South Carolina Department of Health and Environmental Control

ENVIRONMENTAL AFFAIRS

SHELLFISH MANAGEMENT AREA 16B

2021 ANNUAL UPDATE

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

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SHELLFISH MANAGEMENT AREA 16B
2021 ANNUAL UPDATE

[Data Through December 2020]

Prepared By:

Josh Reid, Regional Shellfish Program Manager
Environmental Affairs – Office of Law Enforcement
104 Parker Drive
Beaufort, South Carolina 29906

Reviewer:

Mike Marshall, State Shellfish Program Manager
Environmental Affairs – Office of Law Enforcement
927 Shine Avenue
Myrtle Beach, South Carolina 29577

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Data Inclusive Dates:
01/01/18 thru 12/31/20

Classification Change:
___Yes _X_ No

Shoreline Survey Completed: Yes

Prior Report & Date: 2020 Annual Update

(I)ncreased/(D)ecreased/(N)one:
_N_ Approved
_N_ Conditionally Approved
_N_ Restricted
_N_ Prohibited

SUMMARY

For this 2021 Annual Update and the review period of 2018-2020, Shellfish Management Area 16B (SFMA 16B) reflects nearly the same overall water quality indices as documented in the previous annual update. Water quality during this review period continues to be excellent and requires no changes in classification. All stations meet statistical water quality standards criteria for an Approved shellfish classification.

Area 16B is isolated from natural freshwater inflow from other major river systems and, consists of four ocean inlets which routinely exhibits a salinity range typical of near-shore coastal waters.

The bacteriological and shoreline survey data indicate that SFMA 16B is properly classified. No classification changes will be implemented for the 2021-2022 shellfish harvesting season.

Extreme weather events will continue to be issues within the growing area and have proved this in the past. The Area was impacted by Hurricane Matthew in October 2016, as well as Hurricane Irma in 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 depurated 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 16B consists of 31,516 acres of shellfish growing area habitat located in Beaufort County. The area includes the Harbor River/Trenchards Inlet area between

Hunting Island, Fripp Island and St. Helena Island and tributaries including Story River, Station Creek, Old House Creek, Fripp Inlet, Skull Inlet, and Pritchard's Inlet.

The area's northern boundary starts at the intersection of Highway 21 and Seaside Road (SR-77) and parallels Highway 21, crossing Harbor River to the shore of Harbor Island. The eastern boundary is the Atlantic Ocean. The southern boundary extends along the shores of Fripp and Pritchards Islands and continues southwestward to Trenchards Inlet. The western boundary is an imaginary line drawn between Morse Island Creek (part of Area 15) and Station Creek, which then runs parallel with Seaside Road (SR-77) ending at the intersection with Highway 21.

Area 16B is largely rural, with large areas of agricultural land, particularly on St. Helena Island, used for growing vegetables and sod. Shrimp boat docks are located on Wards Creek and Station Creek. There are residential developments on Fripp Island (which include two golf courses and a marina) and Harbor Island. A South Carolina state park and campground is located on Hunting Island. The Area 16B growing area is isolated from natural freshwater inflow from other river systems and, having four inlets, normally exhibits a salinity range typical of near-shore coastal waters.

The shellfish industry in South Carolina is based mainly on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams (*Mercenaria sp.*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State Shellfish Grounds, Culture Permits, and Kings Grant areas.

Shellfish culture permit (C) areas, state shellfish grounds (S), and a recreational ground (R) are designated within the area. There are seven (7) shellfish culture permit areas in Area 16B, which include C097, C102, C103, C105, C106, C107 and C108. The general public is allowed to harvest on eight (8) state shellfish grounds and one (1) Recreational Ground in Area 16B. State Shellfish Ground S094 is Morse Island and S100 is in Trenchards Inlet; S101 is in Station Creek and parts of Harbor River; S104 and S105 are in Harbor River; S106 is in Old House Creek, and S108 is in Johnson Creek. Finally, S127 is located north and south of Sea Island Parkway encompassing Coffin Point in Area 16A and Ward Creek in Area 16B. Recreational Ground R089 is in Station Creek.

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 harvest 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 16B **prior** to this sanitary survey were as follows:

PROHIBITED

1. Fripp Island Marina closure zone (approximately 1,000 feet.)
2. Fripp canal, from Station 16B-06F at Old House Creek to its confluence with Skull Inlet.
3. Gay Fish Company Shrimp Dock closure zone (approximately 783′ radius from center.)

RESTRICTED

None

CONDITIONALLY APPROVED

None

APPROVED

1. Trenchards Inlet, entire waterbody including all tributaries.
2. Skull Creek/Inlet, entire waterbody including all tributaries.
3. Story River, entire waterbody including all tributaries.
4. Old House Creek, entire waterbody excluding the Fripp Marina Prohibited zone.
5. Club Bridge Creek, entire waterbody.
6. Harbor River, entire waterbody including all tributaries.
7. Fripp Inlet, entire waterbody including all tributaries.
8. Johnson Creek, entire waterbody including all tributaries.
9. Wards Creek, entire waterbody excluding the Gay Fish Company Prohibited zone.

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 16B. Extensive visual examination of lands adjacent to the waters of Area 16B 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 – Sewer lines, serving schools and businesses and new subdivisions, have been installed and extend from Lady's Island along Highway 21 to the Beaufort-Jasper Water and Sewer Authority (BJWSA) St. Helena Wastewater Treatment Plant (WWTP). The BJWSA St. Helena WWTP upgraded to an extended aeration type system with gas chlorination. Treated effluent is pumped to Dataw Island where it is spray irrigated on the Cotton Dike and Morgan River golf courses. Effluent is also pumped to a spray site located at a sod farm on St. Helena Island.

Hunting Island State Park utilizes two above ground septic tanks in series, an effluent pump station, and a tile field for effluent disposal. Harbor Island Utilities operates a Smith & Loveless package plant. This facility consists of a two-phase aeration chamber, clarification, and dual Amiad filters with chlorination. Fripp Island Public Service District (PSD) operates a Zenon Membrane Biological Reactor treatment plant. This is a computerized facility that utilizes a low vacuum membrane system to force wastewater through filaments rejecting solids and bacteria. Disinfection is accomplished through a duel bank Wedeco UV system. Standby power and alarm systems are available at both plants. Treated effluent from Harbor Island is pumped to Fripp Island and treated effluent from both plants is stored in lagoons and spray irrigated onto golf courses. An upgrade of the Fripp Island PSD sewer collection system has been completed and a vacuum sewer system now serves as a retrofit to all portions of the island previously not on sewer.

B. Industrial Waste - There is one permitted industrial discharge in Area 16B. This is from the Henry Farms sand mining operation. 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.

Fripp Island Marina, located on Fripp Island, has a marine sewage pump-out facility, as well as fueling capabilities. There is an approximate 1,000' closure zone in place around the marina. Additionally, a 783′ radius Prohibited closure zone encompasses the commercial fishing docks at Gay Fish Company on Wards Creek.

D. Radionuclides - Sources of radionuclides have not been identified within Area 16B, 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.

B. Agricultural Runoff - Area 16B has a high potential for agricultural nonpoint source pollution. There is a substantial amount of commercial crop production throughout the area.

There are also small populations of cattle and horses located sparsely throughout the area.

C. **Individual Sewage Treatment and Disposal (ISTD) Systems** - The majority of homes adjacent to Area 16B utilize ISTDS for wastewater disposal. Some of the facilities at the Hunting Island State Park were forced to utilize Onsite Wastewater Disposal Systems (OSWDS) as the sewage lift stations were compromised by beach erosion. Construction of new homes is continuing at Fripp Island. Depending on their location, these homes utilize either an OSWDS or will be served by the island's sewer system.

D. **Wildlife and Domestic Animals** - Area 16B supports substantial populations of both wildlife and domestic animals. The natural wildlife that can be found in the area include populations of rabbit, white-tailed deer, raccoon, opossum, alligators, rodents, songbirds, shorebirds, and migratory waterfowl typical of the coastal Carolinas.

   Domestic animal populations in the area are generally limited to dogs and cats. However, there are several horse stables within approximately two miles of estuarine waters.

E. **Boat Traffic** - The Harbor River provides access to St. Helena Sound and the Atlantic Ocean for shrimp boats and recreational boaters. Fripp, Pritchards, Skull, and Trenchards Inlets provide access to the Atlantic Ocean. There are three public boat ramps located in Area 16B.

F. **Hydrologic and Habitat Modification** - Hydrologic and habitat modification in estuarine areas requires both State and federal approval. In the 1960's and 1970's dead-end canals were constructed on Harbor and Fripp Islands in order to maximize land development. Estuarine wetlands were filled to create residential lots. These activities have altered flow patterns but have not significantly contributed to water quality degradation outside of the development boundaries.

NATURALLY OCCURRING PATHOGENS

A. **Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 16B. 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 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 pisicida*, 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 30th through October 1st. 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 16B is part of the St. Helena Sound estuary which is a drowned river valley/bar built system containing numerous marsh islands and tidal creeks. It is among the largest of the South Atlantic estuaries. The average depth of the estuary is approximately 12 feet at mid-tide level. Extensive shallow areas and numerous tidal flats exist within the estuary.

Tides in Area 16B are semidiurnal, consisting of two low and high tides each lunar day. Mean tidal range is 5.9 feet during normal tides and 6.9 feet during spring tides. The greatest tidal ranges of the year typically occur around full moon during the months of September through December. Wind speed and direction may cause significant variation in predicted tide heights.

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 2020 annual rainfall total was 56.35 inches. The 10-year annual rainfall totals for this area of 41.79 inches. Hurricane Matthew impacted Area 16B in October of 2016, producing a total of 14.04 inches of rainfall in a two-day period. Hurricane Irma made its impact in September of 2017. Both storms resulted in numerous sewer overflows. 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 at an average speed of 7-10 MPH and September through December normally maintains a north-north easterly wind direction with an average speed of 6-8 MPH (NOAA).

WATER QUALITY STUDIES

DESCRIPTION OF PROGRAM

The Department utilizes a systematic random sampling (SRS) strategy within Area 16B 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 01/01/18 through 12/31/20, five-hundred forty-four (544) surface water samples (<1.0 ft. deep) were collected at the sixteen (16) currently active Area 16B monitoring stations for bacteriological analyses. Samples were collected in 120 ml bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control, Environmental Affairs, 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

All stations within Shellfish Management Area 16B meet the statistical criteria to be classified as Approved. A fecal coliform bacteriological data summary is included as Table # 2.

CONCLUSIONS AND RECOMMENDATIONS

Shellfish Management Area 16B reflects nearly the same overall water quality indices as the prior year's review period. All stations meet the statistical water quality criteria for the Approved shellfish classification therefore there are no changes to the current classifications for the 2021-2022 shellfish harvesting season.

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

All existing marinas should retain their administrative Prohibited Classification. Additionally, 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 - Southeaster River Forecast Center.

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

PROHIBITED

1. Fripp Island Marina closure zone (approximately 1,000 feet.)
2. Fripp canal, from Station 16B-06F at Old House Creek to its confluence with Skull Inlet.
3. Gay Fish Company Shrimp Dock closure zone (approximately 783′ radius from center.)

RESTRICTED

None

CONDITIONALLY APPROVED

None

APPROVED

1. Trenchards Inlet, entire waterbody including all tributaries.
2. Skull Creek/Inlet, entire waterbody including all tributaries.
3. Story River, entire waterbody including all tributaries.
4. Old House Creek, entire waterbody excluding the Fripp Marina Prohibited zone.
5. Club Bridge Creek, entire waterbody.
6. Harbor River, entire waterbody including all tributaries.
7. Fripp Inlet, entire waterbody including all tributaries.
8. Johnson Creek, entire waterbody including all tributaries.
9. Wards Creek, entire waterbody excluding the Gay Fish Company Prohibited zone.

Station Addition/Re/Deactivation/Modification: None

Analysis of sampling data for Area 16B demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 16B 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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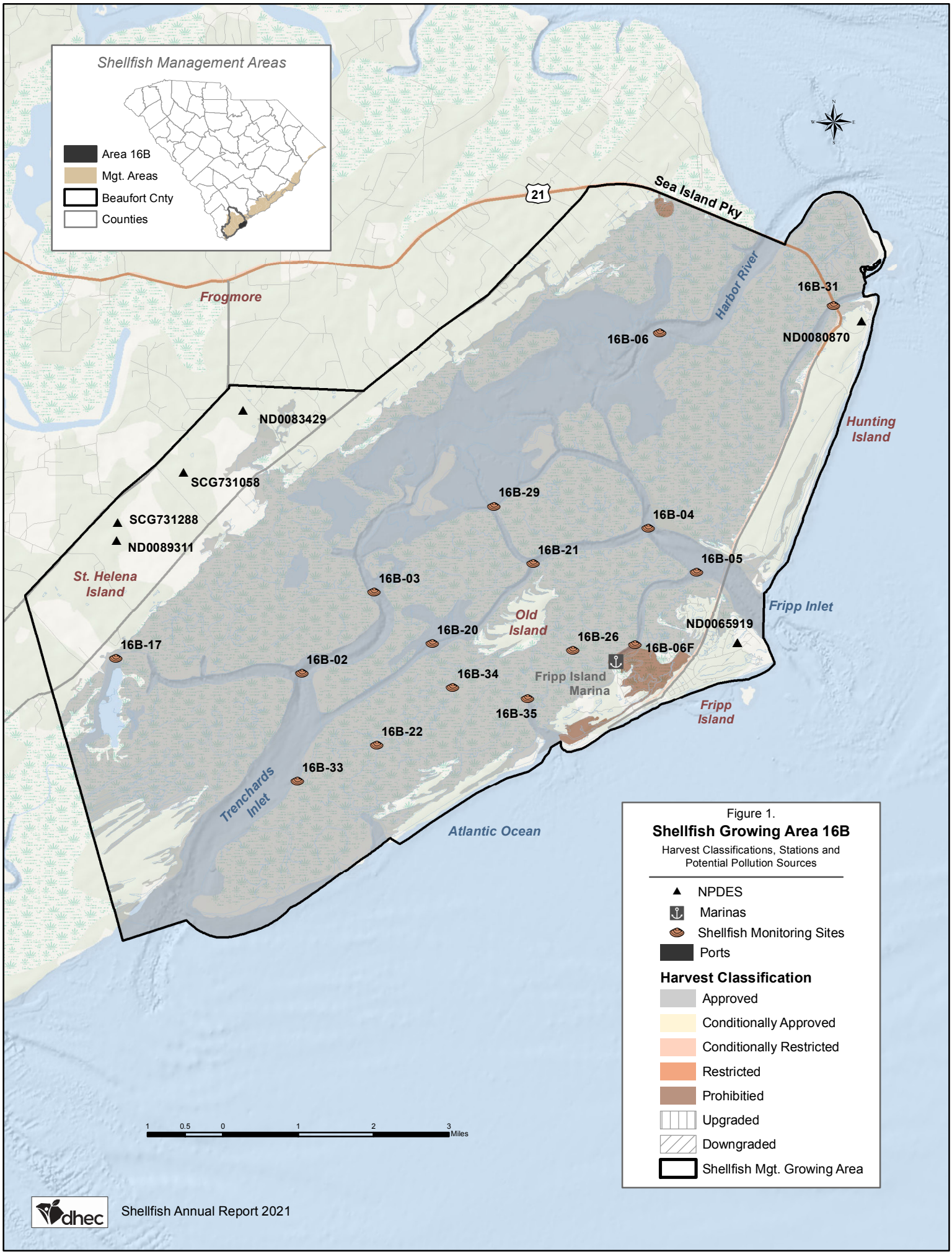
Shellfish Management Areas
Area 16B
Mgt. Areas
Beaufort Cnty
Counties
21
Sea Island Pky
Harbor River
Frogmore
Hunting Island
St. Helena Island
Old Island
Fripp Inlet
Fripp Island
Trenchards Inlet
Atlantic Ocean
Fripp Island Marina
16B-31
16B-06
ND0080870
ND0083429
SCG731058
SCG731288
ND0089311
16B-29
16B-04
16B-21
16B-05
16B-03
16B-20
16B-26
16B-06F
ND0065919
16B-17
16B-02
16B-34
16B-35
16B-22
16B-33
1 0.5 0 1 2 3 Miles
Figure 1.
Shellfish Growing Area 16B
Harvest Classifications, Stations and Potential Pollution Sources
NPDES
Marinas
Shellfish Monitoring Sites
Ports
Harvest Classification
Approved
Conditionally Approved
Conditionally Restricted
Restricted
Prohibitied
Upgraded
Downgraded
Shellfish Mgt. Growing Area

TABLE # 1
Shellfish Management Area 16B
WATER QUALITY SAMPLING STATIONS DESCRIPTION

Station	Description
16B-02	Trenchards Inlet at Mouth of Station Creek
16B-03	Club Bridge Creek at Harbor River Sound
16B-04	Story River at Fripp Island
16B-05	Old House Creek at Fripp Inlet
16B-06	Harbor River at Marker #A-13
16B-06F	Unnamed Creek - Fripp Canal at Old House Creek
16B-17	Station Creek SSG - Beaufort County Landing
16B-20	Two Miles North of Confluence of Story River and Trenchards Inlet
16B-21	Unnamed Creek between Harbor River and Story River
16B-22	Skull Creek at Confluence of Creek Leading to Pritchard's Inlet
16B-26	Old House Creek at Confluence of Two Tributaries in Headwaters Northwest of Fripp Island Marina
16B-29	Midway between Stations 16B-03 and16B-06 at Unnamed Tributary of Story River
16B-31	Johnson Creek at SC Highway 21 Bridge
16B-33	Skull Creek at confluence with Trenchards Inlet
16B-34	Skull Creek, Midway between Skull Inlet and Trenchards Inlet at Confluence with Large Tributary on Northwest Side of Skull Creek
16B-35	Skull Creek at Confluence with First Major Creek on Right Heading Inland from Skull Inlet

(**Total Active - 16**)

TABLE #2

Shellfish Management Area 16B
Fecal Coliform Bacteriological Data Summary
From Shellfish Water Quality Sampling Stations Between

January 01, 2018 and December 31, 2020

Station #	02	03	04	05	06	06F	17	20	21	22	26
Samples	34	34	34	34	34	34	34	34	34	34	34
Geometric Mean	2.1	2.1	2.1	2.9	2.2	5.5	4.4	3	2.1	4.4	4.9
90th percentile	4	4	4	10	4	23	16	13	4	14	18
Water Quality	A	A	A	A	A	A	A	A	A	A	A
Classification	A	A	A	A	A	P	A	A	A	A	A

Station #	29	31	33	34	35
Samples	34	34	34	34	34
Geometric Mean	2.1	4.9	2.9	3.3	3.3
90th percentile	4	19	9	11	12
Water Quality	A	A	A	A	A
Classification	A	A	A	A	A

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

TABLE #3 Fecal Coliform Historical Trend Sheet											
Area 16B Stations 90th%ile Values for Annual Updates Related to Rainfall											
Station #	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**
16B-02	4	3	4	3	3	3	3	3	3	3	4
16B-03	4	4	4	3	5	5	5	3	3	3	4
16B-04	4	3	4	3	2	3	4	4	3	4	4
16B-05	10	7	8	8	7	8	11	13	10	9	8
16B-06	4	5	5	4	4	4	4	4	4	4	4
16B-06F	23	15	18	15	12	9	19	26	24	15	18
16B-17	16	8	9	8	10	7	7	6	6	6	4
16B-20	13	5	4	5	5	4	5	9	9	9	5
16B-21	4	3	4	5	4	4	4	4	3	3	4
16B-22	14	13	15	13	12	16	20	20	17	12	16
16B-26	18	15	19	17	12	8	15	14	20	13	23
16B-29	4	4	5	3	3	3	3	3	4	5	8
16B-31	19	11	15	15	15	10	16	15	16	12	15
16B-33	9	7	8	9	7	8	5	7	5	7	6
16B-34	11	7	11	10	10	7	10	11	15	12	13
16B-35	12	7	8	10	9	8	7	8	10	12	11
Annual Rainfall (inches)	**56.35**	**48.25**	**42.95**	**51.29**	**51.15**	**48.14**	**44.35**	**37.56**	**30.02**	**28.22**	**35.96**
ND = No Data Red = Impaired Water Quality											

TABLE #4

WATER QUALITY SAMPLING STATION DATA

Shellfish Management Area 16B

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 16B

Source:

2018 – 2020 Data
National Weather Service - Southeastern River Forecast Center
Location: Beaufort, South Carolina

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			0.10			0.02		0.22	0.01			
2			0.07					0.07		0.03		0.89
3						0.67		0.41	0.03		0.01	2.61
4	0.74						0.37	0.21				
5		0.28					0.07	0.52			1.18	
6								0.01	0.11		0.33	
7							0.02		0.14			
8		0.17		0.32			0.26	0.01	0.04	0.29	0.41	
9				0.08		0.83			0.01	0.20		0.72
10		0.43		0.05		0.24		0.02	0.01	1.62	0.24	0.38
11	0.01			0.09					0.04	0.02		
12	0.03	0.03	0.22									
13	0.43	0.01	0.13			0.74	0.03		0.02		0.60	
14						0.01	2.58				0.31	1.43
15						0.01					0.36	1.55
16				0.91	0.03			0.01	0.05			
17					0.11		0.53					
18			0.05		0.01	0.05	0.78		0.03			
19			0.16		0.22		0.82				0.09	
20			0.07		0.01		2.16	0.62				0.06
21	0.02		0.37		0.04		0.81		0.03	0.38		0.31
22					0.04			0.05	0.25			
23	0.03			0.30	0.06		0.05		0.01			
24				1.79			0.04		0.04		0.30	
25			0.05		0.07	0.36	0.14	0.03	0.02			
26		0.06	0.06			0.05	0.02	0.10		0.12		
27							0.57		0.01	0.14	0.04	
28					1.62	0.13	0.38	0.08	0.06			0.45
29	0.39				0.14		0.01	0.19	0.04			0.36
30							0.39		0.49			
31			0.18		0.15		0.17					0.09
Total	**1.65**	**0.98**	**1.46**	**3.54**	**2.50**	**3.11**	**10.20**	**2.55**	**1.44**	**2.80**	**3.87**	**8.85**

***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**	**42.95**

2019 Annual Rainfall Summary
Source: National Weather Service - Southeastern River Forecast Center
Location: Beaufort, South Carolina

2019	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1						0.13			0.19		0.10	
2			0.03	0.59			0.10					0.21
3				0.06	0.15			0.38	0.41			
4	0.02	0.16	1.29		0.01			0.05				
5	0.30		0.22	0.03	0.12	1.87	0.22	0.56	3.05	0.16	0.02	
6			0.04	0.09		0.37	1.45	0.15	0.66	0.74		
7				0.07		1.48						
8				0.63		2.58		0.01		0.08	0.29	
9				0.07	0.03	0.59					0.02	
10				1.12	0.10	0.14	0.07					
11				0.01			0.11					
12		0.06	0.01	0.07		1.74		0.01				
13		0.01		0.01	1.10	1.28					0.14	0.01
14	0.09				0.06		0.12	0.11		0.07		1.31
15								0.17			0.51	
16		0.02					0.01	0.53		2.29	0.42	
17		0.01	0.01		0.01			1.84		0.01	1.13	
18	0.01					0.01		1.34	0.24			0.32
19	0.02	0.06								0.02		
20	0.59	0.05		0.27						2.22		
21		0.26				0.04						
22						0.03				0.03		0.01
23						1.16						2.53
24	0.76						0.99				0.06	1.79
25	0.04	0.01						0.12				0.04
26			0.06	0.01								
27		0.01								0.02		
28		0.02						0.02		0.10		
29						0.04		0.04				0.02
30	0.02					0.01				0.01		0.28
31								0.07		0.01		
Total	**1.85**	**0.67**	**1.66**	**3.03**	**1.58**	**11.47**	**3.07**	**5.40**	**4.55**	**5.76**	**2.69**	**6.52**

***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**	**48.25**

2020 Annual Rainfall Summary
Source: National Weather Service - Southeastern River Forecast Center
Location: Beaufort, South Carolina

2020	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1		0.36		0.32	0.14		0.01				0.01	0.92
2							0.03				0.07	
3			0.20				0.50	0.10				
4	0.12		0.06					1.13				
5	0.14		2.31			0.34						0.10
6			1.73			0.02	0.60	0.03	0.52	0.01		
7		0.94				0.01	3.51	0.02	1.81		0.86	0.01
8							2.92		0.02			0.01
9					0.02	0.16	0.04		1.52		0.18	
10						0.01	0.02	0.12	0.14		0.02	
11	0.04			0.01						0.15	0.54	
12	0.03		0.34			0.02	0.01	0.09	0.05		0.63	
13	0.07			0.10		3.32					0.57	
14		0.25		1.80				0.44				
15		0.08		0.05		0.67		0.22		0.04		0.03
16			0.02	0.24				0.02	0.02		0.08	0.01
17	0.16	0.26						0.26	0.32			0.62
18									0.53			
19	0.01	0.26				0.26						
20	0.01			3.37		0.46		0.07				0.01
21		0.68		0.04	0.45			0.06				0.21
22										0.36	0.08	
23					0.32		0.25	0.22			0.09	
24	0.09			2.50		1.55		0.26		0.02		0.10
25	0.13	0.70	0.01			0.05	0.18	1.60	0.03	0.21		0.45
26		0.08	0.06		0.06			0.01	1.48	0.03		
27	0.10	0.10			0.61			0.13				
28					0.03	0.08			0.16		0.10	
29		0.01					0.04	0.05	0.97		0.41	
30	0.30			0.17	0.06		0.04		0.59	0.37	0.20	
31					0.28		0.45	0.07				0.02
Total	**1.20**	**3.72**	**4.73**	**8.60**	**1.97**	**6.95**	**8.60**	**4.90**	**8.16**	**1.19**	**3.84**	**2.49**

***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**	**56.35**

TABLE #6
Shellfish Management Area 16B
Pollution Event Closures
2018 – 2020

Event	Date(s)	Sample Date(s)	Opening Date	Comments
N/A				

TABLE #7
Shellfish Management Area 16B
MARINA INVENTORY

Marina	Total Slips	Pump-out Facility	Fuel Dock
Gay Fish Co	N/A	No	Yes
Fripp Island Marina	75	Yes	Yes