South Carolina Department of Health and Environmental Control

ENVIRONMENTAL AFFAIRS

SHELLFISH MANAGEMENT AREA 09A

2023 ANNUAL UPDATE

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

September 2023

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SHELLFISH MANAGEMENT AREA 09A
2023 ANNUAL UPDATE

[Data Through December 2022]

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2023 ANNUAL UPDATE
Shellfish Management Area 09A

Data Inclusive Dates:
01/01/20 thru 12/31/22

Classification Change:
__X__ Yes ___ No

Shoreline Survey Completed: Yes

(I)ncreased/(D)ecreased/(N)one:
__I__ Approved
__N__ Conditionally Approved
__D__ Restricted
__N__ Prohibited

Prior Report & Date: 2022 Annual Update

SUMMARY

Based on reviews of fecal coliform bacteriological data and a pollution source survey within Shellfish Management Area 09A (SFMA 09A), there is one classification change recommended for the upcoming 2023-2024 shellfish harvesting season. Station 09A-18 (AIWW at Wild Dunes Golf Course storm drainage outfall) now meets the criteria for an Approved water quality classification.

INTRODUCTION

PURPOSE AND SCOPE

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

The United States Food and Drug Administration (USFDA) uses The National Shellfish Sanitation Program's (NSSP) *Guide for the Control of Molluscan Shellfish* to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of

performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria, consistent with the NSSP Model Ordinance, are used by S.C. Regulation 61-47, Shellfish 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 the 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 the 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 the National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish methodology.

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

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvesting classification of shellfish growing waters designated as Shellfish Management Area 09A (SFMA 09A). SFMA 09A consists of approximately 7,044 acres of shellfish growing area habitat located in Charleston County, South Carolina. The area consists of the Atlantic Intracoastal Waterway (AIWW) and four main creeks: Conch, Hamlin, Inlet and Swinton. SFMA 09A extends in a generally northeast to southwest direction, from approximately one quarter mile south of Morgan Creek to the Charleston Harbor. The northern boundary is an imaginary line extending from 41st Avenue on the Isle of Palms, through Gray Bay, to the Mount Pleasant mainland near Six Mile Road. US Highway 17 defines the area's western boundary. The southern boundary is the Charleston Harbor. The eastern boundary consists of the Atlantic Ocean shoreline of the Isle of Palms and Sullivan's Island.

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

There are six (6) State Shellfish Grounds (SSGs) within Area 09A: S217, S222, S251, S252, S254 and S255. Additionally, two (2) Recreational Shellfish Grounds (R) are in SFMA 09A: R234 encompasses Gray Bay, while R252 consists of upper Hamlin Creek and its adjacent marshland. Three (3) King's Grants (G) are in SFMA 09A: G219, G247, and G253. There are five (5) Culture Permits (C) and three (3) Mariculture Permits (M) leases within SFMA 09A.

The shellfish harvesting season in South Carolina typically extends from October 1 through May 31. The South Carolina Department of Natural Resources (SCDNR) has the authority to alter the shellfish harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

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

The harvesting classifications of SFMA 09A **prior** to this sanitary survey were as follows:

PROHIBITED

1. The AIWW, from the border with Area 08 approximately 1,000 feet south.

2. Hamlin Creek, the full width of the creek extending approximately 1,565 feet to the north and 939 feet to the south of Two Island Marina/Long Island Yacht Harbor (based upon Division of Water Quality modeling dated 03/15/2002).
3. The Cove, along Sullivan's Island, between Charleston Harbor and the Ben Sawyer Bridge (Station 09A-09).

RESTRICTED

1. The Atlantic Intracoastal Waterway (AIWW) between Station 09A-19 and 09A-18.

CONDITIONALLY APPROVED

None

APPROVED

All other waters of SFMA 09A.

Station Additions/Deactivations/Modifications: None

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

Shoreline surveys of Shellfish Management Area 09A (SFMA 09A) are conducted by the South Carolina Department of Health and Environmental Control, Environmental Affairs, Lowcountry – Charleston, Shellfish Sanitation Staff**,** by watercraft, vehicle, and on foot, during the survey period and are ongoing.

POINT SOURCE POLLUTION

A. Municipal and Community Waste Treatment Facilities - The Mount Pleasant Waterworks (SC0040771) operates two wastewater treatment plants (WWTP) within SFMA 09A, one located on Rifle Range Road and the other located on Center Street. Neither of these facilities discharge to SFMA 09A waters, their discharge is to the Charleston Harbor (Outfall 005) in SFMA 10B as well as various land applications (Outfalls 006-008). The town of Sullivan's Island WWTP (SC0020052) discharges to Cove Creek (Outfall 001), into the Administratively Prohibited waters immediately adjacent to Ben Sawyer Boulevard. Isle of Palms has two wastewater treatment plants. The Forest Trails WWTP (SC0025283), located on Isle of Palms, discharges treated effluent into the AIWW adjacent to 41st Avenue (Outfall 001) and land applies to the Wild Dunes Beach and Racquet Club Golf Course (Outfall 002). The Wild Dunes WWTP (ND0062260) does not have a direct discharge into shellfish waters. The facility utilizes extended aeration with a holding pond and the treated effluent is land applied to the Wild Dunes Links and Harbor Golf Course (Outfall 001) and on 2 acres at the Forest

Trails WWTP itself (Outfall 003). Refer to the Shellfish Growing SFMA 09A map included in this report. Additionally, the Isle of Palms (SC0043583) and Mount Pleasant Waterworks (SC0043273) both operate Reverse Osmosis (RO) water treatment plants within the area, however there is no fecal coliform component associated with the effluents. Mount Pleasant Waterworks discharges to the Lower Wando in SFMA 9B. Isle of Palms discharges to Lower Hamlin Creek.

The table below summarizes all instances where WWTP facilities exceeded their allowed permit values for fecal coliform, the Discharge Monitoring Report (DMR) value of that violation, and flow value. For the 2020-2022 reporting years for this Annual Update, there were no instances of permit violations for fecal coliform parameters.

National Pollutant Discharge Elimination System (NPDES) Permitted Facilities			
Permit #	**Facility**	**Outfalls**	**Permitted Flow (Gallons Per Day)**
SC0040771	Mt. Pleasant WWTP	005-Chas. Harbor (Combined outfalls 001-004) 006-Land App. (Sloan Park) 007-Land App. (Center St. Ballfield) 008-Land App. (Commissioners Ops. Center)	9,570,336 GPD
SC0020052	Sullivan's Island WWTP	001-Discharge to AIWW via Cove Creek	563,600 GPD
SC0025283	IOP Forest Trails WWTP	001-Discharge to AIWW 002-Land App. (Golf Course)	300,000 GPD
ND0062260	IOP Wild Dunes WWTP	001-Land App. (Golf Course) 002-Discharge to Forest Trails 003-Land App. (WWTP)	1,070,000 GPD
SC0043583	Isle of Palms Reverse Osmosis	001-Unnamed tributary to Lower Hamlin Creek	N/A
SC0043273	Mt. Pleasant Reverse Osmosis	001-Unnamed tributary to Cooper River in Area 10B	N/A

WWTP Discharge Monitoring Report Violations 2020-2022					
Facility	**Limit**	**Violation**	**Outfall**	**Report Date**	**Monthly Avg. Flow (Gallons Per Day)**
Mt. Pleasant WWTP	200 FC/100 ml	None			
	400 FC/100 ml	None			
Sullivan's Island WWTP	501 E.Coli/100 ml	None			
	14 FC/100 ml	None			
	43 FC/100 ml	None			
IOP Forest Trails WWTP	14 FC/100 ml	None			
	43 FC/100 ml	None			
IOP Wild Dunes WWTP	14 FC/100 ml	None			
	43 FC/100 ml	None			

The town of Isle of Palms wastewater collection system, serviced by the Forest Trails WWTP and Wild Dunes WWTP, had one reported sanitary sewer overflows (SSO's) for 2020-2022. The town of Mount Pleasant wastewater collection system had two reported SSO's for 2020-2022 that affected SFMA 09A. The town of Mount Pleasant had eight additional SSO's that did not impact SFMA 09A. Finally, the Sullivans Island WWTP had three SSO's within SFMA 09A but none entered waters within the growing area.

Sanitary Sewer Overflows 2020-2022				
Mt. Pleasant				
Date	**Location**	**Gallons Released**	**Waterbody Entered**	**SFMA**
11/5/20	Retention pond located at 1500 Pearl Tabby Drive	20,000	N/A	09B
11/10/20	Pond Located In The Back Of Franke Homes Adjacent To Long Grove	67,000	N/A	09A
11/13/20	Storm Drain That Leads To Shem Creek	4,500	Shem Creek	10B
12/19/20	A Creek Behind The Pump Station That Leads To Shem Creek	800	Shem Creek	10B
6/20/2021	Retention Pond at the end of Stratton Ferry Court	3,500	N/A	09B
8/7/2021	Near 1450 Chandler Rd.	150	N/A	10A
2/14/22	Von Kolnitz Rd	3,000	Shem Creek	10B
5/6/22	Shem Creek	4,500	Shem Creek	10B
6/21/22	Storm Catch Basin 206	375	Marsh	09A
Isle of Palms				
12/11/20	5700 Palm Blvd	2,000	N/A	09A
Dewees Island				
N/A	N/A	N/A	N/A	N/A
Sullivans Island				
1/17/20	Sullivans Island WWTF	80,000	N/A	09A
4/23/20	Sullivans Island	7,200	N/A	09A
8/21/20	Station 23-24 on Raven Street	45,000	N/A	09A

Available hydrographic information suggests a possible impact from sources located outside the growing area. The area from the Charleston Harbor extending northeast to the Ben Sawyer Bridge appears to be impacted during certain hydrographic conditions by waters originating in the Charleston Harbor (Cleveland, 1967). Effluent from wastewater treatment plants discharging into the harbor may be impacting extreme southwestern portions of SFMA 09A. Flow calculations have established time and distance of travel and place the effluent plumes within the Cove at Sullivan's Island. Due to public health concerns, southwestern portions of SFMA 09A from Ben Sawyer Boulevard to the Charleston Harbor will remain Administratively Prohibited.

B. **Industrial Waste (Discharges)** - Currently there are no operational industrial wastewater discharges located within the boundaries of SFMA 09A.

C. **Marinas** – In 2007, prompted by a SCDHEC Office of Coastal Resource Management (OCRM) marina definition change, SCDHEC Shellfish adopted the following marina definition. S.C. Regulation 61-47, Shellfish defines Marina as any of the following: (1) locked harbor facility; (2) any facility which provides fueling, pump-out, maintenance or repair services (regardless of length); (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.

Prior to the 2007 definition change, there were three recreational marinas located within SFMA 09A. Two of these facilities, Two Island Marina and Long Island Yacht Harbor, are located adjacent to Breach Inlet. Combined, these two marinas typically accommodate approximately 55 boats. Neither fuel nor sewage pump-out services are provided at either marina. An Administratively Prohibited closure zone has been established around these two marinas. Additionally, Toler's Cove is located west of the AIWW, adjacent to the south side of the Ben Sawyer Boulevard. This recreational marina provides rental slips to the boating public as well as slips for condominium/homeowner use. It has 143 wet slips and 9 jet-ski docks and provides both diesel and gasoline fueling services and wastewater pump-out services. Toler's Cove is located entirely within the Administratively Prohibited area south of Ben Sawyer Boulevard. Table #6 is included at the end of this report, providing additional detail on SFMA 09A boat docking facilities.

D. **Radionuclides** - Sources of radionuclides have not been identified within SFMA 09A, and no other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

A. **Urban and Suburban Stormwater Runoff** - Previous shoreline surveys conducted in SFMA 09A revealed a high concentration of homes throughout most uplands adjacent to the shellfish growing area. Single-family homes continue to be built along the mainland

shores as well as on Goat Island, Sullivan's Island, Isle of Palms and Toler's Cove. Stormwater runoff may adversely impact shellfish water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

There are three dredge spoil areas located along the AIWW between Hamlin Creek and Inlet Creek. The Army Corps of Engineers conducted a dredging project within SFMA 09A on the AIWW in December 2015 to restore the waterway to navigable depths.

The uplands surrounding the shellfish growing waters of SFMA 09A consist of various soil textures defined by the United States Department of Agriculture (USDA), Soil Conservation Service (1971) utilizing general classifications and descriptions. Although lands within SFMA 09A consist of numerous soil types, the area is generally comprised of Rutlege-Scranton-Pamlico soils, made up of low, broad flats and long, nearly level, sandy ridges. The area is interlaced with the Chipley series, which is loamy, fine sand. The USDA (1971) further describes these soils as "somewhat poorly drained to very poorly drained, nearly level to depressional, sandy and mucky soils."

B. **Agricultural Runoff** - There are no permitted agricultural facilities located in SFMA 09A. The uplands and barrier islands of SFMA 09A are all heavily developed, either residentially or commercially, with little to no agricultural activity. The lack of concentrated agricultural activity near the shoreline of the growing waters precludes contamination of shellfish waters from agricultural runoff.

C. **Individual Sewage Treatment and Disposal Systems** - Homes adjacent to shellfish growing waters on Isle of Palms and Sullivan's Island are all served by sanitary sewer. Goat Island, located between Isle of Palms and Gray Bay, is served solely by individual septic systems. Isle of Palms and Goat Island are of special concern, as all water sampling stations near these two areas in SFMA 09A have, at one time or another, been impaired (see Table #3). On Isle of Palms, many of the yards of homes on septic systems are prone to flooding after heavy rainfall, and the Isle of Palms Fire Department has been observed on previous occasions using their trucks to pump the floodwaters out of streets and yards, either onto the beach or into the AIWW behind the island. Standing floodwaters over septic tile fields would be a considerable source of fecal coliform bacteria being introduced into shellfish growing waters.

Cassina Plantation also has approximately 33 homes on individual septic systems. This area is near station 09A-24 in upper Inlet Creek. Each system requires inspection by South Carolina Department of Health and Environmental Control's, Environmental Affairs, Bureau of Environmental Health Services Lowcountry – Charleston, On-site Wastewater Section and approval before final installation.

D. **Wildlife and Domestic Animals** - SFMA 09A supports a large population of domestic animals attributable to the number of private residences along the shores of Mount Pleasant, Isle of Palms, Sullivan's Island and Goat Island and are a likely contributor to fecal coliform levels in the Area. The Area also supports moderate wildlife populations, primarily various types of marine water birds typical of coastal South Carolina. The water

birds are present all year in the area, however, are in higher concentrations during the summer months because of migratory nesting season and may contribute minimally to fecal coliform levels at that time.

E. **Boat Traffic** - Recreational boat traffic is heavy in the area throughout the year. Commercial traffic in the AIWW is moderate and consists primarily of tugs and barges. Commercial fisheries boats, primarily shrimpers and crabbers ranging in size from 16 to 50 feet, operate in accordance with seasonal fisheries. During the recreational shrimp-baiting season, typically extending from mid-September through mid-November, recreational traffic is very heavy.

F. **Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites.

NATURALLY OCCURRING PATHOGENS

A. **Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within SFMA 09A. 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 SFMA 01. 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 pisicida*, the Department participates in a State Task Group on Toxic Algae and operates a toxic algae emergency response team. The Department also has a Marine Biotoxin Contingency Plan in place that must be evaluated and updated annually.

B. ***Vibrio Management Plan*** – Because State water temperatures exceed 81 degrees Fahrenheit (F) during June through September; *Vibrio* 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 of oysters is typically closed from June 1 through September 30th. Because R.61-47 does not specifically address control of wild-stock harvest from waters exceeding 81 degrees F, the Department will recommend to and request of SCDNR that the wild stock harvesting season not be opened until October 1. The Department is currently not opposed to the issuance of special wild-stock harvest permits to Certified Shippers during the closed season as long as special permit conditions are included. 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

Shellfish Management Area 09A is comprised of tidal creeks, shallow bays and associated tidal marshlands. The creeks within the area range from 20 to 300 feet in width. Maximum depths approach approximately 20 feet. Additionally, the AIWW traverses the area's entire length in a northeasterly-southwesterly direction. The AIWW is maintained at a mean low water depth of 12 feet by the US Army Corps of Engineers. The major conduits of water flowing into and out of the area are: the AIWW on the northeastern border, Breach Inlet, between Sullivan's Island and the Isle of Palms which defines the eastern extent of the area, and, during low river flow conditions, the Charleston Harbor on the southwestern border. The influence of high-salinity ocean water, entering the area via these inlets, provides high flow and a subsequent flushing action that assists in moderating the effects of rainfall runoff on water quality. The entire area is approximately four miles wide (northwest to southeast) and seven miles long (southwest to northeast).

Tides in SFMA 09A are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in Hamlin Creek along the Isle of Palms are 5.1 feet during normal tides and 6.7 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

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

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 2022 precipitation total recorded for SFMA 9A was 48.86 inches.

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

Freshwater rivers do not discharge directly into Area 09A. Freshwater influence is primarily due to rainfall, although, during periods of high flow in the Cooper River, brackish water may enter via Charleston Harbor.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within SFMA 09A in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

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

Seven Hundred and Ninety-Five (795) SRS surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from twenty-three (23) active water quality sampling stations in SFMA 09A during the period 01/01/20 through 12/31/22. Additionally, many special bacteriological samples were collected during the review period for non-classification purposes, usually associated with reopening the area following a precautionary closure. The samples utilized for this report were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control's, Environmental Affairs, Lowcountry – Charleston Laboratory in North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. At the laboratory, sample sets exceeding a 30-hour holding time or containing a temperature control in excess of 10 degrees Celsius were discarded (APHA, 1970).

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

MONITORING RESULTS

No station exceeds a fecal coliform geometric mean MPN value of 14.

No station exceeded a fecal coliform geometric mean MPN value of 43.

No station exceeded a geometric mean MPN value of 88 and no stations exceeded a fecal coliform MPN estimated 90^{th} percentile value of 260. Fecal coliform data summaries are provided in Table #2.

CONCLUSIONS

Based on the review of the fecal coliform bacteriological data and the pollution source survey for the upcoming 2023-2024 shellfish season, SFMA 09A should retain an Approved classification in the entire growing area except for areas where an Administrative Prohibited Zone is in plance. Although SFMA 09A exhibits excellent water quality it still can be impacted by both point and nonpoint source pollution.

POINT SOURCE IMPACTS

Available hydrographic information suggests a possible impact from sources located outside the growing area. The area from the Charleston Harbor extending northeast to the Ben Sawyer Bridge appears to be impacted during certain hydrographic conditions by waters originating in the Charleston Harbor (Cleveland, 1967). Effluent from wastewater treatment plants discharging into the harbor may be impacting extreme southwestern portions of SFMA 09A. Flow calculations have established time and distance of travel and place the effluent plumes within the Cove at Sullivan's Island. Due to public health concerns, southwestern portions of SFMA 09A from Ben Sawyer Boulevard to the Charleston Harbor will remain Administratively Prohibited.

NONPOINT SOURCE RUNOFF

Stormwater runoff continues to be the major source of fecal coliform bacteria throughout the area. Moderate animal populations, both domestic and wild, likely impact water quality in the area. Nearly all of the upland shoreline has waterfront residential property directly along the marsh. Development in close proximity to shellfish harvesting waters is a likely contributor to lower water quality within the area. Overland runoff in SFMA 09A, however, appears to be mitigated by coastal ocean water entering the estuary through Breach Inlet.

RECOMMENDATIONS

There will be one classification change recommended for the 2023-2024 shellfish harvesting season within SFMA 09A. Station 09A-18 (AIWW at Wild Dunes Golf Course storm drainage outfall) now meets the criteria for an Approved water quality classification and the Approved area will now continue to the boundary of the Prohibited zone (1,000 ft south from the SFMA 08 border on the AIWW) for the upcoming shellfish harvesting season. Below are the recommendations for classifications for the upcoming season:

PROHIBITED

1. The AIWW, from the border with Area 08 approximately 1,000 feet south.

2. Hamlin Creek, the full width of the creek extending approximately 1,565 feet to the north and 939 feet to the south of Two Island Marina/Long Island Yacht Harbor (based upon Division of Water Quality modeling dated 03/15/2002).
3. The Cove, along Sullivan's Island, between Charleston Harbor and the Ben Sawyer Bridge (Station 09A-09).

RESTRICTED

None

CONDITIONALLY APPROVED

None

APPROVED

All other waters of SFMA 09A.

Station Additions/Deactivations/Modifications: None

Analysis of sampling data for SFMA 09A demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of SFMA 09A will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured by the National Weather Service's Southeastern River Forecast Center. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). The National Weather Service publishes PMP estimates for the coastal United States in a series of hydro-meteorological reports (HMRs) (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*).

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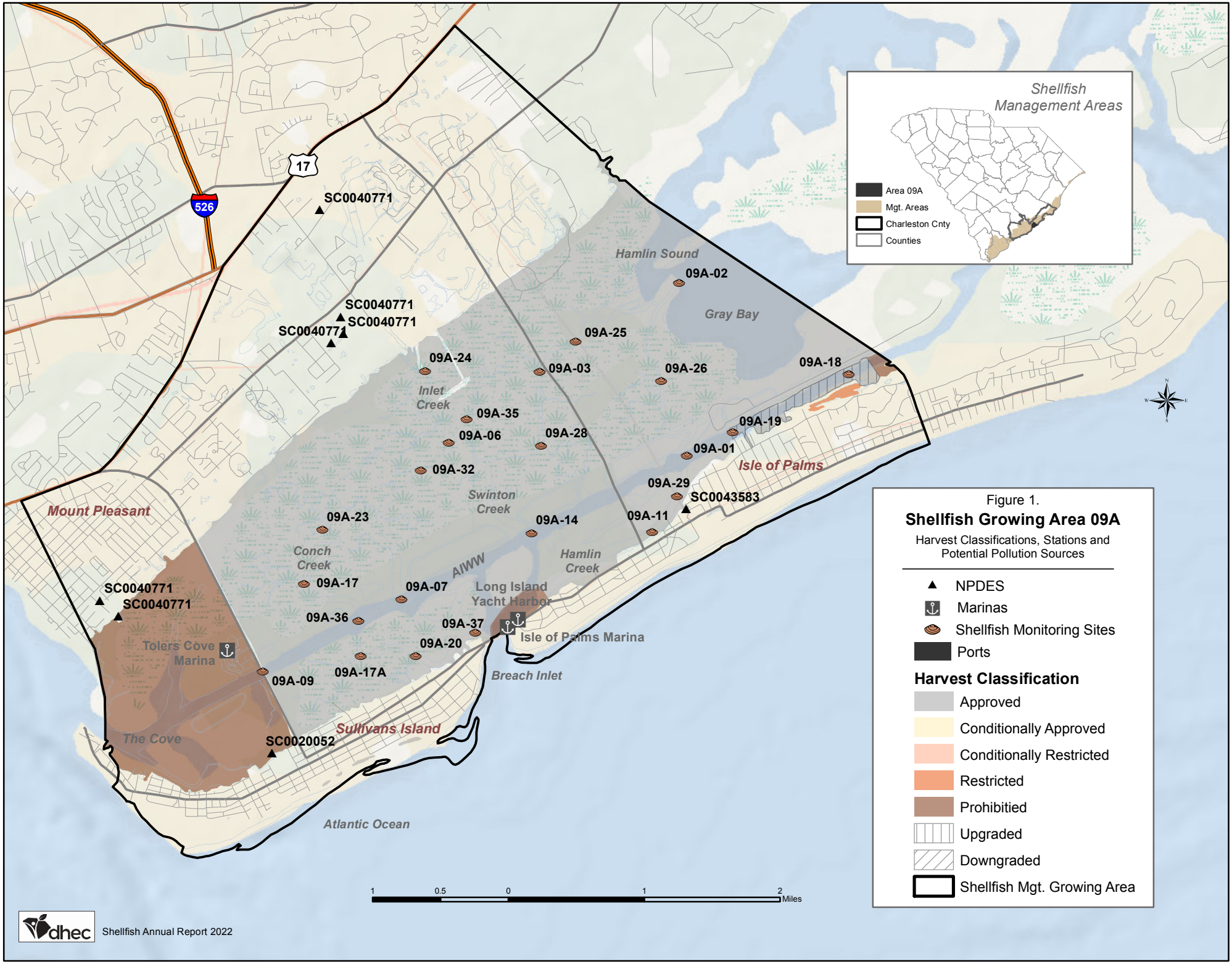
Shellfish Management Areas
Area 09A
Mgt. Areas
Charleston Cnty
Counties
17
526
SC0040771
SC0040771
SC0040771
SC0040771
Hamlin Sound
09A-02
Gray Bay
09A-25
09A-24
09A-03
09A-26
09A-18
Inlet Creek
09A-35
09A-06
09A-28
09A-19
09A-01
09A-32
Isle of Palms
09A-29
SC0043583
Swinton Creek
09A-11
09A-14
09A-23
Mount Pleasant
Conch Creek
AIWW
Hamlin Creek
09A-17
09A-07
Long Island Yacht Harbor
SC0040771
SC0040771
09A-36
09A-37
Isle of Palms Marina
09A-20
Tolers Cove Marina
09A-17A
09A-09
Breach Inlet
Sullivans Island
The Cove
SC0020052
Atlantic Ocean
1
0.5
0
1
2
Miles
Figure 1.
Shellfish Growing Area 09A
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 09A
Water Quality Sampling Stations Description

Station	Description
09A-01	Hamlin Creek at the AIWW
09A-02	Upper Hamlin Creek at Gray Bay
09A-03	Upper Swinton Creek at fork north of Station 9A-28
09A-06	Upper Inlet Creek at Gentide Creek
09A-07	Inlet Creek at the AIWW
09A-09	AIWW at SC Hwy 703 bridge (Ben Sawyer Bridge)
09A-11	Lower Hamlin Creek at 10th Street, Isle of Palms
09A-14	Swinton Creek at the AIWW
09A-17	Upper Conch Creek at fork
09A-17A	Lower Conch Creek at fork
09A-18	AIWW at Wild Dunes Golf Course storm drainage outfall
09A-19	AIWW at 25th Street, Isle of Palms
09A-20	Lower Conch Creek at Lofton Creek
09A-23	Upper Conch Creek at second fork
09A-24	Upper Inlet Creek at sharp bend above Station 9A-06 near causeway
09A-25	Upper Swinton Creek at SC Hwy 517 bridge (IOP Connector)
09A-26	Upper Hamlin Creek midway between Stations 9A-01 and 09A-02
09A-28	Upper Swinton Creek at second bend
09A-29	Lower Hamlin Creek at SC Hwy 517 bridge (IOP Connector)
09A-32	Upper Inlet creek at first creek downstream of Station 9A-06
09A-35	Gentide creek at the power lines
09A-36	Conch Creek at the AIWW
09A-37	Lower Conch Creek at Breach Inlet

(Total Active – 23)

TABLE #2

Shellfish Management Area 09A
FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
From Shellfish Water Quality Sampling Stations Between

January 1, 2020 to December 31, 2022

Station #	01	02	03	06	07	09	11	14	17	17A
SAMPLES	35	34	35	34	35	35	35	34	34	34
GEOMEAN	4.7	2.2	4.1	4.1	3	3.7	4.1	2.7	3.4	2.6
90TH %ILE	22	5	20	16	8	14	16	7	9	6
WATER QLTY	A	A	A	A	A	A	A	A	A	A
CLASSIFICATION	A	A	A	A	A	P	A	A	A	A

Station #	18	19	20	23	24	25	26	28	29	32
SAMPLES	34	34	35	35	35	34	34	35	35	34
GEOMEAN	6.4	4.2	3	4.5	5.8	3.5	2.5	3.4	5.5	3.7
90TH %ILE	39	17	9	18	38	11	6	11	26	13
WATER QLTY	A	A	A	A	A	A	A	A	A	A
CLASSIFICATION	P	R	A	A	A	A	A	A	A	A

Station #	35	36	37
SAMPLES	35	35	35
GEOMEAN	4.7	3.7	2.8
90TH %ILE	17	12	9
WATER QLTY	A	A	A
CLASSIFICATION	A	A	A

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

Table #3 Fecal Coliform Historical Trend Sheet											
Area 09A Stations 90^{tho}%ile Values for Annual Updates Related to Rainfall											
Station #	**2022**	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**
09A-01	22	14	14	12	12	15	11	16	11	17	16
09A-02	5	4	4	4	5	4	4	5	5	5	3
09A-03	20	16	13	29	34	26	6	9	11	11	10
09A-06	16	15	18	26	31	20	8	9	9	10	8
09A-07	8	9	14	12	12	7	4	8	8	8	4
09A-09	14	14	17	18	20	15	8	13	13	13	7
09A-11	16	16	13	13	13	13	7	10	12	20	20
09A-14	7	6	6	12	12	10	3	6	7	7	7
09A-17	9	9	12	23	24	18	6	14	12	12	6
09A-17A	6	7	8	12	12	10	5	11	10	11	9
09A-18	39	58	83	133	182	98	50	39	31	42	24
09A-19	17	23	44	57	51	23	12	15	18	25	22
09A-20	9	7	8	12	14	12	5	6	6	7	10
09A-23	18	17	25	36	39	21	7	18	15	20	13
09A-24	38	39	34	47	45	27	10	20	16	19	10
09A-25	11	7	12	24	28	20	6	9	9	12	8
09A-26	6	5	8	8	9	6	5	7	10	10	7
09A-28	11	8	9	13	13	10	4	7	8	10	6
09A-29	26	25	24	15	15	13	12	17	19	22	17
09A-32	13	11	17	20	26	15	7	6	6	7	4
09A-35	17	15	19	16	19	10	5	10	11	15	9
09A-36	12	12	11	12	15	12	8	10	9	10	9
09A-37	9	8	8	8	10	10	7	8	8	9	8
Annual Rainfall (in inches)	**48.86**	**46.79**	**61.59**	**46.77**	**61.97**	**63.24**	**41.47**	**72.27**	**50.65**	**61.14**	**34.45**
ND = No Data Red = Impaired Water Quality											

TABLE #4

WATER QUALITY
SAMPLING STATIONS DATA

Shellfish Management Area 09A

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

Freedom of Information
Dept. of Health and 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 09A

Source:

2020 – 2022 Data
National Weather Service, Southeastern River Forecast Center
Location: Charleston, South Carolina

2020 Annual Rainfall Summary
Source: National Weather Service's, Southeastern River Forecast Center
Location: Charleston County, South Carolina

2020	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1		0.47		0.57	0.37	0.03	1.09		0.06			0.61
2							0.01	0.01			0.05	
3			0.50				0.18	0.01	0.02			
4	0.11							1.74		0.03		
5	0.09		1.07			0.28		0.19				0.08
6			1.54					0.13	0.05			
7		0.80				0.84	1.19	0.88	0.16		0.02	
8							1.33	0.15			0.04	0.03
9						0.23	0.72	0.07	1.52		0.13	
10						0.25	0.02		0.11	0.01	0.02	
11	0.01					0.74	0.01	0.04		0.93	0.95	
12	0.04		0.05			0.06	0.22	0.01	0.61		1.13	
13	0.05					0.51	0.01		0.03		1.34	
14		0.14		1.15				0.21				
15	0.05	0.03		0.43		2.39		0.57	0.04	0.01	0.02	
16			0.04	0.57				0.10	0.04	0.21		0.06
17	0.06	0.17							1.15			0.31
18			0.05						0.55			0.01
19		0.89				0.02		0.14				
20	0.02	0.06		1.53	0.03	0.29		0.13	0.03			0.01
21		0.68			1.54	0.61		1.32				0.33
22					0.02			0.47		0.01		0.01
23			0.04	0.07	0.17		0.01	0.23			0.01	
24			0.37	3.96		0.28		0.26				0.03
25	0.18	0.71	0.08			0.71	0.23	1.55	0.01	0.29		0.68
26		0.07			0.06	0.04	0.22	0.07	1.19	0.01	0.05	
27	0.16	0.16			1.55		0.11	0.26				
28	0.01				0.55	0.23			0.23			
29						0.02	0.07	0.35	1.07		0.15	
30	0.36			1.04	0.18		0.04		0.39	0.17	0.59	
31					0.65		0.12	0.50				
Total	**1.14**	**4.18**	**3.74**	**9.32**	**5.12**	**7.53**	**5.58**	**9.39**	**7.26**	**1.67**	**4.50**	**2.16**

***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** **61.59**

2021 Annual Rainfall Summary
Source: National Weather Service's, Southeastern River Forecast Center
Location: Charleston County, South Carolina

2021	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	0.29	0.73		0.55				0.05	0.01			
2	0.05		0.08				0.03	0.12	0.07			
3	0.17		1.14				0.09	0.09		0.16		
4			0.29		0.25	0.24		0.56				
5					0.02	1.62		0.03				
6		0.10				0.03		0.19	0.05	0.68	0.31	
7		0.41	0.05			0.01		0.11	0.11	1.23	0.86	
8	0.72						2.37	0.15	0.03		0.14	0.18
9								0.33	0.63	0.05		0.58
10				0.01		0.23	0.40		1.37	0.03		
11												
12	0.05				0.68	0.10					0.06	0.18
13		0.15			0.23	2.65	0.02					
14	0.04	0.26				0.19	0.03					
15		1.19					0.03	0.22				
16	0.19	0.29	0.06			1.44		0.09	0.01			
17			0.01			0.29		0.58		0.01		
18							0.01	0.93	0.08			
19		0.39	2.07				0.02	0.26	0.07			
20		0.48				0.18	0.74	0.02	0.04			0.12
21			0.07			1.70	0.37	0.34	1.87			0.18
22	0.18		0.12			0.01		0.47	0.36			0.52
23	0.18					0.36	0.27	1.21	0.32		0.02	
24												
25				1.60						0.62		
26							0.01			0.10	0.02	
27	0.58		0.07			0.01	0.07				0.01	
28	0.45						0.16					
29			0.01			0.22	0.67			0.51		
30					0.25							
31			0.01							0.01		0.40
Total	**2.90**	**4.00**	**3.98**	**2.16**	**1.43**	**9.28**	**5.29**	**5.75**	**5.02**	**3.40**	**1.42**	**2.16**

*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	46.79

2022 Annual Rainfall Summary
Source: National Weather Service's, Southeastern River Forecast Center
Location: Charleston County, South Carolina

2022	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1				0.20		0.01	0.77		0.09	2.53	0.02	0.19
2							3.21	0.02	1.20			
3	0.02				0.02				0.25			
4						0.08			0.01			
5		0.34			0.02	0.03	0.05	0.01	0.02		0.07	0.01
6	0.03			0.61		0.17	0.01	0.15	0.02			0.24
7		0.06		0.68	0.01		0.05	0.13				
8		0.06		0.03			0.01	0.47				
9			0.41			0.41	0.06	0.33	1.25			
10	0.11		0.42			0.11	0.35	0.05	1.50			0.06
11							3.19	0.03			1.47	
12			0.12			0.04	0.01	0.35		0.01	0.04	0.09
13		0.04	0.03		0.05		0.03	0.90	0.01	0.66		
14		0.03			0.25		0.05					
15							0.07				0.02	0.15
16	0.39		0.01				0.36				0.12	0.09
17	1.00	0.30	0.35	0.14	0.03	0.06	0.03	0.13				
18		0.02		0.32		0.74	0.16	0.94	0.01			
19		0.04	0.07	0.03			0.02	0.74	0.06			
20			0.03				0.26	0.69	0.02		0.03	
21	0.13						1.36	0.01				0.86
22	0.38							0.52				0.21
23					1.00	0.01	1.80	0.42	0.11			0.05
24			0.66				0.31	0.19				
25			0.76				0.01	0.04			0.03	
26	0.01							0.60			0.01	
27				0.01	0.17						0.06	
28		0.06			0.86						0.01	
29	0.07				0.02	1.25		0.34				
30						0.59		2.09	1.62			
31							0.04	0.11		0.29		
Total	**2.14**	**0.95**	**2.86**	**2.02**	**2.43**	**3.50**	**12.21**	**9.26**	**6.17**	**3.49**	**1.88**	**1.95**

***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** | **48.86**

TABLE #6
Shellfish Management Area 09A
Precautionary & Pollution Event Closures
2020 – 2022

Event	Date(s)	Sample Date(s)	Opening Date	Comments
Hurricane Ian	9/30/2022	N/A	10/2/2022	SFMA 09A was closed as a precautionary closure due to the Hurricane Warning. SFMA 09A was not affected by rainfall event.

TABLE #7
Shellfish Management Area 09A
MARINA INVENTORY

Marina	Total Slips	Pump-out Facility	Fuel Dock
Two Islands Marina	25	No	No
Long Island Yacht Harbor	22	No	No
Toler's Cove	152	Yes	Diesel-Gas