BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 15

2006 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

July 2006

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2006 ANNUAL UPDATE

[Data Thru December 2005]

Shellfish Management Area 15
Shellfish Sanitation Program

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ANNUAL UPDATE
Shellfish Management Area 15
SCDHEC EQC Bureau of Water

Data Inclusive Dates:
01/01/03 thru 12/31/05

Shoreline Survey Completed: Yes

Prior Report & Date: Annual -2005

Classification Change:
X Yes ___No

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

SUMMARY

Water quality collected at the majority of the Shellfish Management Area 15 monitoring stations is statistically similar to water quality data contained in the previous Annual Update. Two classification changes will be implemented for the 2006-2007 shellfish harvest season.

A site on the Eastern shore of Battery Creek near shellfish monitoring Station 28 is being evaluated for contaminants of concern due to past mining operations. Although bacteriological water quality at stations 10, 28, 29, and 30 currently meets Approved area criteria, this portion of Area 15 will be classified as Administratively Prohibited and remain closed to shellfish harvest pending outcome of a site assessment and evaluation.

Water quality at stations 18 and 20 has met criteria for an Approved classification for the past five years and, as a result, the Wallace Creek Conditionally Approved area will be reclassified as Approved. Wallace Creek will continue to be closely monitored for water quality oscillations due to rainfall.

The BJW&SA Port Royal Water Reclamation Facility is under construction and is tentatively scheduled for completion in June. This facility will replace the Southside and Shell Point WWTPs. The permitted flow will be 4.8 MGD and it will discharge to the Beaufort River at the same location near the McTeer Bridge (Highway 802).

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 - 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 which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey which 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, and not more than ten percent of the samples shall 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 Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - 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 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 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 subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which 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. 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 and not more than ten percent of the samples shall 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 and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - 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 and not more than ten percent of the samples shall 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 and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

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

BACKGROUND INFORMATION

Shellfish Growing Area 15 consists of approximately 31,071 acres of shellfish growing area habitat located in Beaufort county. It consists of the Beaufort River and Brickyard Creek and their tributaries, including McCalley, Albergottie, Broomfield, Battery, Chowan, Ballast, Station, and Morse Island Creeks. The area's northern boundary is the northern shore of McCalleys Creek. The eastern boundary extends through Lady's Island to Highway 21, then to Morse Island Creek. The southern boundary is the Atlantic Ocean at the mouth of Port Royal Sound. The western boundary extends through Parris Island and follows the western shore of Battery Creek to the portion of McCalley Creek

bordered by Highway 21.

The majority of the shellfish resource and harvesting activity is located in Chowan, Distant Island and Wallace Creeks.

The harvesting classifications of Area 15 prior to this survey were as follows:

Prohibited (Administrative closure):

1. Brickyard Creek, from its confluence with Mulligan Creek at Station 02, to its confluence with Beaufort River
2. Albergottie Creek, from its headwaters to its confluence with Brickyard Creek
3. Broomfield Creek, from its headwaters to its confluence with Beaufort River
4. Factory Creek, entire waterbody
5. Cat Island Creek, entire waterbody
6. Battery Creek and its tributaries, from Station 24 at the Highway 280 (Battery Creek) Bridge to its confluence with Beaufort River.
7. Archers Creek, from the boundary with Area 17 to its confluence with Beaufort River
8. Ballast Creek, from the boundary with Area 17 to its confluence with Beaufort River
9. McCalley Creek, from Station 15-01A to the headwaters
10. Battery Creek, from confluence with the Beaufort River to the southern Conditionally Approved boundary near Station 15-24.
11. Battery Creek Marina Closure Zone

Restricted:

1. Battery Creek, between Station 10 and the headwaters, excluding the Conditionally Approved Area.

Conditionally Approved:

1. Battery Creek, from Station 15-24 at the Hwy 280 (Battery Creek) Bridge to Station 15-21, (excluding all administratively Prohibited closure zones). The Conditionally Approved area also includes stations 10, 25, 26, 27. The Conditionally Approved area **does not** include the main channel between stations 10 and 19.
2. Wallace Creek, the entire tributary, from its confluence with Chowan Creek at Station 15-18 to its headwaters.

Approved:

Remaining portions of Area 15.

Station Addition/Deactivation/Modification: None

The shellfish industry in South Carolina is based on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, Culture permits, and Kings Grant areas. Seven shellfish Culture Permit Areas are designated in Area 15. Culture Permit 097 and 114 are leased to L.P. Maggioni & Company, 119, 120,

and 123 are leased to Dusenbury Seafood, and 90 is leased to Perry Hall. Culture Permit 80 is leased to Bryan Boulineau.

The public is allowed to harvest on four State Shellfish Grounds (S) and one Public Shellfish Ground (R) in Area 15. S-064 is located on Parris Island, S-094 in Morse Creek, and S-118 in Wallace Creek and S-117 in Distant Island Creek. Recreational harvesting is allowed for clams and oysters in both areas, and commercial harvesting by licensed individuals is currently allowed on State Shellfish Grounds only, subject to seasons established by SCDNR. Recreational harvesting only is allowed on R-121 in Wallace (Capers) Creek.

Shellfish harvesting season in South Carolina extends from September 16 through May 15, although actual dates may vary. SCDNR has the authority to alter the shellfish-harvesting season for management purposes. The South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that all shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

SURVEY PROCEDURES

Shoreline surveys of Area 15 were conducted by the Low Country District Shellfish Sanitation staff**,** by watercraft, vehicle, and on foot, during the survey period and are ongoing.

POINT SOURCE POLLUTION

Major sources of actual or potential pollution (see Figure 4):

Permitted Sources	Permit #/Type/ Discharge
Springs Ind/Wamchem NPL site	SC0046701-001/GrdWtr Rmd./McCalley Cr
USMC/ Beaufort Air Station WWTP	SC000825-001/0.75 MGD/Albergottie Cr.
O.C. Welch Ford Lincoln Mercury	SCG750015-001/ Oil/Water Separator/Ditch
BJW&SA Port Royal WWTP	SC0048348-001
BJW&SA St. Helena WWTP	ND0083429-005
BJW&SA Southside WWTP	SC0021016-001/2.0 MGD/Diffuser/Beaufort Riv
BJW&SA / Shell Point WWTP	SC0042609-001/0.4 MGD/Diffuser/Beaufort Riv
USMC / Parris Island WWTP	SC0002577-001/3.0 MGD Beaufort River
USMC / Paris Island	SC0002577-003/Boiler Blowdown/Beaufort Riv
TJ Barnwell Utility, Inc. Pleasant Point Golf Co WWTP	ND0067393-001/ 0.1MGD/Lagoon/Spray Irrig

Permitted Sources	Permit #/Type/ Discharge
Beachwood Mobile Home Park WWTP	ND0067091-001/0.04MGD/ Spray Field
Marsh Harbor Boatyard	Marina- Pumpout – No
Downtown Beaufort Marina	Marina- Pumpout – Yes
Ladies Island marina	Marina- Pumpout – No
Port Royal Landing	Marina- Pumpout – Yes
Battery Creek Marina	Dry Stack Marina- Pumpout – No
S.C. Ports Authority Port Royal Terminal	Port Terminal
Port Royal Seafood	Marina (Shrimp Dock) - Pumpout – No

A. **Municipal and Community Waste Treatment Facilities** - The USMC/ Parris Island WWTP (3.0 MGD) is the largest permitted discharge into Area 15. The plant discharges into the portion of the Beaufort River that is classified as SFH waters and its permitted fecal coliform limits are 14/43 colonies per 100 ml.

The Beaufort/Jasper Water & Sewer Authority (BJW&SA) Southside WWTP (2.0 MGD) and BJW&SA Shell Point WWTP (0.4MGD) each discharge through separate diffusers located near the McTeer Bridge (Highway 802). This portion of the Beaufort River is classified as SA waters and the permitted fecal coliform limits are 200/400 colonies per 100 ml.

The BJW&SA Port Royal Water Reclamation Facility is under construction. This facility will replace the Southside and Shell Point WWTPs. The permitted flow will be 4.8 MGD and it will discharge to the same location near the McTeer Bridge (Highway 802).

The USMC/ Beaufort Air Station (0.75 MGD) discharges into Albergottie Creek. Albergottie Creek is classified as SA waters and the permitted fecal coliform discharge limits are 200/400 colonies per 100 ml.

B. **Industrial Discharges** - A groundwater remediation system at the site of the former Springs Industries/Wamchem industrial site discharges into the headwaters of McCalley Creek. There is no sewage and therefore no fecal coliform bacteria component of the discharge. Prior to the 2001 Annual Update, the SCDHEC Division of Health Hazard Evaluation reviewed the list of chemicals of concern for the Wamchem site and indicated that portions of McCalley Creek might be opened to shellfish harvesting upstream of Station 15-33 (created 2002), which is approximately 1.3 miles downstream of the site. Monitoring at two other stations in McCalley Creek, 15-01 and 15-01A, has been performed since the 1980's and both stations have consistently met the statistical criteria for an Approved classification. Based upon this information, the Shellfish Sanitation Section concluded that little potential existed for adverse health affects associated with the groundwater remediation system discharge and the portion of McCalley Creek between Station 15-01 and Station 15-01A was Approved in the 2001 Annual Update.

Other permitted industrial dischargers into waters of Area 15 include: Barnwell Resources which is a stormwater discharge from a construction and demolition (C&D) landfill; and O.C. Welch, which is an oil/water separator at a car dealership. In addition, the BJW&SA Shell Point WWTP has an approved pretreatment program and accepts some industrial wastes from businesses located in the Beaufort Industrial Park.

C. Marinas – S.C. Regulation 61-47, Shellfish defines Marina as "any water area with a structure (docks, basin, floating docks, etc.) that is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space." Currently, there are seven marina locations in Area 15. Port Royal Landing, Lady's Island Marina, and Downtown Beaufort Marina have marine sewage pump-out facilities. Battery Creek and Marsh Harbor Boatyard (both include dry stack storage) do not have pump-out facilities. Additionally, the S. C. Ports Authority, Port Royal Terminal, operates cargo ship docks and Port Royal Seafood operates a commercial shrimp dock. Both of these facilities are located on Battery Creek. A pump-out vessel has been permitted to operate at the Downtown Marina of Beaufort. There are numerous private boat docks throughout Area 15.

D. **Radionuclides** - Sources of radionuclides have not been identified within Area 15, and radionuclide monitoring has not been conducted. No other source of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

A. **Stormwater** - Stormwater runoff impacts water quality by transporting fecal coliform bacteria (and other pollutants) from land to the shellfish growing area.

Stormwater from roads, residences, and agricultural land is directed to the lowest point of elevation that is typically the nearest creek or marsh. In addition, there are freshwater wetland areas, ditches, and impoundments that drain into tidal creeks.

Beaufort County enacted a stormwater management utility in 2001. The stormwater utility assesses a stormwater fee to residential and non-residential property owners, and the fees collected are dedicated to stormwater-related activities. These may include operation and maintenance of stormwater systems, implementation of improvements to reduce stormwater-related problems such as flooding and stormwater runoff pollution, and related studies.

The Stormwater Master Plan (draft submitted in December 2004) and report were funded through the fees collected by the stormwater utility. The study was designed to identify problem areas related to stormwater, and to recommend a plan to solve problems and better control the impacts of stormwater on receiving waters in Beaufort County.

Most land disturbing activities in South Carolina must comply with the Stormwater Management and Sediment Reduction Act of 1991. The final regulations, effective on June 26, 1992, establish the procedures and minimum standards for a statewide stormwater management program. For activities in the eight coastal counties, additional water quality requirements are

imposed. For all projects, regardless of size, which are located within one-half mile of a receiving water body in the coastal zone, the criteria for permanent water quality ponds having a permanent pool is that they are designed to store the first two inches of runoff from the entire site over a 24-hour period or storage of the first one inch of runoff from the built-upon portion of the property, whichever is greater. Storage may be accomplished through retention, detention, or infiltration systems, as appropriate for the specific site. In addition, for those projects that are located within1000 feet of shellfish beds, the first one and one half inches of runoff from the built-upon portion of the property must be retained on site. Since 1992, these regulations have been applied to the development of residential subdivisions, golf courses, and business areas.

B. **Agricultural Waste** - Small numbers of cattle and horses are located within Area 15.

C. **Individual Sewage Treatment and Disposal (ISTD) Systems** – Typically, older homes and businesses in Area 15 utilize ISTDs while the majority of new construction is serviced by central sewer collection and distribution systems. Picket Fences, adjacent to Battery Creek, initially permitted for 16 lots to use septic tanks, will convert to central sewer collection in approximately two years. Homes in more rural areas, such as those on St. Helena Island adjacent to Wallace Creek, utilize ISTDs.

D. **Wildlife and Domestic Animals** - This area supports populations of white-tailed deer, raccoons, wading birds, migratory waterfowl, and other wildlife, which may contribute to fecal coliform levels in some areas. Domestic animals present in the area include dogs, cats, horses, and goats. Ducks and geese, inhabiting numerous ponds and impoundments in the Area 15 management area, likely contribute to fecal coliform loading within the shellfish growing area.

E. **Boat Traffic** - The Atlantic Intracoastal Waterway (AIWW) begins at the Area 15 northern boundary at the confluence of Brickyard Creek and Coosaw River. The waterway extends through Beaufort River and Port Royal Sound and eventually reaches the area's southern boundary at Skull Creek at Hilton Head Island. Numerous commercial and recreational vessels utilize this North/South route. There are seven public boat landings in Area 15.

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.

G. **Marine Biotoxins** - There have been no documented occurrences of toxic algae affecting water quality in Area 15. The Department participates in a State Task Force on toxic algae and maintains a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 15 is part of the Broad River estuary, which is a drowned river valley system and the largest of Sea Island Coastal Region estuaries (219 square kilometers). This estuary, which includes Broad River, Beaufort River, Port Royal Sound, and several tidal tributaries, includes an extensive system of marshes, tidal creeks, and sea-islands. The average depth of the estuary is approximately 7 meters at mid tide level. Broad deep natural channels exist throughout Port Royal Sound, Beaufort River, and major tidal tributaries. Large shoal areas occur primarily in the Beaufort River and Port Royal Sound. The AIWW (12 feet at MLW) is the only maintained navigational channel (NOAA, 1994).

A. **Tides** - Tides in Area 15 are semidiurnal, consisting of two low and high tides each lunar day. Mean tidal range within Port Royal Sound ranges from 6.15 feet. to 8.15 feet. Spring tidal range is between 7.13 feet and 9.45 feet (www.co-ops.nos.noaa.gov). The greatest tidal ranges of the year typically occur around full moon during the months of September through December. There is considerable variation in the normal tide range due to the prevailing strength and direction of winds.

B. **Rainfall** - Rainfall data used in this survey is collected at a weather station located at the Beaufort/Jasper Water & Sewer Authority Southside WWTP (station 380559- Beaufort 7 SW). The rainfall gauge is typically read at about 7:00 AM and the rainfall amount is recorded for that date. As most shellfish samples are collected after 7:00 AM, the rainfall for the sample date + 24 hours has been added to the rainfall summary table. Rainfall for the sample date + 24 hours may correlate better and help to explain elevated fecal coliform concentrations in sample results, particularly if there was zero rainfall on the date of or prior to sampling.

Annual rainfall is normally about 51.15 inches, with August being the wettest month. Approximately 40% of the annual rainfall falls in the three-month period from June to August. Weather patterns during this time period are often characterized by thunderstorms and shower activity of a short duration. In addition, these three months also have the highest numbers of days with rainfall greater than one inch. The months of December through March historically have the greatest number of days with rainfall exceeding 0.10 inch and 0.50 inch. Rainfall events during these months are typically of a longer duration.

Annual rainfall recorded at the Beaufort 7SW weather station for 2000 and 2001 was significantly below the norm, as averaged over a 30-year period (see Chart Beaufort Annual Rainfall). Below normal rainfall continued through May 2002 and by August 2002, the drought status of all 46 counties in the state, including Beaufort and Colleton, had been upgraded to extreme. Above normal rainfall beginning in late August, however, led the S.C. Drought Response Committee to downgrade the drought status statewide and remove the drought declaration for Beaufort, Charleston, and Colleton counties on November 21, 2002.

C. **Winds** - The prevailing wind direction between February and September ranges between South and South Southwest (180 to 200 degrees) and between October and January is North Northeast

(20 degrees). The annual mean wind speed is 8.5 MPH, with August having the lowest (7.3 MPH) and March the highest (10.0 MPH) mean wind speed.

D. **River discharges** - There are no freshwater rivers that discharge directly into Area 15. The salinity structure is primarily determined by the seasonal freshwater discharge from the Coosawhatchie River and mean salinities vary less than 5ppt between typical high and low salinity periods. The northern portion of Area 15 receives some freshwater inflow into Brickyard Creek from the Coosaw River.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 15 in lieu of monitoring 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. Monitoring 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 monitoring criteria.

Seven hundred eighty-six (789) surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses at 22 active water quality monitoring stations in Area 15 during the period 01/01/03 through 12/31/05.

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 or to the Low Country District laboratory in Beaufort. Upon receipt at the laboratory, sample sets that exceeded a 30-hour holding time or contained a temperature control > 10 degrees C. were discarded. Samples collected after September 1, 1986 have been analyzed using the five-tube/three dilution modified A-1 method described by Nuefeld (1985).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using automatic temperature compensated refractometers. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of monitoring. Tidal stages were determined Nautical Software's Tides and Currents, Version 2 (1996).

MONITORING RESULTS

Stations 01, 01A, 02, 10, 15, 16, 17, 18, 19, 20, 21, 23, 24, 27, 28, 29,30 and 33 did not exceed a fecal coliform MPN geometric mean of 14 nor a fecal coliform MPN estimated 90th percentile value of 43, thus meeting the statistical criteria for Approved classification. Stations 25, 26, 31, and 32 exceeded a fecal coliform MPN geometric mean value of 14 or a fecal coliform MPN estimated 90th percentile value of 43, thus meeting the statistical criteria for a Restricted classification.

CONCLUSIONS

Based on review of fecal coliform bacteriological data and the pollution source survey, Area 15 is impacted by several sources of actual or potential pollution.

POINT SOURCE POLLUTION

Numerous point sources such as waste water treatment facilities and marinas are located within Area 15. Administratively Prohibited closures are established around these pollution sources.

NONPOINT SOURCE RUNOFF

Storm water runoff appears to be the major source of fecal coliform bacteria contamination in Area 15. Elevated fecal coliform bacteria concentrations associated with stormwater runoff affects water quality at stations located in the tributaries of Battery Creek. The impact of rainfall and stormwater runoff on fecal coliform bacteria concentrations was particularly evident during the El Niño event between November, 1997 and April, 1998 when the area received abnormally high rainfall. The resulting elevated fecal coliform bacteria concentrations had an impact also on shellfish harvesting classification for many stations.

Possible sources of fecal coliform bacteria contamination include failing septic systems, pets, domestic animals such as horses and cows, wildlife, and drainage from roads and freshwater wetlands.

INDIVIDUAL SEWAGE TREATMENT AND DISPOSAL SYSTEMS

Homes adjacent to shellfish waters in Area 15 are served by ISTDs or central sewer. Homes in older developed areas utilize ISTDs while most new developments are tied into sewer. Soils in most areas are considered to be suitable for ISTDs and systems should operate properly if maintained. Older, unsound systems represent a potential source of fecal coliform contamination in the Battery Creek and Wallace Creek areas, particularly during periods of heavy rainfall.

RECOMMENDATIONS

It is recommended that the current Wallace Creek Conditional Management Area be reclassified as Approved. This area has met Approved area criteria for the past five years. The area will be closely monitored for oscillations in water quality due to rainfall.

It is recommended that currently Restricted portions of Battery Creek between Station 10 and Station 19 be classified as Prohibited pending outcome of a site assessment and evaluation. Staff from the Bureau of Land and Waste Management and Low Country District EQC has performed preliminary site assessments at two former super phosphate fertilizer- manufacturing sites adjacent to the Beaufort River and Battery Creek in Area 15. The contaminants of concern are Arsenic and Lead. The Beaufort River site is located within an existing Prohibited closure zone. The Battery Creek site is on the Eastern shore of Battery Creek near shellfish monitoring Station 28. For the review period, water quality at stations 19, 28, 29, and 30 meets the criteria for an Approved classification. However, until the site assessment is completed, the area should be Administratively Prohibited and closed to shellfish harvest.

It is recommended that the amount of rainfall required to close the Battery Creek Conditional Management Area remain at 1.10 inches in a 24-hour period, as measured at the BJW&SA Southside WWTP. (See Battery Creek Conditional Management Plan)

The shoreline survey and bacteriological data review of shellfish Management Area 15 indicate that classification boundary and harvesting water classifications of Area 15 should remain the same as in the prior Annual Update. (see Figure 3):

Prohibited (Administrative closure):

1) Brickyard Creek, from its confluence with Mulligan Creek at Station 02, to its confluence with Beaufort River
2) Albergottie Creek, from its headwaters to its confluence with Brickyard Creek
3) Broomfield Creek, from its headwaters to its confluence with Beaufort River
4) Factory Creek, entire waterbody
5) Cat Island Creek, entire waterbody
6) Creek and its tributaries, from Station 24 at the Highway 280 (Battery Creek) bridge to its confluence with Beaufort River.
7) Archers Creek, from the boundary with Area 17 to its confluence with Beaufort River
8) Ballast Creek, from the boundary with Area 17 to its confluence with Beaufort River
9) McCalley Creek, from Station 15-33 to the headwaters
10) Battery Creek, from confluence with the Beaufort River to the southern Conditionally Approved boundary near Station 15-24.
11) Battery Creek Marina Closure Zone (410 ft radius).
12) Battery Creek, between Station 10 and Station 19 (pending site assessment).

Restricted:

1) Battery Creek, between Station 19 and the headwaters.

Conditionally Approved:

1) Battery Creek, from Station 15-24 at the Hwy 280 (Battery Creek) bridge to Station 15-21, (excluding all administratively Prohibited closure zones) - The Conditionally Approved area also includes stations 10, 25, 26, 27.

Approved:

Remaining portions of Area 15.

Station Addition/Deactivation/Modification: None

Analysis of monitoring data for Area 15 demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 15 will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured at the Beaufort-7-SW Weather Station. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). PMP estimates for the coastal United States have been published in a series of hydro-meteorological reports (HMRs) by the National Weather Service (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*).

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TABLE #1
Shellfish Management Area 15
WATER QUALITY MONITORING STATIONS DESCRIPTION

Station	Description
01	Brickyard Creek at Range Marker
01A	McCalleys Creek at Pawkie Island
02	Mulligan Creek at Brickyard Creek
10	Battery Creek at Five Points Creek
15	Ballast Creek at Beaufort River
16	Station Creek at Beaufort River
17	Cat Island Creek at Chowan Creek
18	Second Middle Marsh in Chowan Creek
19	Battery Creek 1000 feet below Rabbit Island
20	Capers Creek SSG at Penn Community Services Retreat Center
21	Unnamed creek at (former) discharge of BC High and Cherry Hill High
23	Distant Island State Shellfish Ground
24	Battery Creek - SC Highway 280 bridge
25	Battery Creek - Dowlingwood tributary
26	Battery Creek - Picket Fence tributary
27	Battery Creek - Cherry Hill tributary
28	Battery Creek - Storm water outfall under RR track
29	Battery Creek - Tributary on right side before Battery Shores
30	Battery Creek - Cottage Farms Community Dock
31	Battery Creek - Battery Point Community Dock
32	Battery Creek - Under power line
33	McCalley Creek, 0.5 miles upstream of station 15-01A

(Total 22 Active)

Figure 1.

Shellfish Management Area 15 Prior Classification

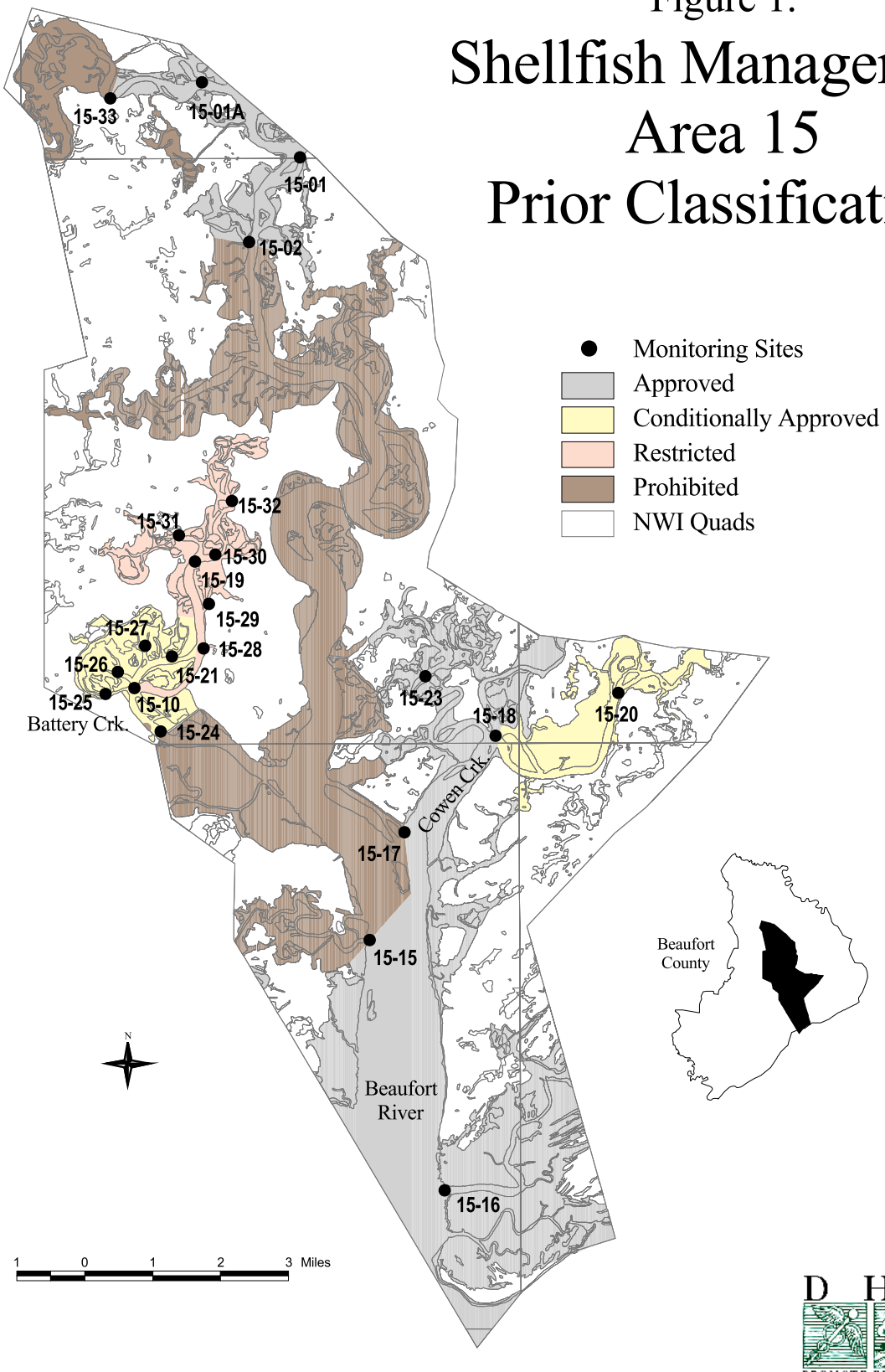

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Figure 2.

Shellfish Management Area 15 Current Classification

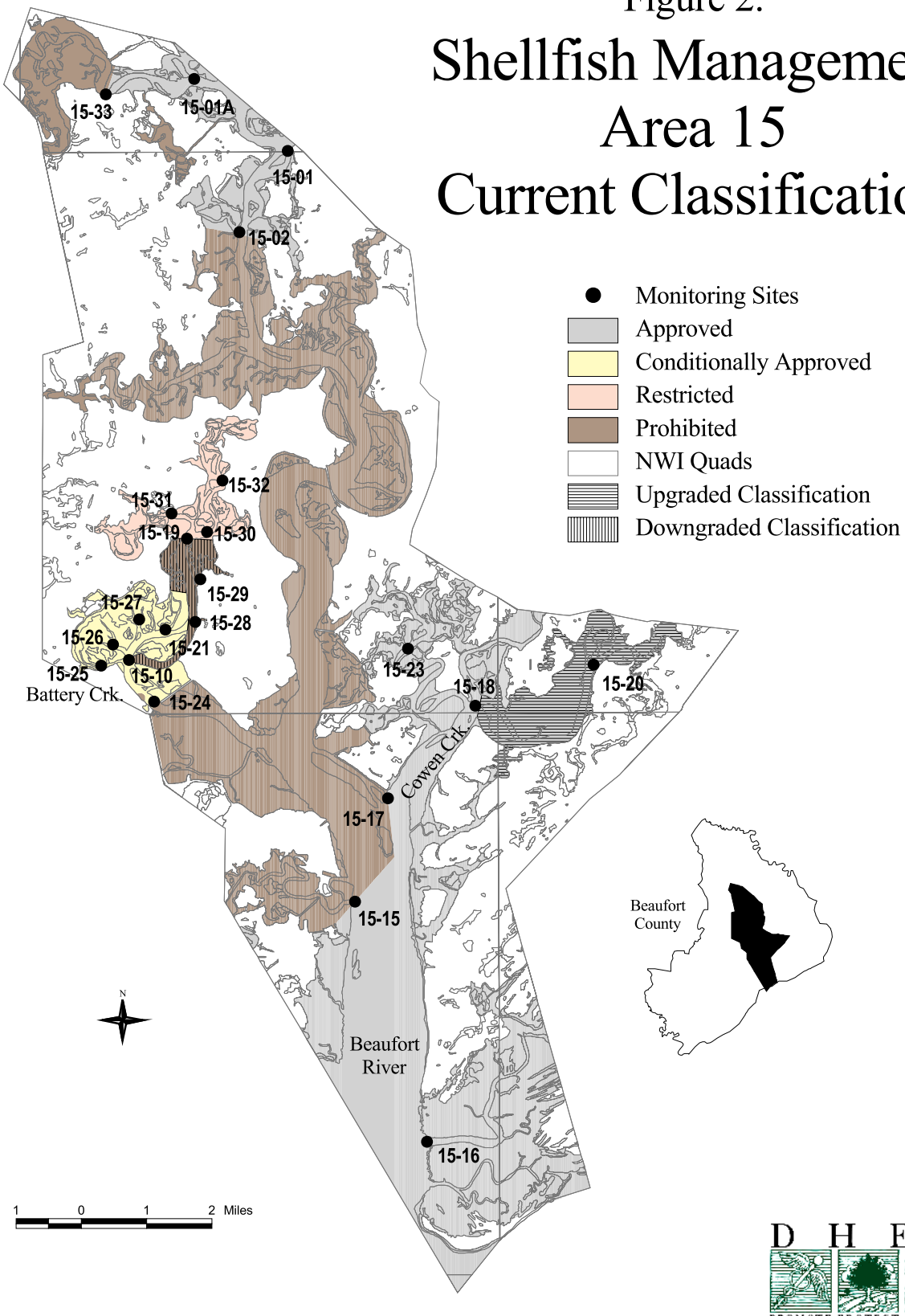

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Figure 3.

Shellfish Management Area 15

Potential Pollution Sources

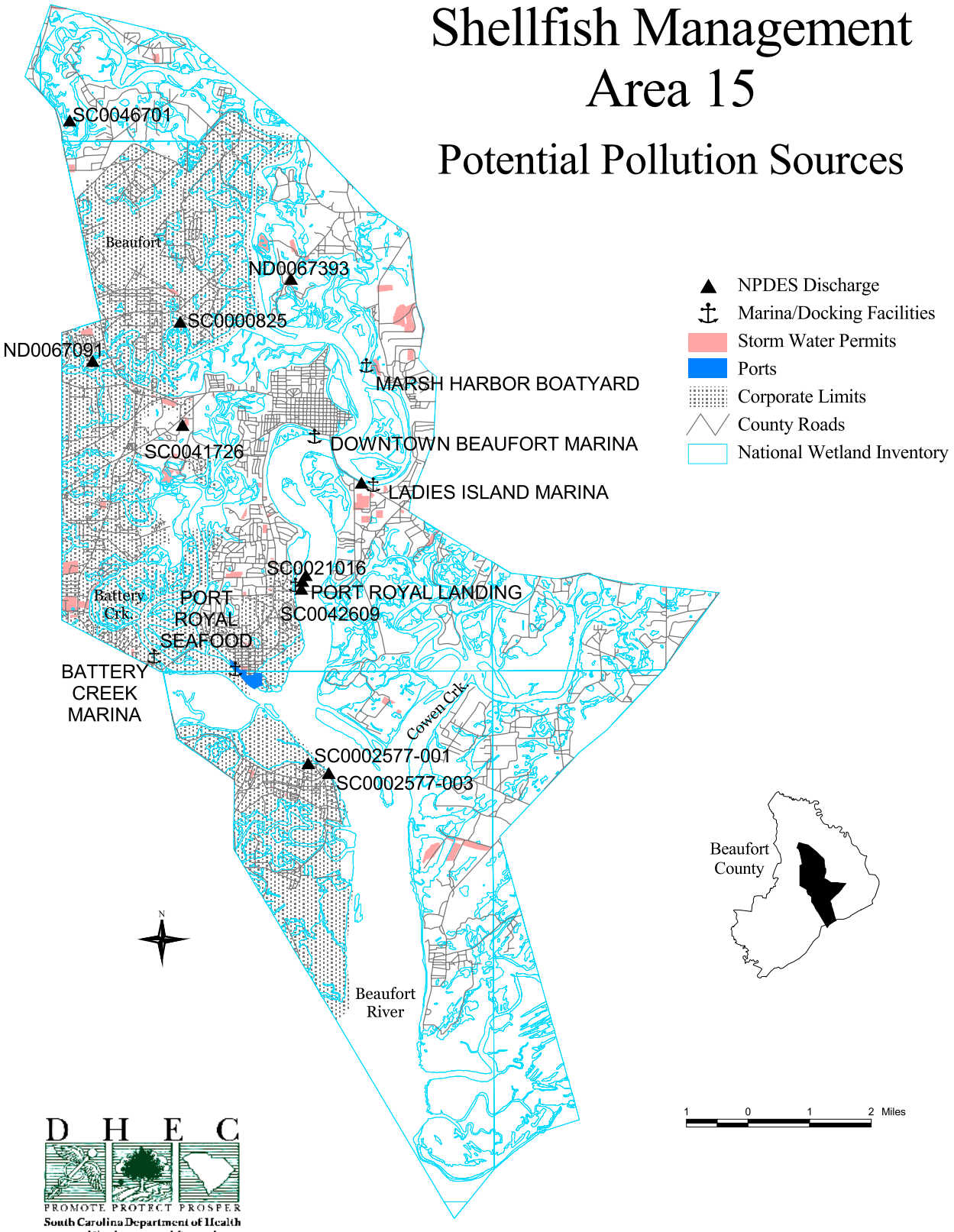

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TABLE #2 (A)
Shellfish Management Area 15
FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Monitoring Stations between

January 1, 2003 and December 31, 2005

Station #►	1	1A	2	10	15	16	17	18	19	20	21
SAMPLES	36	35	36	36	36	36	35	35	36	36	36
GEOMEAN	5.2	7.9	10.1	6.1	4.4	2.1	3.4	4.4	9.6	7.8	7.8
90TH %ILE	21	29	37	16	17	2	8	12	42	28	29
WATER QLTY	A	A	A	A	A	A	A	A	A	A	A
CLASSIFICATION	A	A	A	CA	A	A	A	CA	R	CA	CA

Station #►	23	24	25	26	27	28	29	30	31	32	33
SAMPLES	36	36	36	36	36	36	36	36	36	36	36
GEOMEAN	7.1	5.1	9.5	9.3	7.8	6.9	9.8	9.6	13.3	17.9	11.8
90TH %ILE	37	15	58	50	41	22	41	42	73	77	35
WATER QLTY	A	A	R	R	A	A	A	A	R	R	A
CLASSIFICATION	A	CA	CA	CA	CA	R	R	R	R	R	A

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

TABLE #2 (B)
Shellfish Management Area 15

Conditional Area Stations collected while in Conditional Area Open (CAO) status

between January 1, 2003 and December 31, 2005.

Station #►	10	21	24	25	26	27
SAMPLES	18	18	18	18	18	18
GEOMEAN	4.5	7.3	4.0	6.9	7.7	6.7
90TH %ILE	12	30	10	32	40	30
WATER QLTY	A	A	A	A	A	A
CLASSIFICATION	CA	CA	CA	CA	CA	CA

Battery Creek Conditional Mgmt Area /

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

TABLE #3

Shellfish Management Area 15

WATER QUALITY SAMPLING STATIONS DATA

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 & Envir. 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 #4

RAINFALL DATA

Shellfish Management Area 15

SOURCE :
City of Beaufort Wastewater Treatment Plant
Beaufort, South Carolina (7-SW) Stations #380559

AREA 15 ANNUAL TABLE OF DAILY RAINFALL DATA
SOURCE: City of Beaufort Waste Water Treatment Plant,
Beaufort, SC (7-SW) Station 380559

2003	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.32	0.00	0.00	**0.00**	0.00	1.00	0.02	0.00	0.22	0.00	0.00	**0.00**
2nd	0.00	0.00	0.47	0.00	0.00	0.00	0.61	0.14	0.00	0.00	0.00	0.00
3rd	0.00	0.00	0.01	0.00	0.10	0.00	0.84	0.00	0.00	0.00	0.00	0.00
4th	0.00	0.02	**0.33**	0.00	0.03	0.86	0.00	0.00	0.03	0.00	0.06	0.47
5th	0.00	0.03	0.08	0.00	**0.00**	0.51	0.03	0.56	0.02	0.00	0.05	0.44
6th	0.00	0.00	0.02	0.03	0.00	0.00	0.01	**0.00**	2.10	0.00	0.00	0.00
7th	0.00	0.42	1.04	0.09	0.43	0.16	0.00	0.30	0.15	**0.01**	0.00	0.00
8th	0.00	0.03	0.55	0.96	0.00	0.70	0.05	0.00	0.27	0.02	0.00	0.00
9th	0.00	0.00	0.02	1.26	0.00	0.36	0.00	0.00	0.15	0.07	0.00	0.00
10th	0.00	0.12	0.01	0.72	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00
11th	0.00	0.31	0.00	0.15	0.00	**0.00**	0.00	0.02	0.00	0.02	0.00	--
12th	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13th	0.00	**0.00**	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00
14th	0.00	0.00	0.56	0.00	0.00	0.66	0.11	0.00	0.00	0.00	0.00	0.33
15th	0.00	0.00	0.21	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00
16th	0.00	0.00	0.15	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17th	0.00	1.40	0.02	0.00	0.12	0.25	0.00	0.08	0.00	0.00	0.00	0.02
18th	0.00	0.05	0.38	0.00	1.92	0.26	0.00	0.36	0.00	0.07	**0.00**	0.00
19th	0.00	0.00	0.10	0.00	2.80	1.14	0.00	2.42	0.00	0.00	0.00	0.00
20th	0.00	0.00	0.11	0.00	0.00	0.00	3.95	0.00	0.00	0.00	0.36	0.00
21st	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00
22th	0.03	0.02	0.00	0.07	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	0.00
23rd	0.23	0.58	0.00	0.00	3.01	0.00	0.00	0.00	0.25	0.00	0.00	0.00
24th	0.00	0.00	0.00	0.00	0.00	0.00	1.85	0.00	**0.05**	0.00	0.00	0.04
25th	0.00	0.00	0.00	0.00	0.04	0.00	1.29	0.16	0.00	0.00	0.00	0.00
26th	0.00	0.00	0.00	1.34	0.16	0.00	0.62	0.51	0.00	0.00	0.00	0.00
27th	**0.00**	0.45	0.00	0.46	0.11	0.00	0.20	0.03	0.00	0.00	0.00	0.00
28th	0.00	0.09	0.01	0.00	0.00	0.00	0.63	0.00	0.00	0.25	0.00	0.00
29th	0.00		0.00	0.00	0.00	1.00	0.36	0.00	0.00	2.60	0.21	0.00
30th	0.00		0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.30		0.00		0.00	0.00		0.00		0.00

(Monthly Figures) **Year's Rainfall Total: 54.52**

SUM	0.58	3.52	4.75	5.08	9.00	7.05	11.17	5.07	3.28	3.04	0.68	1.30
MAX	0.32	1.40	1.04	1.34	3.01	1.14	3.95	2.42	2.10	2.60	0.36	0.47
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.02	0.13	0.15	0.17	0.29	0.24	0.36	0.16	0.11	0.10	0.02	0.04

"ND"/"--" = no data (Shaded/bold cells indicate the dates shellfish waters were sampled.)

AREA 15 ANNUAL TABLE OF DAILY RAINFALL DATA
SOURCE: City of Beaufort Waste Water Treatment Plant,
Beaufort, SC (7-SW) Station 380559

2004	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.02	**0.09**	0.13	1.23	0.60	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	1.36	0.02	0.05	0.12	0.25	0.00	0.00	0.00
3rd	0.00	0.28	0.00	0.00	1.26	0.00	0.01	0.40	0.40	0.00	0.00	0.00
4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
5th	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.10	**0.00**	0.10	0.00
6th	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.59	0.00	0.00	0.03
7th	0.00	0.43	0.00	0.00	0.00	0.09	0.00	0.00	1.20	0.00	0.00	0.00
8th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
9th	0.10	0.00	0.00	0.05	0.00	0.00	0.00	**0.00**	**0.00**	0.52	0.00	0.00
10th	0.36	0.00	0.12	0.00	0.00	0.03	0.36	0.00	0.00	0.00	0.00	0.02
11th	0.00	**0.00**	0.00	0.00	0.00	1.74	0.10	0.00	0.26	0.00	0.20	0.06
12th	0.00	0.61	0.00	1.16	0.10	0.00	1.28	0.00	0.40	0.00		0.00
13th	0.00	0.35	0.00	**0.28**	0.00	0.00	0.00	1.90		0.00	0.20	0.00
14th	0.00	0.47	0.00	0.11	0.00	0.78	0.00	0.39		0.00	0.00	**0.00**
15th	0.00	0.56	0.00	0.00		0.86	0.00	0.76	0.50	0.39	**0.00**	0.00
16th	0.00	0.05	0.20	0.00	0.44	0.82	0.00	0.03	0.50	0.35	0.00	0.00
17th	0.00	0.10	**0.00**	0.00	0.03	0.06	0.00	0.00	0.03	0.00	0.00	0.00
18th	0.04	0.01	0.00	0.00	**0.00**	0.00	0.43	0.15	0.00	0.00	0.00	0.00
19th	0.03	0.00	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00
20th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.00
21st	0.00	0.00	0.00	0.00	0.00	0.16	**1.10**	0.00	0.00	0.00	0.06	0.00
22th	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.08	0.00
23rd	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.33	0.00	0.00	0.00	0.07
24th	0.00	0.70	0.00	0.00	0.00	0.21	0.00	1.25	0.00	0.00	0.00	0.00
25th	0.02	0.02	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.29	0.00
26th	0.01	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52
27th	1.32	0.06	0.00	0.31	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.26
28th	0.02	0.00	0.00	0.00	0.00	0.18	0.00	0.21	0.07	0.00	0.50	0.00
29th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.51	0.00	0.00
30th	0.00		0.00	0.00	0.19	0.00	0.16	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.06		0.00		0.00	0.50		0.00		0.00

(Monthly Figures) **Year's Rainfall Total: 43.15**

SUM	1.90	4.52	0.38	1.91	3.40	5.76	5.00	7.61	7.01	2.25	1.45	1.96
MAX	1.32	0.88	0.20	1.16	1.36	1.74	1.28	1.90	2.00	0.52	0.50	1.52
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.06	0.16	0.01	0.06	0.11	0.19	0.16	0.25	0.25	0.07	0.05	0.06

"ND"/"--" = no data (Shaded/bold cells indicate the dates shellfish waters were sampled.)

AREA 15 ANNUAL TABLE OF DAILY RAINFALL DATA
SOURCE: City of Beaufort Waste Water Treatment Plant,
Beaufort, SC (7-SW) Station 380559

2005	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.00	0.00	0.20	1.34	0.00	1.10	0.12	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.86	0.00	0.03	0.40	**0.00**	0.00	0.00	0.00	0.00
3rd	0.00	0.20	0.00	0.00	**0.00**	2.03	0.00	0.00	0.00	0.00	0.00	0.00
4th	0.00	0.50	0.00	0.00	0.00	0.67	0.11	0.00	0.00	0.30	0.00	0.06
5th	**0.00**	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.30	0.00	0.00
6th	0.00	0.00	0.00	0.00	1.72	**0.16**	0.70	0.00	0.00	2.20	0.00	1.10
7th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.14	0.00	0.00
8th	0.00	0.00	0.32	0.92	0.00	0.00	0.00	0.70	0.00	0.66	0.00	0.11
9th	0.02	0.00	0.09	0.00	0.00	0.30	1.15	0.33	0.00	0.00	0.00	0.77
10th	0.00	0.20	0.00	0.00	0.00	0.00	0.40	0.40	0.00	0.63	0.00	0.00
11th	0.00	0.00	0.00	0.00	0.32	0.20	**0.00**	0.10	0.00	0.00	0.00	0.00
12th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	**0.00**	0.02	0.00	0.00
13th	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.02	0.00	**0.03**	0.00	**0.00**
14th	0.70	0.00	0.00	0.02	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
15th	0.80	0.70	**0.00**	0.00	0.00	0.00	0.02	0.00	0.00	0.00	**0.04**	0.02
16th	0.00	0.00	0.84	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.15
17th	0.00	0.00	0.62	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.02
18th	0.00	0.00	0.05	**0.00**	1.46	0.00	0.00	0.68	0.00	0.00	0.00	1.31
19th	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.03
20th	0.00	0.00	0.00	0.00	0.00	2.03	0.00	0.00	0.00	0.00	0.00	0.00
21st	0.00	0.00	0.00	0.00	1.14	0.00	0.00	0.00	0.00	0.00	3.40	0.00
22th	0.00	**0.25**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.14	0.00
23rd	0.00	0.00	2.11	0.25	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00
24th	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.46	0.00	0.00
25th	0.70	0.00	0.02	0.00	0.00	0.17	0.00	0.75	0.00	0.00	0.00	0.09
26th	0.00	0.07	0.18	0.00	0.00	0.31	0.00	0.00	0.09	0.00	0.00	0.01
27th	0.00	0.07	3.12	0.80	0.00	0.04	0.00	1.25	0.00	0.00	0.11	0.00
28th	0.00	1.47	2.72	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.70	0.00
29th	0.20		0.04	0.00	0.00	1.86	0.00	0.00	0.00	0.00	0.00	0.20
30th	0.55		0.00	0.00	0.52	0.08	0.00	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.00		0.00		0.06	0.23		0.00		0.00
(Monthly Figures)						**Year's Rainfall Total:**					**59.83**	
SUM	2.97	3.81	10.11	2.99	6.29	9.73	3.81	6.34	0.21	5.31	4.39	3.87
MAX	0.80	1.47	3.12	0.92	1.72	2.03	1.15	1.25	0.12	2.20	3.40	1.31
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.10	0.14	0.33	0.10	0.20	0.32	0.12	0.20	0.01	0.17	0.15	0.12

"ND"/"--" = no data (Shaded/bold cells indicate the dates shellfish waters were sampled.)

Shellfish Management Area 15
A SUMMARY OF RAINFALL
During and Prior To Fecal Coliform Monitoring

Sample Date	Sample Date + 24 hours	Sample Date	Sample Date - 24 hours	Sample Date - 48 hours	Sample Date - 72 hours
01/27/03	0.00	0.00	0.00	0.00	0.00
02/13/03	0.00	0.00	0.00	0.31	0.12
03/04/03	0.08	0.33	0.01	0.47	0.00
04/01/03	0.00	0.00	0.30	0.00	0.00
05/05/03	0.00	0.00	0.03	0.01	0.00
06/11/03	0.00	0.00	0.00	0.36	0.70
07/22/03	0.00	0.00	0.00	3.95	0.00
08/06/03	0.30	0.00	0.56	0.00	0.00
09/24/03	0.00	0.05	0.25	0.00	0.00
10/07/03	0.02	0.01	0.00	0.00	0.00
11/18/03	0.00	0.00	0.00	0.00	0.00
12/01/03	0.00	0.00	0.00	0.21	0.00
01/06/04	0.00	0.00	0.00	0.00	0.00
02/11/04	0.61	0.00	0.00	0.00	0.00
03/17/04	0.00	0.00	0.20	0.00	0.00
04/13/04	0.11	0.28	1.16	0.00	0.00
05/18/04	0.00	0.00	0.03	No data	No data
06/01/04	0.02	0.09	No data	No data	0.00
07/21/04	0.00	1.10	0.00	0.86	0.43
08/09/04	0.00	0.00	0.00	0.00	0.10
09/09/04	0.00	0.00	0.11	1.20	0.59
10/05/04	0.00	0.00	0.00	0.00	0.00
11/15/04	0.00	0.00	0.00	No data	0.05
12/14/04	0.00	0.00	0.00	0.00	No data
01/05/05	0.00	0.00	0.00	0.00	0.00
02/22/05	0.00	0.25	0.00	0.00	0.00
03/15/05	0.84	0.00	0.00	0.00	0.00
04/18/05	0.00	0.00	0.00	0.00	0.00
05/03/05	0.00	0.00	0.00	0.20	0.00
06/06/05	0.00	0.16	0.00	2.03	0.03
07/11/05	0.00	0.00	0.40	1.15	No data
08/02/05	0.00	No data	1.10	0.00	0.00
09/12/05	0.00	0.00	0.00	0.00	0.00
10/13/05	No data	No data	No data	No data	No data
11/15/05	No data	No data	No data	No data	No data
12/13/05	No data	1.10	No data	0.06	0.00

Amounts Shown Are per Day, not Cumulative / Station 380559 - Beaufort 7 – SW

MANAGEMENT PLAN FOR CONDITIONALLY APPROVED AREAS

Shellfish Management Area 15

►Battery Creek Management Plan and Evaluation

Shellfish Management Area 15
BATTERY CREEK
CONDITIONAL AREA MANAGEMENT PLAN

JULY 2006

I. AREA DESCRIPTION

The 2006 Annual Update includes the following written description of Battery Creek's Conditionally Approved area, in addition to a prior and a current classification map defining the Conditionally Approved area boundaries.

> *Portions of Battery Creek and contiguous estuarine areas, extending from the Hwy 280 Bridge (near Station 15-24) to a point approximately midway between Station 15-21 and Station 15-28. This also includes areas represented by stations 15-10, 15-25, 15-26, and 15-27.*

The Battery Creek Conditionally Approved area currently includes growing area represented by stations 10, 21, 24, 25, 26, and 27. There will be no recommendations for modification to the boundaries of the Battery Creek Conditionally Approved area.

For the review period (January 1, 2003 through December 31, 2005), bacteriological data collected in accordance with the Department's systematic random sampling plan at stations 10, 21, 24, and 27 meet statistical criteria for an Approved classification. Water quality at stations 25 and 26 exceed the statistical criteria for an Approved classification. Analysis of water quality data collected while in the Conditional Area Open (CAO) status indicate that all stations meet statistical criteria for an Approved classification. Further analyses were conducted for all routine samples collected from stations located within the Conditionally Approved area during the review period, excluding samples collected following 24-hour rainfall events greater than or equal to 1.10 inches (on or within 72 hours prior to sample date). Geometric mean and 90th percentile values exhibit substantially lower values when compared to the full 3-year data set and indicate current rainfall criteria is appropriate.

There are no mariculture operations in the area; therefore, year round harvesting is not allowed. The harvesting season is from September 16th through May 15th.

II. FACTORS INDICATING SUITABILITY OF BATTERY CREEK AS A CONDITIONALLY APPROVED AREA

A. The major pollution source adversely affecting water quality in Battery Creek is nonpoint source in origin.

B. Battery Creek receives no substantial freshwater input other than from rainfall and associated runoff.

C. Battery Creek has a tidal range that facilitates sufficient exchange with coastal ocean waters. This exchange results in a typical salinity range of 20 ppt to 28 ppt. Depressed salinities due to rainfall are temporary.

D. Battery Creek is relatively small geographically and does not present major patrol difficulties.

III. PREDICTABLE POLLUTION EVENTS THAT CAUSE CLOSURE

Meteorological Events

1. The Battery Creek Conditionally Approved area will be closed upon receipt of 1.10" or more of rainfall in a 24-hour period, as measured at weather station 380559- Beaufort 7 SW, located at the BJW&SA Southside WWTP.

2. Analysis of routine samples collected from stations located within the Conditionally Approved area during the review period, excluding samples collected following 24-hour rainfall events greater than or equal to 1.10 inches (on or within 72 hours prior to sample date) indicate these stations will meet criteria for an Approved classification. This supports management of the area based upon rainfall of 1.10" or more in a 24-hour period. (See data summary table below).

FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
excludes samples collected during or within 72 hours prior to any 24-hour rainfall event greater than or equal to 1.10 inches.

Station #	10	21	24	25	26	27
SAMPLES	28	28	28	28	28	28
GEOMEAN	5.2	6.6	4.8	8.3	7.2	6.3
90TH %ILE	13	20	12	41	35	26
WATER QLTY	A	A	A	A	A	A
CLASSIFICATION	CA	CA	CA	CA	CA	CA

3. A review of rainfall data for the past five years (2001 to 2005) indicates that the area will receive an average of 5.4 rainfall events per year during shellfish harvesting season equal to or greater than 1.10". Although some events are likely to overlap, each event is considered to be separate from the subsequent event by a minimum duration of 14 days. With this in mind, the Conditionally Approved area in Battery Creek is predicted to be an open status 69% of the eight-month harvest season (September 16 through May 15; a total of 242 days).

Number of 24-hour Rainfall events > 1.10 inches Sept. 16 to May 15

2001	0
2002	8
2003	4
2004	6
2005	9
Total	27 / 5yrs = 5.4/ yr 5.4 x 14 day closure = 75.6 days closed/yr

67.2 / 242 days in harvest season=31% closed, 69% open)

B. Seasonal Events

Any significant input from migratory waterfowl populations is offset by tidal flushing.

IV. IMPLEMENTATION OF A CONDITIONAL AREA CLOSURE

The Low Country EQC District Shellfish Sanitation Program manager is the responsible party for determining compliance with all aspects of this plan, including the tracking of rainfall criteria violations. In the event that the manager shall be unavailable, a responsible employee shall be designated responsibility for tracking, compliance, and notification procedures.

A. **Implementation of Closure (September through May):** The following procedures shall be used in the event a closure is necessary:

1. The State Shellfish Sanitation Program Manager (or his designee) shall be notified upon determination of the need for any closure. Media notification shall be coordinated through the Shellfish Sanitation Program and the Office of Media Relations.

2. The Office of Media Relations (Media Relations) is the responsible authority for issuance of news releases. Media Relations shall be notified within four hours of the determination of the need for a closure. They shall be provided with specific information regarding the pollution event and affected area. In the event of the need for a weekend or holiday closure, Media Relations shall be contacted through their on-call pager number or through the Department's emergency response telephone number.

3. Within approximately four hours of determination of the need for a closure, District Shellfish staff shall notify the South Carolina Department of Natural Resources (SCDNR), Office of Commercial Fisheries Management, & SCDNR Law Enforcement, by telephone and/or fax.

4. District Shellfish Sanitation Program staff shall notify certified Shellfish Shippers with interests in the affected area. SCDNR is the State agency having authority for the issuance of individual commercial shellfish harvest permits and should provide notification to individual permittees.

5. During the closure period, District Shellfish Sanitation Program officers shall insure patrols are conducted at a frequency sufficient to deter illegal harvest activities. Schedules shall include night and weekend patrols. Documentation of these patrols shall be maintained. Unless a district Shellfish Sanitation Program officer has personal knowledge that a violator has been notified of the closure, no summons should be issued during the first 48 hours following the initial call to Media Relations. Written warnings should be issued during this 48 hour period and all shellfish should be returned to the water.

B. Management of Conditional Areas Extraneous to the Normal Shellfish Harvest Season

The Battery Creek Conditionally Approved area shall remain in the closed status from May 16 through September 15.

C. Enforcement of Closures

1. DHEC is the agency responsible for public health protection. This includes public notice and closures of shellfish management areas.

2. District Shellfish Sanitation Program officers shall insure that the area is patrolled at a frequency adequate to prevent illegal harvesting. Documentation of these patrols shall be maintained. District Shellfish Sanitation Program officers may coordinate with other law enforcement officers to insure adequate area coverage.

V. CONTROL ELEMENTS USED TO REOPEN AFTER A POLLUTION EVENT

Opening of areas following closure due to violation of management plan criteria shall adhere to the following control elements.

A. The area shall remain closed for a minimum period of 14 consecutive days following the end of a rainfall event. If, during the initial closure period, a subsequent event occurs that meets the criteria for a closure, the area shall remain closed for 14 consecutive days following the occurrence of the subsequent event.

B. The bacteriological water quality at all stations located within, or on the boundary of, the closed Conditionally Approved area shall be assessed prior to reopening. For the year 2006 report this shall include stations 10, 21, 24, 25, 26, 27, and 28. The area shall remain closed and be re-sampled at a later date if more than 15% of the reopening samples exceed a fecal coliform MPN of 43.

C. District Shellfish Sanitation Program staff and the State Shellfish Sanitation Program Manager (or his designee) shall concur on the decision to reopen the area.

D. District Shellfish Sanitation Program staff shall notify SCDNR, Division of Commercial Fisheries Management, of the opening following issuance of the news release.

E. Local Certified Shellfish Shippers shall be notified by SCDHEC of the opening as soon as possible.

VI. MANAGEMENT PLAN EVALUATION

This plan shall be evaluated once per year and included as a part of the Shellfish Management Area 15 Annual Update.

Shellfish Management Area 15
EVALUATION OF BATTERY CREEK
CONDITIONAL AREA MANAGEMENT PLAN
July 2006

I. BACKGROUND INFORMATION

The following is a description of the Area 15 Conditionally Approved areas as indicated in the July, 2005 Annual Update:

Battery Creek, from station 15-24 at the Hwy 280 (Battery Creek) bridge to station 15-21, (excluding all administratively Prohibited closure zones). The Conditionally Approved area also includes stations 10, 25, 26, 27. The portion of the main channel between stations 10 and 19 will be classified as Restricted.

This report evaluates compliance with the 2005 Battery Creek Conditional Area Management Plan. This area was delineated in its present configuration in the 2000 Annual Update. In January 2001, SCDNR assigned Culture Permit C-080 to the area. A map indicating the Area 15 Battery Creek conditional area boundary is included in the 2005 and 2006 Area 15 Annual Update Report.

Although the evaluation period is calendar year 2005, water quality is evaluated for a three-year review period. . Closure of the Conditionally Approved area for CY 2005 is based on rainfall of 1.10" or greater in a 24-hour period and is measured at the Southeast Regional Climate Center Station 380559 – Beaufort.

There are no mariculture activities in this area, therefore, no year-round harvesting is allowed.

II. REEVALUATION OF CONDITIONAL CLASSIFICATION

The following table is a summary of conditional area closures during CY 2005:

Closure Date	Event	Sample Date	Reopening Date
02-28-05	Closed Area- (Rainfall 1.47”)	03/07/05	03/15/05
03/23/05	Closed Area- (Rainfall 2.11”)	04/04/05	04/11/05
03/27/05	Area Remained Closed (Rainfall 3.12”)	04/04/05	04/11/05
03/28/05	Area Remained Closed (Rainfall 2.72”)	04/04/05	04/11/05
05/06/05	Closed Area- (Rainfall 1.72”)	09/12/05	09/16/05
10/05/05	Closed Area (Hurricane-Rainfall 2.2”)	10/13/05	10/25/05
11/21/05	Closed Area- (Rainfall 3.4”)	12/28/05	12/30/05
12-06-05	Area Remained Closed - (Rainfall 1.10”)	12/28/05	12/30/05
12/08/05	Area Remained Closed - (Rainfall 1.31”)	12/28/05	12/30/06

Compliance - For the evaluation period, the Battery Creek Conditional Management Area was managed in accordance with the plan.

Cooperation - Cooperation by BJW&SA Southside WWTP personnel in reporting rainfall events has been excellent. WWTP personnel readily supply necessary rainfall data.

Evaluation of Water Quality with Respect to the Bacteriological Standards - For the review period (January 1, 2003 through December 31, 2005), stations10, 21, 24, and 27, when sampled in accordance with the Department's systematic random sampling plan, meet the criteria for an Approved water quality classification. Water quality at Stations 25, and 26 meets the statistical criteria for a Restricted classification.

Analysis of samples collected while in the Conditional Area Open (CAO) status indicates stations 10, 21, 24, 25, 26 and 27 meet the statistical criteria for an Approved classification (see data sheets- Conditional Area in Open Status). Therefore, the amount of rainfall required to close this Area will remain at 1.10" or greater in a 24 hour period.

FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
Conditional Area Stations collected while
Conditional Area Open (CAO)

from January 1, 2003 through December 31, 2005.

Station #►	10	21	24	25	26	27
SAMPLES	18	18	18	18	18	18
GEOMEAN	4.5	7.3	4.0	6.9	7.7	6.7
90TH %ILE	12	30	10	32	40	30
WATER QLTY	A	A	A	A	A	A
CLASSIFICATION	CA	CA	CA	CA	CA	CA

III. Recommendations

No changes in the boundaries of the Battery Creek Conditional Area are recommended in the 2006 Annual Update. The rainfall management criteria will remain at 1.10 inches or greater in a 24-hour period as measured at the Southeast Regional Climate Center Station 380559.