South Carolina Department of Health and Environmental Control

ENVIRONMENTAL AFFAIRS

SHELLFISH MANAGEMENT AREA 03

2019 ANNUAL UPDATE

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

November 2019

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http://www.scdhec.gov/FoodSafety/ShellfishMonitoring/

SHELLFISH MANAGEMENT AREA 03
2019 ANNUAL UPDATE

[Data Through December 2018]

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SCDHEC Environmental Affairs

Data Inclusive Dates:
01/01/16 thru 12/31/18

Classification Change:
___ Yes _X_ No

Shoreline Survey Completed: Yes

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

Prior Report & Date: 2018 Annual Update

_N_ Approved
_N_ Cond. Approved
_N_ Restricted
_N_ Prohibited

SUMMARY

Shellfish Management Area 03 will maintain a Restricted classification in its entirety for 2019-2020 shellfish harvesting season. Area 03 lies within the City of Myrtle Beach and is impacted by nonpoint sources with stormwater runoff being the primary source. The area is highly developed both residentially and commercially with very little marsh lands and undeveloped lands surrounding it. According to Horry County Planning and Zoning, South Carolina was the 7th fastest growing state in the United States in 2018 and 31% of individuals moved to Horry County. The area is extremely busy especially during the summer months as a major tourist location with many businesses, restaurants, and other entertainment venues located throughout. Two estuaries/swashes within the area serve as major drainage basin outlets for the City of Myrtle Beach. Due to the excessive fecal coliform levels found in the bacteriological sample data, no depuration harvest activities should be permitted from this area.

In 2017, the collection of rainfall data has been improved for consistency, accuracy, and reliability. 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 program provides shellfish program staff with real-time daily updates for rainfall accumulation which assists in properly managing each of the shellfish growing areas within South Carolina. In 2018, annual rainfall totals were 20 inches higher than in 2017 and the highest total in the past 10-years for Area 03. Hurricane Florence made landfall in September of 2018 and produced 9.01 inches of rainfall during a four-day period. During the past five years there have been four major rainfall and flooding events that have impacted the northern coast of South Carolina.

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 years 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 using 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 03 includes two separate estuaries that serve as major storm water drainage outlets for the City of Myrtle Beach. Withers Swash is located between 3rd and 5th Avenues South and extends several hundred yards to the west of U.S. Highway 17. Midway Swash is located near 29th Avenue South and U.S. Highway 17. Midway Swash is a small meandering channel that is easily discernible from the ocean outlet to the Myrtle Beach Jetport property on the western side of U.S. Highway 17. The total combined area of both drainage areas is approximately 14.4 acres.

The harvesting classifications for Area 03 prior to this sanitary survey was as follows:

Prohibited: None

Restricted:

1. All waters of Withers Swash.
2. All waters of Midway Swash.

Conditionally Approved: None

Approved: None

Station Addition/Reactivation/Deactivation/Modification: None

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 South Carolina Department of Health and Environmental Control currently disallows harvesting of oysters and clams within Area 03 for direct marketing purposes. No relay projects have been permitted during the past three-year review period.

The shellfish harvesting season in South Carolina normally extends from October 1 through May 15. 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.

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

Shoreline surveys of Shellfish Management Area 03 were conducted by the South Carolina Department of Health and Environmental Control (SCDHEC) - Environmental Affairs, Pee Dee - Myrtle Beach, Shellfish Sanitation Staff during the survey period and are ongoing. Extensive visual examination of lands adjacent to the waters of Area 03 was conducted to determine potential sources of pollution entering shellfish growing waters.

POINT SOURCE POLLUTION

A. **Municipal and Community Waste Treatment Facilities** - The majority of the City of Myrtle Beach has central sewer and is serviced by the City of Myrtle Beach. Discharge of effluent from their facilities is to the Atlantic Intracoastal Waterway (Waccamaw River) and does not affect Area 03 shellfish growing waters.

B. **Industrial Waste** - One National Pollutant Discharge Elimination System (NPDES) discharge site (SC0047953) is indicated on the Potential Pollution Sources map. This is a groundwater remediation site which is owned by the AVX Corporation on 17th Avenue South in Myrtle Beach. This site utilized chlorinated solvents as cleaners and degreasers which was found to be a source of groundwater contamination a few years ago. This groundwater remediation site project is being overseen by SCDHEC Central and Regional Office personnel.

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 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. There are no marinas located in Area 03 due to lack of navigable channels.

D. **Radionuclides** - Sources of radionuclides have not been identified within Area 03, and radionuclide monitoring has not been conducted.

NONPOINT SOURCE POLLUTION

A. Urban and Suburban Stormwater Runoff - Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it can pick up pollutants like sediment, debris, and chemicals and transport these to a nearby storm sewer system or directly to a river, lake, coastal waterways, or shellfish growing area. Stormwater runoff is a substantial problem in the majority of Area 03 waters due to dense development of the surrounding area. SCDHEC Bureau of Water in coordination with the Office of Ocean and Coastal Resource Management ensure that land disturbance activities are permitted accordingly and utilize stormwater best management practices to ensure potential pollutants are not introduced into the environment and nearby water bodies.

Shellfish Management Area 03 lies within the City of Myrtle Beach, which is a major tourist attraction location for out of town visitors as well as for many South Carolina residents. There are many entertainment options such as restaurants, amusement parks, golf courses, and shopping centers located in the area. The area has an abundance of residential development including condominiums, townhomes, and single-family home subdivisions. The area has steadily increased in population size throughout the last number of years, mostly due to citizens moving to the area from other states. This trend is likely to continue for years to come as the City of Myrtle Beach area has become a desired location attracting people from all destinations.

B. Agricultural Runoff - There are no commercial agricultural activities adjacent to the waters of Area 03, and sampling for pesticides and herbicides has not been conducted.

C. Individual Sewage Treatment and Disposal (ISTD) Systems - Individual sewage treatment and disposal (ISTD) systems are known to exist in the Withers Swash Basin; however, exact numbers and locations have not been documented.

D. Wildlife and Domestic Animals - Wildlife in Area 03 consists primarily of birds, small mammals and rodents. These populations, in combination with domestic cats and dogs are contributors to nonpoint source pollution within the area.

E. Boat Traffic - The use of watercraft in Area 03 is extremely minimal due to the lack of navigable channels within the area.

NATURALLY OCCURRING PATHOGENS

A. Marine Biotoxins - 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 Areas 01 - Area 04. 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.

Vibrio parahaemolyticus – Because State water temperatures exceed 81 degrees Fahrenheit (F) during June through September. *Vibrio parahaemolyticus* (Vp) management controls must be implemented during these months. Management controls for permitted Aquaculture facilities are specifically addressed in R.61-47. The season for wild-stock harvest is currently closed from May 16 through October 1. 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 closed season be extended through the end of September. 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.

B.

HYDROGRAPHIC AND METEOROLOGIC CHARACTERISTICS

Withers Swash is approximately 850 meters in length from its ocean inlet to its upper reaches. Maximum width is approximately 200 meters with average widths being less than 35 meters.

Midway Swash is approximately 450 meters in length with an average width of less than 50 meters.

Tides along the beaches in Area 03 are semidiurnal, consisting of two low and two high tides each lunar day. Mean tidal ranges are 5.06 feet during normal tides and 5.87 feet during spring tides (Tides and Currents for Windows, Version 2.2, Nautical Software Inc.).

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 annual rainfall total for 2018 was measured at 66.53 inches. This was well above the 10-year average of 43.31 inches. In 2015, 2016, and 2018 major storm events impacted the area. In October of 2015, a major rainfall and flooding event took place that accumulated 17.07 inches of rain over a four-day period. In 2016, Hurricane Matthew made landfall in South Carolina and produced approximately 8-10 inches of rain in the northern region of the state. Unfortunately, during this storm, the previous NOAA Weather Station that was used to measure rainfall data did malfunction and did not record any rainfall during the event. In September of 2018, Hurricane Florence made landfall just north of the South Carolina/North Carolina state line and produced 9.01 inches of rain during a four-day period. Hurricane Florence was a very slow-moving storm that produced extreme rainfall amounts in North Carolina which weeks later flowed south and flooded many areas within Horry County and Area 03. No special sampling or closures were issued during either of these storm events because the area was already classified as Restricted in its entirety.

During winter months rainfall is more uniform in nature; heavy, short-term rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low pressure

systems may generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns are often extremely dynamic with associated thunderstorms and severe weather conditions.

Prevailing winds along the northern portion of the South Carolina coast are from the southwest during spring and south/southwest during the summer. During autumn wind direction is generally from the Northeast. Winter winds fluctuate between Northeast and Southwest. Wind speeds average less than 10 mph; however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes frequently occur. There are no rivers in close proximity to Area 03. Freshwater input occurs via localized precipitation and resulting runoff. Withers Swash and Midway Swash serve as ocean outlets for two of the City of Myrtle Beaches major drainage basins.

Currents are tidally generated, although wind speed and direction may affect current velocities. Tidal flows reverse direction approximately every six hours.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 03 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.

Seventy-two (72) surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from two active water quality sampling stations in Area 03 during the period 01/01/16 through 12/31/18. The samples were collected in 120ml amber glass bottles, immediately placed on ice and transported by bus 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. Upon receipt at the laboratory, sample sets that exceeded a 30-hour holding time or contained a temperature control greater than 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)[1].

[1] Nuefeld, N. 1985. Procedures for the bacteriological examination of seawater and shellfish. In: A.E. Greenberg and

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 Nautical Software's Tides and Currents, Version 2.2.

MONITORING RESULTS

The monitoring results from the three-year bacteriological data period show that no stations in Area 03 meet the geometric mean and the estimated 90th percentile standard for an Approved classification.

All stations exceeded a geometric mean (MPN) value of 14.

All stations exceeded the estimated 90th percentile MPN value of 43.

All exceeded a geometric mean MPN value of 88.

All stations exceeded a fecal coliform MPN estimated 90th percentile value of 260.

Fecal coliform data collected are summarized in Table #2. Also, included in this report is a long-range trend summary of each station with the estimated 90th percentile values in correlation to annual rainfall totals (Table #3).

CONCLUSIONS

Water quality data results showed that the waters within Withers Swash and Midway Swash have improved but are still considered poor for shellfish harvesting. Both swashes serve as major drainage basins for the City of Myrtle Beach. Nonpoint source runoff from varied pollution sources is the prime contributor to elevated fecal coliform levels in the area. Most of the surrounding areas along these swashes are developed and located in residential and commercial property. Chlorinated solvent contaminated groundwater has been documented in southern portions of the City of Myrtle Beach and are treated with continuous remediation projects that are overseen by SCDHEC Central and Regional Office staff on a continuous basis.

All stations in Area 03 exceed a fecal coliform geometric mean in excess of 88 MPN/100 ml. Also, all stations in Area 03 exceeded an estimated ninetieth percentile fecal coliform value of 260 per 100 ml. Therefore, no shellfish in the area should be used for depuration purposes.

D.A. Hunt (eds.) Laboratory procedures for the examination of seawater and shellfish, Fifth Edition. American Public Health Association, Washington, D.C. p. 37-63.

RECOMMENDATIONS

The shoreline reconnaissance and bacteriological data review of shellfish growing Area 03 indicate that the current Restricted Classification is appropriate. Due to the excessive estimated 90^{th} percentile values, no depuration activities should be allowed within Shellfish Management Area 03. The harvesting classifications for Area 03 are recommended to remain as follows:

Prohibited: None

Restricted:

1. All waters of Withers Swash.
2. All waters of Midway Swash.

Conditionally Approved: None

Approved: None

Station Addition/Reactivation/Deactivation/Modification: None

REFERENCES

Nautical Software Inc. Copyright 1993-1996. Tides & Currents. Version 2.2.

Nuefeld, N. 1985. Procedures of the bacteriological examination of seawater and shellfish. p. 37-63. In A. E. Greenberg and D. A. Hunt (ed.) Laboratory procedures for the examination of seawater and shellfish, Fifth Edition. American Public Health Association, Washington, D.C.

NOAA, National Weather Service data base

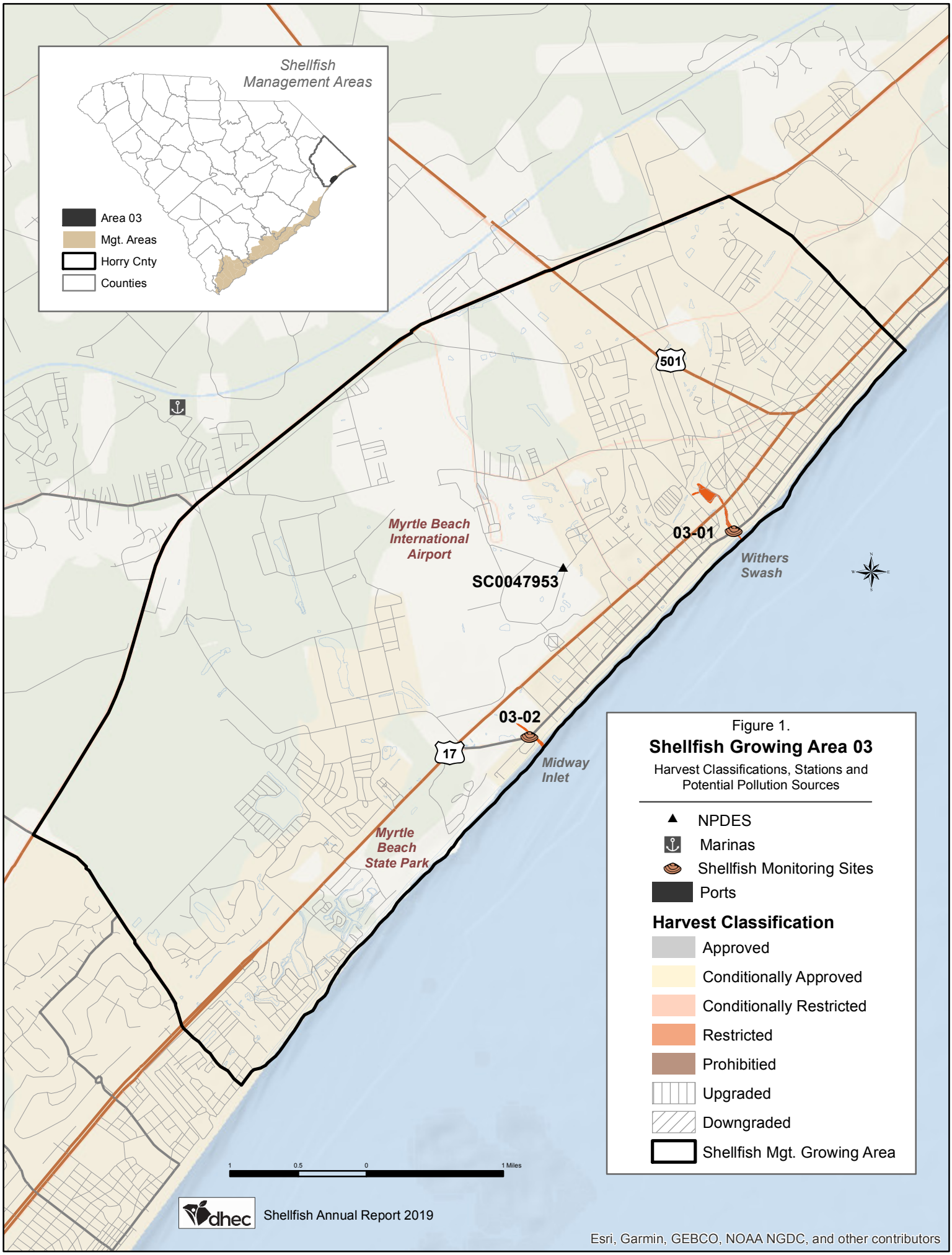
Shellfish Management Areas
Area 03
Mgt. Areas
Horry Cnty
Counties
501
Myrtle Beach International Airport
SC0047953
03-01
Withers Swash
03-02
17
Midway Inlet
Myrtle Beach State Park
1 0.5 0 1 Miles
Figure 1.
Shellfish Growing Area 03
Harvest Classifications, Stations and Potential Pollution Sources
NPDES
Marinas
Shellfish Monitoring Sites
Ports
Harvest Classification
Approved
Conditionally Approved
Conditionally Restricted
Restricted
Prohibitied
Upgraded
Downgraded
Shellfish Mgt. Growing Area
dhec
Shellfish Annual Report 2019
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

TABLE #1

Shellfish Management Area 03
WATER QUALITY SAMPLING STATIONS DESCRIPTION

Station	Description
03-01	Withers Swash
03-02	Midway Swash

(Total 2)

TABLE #2

Shellfish Management Area 03
FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
From Shellfish Water Quality Sampling Stations between

January 01, 2016 and December 31, 2018

Station #	1	2
Samples	36	36
Geometric Mean	472.2	509.7
90th percentile	2700	2882
Water Quality	RND	RND
Classification	RND	RND

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

TABLE # 3
Fecal Coliform Historical Trend Sheet

Area 03 Stations 90th%ile Values for Annual Updates Related to Rainfall

Station #	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
03-01	2700	2553	3043	3379	3308	2355	1627	1828	1326	1690	2484
03-02	2882	2632	3544	3555	4287	2858	2420	1880	2697	2745	2911
Annual Rainfall (inches)	**66.5**	**45.1**	**42.7**	**51.9**	**40.1**	**46.0**	**46.6**	**28.4**	**48.2**	**36.4**	**47.7**

ND = No Data Red = Impaired Water Quality

TABLE #4

WATER QUALITY
SAMPLING STATION DATA

Shellfish Management Area 03

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 03

SOURCE:

2016 Data
NOAA National Weather Service
Location: Myrtle Beach, South Carolina

2017 - 2018 Data
NOAA National Weather Service - Southeastern River Forecast Center
Location: Myrtle Beach, South Carolina

2016 Annual Rainfall Summary
Source: NOAA National Weather Service
Location: Myrtle Beach, South Carolina

2016	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	0.85			0.05		0.40		0.04				0.27
2			0.11		0.38		0.20		0.65	0.04		
3								0.40	*7.00			
4							0.34	2.00				
5		2.02									0.22	0.60
6					1.00			1.00		0.05		2.13
7				1.12		1.70	0.10					
8				0.01			0.25					
9		0.01					0.10					
10	0.25											
11							0.74					
12								0.05	0.28			0.02
13									0.10		0.05	
14									1.22		0.80	0.46
15									0.30		0.05	
16							0.10					
17							0.17					0.08
18					0.35							
19					0.01		0.05	0.50	0.08			
20							2.00	0.10	2.20			0.40
21			0.35		0.02				0.03			
22												
23		0.30			0.40				0.75			
24		0.01			0.02				0.66			
25						1.60						
26											0.20	
27									0.15			
28			0.70						0.15			
29					1.00	1.15		0.20				
30					0.05				0.13			
31								1.52				
Total	**1.10**	**2.34**	**1.16**	**1.18**	**3.23**	**4.85**	**4.05**	**5.81**	**13.70**	**0.09**	**1.32**	**3.96**

***Days highlighted indicate 4 or more inches of rain in a 24-hour period.**

***Sample dates are indicated in blue.** | **ND = No Data** | **ANNUAL RAINFALL** | **42.79**

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

2017	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	0.12			0.07		0.02	0.19		0.19			
2	0.06		0.17		0.35	0.01			0.18			0.02
3	0.26							0.33	0.76			
4	0.1	0.04		0.43		0.02	0.11	0.22				
5					0.35			0.12				
6				1.39	0.06	0.81		0.17	0.22			
7	0.33				0.08	1.05			0.75	0.14		0.26
8	0.06	0.48				0.75		0.27		0.4		0.51
9		0.06				0.24	0.41	0.36		0.24		0.77
10							0.27	0.38		2.4	1.05	
11							0.06	0.76	0.13	0.12		
12		ND	0.2					ND	2.17			
13			0.28							0.07		
14			0.48		1.07			0.04				
15								0.03	0.21			
16		0.35					0.18	ND				
17						0.03	0.3	ND		0.5		
18							0.35	ND				
19							0.02	ND			0.03	
20						0.14		ND				
21			0.01			0.94		0.09				1.11
22	0.35		0.11			0.02		ND	0.05		0.31	
23	0.98				0.66	0.71		0.07		0.04		
24	0.07			0.22	0.9		0.07	2.43		2.07	0.11	
25				0.36	1.42	0.21	0.08	0.01				0.02
26					0.01	0.37						
27	0.1											
28		0.08					0.1					0.06
29					0.22			2.78		0.97		0.12
30					0.07		0.93			0.08		0.03
31			0.21					0.03				
Total	**2.43**	**1.01**	**1.46**	**2.47**	**5.19**	**5.32**	**3.07**	**8.09**	**4.66**	**7.03**	**1.50**	**2.90**
***Days highlighted indicate 4 or more inches of rain in a 24-hour period.**												
***Sample dates are indicated in blue.**						**ND = No Data**			**ANNUAL RAINFALL**			**45.13**

2018 Annual Rainfall Summary
Source: NOAA National Weather Service - Southeastern River Forecast Center
Location: Myrtle Beach, South Carolina

2018	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1			0.37					0.14				
2		0.04	0.20				0.04	0.33			0.32	0.47
3						0.30		0.66	0.02		0.04	0.33
4	0.58							0.49				0.04
5		0.35		0.04			0.06	0.32			0.37	
6					0.19		0.03	0.02				
7			0.13				0.01	0.08			0.21	
8		0.09		1.03			0.10		0.24	0.02	0.40	0.03
9				0.04				0.08		0.02		1.06
10		0.50		0.10						0.11	0.04	0.78
11				0.08					0.08	0.42		
12	0.36	0.05	0.24			0.55			0.15			
13	0.41	0.06	0.19			0.68	0.52				0.60	
14								0.63	**0.12**		0.04	0.06
15					0.02	1.26		0.11	***5.36**	0.08	0.12	3.07
16				0.93	0.14	0.91		0.04	**2.39**		0.11	0.17
17					0.26		0.11		**1.14**	1.47		
18	0.04		0.05		0.47		0.85					
19					0.46		1.05	0.08	0.17		0.11	
20			0.33		1.45		0.86					0.04
21			0.40			0.02	***5.20**			0.03		0.63
22								0.03				
23	0.41			0.31			0.26					
24				1.48	0.43	0.02	0.68				0.15	
25			0.06		0.17		0.84				0.98	
26						0.38	0.32		0.04	0.13		
27		0.10		0.12			0.47			1.25		
28					1.09	0.01	0.35					0.02
29	1.53				1.68							1.26
30					0.04		1.91		0.50			
31			0.20		0.25		2.05					0.02
Total	**3.33**	**1.19**	**2.17**	**4.13**	**6.65**	**4.13**	**15.71**	**3.01**	**10.21**	**3.53**	**3.49**	**7.98**
***Days highlighted indicate 4 or more inches of rain in a 24-hour period.**												
***Sample dates are indicated in blue.**						**ND = No Data**			**ANNUAL RAINFALL**			**66.53**