities. The Comprehensive Master Plan identified nine (9) program elements that the utility must address. These elements are: Stormwater Control Regulations, Water Quality Controls for Existing Developments, Water Quality Monitoring, Annual Maintenance, Inventory of Secondary Stormwater Management Systems, Additional and On-going studies and analysis, Public Information, and Utility Administration.

The Comprehensive Master Plan is funded through the fees collected by Beaufort County. The Master Plan was designed to identify problem areas related to stormwater, and to recommend a plan to solve problems and better control the impacts on receiving waters in Beaufort County. The Stormwater Management Utility also partners with four Municipalities which include: The Town of Hilton Head Island IGA, Town of Bluffton IGA, Town of Port Royal IGA, and the City of Beaufort IGA. The above information was gathered from the Beaufort County Stormwater webpage which can be found at:

<https://www.beaufortcountysc.gov/stormwater/index.html>

The Beaufort County Manual for Stormwater Best Management Practices and Design Practices (BMP’s) was developed in May 2010 and most recently revised in 2018. This manual has recommended policies and standards for stormwater pollution control for new developments, policies and standards for existing developments, and structural BMP design guidelines. This manual also has the Average Annual Fecal Coliform Runoff Load Calculations for various land uses with percent reductions required to meet fecal coliform loading targets. This manual not only requires pollutant removal, but also considers

stormwater volume control to meet the County's antidegradation goals. Sec. 99-107 of the County Codes sets requirements for on-site stormwater systems: enforcement, methods, and inspections.

On June 4, 2014, SCDHEC designated Beaufort County as a Municipal Separate Storm Sewer System (MS4). MS4 is a component of the National Pollutant Discharge Elimination System (NPDES). The notice of intent was submitted, and the expected effective date was October 1, 2015 (Beaufort County Stormwater Utility, 2015).

Most land disturbing activities in South Carolina must comply with the Stormwater Management and Sediment Reduction Act of 1991. The final regulations, effective on June 28, 2002, establish the procedures and minimum standards for a statewide stormwater management program. For activities in the eight coastal counties, additional water quality requirements are imposed. For all projects, regardless of size, which are located within one-half mile of a receiving water body in the coastal zone, the criteria for permanent water quality ponds having a permanent pool is that they are designed to store the first inch of runoff from the entire site over a 24-hour period or storage of the first one inch of runoff from the built-upon portion of the property, whichever is greater. Storage may be accomplished through retention, detention, or infiltration systems, as appropriate for the specific site. In addition, for those projects that are located within 1000 feet of shellfish beds, the first one and one-half inches of runoff from the built-upon portion of the property must be retained on site. Since 1992, these regulations have been applied to the development of residential subdivisions, golf courses, and business areas.

In the Summer/Fall of 2016, effort was put forth to determine potential causes for the decline in water quality regarding the western portion of Area 17, specifically, the Hazzard, Euhaw, and Boyd Creek waterbodies. Areas of concern that were evaluated included landfills in the area and Individual Sewage Treatment and Disposal Systems (ISTDS). A public meeting was held at the Port Royal Sound Foundation Maritime Center in March of 2017. A correlation was discovered between change in land use and elevated fecal coliform concentration. Water quality seemed to diminish in the same time frame as surrounding land became deforested. It was recommended that a Community Action Group convene at some frequency to further address concerns to this area.

- B. Agricultural Runoff** - Area 17 does have some potential for agricultural nonpoint source pollution. Small agricultural operations exist at some plantations located in the area. Small populations of cattle and horses are found throughout Area 17 mainly in the northern and northwestern portions of the management area.
- C. Individual Sewage Treatment and Disposal (ISTD) Systems** – The majority of homes in the northwestern portion of Area 17 utilize ISTDS for wastewater disposal. North of the Broad River located within Beaufort County, urban/suburban areas are serviced by the BJSWA. All other older homes, not on municipal sewer utility, utilize ISTDS.

Central treatment systems have less potential to impact shellfish growing waters than ISTD systems, although central treatment system malfunctions can occasionally result in spills of untreated wastewater to the environment.

- D. Wildlife and Domestic Animals** - Area 17 supports substantial populations of both wildlife

and domestic animals. This area supports natural populations of rabbit, white-tailed deer, raccoon, opossum, alligators, rodents, songbirds, shorebirds, and migratory waterfowl typical of the coastal Carolinas.

Domestic animal populations that are present in the area are dogs, cats, horses and goats.

- E. Boat Traffic** - Recreational boating and fishing occur throughout the year along the waterways of this management area. There are several public boat landings and numerous private docks throughout Area 17. Boat traffic is heaviest during summer months and on weekends during the spring and fall. Weekday boating activity during the spring and fall is moderate.
- F. Hydrologic and Habitat Modification** - Hydrologic and habitat modification in estuarine areas requires both State and federal approval. No modifications were approved for Area 17 for this annual review period.

NATURALLY OCCURRING PATHOGENS

- A. Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 17. 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 other coastal areas of the state. There have 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 June 1 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 17 is part of the Broad River estuary (a drowned river valley system) that contains numerous marsh flats and tidal creeks that flow throughout the surrounding sea-islands. It is the largest of the Sea Island Coastal Region estuaries (219 square kilometers). The estuary includes Broad River, Beaufort River, Port Royal Sound, and several tidal tributaries. The average depth of the estuary is approximately 7 meters at mean low tide. Broad, deep natural channels exist throughout Port Royal Sound, Beaufort River, and most major tidal tributaries. Large shoal areas exist primarily in the Beaufort River and Port Royal Sound (NOAA, 1994).

Tides in Area 17 are semidiurnal, consisting of two low and high tides each lunar day. Mean tidal range at the mouth of Port Royal Sound is 7.0 feet during normal tides and 9.0 feet during spring tides. The greatest tidal ranges of the year typically occur around full moon during the months of September through December. There is considerable variation in the normal tide range due to the prevailing strength and direction of wind.

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.

The yearly rainfall amount was 46.26 inches for 2019. The total annual rainfall amount for 2016 51.15 inches and 51.67 inches for 2017. These totals are above the 10-year annual rainfall totals for this area of 41.49 inches. Normally, approximately 40% of the annual rainfall falls in the three-month period from June to August. Weather patterns during this time period are often characterized by thunderstorms and thundershower activity of short duration. In addition, these three months also have the highest numbers of days with rainfall greater than 1.00". The months of December through March historically have the greatest number of days with rainfall exceeding 0.10" and 0.50". Rainfall events during these months are typically of a longer duration.

Prevailing wind direction during January through February is generally from the west to northwest with an average speed of 8-12 MPH. During the months of March through August, wind direction is typically a southerly component with an average speed of 7-10 MPH and September through December wind normally maintains a north-north easterly direction with an average speed of 6-8 (NOAA).

The salinity structure is primarily determined by the seasonal freshwater discharge from the Coosawhatchie and Pocotaligo rivers. There is a mean variance of salinity of less than 5 parts per thousands (ppt) during typical high and low salinity periods.

WATER QUALITY STUDIES

DESCRIPTION OF PROGRAM

The Department utilizes a systematic random sampling (SRS) strategy within Area 17 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 calendar year 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 data analysis 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 samples, lab error, breakdowns, etc. This also allows each annual report to meet the NSSP Triennial Review sampling criteria.

During the period 01/01/17 through 12/31/19, six hundred forty-three (643) surface water samples (<1.0 ft. deep) were collected at the twenty (20) currently active Area 17 monitoring stations for bacteriological analyses. Samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control EQC Lowcountry – Beaufort laboratory in Burton, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. Upon receipt at the laboratory, sample sets that exceeded a 30-hour holding time or contained a temperature control >10 degrees C. were discarded. Samples collected after September 1, 1986 have been analyzed using the five-tube/three dilution modified A-1 method described by Nuefeld (1985).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using automatic temperature compensated refractometers. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages were determined using the National Oceanic and Atmospheric Administration, 2018 Tides and Currents Predictions website located at http://tidesandcurrents.noaa.gov/curr_pred.html.

MONITORING RESULTS

Sample stations 17-01, 17-02, 17-03, 17-04A, 17-07, 17-08, 17-09, 17-10A, 17-13, 17-16, 17-17, 17-21, 17-22 and 17-23 met the statistical criteria for the Approved classification. Sample stations 17-16A, 17-18, and 17-25 failed to meet either the fecal coliform MPN geometric mean value of 14 or the MPN estimated 90th percentile value of 43. Therefore, these three (3) stations, and the associated bodies of water will be classified as Restricted. A fecal coliform bacteriological data summary is included as Table # 2.

CONCLUSIONS AND RECOMMENDATIONS

During the 2020 review period, one station that was previously in the Restricted Classification is now recommended to be upgraded to the Approved Classification based on fecal coliform bacteriological data. Water quality data exhibited by Station 17-21 indicated an improvement as compared to last year’s review and should be upgraded. This area will include Whale Branch at its confluence with the Broad River and extend northeast to the SFMA 17 boundary line.

Hazzard and Habersham Creeks will remain in the Restricted classification. Sample station 17-26 was added in 2017 approximately halfway between stations 17-09 and 17-23 to better analyze water quality in Euhaw Creek.

Sample station 17-22, located in Boyd Creek continued to meet the criteria to remain in the Approved classification. Stations 17-22A and 17-22B were placed in the West and East Branch of Boyd Creek in 2017 to get a better perspective on the water quality in this area.

The Approved classification shall continue to include all portions of the Broad River excluding the Laurel Bay Prohibited Zone. The Chechessee River, Bird Island Creek, as well as the portions of the Pocotaligo River and Coosawhatchie River that are within the boundaries of Area 17, shall remain classified as Approved. The Approved classification will also include Euhaw Creek from its confluence with the Broad River to the headwaters.

Sewage overflows are infrequent and will continue to be managed in accordance with National Shellfish Sanitation Program emergency closure guidelines.

During the harvest season, all Approved portions of the estuary should continue to be placed under a precautionary closure upon issuance of an official National Weather Service Hurricane Warning or upon receipt of four or more inches of rainfall within twenty-four hours, as recorded by the National Weather Service, Southeastern River Forecast Center.

Based upon the findings of this Annual Update, the following classification is recommended:

PROHIBITED

1. Portions of the broad River adjacent to USMC/Laurel Bay WWTP. The closed portion of the Broad River is approximately 1600 meters long by 360 meters wide. Adjacent marshlands are also included.
2. Approximately 1000 meters of Archers Creek and surrounding marshland adjacent to, and west of, the Parris Island Bridge.
3. Portions of Hazzard Creek extending upstream from Station 17-25 to the boundary of Area 17 (including tributaries and adjacent marshlands).

RESTRICTED

1. Habersham Creek, entire waterbody.
2. Hazard Creek from Station 17-25 downstream to its confluence with the Chechessee River at Station 17-17.
3. Haulover Creek, the portion that is south of the Haulover Creek Drive causeway, including all adjacent marshlands.
4. Middle Creek, including all adjacent marshlands, continuing to the boundary of SFMA 17.
5. Big Island Creek, entire waterbody.

CONDITIONALLY APPROVED

None

APPROVED

1. Broad River, entire waterbody excluding the Laurel Bay Prohibited zone.
2. South Haulover Creek, entire waterbody.
3. Coosawhatchie River from the northern boundary of Area 17 to its confluence with Broad River.
4. Pocotaligo River from the northern boundary of Area 17 to its confluence with

Broad River.

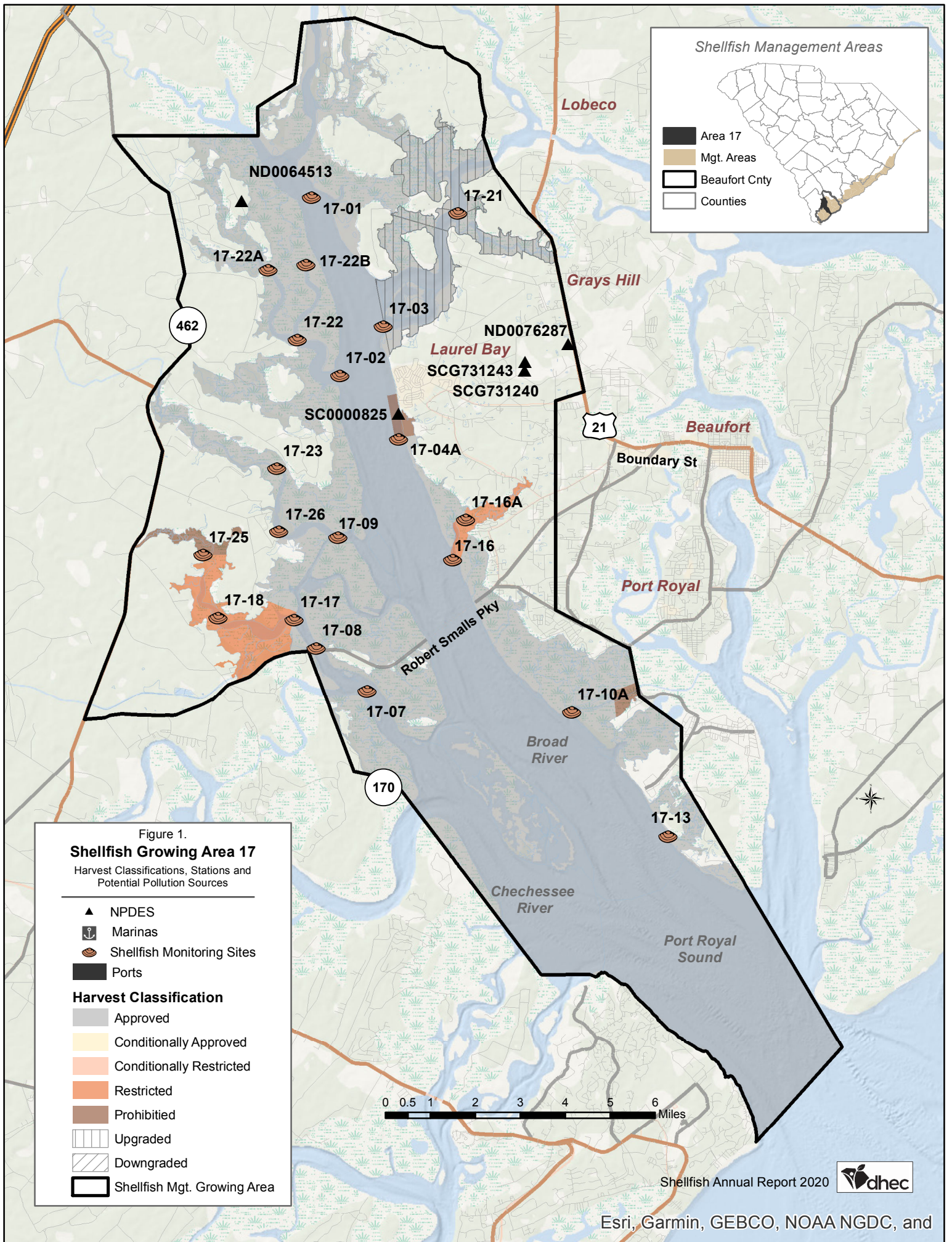
5. Euhaw Creek, from the headwaters to its confluence with Broad River.
6. Bird Island Creek, entire waterbody.
7. Hazzard Creek, from Sample Station 17-17 continuing northwest to Sample Station 17-09.
8. Boyd Creek, entire waterbody, including both branches and all adjacent marshlands.
9. Chechessee River, entire waterbody
10. Archers Creek, from the Prohibited zone (~1000 ft from the Parris Island Bridge) to its confluence with Broad River.
11. Ribbon Creek, from the Parris Island Bridge to its confluence with Broad River.
12. Whale Branch from its confluence with the Broad River continuing northeast to the boundary line of SFMA 17, located at the Whale Branch Fishing Pier.

Station Addition/Re/Deactivation/Modification: None

Analysis of sampling data for Area 17 demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 17 will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured by the National Weather Service, Southeastern River Forecast Center. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). PMP estimates for the coastal United States have been published in a series of hydro-meteorological reports (HMRs) by the National Weather Service (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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Shellfish Management Areas

- Area 17
- Mgt. Areas
- Beaufort Cnty
- Counties

Figure 1.
Shellfish Growing Area 17
 Harvest Classifications, Stations and Potential Pollution Sources

- NPDES
- Marinas
- Shellfish Monitoring Sites
- Ports

Harvest Classification

- Approved
- Conditionally Approved
- Conditionally Restricted
- Restricted
- Prohibited
- Upgraded
- Downgraded
- Shellfish Mgt. Growing Area

TABLE # 1
Shellfish Management Area 17
WATER QUALITY SAMPLING STATIONS DESCRIPTION

<u>Station</u>	<u>Description</u>
17-01	Broad River at S.A.L. Railroad Bridge
17-02	Boyd Creek at Broad River
17-03	Broad River at Whale Branch
17-04A	USMC Laurel Bay WWTP Output (combined 17-04e&17-04f)
17-07	Mouth of Chechessee Creek at Chechessee River
17-08	Chechessee River Bridge
17-09	Mouth of Euhaw Creek at Hazard Creek
17-10A	Confluence of Archers Creek and Broad River (amended 2008)
17-13	Broad River at Creek below Ballast Creek
17-16	Broad River at Corn Island - Mouth of Creek
17-16A	First Split in Habersham Creek above Station 17-16
17-17	Hazard Creek at Chechessee River
17-18	Hazard Creek at Chelsea Plantation Clubhouse
17-21	Confluence of Middle Creek and Whale Branch
17-22	Confluence of East and West Branch of Boyd Creek
17-22A	West Branch Boyd Creek, ~2 miles upstream of Station 17-22
17-22B	East Branch Boyd Creek, ~2 miles upstream of Station 17-22
17-23	Headwaters of Euhaw Creek one mile above Bolin Hall Landing
17-25	Hazard Creek at Second Right Bend above Stations 17-17 & 17-18
17-26	Euhaw Creek, ~0.5 miles South of Bolan Hall Landing

(Total Active - 20)

TABLE #2

**Shellfish Management Area 17
Fecal Coliform Bacteriological Data Summary
From Shellfish Water Quality Sampling Stations Between
January 01, 2017 and December 31, 2019**

Station #	01	02	03	04A	07	08	09	10A	13	16	16A
Samples	34	33	34	33	34	34	33	34	34	33	33
Geometric Mean	6	4	4	3	3	4	4	3	3	6	15
90th percentile	19	11	10	10	8	17	10	9	6	27	107
Water Quality	A	A	A	A	A	A	A	A	A	A	R
Classification	A	A	A	P	A	A	A	A	A	R	R

Station #	17	18	21	22	22A	22B	23	25	26
Samples	33	33	34	33	25	25	33	33	25
Geometric Mean	4	11	7	5	8	4	7	27	4
90th percentile	15	71	31	13	28	11	27	171	15
Water Quality	A	R	A	A	A	A	A	R	A
Classification	R	R	A	A	N/A	N/A	A	P	N/A

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

TABLE #3											
Fecal Coliform Historical Trend Sheet											
Area 17 Stations 90 th ile Values for Annual Updates Related to Rainfall											
Station #	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
17-01	19	28	33	34	36	30	23	13	13	20	20
17-02	11	13	13	14	18	15	11	7	8	14	13
17-03	10	15	19	21	19	17	14	12	15	23	22
17-04A	10	12	14	16	14	11	13	13	18	16	16
17-07	8	11	10	11	10	10	10	8	7	7	7
17-08	17	14	11	11	11	7	6	5	8	11	11
17-09	10	10	13	13	17	12	11	9	11	13	12
17-10A	9	16	15	18	13	11	10	9	8	7	7
17-13	6	8	17	20	20	8	7	5	7	6	6
17-16	27	27	31	47	45	27	18	20	36	27	27
17-16A	107	140	170	176	134	85	60	48	70	82	78
17-17	15	15	15	19	20	15	10	10	10	12	11
17-18	71	72	58	64	72	52	38	26	22	30	29
17-21	31	50	50	52	34	33	23	19	19	22	22
17-22	13	19	40	40	44	18	14	7	11	20	19
17-22A	28	28	49	ND	ND	ND	ND	ND	ND	ND	ND
17-22B	11	16	37	ND	ND	ND	ND	ND	ND	ND	ND
17-23	27	35	60	72	103	60	44	16	15	24	23
17-25	171	139	154	167	158	107	57	40	28	30	30
17-26	15	15	22	ND	ND	ND	ND	ND	ND	ND	ND
Annual Rainfall (inches)	46.26	48.57	51.67	51.15	48.14	44.35	37.56	30.02	28.22	29.04	44.99
ND = No Data Red = Impaired Water Quality											

TABLE #4

**WATER QUALITY
SAMPLING STATION DATA**

Shellfish Management Area 17

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 17

Source:

2017 – 2019 Data

National Weather Service - Southeastern River Forecast Center

Location: Beaufort, South Carolina

2017 Annual Rainfall Summary
Source: National Weather Service - Southeastern River Forecast Center
Location: Beaufort, South Carolina

2017	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	0.08					0.06	1.64		0.51			
2	0.01		0.08		1.25	0.15	0.01		0.96			
3	0.40		0.03			0.08	0.25	1.72	0.01			
4	0.05	0.05		0.70			0.90	0.19		0.02		
5					0.50			1.07				
6				2.37		0.41		0.04				
7	0.93					0.63	0.07	0.01	0.07	0.01		0.29
8	0.02	0.24				0.63	0.01	0.39				0.74
9		0.14					0.17	0.14		0.45	0.07	1.02
10							0.16	0.68	0.02	0.21	0.41	
11							0.47	0.23	1.15			
12		ND					0.01	ND	*5.99			
13					0.11			1.25				
14			0.43		0.68			0.09				
15								0.06				
16		0.13					0.01	ND				
17							0.52	ND		0.17		
18						0.07	1.30	ND				
19								ND				
20				0.13		0.02	0.22	ND				
21	0.01					0.38	0.08	0.10	0.01			0.11
22	1.80	0.01	0.08		0.08	0.27		ND	0.02		0.60	
23	1.73	0.01			2.67	0.16		0.09	0.08	0.23		
24	0.06	0.01		0.12	1.56		0.06	0.04		0.50	0.57	
25				0.01	0.64	0.09	0.74	0.30				0.04
26						1.36	0.16	0.45				
27						0.01	0.42	0.14				
28		0.48				0.02	0.06	0.11				0.04
29			0.05				0.19	0.07				0.10
30						0.03	0.40		0.07			
31			0.16									
Total	5.09	1.07	0.83	3.33	7.49	4.37	7.85	7.17	8.89	1.59	1.65	2.34
*Days highlighted indicate 4 or more inches of rain in a 24 hour period. Blank fields indicate no rainfall.												
* Sample dates are indicated in blue.						ND = No Data			ANNUAL RAINFALL		51.67	

2018 Annual Rainfall Summary

Source: National Weather Service - Southeastern River Forecast Center

Location: Beaufort, South Carolina

2018	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1			0.03			0.10	0.05	0.45		0.01		
2			0.07					0.25	0.03		0.01	1.05
3						0.51		0.99	0.23		0.02	2.50
4	0.69	0.01					0.09	0.78	0.03			
5		0.47					0.09	0.16			0.74	
6							0.03		0.04		0.27	
7			0.06				0.09	0.26	0.03		0.01	
8		0.34		0.41			0.59		0.15	0.56	0.39	
9				0.06		0.63			0.12	0.21		0.49
10		0.65		0.01		0.34		0.01		1.87	0.30	0.79
11	0.02			0.02						0.73		
12	0.05	0.09	0.22			0.01			0.06			
13	0.45	0.01	0.14			0.65			0.01		0.66	
14						0.29	0.79	0.03			0.90	0.96
15					0.02	0.20		0.09			0.24	0.99
16				1.14	0.35		0.04	0.04	0.11			0.02
17					0.20	0.02	1.00					
18			0.03		0.21	0.01	0.87	0.03	0.01			
19			0.17		0.44		0.73	0.06	0.18		0.09	
20			0.29		0.02		2.12	0.64				0.01
21			0.24		0.13	0.02	0.59			0.17		0.07
22					0.05			0.06	0.01			0.01
23	0.10			0.39	0.11		0.02					
24				1.68	0.08	0.11	0.24		0.17		0.20	
25			0.04		0.74	0.19	0.28					
26		0.03	0.07		0.01	0.39	0.06	0.29		0.06	0.04	
27			0.02	0.01	0.02		0.75	0.18		0.10	0.05	
28					1.14	0.07	0.27	0.01	0.16			0.69
29	0.53				0.07		0.06	0.09				0.48
30							0.61		0.67			0.02
31			0.23		0.43		0.68					0.05
Total	1.84	1.60	1.61	3.72	4.02	3.54	10.05	4.42	2.01	3.71	3.92	8.13
*Days highlighted indicate 4 or more inches of rain in a 24 hour period. Blank fields indicate no rainfall.												
* Sample dates are indicated in blue.						ND = No Data			ANNUAL RAINFALL		48.57	

2019 Annual Rainfall Summary
Source: NOAA Southeast River Forecasting Center
Location: Beaufort, South Carolina

2019	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1			0.05	0.01		0.09			0.18		0.08	
2			0.09	0.59					0.09			0.23
3			0.01	0.02	0.16			0.25	0.55			
4	0.01	0.14	1.00		0.30		0.06	0.04				
5	0.38		0.23	0.08	0.72	0.64	0.24	0.84	1.69		0.02	
6			0.03	0.02	0.05	0.60	1.80	0.25	0.54	0.16	0.07	
7				0.12		0.58						
8				0.18	0.07	0.91		0.16		0.01	0.32	
9				0.06		0.92						
10				1.20	0.05	0.70	0.06		0.01			
11				0.19		0.09	0.10	0.02	0.04			
12		0.02	0.02	0.05		2.65	0.10	0.25				
13		0.04		0.24	0.57	2.02		0.14			0.18	0.03
14	0.04				0.02		0.10	0.02		0.10		1.33
15								0.41	0.06		0.59	
16		0.03	0.01				0.03	0.11	0.02	1.54	0.87	
17		0.02						0.43		0.01	1.08	
18	0.02				0.02	0.01		1.02	0.60			0.45
19	0.01	0.04				0.05		0.02	0.10	0.01		
20	0.81	0.07		0.38		0.03				1.71		
21		0.19				0.10		0.02				
22						0.13						0.01
23						0.50		0.25				2.94
24	0.94	0.01				0.01	1.23				0.06	1.75
25	0.05	0.04						0.01				0.04
26			0.07									
27		0.02								0.13		0.01
28		0.01						0.01		0.06		
29						0.12		0.01		0.01		
30	0.02				0.01	0.13				0.32		0.21
31								0.24		0.01		0.01
Total	2.28	0.63	1.51	3.14	1.97	10.28	3.72	4.50	3.88	4.07	3.27	7.01
*Days highlighted indicate 4 or more inches of rain in a 24 hour period. Blank fields indicate no rainfall.												
* Sample dates are indicated in blue.						ND = No Data			ANNUAL RAINFALL		46.26	

TABLE #6
Shellfish Management Area 17
Pollution Event Closures
2017 – 2019

Event	Date(s)	Sample Date(s)	Opening Date	Comments
5.99” of Rainfall	09/12/2017	N/A	N/A	Open Shellfish Harvesting Season was closed. No summer harvest in Area 17 during this time.

TABLE #7
Shellfish Management Area 17
MARINA INVENTORY

Marina	Total Slips	Pump-out Facility	Fuel Dock
None	N/A	N/A	N/A