

**State of South Carolina**  
**Integrated Report for 2022**

**Part II: *Section 305(b) Assessment and Reporting***



September 2022



## **PREFACE**

The South Carolina Department of Health and Environmental Control (SCDHEC) prepared this report as a requirement of Section 305(b) of Public Law 100-4, last reauthorized and commonly known as The Clean Water Act (CWA) of 1987, and as a public information document. The report presents a general assessment of water quality conditions and water pollution control programs in South Carolina. SCDHEC has enhanced the watershed water quality management strategy by replacing the Watershed Water Quality Assessment documents, previously published every five years for each of the state's major river basins, with the GIS-based web application the South Carolina Watershed Atlas. While the title page states that this is an integrated report, Section 303(d) of the CWA requirements are submitted separately as a companion document.

The determinations of surface water quality were based on data collected by SCDHEC at ambient water quality monitoring stations, point source permit required monitoring, and evaluation of nonpoint source (NPS) data. Other information in this report was obtained from SCDHEC programs associated with water quality monitoring and water pollution control.

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## EXECUTIVE SUMMARY

The Clean Water Act (CWA) states “it is the national goal that wherever attainable, an interim goal of water quality that provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water shall be achieved by July 1, 1983.”

The State of South Carolina has promulgated S.C. Regulation 61-68, *Water Classifications and Standards* and S.C. Regulation 61-69, *Classified Waters* that establish specific standards and general rules to protect and maintain these uses and designate classified uses for each waterbody. It is the intent and purpose of the regulations that waters that meet standards shall be maintained and waters that do not meet standards shall be improved.

The statewide statistical survey component of the ambient monitoring program is designed to make statewide estimates of water quality. The data derived from those monitoring activities is used to develop the stream, lake/reservoir, and estuarine summary information presented in this report. At the request of the USEPA there are two separate statewide condition summaries contained in this report, the 2014 through 2018 survey and the 2016 through 2020 survey. A statistical survey monitoring design samples the population of interest in a fashion that allows statements to be made about the whole population based on a subsample from the population of interest. The advantage of the statistical survey sampling design is that statistically valid statements about water quality can be made about large areas based on a relatively small subsample. Based on the modified USEPA National Hydrography Dataset (NHD) and the results of survey site selection validation, South Carolina has an estimated 22,658 to 23,358 miles of freshwater rivers and streams representing the stream sampling design frame based on the two different survey windows, and 393,430 acres of lake and reservoir representing the lake/reservoir sampling design frame. Based on a hydrographic GIS cover developed jointly by SCDHEC and the South Carolina Department of Natural Resources and the results of survey site selection validation, South Carolina has an estimated 289 combined square miles of tide creek and open water habitat representing the estuarine sampling design frame.

Quality assured water quality data collected as part of the survey network from 2014 through 2018 and 2016 through 2020 provided the database for this assessment. Evaluation of these data determines if water quality in rivers, lakes, and estuaries is suitable to support State classified uses. The tables in this report include the level of use support for the waters of South Carolina and the cause of nonattainment affecting the largest size in each waterbody type for aquatic life and primary contact recreation uses.

## BACKGROUND

### Water Pollution Control Program

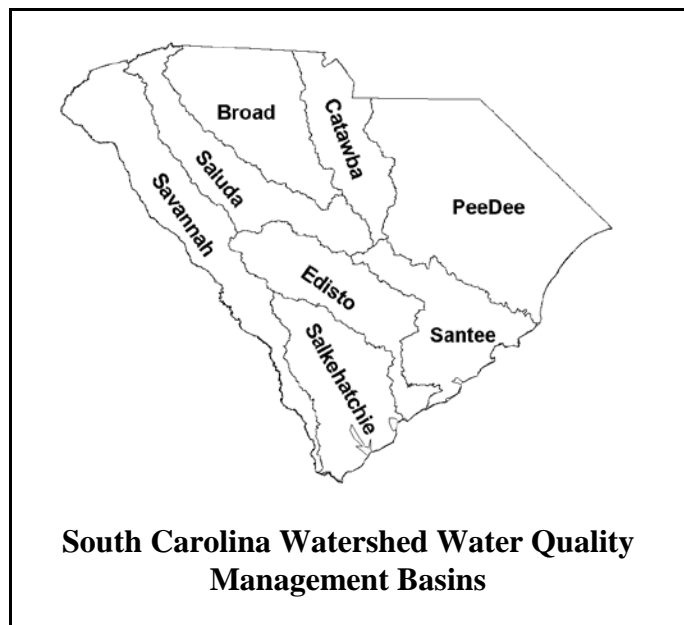
#### A. Watershed Approach

SCDHEC conducts water quality assessment and protection on a watershed basis in order to promote a coordinated approach to river basin development and water quality maintenance or improvement, to better address congressional and legislative mandates, to better utilize current resources, and to better inform the public and regulated community of existing and future water quality issues. Watershed water quality management recognizes the interdependence of water quality and all the activities that occur in the associated drainage basin including: monitoring, assessment, problem identification and prioritization, TMDL development, water quality modeling, planning, permitting, and other activities.

SCDHEC has divided the state into eight major drainage basins along USGS hydrologic units (Figure 1), encompassing approximately 185, 10-digit National Watershed Boundary Data Set watersheds. These watersheds serve as the hydrologic boundaries that guide SCDHEC water quality activities.

Planning on a watershed basis is consistent with basic ecological principles of watershed management. It allows the coordination of implementation activities so that all actual and potential impacts on water quality can be evaluated. Both point source and nonpoint source impacts can be evaluated when making water quality protection decisions. Problem areas in a particular drainage basin can be identified and existing and potential contributors can be examined. Subsequently, waste assimilative capacities can be determined and allocated in a more equitable fashion.

SCDHEC has enhanced the watershed water quality management strategy by replacing the Watershed Water Quality Assessment documents, previously published every five years for each of the state's major river basins, with the GIS-based web application the South Carolina Watershed Atlas. The Atlas contains watershed descriptions, Water permits, advisories, public water supply, water quality monitoring stations, water quality assessments, use support status, water classifications, watershed



boundaries, ecoregions, National Land Cover Dataset, MS4s, 319 projects and TMDLs. The SC Watershed Atlas facilitates transparency, collaboration and broader participation in the watershed water quality management process. Please see <https://gis.dhec.sc.gov/watersheds/>



## **B. Water Quality Standards and Classifications**

S.C. Regulations 61-68, *Water Classifications and Standards* (R.61-68) and S.C. Regulation 61-69, *Classified Waters* (R.61-69) were promulgated by SCDHEC pursuant to the South Carolina Pollution Control Act (48-1-10, *et seq.*, S.C. Code of Laws, 1976) and the South Carolina Administrative Procedures Act.

The water quality standards regulation contains provisions that provide for the protection and maintenance of the existing and classified uses of the waters of the State. The water quality standards include general rules and specific water quality criteria, both narrative and numeric, to protect those classified and existing uses as well as antidegradation rules to protect the public health and welfare, and maintain and enhance water quality.

The water quality standards also serve as the basis for decisions in the other water quality program areas. NPDES permit limitations for waste discharges are determined according to the classification and standards of the receiving water. The standards and classifications also affect the control of toxic substances, thermal discharges, stormwater discharges, dredge and fill activities, and other water related activities. SCDHEC implements the antidegradation rules through its regulatory programs. R.61-69 alphabetically lists the waterbodies in South Carolina that have been specifically classified by name, gives the classification, and describes the boundaries of the use classification, the county of location, and any applicable site-specific standards.

Revisions to water quality standards and any reclassification of waters of the State require a public hearing process, approval by the SCDHEC Board, approval by the General Assembly, publication in the State Register, and approval by the U.S.EPA. The latest amendments to R.61-68 and R.61-69 were approved by the SCDHEC Board on November 7, 2019. Following approval by the General Assembly, these amendments were published in the State Register on June 26, 2020, and approved by EPA on April 22, 2021.

## 1. Surface Water Classes – Freshwaters

**Table 1. Freshwater Classifications and Descriptions**

<b>Freshwaters</b>	<b>Description</b>
Outstanding National Resource Waters	Exceptional national recreational and/or ecological resource.
Outstanding Resource Waters	Exceptional recreational and/or ecological resource and suitable for drinking water source with minimal treatment.
Trout Waters - (3 types) Natural Put, Grow and Take  Put and Take	Suitable for supporting reproducing and/or stocked trout populations and cold water indigenous aquatic community and the survival and propagation of aquatic life. Primary and secondary recreational contact including fishing and as drinking water source. Suitable for industrial and agricultural uses.
Freshwater	Suitable for the survival and propagation of aquatic life; fishing and primary and secondary recreational contact and as drinking water source. Suitable also for industrial and agricultural uses.

## 2. Surface Water Classes – Saltwater

**Table 2. Saltwater Classifications and Descriptions**

<b>Saltwater</b>	<b>Description</b>
Outstanding National Resource Waters	Exceptional national recreational and/or ecological resource.
Outstanding Resource Waters	Exceptional recreational and/or ecological resource.
Shellfish Harvesting Waters	Suitable for survival and propagation of aquatic life; primary and secondary contact recreation. Suitable for harvesting of shellfish, crabbing, and fishing for market purposes and/or for human consumption.
Class SA	Suitable for survival and propagation of aquatic life; primary and secondary contact recreation; crabbing and fishing for market purposes and/or human consumption.
Class SB	Suitable for survival and propagation of aquatic life; primary and secondary contact recreation; crabbing and fishing for market purposes and/or human consumption.

### 3. Groundwater Classes

**Table 3. Groundwater Classifications and Descriptions**

<b>Groundwater Type</b>	<b>Description</b>
Class GA	Vulnerable to contamination due to hydrological characteristics.
Class GB	Suitable as an underground source of drinking water. All groundwaters of the State unless otherwise classified.
Class GC	Not suitable for underground drinking water source.

The following table summarizes the uses of each of the surface water classifications. No degradation of existing uses is permitted regardless of classification and no degradation of natural conditions is allowed in Outstanding Resource Waters or Outstanding National Resource Waters.

**Table 4. Summary of Supported Classified Uses for South Carolina**

<b>Uses</b>	<b>Description</b>
Fish and wildlife	All classes
Domestic water supply	All freshwater classes
Primary contact recreation	All classes
Secondary contact recreation	All classes
Industrial	All freshwater classes
Agriculture	All freshwater classes
Navigation	All classes

### 4. Reclassifications and Site-Specific Criteria

Most reclassifications are initiated after receiving a written request from an individual, special interest group, or organization. SCDHEC also proposes waters for reclassification where existing water quality is better than required to protect the classified uses or if there is an existing use not recognized by the present classification. Also added to the classification system is the designation of No Discharge Zones (NDZs). NDZs relate specifically to the discharge of treated waste from Marine Sanitation Devices (MSDs) and are authorized pursuant to §312 of the Federal Clean Water Act. Waters of the State designated as NDZ prohibit any discharge from MSDs into these waters and require that the MSDs be pumped out at an appropriate facility. SCDHEC has designated six

waterbodies as NDZs. All of South Carolina's site-specific criteria are found in R.61-69.

### **C. Point Source Program – Domestic Facilities**

The EPA has delegated the authority to SCDHEC for administering the National Pollutant Discharge Elimination System (NPDES) Program within the State. As a functional part of this NPDES program, all municipal and private domestic wastewater treatment works that discharge to surface water in South Carolina are monitored by the Bureau of Water (BOW). Permit effluent limits of each surface water discharge are derived using water quality models and other tools.

#### **1. Loan Program**

Beginning with fiscal year 1989, the state established a Clean Water State Revolving Loan Fund (CWSRF) program, with EPA providing annual capitalization grants to seed the CWSRF program. This program is a low-interest, revolving loan program established pursuant to Public Law (P.L. 100-4), Water Quality Act of 1987. The State, in accordance with EPA requirements, has established a project priority rating system. The State's priority list ranks each wastewater treatment project need as well as other projects based on water quality and sludge disposal needs.

Newly constructed or upgraded treatment works funded by CWSRF improve wastewater treatment resulting in favorable water quality benefits. This construction has eliminated poorly treated effluent from many streams and provided improvements to facility capacity. As an overall result, the CWSRF helps to improve and maintain water quality.

#### **2. Pretreatment and Toxicity Program**

The implementation of SCDHEC pretreatment program continues. The State approves implementation of pretreatment programs for Publicly Owned Treatment Works (POTWs). The pretreatment programs are typically updated upon permit renewal or when the facility expands the discharge. An assessment of program requirements is conducted to insure that the latest pretreatment regulation requirements are in place. This benefits water quality. With the implementation of approved programs, many industries that previously discharged untreated wastewater to a POTW must pretreat their discharges. This has resulted in a significant reduction in the amounts of materials (contaminants) that POTWs are now receiving from the industries. This allows the POTW to adequately treat all wastewater prior to discharging to a State stream, resulting in the ability to better maintain the existing stream water quality standards.

Since FY 89, appropriate majors, significant minors (minors with pretreatment programs) and selected other permits have been issued or reissued with effluent toxicity monitoring requirements to be performed as appropriate based on the information related to the discharge characteristics. Depending on the in-stream waste concentration and presence or absence of a diffuser, an acute toxicity test, chronic toxicity test, or both may be required. The toxicity testing typically will be multi-concentration tests that will allow an assessment of the potential toxicity of the effluent at varying concentrations.

### **3. Stormwater Controls**

South Carolina has no known combined stormwater/sanitary sewer discharges associated with POTWs. Combined sewers are usually prohibited by local ordinance to preclude overloading treatment systems with stormwater. Stormwater runoff control on POTW sites is mandatory in some areas of the State.

SCDHEC is implementing a state stormwater permitting program policy in support of EPA guidelines of requirements required by the 1987 amendments to the Clean Water Act. See the Section on Stormwater Permits under “D. Point Source Program - Industrial and Agricultural Facilities.”

### **4. Land Application of Sludge and Effluent**

SCDHEC issues State discharge permits to facilities that discharge directly to land (e.g., spray irrigation). For effluent, this involve the application of wastewater to land surfaces with the applied effluent being further treated as it percolates through the plant-soil matrix. A portion of the applied effluent percolates to groundwater, some is absorbed by vegetation, and some evaporates to the atmosphere. For sludge, this involves the beneficial incorporation of sludge onto fields to provide nutrients (as an alternative to commercial fertilizers).

The primary objectives of this program are:

- (a) Beneficial use of applied wastewater and sludge without exceeding groundwater quality standards as specified in S.C. Regulation 61-68 *Water Classifications and Standards*.
- (b) Beneficial use of treated effluent, water and nutrients, in lieu of using other sources of water (e.g. water conservation).
- (c) Beneficial use of sludge as a source of nutrients as an alternative to using commercial fertilizers.

As a permit requirement, a program for monitoring the quality of groundwater is typically established and implemented. Proper placement of groundwater monitoring wells will provide a check on the effectiveness of land application and will serve as an early warning system for groundwater quality protection for nearby groundwater users. The direction of groundwater flow determines the placement of groundwater monitoring wells.

### **5. Strategies to Improve the Domestic Permitting Program**

SCDHEC regional personnel inspect the operation and maintenance programs of POTWs on a routine basis. Deficiencies noted during inspections are conveyed to the POTW and may require SCDHEC to take formal enforcement action. Operational advice is provided on a limited basis by SCDHEC staff. The South Carolina Environmental Training Center at Sumter Area Technical College also provides training for treatment plant operators.

SCDHEC has developed sludge management regulations and guidance for permittees. All NPDES permits issued or reissued have sludge disposal requirements. The permit typically requires the sludge generator to monitor the content of its sludge and to dispose of it in an environmentally acceptable manner. The permit authorizes specific methods (e.g., land application, land filling, etc.) and procedures to be fully implemented.

## **D. Point Source Program - Industrial and Agricultural Facilities**

### **1. Industrial Facilities**

SCDHEC reviews NPDES permit applications for new and existing facilities and determines whether treatment must be technology-based or based on water quality standards. The more stringent of these derived numbers are used as the applicable permit limits. Effluent guidelines, where promulgated by EPA, are used to determine technology-based limits. If EPA effluent guidelines have not been developed, best professional judgment of technology-based limits is used. Water quality limits are developed using computerized water quality modeling procedures, which result in wasteload allocations for constituents affecting in-stream oxygen levels. South Carolina water quality standards and/or biological monitoring are used to determine limits for potentially toxic constituents. Where appropriate, permit limits are developed using a combination of water quality limitations for specific constituents, whole effluent toxicity limits, and in-stream biological monitoring to insure no adverse impacts from industrial point source dischargers.

### **2. Agricultural Facilities**

Unregulated wastewater discharges from agricultural animal facilities or fruit and vegetable processing facilities may affect water quality. Additionally, South Carolina does not allow surface water discharges from these facilities under any circumstances. To ensure these wastes do not enter the waters of the State, SCDHEC requires that both solid and liquid agricultural wastes from these facilities be collected, treated, and disposed in an environmentally acceptable manner. This is accomplished through a State permitting and inspection program requiring recycling or land application of agricultural wastes. Land application of wastes to viable crops at agronomic rates eliminates direct surface water discharges of agricultural wastes and is effective in insuring water quality.

### **3. Toxics Controls**

Toxic pollutants are generally defined as substances that by themselves or in combination with other chemicals are harmful to animal life or human health. They include some of the metals, pesticides, and other synthetic organic pollutants that have the potential to impact water, fish tissue, and bottom sediments. Each NPDES permit application is reviewed for potential toxic pollutants. These pollutants are evaluated for aquatic life and human health concerns. If determined to be potentially toxic, a limitation is placed in the NPDES permit for that specific pollutant using South Carolina water quality standards. SCDHEC has EPA-approved standards for specific pollutants. Other scientifically-defensible published criterion may be used for a pollutant in permit development in the absence of an approved water quality standard. Whole effluent toxicity testing is placed in many NPDES permits; those tests being for acute and/or chronic monitoring as appropriate. In-stream biological assessments are also being utilized in some cases (e.g., to

evaluate stormwater runoff).

#### **4. Land Application of Treated Wastewater**

The process utilized for industrial and agricultural facilities is the same as that for municipal and domestic facilities. However, limitations for effluent and sludge are based on site-specific requirements.

#### **5. Stormwater Permits- Industrial**

SCDHEC regulates stormwater discharges associated with industrial activities. The State has issued three general NPDES permits for activities associated with industry. These permits are the Construction Activity NPDES Permit, the Construction Activity for SCDOT NPDES Permit and the Associated with Industrial Activity, Except Construction, NPDES Permit.

The general permits require permittees to develop and implement Storm Water Pollution Prevention Plans (SWPPPs) that will minimize pollutants in their storm water discharges. Some industrial activities, except construction, must monitor on either an annual or semiannual basis while all industrial activities, except construction, are required to update their SWPPPs on an annual basis.

#### **6. Stormwater Permits -Construction**

In addition to regulating stormwater discharges associated with industrial activities, SCDHEC is charged with regulation of stormwater discharges originating from construction sites. This is done through the NPDES General Permit for Stormwater Discharges from Construction Activities (SCR100000) and the NPDES General Permit for Stormwater Discharges from South Carolina Department of Transportation Construction Activities (SCR160000). The permit was updated to include additional requirements from the non-numeric stormwater rule. SWPPPs are to be prepared and submitted to the Department or MS4 for review. Plans are to be updated and must reflect the activities, from initial clearing to final stabilization, that are to take place on the construction site. Plans must also reflect any controls necessary to keep the site in compliance with existing TMDLs or other water quality concerns.

#### **7. Stormwater Permits- MS4**

SCDHEC also regulates Municipal Separate Storm Sewer Systems (MS4s) in the overall stormwater program. There are one large and three medium-sized MS4s in SC and all of these permits have been issued. There are over 80 small MS4s. Most of these are covered under the Small MS4 NPDES Permit. Some of the small MS4s are being covered under the Medium individual permits. The Small MS4 General Permit was reissued and effective on January 1, 2014. All of these programs are working on practices to improve water quality on a local basis.

### **E. Permit Compliance and Enforcement**

Compliance tracking is a complex activity that involves various program elements and activities

within the Bureau of Water. Regulatory functions require ongoing monitoring of all permits, inspection activities, and investigatory work. A computer based tracking system, ePermitting, is being implemented across the agency for the storage, retrieval, and management of permit compliance information for individual permits, including all effluent limits and compliance schedule data, facility operation and maintenance and pretreatment status. The availability of this information and ability to manage the data electronically enhances the Bureau information base providing greater program management capabilities.

All data necessary for issuing permits and tracking the compliance of those individual permits is maintained on the Bureau's network. Staff has access to information on permitting status, compliance monitoring, enforcement status, etc.

The ePermitting system is being designed to interface with EPA's Permit Compliance System (PCS). Updated compliance data is batched to PCS weekly. The Bureau is continuing its efforts to improve its utilization of the computer generated EPA Quarterly Noncompliance Report (QNCR).

Enforcement activities are performed in order to appropriately respond to facilities in permit noncompliance and other entities found to be in violation of state statutes and regulations. Data accessibility through the Bureau's networking system, as well as organizational changes, have greatly enhanced enforcement staff capabilities for efficient case development and management. Improvements in entry of limits and data will further improve tracking and enforcement efficiency.

An emphasis on enforcement activity will continue in accordance with implementation of the Bureau's Watershed Water Quality Management Program. Appropriate and timely enforcement responses in conjunction with the activities of other program areas are expected to contribute significantly to accomplishment of this program's goals through the development of TMDLs.

Enforcement staff will also be active in providing assistance to criminal investigators as necessary. A greater emphasis has been placed upon pursuing prosecution of violators under the criminal statutes and the support and assistance of enforcement staff in this process will continue to be invaluable; however, criminal and administrative investigations must be conducted separately.

It is recognized that aggressive enforcement activity encourages compliance. In this regard, enforcement staff are committed to secure for South Carolina the benefits from these activities to protect our water resources through implementation of appropriate enforcement strategies. The development and continued improvement of automated tools and methodology to accomplish this is considered to be vital to this function and will be given priority.

## **F. Nonpoint Source Program**

Nonpoint source (NPS) water pollution generally comes from numerous diffuse sources. Runoff occurring after a rain event may transport pollutants like sediment from plowed fields, construction sites, or logging operations, pesticides and fertilizers from farms and lawns, motor oil and grease deposited on roads and parking lots, bacteria containing waste from agricultural animal facilities or malfunctioning septic systems, and various other pollutants. The rain moves the pollutants



across the land to the nearest water body or storm drain where they may impact the water quality in creeks, rivers, lakes, estuaries and wetlands. NPS pollution may also impact groundwaters when it is allowed to seep or percolate into aquifers. The adverse effects of NPS pollution include physical destruction of aquatic habitat, fish die-offs, interference with or elimination of recreational uses of a water body (particularly lakes), closure of shellfish beds, reduced water supply or taste and odor problems in drinking water, potential human health problems due to bacteria and toxic chemicals, and increased potential for flooding as water bodies become choked with sediment.

The 2020-2024 South Carolina Nonpoint Source Management Plan (Plan) describes the State's Nonpoint Source Management Program, which is focused on protecting high quality waters from NPS threats and restoring waters impaired by NPS pollution. The South Carolina Department of Health and Environmental Control expects this Plan to be both useful and informative. The Plan will serve as a tool for positive change in protecting and improving water quality, as it provides a framework for addressing the major causes and sources of nonpoint source pollution in the state. It outlines the state's goals and objectives for mitigating nonpoint source pollution and the strategies, management measures, partnerships, funding sources, and evaluation tools necessary to achieve those goals..

To facilitate success in achieving water quality improvements, South Carolina's NPS program prioritizes federal Clean Water Act §319 funding and state resources on impaired §303(d) listed waterbodies in priority watersheds through the implementation of approved nine-element watershed-based plans (WBPs). The State's Coastal Nonpoint Pollution Control Program under federal Coastal Zone Management legislation is also implemented.

Categories of NPS pollution that impact South Carolina's waters include: agriculture, forestry, urban areas, marinas and recreational boating, mining, hydrologic modification, wetlands disturbance, land disposal/groundwater impacts, and atmospheric deposition. Technology based controls, or management measures, are employed to address these impacts. The management plan describes specific management measures to mitigate NPS pollution as well as implementation schedules. South Carolina has the legal authority to implement all of the necessary management measures.

SCDHEC is responsible for program implementation, but is dependent upon the cooperation of all levels of government, private sector stakeholders, and especially the citizens of the State in order to realize positive results. Many organizations have expertise that can be beneficial to the NPS pollution management program. For example, trade and environmental organizations have program delivery mechanisms that reach persons capable of implementing NPS controls, e.g., farmers, contractors, mine operators, and homeowners. These partnership roles are described in the management plan.

South Carolina's NPS Management Program's success is based on meeting the Program's two long-term goals of protecting and restoring the State's water quality from the negative impacts of nonpoint source pollution. Specifically, the NPS Program strives to achieve water quality standards in waterbodies affected by NPS pollution, as documented through water quality monitoring efforts. Evaluation techniques include water quality monitoring, stakeholder

participation, internal reviews, and progress and success reporting to EPA.

The Nonpoint Source Program uses a variety of environmental and administrative measures to determine the Plan's success, both in preventing and reducing the impacts of NPS pollution. Although water quality standard attainment maintains that the goals of the NPS Program are being met, meeting a water quality standard may take years to achieve and can be difficult to demonstrate in the short term given the variability of natural systems, the limited resources available to address the problems, and the extent and nature of the problem. Therefore, interim measures of success beyond water quality monitoring results are also important measures of progress in achieving improvements at the watershed scale.

The 2020-2024 South Carolina Nonpoint Source Management Plan fulfills the requirements of Section 319 of the Clean Water Act Amendments of 1987. It comprehensively describes a framework for agency coordination and cooperation and serves to implement a strategy for employing effective management measures and programs to control NPS pollution statewide.

South Carolina receives approximately \$2.5 million annually to be split between the NPS program and implementation of projects to reduce or eliminate NPS pollution through the Section 319 grant program. Some of these projects are statewide or regional in scope and include activities such as implementation of a variety of BMPs, water quality monitoring, local outreach and education, and water quality protection. Other projects are watershed based, aimed at remediation of NPS related problems from the State's Section 303(d) list. The current focus for Section 319 grant funding is the implementation of nine element watershed-based plans for water quality restoration or protection.

In addition to implementing watershed-based plans, the NPS Program also receives a \$150,000 set-aside from the Drinking Water State Revolving Fund. This set-aside funds the development of watershed-based plans that address point and nonpoint source pollution in surface waters that function as public drinking source waters. These source water protection-oriented plans are written by stakeholders who are awarded grants in a competitive process to study the watershed and produce a DHEC approved watershed-based plan that includes EPA's nine required elements. Approved watershed-based plans are eligible for funding opportunities under Section 319.

## **G. Wasteload Allocations and Total Maximum Daily Loads**

A total maximum daily load (TMDL) is the maximum load of a pollutant that can be assimilated by a waterbody without contravening water quality standards. Section 303(d) of the Clean Water Act requires that TMDLs be developed for waters that are determined to be impaired, that is, not meeting applicable water quality standards. A TMDL is made up of a wasteload allocation (WLA) that is the portion of the assimilative capacity allocated to point sources, a load allocation (LA) that is the portion of the assimilative capacity allocated to nonpoint sources, plus a margin of safety. A TMDL can be developed for an individual pollutant, such as bacteria, or for a category of pollutants, such as oxygen demanding substances. In addition to developing WLAs in conjunction with TMDLs for waters on the State's 303(d) list of impaired waters, SCDHEC also develops WLAs as part of the routine review required for new discharges or for permit reissuance for existing discharges to surface waters.

Various techniques, ranging from simple mathematical models to complex computer based models, are used by SCDHEC to determine the ability of a waterbody to assimilate various pollutants. TMDLs and WLAs developed using these techniques allow use of the assimilative capacity of a waterbody while ensuring that a level of water quality to protect existing and classified uses is maintained. WLAs are now developed as part of the basin review process as well as in response to proposals for new and expanded projects throughout the State. WLAs for oxygen demanding substances (carbonaceous and nitrogenous oxygen demand), ammonia toxicity, and total phosphorus are determined by the Water Quality Modeling Section. WLAs for metals, organic pollutants, and most toxicants are determined by the individual permitting sections.

Wasteload allocations fall into one of two categories. In instances when the assimilative capacity of a waterbody exceeds the existing or proposed pollutant loading, the waterbody is said to be effluent limited. Effluent limitations for discharges to such waters are determined by the minimum standards required for the type of discharge involved. In instances where the permitted loading is equal to or a proposed loading is greater than the assimilative capacity, the stream is said to be water quality limited. The limits on the discharges to such waters are determined by the water quality of the receiving stream, rather than the minimum standards. TMDLs are not required for water quality limited streams that meet applicable standards. In cases where the water body is meeting standards but a previously permitted or proposed loading would cause the waterbody to be impaired, the new wasteload allocation is a maximum allowable loading. In multiple discharge situations, the load must be divided or allocated among the discharges.

To date, TMDLs have been developed for fecal coliform bacteria, *E. coli*, Enterococci, total phosphorus, pH, and oxygen demanding substances for many waterbodies. Development of additional TMDLs is currently underway. Wasteload allocations have been developed for numerous waterbodies for ammonia, total phosphorus and oxygen demanding substances. These WLAs in many cases constitute the maximum allowable loading to the waterbody. Wasteload allocations for metals and other toxicants, that in many cases can be considered the maximum available loading to the stream, are now developed on a routine basis. WLAs for phosphorus have been developed for several streams including Eighteen Mile Creek, Reedy River, Bush River, Saluda River above Lake Greenwood, and Catawba River. There are efforts underway for development of nutrient TMDLs or alternative restoration plans for the Reedy River basin, the lower Catawba River basin, the upper Lake Murray area, and the Eighteen Mile Creek arm of Lake Hartwell. Development of new TMDLs or alternative restoration plans is expected to play an increasingly important part in the overall wasteload allocation process as SCDHEC continues implementation of the basin planning and permitting strategy with emphasis on restoring the State's impaired waters.

## **SURFACE WATER ASSESSMENTS**

### **1. Surface Water Monitoring Program**

#### **A. Purpose and Design**

State administrators need to assess the quality of the aquatic environment so that they can make decisions concerning water program priorities and provide reports to the public on the state of the environment, important trends over time, and accomplishments. They also need to evaluate the effectiveness of control measures. Water quality monitoring data provide information necessary to meet these needs.

The SCDHEC operates and collects data from a statewide network of ambient monitoring sites. The ambient monitoring network is directed toward determining long-term water quality trends, assessing attainment of water quality standards, identifying locations in need of additional attention, and providing background data for planning and evaluating stream classifications and standards. The ambient monitoring network, as a program, involves sampling a wide range of physical, chemical, and microbial parameters and analyzing them for the presence or effects of contaminants and comparing them to criteria to determine use support.

There are several major components to SCDHEC's ambient water quality monitoring activities, including ongoing fixed-location monitoring and statewide statistical survey monitoring, each designed to provide data for water quality assessment of major water resource types at different spatial and temporal scales. For a detailed discussion of each of these components, please see the most recent version of the State of South Carolina Monitoring Strategy at [https://scdhec.gov/sites/default/files/media/document/SC%20State%20Monitoring%20Strategy%202022%20DHEC%20signatures\\_epasig.pdf](https://scdhec.gov/sites/default/files/media/document/SC%20State%20Monitoring%20Strategy%202022%20DHEC%20signatures_epasig.pdf).

#### **B. Networks and Programs**

The statewide statistical survey component of the ambient monitoring program is designed to make statewide estimates of water quality. The data derived from those monitoring activities is used to develop the stream, lake/reservoir, and estuarine summary information presented in this report. A statistical survey monitoring design is where the population of interest is sampled in a fashion that allows statements to be made about the whole population based on a subsample, and produces an estimate of the accuracy of the assessment results. The advantage of the statistical survey sampling design is that statistically valid statements about water quality can be made about large areas based on a relatively small subsample.

Separate monitoring schemes have been developed for stream, lake/reservoir, and estuarine resources. Site selection is done by Aquatic Science Programs using tools developed in cooperation with the U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory (NHEERL), Corvallis, Oregon. Survey Sites are sampled once a month for one year, and a new statewide set of statistical survey sites is selected for each waterbody type every year.

Please refer to the State of South Carolina Monitoring Strategy for details of parameters sampled at [https://scdhec.gov/sites/default/files/media/document/SC%20State%20Monitoring%20Strategy%202022%20DHEC%20signatures\\_epasig.pdf](https://scdhec.gov/sites/default/files/media/document/SC%20State%20Monitoring%20Strategy%202022%20DHEC%20signatures_epasig.pdf).

Although statements about resource conditions can theoretically be made based on data from a single year, the compilation of data from multiple years increases the confidence and accuracy of statements about water quality. An additional advantage of the statistical survey approach is that it presents the opportunity for previously unsampled locations to be selected for data collection.

### **C. Laboratory Analytical Support**

The Analytical and Radiological Environmental Services Division (ARESD) in the Bureau of Environmental Health Services (BEHS) provides laboratory services to the Bureaus of Water, Land and Waste Management, Bureau of Air Quality, and the Milk and Dairy Program. The analytical services offered include bacteriological, chemical, ambient air monitoring, and physical analyses. The types of samples analyzed include water, wastewater, leachate, soil, sediment, chemical waste, fish, shellfish, ambient air, and milk/dairy products.

The BEHS organizational structure encompasses the Central Laboratory (ARESD), seven regional laboratories (each of these regional labs also has a field lab), and five additional field labs. ARESD, also known as the Central Laboratory includes the following laboratories: Microbiology and Milk/Dairy, Inorganic Chemistry, Organic Chemistry, Radiochemistry and the Sample and Data Management Section. The EA Laboratory also has an air toxics laboratory under the Division of Air Quality Analysis which performs ambient air monitoring and includes a field element which is the larger focus of the ambient air monitoring network. These are located in the Hayne Building in Columbia. The seven regional laboratories are located in Aiken, Beaufort, North Charleston, Florence, Greenville, Lancaster, and Myrtle Beach. Other field labs which only collect samples and perform field analyses (pH, conductivity, temperature, residual chlorine, and dissolved oxygen) are located in Anderson, Greenwood, Spartanburg, Columbia, Orangeburg, and Sumter. The Columbia facility is separate from ARESD but collects samples for this lab. ARESD, in turn, performs similar functions as the other regional laboratories for the Columbia facility.

The field laboratories initiate all stream and wastewater analysis. The Central Laboratory provides support analyses, i.e., metals, nutrient, extraction procedures, and organic analyses. The Beaufort and Myrtle Beach regional laboratories analyze microbiological samples only. Drinking water chemical analysis is essentially a Central Laboratory program with support from the regional labs. All regional laboratories perform microbiological analyses for the Drinking Water Program.

### **D. Quality Assurance**

SCDHEC's Quality System is the means by which the Department implements the quality management process. The Quality System encompasses a variety of technical and administrative elements, which are outlined in the *SCDHEC Quality Management Plan*. This plan describes

how programs within Environmental Affairs (EA) will plan, implement, and assess the quality of environmental work to be performed as part of the various programs' functions within the Agency.

The Director of Environmental Affairs has the overall responsibility for the development, implementation, and continued operation of EA's Quality Assurance (QA) Program. To ensure that EA's QA Program is uniformly applied to the generating and processing of all environmental data, a Quality Assurance Manager (QAM) has been appointed.

The QAM is responsible for the Quality Assurance Program. Environmentally related measurement activities conducted by or for EA shall be done only with the approval of the QAM and/or QAM designee after ensuring that adequate quality assurance guidelines and procedures have been incorporated. This includes study planning, sample collection, preservation and analysis, data handling, and use of physical, chemical, biological, and other data related to the effects, sources, transport and control of pollution, as well as personnel review and training.

To accomplish the QA objectives cited above, the Aquatic Science Programs and Water Pollution Compliance Section have developed and instituted QAM- approved field study procedures and documentation, data review, and routine EPA operating overview. Some specifics of these Sections' QA/QC activities include:

- Submission of all Quality Assurance Project Plans (QAPPs) to the QAM and/or designee for review and approval prior to implementation. Submission of work plans as requested by the QAM. The project manager can also request reviews of work plans to ensure QA/QC requirements are addressed.
- Regular reviews and updates of SCDHEC's *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* and *Procedures Manual for Stream and Wastewater Facility Flow Measurement*.
- At least once yearly all water quality monitoring personnel are accompanied on sample collection activities by the Aquatic Science Programs' quality assurance officer for evaluation of adherence to the applicable SOP/s for QA/QC.
- Water Pollution Compliance Section program staff routinely accompany facility compliance monitoring personnel to ensure adherence to applicable SOP/s during sample collection activities for QA/QC.
- All SC DHEC EA laboratories in the State are expected to participate in Proficiency Testing annually as a requirement for their Certification.
- Field staff are required to participate in the analysis of blind QC samples or PT samples if they perform field analysis for residual chlorine, conductivity, or pH.
- Approximately every three years, EPA Region 4 Office conducts an on-site routine audit of the ARES, the Central Laboratory in Columbia, and also reviews the Laboratory

SOPs. EPA also conducts an on-site audit of all regional laboratories certified for drinking water microbiological parameters each cycle. Approximately every three years the Office of Environmental Laboratory Certification performs an on-site audit that covers both drinking water and wastewater.

- Internal assessments are also performed on the Central and regional laboratories. These are conducted by the Quality Assurance Assistants for the EA Central laboratory; but these are not certifying audits. They are designed as an internal look at lab procedures and processes. EPA Region 4 is the certifying authority over the ARES D Laboratories.

ARESD has four quality control manuals which detail the day-to-day operation of the quality assurance program: (1) *Procedures and Quality Control Manual for Chemistry Laboratories*, (2) *Laboratory Procedures Manual for Environmental Microbiology*, (3) *Procedures and Quality Control Manual for the Radiochemistry Laboratory*, and (4) *Standard Operating Procedures for Milk and Dairy*. The elements addressed in the manuals include organization, sample chain of custody, personnel training, quality control of laboratory services, scope and application, equipment and supplies, reagents, standards, methodology, preservation and storage, calibration, performance criteria and quality assurance, and waste management.

The overall laboratory quality assurance program contains many elements, some of which have been previously discussed. The frequency for analysis of replicates and spike recovery samples is noted in the manuals and is in compliance with U.S. EPA guidelines. Acceptance criteria for each QC check is detailed in each procedure of the SOP Manual. The Environmental Microbiology Laboratories perform replicate analyses, positive test controls, media control tests, equipment control tests, etc., as required by EPA Laboratory Certification and Evaluation guidelines. In addition, ARES D and the regional laboratories participate in annual Water Supply and Water Pollution Proficiency Testing Programs. All regional personnel who collect samples that require field testing participate in either the yearly Water Supply or Water Pollution Proficiency Testing Program, whichever is appropriate. Occasionally, field or other nonlaboratory staff may assist the Microbiologist in setting up samples or reading them. Anyone participating in this way must demonstrate proficiency in any activity they will perform. Their proficiency is assessed through use of a blind sample obtained from either a QC Sample Vendor or made in-house. This proficiency is documented and kept in the Regional Office.

The laboratory analyses for water quality monitoring are conducted according to 40 CFR Parts 141, 136, and 143. The ARES D quality control manuals include a section on methodology designed to reduce variations in applied techniques among the State laboratories where methods permit analyst interpretation, and thus provide a more uniform approach which will increase the reproducibility of results reported from the laboratory system. Analytical SOPs are identified by number and date of revision. Each SOP includes the approved method reference. SOPs are reviewed annually.

SOPs include instrument calibration and maintenance procedures as well as corrective actions for any deficiencies or problems encountered.

## **E. Data Storage, Management and Interpretation**

Routine ambient stream samples are collected by Regional Office personnel with some analyses conducted in the Regional Laboratories and others by the Central Laboratory. Data for samples that are analyzed in the Regional Laboratories are reported on the appropriate data sheets and released by the sample custodian for the region. These data sheets are sent to the Analytical and Radiological Environmental Services Division in Columbia where they are sent to the appropriate program areas. All Ambient Surface Water Physical & Chemical and Microbiological Monitoring data are received by Aquatic Science Programs from the Data Management Section, Bureau of Environmental Health Services. The data are reviewed, edited and stored into the IMAP database. The Aquatic Science Programs performs a 10 percent review of all data to ensure quality assurance of the data. The data are uploaded to the National Water Quality Monitoring Council's Water Quality Portal water quality database at <https://www.waterqualitydata.us/>. Data sheets are kept on file in the Aquatic Science Programs.

Macroinvertebrate and habitat data are entered into an in-house relational database program. This database program generates metric calculations and reports. All data are available to the public through the Freedom of Information Act. Coverage of the macroinvertebrate monitoring stations is available through an in-house Geographic Information System.

## **2. Assessment Methodology**

### **A. Statistical Survey §305(b) Assessment Approach**

The initial selection of prospective statistical survey sites is conducted by Bureau of Water, Aquatic Science Programs, using tools developed in cooperation with the U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory (NHEERL), Corvallis, Oregon. Independently for each waterbody type, rivers and streams, lakes and reservoirs, and estuarine habitat, a statewide computer selection program is used to randomly select a statewide spatial distribution of specific locations according to the specifics of the design for each waterbody type.

The basic starting hydrographic GIS cover for stream and lake site selection is the USEPA National Hydrography Dataset (NHD) coverage at a scale of 1:100,000, which is based on the U.S. Geological Survey (USGS) Digital Line Graph map base. Because of stream density inconsistencies in NHD, some missing stream reaches in part of the state were added by digitization for a more consistent statewide representation. Similarly some important reservoirs that are missing in NHD were also added.

Estuarine sites selection uses a hydrographic GIS cover developed jointly by SCDHEC and the South Carolina Department of Natural Resources from the National Wetlands Inventory (NWI) digital files at a scale of 1:24,000.



## **1. Rivers and Streams**

Streams of different sizes may be more or less sensitive to different types of environmental perturbations. Because of this, three stream size categories have been specifically targeted to ensure they are represented in the selected survey sites. Approximately 30 total stream survey sites are sampled each year. Each site is sampled monthly for one year.

- a. First Order streams, or headwater streams, are targeted because these represent streams with the least dilution capacity and therefore are most immediately impacted by adjacent land use activities and associated runoff.
- b. Second and Third Order streams are also streams with relatively small dilution capacity and represent important habitat for reproduction and survival of aquatic life. They may also reflect the direct impacts of major land use activities.
- c. Fourth Order and larger streams include the major rivers of the State. In general these streams have greater dilution capacity and are less affected by small scale land use perturbations and may be heavily utilized for primary contact recreation.

These different size categories do not occur in equal proportions in the state, therefore an unequal weighting procedure is used in the site selection process to guarantee inclusion of sites in all three stream size categories. Taken together and using the proper weighting factors, the random stream sites can be used to make statistically valid statements about all stream resources of the State.

## **2. Lakes and Reservoirs**

Eligible lakes/reservoirs are restricted to “significant lakes,” defined as those freshwater lakes/reservoirs with at least 40 acres surface area that offer unrestricted public access. The size of significant lakes/reservoirs varies immensely; therefore two size categories of lakes/reservoirs have been specifically targeted to ensure that the smaller lakes/reservoirs are represented in the selected survey sites. Approximately 30 total lake and reservoir survey sites are sampled each year. Each site is sampled monthly for one year.

- a. Major Lakes/Reservoirs greater than 850 acres surface area.
- b. Minor Lakes/Reservoirs greater than 40 acres surface area, but less than or equal to 850 acres.

These different size categories do not occur in equal proportions in the state, therefore an unequal weighting procedure is used in the site selection process to guarantee inclusion of approximately 20 sites in major lakes and 10 sites in minor lakes. Taken together and using the proper weighting factors, the statistical survey lake/reservoir sites can be used to make statistically valid statements about all lake/reservoir resources of the State.

### 3. Estuaries

The coastal estuarine statistical survey monitoring scheme has been developed jointly by SCDHEC, Bureau of Water, and the South Carolina Department of Natural Resources (SCDNR), Marine Resources Research Institute (MRRI). This effort has been named the South Carolina Estuarine and Coastal Assessment Program (SCECAP) and sampling of the statistical survey coastal estuarine sites is a cooperative venture between SCDHEC and SCDNR-MRRI. To ensure inclusion of a variety of estuarine ecosystems and habitats, the coastal estuaries have been divided into two discrete categories (strata) based on a common GIS cover developed and utilized by both agencies.

- a. Tidal Creeks, identified as less than 100 meters wide on the GIS cover, serve as nursery areas for important marine species and are most immediately affected by upland land use activities and associated runoff.
- b. Open Water areas, identified as greater than 100 meters wide on the GIS cover, represent larger estuarine rivers and sounds.

Sites are sampled monthly for one year by SCDHEC for water column physical, chemical, and microbiological parameters and are used for §303(d) and §305(b) reporting purposes.

Each year approximately 15 Tidal Creek sites and 15 Open Water sites are selected. Differential weights are based on the relative proportions of these two size categories in the estuarine areas of the state and are used in the assessment to adjust the contribution of each estuary site to the statewide resource size.

## B. Determination of Attainment of Classified Uses

### 1. General Considerations

Physical, chemical and biological data were evaluated, as described below, to determine if water quality met the water quality criteria established to protect the State classified uses promulgated in S.C. Regulation 61-68, *Water Classifications and Standards*. These regulations are subject to a triennial review as required in section 303 of the Clean Water Act. To determine the appropriate classified uses and water quality criteria for specific waterbodies and locations, refer to Regulation 61-69, *Classified Waters*, in conjunction with Regulation 61-68. These regulations are located on the Internet at:

<https://www.scdhec.gov/environment/bureau-water/water-quality-standards/water-quality-standards-south-carolina>.

In compliance with water quality standards (SC Regulation 61-68), waterbodies with standards excursions attributable solely to natural conditions are not included on South Carolina's §303(d) list.

Water samples for analysis are collected as surface grab samples once per month, every other month, quarter, or year, depending on the parameter and station type. Grab samples collected at a depth of 0.3 meters are considered to be a surface measurement. At many stations sampled by

boat, dissolved oxygen, pH, and temperature are sampled as a water column profile, with measurements being made at a depth of 0.3 meters below the water surface and at one meter intervals to the bottom for select lake sites or at 0.3 meters, bottom and mid-depth for estuarine sites. At stations sampled from bridges, these parameters are measured only at a depth of 0.3 meters. For the purpose of assessment, only surface samples are used in standards compliance assessment. Because of the inability to target individual high or low flow events on a statewide basis these data are considered to represent the typical range of physical conditions and chemical concentrations in the waterbodies sampled. All samples are collected and analyzed according to the most current standard operating procedures (SCDHEC, EQC Environmental Investigations Standard Operating Procedures and Quality Assurance Manual).

Results from water quality samples can be compared to State and USEPA criteria, with some restrictions due to time of collection and sampling frequency. For certain parameters, the monthly or bi-monthly sampling frequency employed is insufficient for strict interpretation of the standards. The grab sample method is considered to be representative for the purpose of indicating excursions relative to criteria, within certain considerations. A single grab sample is more representative of a one-hour average than a four-day average, more representative of a one-day average than a one-month average, and so on; thus, when inferences are drawn from grab samples relative to criteria, sampling frequency and the intent of the criteria must be weighed. When the sampling method or frequency does not agree with the intent of the particular standard, any conclusion about water quality should be considered as only an indication of conditions, not as a proven circumstance.

The following statewide assessment information are based on the available quality assured physical, chemical and biological water quality data collected through two separate statewide condition summaries contained in this report, the 2014 through 2018 survey and the 2016 through 2020 survey

## **2. Aquatic Life Use Support**

One important goal of the Clean Water Act, the South Carolina Pollution Control Act, and the State Water Quality Classifications and Standards is to maintain the quality of surface waters to provide for the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Aquatic life use support is assessed by comparing important water quality characteristics to State standards.

Support of aquatic life uses is determined based on the percentage of numeric criteria exceedances and, where data are available, the composition and functional integrity of the biological community. The term exceedance is used to describe a measured pollutant concentration that is outside of the acceptable range as defined by the appropriate State standard. Some waters may exhibit characteristics outside the appropriate standards due to natural conditions. Such natural conditions do not constitute a violation of the water quality standards. A number of waterbodies have been given waterbody-specific standards for pH and dissolved oxygen (DO), to reflect natural conditions. To determine the appropriate numeric standards and classified uses for specific waterbodies and locations, please refer to S.C. Regulation 61-68, *Water Classifications and Standards* and S.C. Regulation 61-69, *Classified Waters*.

For DO and pH, if 10 percent or less of the samples contravenes the appropriate standard, then the standard is said to be fully supported. If the percentage of standard exceedances is greater than 10 percent, but less than or equal to 25 percent, the standard is partially supported, unless excursions are due to natural conditions. If there are more than 25 percent exceedances, the standard is not supported, unless excursions are due to natural conditions. The decision that criteria excursions are due to natural conditions is determined by consensus and/or the professional judgment of SCDHEC staff with specific local knowledge.

For toxicants (heavy metals, priority pollutants, chlorine, ammonia), for any individual pollutant, if the appropriate acute and/or chronic aquatic life standard is exceeded more than once in three years, the waterbody is listed as impaired for the pollutant of concern. The Department also used discretion, considering factors other than excursion magnitude and frequency, in order to determine the impairment status due to toxicants. If the appropriate acute or chronic aquatic life standard is exceeded more than once, representing more than 10 percent of the samples collected, the standard is not supported. If the acute or chronic aquatic life standard is exceeded more than once, but in less than or equal to 10 percent of the samples, the standard is partially supported.

The total recoverable metals criteria for heavy metals are adjusted to account for solids partitioning consistent with guidance set forth in the "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria" October 1, 1993, Martha G. Prothro ( <https://www3.epa.gov/npdes/pubs/owm0316.pdf> and 40CFR'131.36(b)(1)). Under this approach, a default TSS value of 1 mg/L is used. Where the metals criteria are hardness based, a default value of 25 mg/L is used for waters where hardness is 25 mg/l or less unless actual values exist for the sample.

For ammonia, the calculation of the appropriate criterion value requires the values of several associated field parameters measured concurrent with the ammonia sample collection. Where direct measurements of any of the parameters are lacking the ammonia value will not be used to determine compliance with the standards.

For turbidity in lakes, and for waters with numeric total phosphorus, total nitrogen, and chlorophyll-a criteria, if the appropriate criterion is exceeded in more than 25 percent of the samples, the criterion is not supported. For waters with exceedances of standards between 10% and 25%, further site specific evaluation is necessary to determine if standards violations indicate actual aquatic life use impairment. For turbidity in streams, if the criterion is exceeded more than 10 percent of the time, the criterion is partially or not supported.

If the conclusion for any single parameter is that the criterion is "not supported", then it is concluded that aquatic life uses are not supported in the waterbody, at that monitoring location. If there are no criteria that are "not supported", but the conclusion for at least one parameter criterion is "partially supported", then it is concluded that aquatic life uses are partially supported. Regardless of the number of samples, no monitoring site will be listed as partially or not supporting for any pollutant based a single water chemistry sample result because of the possibility of an anomalous event.

For aquatic life uses, the goal of the standards is the protection of a balanced indigenous aquatic community. South Carolina Regulation 61-68 Section E. 14 d. (2) states that if the ambient concentration is higher than the numeric criterion for toxic pollutants, the criterion is not considered violated if biological monitoring has demonstrated that the in-stream indigenous biological community is not adversely impacted. Therefore, biological data are the ultimate deciding factor, regardless of chemical conditions. If biological data shows a healthy, balanced community, the use is considered supported even if chemical parameters do not meet the applicable criteria.

### **3. Macroinvertebrate Data Interpretation**

Macroinvertebrate community assessment data are used to determine Aquatic Life Use Support and to support determinations based on water chemistry data. Macroinvertebrate community data may also be used to evaluate potential impacts from the presence of sediment or other contaminants. Aquatic macroinvertebrates are identified to the lowest practical taxonomic level depending on keys available and the condition and maturity of specimens collected.

The EPT Index and the North Carolina Biotic Index (BI) are the main indices used in analyzing macroinvertebrate data. To a lesser extent, taxa richness and total abundance may be considered to help interpret data. The EPT Index (Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies) Index) is the total taxa richness of these three generally pollution-sensitive orders. The Biotic Index for a sample is a weighted average of tolerance values of all organisms collected. The tolerance values range from 0 to 10 and reflect each taxon's sensitivity to pollution.

Taxa richness is the total number of distinct taxa collected and is the simplest measure of diversity. High taxa richness is often associated with high water quality. Increasing levels of pollution progressively eliminate the more sensitive taxa, resulting in lower taxa richness. Total abundance is the enumeration of all macroinvertebrates collected at a sampling location.

### **4. Recreational Use Support**

The degree to which the swimmable goal of the Clean Water Act is attained (Recreational Use Support) is based on the concentration of indicator bacteria present in a waterbody. Standards for primary contact recreation were derived from public health data that estimate the potential risks to humans of contracting waterborne illnesses after swimming. As previously mentioned, all water quality standards are promulgated in Regulation 61-68, *Water Classifications & Standards*.

#### *Freshwater:*

South Carolina's current water quality standard (WQS) for primary contact recreational use in freshwaters is *Escherichia coli*, "Not to exceed a geometric mean of 126/100 ml based on at least four samples collected from a given sampling site over a 30 day period, nor shall a single sample maximum exceed 349/100 ml".

The current standards are protective of primary contact recreational use; therefore, secondary contact recreational use is also protected.

Because of the monthly sampling frequency of survey sites, insufficient data are collected to evaluate against the geometric mean component of the standard as prescribed in R. 61-68; therefore, evaluation against the single sample maximum (SSM) criterion is necessary.

In absence of sufficient data for evaluation of the geometric mean, only evaluation against the current *E. coli* SSM is considered. For the purposes of this §305(b) report, if 10 percent or less of the samples are greater than the SSM then recreational uses are said to be fully supported. A percentage of criteria excursions greater than 10 and less than or equal to 25 is considered partial support of recreational uses, and greater than 25 percent is considered to represent nonsupport of recreational uses.

#### *Tidal Saltwater:*

South Carolina's current water quality standard (WQS) for primary contact recreational use in tidal saltwaters (Classes SA and SFH) is Enterococci, "Not to exceed a geometric mean of 35/100 ml based on at least four samples collected from a given sampling site over a 30 day period, nor shall a single sample maximum exceed 104/100 ml".

South Carolina's current water quality standard (WQS) for primary contact recreational use in tidal saltwaters (Class SB) is Enterococci, "Not to exceed a geometric mean of 35/100 ml based on at least four samples collected from a given sampling site over a 30 day period, nor shall a single sample maximum exceed 104/100 ml".

Because of the monthly sampling frequency of survey sites, insufficient data are collected to evaluate against the geometric mean component of the standard as prescribed in R. 61-68; therefore, evaluation against the single sample maximum (SSM) criterion is necessary.

In absence of sufficient data for evaluation of the geometric mean, only evaluation against the current Enterococci SSM is considered. For the purposes of this §305(b) report, if 10 percent or less of the samples are greater than the SSM then recreational uses are said to be fully supported. A percentage of criteria excursions greater than 10 and less than or equal to 25 is considered partial support of recreational uses, and greater than 25 percent is considered to represent nonsupport of recreational uses.

### **3. Rivers and Streams Water Quality Assessment**

The U.S. Environmental Protection Agency has developed a system to determine estimates of total river miles and total lake acres for the states to use in reporting for §305(b) reports. The estimates are based on the Digital Line Graph (DLG) database and the National Hydrography Dataset (NHD), that are in turn based on the U.S. Geological Survey 1:100,000 scale hydrologic maps. The original DLG database was missing a significant number of South Carolina streams. Many of these missing features have been added by SCDHEC, with the cooperation and oversight of the USEPA.

## A. Summary Statistics

At the request of the USEPA there are two separate statewide condition summaries contained in this report, the 2014 through 2018 survey and the 2016 through 2020 survey. Based on the modified USEPA National Hydrography Dataset (NHD) and the results of survey site selection validation, South Carolina has an estimated 22,658 to 23,358 miles of freshwater rivers and streams representing the stream sampling design frame based on the two different survey windows previously described.

A summary of classified use support statewide based on these data, along with causes for partial or nonattainment is presented below. The Lower and Upper 95 Percent Confidence Intervals for the statistical survey estimates signify that it is 95% certain that the true mileage is between the upper and lower confidence limits.

2014 through 2018 Survey Results based on 149 survey sites sampled during this window.

**Table 5a. Rivers and Streams Use Support Summary (Miles) 2014-2018**

Indicator	Category	Survey-Based Estimated Percent of Total Resource	Survey-Based Estimated Miles of Total Resource	Lower 95 Percent Confidence Interval (Miles)	Upper 95 Percent Confidence Interval (Miles)
Aquatic Life Use	Fully Supporting	76.2	17,276	15,520	19,033
	Partially Supporting	6.9	1,561	709	2,413
	Not Supporting	16.9	3,821	2,194	5,447
Recreational Use	Fully Supporting	20.5	4,656	3,341	5,971
	Partially Supporting	20.3	4,590	3,148	6,032
	Not Supporting	59.2	13,412	11,637	15,187

**Table 6a. Summary of Fully Supporting and Impaired Rivers and Streams (Not including Fish Consumption Use) 2014-2018**

Category	Survey-Based Estimated Percent of Total Resource	Survey-Based Estimated Miles of Total Resource	Lower 95 Percent Confidence Interval (Miles)	Upper 95 Percent Confidence Interval (Miles)
Fully Supporting All Assessed Uses	14.6	3,317	2,261	4,373
Impaired for One or More Use	85.4	19,341	18,284	20,397

**Table 7a. Total Sizes of Rivers and Streams Impaired by Various Cause Categories (Miles) 2014-2018**

Cause Category	Survey-Based Estimated Miles of Total Resource	Lower 95 Percent Confidence Interval (Miles)	Upper 95 Percent Confidence Interval (Miles)
Dissolved Oxygen	1,496	722	2,269
pH	1,962	612	3,311
Turbidity	1,794	629	2,958
Ammonia	195	0	531
Cadmium	65	0	179
Zinc	65	0	179
Macroinvertebrate Community	1,496	627	2,364
<i>E. coli</i>	18,002	16,687	19,317

2016 through 2020 Survey Results based on 144 survey sites sampled during this window.

**Table 5b. Rivers and Streams Use Support Summary (Miles) 2016-2020**

Indicator	Category	Survey-Based Estimated Percent of Total Resource	Survey-Based Estimated Miles of Total Resource	Lower 95 Percent Confidence Interval (Miles)	Upper 95 Percent Confidence Interval (Miles)
Aquatic Life Use	Fully Supporting	73.6	17,189	15,405	18,973
	Partially Supporting	9.0	2,106	1,115	3,096
	Not Supporting	16.5	3,866	2,325	5,406
Recreational Use	Fully Supporting	21.7	5,078	3,526	6,629
	Partially Supporting	20.2	4,710	3,227	6,194
	Not Supporting	57.3	13,372	11,399	15,346

**Table 6b. Summary of Fully Supporting and Impaired Rivers and Streams (Not including Fish Consumption Use) 2016-2020**

Category	Survey-Based Estimated Percent of Total Resource	Survey-Based Estimated Miles of Total Resource	Lower 95 Percent Confidence Interval (Miles)	Upper 95 Percent Confidence Interval (Miles)
Fully Supporting All Assessed Uses	15.1	3,526	2,267	4,784
Impaired for One or More Use	84.1	19,635	18,332	20,937



**Table 7b. Total Sizes of Rivers and Streams Impaired by Various Cause Categories (Miles) 2016-2020**

Cause Category	Survey-Based Estimated Miles of Total Resource	Lower 95 Percent Confidence Interval (Miles)	Upper 95 Percent Confidence Interval (Miles)
Dissolved Oxygen	1,579	810	2,348
pH	2,248	990	3,506
Turbidity	2,341	1,049	3,633
Ammonia			
Cadmium	66	0	178
Zinc	263	0	617
Macroinvertebrate Community	2,670	1,416	3,924
<i>E. coli</i>	18,083	16,496	19,669

#### 4. Lakes Water Quality Assessment

##### A. Summary Statistics

At the request of the USEPA there are two separate statewide condition summaries contained in this report, the 2014 through 2018 survey and the 2016 through 2020 survey. Based on the modified USEPA National Hydrography Dataset (NHD) and the results of survey site selection validation, South Carolina has an estimated 393,430 acres of lake and reservoir representing the lake/reservoir sampling design frame previously described. A summary of classified use support statewide based on these data, along with causes for partial or nonattainment is presented below. The Lower and Upper 95 Percent Confidence Intervals for the statistical survey estimates signify that it is 95% certain that the true acreage is between the upper and lower confidence limits.

2014 through 2018 Survey Results based on 152 survey sites sampled during this window.

**Table 8a. Lake Use Support Summary (Acres) 2014-2018**

Indicator	Category	Survey-Based Estimated Percent of Total Resource	Survey- Based Estimated Acres of Total Resource	Lower 95 Percent Confidence Interval (Acres)	Upper 95 Percent Confidence Interval (Acres)
Aquatic Life Use	Fully Supporting	79.9	314,263	290,727	337,798
	Partially Supporting	5.0	19,540	5,916	33,164
	Not Supporting	12.5	49,293	31,416	67,171
Recreational Use	Fully Supporting	96.4	379,442	366,829	392,055
	Partially Supporting	0.9	3,539	0	8,923

**Table 9a. Summary of Fully Supporting and Impaired Lakes  
(Not including Fish Consumption Use) 2014-2018**

Category	Survey- Based Estimated Percent of Total Resource	Survey- Based Estimated Acres of Total Resource	Lower 95 Percent Confidence Interval (Acres)	Upper 95 Percent Confidence Interval (Acres)
Fully Supporting All Assessed Uses	79.0	310,889	286,824	334,954
Impaired for One or More Use	18.4	72,208	50,878	93,537

**Table 10a. Total Sizes of Lakes Impaired by Various Cause Categories (Acres) 2014-2018**

Cause Category	Survey- Based Estimated Acres of Total Resource	Lower 95 Percent Confidence Interval (Acres)	Upper 95 Percent Confidence Interval (Acres)
Total Phosphorus	24,985	9,996	39,974
pH	27,999	13,554	42,444
Dissolved Oxygen	9,535	1,156	17,913
Total Nitrogen	4,432	0	9,428
Ammonia	4,400	0	11,630
Chlorophyll <i>a</i>	182	0	421
Turbidity	5,216	0	13,135
Copper	5,135	0	13,570
<i>E. coli</i>	3,539	0	8,923

2016 through 2020 Survey Results based on 154 survey sites sampled during this window.

**Table 8b. Lake Use Support Summary (Acres) 2016-2020**

Indicator	Category	Survey- Based Estimated Percent of Total Resource	Survey- Based Estimated Acres of Total Resource	Lower 95 Percent Confidence Interval (Acres)	Upper 95 Percent Confidence Interval (Acres)
Aquatic Life Use	Fully Supporting	83.1	326,795	304,383	349,208
	Partially Supporting	3.8	14,817	4,536	25,099
	Not Supporting	9.2	36,244	19,162	53,325
Recreational Use	Fully Supporting	92.9	365,576	349,270	381,882
	Partially Supporting	2.3	9,215	60	18,369
	Not Supporting	0.0	160	0	439

**Table 9b. Summary of Fully Supporting and Impaired Lakes  
(Not including Fish Consumption Use) 2016-2020**

<b>Category</b>	<b>Survey- Based Estimated Percent of Total Resource</b>	<b>Survey- Based Estimated Acres of Total Resource</b>	<b>Lower 95 Percent Confidence Interval (Acres)</b>	<b>Upper 95 Percent Confidence Interval (Acres)</b>
Fully Supporting All Assessed Uses	82.0	322,611	300,017	345,205
Impaired for One or More Use	14.0	55,245	35,210	75,281

**Table 10b. Total Sizes of Lakes Impaired by Various Cause Categories (Acres) 2016-2020**

<b>Cause Category</b>	<b>Survey- Based Estimated Acres of Total Resource</b>	<b>Lower 95 Percent Confidence Interval (Acres)</b>	<b>Upper 95 Percent Confidence Interval (Acres)</b>
Total Phosphorus	15,866	3,060	28,672
pH	26,311	12,813	39,809
Dissolved Oxygen	5,443	0	13,225
Total Nitrogen	160	0	453
Chlorophyll <i>a</i>	4,938	0	12,423
Turbidity	5,346	0	12,771
Copper	4,812	0	12,659
<i>E. coli</i>	9,375	218	18,532

**B. Section 314 Reporting**

Section 314(a) of the Clean Water Act of 1987 directs each State to prepare or establish: (1) an identification and classification according to trophic condition of publicly-owned freshwater lakes within such State; (2) procedures, processes, and methods to control sources of pollution of such lakes; (3) methods and procedures, in conjunction with appropriate Federal agencies, to restore the quality of such lakes; (4) a list and description of lakes for those uses that are known to be impaired; and (5) an assessment of the status and trends of water quality in lakes. Further, States are required to submit a biennial assessment of lake trophic condition as part of their §305(b) report.

**1. Background**

Sampling is conducted each year in lakes throughout the state as part of SCDHEC’s ambient water quality monitoring activities, including ongoing fixed-location monitoring and statewide statistical survey monitoring.

**2. Trophic Status**

In 2001, South Carolina adopted numeric nutrient criteria for lakes by ecoregion and beginning FY 2002, trophic condition assessment was based upon the criteria for Total Phosphorus (TP),

Total Nitrogen (TN) and Chlorophyll *a* (CHL-A). Table 11 lists those lake sites that were identified as not meeting one or more of these numeric criteria as part of the current §303(d) assessment reported in *Part I: Listing of Impaired Waters* of this Integrated Report. The second part of the same table lists all other sites that were assessed and found to meet the numeric criteria.

**Table 11. Summary of Lake Conditions**

Lake Sites Not Attaining Numeric Nutrient Criteria		
BLUE RIDGE		
Station ID(s)	Location	Parameters
CL-019	LK JOCASSEE IN FOREBAY EQUIDISTANT FROM DAM AND SHORELINES	TN
MIDDLE ATLANTIC COASTAL PLAIN		
Station ID(s)	Location	Parameters
ST-033	GOOSE CK RESERVOIR AT 2ND POWERLINES US OF BOAT RAMP	TP
PIEDMONT		
Station ID(s)	Location	Parameters
S-311	BOYD MILL POND .6 KM W DAM	TN
CW-033	CEDAR CK RESERVOIR 100 M N OF DAM	TP
CW-174	CEDAR CK RESERVOIR AT UNIMP RD AB JCT WITH ROCKY CK	TP
RL-02319	CEDAR CK RES FROM W OF BIG ISL 7 MI BELOW ROCKY CK CONFL	TP
RL-18146	CEDAR CREEK RESERVOIR DEBUTARY CREEK ARM IN COVE APPROX 90 YARDS N OF DEBUTARY BOAT RAMP	TP
LCR-01	UPPER FISHING CREEK LAKE	TP
CW-016F	FISHING CK RES 2 MI BL CANE CREEK	TP
RL-17071	FISHING CREEK RESERVOIR MID-CHANNEL BETWEEN ISLAND AND EAST BANK APPROX 1 MILE SSW OF CW-016F	TP
RL-19258	GREAT FALLS RESERVOIR WESTERN SIDE OF LAKE 0.7 MI NNW OF DAM	TP
SV-268	LAKE HARTWELL - EIGHTEEN MILE CK ARM AT S-04-1098	TP
RL-18151	LAKE KEOWEE APPROX 0.15 MILES SSW OF END OF POINT NORTH DRIVE	TP
RL-19154	LAKE MURRAY BIG CREEK ARM ACROSS LAKE FROM SHINNER LN	TP,CHLA
S-309	LAKE MURRAY; BUSH RVR ARM; 4.6 KM US SC 391	TP,CHLA
SV-331	LK SECESSION; 1 1/4 MI BELOW SC ROUTE 28	CHLA
CW-231	LK WATEREE HEADWATERS APPROX 50 YDS DS CONFL CEDAR CK	TP
SOUTHEASTERN PLAINS		
Station ID(s)	Location	Parameters
RL-13136	LAKE EDGAR BROWN APPROX 30 YDS OFF WEST DIKE OPPOSITE END OF TURNER ST	TP,CHLA
RL-17125	LAKE EDGAR BROWN APPROX 50 YARDS WSW OF THE END OF IRVING STREET	CHLA
RL-20180	LAKE MARION APPROX 1 MI SSE OF PINE ISLAND	TP
SC-005	UPPER LAKE MARION NEAR PACK'S LANDING	TP
SC-014	UPPER LAKE MARION AT HEADWATERS OF CHAPEL BRANCH CREEK	CHLA
SC-059	ASSIGNED TO SANTEE-COOPER PROJECT	TP
SOUTHERN COASTAL PLAIN		
Station ID(s)	Location	Parameters
RL-19259	GOOSE CREEK RESERVOIR 0.25 MI WSW FROM CENTER OF GOOSE CREEK PRIMARY SCHOOL	TP,CHLA

Lake Sites Attaining Numeric Nutrient Criteria	
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BLUE RIDGE	
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Station ID(s)	Location
RL-17053	LAKE JOCASSEE LAKE JOCASSEE 1 MI SE OF DOUBLE SPRINGS MOUNTAIN
RL-18085	LAKE JOCASSEE 50 YARDS SW OF WESTERN TIP OF COVE AT POINT BETWEEN HORSEPASTURE RIVER AND TOXAWAY RIVER
RL-19155	LAKE JOCASSEE CONFLUENCE OF HORSEPASTURE CREEK AND BEARCAMP CREEK ARMS
RL-20183	LAKE JOCASSEE APPROX 1 MILE WNW OF DEVILS FORK RD BOAT LANDING 1
SV-335	LK JOCASSEE AT TOXAWAY; HORSE PASTURE; AND LAUREL FORK CONFLUENCE
SV-336	LK JOCASSEE AT CONFLUENCE OF THOMPSON AND WHITEWATER RVRS
RL-18143	LAKE YONAH NEAR WEST BANK APROX 2.3 MILES DOWNSTREAM OF TUGALOO DAM
RL-19251	LAKE YONAH 0.7 MI NORTH OF DAM
RL-18141	LAKE TUGALOO APPROX ON STATE LINE APROX ACROSS FROM BULL SLUICE RD
RL-19255	TUGALOO LAKE CENTER OF LAKE 1 MI NORTH OF DAM.

MIDDLE ATLANTIC COASTAL PLAIN	
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Station ID(s)	Location
CSTL-124	BUSHY PARK RESERVOIR IN FOREBAY EQUIDISTANT FROM DAM AND SHORELINES
CSTL-075	LAKE GEORGE WARREN; BLACK CK ARM; AT S-25-41 5 MI SW OF HAMPTON
RL-17062	LAKE MOULTRIE SLIGHTLY NORTH OF THE CENTER OF THE LAKE USE LAT-LONG
RL-17066	LAKE MOULTRIE APPROX 2;25 MILES NNW OF PINOPOLIS
RL-18078	LAKE MOULTRIE NEAR BONNEAU BEACH NEAR SOUTH FACING DOCKS OFF PORCHER DRIVE
RL-18095	LAKE MOULTRIE APPROX 2.8 MILES SSE FROM CROSS
RL-18098	LAKE MOULTRIE ALONG NE AREA OF LAKE S OF CROOKED BAY BEHIND ISLAND
RL-19156	LAKE MOULTRIE 0.80 MI NNW OF AUGUSTUS M FLOOD BOAT LANDING 0.38 MI WEST OF INTERSECTION OF INDIAN FIELDS DR AND PORCHER DR
RL-19168	LAKE MOULTRIE APPROX 2 MI SE OF INTERSECTION OF OLD HIGHWAY 6 AND RANGER DR
RL-20184	LAKE MOULTRIE APPROX 3.5 MILES EAST OF MOUTH OF DIVERSION CANAL
RL-20188	LAKE MOULTRIE APPROX 2.9 MILES SE OF HATCHERY BOAT RAMP
SC-027	SW QUADRANT OF LAKE MOULTRIE 1.2 KM EAST OF SHORELINE
SC-028	NW QUADRANT OF LAKE MOULTRIE NEAR ANGEL'S LANDING COVE
SC-031	NORTH QUADRANT OF LAKE MOULTRIE AT MOUTH OF REDIVERSION CANAL
SC-032	SE QUADRANT OF LAKE MOULTRIE AT CHANNEL MARKER 2
SC-046	SE QUADRANT OF LAKE MOULTRIE AT PINOPOLIS EMBAYMENT
ST-037	LAKE MOULTRIE AT CHANNEL MARKER 17 -SC-030

PIEDMONT	
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Station ID(s)	Location
RL-18136	BROADWAY LAKE OPPOSITE SMALL COVE NEARSHORE ALONG LAKESIDE DRIVE
RL-20266	BROADWAY LAKE APPROX 0.35 MILES ENE OF MCFALLS BOAT RAMP
RL-17127	CEDAR CREEK RESERVOIR BETWEEN PICKETT ISLAND AND BIG ISLAND NEARER SOUTHERN END OF PICKETT ISLAND
RL-19149	CEDAR CREEK RESERVOIR 100 M NW OF END OF POWERLINE EASEMENT ON EASTERN SIDE OF LAKE

RL-19254 CEDAR CREEK RESERVOIR 15M EAST OF BOWDEN ISLAND SHORELINE  
 LCR-05 BEAR CREEK ARM OF FISHING CREEK LAKE  
 CW-057 FISHING CK RES 75 FT AB DAM NR GREAT FALLS  
 LCR-04 FISHING CK RES MIDLAKE OFF BEAR CK ARM  
 RL-17132 GREAT FALLS RESERVOIR BETWEEN LARGE ISLAND AND EAST BANK  
 CL-041 CLARKS HILL RESERVOIR IN FOREBAY NEAR DAM  
 RL-17068 STROM THURMOND RESERVOIR 0.9 MILES NW OF MODOC PARK BOAT RAMP  
 STROM THURMAN RESERVOIR ON LONG CANE CREEK ARM APPROX 0.5 MILES SW OF SC-28  
 RL-18100 BRIDGE  
 J. STROM THURMOND LAKE APPROX 0.2 MILES SOUTH OF DORDEN BOAT LANDING ON STATE  
 RL-20189 RD S-33-68  
 RL-20197 J. STROM THURMOND LAKE APPROX 0.9 MILES WNW OF MCINTOSH BOAT LANDING  
 RL-20201 J. STROM THURMOND LAKE APPROX 1.2 MILES SSW OF MODOC PARK BOAT RAMP  
 RL-17126 LAKE BLALOCK IN MOUTH OF COVE OFF S-42-4394  
 LAKE BLALOCK APPROX .25 MILES SSW PAST BUCK CREEK ROAD APPROX OFF END OF BISHOP  
 RL-18137 DRIVE  
 LAKE BLALOCK IN COVE IN BETWEEN DANCING BROOKE LN AND DANCING WATER DR 135M  
 RL-19253 SE OF CUL-DE-SAC AT THE END OF DANCING BROOKE LN  
 RL-19257 LAKE BLALOCK 75M NW OF THE END OF DAVIS TRADING POST RD  
 B-348 LAKE COOLEY IN FOREBAY NEAR DAM  
 LAKE COOLEY MIDLAKE OPPOSITE FIRST BIG COVE WEST OF DAM -BETWEEN ENDS OF TEAD  
 RL-13137 DR AND BLACK DUCK LN  
 RL-18139 LAKE COOLEY JORDAN CREEK ARM OFF END OF ANDRE DRIVE  
 RL-17131 LAKE CUNNINGHAM NEARSHORE TO DEVELOPMENT ON CUNNINGHAM POINT COURT  
 RL-18144 LAKE CUNNINGHAM APROX DIRECTLY OFF END OF LAKE CUNNINGHAM CIRCLE  
 S-022 REEDY FORK OF LK GREENWOOD AT S-30-29  
 S-024 LAKE GREENWOOD; HEADWATERS; JUST US S-30-33  
 S-131 LK GREENWOOD AT US 221 7.6 MI NNW 96  
 S-308 LAKE GREENWOOD; REEDY RVR ARM; 150 YDS US RABON CK  
 RL-17057 LAKE HARTWELL APPROX 180 YARDS SSE OF US 178 BRIDGE  
 RL-17065 LAKE HARTWELL APPROX 1500 YARDS SW OF END OF LOOP OF S-04-745  
 LAKE HARTWELL SIX AND TWENTY CREEK ARM APPROX 0.7 MILES NE OF ASBURY BOAT  
 RL-17073 RAMP CLOSER TO WESTERN SIDE OF CHANNEL  
 LAKE HARTWELL 0.5 MI SSW OF BOAT LANDING AT PORTMAN MARINA NEARSHORE AT POINT  
 RL-19179 ON WEST SIDE OF UNINHABITED ISLAND  
 LAKE HARTWELL APPROX 0.25 MILES NORTHWEST FROM END OF RD C-11-44A AT CRESENT  
 RL-20191 GROUP CAMPGROUND  
 RL-20195 LAKE HARTWELL APPROX 0.35 MILES SSE OF CLEMSON MARINA  
 LAKE HARTWELL BEAVERDAM CREEK ARM APPROX 0.7 MILES SSE OF S-04-23 OLD DOBBINS  
 RL-20203 BRIDGE ROAD  
 SV-200 TUGALOO RVR ARM OF LAKE HARTWELL AT US 123  
 SV-236 LAKE HARTWELL AT S-37-184 6.5 MI SSE OF SENECA  
 SV-339 LK HARTWELL; SENECA RVR ARM AT USACE BUOY BTWN S-14 AND S-15  
 SV-340 LK HARTWELL; MAIN BODY AT USACE WQ BUOY BTWN MRKRS 11 AND 12  
 SV-363 LAKE HARTWELL OFF GLENN FORD LANDING US BEAVERDAM CK COVE  
 LAKE HARTWELL - EIGHTEEN MILE CK ARM APPROX 227 YARDS SW OF 18 MILE CREEK BOAT  
 SV-374 LANDING

RL-05395 LAKE J. ROBINSON 0.77 MI NNW OF BRIDGE OVER BEAVERDAM CREEK ON S-23-92  
 RL-06449 LAKE J. ROBINSON 1.7 MI NNE BRIDGE S-23-113 OVER LAKE  
 RL-13135 LAKE J. ROBINSON APPROX 0.25 MI SW OF END OF POOLE RD  
 RL-17135 J. ROBINSON LAKE NEARSHORE OF DEVELOPMENT ON KING EIDER WAY  
 RL-18142 LAKE J. ROBINSON NEAR SHORE OPPOSITE THE END OF HARBOR MASTER LANE  
 RL-17061 LAKE KEOWEE APPROX 60 YARDS WEST OF LAST DOCK OFF GOLDEN BEAR DRIVE  
 RL-17069 LAKE KEOWEE CENTER OF CROOKED CREEK ARM OFF END OF LAKE RIDGE LANE  
 RL-18081 LAKE KEOWEE 0.7 MILES NNE OF SV-338 APPROX 50 YARDS SW OF TIP OF ISLAND  
 RL-19159 LAKE KEOWEE AT THE END OF KELLY CREEK ARM NEARSHORE APPROX 0.3 MILES ESE OF CEDAR BLUFF COURT CUL-DE-SAC  
 RL-19167 LAKE KEOWEE IN COVE IN THE V OF ARROWHEAD TRAIL AND CLIFFWICK DRIVE  
 RL-20199 LAKE KEOWEE APPROX 0.8 MILES DOWNSTREAM FROM LAKE JOCASSEE DAM  
 SV-338 LK KEOWEE ABOVE SC ROUTE 130 AND DAM  
 SV-361 LK KEOWEE IN FOREBAY OF LITTLE RIVER DAM  
 B-327 MONTICELLO LK-LOWER IMPOUNDMENT BETWEEN LARGE ISLANDS  
 RL-17067 LAKE MONTICELLO JUST OFF ISLAND JUNCTION OF BERMS/ROADS  
 RL-19170 LAKE MONTICELLO IN COVE LOCATED HALF WAY BETWEEN ENDS OF LIGHTED LANE AND FIRESIDE DRIVE  
 RL-17059 LAKE MURRAY APPROX 0.5 MILES NNW OF THE END OF JAKES LANDING ROAD  
 RL-17063 LAKE MURRAY APPROX 350 YARDS EAST OF DREHER ISLAND OPPOSITE END OF LITTLE GAP LAND  
 RL-17075 LAKE MURRAY APPROX 0.5 MILES SW OF THE END OF OLD LEXINGTON HIGHWAY  
 RL-18079 LAKE MURRAY APPROX 270 YARDS SSW OF THE HOUSE AT THE END OF POINT VIEW ROAD  
 RL-18096 LAKE MURRAY IN BEAVER DAM CREEK COVE NEAR END OF PINE POINT DRIVE  
 RL-18099 LAKE MURRAY BUFFALO CREEK ARM DIRECTLY ACROSS FROM S-211 NEAR END OF BETHEL CHURCH ROAD POINT  
 RL-19158 LAKE MURRAY APROX 0.25 MILES NE OF END OF ROCK ISLAND RD  
 RL-19174 LAKE MURRAY 133 METERS NNE OF COVE OFF OF PUTNAM DR  
 RL-20186 LAKE MURRAY APPROX 0.1 MILES EAST OF SPENCE DRIVE  
 RL-20190 LAKE MURRAY APPROX 1.9 MILES NW OF ROACKY POINT BOAT LANDING  
 RL-20202 LAKE MURRAY APPROX 0.5 MILES NNW FROM NORTHERN END OF JIM SPENCE ISLANDS  
 S-211 HOLLANDS LANDING LK MURRAY OFF S-36-26 AT END OF S-36-3  
 S-213 LAKE MURRAY AT S-36-15  
 S-222 LAKE MURRAY; LITTLE SALUDA ARM AT SC 391  
 S-310 LAKE MURRAY; SALUDA RVR ARM; US BUSH RVR; 3.8 KM US SC 391  
 RL-17128 LAKE RABON NEARSHORE AROUND POINT FROM LAKE RABON PARK BOAT RAMP  
 RL-18138 LAKE RABON NORTH RABON ARM NEAR HEADWATERS NEAR EAST BANK  
 RL-20262 LAKE RABON APPROX 0.35 MILES ESE OF LAKE RABON PARK BOAT RAMP  
 RL-17076 LAKE SECESSION APPROX 270 YARDS EAST OF THE END OF JACKSON ROAD  
 RL-19165 LAKE SECESSION MIDWAY BETWEEN 3RD AVENUE POINT AND TURTLE POINT  
 CL-089 LK WATEREE IN FOREBAY EQUIDISTANT FROM DAM AND SHORELINES  
 CW-207 LK WATEREE AT END OF S-20-291  
 CW-207B MID LAKE LK WATEREE  
 CW-208 LK WATEREE AT S-20-101 11 MI ENE WINNSBORO

LCR-02 LK WATEREE UPSTREAM OF WATEREE CREEK ARM  
LCR-03 LK WATEREE OFF DUTCHMAN CREEK ARM  
RL-17055 LAKE WATEREE; MOUTH OF BEAVER CREEK COVE APPROX 0.3 MI SE OF THE END OF GULL ROAD  
RL-18083 LAKE WATEREE APPROX .25 MILES NE OF LAKE WATEREE STATE PARK BOAT RAMP  
RL-19166 LAKE WATEREE NEAR END OF TAYLOR CREEK ARM  
RL-20198 WATEREE LAKE APPROX 0.2 MILES SW OF END OF MILLER RD IN COVE  
RL-06435 LAKE WHELCHER 3 MI NE OF GAFFNEY  
RL-19150 LAKE WHELCHER 670M ENE OF BOAT LANDING ON WESTERN SIDE OF LAKE  
B-339 LAKE BOWEN 0.3 MI W OF SC 9  
RL-18089 LAKE BOWEN NEAR SHORELINE DIRECTLY OPPOSITE NORTH WOODFIN RIDGE DRIVE  
CW-197 LAKE WYLIE AB MILL CK ARM AT END OF S-46-557  
CW-201 LK WYLIE N LAKEWOODS S/D AT EBENEZER ACCESS  
CW-230 LAKE WYLIE AT DAM; UNDER POWERLINES  
RL-19178 LAKE WYLIE CROWDERS CREEK ARM 125 YDS ENE OF BRIDGE  
RL-20194 LAKE WYLIE APPROX 0.5 MILES EAST OF MOUTH OF SOUTH FORK CATAWBA RIVER AND 0.3 MILES NNW OF LAKE WYLIE PARK BOAT RAMP  
RL-17129 LAKE YONAH AT BIG BEND WITH TWO BIG HOUSES THE NEXT BIG BEND DOWNLAKE OF BAY SHADOWS DRIVE  
RL-17133 LAKE YONAH APPROX 320 YARDS NE OF SPILLWAY  
B-345 PARR RESERVOIR IN FOREBAY NEAR DAM  
RL-13081 PARR RESERVOIR APPROX 0.5 MI NNW OF B-345  
RL-17072 LAKE RICHARD B. RUSSELL ALLEN CREEK ARM APPROX 0.5 MI SW OF ALLEN CREEK BOAT RAMP BEFORE ISLAND  
RL-18092 LAKE RICHARD B. RUSSELL APPROX 0.35 MILES SSW OF LATIMER RAMP BEHIND ISLAND  
RL-19177 RICHARD B. RUSSELL LAKE 0.8 MI SSW OF THE SWIMMING BEACH AT THE END OF DAY USE RD CALHOUN FALLS STATE RECREATION AREA  
RL-20193 RICHARD B. RUSSELL LAKE APPROXIMATELY 1.55 MILES SW OF CALHOUN FALLS RECREATIONAL AREA BOAT RAMP  
SV-098 LAKE RUSSELL AT SC 72 3.1 MI SW CALHOUN FALLS  
SV-357 LAKE RUSSELL; ROCKY RVR ARM BETWEEN MARKERS 48 AND 49; DS FELKEL  
S-250 SALUDA LAKE AT FARRS BRDG ON SC 183 7 MI NE EASLEY  
SV-372 STEPHENS CREEK RESERVOIR/SAVANNAH RIVER AT SC 28; WALK IN FROM GA SIDE

SOUTHEASTERN PLAINS	
Station ID(s)	Location
PD-327	LK ROBINSON AT S-13-346 5 MI E MCBEE BY BOAT
RL-18087	LAKE ROBINSON COVE NEAR UPSTREAM END OF LAKE NEAR END OF ROAD S-13-7391
RL-03346	EUREKA LAKE IN CHERAW STATE PARK APPROX MID-LAKE
RL-17134	EUREKA LAKE (LAKE JUNIPER) SLIGHTLY OFFSHORE OF SPIT OF LAND ON THE SOUTH SHORE
RL-19256	LAKE JUNIPER (EUREKA) OFF DOCK APPROX 0.3 MI EAST OF SWIMMING BEACH ON LAKE
CL-042	LAKE MARION FOREBAY; SPILLWAY MARKER 44 -SC-022
RL-01011	LAKE MARION 1.10 M SSE OF SANTEE NAT. WILDLIFE REFUGE AND 1MI S OF EAGLE POINT - SC-035
RL-02306	LK MARION AT JACK'S CK EMBAYMENT; USE SANTEE COOPER SC-012
RL-02308	LK MARION AT CHANNEL MARKER 69; USE SANTEE COOPER SC-016



RL-04388 LAKE MARION 0.5 MI NE OF CALHOUN LANDING -USE SC-044  
LAKE MARION APPROX 0.25 MI NE OF FREGUSON LANDING. NEED TO GET A REACTION FROM  
SANTÉE COOPER. ALTHOUGH THERE IS A LANDING THERE ARE ALSO LOTS OF STUMPS;  
RL-17054 ISLANDS; ETC.; SUGGESTING IT MAY BE VERY SHALLOW  
RL-17070 LAKE MARION APPROX 1.6 MILES SOUTH OF ROUND ISLAND  
RL-18094 LAKE MARION POTATO CREEK ARM SANTÉE NATIONAL WILDLIFE REFUGE  
LAKE MARION 3.3 MI SOUTH OF JOHN C LAND III BOAT RAMP OUT FROM MOUTH OF TAW CAW  
RL-19164 CREEK  
RL-19176 LAKE MARION 1.25 MI WSW OF BRIDGE OF SC-260 OVER CHURCH BRANCH  
RL-20192 LAKE MARION APPROX 1.6 MILES NE OF CATHEAD BOAT LANDING  
RL-20196 LAKE MARION APPROX 1.1 MILES NNW OF THE MOUTH OF MILL CREEK  
SC-010 UPPER LAKE MARION AT CHANNEL MARKER 150  
SC-017 MID LAKE MARION AT TAW CAW CREEK EMBAYMENT  
SC-019 LOWER LAKE MARION AT POTATO CREEK FLOODED EMBAYMENT  
SC-021 LOWER LAKE MARION; 1.5 KM NE OF ROCK'S POND CAMPGROUND  
SC-036 MID LAKE MARION AT THE MOUTH OF TAW CAW CREEK  
SC-038 UPPER LAKE MARION AT THE MOUTH OF HALFWAY SWAMP CREEK  
SC-039 UPPER LAKE MARION 2.0 KM BELOW RIMINI RAILROAD TRESTLE  
SC-040 MID LAKE MARION AT CHANNEL MARKER 79  
SC-042 MID LAKE MARION AT NORTH END OF I-95 / U.S. 301 BRIDGES  
SC-049 ASSIGNED TO SANTÉE-COOPER PROJECT  
ST-025 LK MARION AT OLD US 301/15 BRDG AT SANTÉE -SC-015  
ST-034 LAKE MARION AT RR TRESTLE AT LONE STAR -SC-008  
ST-036 LK MARION; WYBOO CREEK ARM DS OF CLUBHOUSE BR -SC-023A  
PD-374 LAKE PAUL WALLACE AT THE SKI IMPOUNDMENT BOAT LANDING DOCK  
CL-069 LANGLEY POND IN FOREBAY NEAR DAM

## **5. Estuary and Coastal Assessment**

### **A. Summary Statistics**

At the request of the USEPA there are two separate statewide condition summaries contained in this report, the 2014 through 2018 survey and the 2016 through 2020 survey. Based on a hydrographic GIS cover developed jointly by SCDHEC and the SC DNR and the results of survey site selection validation, South Carolina has an estimated 289 combined square miles of tide creek and open water habitat representing the estuarine sampling design frame previously described.

A summary of classified use support statewide based on these data, along with causes for partial or nonattainment, is presented below. The Lower and Upper 95 Percent Confidence Intervals for the statistical survey estimates signify that it is 95% certain that the true mileage is between the upper and lower confidence limits.

2014 through 2018 Survey Results based on 150 survey sites sampled during this window.

**Table 12a. Estuaries Use Support Summary (Square Miles) 2014-2018**

<b>Indicator</b>	<b>Category</b>	<b>Survey - Estimated Percent of Total Resource</b>	<b>Survey - Estimated Square Miles of Total Resource</b>	<b>Lower 95 Percent Confidence Interval (Square Miles)</b>	<b>Upper 95 Percent Confidence Interval (Square Miles)</b>
Aquatic Life Use	Fully Supporting	87.6	253.2	240.9	265.5
	Partially Supporting	5.6	16.1	5.5	26.6
	Not Supporting	6.6	19.2	9.1	29.3
Recreational Use	Fully Supporting	94.7	273.8	265.6	282.0
	Partially Supporting	4.9	14.0	5.9	22.2
	Not Supporting	0.2	0.6	0.0	1.7

**Table 13a. Summary of Fully Supporting and Impaired Estuaries (Not including Fish/Shellfish Consumption Use) 2014-2018**

<b>Category</b>	<b>Survey-Based Estimated Percent of Total Resource</b>	<b>Survey-Based Estimated Square Miles of Total Resource</b>	<b>Lower 95 Percent Confidence Interval (Square Miles)</b>	<b>Upper 95 Percent Confidence Interval (Square Miles)</b>
Fully Supporting All Assessed Uses	83.6	241.7	227.8	255.6
Impaired for One or More Use	16.2	46.8	32.9	60.7

**Table 14a. Total Sizes of Estuaries Impaired by Various Cause Categories (Square Miles) 2014-2018**

<b>Cause Category</b>	<b>Survey-Based Estimated Square Miles of Total Resource</b>	<b>Lower 95 Percent Confidence Interval (Square Miles)</b>	<b>Upper 95 Percent Confidence Interval (Square Miles)</b>
Turbidity	27.6	15.3	39.8
Dissolved Oxygen	7.7	0.0	15.5
Enterococci	14.7	6.5	22.9

2016 through 2020 Survey Results based on 150 survey sites sampled during this window.

**Table 12b. Estuaries Use Support Summary (Square Miles) 2016-2020**

Indicator	Category	Survey - Estimated Percent of Total Resource	Survey - Estimated Square Miles of Total Resource	Lower 95 Percent Confidence Interval (Square Miles)	Upper 95 Percent Confidence Interval (Square Miles)
Aquatic Life Use	Fully Supporting	81.8	236.5	220.4	252.6
	Partially Supporting	11.8	34.1	19.2	48.9
	Not Supporting	6.2	17.9	8.6	27.2
Recreational Use	Fully Supporting	93.8	271.3	263.1	279.4
	Partially Supporting	4.9	14.0	6.0	22.1
	Not Supporting	1.1	3.2	0.8	5.5

**Table 13b. Summary of Fully Supporting and Impaired Estuaries (Not including Fish/Shellfish Consumption Use) 2016-2020**

Category	Survey-Based Estimated Percent of Total Resource	Survey-Based Estimated Square Miles of Total Resource	Lower 95 Percent Confidence Interval (Square Miles)	Upper 95 Percent Confidence Interval (Square Miles)
Fully Supporting All Assessed Uses	77.4	223.8	206.0	241.5
Impaired for One or More Use	22.4	64.7	47.0	82.5

**Table 14b. Total Sizes of Estuaries Impaired by Various Cause Categories (Square Miles) 2016-2020**

Cause Category	Survey-Based Estimated Square Miles of Total Resource	Lower 95 Percent Confidence Interval (Square Miles)	Upper 95 Percent Confidence Interval (Square Miles)
Turbidity	47.5	31.6	63.3
Dissolved Oxygen	7.7	0.0	15.4
Enterococci	17.2	9.1	25.4

## 6. Wetlands Assessment

### A. Extent of Wetland Resources

A tracking system called ePermitting is being adopted agency-wide. The Water Quality Certification and Wetlands Section has developed a module into which all Section 10 and Section

404/401 projects are entered. This module includes information on project location (latitude/longitude, basin, and watershed unit), purpose, types of impacts, acreage of wetland and non-wetland impacts, compensation requirements and location (latitude/longitude, basin, and watershed unit) and remediation requirements. Information regarding projects from the years of 1983 to the present has been entered into this tracking system.

## **B. Integrity of Wetlands Resources**

There is no specific legislation authorizing a statewide wetlands protection program. The primary mechanisms for wetlands protection in the state are federal and state regulatory programs for the discharge of dredged or fill material into waters of the state and for activities in the critical areas of the coastal zone.

### **1. Section 404 Permit Program**

Section 404 of the Clean Water Act requires a permit for the discharge of dredged or fill material into navigable waters, including wetlands, throughout the United States. Certain activities, such as normal agriculture, silviculture and ranching activities, are exempt from such permit requirements. The United States Army Corps of Engineers (USACE) administers the Section 404 permitting program, but the EPA exercises final authority. The Agency can prohibit the use of a disposal area if the discharge will have an adverse impact on municipal water supplies, shellfish beds, fishing areas, wildlife, or recreational areas. No permit can be issued without a Section 401 Certification from SCDHEC's Division of Water Quality, and in coastal areas, a determination of consistency with the Coastal Zone Management Program (CZMP) from SCDHEC's Office of Ocean and Coastal Resource Management (OCRM) is required. Other state and federal natural resource agencies, such as DNR, U. S. Fish and Wildlife Service, and National Marine Fisheries Service, provide input to decisions of the federal permitting agency and the state certifying agencies on proposed activities.

Section 404 permit authority can be delegated to states but South Carolina has elected not to assume that authority. In 1986, SCDHEC completed a study to determine the feasibility of assuming the Section 404 program. The study concluded that although SCDHEC had the legal authority and the technical expertise, it was not advisable to assume that authority because of the limited area of the jurisdiction involved. Perhaps more importantly, there would be no new funding from Congress to support that assumption.

### **2. Section 401 Water Quality Certification**

Section 401 of the Clean Water Act requires any applicant for a federal permit or license involved in an activity that may result in a discharge to navigable waters to receive certification from the state that the discharge will not cause violations of the state's water quality standards. Consequently, 401 Certification is required for all activities requiring a Section 404 permit from the ACE. This mechanism provides a State position on wetlands alterations.

SCDHEC routinely requires compensation for wetland impacts at greater than a one to one basis. This compensation may be in the form of preservation, enhancement, or restoration.

SCDHEC administers certification programs using as guidance the South Carolina Pollution Control Act. S. C. Regulation 61-101, *Water Quality Certification*, guides the administration and technical review for the §401 Certification Program that determines if the standards of S. C. Regulation 61-68 will be met.

The S. C. Pollution Control Act provides authority for regulation of wetlands since it defines waters of the State as:

*“lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt, that are wholly or partially within or bordering the State or within its jurisdiction.”*

This definition does not specifically list wetlands, but wetlands are included through the generic use of the word “marshes” as well as within the broad inclusion of the phrase “all other bodies of surface or underground water.” Therefore, all water pollution control programs administered by SCDHEC apply to activities in wetlands.

During review of applications for §401 Certification, SCDHEC, with authority from S.C. Regulation 61-101, evaluates whether or not there are feasible alternatives to the activity that reduce adverse consequences on water quality and classified water uses, if the activity is water dependent, and the intended purpose of the activity. Certification is denied if the activity will adversely affect existing or designated uses. Certification is granted if water quality standards, that include protection of existing uses, will not be violated. The federal permit cannot be issued if certification is denied.

### **C. Development of Water Quality Standards for Wetlands**

S.C. Regulation 61-68 provides that waters not classified by name assume the classification of the waterbody to which they are adjacent. Wetlands contiguous to a stream or lake assume the classification of the waterbody to that they are contiguous. The standards allow variation from specific numeric standards if those variations are due to natural conditions. SCDHEC is continuing to evaluate the development of water quality classifications and standards specifically applicable to wetlands.

Before proceeding with regulation development for the proposed classifications and standards for wetlands, there is the need to gain general agreement regarding wetlands protection policy and mechanisms in the State. Consensus-building among Federal, State, and local regulators with developers, farmers, forestry industry, and environmental groups would ensure acceptance of a clearly defined South Carolina wetlands protection policy.

### **D. Additional Protection Activities**

SCDHEC also uses antidegradation rules in S.C. Regulation 61-68 to evaluate applications for

Water Quality Certification. The basic tenet of antidegradation is:

*“...existing uses and the level of water quality necessary to protect existing uses in all segments of a water body must be maintained.”*

Strict application of this water quality standard is impossible if there is to be any fill in wetlands. Therefore, the federal government determined that some fill in wetlands may be allowed pursuant to Section 404 of the Clean Water Act. S.C. Regulation 61-68 provided for this by adding a provision that states,

*“Discharge of fill into waters of the State is not allowed unless the activity is consistent with Department regulations and will result in enhancement of classified uses with no significant degradation to the aquatic ecosystem or water quality”.*

Fill may only be allowed if it does not cause or contribute to significant degradation of the aquatic environment that can be determined by whether or not the activity will cause adverse effects on:

1. Human health or welfare;
2. Life stages of aquatic life or wildlife dependent upon the aquatic ecosystem;
3. Ecosystem diversity, productivity, and stability;
4. Recreational, aesthetic, and economic values.

## **7. Public Health Concerns**

### **A. Public Health Impacts**

#### **1. Pollution Caused Fish Kills/Abnormalities**

There was a total of 35 recorded fish kill (FK) investigations conducted by SCDHEC in 2021. Through July 2022 there have been a total of 28 reported FKs to SCDHEC. In the past the agency can have anywhere from 23 to 70 reported fish kills per year.

*Dissolved oxygen depletion, weather conditions, and other natural causes accounted for most of the yearly kills. Over the past 10 years natural kills normally make up 60-70% followed by ~20-30% where no cause can be determined. Only around ~10% or less are what can be classified as unnatural causes. Unnatural causes ranged from fish being caught and dumped back into lakes and streams to the runoff of pesticides and pollution. 2022 numbers are consistent with kills investigated over the past 10 years ± 2%.*

Yearly trends have shown that a majority of FK calls SCDHEC receives are 12 hours to 2 days after the initial occurrence of the FK. Late reporting of fish kills to SCDHEC investigators hinders accurate determination of the cause of the fish kills. Late reporting can result in kills not being documented. It is SCDHEC's policy in follow up and investigate all fish kills reported to agency.

There are no waters in the State that routinely experience fish kills or fish abnormalities due to toxics. When fish kills do occur that can be attributed to other than natural causes, enforcement action is taken by SCDHEC. The action usually takes the form of an administrative order and includes penalties commensurate with the violation. Schedules for corrective actions are included in the order along with appropriate assessment of monetary damage of the fish killed. As of May 31, 2001, SCDHEC required that its entire staff use its *Field Manual for Investigation of Fish Kills*. SCDHEC's computer system, e-Permitting acts as the official fish kill report. It is SCDHEC policy to acquire GPS coordinates on all fish kills to pinpoint fish kill location.

SCDHEC coordinates fish kill investigations with other following state agencies, SC Department of Natural Resources and Clemson University Department of Pesticide Regulation on a regular basis to ensure South Carolina's waters are protected and fish kills are investigated. SCDHEC's 2021 Fish Kill Investigation Protocol, Standard Operating Procedures manual states Columbia Office Duty Officer (CODO) will give SC Department of Natural Resources (DNR) a courtesy notification if they receive the initial call of a fish kill.

## **2. Fish Consumption Advisories**

The SCDHEC uses a risk-based approach to evaluate contaminant concentrations in fish tissue and to issue consumption advisories in affected waterbodies. This approach contrasts the average daily exposure dose to the reference dose (RfD). Using these relationships, fish tissue data are interpreted by determining the consumption rates that would not be likely to pose a health threat to adult males and nonpregnant adult females. An acceptable RfD for developmental neurotoxicity has not been determined and scientific studies suggest that exposure before birth may have adverse effects on the developing fetus. For these reasons infants, pregnant women, nursing mothers, and children are advised to avoid consumption of fish from any waterbody where an advisory has been issued.

Fish consumption advisories are updated annually in April. For background information and the most current advisories, please visit the Bureau of Water homepage at <http://www.scdhec.gov/fish> or call SCDHEC's Division of Health Hazard Evaluation, toll-free, at (888) 849-7241.

## **3. Shellfish Restrictions/Closures**

The goal of SCDHEC's Shellfish Sanitation Program (SSP) is to ensure that mollusk and shellfish and areas from which they are harvested meet the health and environmental quality standards provided by federal and state regulations, laws, and guidelines. Additionally, SCDHEC promotes and encourages coastal quality management programs consistent with protected uses established through the S.C. Regulation 61-68, *Water Classifications and Standards*. SSP management policy is primarily determined by S.C. Regulation 61-47, *Shellfish*, as well as other State legislation. The National Shellfish Sanitation Program (NSSP) Model Ordinance, developed through participation in the Interstate Shellfish Sanitation Conference (ISSC) and endorsed by all shellfish producing states and the United States Food and Drug Administration (USFDA), is used as primary guidance for shellfish regulation development.

Sanitary surveys are conducted by SCDHEC to assess the quality of the coastal waters. These surveys result in shellfish harvesting classifications described as follows:

**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 that would render shellfish unsafe for human consumption. Approved area classification 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 Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, nor shall the estimated ninetieth percentile exceed an MPN of forty-three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using National Shellfish Sanitation 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, potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under that 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 that may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved area 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 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 Guidelines.

**Prohibited:** Growing areas shall be 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 that could render shellfish unfit or unsafe for human consumption.

As a matter of SCDHEC policy, prohibited areas are established adjacent to all point source and/or marinas as a precaution to protect public health. These prohibited areas are not necessarily an indication of lesser water quality or that standards are not being met; rather, they are areas that have the potential for variable water quality.

South Carolina currently (July 2022) has approximately 580,188 estuarine/riverine surface acres classified for the harvest of molluscan shellfish. Of this total, Approved accounts for 69.0% of total acreage, Restricted - 18.8%, and Prohibited - 12.2%.

**Table 15. Summary of Shellfish Harvesting Status in South Carolina Shellfish Waters**

Harvesting Status	Acreage	Percent
Approved	400,373	69.0%
Conditionally Approved	35	0.0%
Restricted	109,244	18.8%
Prohibited	70,536	12.2%
Total Assessed	580,188	100.0%

#### **4. Ocean Water Quality Monitoring**

South Carolina’s conducts an annual program for monitoring bacteria content of recreational waters along the Atlantic coast from May 1st to Oct. 1st. A partnership between the state’s Department of Health and Environmental Control and local governments provides residents and visitors with specific and timely information about beach water quality along the state’s coastline.

An annual report is prepared and submitted to the USEPA detailing number of monitoring locations, sampling frequency, action levels, and number of advisory days. More information regarding sample results for all monitored beaches and about the program’s other activities is available at the S.C. Department of Health and Environmental Control’s Web site

at <https://scdhec.gov/environment/your-water-coast/ocean-coastal-resource-management-ocrm/beach-management/beach-monitoring>

## **B. Public Health: Drinking Water**

The Drinking Water Enforcement program is charged with carrying out enforcement actions on those entities that are in violation of the State Safe Drinking Water Act (SDWA) or the State Recreational Waters Act (SRWA). For detailed information concerning enforcement orders issued within the Drinking Water Program and other areas of Environmental Quality Control, you may also wish to visit: <http://www.scdhec.gov/Environment/EnforcementActions/>.

To view information on a specific drinking water supplier in the state, you may visit: [Drinking Water Branch \(sc.gov\)](#).

## **GROUNDWATER ASSESSMENT**

Groundwater is the source of drinking water for approximately 35 percent of the population of the State. This resource is also used by agricultural, industrial, and commercial interests. The policy of the State of South Carolina, with respect to groundwater protection, is founded on the belief that there is a direct connection between land use and groundwater quality, and that at least some activities of man will always impact groundwater, regardless of the regulatory safeguards employed. Because it is an expensive and technologically complex task to restore contaminated groundwater to its original pristine state within a reasonable time frame, a justifiable goal of any groundwater protection strategy is to protect the present and future uses of the resource. It should be noted that at this time, ambient groundwater monitoring activities are still suspended with no timeline of reinitiating. Groundwater protection activities are ongoing, as summarized below.

SCDHEC maintains a primary long term objective for groundwater protection. As expressed in the S.C. Regulation 61-68, *Water Classifications and Standards*.

*“It is the goal of the Department to maintain or restore groundwater quality so it is suitable as a drinking water source without any treatment. Recognizing the technical and economic difficulty in restoring groundwater quality, the Department will emphasize a preventive approach in protecting groundwater.”*

The groundwater quality protection and restoration, when needed, relies heavily on regulatory mechanisms, most of which are founded in state and federal law. Groundwater sources are protected by requiring that state groundwater quality standards are maintained or restored, if needed, and by incorporating Drinking Water Source Protection principles into the Underground Storage Tank, State and Federal Superfund, Brownfields, Solid and Hazardous Waste, Mining, Emergency Spill Response, Animal Feeding Operation, Wastewater Land Application, and Groundwater Use programs.

A primary tool for revealing the effectiveness of the overall strategy is the monthly review of compliance data from all public wells in the state to measure overall effectiveness, to identify wells

and systems with existing or potential drinking water problems, and to detect regional and/or temporal trends in water quality.

### 1. Overview of Groundwater Protection Programs

The state’s groundwater protection programs are summarized and characterized in Table 16. The Groundwater Working Group that is comprised of SCDHEC’s groundwater program managers was formed to provide consistency across the programs.

**Table 16. Summary of State Groundwater Protection Programs**

<b>Programs or Activities</b>	<b>Check (Y)</b>	<b>Implementation Status</b>	<b>Responsible State Agency</b>
Active SARA Title III Program	Y	Fully Established	SCDHEC/BLWM/BES
Ambient groundwater quantity monitoring system	Y	Continuing Efforts	DNR-SCDHEC/BOW
Aquifer vulnerability assessment	Y	Continuing Efforts	SCDHEC/BOW
Aquifer mapping	Y	Continuing Efforts	DNR-SCDHEC/BOW
Aquifer characterization	Y	Continuing Efforts	DNR-SCDHEC/BOW
Comprehensive data Management system	Y	Continuing Efforts	DNR-SCDHEC
Groundwater discharge permits	Y	Fully Established	SCDHEC/BOW
Groundwater Best Management Practices	Y	Continuing Efforts	SCDHEC/BOW
Groundwater legislation	Y	Continuing Efforts	SCDHEC-SCDNR
Groundwater classification	Y	Fully Established	SCDHEC/BOW
Groundwater quality standards	Y	Continuing Efforts	SCDHEC
Interagency coordination for groundwater protection initiatives	Y	Continuing Efforts	SCDHEC-SCDNR-Clemson Univ.
Nonpoint source controls	Y	Continuing Efforts	SCDHEC/BOW
Pesticide State Management Program	Y	Fully Established	Clemson Univ.
Pollution Prevention Program	Y	Fully Established	SCDHEC/BLWM
Resource Conservation and	Y	Fully Established	SCDHEC/BLWM

<b>Programs or Activities</b>	<b>Check (Y)</b>	<b>Implementation Status</b>	<b>Responsible State Agency</b>
Recovery Act (RCRA) Primacy			
State Superfund	Y	Fully Established	SCDHEC/BLWM
State RCRA Program incorporating more stringent requirements than RCRA primacy		Not Applicable	
State septic system requirements	Y	Fully Established	SCDHEC/BOW
Underground storage tank installation requirements	Y	Fully Established	SCDHEC/BLWM/UST Program
Underground Storage Tank Remediation Fund	Y	Fully Established	SCDHEC/BLWM/UST Program
Underground Storage Tank Permit Program	Y	Fully Established	SCDHEC/BLWM/UST Program
Underground Injection Control Program	Y	Fully Established	SCDHEC/BOW
Vulnerability assessment for drinking water/wellhead protection	Y	Fully Established	SCDHEC/BOW
Well abandonment regulations	Y	Fully Established	SCDHEC/BOW
Wellhead Protection Program (EPA-approved)	Y	Fully Established	SCDHEC/BOW
Well installation regulations	Y	Fully Established	SCDHEC/BOW

Notes:

SCDEHC – South Carolina Department of Health and Environmental Control

SCDNR – South Carolina Department of Natural Resources

BOW – Bureau of Water

BLWM – Bureau of Land and Waste Management

BES – Bureau of Environmental Services

UST – Underground Storage Tank

## **2. Overview of Groundwater Contamination Sources**

The major sources of contamination impacting groundwater are presented in Table 17. Underground storage tank (UST) releases account for the largest number of releases to

groundwater in the state. The additional nine sources indicated were the next most numerous instances. Another factor indicated was human health and/or environmental risk for those sources for petroleum products and hazardous waste. The size of the population at risk was also indicated for USTs given the large number of releases. The next column on Table 17 indicates the contaminants associated with the highest priority sources. Petroleum compounds, halogenated solvents, metals and nitrates are the contaminants most frequently detected.

**Table 17. Major Sources of Groundwater Contamination**

<b>Contaminant Source</b>	<b>Ten Highest-Priority Sources (T)</b>	<b>Factors Considered in Selecting a Contaminant Source</b>	<b>Contaminants</b>
<b><i>Agricultural Activities</i></b>			
Agricultural chemical facilities			
Animal feedlots		A,C,E	E
Drainage wells			
Fertilizer applications		A,C,E	E
Irrigation practices			
Pesticide applications			
<b><i>Storage and Treatment Activities</i></b>			
Land application	T	D, A	E
Material stockpiles			
Storage tanks (above ground)	T	D,A	D
Storage tanks (underground)	T	D,A,B	D
Surface impoundments	T	D, A	C,E
Waste piles		A,C,E	E
Waste tailing			
<b><i>Disposal Activities</i></b>			
Deep injection wells			
Landfills	T	D, A	C,D,H

Contaminant Source	Ten Highest-Priority Sources (T)	Factors Considered in Selecting a Contaminant Source	Contaminants
Septic systems			
Shallow injection wells			
<i>Other</i>			
Hazardous waste generators	T	D,A	C,H
Hazardous waste sites	T	D,A	C,H
Industrial facilities	T	D, A	C,E, H
Material transfer operations			
Mining and mine drainage	T	A,C	H, Acid mine drainage
Pipeline and sewer lines			
Salt storage and road salting			
Salt water intrusion			
Spills	T	D	D
Transportation of materials			
Urban runoff			
Other sources (please specify)			
Other sources (please specify)			

1. Check (X) up to 10 contaminant sources identified as highest priority in your State.
2. Specify the factor(s) used to select each of the contaminant sources. Denote the following factors by their corresponding letter (A through G) and list in order of importance. Describe any additional or special factors that are important within your State in the accompanying narrative.
  - A. Human health and/or environmental risk (toxicity)
  - B. Size of the population at risk
  - C. Location of the sources relative to drinking water sources
  - D. Number and/or size of contaminant sources
  - E. Hydrogeologic sensitivity

- F. State findings, other findings
- G. Other criteria (please add or describe in the narrative)

3. List the contaminants/classes of contaminants considered to be associated with each of the sources that was checked. Contaminants/contaminant classes should be selected based on data indicating that certain chemicals may be originating from an identified source. Denote contaminants/classes of contaminants by their corresponding letter (A through L).

- |                         |                  |
|-------------------------|------------------|
| A. Inorganic pesticides | H. Metals        |
| B. Organic pesticides   | I. Radionuclides |
| C. Halogenated solvents | J. Bacteria      |
| D. Petroleum compounds  | K. Protozoa      |
| E. Nitrate              | L. Viruses       |
| F. Fluoride             |                  |
| G. Salinity/brine       |                  |

### **3. Summary of Groundwater/Surface Water Interactions**

The Drinking Water Program reports that no Public Water Supply well is under the influence of surface water. Although there are anecdotal reports of groundwater in wells being heavily pumped showing signs of influence by surface water, no instance of groundwater being impacted by surface water has been confirmed.

As groundwater serves to recharge most of the streams in South Carolina, instances where contaminated groundwater impacts surface water are more prevalent. Contaminated groundwater discharging to surface water has been identified at some sites being assessed by the various groundwater programs of the Department. A table was not included in this report because contaminant concentration levels in both the aquifer and surface water are not available.