

BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 02

2008 ANNUAL UPDATE

**Shellfish Sanitation Section
Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, SC 29201**

September 2008



WEB ADDRESS
<http://www.scdhec.net/environment/water/shellfish.htm>

SHELLFISH MANAGEMENT AREA 02 2008 ANNUAL UPDATE

[Data Through December 2007]



Prepared By:

David M. Warren, Regional Shellfish Program Manager
Region 6 Environmental Quality Control
927 Shine Avenue
Myrtle Beach, South Carolina 29577

Reviewers/Editors:

D.M. Pearson, Shellfish Program Manager
and

Charles L. Newell, Technical Consultant
Monitoring, Assessment, and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

Charles M. Gorman, Division Director
Water Monitoring, Assessment, and Protection Division
Environmental Quality Control - Bureau of Water

TABLE OF CONTENTS
Shellfish Management Area 02 Annual Update

Summary	2
Introduction	2
Pollution Source Survey.....	5
Survey Procedures.....	5
Point Source Pollution.....	5
A. Municipal and Community Waste Treatment Facilities.....	5
B. Industrial Waste.....	5
C. Marinas	5
D. Radionuclides	5
Nonpoint Source Pollution.....	5
A. Urban and Suburban Stormwater Runoff.....	5
B. Agricultural Runoff.....	5
C. Individual Sewage Treatment and Disposal Systems	5
D. Wildlife and Domestic Animals.....	5
E. Boat Traffic.....	5
F. Marine Biotoxins	5
Hydrographic and Meteorological Characteristics.....	6
Water Quality Studies	7
Conclusions	8
Recommendations	8

Figures and Tables

Figures:

(1) Shellfish Harvesting Classification Prior to this Survey	09
(2) Current Shellfish Harvesting Classification & Sampling Stations	10
(3) Potential Pollution Sources.....	11

Tables:

(1) Shellfish Water Quality Sampling Stations Description	12
(2) Fecal Coliform Bacteriological Data Summary Sheet (January 01, 2005 - December 31, 2007).....	13
(3) Water Quality Sampling Stations Data	14

**2008 ANNUAL UPDATE
Shellfish Management Area 02
SCDHEC EQC Bureau of Water**

Data Inclusive Dates:

01/01/05 thru 12/31/07

Classification Change:

 Yes X No

Shoreline Survey Completed: Yes

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

 N Approved

 N Cond. Approved

 N Restricted

 N Prohibited

Prior Report & Date: Annual-2007

SUMMARY

Shellfish Management Area 02 is adversely impacted primarily by nonpoint source pollution due to dense development. The shoreline reconnaissance and bacteriological data review indicate that the present restricted classification is appropriate. No depuration harvest permits should be issued for this area.

INTRODUCTION

PURPOSE AND SCOPE

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

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

collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

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

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

Restricted Area - Growing areas shall be classified restricted when sanitary survey data show a moderate degree of pollution or the presence of deleterious or poisonous substances to a degree that may cause the water quality to fluctuate unpredictably or at such a frequency that a conditionally approved classification is not feasible. Shellfish may be harvested from areas classified as restricted only for the purposes of relaying or deperation 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 deperation 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 02 (Area 02) is comprised of three separate estuaries. White Point Swash, located in the Windy Hill section of North Myrtle Beach, is bordered to the northwest by U. S. Highway 17 and to the northeast by mainland residential portions of Windy Hill, North

Myrtle Beach. White Point is bordered to the southwest by the Town of Briarcliff Acres and to the southeast by the Atlantic Ocean. Singleton Swash is located approximately six miles south of White Point Swash and is bordered generally to the west by U. S. Highway 17, to the south by the Dunes Golf and Beach Club of Myrtle Beach, to the north by Lake Arrowhead Road, and on the east by Shore Drive and the Atlantic Ocean. Cane Patch Swash is located within the Myrtle Beach city limits. It is bordered to the west by U. S. Highway 17, to the north by 68th Avenue North, on the south by 66th Avenue North, and on the east by the Atlantic Ocean. (Figure 1) The combined area of shellfish waters in Area 02 is approximately 100 acres. Although the area is small, a substantial shellfish resource does exist, necessitating review and classification.

The harvesting classification of Area 02 prior to this sanitary survey was as follows:

Prohibited: None

Restricted

1. All waters of White Point Swash;
2. All waters of Singleton Swash;
3. All waters of Cane Patch Swash;

Conditionally Approved: None.

Approved: 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 does not allow harvesting of oysters and clams within Area 02. No relay projects have been permitted within this area during the past three-year review period.

Shellfish harvesting season in South Carolina normally extends from September 16 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 Area 02 were conducted by the Waccamaw District Shellfish Sanitation staff during the survey period and are ongoing. Extensive visual examination of lands adjacent to the waters of Area 02 was conducted in order to determine type and density of structures, location of significant concentrations of domestic animals, and other potential sources of

pollution entering shellfish growing waters. Additionally, Waccamaw EQC District personnel, in conjunction with the Department's ocean water quality monitoring program, have extensively examined lands surrounding White Point Swash.

In February 2007, a series of aerial thermal imaging reconnaissance flights were funded through a 319 grant obtained by the Department. A single anomaly was identified in the White Point Swash area portion of Area 02. A site visit determined the need for bacteriological sampling and sampling has been scheduled for October 2008.

POINT SOURCE POLLUTION

- A. Municipal and Community Waste Treatment Facilities** - The majority of this area has central sewer and is serviced by the cities of Myrtle Beach and North Myrtle Beach. Discharge of effluent from their facilities is to the Atlantic Intracoastal Waterway and does not affect the shellfish growing waters in Area 02. The town of Briarcliff Acres, however, is primarily serviced by individual sewage treatment and disposal systems (ISTDs).
- B. Industrial Waste** - There are no permitted point source discharges of industrial waste in Area 02.
- 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 02 due to lack of navigable channels.
- D. Radionuclides** - Sources of radionuclides have not been identified within Area 02, and radionuclide monitoring has not been conducted. No poisonous or deleterious substances have been identified.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** - Nonpoint source runoff is the apparent primary contributor to elevated fecal coliform bacteria levels in the area. White Point Swash receives drainage from a densely developed portion of the City of North Myrtle Beach (Windy Hill). Development includes an extensive residential area in addition to a family campground and numerous condominiums, restaurants, gift shops, and amusement facilities. Singleton Swash receives drainage from Singleton Lake and several small ponds within the management area. Development is

extremely dense, primarily consisting of high-rise and smaller stick built condominiums, campgrounds, and golf courses. Cane Patch Swash serves as a drainage outlet for northern portions of the City of Myrtle Beach. Drainage is from a series of small lakes located west of the U. S. Highway 17. Development is dense with single and multi-family residences and numerous small businesses.

- B. Agricultural Runoff** - There are no commercial agricultural activities conducted adjacent to the waters of Area 02, 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 North Myrtle Beach areas bordering White Point Swash and Briarcliff acres; however, exact numbers and distribution have not been identified.

- D. Wildlife and Domestic Animals** - Wildlife in Area 02 primarily consists of birds, small rodents, deer, raccoons, and opossums. These populations, in combination with domestic cats and dogs, are contributors to nonpoint source pollution. Effective resource management of deer populations coupled with a dramatic loss of natural habitat due to continued development within, and on lands adjacent to, Area 02, has resulted in efforts to reduce the deer population within the town Briarcliff Acres. Briarcliff Acres is approximately one mile southwest of White Point Swash.

- E. Boat Traffic** - The lack of navigable channels within Area 02 generally precludes watercraft use.

- F. Marine Biotoxins** - During the winter and spring of 1988, South Carolina experienced an occurrence of "Red Tide", specifically *Karenia brevis* (*Ptychodiscus brevis*), which affected water quality in Area 01. There has been no documented reoccurrences of this organism at levels requiring emergency response in South Carolina waters subsequent to the 1988 event. The Department participates in a State Task Group on Toxic Algae and operates a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGIC CHARACTERISTICS

PHYSIOGRAPHY

White Point Swash is approximately 650 by 500 meters and includes approximately 42 acres of habitat suitable for shellfish production. Immediately adjacent to White Point Swash is a series of marsh areas that extend approximately 2000 meters in a northeast - southwesterly direction and parallel the beachfront. This area averages less than 100 meters in width. Total area is approximately 35 acres. A single shallow swash connects the White Point estuary with the Atlantic Ocean.

Singleton Swash contains approximately 41 acres of bottoms suitable for shellfish production. A single shallow swash immediately adjacent to the Dunes Golf and Beach Club connects the Singleton Swash estuary with the Atlantic Ocean.

Cane Patch Swash contains less than three acres of bottoms suitable for shellfish production. Connection to the Atlantic Ocean is via a shallow ditch and 36-inch drain culvert.

Tides - Tides along the beaches in Myrtle Beach/North Myrtle Beach are semidiurnal, consisting of two low and two high tides each lunar day. Mean tidal ranges are 5.00 - 5.06 feet during normal tides and 5.70 - 5.87 feet during spring tides (Tides and Currents for Windows, Version 2.2, Nautical Software Inc.).

Precipitation - Precipitation in Area 02 averages between 50 and 52 inches per year with the heaviest rainfall occurring during the summer months. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall.

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, however, low pressure systems infrequently cross Florida and become stationary just offshore of the Georgia coast. Such was the case in late December 1989. This storm system resulted in approximately 14 inches of snow along Horry County's beaches. Spring weather patterns are often extremely dynamic with associated thunderstorms and severe weather conditions.

Winds - 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.

River Discharges - There are no rivers in close proximity to Area 02. Freshwater input occurs via localized precipitation and resulting runoff.

Currents - Currents are tidally generated, although wind speed and direction may cause affect current velocities. Flow reverses direction approximately every six hours.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 02 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 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.

One hundred and eight surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from three active water quality sampling stations in Area 02 during the period 01/01/04 through 12/31/06. The samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported by bus to the South Carolina Department of Health and Environmental Control's Trident District Environmental Quality Control laboratory at 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 >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 (1985¹).

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 (1996).

MONITORING RESULTS

Stations 02-01, 02-02 and 02-03 exhibited fecal coliform geometric means in excess of 88 MPN/100 ml. Each station also exceeded an estimated 90th percentile fecal coliform MPN/100 ml. value of 260.

CONCLUSIONS

Based on review of fecal coliform bacteriological data summaries and the pollution source survey, Area 02 is impacted by one primary source of pollution. There are no specific point source discharges and the conclusion is that, primarily due to dense development, nonpoint source runoff is the prime contributor to elevated fecal coliform bacteria levels in the area.

¹Nuefeld, N. 1985. Procedures for the bacteriological examination of seawater and shellfish. *In*: A.E. Greenberg and 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 02 indicated that the current restricted classification is appropriate. Due to the excessive fecal coliform geometric means and estimated 90th percentile values, no depuration activities should be allowed. The harvesting classification of Area 02 is recommended to remain as follows:

Prohibited: None

Restricted:

1. All waters of White Point Swash;
2. All waters of Singleton Swash; and
3. All waters of Cane Patch Swash.

Conditionally Approved: None.

Approved: None.

Station Addition/Deactivation/Modification: None