



Ashepoo-Combahee-Edisto (ACE) Basin National Estuarine Research Reserve Management Plan

2026 – 2031



Acknowledgements

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This management plan has been developed in accordance with NOAA regulations, including all provisions for public involvement. It is consistent with the congressional intent of Section 315 of the Coastal Zone Management Act of 1972, as amended, and the provisions of the South Carolina Coastal Management Program. This plan was also prepared utilizing NOAA's Reserve System Management Plan Guidelines and Resources (2023).

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Executive Summary

The Management Plan for the Ashepoo-Combahee-Edisto (ACE) Basin National Estuarine Research Reserve (NERR) covers the period 2026– 2031. The plan describes the history, assets, programs, and administrative structure of the ACE Basin NERR. It also defines the strategy for meeting the Reserve’s goals for the next five years and lays out how the Reserve will address priority management issues. This plan provides an update to the ACE Basin National Estuarine Research Reserve Management Plan, 2011 – 2016. It also proposes the state’s addition of 12 privately-owned parcels that have been acquired by the state in 2017 be incorporated within the Reserve’s boundary, which would increase the acreage of land managed as part of the Reserve by 640 acres.

The ACE Basin NERR in South Carolina, which was designated in 1992, spans 138,352 acres situated between the Charleston and Beaufort metropolitan areas – an area that included significant lands owned by state, federal, and private entities. Within this area, the Reserve boundary currently encompasses 121,255 acres of protected lands (121,895 with the proposed new parcels).

The ACE Basin NERR is part of the National Estuarine Research Reserve System (NERRS), a network of protected areas. The NERRS addresses nationally significant and locally relevant issues through research, education, and stewardship programs. The NERRS currently consists of 30 Reserves in 25 states and territories, protecting over one million acres of estuarine land and water.

The ACE Basin NERR is managed as a federal-state partnership between the National Oceanic Atmospheric Administration’s (NOAA) Office for Coastal Management (OCM) and the South Carolina Department of Natural Resources’ (SCDNR) Marine Resources Division (MRD). OCM implements the National Coastal Zone Management Program and the NERRS with authorization from the Coastal Zone Management Act of 1972. OCM provides funding, technical assistance, and national coordination and oversight to Reserves within the NERRS. As state partner, SCDNR has delegated authority from the state to manage the ACE Basin NERR and provides staff, programming, and matching funds for the implementation of the Reserve. Both organizations’ missions align well and address sustaining South Carolina’s coastal natural resources. Programmatically, the alignment is mutually beneficial because each is able to leverage expertise in planning, research, education, and land management.

The ACE Basin NERR has identified four priority management areas: water quality, habitat conservation, public access, and community resilience. The Reserve’s mission is to sustain the ecological health of ACE Basin ecosystems and provide natural areas for research, education, stewardship, and compatible human uses. Over the next five years, the Reserve’s goals are to:

1. Enable South Carolina’s communities, residents, and visitors to protect coastal resources.
2. Advance knowledge about coastal and estuarine ecosystems through research and monitoring.
3. Apply science and stewardship to balance long-term protection of the ACE Basin’s natural and cultural resources with enjoyment by current and future generations.
4. Enhance the capacity of the Reserve to contribute to the ACE Basin community, SCDNR, and the NERRS system through effective operations and communication.

The goals and associated objectives and strategies will be implemented through coordinated actions by the Reserve’s programs. The research program conducts, promotes, and facilitates research and monitoring within the NERR. The program participates in the NERRS System-Wide Monitoring Program (SWMP), providing long-term data on water quality, weather, biological communities, and habitat characteristics. The Reserve staff draws upon the research and monitoring of the Reserve and other scientists to promote awareness and stewardship. The Education Program raises scientific literacy and estuarine awareness among K-12 students and teachers through hands-on programs, lessons, and materials. The Training and Engagement Program encourages informed decisions about coastal

resources through trainings and technical assistance to coastal decision-makers. The stewardship program promotes a stewardship ethic by serving the general public through experiential outreach, volunteer opportunities,

and citizen science. The stewardship program also facilitates land management to promote healthy habitats and access for Reserve visitors.

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Introduction to the National Estuarine Research Reserve System

The National Estuarine Research Reserve System is a network of 30 protected estuarine areas that represent different biogeographic regions and estuarine types within the United States (Figure 1). Reserves are protected for long-term research, monitoring, education, and coastal stewardship. The Reserve System, created by the [Coastal Zone Management Act of 1972](#), currently protects over one million acres of estuarine lands and waters. The system is managed in accordance with federal regulations at [15 CFR Part 921](#).

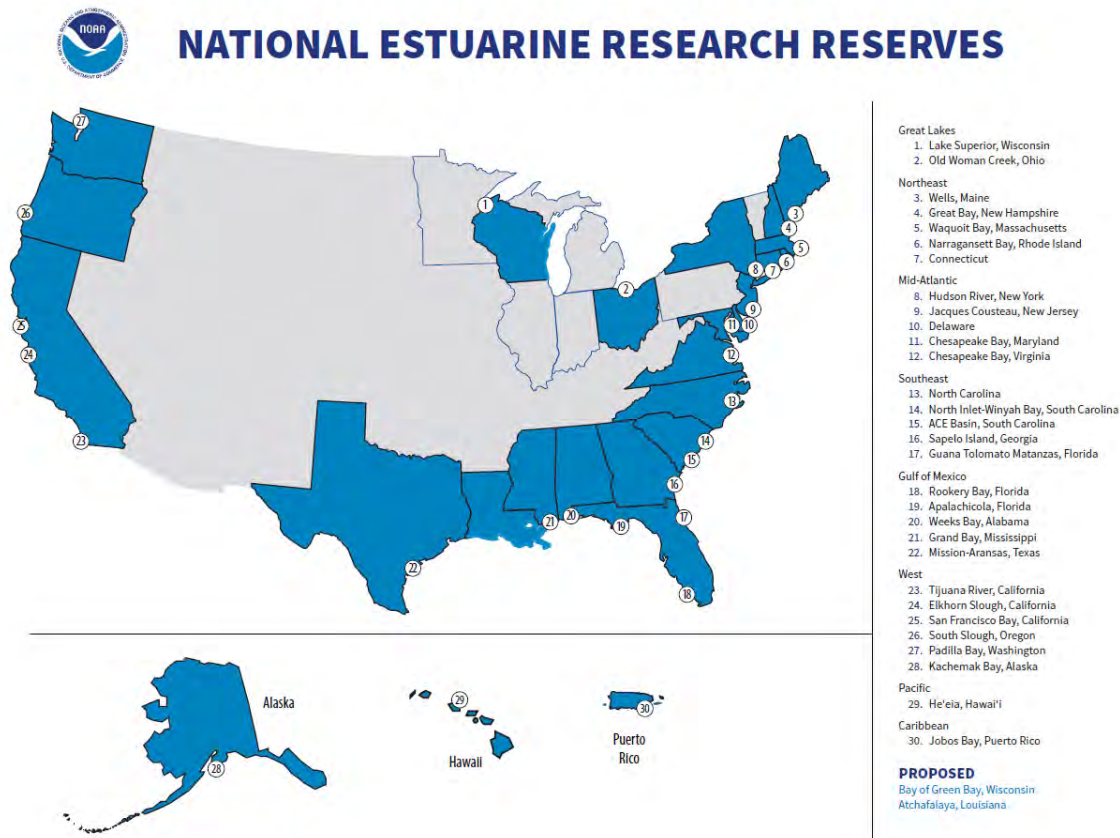


Figure 1. National Estuarine Research Reserve Map (2023).

Each reserve has a unique boundary based on the nature of its ecosystem. The boundaries include the land and water areas needed to protect an intact ecological unit. Reserves classify their land and water areas as either “core” or “buffer,” which determines the level of protection and the types of activities allowed within each area. Each reserve develops the programming most appropriate for its location while also delivering required system-wide programs focused on research and monitoring, education, training, and stewardship.

The Reserve System is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. NOAA provides funding, national guidance, and technical assistance for reserve operations and system-wide programs, facilities construction and land acquisition, graduate fellowships, and collaborative science projects. The state partner manages the reserve on a daily basis and works collaboratively with local and regional partners. NOAA also leads projects that

integrate data or support decision-making at the national level.

Each reserve is required to develop a management plan that contains the goals, objectives, and strategies for that reserve. Management plans are updated every five years and must be approved by NOAA. These plans enable the reserves and NOAA to track progress and realize opportunities for growth. Each plan describes how the reserve will carry out its foundational research, education, and training programs. Each plan also outlines administration, resource protection, public access, land acquisition, and facility plans, as well as restoration and resource manipulation plans if applicable. The plans also incorporate strategies designed to help the reserve contribute to the system's national goals. NOAA periodically evaluates reserves for compliance with federal requirements and their approved management plan.

The most recent strategic plan for the National Estuarine Research Reserve System can be found at coast.noaa.gov/data/docs/nerrs/StrategicPlan.pdf. It describes the following goals for the system.

1. **Protecting Places:** Enhance and inspire stewardship, protection, and management of estuaries and their watersheds in coastal communities through place-based approaches.
2. **Applying Science:** Improve the scientific understanding of estuaries and their watersheds through the development and application of reserve research, data, and tools.
3. **Educating Communities:** Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watersheds, and coastal communities.

Introduction to the ACE Basin NERR



Figure 2. Aerial view of the dock at South Fenwick Island.

The ACE Basin NERR encompasses approximately 121,255 acres (plus a proposed 640) of diverse habitat in Beaufort, Colleton, and Charleston Counties in southeastern South Carolina (Figure 3). The Reserve was designated in 1992, along with the North Inlet-Winyah Bay NERR in Georgetown, SC. The ACE Basin NERR program is administered through a partnership between the Marine Resources Division (MRD) of the South Carolina Department of Natural Resources (SCDNR) and the Office for Coastal Management (OCM) within NOAA. Since designation, the Reserve has established an on-site presence at the Ft. Johnson complex near Charleston, the McKenzie Field Station at Bennett's Point, the Environmental Learning Center on Edisto Island, and at Botany Bay Plantation Wildlife Management Area/Heritage Preserve on Edisto Island. Through work conducted at these sites and throughout coastal South Carolina, the Reserve has created a unique program that integrates long-term scientific research and monitoring, habitat protection, marine and estuarine education, public outreach, resource stewardship, and recreational opportunities with coastal decision-making processes in South Carolina.

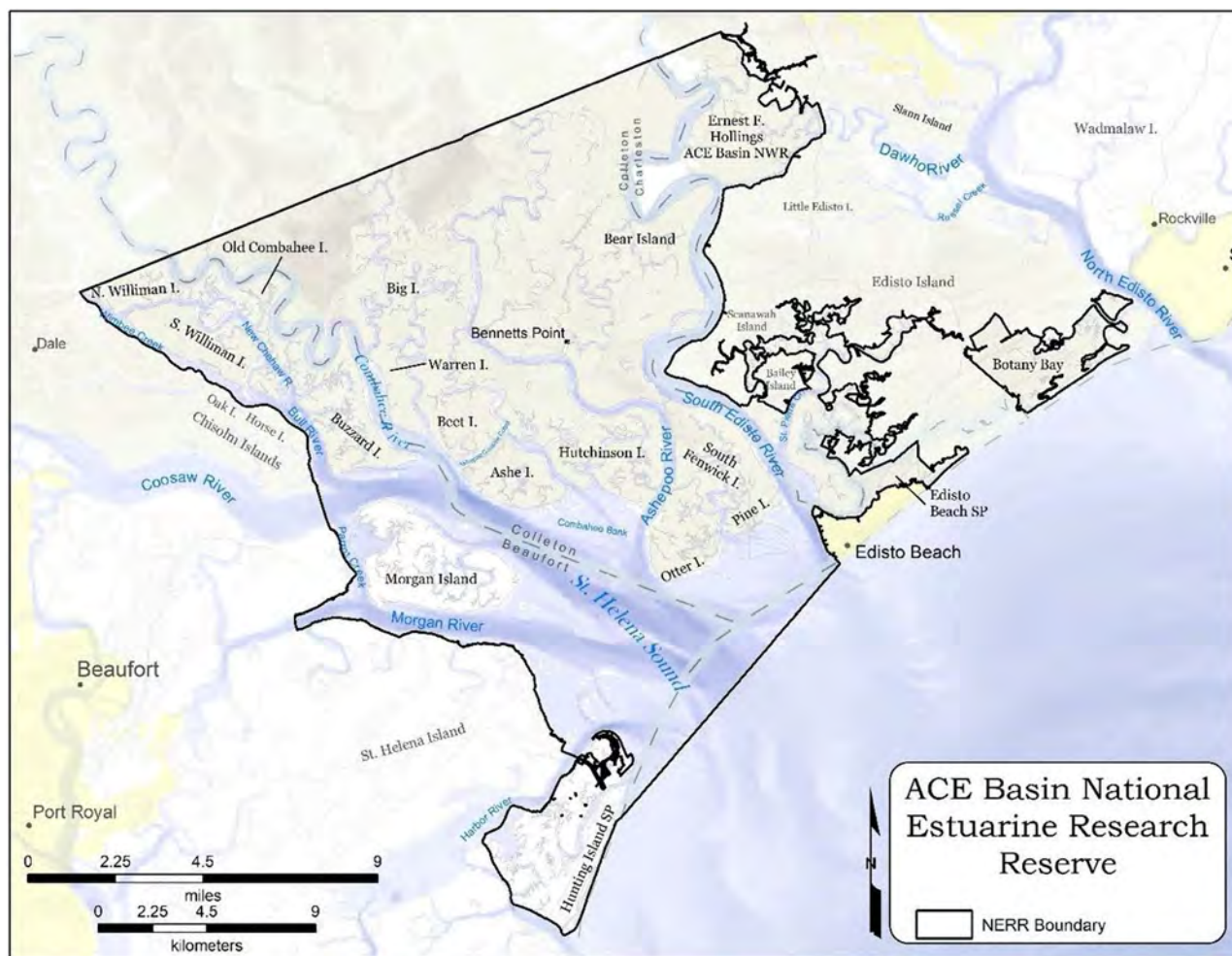


Figure 3. ACE Basin National Estuarine Research Reserve Boundary.

The [ACE Basin Characterization](#) (1999) provides a detailed site profile of the Basin, but the key habitats and species, geomorphology, hydrology, climate and weather, and water quality characteristics are described below.

Key Habitats and Species

The ACE Basin is relatively undeveloped and contains extensive salt and brackish marshes, maritime forest, upland pine, and bottomland hardwood forests. The ACE Basin contains some of the largest undeveloped estuarine wetlands on the East Coast. This diversity of habitats and microhabitats can support a diverse range of species, including many threatened and endangered species. These natural ecosystems also provide many important ecosystem services. For example, marshes trap and process nutrients and pollutants; and marshes, dunes, and maritime forests act as buffers during storms to dissipate wave energy and protect the coastline.

Salt marshes are highly productive systems and act as nursery habitats for several species in the ACE Basin. Decapods, such as the recreationally and commercially important blue crab and penaeid shrimp species, depend on marshes during their larval and juvenile stages for food and protection from predators. Salt and brackish marshes are also important habitats for fish, and many species use them to find prey and protect themselves from predators before moving into deeper habitats. Additionally, birds

use salt marshes for feeding and nesting and mammals such as the white-tailed deer use it for foraging. Oyster reefs are also important habitats and provide several services, such as food, protection, and the filtering of suspended particles from the water column. Impoundments, which are estuarine or freshwater wetlands that have been diked and are managed primarily for waterfowl, are also common throughout the ACE Basin and are habitat for several species. Waterfowl in impoundments primarily consists of geese, puddle ducks and diving ducks, however wading birds and shorebirds also utilize these habitats. Other species also rely heavily on impoundments. The lands within the ACE Basin Reserve support 14% of South Carolina's nesting bald eagles, and large pine forests situated near impoundments are ideal for nesting and foraging. The American alligator, once listed as threatened, also uses marsh impoundments as their preferred nesting habitat due to their abundant food resources and varied water depths.

The South Carolina Heritage Trust has identified 246 significant natural areas (as of the date the ACE Characterization was published) that have been recognized within the ACE Basin that contain either endangered or threatened species, outstanding remnants of an undisturbed plant community, or unusual or outstanding characteristics. One example is Otter Island, a barrier island that contains a variety of habitats including dunes, maritime forests, *Spartina* marshes and fresh to brackish ponds. There are several endangered and threatened species in the ACE Basin that are found regularly, seasonally, for part of their life cycle, or are thought to occur within its boundaries. The relatively undeveloped nature of the ACE Basin combined with low pollution levels and high habitat diversity makes this area an important refuge for endangered and threatened species.

Geomorphology

The geomorphology of the ACE Basin is the result of interactions between natural (i.e., fluctuations in sea level, erosion) and anthropogenic (i.e., agriculture, silviculture) processes. The ACE Basin is relatively flat or low-lying and characterized by barrier islands, marsh (hammock) islands, extensive salt marshes, intertidal areas, estuaries, and oyster reefs. It is located within the Atlantic Coastal Plain Physiographic Province where it is subjected to both terrestrial and marine processes. Much of the South Carolina's lower coastal plain topography is the result of changes in sea level during the Pleistocene to Holocene era, or the last 1.8 million years. Periods of submersion have resulted in the deposition of marine sediments while periods of glaciation resulted in fluvial processes controlling much of the deposition and erosion. This has created a unique mix of fluvial and marine sediments as well as a series of at least 8 plain/ridge sequences including the current shoreline. During the last glacial period, St. Helena Sound was formed as sea level rose and the land subsided, drowning the river valley.

Hydrology

The Ashepoo River, Combahee River, and Edisto River are the three main rivers that provide freshwater to the basin. All three of the ACE Basin rivers are tidally influenced, with the saltwater interface extending inland toward highway 17 during low flow conditions. The Edisto River is part of the Edisto River Basin and is one of the longest free flowing black-water rivers in the United States, originating in the upper coastal plain. The Edisto River joins with the Dawhoo River to form the South Edisto River, which accepts drainage from multiple creeks before draining into the Atlantic Ocean. Stream flow on the Edisto River is substantial and average daily stream flow (1938 – 2019) near Givhans, SC is 3,240 cubic feet per second (cfs, or 91.7 cubic meters per second, cms). The Ashepoo and Combahee rivers originate primarily in the lower coastal plain and are within the Salkehatchie River Basin. The Salkehatchie River joins with the Little Salkehatchie to form the Combahee River, which subsequently flows into the Coosaw River and St. Helena Sound. The Ashepoo River originates near Walterboro and accepts drainage from a number of creeks before flowing into St. Helena Sound. The nearest tide gauge in this

basin is on the Salkehatchie River which reported an average daily stream flow of 436 cfs (12.3 cms) from 1951 to 2019.

Six aquifer systems underlie the ACE Basin, with three being utilized by humans: the Tertiary sand, the Floridian, and the shallow aquifer. Groundwater is the primary human water source, and the aquifers are facing localized saltwater intrusion.

Climate and Weather

The ACE Basin's climate is influenced by latitude, the southern Appalachian Mountains, and the proximity of the Gulf Stream. Summers are hot and humid with maximum temperatures in July and August averaging approximately 90 °F (32 °C). Winters are relatively mild with average temperatures around 50 °F (10 °C), however there can be quite large interannual fluctuations. Precipitation ranges from 39 to 512 inches (100 - 130 cm), with most rainfall occurring in the summer months as thunderstorms or hurricanes. Precipitation during the winter months is mostly driven by mid-latitude cyclones bringing long periods of drizzle or steady rain.

Water Quality Conditions

Water quality in the ACE Basin is known to be relatively good in comparison to more developed watersheds. The ACE Basin NERR routinely measures water quality at six locations, which were sited to provide comparisons between developed and undeveloped sites as well as placed along a salinity gradient to better understand the impacts of drought and sea rise. At these sites, temperature, conductivity, salinity, dissolved oxygen (DO), pH, turbidity and depth are monitored continuously. Additionally, since 2002, nutrient concentrations have been analyzed once a month at four sites and monthly sampling is conducted at one site to analyze water quality parameters over a tidal cycle. This allows for long-term changes to be observed apart from the natural and temporal variability found in coastal systems.

Recent analysis of the ACE Basin water quality data from 2007 to 2018 has identified some notable trends. In general, salinity is decreasing at the three primary sites included in the analysis which coincides with an increasing trend in precipitation at the Bennett's Point weather station. With salinity decreasing, pH is also decreasing while turbidity is increasing. Dissolved oxygen concentrations are generally not changing, with most of the measurements within the fair to good range and only occasionally falling below the hypoxic threshold of 2 mg/L, particularly in the summer months and at the St. Pierre site, which is relatively shallow. Water temperature is only showing an increasing trend at one site (St. Pierre). The nutrient concentrations are variable, and no consistent pattern is observed across the three primary sites.

The ACE Basin Region

The Reserve serves the larger ACE Basin region in many ways including protection and conservation of invaluable habitats. These ecologically important attributes, coupled with management goals that balance conservation of natural resources with economic development and population growth, have made the ACE Basin region the focus of national attention. A number of organizations and local citizens have been instrumental in the conservation of the ACE Basin including the SCDNR, The Nature Conservancy (TNC), Ducks Unlimited (DU), Colleton County, and the U.S. Fish and Wildlife Service (USFWS). Through these and other organizations, over 300,000 acres of the upland and wetland habitats in the ACE Basin have been permanently protected by purchase and conservation easements.

Coastal South Carolina's population is growing rapidly, especially in its urban centers. To the north of the ACE Basin, the Charleston region's population is over 802,000 people and growing at twice the national average. To the South, the population of Beaufort County in 2021 was 191,748, a 17.8% increase from 2010 (U.S. Census). Land use change in these areas corresponds with these trends; the footprint of urban and residential development is increasing. However, land use in the ACE Basin and within the Reserve boundary itself has remained relatively constant over the last several decades, owing to the large percentage of land either publicly owned or held in conservation easement (Figure 3).

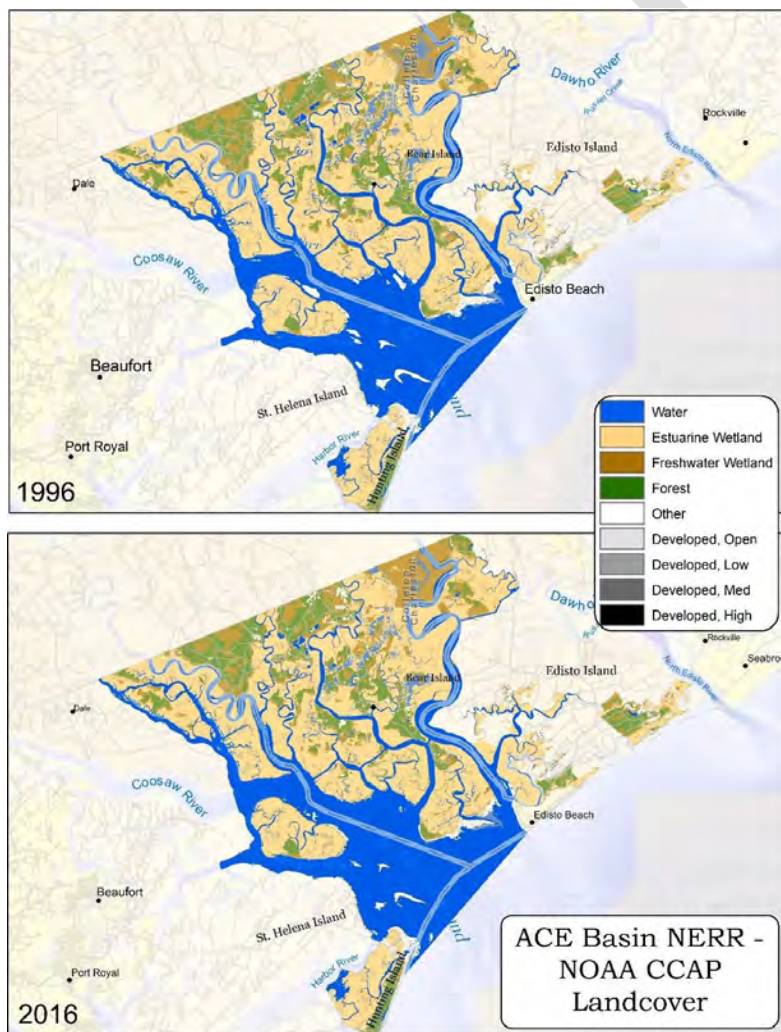


Figure 4. Land Cover within the Reserve Boundary from 1996 to 2016.

ACE Basin NERR Boundaries

The boundary for the ACE Basin NERR must include “an adequate portion of the land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation” (15 C.F.R., Part 921.11). These areas must be discrete enough to be effectively managed, but large enough to accommodate long-term research and monitoring. To help focus management efforts, ACE Basin NERR boundaries encompass two zones: key land and water areas (core area) and a buffer zone. The Reserve boundary includes significant lands protected by state, federal, and private entities (Figure 4).

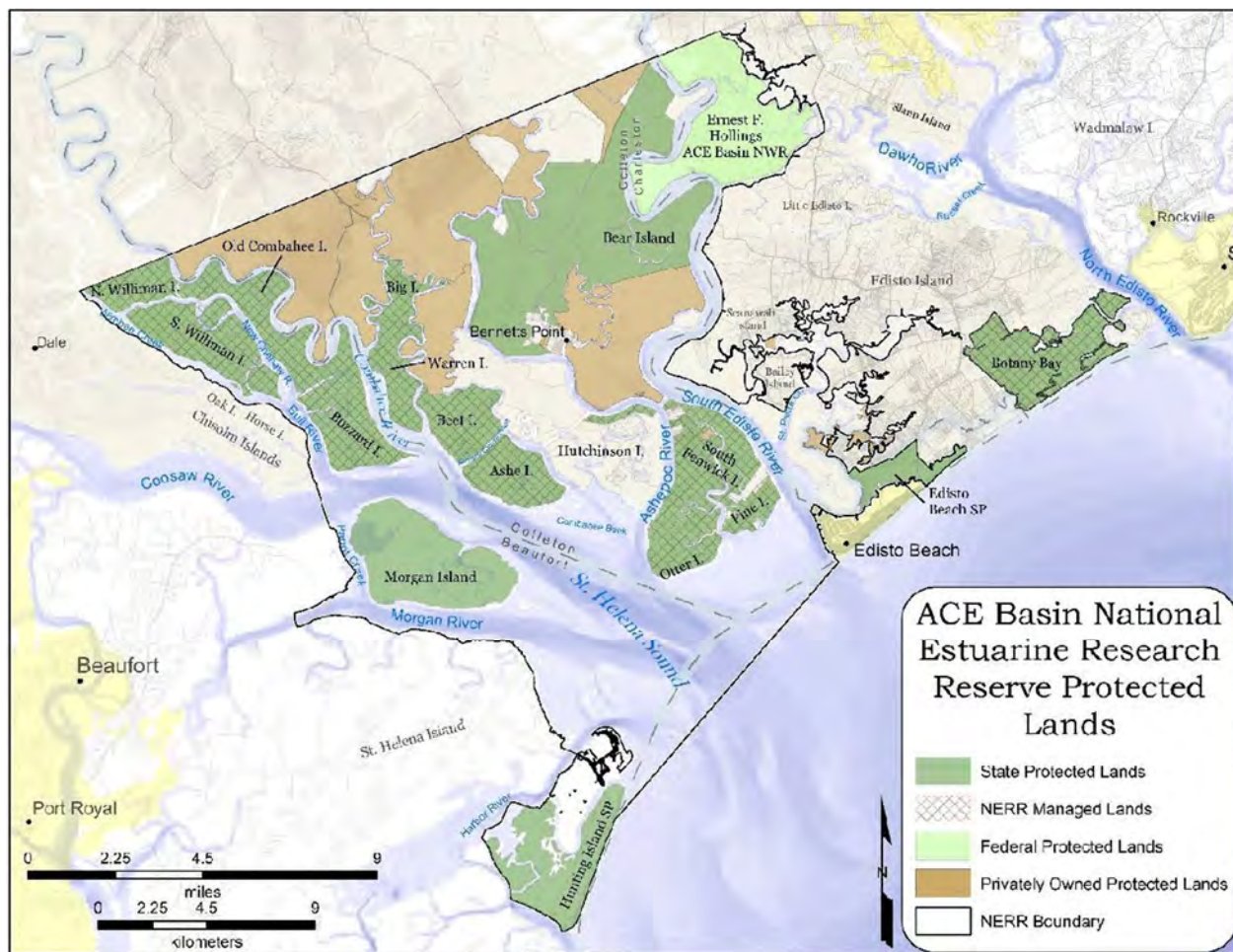


Figure 5. Protected Lands within the ACE Basin NERR boundary.

The core area of the ACE Basin NERR is a series of remote coastal islands in southeastern Colleton and northeastern Beaufort Counties (Figure 5), which are accessible only by water. These are Ashe, Beet, Big, Warren, South Williman, Buzzard, and Old Combahee Islands, and proposed South Hutchinson. The total core area currently encompasses 14,416 acres of highland and marsh, and the Reserve proposes adding 240 acres to core on South Hutchinson Island.

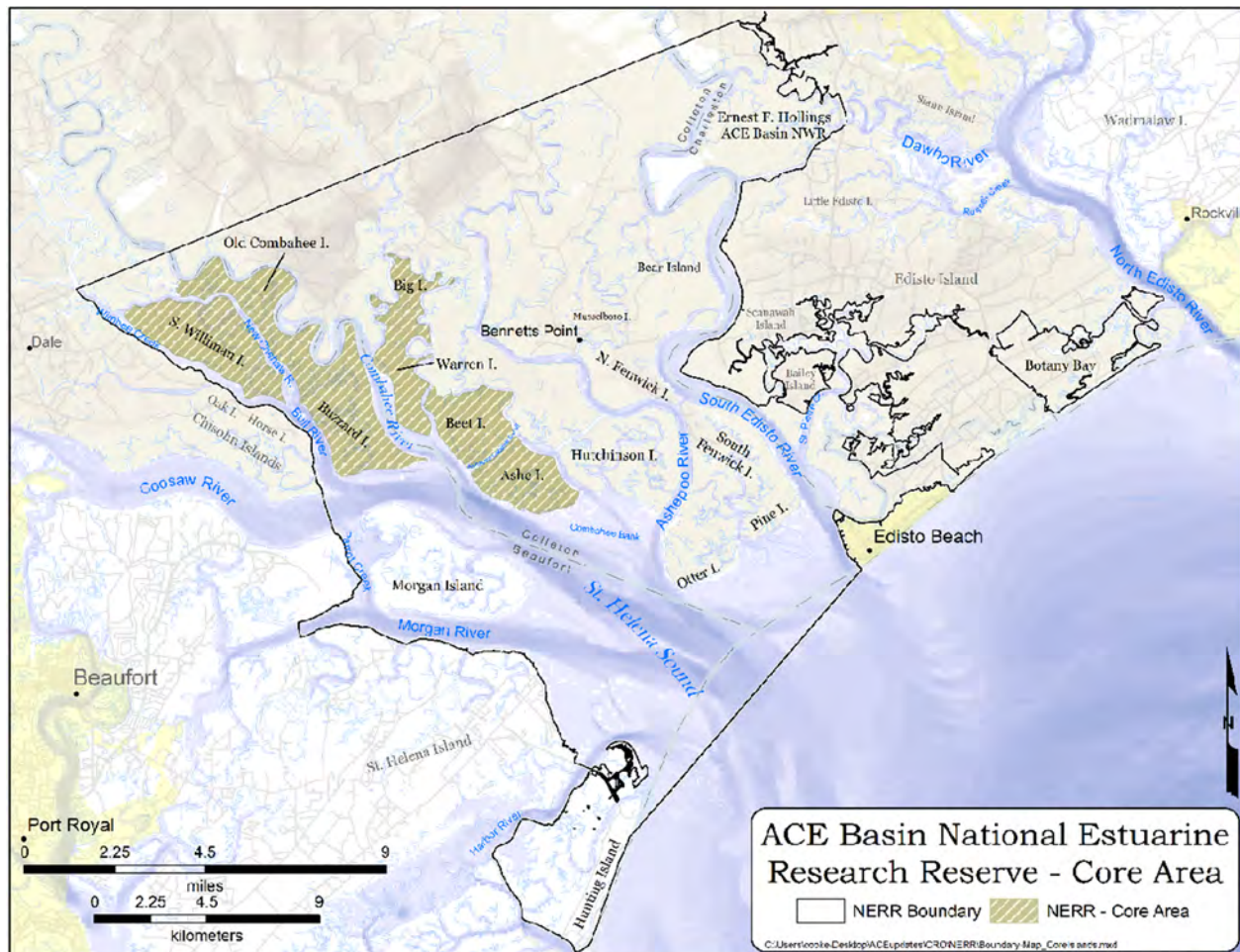


Figure 6. Core Islands of the ACE Basin NERR 2012.

In most cases the islands comprising the core of the Reserve consist of a complex including one to two significant pieces of upland interspersed with several marsh islands consisting of low Pleistocene beach ridge remnants surrounded by estuarine tidal marshes. The Ashepoo River bounds the core area to the east and north. Although Ashe Island faces south on St. Helena Sound, it does not have exposed beaches as do Otter and Pine Islands. Rock Creek separates North Hutchinson (not in the core area) from the Ashe-Beet-Warren-Big complex that lies in the central portion of the Reserve. The Ashepoo-Coosaw Cut separates North Hutchinson from South Hutchinson (proposed to be added to the core area). The Combahee River separates the Buzzard-Williman complex from the islands to the east. Morgan Island is delineated as the westernmost part of the Reserve by Coosaw River and is not in the core area, but rather the buffer zone. Uplands associated with Morgan Island are not in the Reserve.

Excavated portions of the Atlantic Intracoastal Waterway (AIWW) bisect Hutchinson Island and Fenwick Island and separate the marshes of Ashe Island to the south and Beet Island to the north. Beet Island is bounded to the west by the New Chehaw River and Rock Creek to the north and east. Warren and Big Island form the westernmost boundary of the core area. They are both located between the New and Old Chehaw rivers, Big to the north and Warren to the south.

The buffer is calculated at 106,839 acres, the Reserve proposes to add 400 acres of buffer on South Fenwick Island to the Reserve boundary. The buffer zone includes the NERR managed lands outside the core area as well as all state-owned land, open waters, and wetlands extending up to and including the critical area as defined in the South Carolina Coastal Management Act (Act 123 of the 1977 South

Carolina General Assembly). The buffer excludes privately owned uplands and wetlands and the uplands associated with Morgan Island. The seaward boundary of the buffer zone is marked by an artificial line, the International Regulations for Preventing Collisions at Sea (COLREGS) line, lying between the headlands of Edisto Beach and Hunting Island. The northeastern boundary includes the marshes of the South Edisto River draining the western side of Edisto Island and the following tidal stream systems: Big Bay Creek, St. Pierre Creek (Fishing, Store, and Bailey Creeks), North Creek and the portion of the Atlantic Intracoastal Waterway (AIWW) connecting the Dawhoo River to the South Edisto. All of Jehossee Island and further north along the South Edisto to the abandoned Seaboard Coastline Railroad (SCR) forms the northeast corner.

The alignment of the abandoned SCR, running approximately in a southwestern direction, is a persistent dominant feature, and serves as the northern boundary up to the crossing at Wimbee Creek on the eastern Chisolm Island shoreline. The zone includes the entire width of the Combahee River floodplain, with Wimbee Creek as the westernmost boundary. Downstream of the former railroad alignment, the western boundary follows Wimbee Creek (including the Williman Islands) into Bull River and across the lower Coosaw River into Morgan River.

The boundary then follows Morgan River out into St. Helena Sound across the mouth of Jenkins, Village, and Coffin Creeks, and then southeastward along the shore of St. Helena Island to Harbor River. The boundary crosses Harbor River at the U.S. Highway 21 bridge to Harbor Island, including all the marshes, but excluding the upland now held in private ownership. The boundary then continues southeast across Johnson Creek, again following U.S. Highway 21, and onto Hunting Island. There, the entire area of marsh and upland owned by the State of South Carolina and managed by the SC Department of Parks, Recreation, and Tourism (SCPRT) is included. The southern terminus of the COLREGS line ends at Hunting Island, thus closing the boundary of the buffer zone.

At the easternmost point of the buffer zone, on Edisto Island, the marsh and upland similarly owned by the state and managed by SCPRT as Edisto Beach State Park is also included as are all wetlands and critical areas up to Highway 174. With the management plan update in 2011, the non-contiguous parcel, Botany Bay Plantation, was added to the buffer area. The parcel is to the east of Hwy 174 adjacent to the waters of the Atlantic Ocean in the northeastern corner of Edisto Island in lower Charleston County. The area lies near the North Edisto River just south of Seabrook Island and just north of Edisto Beach.

Since the last management plan, the state has acquired 12 privately-owned parcels and would like them to be incorporated within the Reserve's boundary, which would increase the acreage of land managed as part of the Reserve by 640 acres (Figure 7). These parcels were privately-owned 'in-holdings' excluded from the Reserve's boundary. Since the last management plan, the State has acquired these parcels and is now proposing to add them to the Reserve's boundary. Protecting these parcels removes the threat of development, has preserved the integrity of the ecosystem and protected water quality from potential impacts from sediment, stormwater runoff, and fecal coliform. The Hanahan Tract on South Hutchinson Island consists of 228 acres of marsh and a 12 acre small hammock island with maritime forest habitat and a small, isolated freshwater wetland used as a refuge for amphibians and migratory birds, including many priority species. Once added to the Reserve, it will become part of the Reserve's core area. The property has been used in the past for recreational enjoyment of natural resources, such as hunting and fishing, as cultural activities, and will be managed for wildlife habitat and allow continued cultural recreational enjoyment of natural resources that do not disrupt the natural integrity of the site or interfere with research and educational activities. It will also provide space for salt marsh to migrate landward and adapt as water levels rise.

The property on South Fenwick Island adds to the growing percentage of the island under conservation and provides recreational opportunities, such as hiking, wildlife viewing, and hunting, to visitors on the island. The area's maritime forest ranked highly because of its relatively large patch size and isolation from roads. The estuarine waters, particularly toward the Southeastern part of the tract, ranked highly because of the relatively good condition of their water quality, sediment quality, and benthic quality. It was a Sea Island cotton plantation pre-civil war, transitioning to cattle grazing and row crop farming by a community of formerly enslaved people post-civil war into the 1970s. Most recently the island was used as a hunting retreat and consists of open fields and pine forests. The desired future condition of the island is the maintenance and improvement of upland wildlife habitats through use of accepted natural resource management techniques.

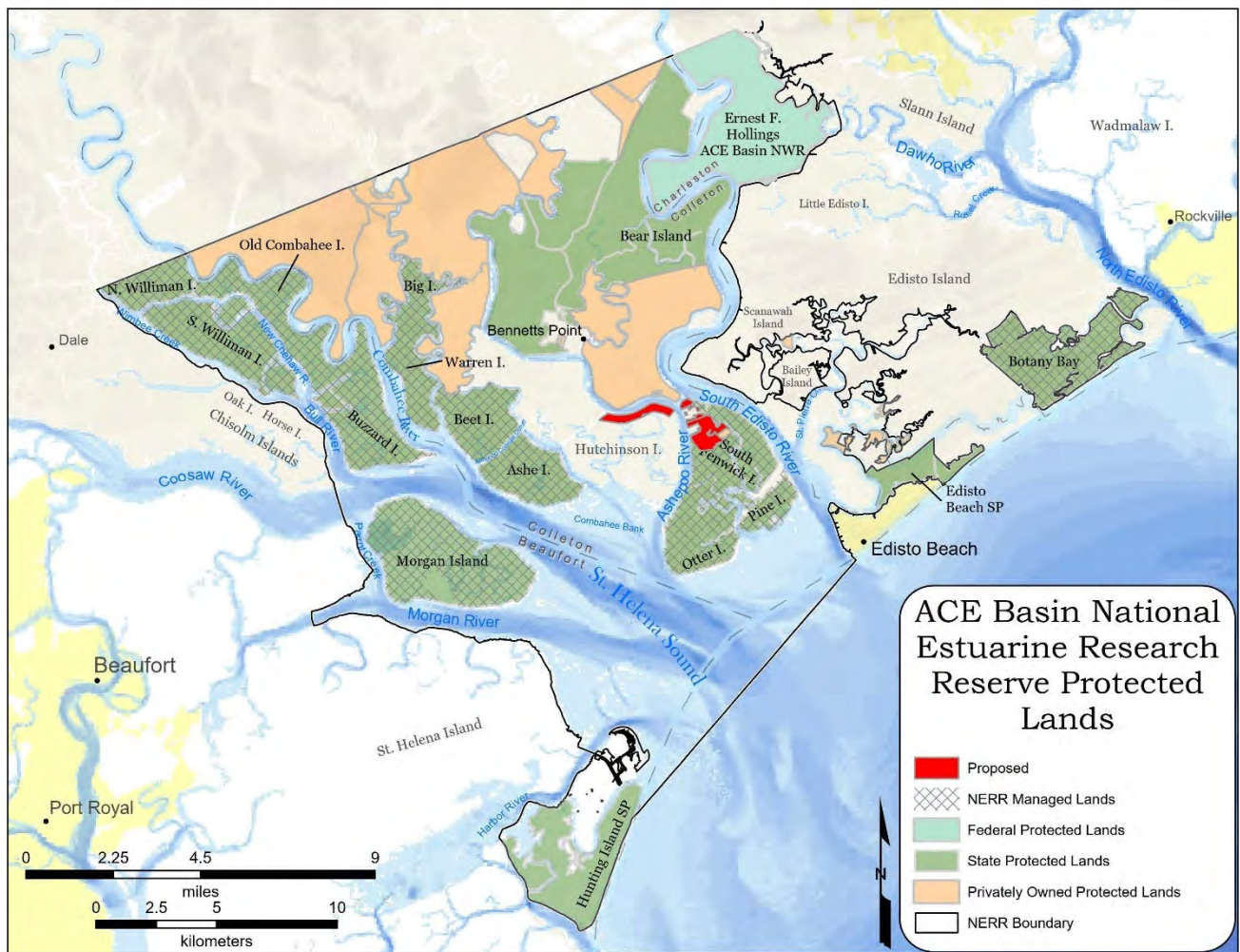


Figure 7. Location of acquired properties on South Hutchinson Island and South Fenwick Island for proposed addition within the ACE Basin Reserve boundary.

ACE Basin NERR Strategic Plan



Figure 8. Aerial view of Donnelley Wildlife Management Area.

Our vision for the ACE Basin NERR program is to be recognized as a leader in maintaining healthy estuaries and enhancing quality-of-life for coastal communities.

Our mission is to sustain the ecological health of estuaries entrusted to our care and provide natural areas for research, education, stewardship, and compatible human uses.

Priority Management Issues

- Water quality;
- Habitat conservation;
- Public access; and
- Coastal resilience.

The identification of these issues strengthens the alignment of the ACE Basin NERR with the NERRS strategic goals and addresses stakeholder as well as Reserve needs. The issues identified are emblematic of those facing coastal South Carolina more generally, and progress made by the Reserve may translate directly to wider benefits for the region.

There are a number of threats and stressors impacting not only the ACE Basin NERR, but the South Carolina coast as a whole. For example, coastal growth and development practices impact habitats and water quality. Increasing coastal population and tourism presents challenges in balancing nature-based recreation with resource protection. Environmental factors impact coastal communities, both ecological and

built, in a variety of ways: changing weather patterns result in longer or more intense periods of drought, a longer growing season which can encourage invasive species and disease. Rainstorms become more intense, increasing localized flooding. Sea rise results in flooding, eroding beaches and estuarine shorelines, saltwater intrusion into groundwater, habitat migration and the loss of marshes where they are unable to migrate due to built infrastructure.

The priority issue areas draw on the strengths of the ACE Basin Reserve and the NERRs to address these threats and stressors through focused programming. These priorities were informed by the current work, concerns, and needs of Reserve staff, partners, and key stakeholders. They were identified through formal and informal censuses of Reserve and partner agency staff, key community representatives, professional managers, and community leaders.

The Reserve recognizes that management issues are not static and therefore reserves the flexibility to respond to emerging threats as needed. In prioritizing issues, the Reserve may consider community attitudes, temporal and spatial extent of the issue, urgency of the issue, political feasibility of addressing the issue; practicality of addressing the issue in the community context; and availability of resources including fiscal, personnel, and equipment.

The Reserve's four priority issues are described in more detail below. Each issue is addressed through Reserve programming in an integrated fashion. Therefore, each issue is connected to actions within the strategic plan.

Water Quality

The quality of the water in the ACE Basin NERR is the foundation of a healthy aquatic ecosystem. A wide range of activities can impact water quality including coastal development, agriculture, impoundments, sea rise, and changes in weather patterns. Maintaining and improving water quality begins with understanding its condition over a long period of time. Through the NERR System-wide Monitoring Program (SWMP), the Reserve monitors water quality conditions within the Reserve and gains perspective on changes over time. The ACE Basin NERR currently measures water quality at four primary and two secondary sites. Two sites have been monitored continuously since 1995 and two sites since 2002, which allows for long-term changes to be observed apart from the natural and temporal variability found in these coastal systems. The two new secondary sites, installed in 2015, were intended to provide coverage of the South Edisto River to capture the full salinity gradient.

The ACE Basin Reserve is well positioned to bring the best available science to bear in understanding water quality because of its programmatic positioning within the Marine Resources Division of SCDNR. Staff have a close relationship with the Marine Resources Research Institute (MRRI), the research arm of the Division. MRRI is home to over 30 doctoral and master's level staff actively engaged in providing the information necessary to understand and effectively manage South Carolina's marine resources. Additionally, many Reserve staff are stationed at the Fort Johnson complex in Charleston, facilitating access to researchers not only at the MRRI, but also at the College of Charleston and NOAA's Hollings Marine Laboratory with a wide range of expertise including water quality. Reserve staff work closely with the SC Department Environmental Services' Bureau of Coastal Management (SCDES-BCM), which has regulatory authority over water quality issues and may provide valuable information from their monitoring networks.

In addition to understanding the water quality conditions, the Reserve works to positively impact the water quality itself on several fronts. Reserve staff integrate water quality concepts and Reserve research into programming to improve understanding and awareness among several audience groups. The Education Sector works with K-12 and college students, teachers, visitors, and residents of the

southern coastal counties of South Carolina to promote actions that increase water quality in the ACE Basin region. During school programs and teacher professional development, educators use the System-wide Monitoring Program (SWMP) data to understand water quality parameters, and data analysis and interpretation concepts. During public programs, educators promote the SWMP mobile site so adults can access the data on their mobile phone. During all programs, actions that individuals can take in their community to increase water quality are discussed and encouraged. Multiple stewardship activities such as salt marsh restoration are coordinated with school and public groups within and around the Reserve to promote improved water quality.

The Training and Engagement (T&E) Program (formerly Coastal Training Program CTP) connects decision-makers with water quality information particularly in the context of stormwater. For example, T&E works with the Clemson University Extension Service and other stormwater education consortium partners to develop and deliver the Healthy Pond Series, a discussion group for stormwater pond owners in the Charleston and Beaufort areas. In addition to this effort, T&E helps organize bi-annual stormwater pond management conferences for pond owners and managers in both regions. Recently, real estate professionals emerged as a key audience for stormwater education, and T&E, along with South Carolina Coastal Information Network and local real estate associations, partnered to create four stormwater-related continuing education courses for real estate agents.

The Stewardship sector provides educational programming to residents and visitors that build awareness about water quality issues and provide actionable solutions. Stewardship staff educates public groups about the SWMP sites within the Reserve, teaches undergraduate and graduate level students how to use the Centralized Data Management Office (CDMO), and encourages visiting researchers to utilize this resource. The Stewardship sector also provides opportunities for residents of the ACE Basin and its surrounding areas to participate in projects and events, such as citizen science or restoration, that enhance water quality. In doing so, it encourages individuals to bring these changes into their homes, communities, and organizations. To address water quality needs more efficiently, Stewardship focuses on specific audiences to overcome barriers and provide technical assistance. Overall, these actions foster a commitment to water quality protection within the ACE Basin community and increases the capacity of Reserve staff by limiting the need for resource management.

Habitat Conservation

High-quality habitat is the cornerstone of an ecologically sound ACE Basin and forms the foundation of quality of life for humans in the region. As discussed above, the ACE Basin is one of the largest undeveloped estuaries on the East coast and boasts a variety of important habitats that support diverse species and ecosystem services. The Reserve is committed to protecting and enhancing habitat for key species and to maintaining and improving ecosystem function. The focus on habitat conservation was also affirmed and supported by the South Carolina Department of Natural Resources Board, which in 1999 unanimously adopted a resolution establishing habitat conservation as the agency's highest priority.

Since its designation in 1992, the Reserve has participated actively in the ACE Basin Task Force, a coalition of conservation-minded entities and individuals from the private, government, and non-profit sectors. The group is dedicated to the long-term stewardship of the ACE Basin and to this date its efforts have protected over 300,000 acres of land through various mechanisms including conservation easements and in-fee acquisition for public open space.

As many of the large, highly significant tracts of land have come under conservation status, the Reserve's attention has turned towards habitat management and stewardship. The St. Helena Sound

Heritage Preserve/Wildlife Management Area (HP/WMA), including Ashe, Beet, Big, Warren, and South Williman Islands and their surrounding marshes, was established when the Reserve was introduced in 1992. Subsequently, the State acquired Otter Island and parts of Pine Island to include within this HP/WMA. The original St. Helena Sound islands represents the core of the ACE Basin and is essential for stewardship efforts. Otter Island is one of only four beachfronts in the Reserve boundary and provides critical habitat for spawning horseshoe crabs, nesting sea turtles, and nesting shorebirds, such as Red Knots and Piping Plovers. Consequently, it also plays a major role in outreach efforts, such as beach cleanups and horseshoe crab tagging events.

In 2017, the State acquired properties on South Fenwick Island, facilitated by a partnership with The Nature Conservancy and funded through the USFWS National Coastal Wetlands Grant Program, The South Carolina Conservation Bank, and the North American Wetlands Conservation Act. Since then, South Fenwick Island WMA has been one of the focus areas for resource management efforts. Education programs are held on site to teach land conservation, highlight partnerships, and promote safe and responsible recreational uses, such as primitive camping and archery hunting. South Fenwick Island is also a site for several public stewardship efforts, such as living shorelines, semi-annual bird counts, and wood duck boxes built through a partnership with the Boy Scouts of America.

Stewardship staff work to protect, maintain, and enhance the natural and cultural resources in the St. Helena Sound HP/WMA and South Fenwick Island WMA using best management practices specified in their property management plans. The main habitat management methods used are prescribed burning, native plant cultivation, and invasive species removal. These activities are coordinated with state partners and other habitat management experts in the region to determine the most effective approaches. Restoration efforts within the Reserve have focused on salt marsh restoration such as oyster reef and marsh grass installations. These activities are implemented by partners in SCDNR's Shellfish Research Section and SC Oyster Recycling and Enhancement program. They have decades of experience and success in site selection, and installation methods for living shorelines.

Public Access

The Reserve's abundant natural resources and strategic location within the heart of the ACE Basin make it a signature destination for those seeking a high-quality outdoor experience in South Carolina. As we strive to maintain and enhance the condition of the ecosystem through management, we must also facilitate the public's access to those resources. The Reserve strives to provide high-quality nature-based recreation that is compatible with the ecosystem protection essential to the success of the Reserve.

The Reserve provides many opportunities for recreation including hunting, fishing, boating, hiking, birdwatching, camping, and numerous other forms of passive recreation. Hunting and fishing are considered "traditional uses" and represent a hallmark of the partnership embodied in the ACE Basin Task Force, the primary engine of conservation in the ACE Basin. Together passive recreation and traditional uses form a rich mix of opportunities for visitors.

With coastal population and tourism increasing, demands for recreational opportunities within the Reserve have also increased over the last several years. Within the ACE Basin, visitation is increasing to many properties, particularly those that are more accessible to population centers and those with beachfront access. For instance, Botany Bay Plantation HP/WMA at the northern end of the Reserve sees over 70,000 visitors a year, by far the most visited WMA in the SCDNR system due to its beachfront access and proximity to the vacation destination of Edisto Beach. Although data on the level and type of visitation at the Botany Bay location exists, use at other Reserve properties is more difficult to quantify. There are generally no designated access points. Users can enter the Reserve by water at any public or

private entry point or may visit land-based destinations through a variety of road networks. To effectively address the needs of both the ecosystem and the human community, a study is being conducted by a Margaret A Davison Fellow to characterize visitor use and understand its potential to impact key natural resources within the reserve. This study works to provide baseline data on 1) visitor use, attitudes, and perceptions of impacts, 2) indicators and thresholds for the visitor experiences, 3) visitor attitudes towards management alternatives, and 4) recreation-related impacts to key resources at sites of concern, and 5) visitor use levels, demographics, and distributions throughout the ACE Basin and how they overlap with key environmental areas and processes. After this baseline is determined, staff will work to set goals for increasing the number of visitors to the reserve. Through this and other initiatives with our state partner, such as Human Dimensions work and the USFWS Civil Right Review Evaluation Plan, we will determine gaps in visitor participation and work towards solutions.

Similarly, in addition to increasing visitor use, constituent interests in various forms of recreation may evolve over time. The Reserve must be proactive in seeking to understand new uses as they develop and using the mechanisms available to ensure that resource use and protection are balanced. In the past few years, staff have worked to build relationships with community organizations from many different backgrounds to facilitate a welcoming environment in the reserve for all.

The Reserve exists within a network of recreation providers including TNC, Charleston County Parks, and SC State Parks, Recreation, and Tourism (SCPRT) who provide opportunities for outdoor recreation related to the ACE Basin. Additionally, the Reserve has begun to pursue relationships with and training for ecotour operators who provide opportunities both within and outside the ACE Basin. The Reserve will continue to seek innovative partnerships with these entities and other outdoor accessibility organizations to address recreational needs without compromising the vision for the ACE Basin.

Coastal Resilience

The ACE Basin NERR and the coast of South Carolina more generally are facing threats due to changing environmental conditions including sea rise, flooding, storm surge, shoreline erosion, and changing weather and storm patterns. The impact of these acute and long-term hazards is compounded by coastal development as the population increases and natural resources are degraded. The ACE Basin NERR strives to have an impact on the resilience of both built and natural communities.

A resilient built community understands the potential impacts of these hazards and prepares themselves to respond with timely and comprehensive management strategies. This affords communities the ability to recover after events as well as adapt and plan for future conditions. The Reserve seeks to assist communities in becoming more resilient to hazards and environmental change by strengthening the understanding of and appreciation for the coastal environment and helping local governments and partners plan for future events. The Reserve also increases awareness and understanding of environmental change and coastal hazards, their impacts on the community and ecosystems, and how protection of natural areas helps decrease vulnerability to natural hazards. Through existing partnerships, the Reserve provides access to information and tools designed to help communities identify critical linkages and understand how decisions impact their community and environment.

A resilient natural community is one that has the ability to recover from a disturbance. The Reserve fosters natural community resilience by maintaining and enhancing the ecological diversity of the ACE Basin. The Reserve coordinates with partners to ensure that adequate land is protected to mitigate the impacts of sea rise and migration of ecological communities. Protected land also ensures habitat availability even as land use change over time and serves as a buffer to protect built communities. In particular, the fate of our extensive salt marshes under sea rise is becoming an important

consideration for coastal communities and for the Reserve. The Reserve's Wetlands and Water Levels (WWL) Site at Edisto Island is helping to collect information to better understand marsh health in relation to sea rise and changing weather patterns. The reserve also participates in multiple local and regional initiatives, such as the South Atlantic Salt Marsh Initiative, aimed at conserving, protecting, and restoring salt marshes and coastal spaces in the southeastern United States.

Goals, Objectives, and Strategies

The goals, objectives, and strategies outlined below will guide and support the Reserve in its efforts over the next five years to improve coastal management, advance estuarine research, and educate current and future generations of coastal stewards. This plan is intended to provide broad guidance to the Reserve. Details of implementation can be found in the annual work plan.

Goal 1. Enable South Carolina's communities, residents, and visitors to protect coastal resources.

Objective 1. South Carolina residents and visitors understand the value of coastal and estuarine ecosystems and take actions to protect them.

- Encourage a stewardship ethic by providing educational and experiential activities for different audiences at Reserve and partner sites.
- Encourage program participants to make a commitment to protect their coastal areas and resources by providing actionable stewardship practices.
- Deliver science-based, timely, audience-driven information to support the public in understanding, appreciating, and protecting resources.
- Maintain and develop relationships with stewardship partners and resource users to facilitate dialogue between stakeholders and researchers.
- Inventory, evaluate, and update existing publications and resources to increase public knowledge and skills to protect coastal ecosystems.

Objective 2. Volunteers contribute to outreach and community science.

- Recruit and train a set of volunteers to participate in outreach, stewardship, and research activities.
- Enhance volunteers' knowledge and skills by providing hands-on educational experiences about coastal issues.

Objective 3. Coastal decision-makers have the locally relevant, science-based knowledge, skills, and training required to protect coastal resources.

- Conduct formal and informal audience information and training needs assessments.
- Coordinate a minimum of five trainings annually for decision-makers in collaboration with program partners based on audience needs.
- Ensure that information incorporated into training and resources is science-based and locally relevant.
- Maintain and enhance many partnerships for program development and implementation.
- Serve as a resource for information, providing connections between decision makers and local experts and agencies.

Objective 4. Coastal decision-makers and partners have access to technical assistance to address priority areas that align with the NERR management plan.

- Engage decision-makers in collaborative science to address research needs.
- Establish new and maintain existing partnerships with local communities to understand their technical assistance needs.
- Equitably provide technical assistance to communities and partners relating to issues that align with ACE Basin NERR priorities.
- Facilitate coordination among stakeholder groups to promote more informed decision making.

Objective 5. Teachers improve their scientific literacy including basic estuary principles.

- Focus educator training on science concepts that align with Reserve priority issues and provide resources that facilitate teaching these concepts.
- Provide teachers with the knowledge and resources to use NERRS and NOAA research and monitoring in promoting the health of estuaries.
- Ensure that Teachers on the Estuary (TOTE) workshops adhere to National TOTE Criteria and Teacher Professional Development Best Practices as indicated by current research.
- Incorporate SWMP data, relevant research, and science investigation techniques into workshops to increase teachers' confidence in collecting and analyzing data with their students.
- Maintain and enhance partnerships for training development and implementation such as County School Districts, schools, and other local partners.
- Incorporate Reserve stewardship messages and activities into workshops and resources to ensure teachers have the knowledge, skills, and appreciation to act as stewards of our estuaries, and help their students do the same.
- Provide technical assistance to teachers in local schools to increase their confidence teaching science concepts and research skills.

Objective 6. Foster students' appreciation of estuaries and improve their scientific literacy.

- Provide experiential education programs for K-college students that increase their knowledge of coastal habitats and issues.
- Ensure that student programs are aligned to SC state standards and follow pedagogical best practices as well as recommendations from the K-12 Estuary Education Program (KEEP) Overview, Market analysis, Needs Assessment, Teacher Advisory Committee, and evaluations.
- Provide job shadow and volunteering opportunities for middle school and high school students in Title 1 schools to encourage a future workforce.
- Provide educational products that increase students' knowledge and skills to understand estuarine concepts and research techniques.
- Provide educational stewardship activities to schools that involve students in improving water quality, resilience, and habitat conservation, and help them understand their role as stewards of our estuaries.

Goal 2. Advance knowledge about coastal and estuarine ecosystems through research and monitoring.

Objective 1. Conduct monitoring within the Reserve and associated watersheds to improve understanding of coastal ecosystems and human influences on them.

- Fully participate in the NERR System Wide Monitoring Program (SWMP) through the collection of water quality and meteorological data.
- Continue implementation of Edisto Island Wetlands and Water Levels (WWL) site as part of the WWL Plan.
- Analyze and synthesize Reserve SWMP and WWL Site monitoring data to evaluate significant trends over time related to weather, climate, and human alterations.
- Implement future NERR system monitoring modules and participate in regional and national projects, as appropriate.

Objective 2. Broaden the Reserve's research portfolio by encouraging and enabling non-SWMP research activities.

- Facilitate access to the Reserve for research by providing a field station and logistical support to visiting scientists.
- Track research projects submitted by researchers to better understand the findings and outcomes of each project.
- Participate in local, regional, and national science networks and partnerships to understand current research.
- Seek funding and partnerships to meet the research needs of the Reserve and coastal stakeholders.

Objective 3. Provide research and monitoring information to target audiences to address relevant coastal issues.

- Provide open public access to high quality monitoring data through the Centralized Data Management Office website.
- Collaborate with ACE Basin T&E, Education, and Stewardship programs to help integrate research and monitoring into sector programming.
- Collaborate with Reserve sectors to develop effective research-related communication products.
- Communicate Reserve research and monitoring through participation in local, regional, and national meetings to ensure relevant researchers and outreach providers have access to science-based information.

Objective 4. Conduct research collaboratively to address resource management issues.

- Understand the research needs of coastal stakeholders.
- Collaborate with coastal managers to conduct research that addresses research priorities and the NERR priority issue areas.
- Provide advisory services to research and management communities, such as by serving on graduate student committees and technical advisory committees.

Goal 3. Apply science and stewardship to balance long-term protection of the ACE Basin's natural and cultural resources with enjoyment by current and future generations.

Objective 1. Protect the coastal and estuarine ecosystems that are under the Reserve's management.

- Monitor general site condition of Reserve-managed lands.
- Manage Reserve lands principally for the benefit of native wildlife and compatible public uses.

- Respond to events of concern by coordinating with law enforcement, state and federal agencies, and other partners.
- Support land protection initiatives throughout the ACE Basin watershed.
- Support efforts to assess and update recreational use and land management regulations and policies to ensure that the Reserve's interests are upheld.

Objective 2. Manage ACE Basin lands to promote high quality habitats.

- Develop proactive management strategies and participate in partner-based protection and initiatives.
- Conduct and facilitate resource inventories on Reserve-managed lands.
- Participate in partner-led efforts to monitor, inventory, and manage species of concern.
- Support partners to and lead efforts to identify, monitor, and manage for invasive species.
- Implement and support partners in the implementation of habitat restoration and improvement.

Objective 3. Work to improve understanding of human use and activities on Reserve properties.

- Assess human use and activities on Reserve managed lands.
- Maintain visitor use permits for day-use, camping, and hunting.
- Develop an understanding of use on remote properties with multiple points of access.
- Build and maintain partnerships with ecotour and other commercial outfitters who facilitate nature-based recreation within the Reserve.

Objective 4. Facilitate uses that are appropriate and compatible with Reserve objectives.

- Provide public access for uses that are appropriate and compatible with Reserve and state partner-managed lands.
- Promote traditional resource uses (i.e. hunting, fishing, and non-consumptive resource use).
- Facilitate public access by providing access points, signage, trails, and information to guide visitors.
- Provide information to user groups to promote safe, appropriate, and minimally impactful use of Reserve sites.

Goal 4. Enhance the capacity of the Reserve to contribute to the ACE Basin community, SCDNR, and the NERRS through effective operations and communication.

Objective 1. Coordinate and collaborate to advance common goals of the ACE Basin NERR and partners.

- Participate fully in partner coordination networks (i.e. ACE Basin Task Force, the South Carolina Coastal Information Network, SC Marine Educators Association, etc).
- Participate in initiatives of common interest with partners.
- Provide high quality facilities, equipment, and services for partners.

Objective 2. Reinforce programmatic connections between the Reserve and NOAA OCM as well as other Reserves.

- Coordinators attend the NERR Annual meeting as well as sector meetings.
- Staff serve on Reserve-level and sector-level committees as appropriate.
- Appropriate staff participate in NERR/NOAA regional meetings.
- Communicate with site liaison to develop annual cooperative agreements and performance reports.

Objective 3. Constituents and partners recognize staff as leaders in their programmatic area.

- Provide staff opportunities to maintain current skills and develop new knowledge and skills that support their role.
- Staff participate in core required trainings each year as well as strive to participate in a minimum of two additional trainings per year appropriate to their role and responsibilities.
- Encourage staff to participate in local, regional, state, and national workgroups and committees.
- Promote Reserve programs and expertise through participation in local, regional, and national conferences.

Objective 4. Provide the administrative structure needed to fulfill the Reserve's mission.

- Ensure adequate funding and staffing to accomplish the full range of responsibilities of the NERR program.
- Provide an administrative structure that encourages sector integration.
- Use a collaborative process to make decisions about Reserve strategies and direction.
- Ensure a safe work environment by providing staff and volunteers with workplace safety procedures, training, and equipment.

Research and Monitoring Program



Figure 9. Reserve employees checking on a Wetlands and Water Levels Site.

National Estuarine Research Reserves are created to provide a stable platform for long-term research on estuarine conditions and relevant coastal management issues. The national System- Wide Monitoring Program (SWMP) delivers standardized measurements of short-term variability and long-term changes in water quality and biological systems, and maps land use and land cover characteristics across all reserves. The effort is focused on three ecosystem characteristics: abiotic characteristics (water temperature, salinity and quality, and weather); biotic characteristics (habitat types and species); and watershed and land use characteristics (land cover and elevation changes). Reserve-generated data meet federal geographical data standards and are available via the Reserve System's Centralized Data Management Office. Reserves also serve as sentinel sites for observing how coastal habitats respond to changing water levels. This program is guided by the [reserves' System-wide Monitoring Program Plan](#), the [Reserve Habitat Mapping and Change Plan](#), and guidance for monitoring [Coastal Habitat Response to Changing Water Levels](#).

The Reserve System also supports applied research through its Science Collaborative program and the Margaret A. Davidson Graduate Fellowship program. The Science Collaborative funds competitive research projects that engage end-users in the project design and address system- wide NERRS research and management needs. The goal of the Davidson Fellowship is to build the next generation of leaders in estuarine science and coastal management. The fellowship provides opportunities for graduate students to conduct research within a reserve under the guidance of a mentor who also supports their professional development.

The *Reserve System Strategic Plan* outlines research objectives to maintain and expand biophysical and socioeconomic monitoring to track environmental change, increase the use of collaborative research to

address decision-maker needs, and ensure that scientific, education, and management audiences can use the data, research results, and tools developed by the system.

Program Context

The Reserve System provides a mechanism for addressing scientific and technical aspects of coastal management problems through a comprehensive, interdisciplinary, and coordinated approach. Research and monitoring programs form the foundation of this approach. Reserve research and monitoring activities are guided by the *2017-2022 Reserve System Strategic Plan* which identifies goals, priorities, and implementation strategies. Research efforts in combination with the education and outreach programs, will help ensure the availability of scientific information that has long-term, system-wide consistency. Guidance provided from Training, Stewardship, and Education sectors will help ensure collection and translation of data most relevant to the needs of audiences served by the Reserve.

The ACE Basin provides a benchmark to compare against coastal areas where significant human disturbances are occurring. The core area is well protected and serves as an undisturbed baseline monitoring area while the buffer zone is large and diverse enough to support a wider range of research activities. The Research sector focuses on three of the four priority management issues of the ACE Basin NERR including water quality, habitat conservation, and coastal resilience. In addition, the Reserve has a prominent role in protecting the resources found within the ACE Basin NERR through the activities of the Research sector. The Research sector leads activities that advance understanding of the short-term variability and long-term change in coastal ecosystems by conducting and enabling research, particularly within the ACE Basin watershed. Much of the Reserve's work occurs under the System-wide Monitoring Program (SWMP) and Wetlands and Water Levels Program (WWL).

Additional sampling occurs through partnerships with the South Carolina Department of Natural Resources, primarily the research arm of the Marine Resources Division (MRD), and other research institutions. The Reserve facilitates research on a wide range of topics by providing access to facilities and managed properties to cooperating investigators. Approximately 10 research and monitoring efforts by non-ACE NERR staff are undertaken in the ACE Basin NERR each year from a range of institutions within and outside of South Carolina.

It is particularly important to work collaboratively and to effectively communicate results of research to those responsible for resource management and coastal zone planning at individual, local, state, and federal levels. To improve the ability of a wide range of audiences and partners to act as good stewards of the ACE Basin, the research staff in conjunction with the other Reserve sectors, will collaborate with resource managers to identify research needs, seek funding, and undertake these projects with coastal decision-makers to ensure the application of the research results.

Program Capacity

The ACE Basin NERR's facilities provide functional space for the Reserve's research and monitoring work. The Reserve is involved in several facilities in a variety of capacities. The research sector utilizes the Michael D. McKenzie Field Station, the Edisto Environmental Learning Center, and the Marine Resources Research Institute (MRRRI). The McKenzie Field Station is a 4,100 square foot, mixed-use building which contains offices, a classroom, a laboratory, and dormitory space. The wet/dry laboratory are approximately 640 square feet each and contain benches and sinks for research purposes. The wet lab contains a shower and storage space for scientists conducting fieldwork and the dry lab contains available equipment, such as compound microscopes. The Field Station grounds house

the Reserve's weather station. The dormitory space includes two rooms, each accommodating six guests, as well as a kitchenette and is primarily intended for the use of visiting researchers.

The Edisto Environmental Learning Center is operated by the South Carolina Department of Parks, Recreation, and Tourism within the Edisto Beach State Park. The facility has a dock and boat ramp which provide water access, a location for one of the Reserve's SWMP water quality sites, and adjacent marsh for the location of the WWL site.

The MRRI houses the research arm of MRD. It is a 50,000 square foot building that contains 18,000 square feet of wet and dry laboratory space, a classroom, and auditorium, a computer center, and the College of Charleston's Marine Resources Library. Reserve research staff and equipment are housed within the MRRI which includes three dedicated office spaces, a dedicated research laboratory, and a shared research laboratory. The dedicated research space allows for calibration of the data sondes and storage of all equipment. The shared space houses the fluorometer and acid bath used for preparing nutrient and chlorophyll samples, running chlorophyll, and acid washing nutrient bottles. Two research vessels are devoted to the ACE Basin research staff for their use including a 20-foot privateer and a 20-foot privateer with a cabin.

Program Delivery

System-Wide Monitoring Program

The ACE Basin NERR implements each component of the System-Wide Monitoring Program (SWMP) according to the requirements of the program.

Abiotic Indicators. The ACE Basin NERR maintains one weather station, four primary water quality stations, and two secondary water quality stations (Figure 10). The weather station is located at the Bennett's Point field station on Mosquito Creek, a navigable tributary of the Ashepoo River. Weather data have been collected at the ACE Basin NERR Bennett's Point weather station since the station became operational in March 2001.



Figure 10. ACE Basin NERR Monitoring Stations.

Long-term water quality monitoring in the ACE Basin provides a unique opportunity to increase our understanding of how various environmental factors influence estuarine processes. Based on discussions with local Coastal Zone Management (CZM) personnel and ACE Basin NERR staff knowledge of land use within the Reserve, the South Edisto River drainage basin was selected because it is well suited for studying contrasting hydrographic conditions and land use patterns. The two major objectives of the ACE Basin water quality monitoring program are: 1) compare water quality conditions in shallow creeks along a salinity gradient and at different levels of development in the South Edisto River watershed and 2) track changes to the saltwater demarcation line in the South Edisto River because of prolonged drought, extraction of river water, and sea rise.

The water quality program began on March 3, 1995, in two tributaries of the South Edisto River, Big Bay Creek and St. Pierre Creek. In October 2002, monitoring stations were established in Fishing Creek and Mosquito Creek, tributaries of the South Edisto River. In 2014, two sites were established in the South Edisto River proper at Jehossee Island and Grove Plantation. The four primary monitoring stations (Edisto Island [replacement for Big Bay], Fishing Creek, Mosquito Creek, and St. Pierre Creek) are used to study contrasting land use patterns in the reserve. The two "treatment" sites are Edisto Island and Mosquito Creek, where boat traffic is moderate and residential development is low to moderate. St. Pierre Creek and Fishing Creek, where boat traffic is light and development is sparse, are designated as "control" sites. The four sites are located along a salinity gradient ranging from the polyhaline (Edisto Island & St. Pierre Creek) to mesohaline (Mosquito Creek & Fishing Creek). The secondary stations at

Jehossee Island and Grove Plantation are used to track changes in the saltwater demarcation line. These two stations extend coverage of the salinity gradient in the South Edisto River from the polyhaline to the oligohaline zones. The Jehossee Island station is in the mesohaline zone, and the Grove Plantation station is in the oligohaline zone, approximately 0.16 km (0.1 nautical miles) downstream of the legal saltwater demarcation line.

In July 1997, the Reserve staff initiated a nutrient monitoring study which was standardized with the SWMP nutrient management protocol in January 2002. Nutrient levels are measured at St. Pierre during a complete tidal cycle each month and a monthly grab sample on the falling tide at the four primary water quality sites. The samples are analyzed for ammonia, nitrite & nitrate, orthophosphate, and chlorophyll *a* concentration.

Biological Monitoring. The primary biological monitoring is associated with the Edisto Island WWL Site. This involves six vegetation transects which are monitored every one to two years. Additional biological monitoring is primarily conducted through non-SWMP activities by the SCDNR partnership. Currently within the ACE Basin, long-term trawl monitoring of fixed locations for estuarine fish and crustaceans is ongoing as well as a probabilistic sampling program for macrobenthic organisms and fish and crustaceans.

Watershed, Land Use, and Habitat Mapping. The ACE Basin has watershed boundary maps based on the USGS Hydrologic Unit Code (HUC) units. These boundaries are used to evaluate land cover/land use change over time using available NOAA C-CAP data. In addition, the ACE Basin NERR has created a habitat map that focused on the Edisto Island WWL Site, and it was approved by the NERRS Habitat Mapping and Change Committee in 2018. The original map was created in 2013 but based on 2011 imagery. There are no plans to update the map until new guidance is received.

Wetlands and Water Levels (WWL) Program. In 2014, the ACE Basin NERR established two locations as Sentinel sites as they were formerly known until 2023: one primary and one secondary. The primary site at Edisto Island is a high salinity location and is a fully compliant NERRS WLWL site with the following infrastructure: high resolution land use/vegetation map; six vegetation transects with permanent plots and porewater wells; six Surface Elevation Tables (SETs) in close proximity to the permanent vegetation transects; a water quality station providing continuous recording of core SWMP parameters as well as monthly nutrient and chlorophyll analyses; a core SWMP meteorological station within ecologically relevant proximity; a NERRS-approved tide gauge station providing continuous recording of six-minute water level measurements; a network of National Spatial Reference System (NSRS) benchmarks at the site; and a Continuously Operating Reference Station (CORS) within ecologically relevant proximity.

The secondary WWL site is on Jehossee Island which is a brackish water location. The site provides the following infrastructure: two Surface Elevation Tables (SETs) and a primary water quality station fixed to a vertically stable platform providing continuous recording of core SWMP parameters as well as monthly nutrient and chlorophyll analyses; and a core SWMP meteorological station within ecologically relevant proximity. There are currently no plans to expand this site to a primary location.

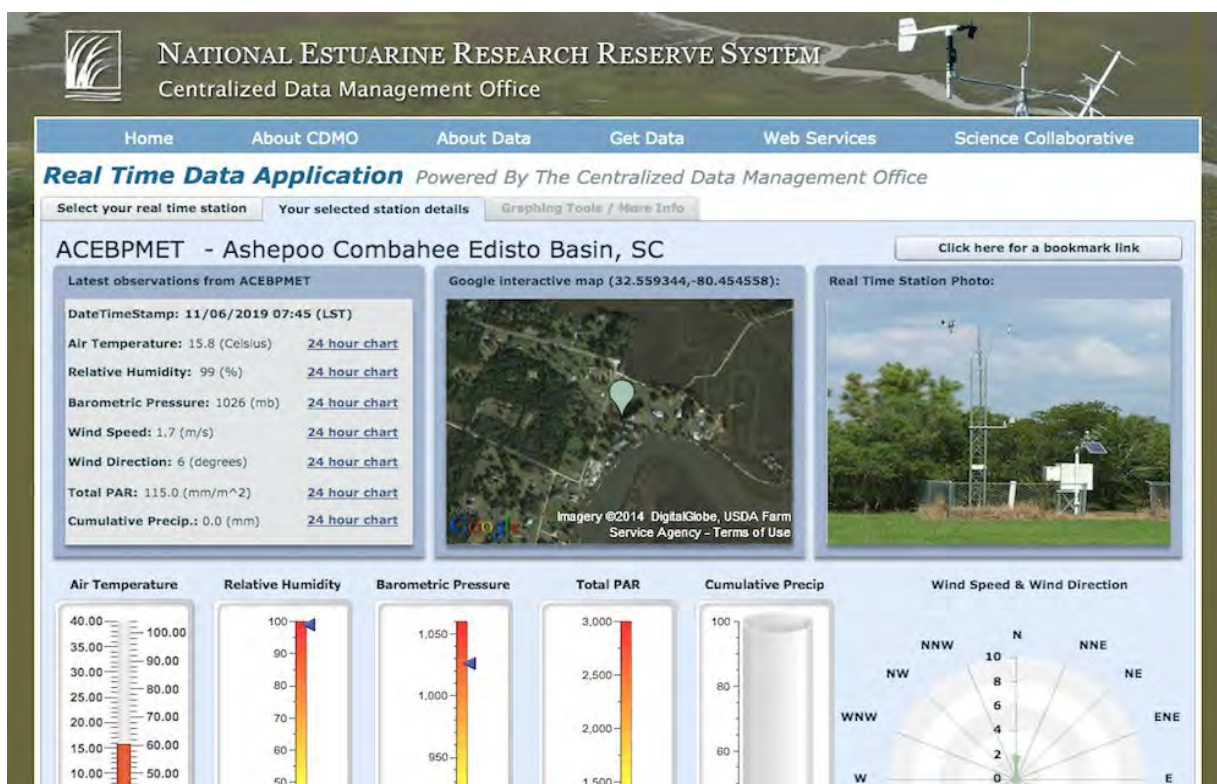


Figure 11. Live, publicly accessible data from an ACE Basin Station.

Research

The research sector of the ACE Basin NERR conducts, encourages, and facilitates research throughout the Reserve. Overall, the ACE Basin is a relatively undeveloped system and serves as an ideal reference location. The historical and current use of the ACE Basin for agriculture, including rice impoundments, and silviculture provide unique opportunities for research and monitoring. The ACE Basin is a large watershed with numerous entry points for researchers. Therefore, research may be occurring within the ACE Basin watershed that the Reserve is not aware of. However, we work closely with interested researchers to try and capture all the research that is undertaken, at least within the NERR boundary. In March 2020, the first ACE Basin Research Symposium was held with over 100 people attending and 32 presentations. We have continued this event biannually to further understand the various research efforts within the ACE Basin NERR and surrounding areas. These projects are tracked by the Research sector through a facility and research form. The form requests information on the research activity and locations as well as highlights the availability of the field station and other resources. Researchers are asked to submit publications to the research sector upon completion of the research efforts.

Partners

The ACE Basin NERR research sector has primary partnerships with other researchers at SCDNR, however we seek additional expertise as necessary or as opportunities arise with academic institutions such as the College of Charleston and the University of South Carolina. Additional partners include federal, state, municipal, and non-government entities, including the US Fish & Wildlife Service, SC Department of Parks, Recreation and Tourism, The Nature Conservancy, and Nemours Wildlife Foundation. In addition to the lands managed by the NERR itself, these organizations all manage lands within the greater ACE Basin and share common, long-term concerns such as saltwater intrusion, salt

marsh migration with rising sea level, estuarine salinity, and salt marsh response to extreme weather such as droughts, heavy precipitation, storm events, invasive species, and changing weather-related phenologies. All these questions require a wide range of expertise and partnerships.

Collaborations and partnerships are crucial to the goals of the Research sector and the ACE Basin NERR. Through collaborations with decision makers, we strive to make our science more applicable to their needs. Through partnerships with federal, state, academic, and local scientists, we strive to expand the knowledge base for the ACE Basin NERR with both basic and applied research efforts. The research sector encourages research efforts being conducted in the boundary and works to facilitate their success.

Needs and Opportunities

The primary goal of the research sector is to maintain long-term SWMP and WWL Site monitoring. The exemplary quality of this program can only be maintained by extensive resources which are provided through NOAA reserve operations funding. Any additional research efforts require NERRS Science Collaborative or other outside funding sources to undertake. Some of the most pressing research needs revolve around changing conditions such as sea level and droughts. It is critical for the reserve to stay current and continue to study these issues and potential climate impacts such as marsh health and marsh loss from rising seas. Therefore, the research sector regularly seeks additional funding sources to meet the needs of stakeholders.

The research sector also maintains close relationships with the ACE Basin education, stewardship, and training and engagement sectors to ensure that the research conducted meets the research needs and priorities of local stakeholders.

Goals, Objectives, and Actions

The following ACE Basin NERR goals, objectives, and actions will drive the efforts of the research sector from 2026-2031. Many of these will be undertaken in association with other ACE Basin NERR sectors.

Goal 1. Advance knowledge about coastal and estuarine ecosystems through research and monitoring.

Objective 1. Conduct monitoring within the Reserve and associated watersheds to improve understanding of coastal ecosystems and human influences on them.

- Fully participate in the NERR System Wide Monitoring Program (SWMP) through the collection of water quality and meteorological data.
- Continue implementation of Edisto Island Wetlands and Water Levels site as part of the WWL Plan.
- Analyze and synthesize Reserve SWMP and WWL Site monitoring data to evaluate significant trends over time related to weather, climate, and human alterations.
- Implement future NERR system WWL Site modules and participate in regional and national projects, as appropriate.

Objective 2. Broaden the Reserve's research portfolio by encouraging and enabling non-SWMP research activities.

- Facilitate access to the Reserve for research by providing a field station and logistical support to visiting scientists.
- Track research projects submitted by researchers to better understand the findings and outcomes of each project.

- Participate in local, regional, and national science networks and partnerships to understand current research.
- Seek funding and partnerships to meet the research needs of the Reserve and coastal stakeholders.

Objective 3. Provide research and monitoring information to target audiences to address relevant coastal issues.

- Provide high quality monitoring data publicly through the Centralized Data Management Office website.
- Collaborate with ACE Basin T&E, Education, and Stewardship programs to help integrate research and monitoring into sector programming.
- Collaborate with Reserve sectors to develop effective research-related communication products.
- Communicate Reserve research and monitoring through participation in local, regional, and national meetings to ensure relevant researchers and outreach providers have access to science-based information.

Objective 4. Conduct research collaboratively to address resource management issues.

- Understand the research needs of coastal stakeholders.
- Collaborate with coastal managers to conduct research that addresses research priorities and the NERR priority issue areas.
- Provide advisory services to research and management communities, such as by serving on graduate student committees and technical advisory committees

Education Program



Figure 12. Students holding the trawl net aboard the E/V Discovery.

The National Estuarine Research Reserve System seeks to enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation. The reserve system increases estuary literacy among students, teachers, and the public through the K-12 Estuarine Education Program (KEEP) and Environmental Action programs.

The K-12 Estuarine Education Program helps educators bring estuarine science into the classroom through hands-on learning, experiments, fieldwork, and data explorations using grade-appropriate lessons, activities, and videos. Reserves also offer teacher development programs that use established coastal and estuarine science curricula aligned with state and national science education standards. Teachers on the Estuary (TOTE) workshops give teachers the opportunity to explore coastal habitats and conduct field investigations, learn how to integrate local and national monitoring data into the classroom, and gain hands-on experience using estuary education resources.

Environmental Action programs focus primarily on fostering and modeling behavioral change that leads to resource conservation and advances the mission of the reserve. Such programs are specifically designed with the intention of creating behavior change and/or fostering wise stewardship of estuaries. The ultimate goal is to help audiences make personal choices and collective actions that help them conserve, protect and restore our estuaries and their associated watersheds. Target audiences include, but are not limited to, residents of the watershed and surrounding communities, watershed residents and recreational users of the reserve. Participants in the reserve's training and engagement and K-12 audiences are not included in this category. Reserves integrate

research and monitoring into their educational and outreach efforts, providing a multi-faceted, locally focused approach aimed at engaging the community. The Reserve System Strategic Plan outlines education objectives designed to increase the public's awareness of and participation in stewardship activities; improve educators' and students' understanding and use of the Reserve System and NOAA resources for place-based and inquiry-based learning; and grow and motivate the next generation of coastal professionals through access to programs and facilities that facilitate research, resource management, and educational opportunities.

The ACE Basin NERR Education Program aligns with NERR System Goals to increase students', teachers', and residents' knowledge, appreciation, and skills to act as stewards of our estuaries. Programs are offered to multiple audiences including, K-12 and college students, teachers, visitors, and residents of the southern coastal counties of South Carolina. These participants will have an increased understanding of NERRS and NOAA resources through place-based experiential learning opportunities.

Program Context

ACE Basin Education Programs work to educate communities by providing a place-based learning experience that helps them understand how the reserve studies estuaries and how everyone can help protect them. Education programs are conducted at multiple sites along the southern coastal counties of SC, in Charleston, Beaufort, and Colleton Counties. These sites are located within the ACE Basin Reserve and at the SCDNR Marine Resources Division complex at Fort Johnson in Charleston. Education programs focus on Reserve priority issues of habitat conservation, water quality, public access, and coastal resilience. Current educational research-based strategies are employed to align and meet the NERRS 2017-2022 Strategic Plan under the Goal of Advancing environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watersheds, and coastal communities.

Specific student and teacher audiences have been determined using several forms of assessment. A Market Analysis of the other environmental education organizations along the coast of South Carolina was conducted in 2024. According to this analysis, there are fewer environmental education opportunities for students and teachers in Colleton and Beaufort counties and more environmental education programs for students and teachers in the Charleston tri-county area (Charleston, Berkeley, and Dorchester). The Charleston tri-county area has the largest student and teacher populations in lower coastal South Carolina compared to Beaufort, Colleton, and Jasper county. This, along with the proximity to program locations, determined that target audiences are students and teachers from Charleston, Berkeley, Dorchester, Colleton, and Beaufort counties, although any school is welcome. The market analysis showed a gap in programs addressing data analysis and interdisciplinary research. In 2013, a Needs Assessment of teachers in the eight coastal counties of SC was conducted to determine needs for both student programs and teacher professional development. Education staff also use student evaluations and teacher feedback surveys, communication with the Education Advisory Committee, periodic focus groups on specific topics, State Curriculum Standards, and input from researchers on current research to direct programming. Teachers that responded to the Needs Assessment listed experimentation, human impact on the environment, and lab or field work techniques as the topics of highest interest. The teacher feedback survey echoes this idea. The South Carolina state science standards have been updated to mirror the Next Generation Science Standards with a focus on scientific practices and cross cutting concepts in addition to knowledge content. This information, together with the results of the Needs Assessment, feedback surveys, and focus groups led to a revision of programs to include field and lab scientific investigation skills, use of equipment, data collection, and analysis. ACE Basin education programs have been modified to provide this unique opportunity to learn

about and participate in estuary research and use real-world data to investigate coastal issues. Teaching style is informed by participation in educator work groups on best practices and new teaching techniques in published research. We are currently compiling these resources to have an updated market analysis and needs assessment.

Education Advisory Committees are required for programs under the K-12 Estuary Education Programs (KEEP). They provide key input to guide programming at each Reserve to meet the local educational needs. These committees ensure accountability and that programs are meeting high standards of excellence. Input from local educators guides market analyses, needs assessments, and partnership opportunities, as well as program development, implementation, and evaluation. The ACE Basin Education Advisory Committee represents multiple sectors of the education community such as formal educators (both public and private), nonformal and informal educators, school administrators, and school district staff.

Public outreach and environmental action program audiences consist of residents and visitors in proximity to the Reserve sites, whose actions will affect the estuary and surrounding watershed. These programs are conducted in partnership with Stewardship sector staff and are detailed in the Stewardship Plan.

Program Capacities

Education programs are conducted by four educators: the Education Coordinator, two Education Specialists, and an hourly educator or graduate assistant. Programs are regularly conducted at four program locations: the McKenzie Field Station, Botany Bay Plantation Wildlife Management Area/Heritage Preserve, the Edisto Environmental Learning Center in the ACE Basin estuary, and SCDNR's Marine Resources Division complex at Fort Johnson in Charleston Harbor. At these facilities, there is access to beaches, salt marshes, indoor and outdoor classrooms, and laboratories. Education programs typically include a trip aboard the *E/V Discovery*, a 45 ft powered catamaran, providing students and teachers an opportunity to learn first-hand about our estuaries and practice various sampling techniques. Many participating students have never visited these sites or ever been on a boat. Approximately 4,000-6,000 students and teachers participate in these programs annually. Students also participate in land-based programs, focusing on field study techniques, tools, and data analysis skills. These programs include salt marsh and beach field studies, dissections, and cover topics such as plankton, sea turtles, and careers in marine science. The education program works with several partners to increase our reach to students of coastal South Carolina. Education staff consider the types of schools that attend to maintain equitable access to programs. Every year, staff visit other environmental education centers with the *E/V Discovery* to provide boat and land-based programs to students in two additional estuaries; Winyah Bay in partnership with the North Inlet-Winyah Bay NERR and the Port Royal Sound in partnership with the Port Royal Sound Foundation Maritime Center.

For free-choice learning, the Environmental Learning Center at Edisto Beach State Park and Botany Bay Plantation WMA/HP provide opportunities for visitors. The Environmental Learning Center helps promote the responsible use of coastal resources and the Goals of the ACE Basin NERR. This Center is a partnership between the Reserve and the South Carolina Department of Parks, Recreation, and Tourism through the Edisto Beach State Park, and features interactive displays, a touch tank, and outdoor nature trails, all of which help visitors understand the resources of the Reserve and the role they can play in stewardship of those resources. In addition to school groups, the Center also hosts over 20,000 visitors annually. Botany Bay Plantation WMA/HP hosts about 70,000 visitors a year to experience beaches, salt marshes, and forests, with trails, a driving tour, and interpretive signs for self-guided learning about our coastal habitats.

Program Delivery

NERRS Education Programs follow a set of guidelines to deliver quality estuary education. This K-12 Estuary Education Program (KEEP) Guidance incorporates the NOAA Education Goals of creating a science-informed society, promoting conservation and stewardship, increasing safety and preparedness, and a skilled future workforce, and incorporates strategies from the NERRS Strategic Plan 2017-2022. ACE Basin Education Programs follow KEEP guidelines, goals, objectives, and priorities of the National NERR system, NOAA Education Goals, and ACE Basin Reserve Priorities.

Student Education Programs use a variety of delivery modes to reach different learning styles and use creative technology to reach a broad range of teachers and students. To enhance learning during the one-day vessel and land-based estuary programs, online estuary lessons that are part of the national Estuary Education Resources are provided as pre and post materials. Several multi-day experiences for students are offered. For example, through the salt marsh restoration program called From Seeds to Shoreline®, education sector staff work with classes throughout the year. Students harvest *Spartina alterniflora* seeds, grow plants in a greenhouse, and then transplant them to restore areas of eroded marsh. This program is a partnership between the South Carolina Sea Grant Consortium, Clemson Extension, South Carolina Department of Natural Resources, and the ACE Basin NERR and was recently expanded into other Reserves in the Southeast. Additionally, each year, the education program also engages several schools in the ACE Basin Climate Explorers Program. This program gives students an opportunity to learn basic climate principles and investigate how changing conditions affect the Reserve and our community. Students then work to implement a project that will make their community more resilient to flooding and storms.

For Teacher Professional Development, the program collaborates with several partners to leverage resources and provide valuable learning experiences. Partners for the development and implementation of teacher trainings include the SC Sea Grant Consortium, North Inlet-Winyah Bay NERR, and county school districts. Trainings range from one day professional developments to longer Teachers on the Estuary (TOTE) Workshops. These professional development programs vary in theme based on the needs of the school district curriculum coaches, priority issues of the Reserve, Education Advisory Committee input, and the Needs Assessment data. Education staff use National TOTE criteria and best practices for teacher trainings to implement this teacher professional development. ACE Basin Research staff support these trainings by providing guidance on SWMP and WWL Site data analysis and interact with teachers to conduct field work. Web-based Learning with online national products, such as Estuary Education Resources and the SWMP graphing tool, help increase teacher confidence in using technology to create a scientifically literate workforce for the future.

ACE Basin stewardship staff, with the Education Specialist, conduct most public and environmental action programs in the Reserve with partners mentioned above, as well as local Master Naturalists Associations, colleges and universities, local municipalities, and others. These programs provide engaging experiences, such as interpretive field trips, expert lectures, large public events, and skill building workshops, for people of all ages to increase their awareness and ability to act as stewards of our estuaries. These efforts are described further in the Stewardship Plan.

Education staff with Research, Stewardship, and T&E guidance, creates relevant publications and educational products such as the Southeastern Salt Marsh Field Guide, online field guides, posters, coloring books, Sea Sciences, event displays, and exhibits to further learning. All education programs

and products work to increase appreciation of our coastal resources, understanding of science principles, and promote stewardship of our estuaries with community efforts and individual behaviors.

Needs and Opportunities

The program operates at maximum capacity according to the availability of vessel funding, staff, bus logistics, and school days. This capacity should remain constant over the next five years unless these factors change. Most limitations are external and related to the amount of time groups can spend at the Reserve, such as buses and school schedules. The demand for vessel-based student education programs is high in this area and is not a limitation. To increase program capacity, an additional education vessel and associated staffing would be required, and the Reserve in partnership with SCDNR will explore opportunities to increase capacity. The program budget is supplemented by outside funding sources to provide more education programs per year, and partnerships are used to leverage resources.

The format and length of student programs, teacher trainings, and educational materials were informed by the Market Analysis and Needs Assessment, teacher feedback surveys, and the Education Advisory Committee. The time limitation was addressed by creating the multi-day programs mentioned in the Program Delivery, as well as providing pre and post materials for teachers. Moving forward, partnerships, funding sources, and technology will continue to be leveraged to enhance student and teacher learning experiences.

Monitoring and Evaluation Strategies

Performance measures such as number of program participants and contact hours are recorded regularly for input into the Knack database, NOAA's education performance monitoring system. Currently student, teacher, and public education programs are evaluated using well-defined evaluation strategies. Student programs are assessed with pre and post surveys. These surveys measure knowledge of content covered during the program, knowledge of science principles covered in the state standards, and attitudes towards estuaries. The From Seeds to Shoreline® and ACE Basin Climate Explorers programs utilize surveys that evaluate not only knowledge and attitudes towards estuaries, but also changed behaviors to more conservation actions. Additionally, teachers who bring their students to a program receive a feedback survey to gain information on whether the teachers' curriculum needs are met with the program.

Teachers on the Estuary Workshop effectiveness is measured using a TOTE evaluation that is coordinated nationally, with the data collected locally. Focus groups are conducted for specific topic feedback during teacher workshops. Results from all evaluations are used to improve and modify program content and delivery. Results are disseminated through grant reports, organizational annual and semiannual performance measures and reports, and during advisory committee meetings. This evaluation plan will continue to measure the program's impact and mission to increase environmental appreciation and scientific literacy in coastal South Carolina, to allow for science-based decisions that positively affect estuaries, watersheds, and our coastal community.



Figure 13. An SCDNR educator showing off an Atlantic stingray to students aboard the E/V Discovery.

Education Related Objectives and Actions

The following ACE Basin NERR goal, objectives, and actions will shape the programs and products of the education sector from 2026-2031.

Goal 1. Enable South Carolina’s communities, residents, and visitors to protect coastal resources.

Objective 1. South Carolina residents and visitors understand the value of coastal and estuarine ecosystems and take actions to protect them.

- Encourage a stewardship ethic by providing educational and experiential activities for adult audiences at Reserve and partner sites.
- Encourage program participants to make a commitment to protect their coastal areas and resources by providing actionable stewardship practices.
- Deliver science-based, timely, audience-driven information to support the public in understanding, appreciating, and protecting resources.
- Inventory, evaluate, and update existing publications and resources to increase public knowledge and skills to protect coastal ecosystems.

Objective 2. Volunteers contribute to outreach and citizen science.

- Recruit and train volunteers to participate in outreach, stewardship, and research activities.
- Enhance volunteers’ knowledge and skills by providing hands-on educational experiences about coastal issues.

Objective 5. Teachers improve their scientific literacy including basic estuary principles.

- Focus educator training on science concepts that align with Reserve priority issues and provide resources that facilitate teaching these concepts.
- Provide teachers with the knowledge and resources to use NERRS and NOAA research and monitoring in promoting the health of estuaries.
- Ensure that Teachers on the Estuary (TOTE) workshops adhere to National TOTE Criteria and Teacher Professional Development Best Practices as indicated by current research.
- Incorporate SWMP data, relevant research, and science investigation techniques into workshops to increase teachers' confidence in collecting and analyzing data with their students.
- Maintain and enhance partnerships for training development and implementation such as County School Districts.
- Incorporate Reserve stewardship messages and activities into workshops and resources to ensure teachers have the knowledge, skills, and appreciation to act as stewards of our estuaries, and help their students do the same.
- Provide technical assistance to teachers to increase their confidence teaching science concepts and research skills.

Objective 6. Foster students' appreciation of estuaries and improve their scientific literacy.

- Provide experiential education programs for K-college students that increase their knowledge of coastal habitats and issues.
- Ensure that student programs are aligned to SC state standards and follow pedagogical best practices as well as recommendations from the K-12 Estuary Education Program (KEEP) Overview, Market analysis, Needs Assessment, Teacher Advisory Committee, and evaluations.
- Provide job shadow and volunteering opportunities for middle school and high school students to encourage a future workforce.
- Provide educational products that increase students' knowledge and skills to understand estuarine concepts and research techniques.
- Provide educational stewardship activities to schools that involve students in improving water quality, resilience, and habitat conservation, and help them understand their role as stewards of our estuaries.

Training and Engagement Program



Figure 14. Testing water quality at an event from the T&E Healthy Pond Series.

The NERRS Training and Engagement Program (formerly named Coastal Training Program) provides up-to-date scientific information and skill-building opportunities to coastal decision-makers on relevant coastal management issues. Target audiences may vary for each reserve, but generally include local elected or appointed officials, managers of both public and private lands, natural resource managers, coastal and community planners, and coastal business owners and operators. They may also include such audiences as farmers, watershed councils, professional associations, ecotour businesses, researchers, and more.

The place-based nature of reserves makes them uniquely positioned to deliver pertinent information to these audiences. Each reserve conducts an analysis of the training market and assessment of audience needs to identify how best to deliver relevant training on priority issues to their area.

Partnerships are integral to the program's success. Reserves work closely with a host of local partners, as well as several NOAA programs, to determine key coastal resource issues and the appropriate target audiences and expertise needed to deliver relevant and accessible programs.

The *Reserve System Strategic Plan* outlines training and engagement objectives designed to ensure that coastal decision-makers and environmental professionals understand and effectively apply science-based tools, information, and planning approaches that support resilient estuaries and coastal communities.

Program Context

The Ashepoo-Combahee-Edisto (ACE) River Basin of South Carolina has a largely undeveloped landscape consisting of extensive, diverse habitats, such as saltwater and brackish-water marshes, maritime forests, upland pines, and bottomland hardwoods. The Reserve and its surrounding areas are relatively

rural and protected. Within the ACE Basin Project area, there are over 320,000 protected acres, a mix of public lands and private easements. Despite the abundance of protected land surrounding it, the Reserve is situated between two rapidly growing population centers, the Charleston metro area to the north and the Hilton Head Island-Beaufort-Bluffton metro area to the south. Stressors associated with this population growth include habitat loss, resource depletion, nonpoint source pollution, and nutrient loadings to estuaries and coastal waters.

The region is already beginning to see the effects of sea rise, overdevelopment, and changing weather patterns. In the future the region will be increasingly impacted by these factors. These stressors, acting alone or in combination, will challenge and threaten to reshape the ecosystem, including patterns of human inhabitation.

Since 2005, T&E has provided over 150 training events to an average of 150 coastal decision-makers each year. Primary audiences are state and local government, business or other private industry, non-profits and community organizations, academia, and local federal government staff. Water quality and stormwater topics are a focus, making up about 27% of the trainings, followed by communications topics, process skills, habitat conservation and restoration, watersheds, hazards, and visitor use. The geographic coverage of the program is focused both within the reserve boundaries and in the surrounding population hubs. Target areas include the greater Charleston region and the Southern Lowcountry (Beaufort, Hilton Head, Bluffton) area, and training events regularly draw participants from seven coastal South Carolina counties.

Priority Audiences

The ACE Basin T&E provides support and training for coastal decision makers - professionals and officials who make decisions impacting the ACE Basin ecosystem and communities. The program serves communities along the South Carolina coast, focusing on the central and southern SC coast, and working in partnership with the North-Inlet Winyah Bay NERR T&E to provide coordinated services coast-wide. The priority audiences within these communities vary, but primarily include:

- Municipal and county staff (including planners, engineers, administrators, stormwater staff, and public works staff)
Focus area topics: stormwater, adapting to changing conditions, visitor use
- Community group leaders and property owner organizations
Focus area topics: stormwater, living shorelines, adapting to changing conditions
- Private organizations (including developers, engineering and architectural firms, landscaping companies, and real estate agents)
Focus area topics: stormwater, adapting to changing conditions
- Elected/appointed municipal and county officials (including mayors, councils, zoning officials, planning board members)
Focus area topics: stormwater, adapting to changing conditions, living shorelines
- State and locally based federal staff and researchers
Focus area topics: adapting to changing conditions, living shorelines, visitor use, science communications

Support for training needs of local government officials, county staff and private organizations are focused on the community population centers surrounding the NERR. These coastal decision-maker (CDM) audiences are centered within rapidly growing communities and rely on science-based guidance for decision making. Property owner organizations and community group leaders are an important CDM audience throughout the central and southern SC coast due to their widespread influence on priority

topic areas such as land protection, water quality and coastal resiliency. Gaps in scientific information and understanding, resources, tools, barriers to implementation and desired training formats will be assessed using formal and informal needs assessments to provide dynamic training that best fits the needs of the priority audiences. Input from T&E partners is also valuable in determining emerging needs of the CDM audience and will continue to be used to keep training topics relevant. In addition, our state partner, SCDNR, is designated as a priority audience for training related to providing better resources and efforts for local communities. The state partner is also a priority audience for technical assistance related to communications, program development, and program support.

Priority Issues

The Training and Engagement's work will center on focus areas under each Reserve priority management issue, but the program will also maintain the flexibility to address new or emerging focus areas.

Priority Issue: Water Quality; Focus Area: Stormwater

The largest contributor to water quality impairments in coastal South Carolina is non-point source pollution from stormwater runoff. Over the past 10 years, T&E has provided a number of events including demonstrations, design workshops, and seminars on stormwater Best Management Practice (BMP's). Additionally, T&E led a NERRs Science Collaborative project to develop locally specific, science-based low impact stormwater best management practice guidance and site design guidance.

Despite the work of T&E and others in the area of stormwater management, barriers and challenges remain. Additionally, some ACE Basin-adjacent communities are adjusting to a changing regulatory environment as their population growth requires them to become permitted Municipal Separate Stormwater Sewer Systems (MS4s). This program requires the communities to develop programs for public outreach, public participation, illicit discharge detection, construction site runoff, post-construction runoff control, and pollution prevention. Stormwater management is an ongoing issue and audiences continue to need up-to-date scientific information.

An analysis of training topic requests and interviews with partners and stakeholders reveals the most important specific topic areas are stormwater pond management, inspection and maintenance, and design as well as bioretention and other low impact stormwater systems. Utilizing the education products that resulted from the NERRs Science Collaborative project, T&E will continue to offer trainings focused on low impact stormwater BMPs over the next five years. Workshops that include a mix of seminars and field demonstration components have been identified as a preferred format by the CDM audience and will be used to provide education on site design and pollution prevention practices. To maintain T&E's role as a trusted resource on stormwater topics, T&E will work with partners and the NERRs research sector to include the most current scientific guidance around emerging stormwater management issues into training events. Informal audience assessments have indicated specific needs for stormwater-pond specific education, resulting in the Healthy Pond Series and regional stormwater pond management conferences. T&E continuously conducts informal stormwater training needs assessments by analyzing feedback from workshop evaluations and by cultivating open relationships with key stakeholders who are able to report stormwater education needs or request certain training for their areas.

Priority Issue: Habitat Conservation; Focus Area: Living shorelines

Habitat conservation is an especially important issue for the ACE Basin watershed as a whole. The ACE Basin partners have been recognized as pioneers in public-private land conservation efforts, resulting in

over 320,000 protected acres in the watershed. The ACE Basin boasts many important habitat types that are critical to protect for the continued success of many important species.

One habitat type that requires additional support in the form of protection and restoration is the salt marsh. In South Carolina's Lowcountry, salt marshes are quite extensive, but are experiencing erosion in part due to sea rise. Additionally, in developed areas, salt marshes have less flexibility to migrate as changes occur because of existing infrastructure. Therefore, it is important to protect existing salt marshes and expand them where possible through living shorelines. In South Carolina, living shorelines are primarily oyster-based, so protecting the salt marsh using oyster reefs provides additional benefits of increasing a culturally, commercially, and recreationally important fishery, increasing biodiversity, and improving water quality.

T&E has been engaged in the issue of living shorelines over the last several years through NERRS Science Collaborative grants, working to implement and study living shorelines. The results of the most recent study were used by SCDES Bureau of Coastal Management (BCM) to implement living shorelines policy. T&E will work closely with the NERR Research and Education Coordinators to incorporate the results of the study into education programs and teacher workshops. Over the next five years, T&E will continue to work in this area, supporting BCM in order to provide outreach and education to decision-makers about living shorelines policy and implementation.

As communities surrounding the NERR continue to grow, coastal development will increase the strain on natural resources and habitats already vulnerable to disruption from rising seas. T&E will conduct informal needs assessments related to increasing resiliency through habitat management with local land managers and state and federal partners. Using the results of the needs assessment as guidance, T&E will provide a training for this audience focused on assessing habitat vulnerability and planning for sea rise. Over the next five years, T&E will also explore the needs of local municipal and county officials related to landscape scale conservation efforts.

Priority Issue: Public Access; Focus Area: Visitor Use

Public access to natural resources is becoming a critical issue for coastal communities and partners of the Reserve. As both the coastal population and the tourism industry expands, it is important to maintain existing as well as create new opportunities for people to access natural resources. At existing public lands like parks and wildlife management areas, increased traffic is beginning to put pressure on the natural systems.

Over the past ten years, T&E has addressed the issue of visitor use by coordinating with the Stewardship sector to evaluate the training needs of ecotour operators, especially those conducting tours within protected lands. Ecotour operators provide a great deal of information to the general public, however, the quality and accuracy of that information varies greatly. After using a combination of an informal needs assessment and interviews, T&E worked with the stewardship sector to deliver a series of science-based workshops for guides, covering research and life histories of various coastal species, as well as providing best practices for observation and focusing on a stewardship ethic for ecotour professionals that they can share with guests. As needs develop, T&E will continue to coordinate with the Stewardship sector to provide training opportunities to resource managers providing public access.

Priority Issue: Community Resilience; Focus Area: Adapting to changing conditions

Over the last ten years, the amount and quality of scientific information as well as the number of tools and resources available to decision-makers has increased significantly. In the ACE Basin region, opportunities for local governments to connect with assistance and build their own capacity has also

increased. There are several other programs in the region which specialize in working with built communities in planning for changing conditions. T&E will work to support those partners. For example, T&E is a partner in the Southeast and Caribbean Disaster Resilience Partnership. The SCDRP produces climate-related outreach and organizes periodic in-person workshops for decision-makers in the Southeast. At one in-person workshop, participants identified in-person interactions as the most valuable and suggested that more resources should be directed towards coordinating those efforts. In the next five years, T&E will support SCDRP efforts to provide in-person training, networking, and discussion opportunities.

In addition to supporting partners who specialize in assisting human communities with adapting to a changing environment, T&E will focus on providing decision-makers with the information, tools, resources, and collaborative capacity to mitigate or manage impacts to ecological communities. The work with living shorelines (discussed above) is one way T&E will address ecological community resilience. Working with the Education and Research sector will be important to ensure that the reserve messages regarding research and resilience are consistent across sectors. To achieve this T&E will assist with the development and implementation of trainings for teachers that focus on coastal resilience and highlight the importance of protected lands.

Another way that T&E will approach this focus area will be to provide training that supports decision-makers' ability to protect important habitats and ecosystems. For example, T&E has offered a training called Coastal Wetland Identification several times over the last ten years. The training is very popular and fills an important need, especially for local government staff. Regulatory and enforcement staff need to determine wetland habitats when they are permitting or inspecting construction sites. However, oftentimes the staff in these positions have no background in coastal ecology and use this training as a basis for their decision-making. T&E will continue to offer this training and explore expanding it. Also, wetland mitigation is a topic that decision-makers consistently identify needing more information about. T&E will assess the need for additional related trainings.

Program Capacity

Full time staff for the program includes one program coordinator employed through the SCDNR. Program capacity can be increased with at least two highly skilled full-time staff given the large service area spanning six counties, two different urban areas, and a variety of rural communities, and the necessity of building long-term relationships with stakeholders to truly make progress on community needs. Community resilience concerns are increasing and the need for technical assistance and training is rising. Needs assessment efforts during and after training events show an increase in the number of concerns and topics that stakeholders identify as priorities, but there is not enough staff capacity to address any but the very top concerns. Many projects span several years and can also lead to further projects, and communities want to continue working with an experienced individual they trust. When funds are available, a part-time intern is employed through the College of Charleston Master's in Environmental Science and Sustainability Studies program. T&E hosted three Hollings Scholars and intends to host scholars again in the future should suitable projects arise. Interns can serve as support on certain projects, but it is crucial to have long term staff who can build relationships with stakeholders and see the larger connections between issues. Assistance from other Reserve and SCDNR staff is offered as necessary during training events or technical assistance.

The program will likely maintain an office for a staff member at SCDNR's Marine Resources Division in Charleston, conveniently located to serve the needs of Charleston, Berkeley, and Dorchester Counties. Office space and meeting space is available at SCDNR's Marine Resources Division in Charleston as well as potential for office and meeting space at the McKenzie Field Station. In the Beaufort/Bluffton area, meeting space is typically available at minimal or no cost through partner organizations.

The program budget is flexible to allow for paid venues when the need arises. The program maintains GoToMeeting and Padlet subscriptions to provide virtual meetings and programming. This combination of physical and virtual meeting spaces currently meets audience needs. The program may explore options to enhance hybrid meeting and event capabilities in the next five years, depending on stakeholder need.

The program is seeking to expand social science capacity, as the coordinator is increasingly asked to provide social science guidance related to a variety of grant requests. T&E currently maintains software to analyze qualitative data and is searching for ways to access other appropriate analysis and data display software. Program staff will seek professional development opportunities related to social science. The program intends to continue to build working relationships with social scientists in a variety of disciplines at universities interested in working with the Reserve, such as other divisions of SCDNR, College of Charleston, Clemson University, University of South Carolina, and The Citadel.

Strategic and Training Partnerships

The ACE Basin T&E operates in a network of partners to accomplish program goals. As a partner, T&E often provides staff expertise and connection with local audiences, experience with marketing and engagement planning, logistical support, and access to SCDNR's marketing and communications capabilities. T&E most often calls on partners for staff expertise and additional marketing of partnered events. For all efforts, T&E partners with local and county governments, academic institutions, non-profit organizations, private entities, and/or state and federal agencies. Partners are chosen based on the event topic, intended audience, and interest of the partners. This has proven to be an invaluable way to provide quality training by sharing costs and increasing contact with the intended audience. New partnerships are continuously being sought based on the mission and local focus of the groups involved.

State level partnerships include:

- SC Sea Grant Consortium
Focus area topics: stormwater, adapting to changing conditions,
Support provided by partner: staff expertise, marketing and graphic design for partnered events, cost sharing for partnered events, possibility for financial support for evaluation of partnered programs
- Clemson Extension and Carolina Clear Programs
Focus area topics: stormwater
Support provided by partner: staff expertise, marketing for partnered events, venue space, cost sharing for partnered events
- South Carolina Department of Environmental Services-Bureau of Coastal Management
Focus area topic: living shorelines
Support provided by partner: staff expertise
- Local universities
Focus area topic: adapting to changing conditions
Support provided by partner: staff expertise, connections to appropriate researcher, venue space
- South Carolina Office of Resilience
Focus areas topic: community resilience

Support provided by partner: staff expertise, connections to appropriate researcher, venue space

Additional existing partnerships include:

- Ashley Cooper Stormwater Education Consortium
Focus area: stormwater
- Lowcountry Stormwater Partners
Focus area: stormwater
- Local counties and municipalities
Focus area: stormwater, living shorelines, adapting to changing conditions, visitor use
Support provided by partner: venue space
- Local land trusts
Focus area: adapting to changing conditions

T&E also partners with the North Inlet-Winyah Bay (NI-WB) NERR on state-wide efforts as appropriate and on topics that are priorities to both Reserves. T&E also forges connections with existing organizations that may not be traditional partners, for example the Community Associations Institute, a professional network for community management professionals. Presently, all state-level agency partners as well as additional partners are part of the SCCIN, described above.

Program Delivery

Prior to the pandemic, the two most common types of in-person training events provided by T&E were workshops that are participatory in nature, and seminar-style informational sessions. The audience's preference was for half-day to full-day sessions with a participatory, hands-on application, demonstration, or field experience component. For example, previous trainings on stormwater BMPs have successfully combined seminars on current research and educational content with hands on demonstrations that provided attendees with an opportunity to practice implementing new skills learned. During the COVID-19 pandemic, T&E successfully switched to virtual delivery of programs. Informational webinars as well as more interactive workshops were both successful.

Building on our foundation of in-person event knowledge, and virtual skills gained during the pandemic, T&E now provides training and information using a variety of strategies, depending on topic, audience, and timing. In partnership with NI-WB T&E, ACE Basin T&E has successfully created "evergreen" content, such as videos providing the basics of wetlands, that we use to prime attendees before a variety of interactive webinars and in-person, hands-on field sessions. This combination of methods allows in-person events to be shortened, cutting down on logistical costs and planning time. The on-demand access of information meets a variety of audience knowledge levels and backgrounds. Stakeholders have indicated that this approach is beneficial.

Independent of delivery strategy, participants highly value networking and the opportunity to voice their opinions to a range of stakeholders involved in the issue. Training sessions across all priority issues and in partnership with any organizations will continue to provide these opportunities and the reserve will seek out unique ways to include them.

T&E maintains a list-serve of participants who have identified that they want to remain informed about events. Audience members are contacted individually through e-mail to market events. Further potential participants that may be invited to each event are determined based on the objectives of the training. Additionally, program staff update multiple website calendars with events, and some events are posted on SCDNR's social media if intended for a more general audience, such as homeowners.

Most participants (about 55%) report that they hear about events from the listserv. Word of mouth is also very important for the program, with about 27% of participants learning of events through word of mouth, primarily by a colleague who is on the list forwarding them the invitation.

T&E also cross-promotes programs with listservs of relevant partner organizations. The ACE Basin T&E has a website on the SCDNR webpage which provides information on the program in general, upcoming and past events, and resources for coastal decision makers.

Social media is managed at the agency level and is generally not available for use by T&E. T&E will continue to use the existing avenues and will explore new ways to market programs in the future, however programs are consistently at capacity and filling them has so far not been a challenge the program has needed to address.

Needs and Opportunities

The T&EP continually asks for feedback on training needs and opportunities from training participants and strategic partners. Individuals within the T&E network (training participants, workshop providers and speakers, state agency staff, key community leaders, etc.) also feel comfortable contacting the coordinator directly to request specific training or make the coordinator aware of a need. The program is developing an evaluation and needs assessment tracking system based on the principles of action research, which more closely aligns with the way the program works than employing one-off needs assessment and evaluation methods.

T&E staff were involved in creating the SC Statewide Resilience Plan and anticipates that this process will bring more technical assistance and training requests. Stakeholders have also requested more complex training regarding wetlands and salt marshes to understand scientific and policy information. There is a growing understanding that most government staff and environmental professionals are aware of issues such as sea rise and poor water quality, and focus is shifting to removing barriers, which requires more tailored and long-term training and technical assistance. The growing demand on T&E staff knowledge and skill set, requires highly skilled staff. Truly assisting stakeholders to tackle the many challenges that face the South Carolina coast requires that experienced and skilled staff build long term, trusting relationships, and is not possible with part time staff or interns.

The ACE Basin T&E is advised by key partners and stakeholders through an advisory group equivalent process by active participation in several coordinating committees. As described above, T&E is active in the S.C. Coastal Information Network (SCCIN) whose partner organizations include local Sea Grant, Coastal Program, and NOAA representatives among other local coastal information providers. This group fosters inter-agency communication and coordination with respect to outreach to coastal decision-maker audiences. In addition to the SCCIN, T&E participates in several water-quality related coordinating organizations as described above. Members of these groups include Sea Grant and the Coastal Program as well as local coastal community stakeholders. Additionally, T&E as well as other ACE NERR sectors are advised by stakeholders directly through the NERR advisory committee. This committee is comprised of representatives of each sector's constituents as well as constituents of the Reserve as a whole. Over the course of the next five years, T&E plans to remain fully engaged in these committees, using them in an equivalent manner to a true advisory committee.

Monitoring and Evaluation Strategies

The program has traditionally monitored and evaluated training and technical assistance through the performance measures developed by the T&E community.

- Distributing evaluation forms to event attendees to determine overall satisfaction and self-reporting of effectiveness
- Six month follow up evaluations to evaluate mid- and long-term impact.
- Conducting occasional longer term evaluation efforts to evaluate specific projects.

The short and mid-term evaluation objectives for ACE Basin T&E are:

- By 2026 at least 90% of surveyed participants indicate that participating in T&E sponsored events was a valuable use of their time.
- By 2026, at least 90% of surveyed participants indicate they increased their knowledge and/or skills related to reserve priorities.
- By 2026, at least 90% of surveyed participants state that they will use knowledge or skills gained through T&E programs or services in their work.

The current methods and measures are appropriate for evaluating trainings, where participants come in with little prior knowledge and never return to interact with the program. They are also appropriate for evaluating projects that have a discrete end point. However, this does not appropriately evaluate the actual practice of the ACE Basin Training and Engagement Program, nor does it capture the true needs and successes of participants.

Each participant has their own involvement level with the program, ranging from only ever attending one program all the way through attending multiple programs over several years, receiving technical assistance on a variety of projects, collaborating on needs assessment efforts, providing technical expertise, or becoming an instructor. Most technical assistance projects are woven into a network of ongoing projects and training, making it difficult to evaluate work on a project-by-project basis. As such, the program believes that the current methods of monitoring and evaluation are insufficient to truly capture the impact of the program. This is also a missed opportunity to evaluate stakeholder needs and integrate stakeholders into the research process.

Over the next five years, the program intends to create a combined evaluation and needs assessment system, based on the principles of action research, that shifts the evaluation focus from discrete events and projects to evaluating and improving the entire practice of the program. The intent is to develop a system that recognizes participants' long-term involvement and more holistically monitors decision making needs in a community.

Related Objectives and Actions

The following ACE Basin NERR goal, objectives, and actions will drive the efforts of the T&E programs and products from 2026-2031.

Goal 1. Enable South Carolina's communities, residents, and visitors to protect coastal resources.

Objective 1. Coastal decision-makers have the locally relevant, science-based knowledge, skills, and training required to protect coastal resources.

- Conduct formal and informal audience information and training needs assessments.
- Coordinate a minimum of five trainings annually for decision-makers in collaboration with program partners based on audience needs.
- Ensure that information incorporated into training and resources is science-based and locally relevant.

- Maintain and enhance partnerships for program development and implementation.
- Serve as a resource for information, providing connections between decision makers and local experts and agencies.

Objective 2. Coastal decision-makers and partners have access to technical assistance to address priority areas that align with the NERR management plan.

- Engage decision-makers in collaborative science to address research needs.
- Establish new and maintain existing partnerships with local communities to understand their technical assistance needs.
- Provide technical assistance to communities and partners relating to issues that align with ACE Basin NERR priorities.
- Facilitate coordination among stakeholder groups to promote more informed decision making.

Stewardship Program



Figure 15. Aerial view of the McKenzie Field Station in the ACE Basin.

Program Context

The ACE Basin NERR Stewardship program works to serve both the ecological communities and the human communities within and surrounding the Reserve. Efforts are directed towards resource stewardship and to fostering stewardship among ACE Basin constituents. Stewardship staff work both within Reserve boundaries as well as with surrounding communities to further stewardship goals.

Resource Stewardship

Through the Reserve's resource stewardship efforts, resources of the ACE Basin Reserve are protected, maintained, and enhanced. The Stewardship sector relies on several additional aspects of this Management Plan to guide its resource stewardship activities; the Resource Protection Plan, the Public Access and Visitor Use Plan and, to an extent, the Land Acquisition Plan.

Habitat protection through land protection has long been a cornerstone of the ACE Basin watershed's conservation efforts and is described in detail in the Land Acquisition Plan. The Stewardship sector's role is to represent the Reserve as a partner in the ACE Basin Task Force. Approximately six ACE Basin Task Force meetings are held annually focused on land conservation within the ACE Basin watershed. Current outcomes of cooperative efforts of the ACE Basin Task Force have resulted in over 320,000 acres of the total protected in the project area (1.5 million acres) and protection efforts are active and ongoing.

The Reserve's Stewardship Sector is responsible for managing two of the designated Wildlife Management Areas (WMA) within the Reserve's boundary; the Saint Helena Sound WMA/Heritage Preserve which contains islands within the core area of the Reserve, and the South Fenwick Island WMA. Stewardship staff develop and implement property-specific management plans, which serve as the overarching guidance for management of these properties.

The Reserve employs habitat management and enhancement techniques to ensure high quality habitats persist. These efforts are discussed in detail in the Resource Protection Plan. The Stewardship sector's role in habitat enhancement is to plan, direct, and implement habitat enhancement efforts within the Reserve, and to provide related information and assistance to partners.

Visitation and public use are growing aspects of the Reserve's management and the Reserve strives to achieve a balance between facilitating access and maintaining ecological health. The Reserve's Stewardship sector is responsible for maintaining and enhancing the public usability of the Reserve, while also considering the impacts of use on key habitats and species. This includes developing and maintaining public access points, providing visitors with information about use, ensuring safety of public access areas, as well as engaging in visitor as well as species and habitat monitoring. More detail about public use within the Reserve can be found in both the Public Access and Visitor Use Plan and the Resource Protection Plan.

Fostering Stewardship

The Stewardship sector also places a great emphasis in fostering stewardship among others. The Reserve alone cannot fully protect coastal resources; constituents need to be engaged in protection efforts at a variety of scales as well. The Stewardship sector aims to increase awareness and knowledge of natural resources by the general public through a variety of ways described below. The Reserve seeks to understand the community's information needs, efficiently and effectively deliver information, and coordinate with partners to effect common goals. Priority audiences for stewardship-related outreach include other state, federal, and local agencies, the ACE Basin NERR Advisory Committee, stakeholders of the ACE Basin watershed, Reserve and SCDNR volunteers, and the general public. The Stewardship sector will continue to identify avenues for partnership and collaboration both within and outside of the Reserve.

It is a priority for the Stewardship sector to be a productive partner to other SCDNR sections. Staff at the McKenzie Field Station provide logistical and technical support to SCDNR's Sea Turtle Program, South Carolina Oyster Recycling and Enhancement Program, Shellfish Research Section, Inshore Fisheries Program, Wading Bird Program, and others. Staff will continue cooperating with and providing support for SCDNR horseshoe crab tagging and surveys in the ACE Basin NERR. The Stewardship staff will support the work with SCDNR Coastal Bird Program to continue and enhance current coastal bird awareness and education in and near the NERR.

In collaboration with the other Reserve sectors, the Stewardship sector coordinates with other federal, state, local, and private organizations for outreach and research and monitoring projects. Outreach offerings are hosted in collaboration with a variety of partners including SC Audubon, The Nature Conservancy, SC State Parks, the Nemours Wildlife Foundation, the SC Aquarium, Clemson University, the Lowcountry Institute, Charleston County Parks and others. Visits to the field station are facilitated for groups such as Camp Wildwood (SCDNR), South Carolina Sea Grant Consortium, intern programs from partners in the region (Fripp Island, Hunting Island State Park, Waddell Mariculture Center), as well as eco-tour- based groups which visit McKenzie Field Station as part of their educational focus on the ACE Basin.

The Stewardship sector implements a winter workshop series for ecotour guides surrounding the ACE Basin. This workshop series was created to equip ecotour guides and other nature-based businesses with the information necessary to understand, appreciate, and advocate for natural and cultural resources, which will be implemented within their programs. These workshops are held within Charleston and Beaufort counties and include lectures from experts, hands-on activities, and working discussions on conservation topics such as intertidal zone habitats, fisheries management, and critical species research and management.

The Stewardship sector provides outreach and technical assistance to several partners in the development of Motus Wildlife Tracking Towers. This work is funded by partners, including but not limited to, SC Audubon, National Park Service, Nemours Wildlife Foundation, Port Royal Sound Maritime Center, South Carolina State Park System, and several local communities.

The Stewardship sector also creates opportunities for adult residents and visitors of the ACE Basin to learn about natural resource management issues and advocate for the protection of habitats and species within the ACE community. Service-learning opportunities are created in various formats, including series events, small target group programs, recurring volunteer events, and passive engagement. Many of these adult public programs are held within the Reserve boundary but can extend throughout the ACE Basin watershed in Charleston, Colleton, and Beaufort counties.

The Stewardship and Education sector co-host ACE Basin Fun Days and other public programs, which foster a relationship between the ACE Basin NERR and the public while increasing stewardship of South Carolina's natural resources. Events highlight managed properties, research projects, and expertise of local natural resource professionals. They address topics ranging from ACE Basin NERR, water quality protection issues, habitat protection, the value of protected properties, threatened and endangered species, environmental change and human impacts on coastal wildlife. Spring and autumn programming is offered with approximately 20 events held annually. The 'Bringing the Outside In' virtual programs began during the COVID-19 pandemic as a safe alternative while the in-person events were suspended. Because of the virtual nature of the programming, Stewardship staff was able to reach a much wider audience and staff will continue to offer both in-person and virtual options in the future.

The ACE Basin consists of a wide range of smaller communities and local groups. Besides hosting events that are open to the general public, the Stewardship sector targets and engages these individuals to better understand different needs of the ACE community. For comprehensive and direct educational opportunities, small programs are hosted at various locations within the Reserve, such as the McKenzie Field Station, South Fenwick Island WMA, St. Helena Sound HP/WMA, Donnelley WMA, Bear Island WMA, Edisto Environmental Learning Center, and others. Utilizing the *E/V Discovery*, the Stewardship staff partners with the Education staff to educate local community groups, such as Senior Leadership Programs and Master Naturalists, about the benefits of the estuary and research within the estuary. Other programs target groups within the ACE watershed that have an impact on the estuary and its surrounding habitats and communities. Examples of these programs include pollution prevention and clean-up, conservation of keystone species, or highlighting different cultures and historical events in the Lowcountry.

The Botany Bay Plantation HP/WMA is co-managed by both the Reserve and the Wildlife and Freshwater Fisheries (WFF) Division of SCDNR, with the Reserve's focus on visitor use, volunteers, and providing input on the management of the beach-front related resources including sea turtles, shorebirds, and cultural resources. Botany Bay Plantation HP/WMA is by far the most heavily visited property within the SCDNR system and therefore requires an enhanced effort to educate and manage

visitation and natural resources. To accomplish this, the Reserve's Botany Bay Volunteer Coordinator maintains a core of about 100 volunteers who provide several key functions. They provide education and outreach to visitors about property natural resources, history, and rules and regulations, they issue day passes to visitors, and they assist with general property and infrastructure maintenance and repair. Volunteers contribute a significant number of hours annually and the Reserve relies on their efforts to educate visitors.

Throughout the ACE Basin, the Stewardship sector works to create indirect methods of education for visitors. The Stewardship sector monitors "Picture Posts" throughout the ACE Basin, a citizen science project developed by the University of Oklahoma that seeks to track habitat change over time via pictures submitted from members of the public. Staff also develops and maintains informative signage, trail maps, and other products in collaboration with communications staff.



Figure 16. Clemson students alongside SCDNR staff building an experimental living shoreline.

Program Capacity

The stewardship program core staff consists of the following:

- A Stewardship Coordinator stationed full-time at the McKenzie Field Station
- A Stewardship Biologist stationed full-time at the McKenzie Field Station
- A Natural Resource Technician stationed full-time at the McKenzie Field Station
- A Volunteer Coordinator stationed full-time at Botany Bay Plantation HP/WMA
- An Education Specialist stationed in the Charleston office and splits time between stewardship and education

Additionally, the stewardship program receives support from an administrative assistant as well as a Natural Resource Technician stationed in the Charleston office who supports management activities across all coastal properties managed by the Marine Resources Division as well as oversees the Botany Bay Volunteer Program and Coordinator.

In addition to the core and support staff, the stewardship program benefits greatly from an integrated relationship in the Coastal Stewardship (CSS) section of MRD as well as with SCDNR more broadly. CSS staff are available to support the sector as needed for special projects requiring additional assistance or expertise including building maintenance and land management, communications, and outreach. SCDNR staff are available to consult on special areas of expertise, particularly related to species and habitat management, geology, cultural and historical resources, and marine science.

Program Delivery

Through partnership development, public outreach, and land stewardship projects, the Stewardship sector works to protect and enhance the natural resources within the ACE Basin. The Stewardship sector frequently works with the other programs within the Reserve. The Research sector provides the baseline knowledge and information needed to understand the functions of the estuary that can be shared through outreach programs. Stewardship, Education, and T&E regularly collaborate to develop outreach materials that can be applicable to many audiences. Stewardship also provides for and receives technical assistance and logistical support from the other sectors wherever needed.

The Stewardship sector uses its partnerships to educate the general public about the natural and cultural resources within the ACE Basin and the different functions of the NERR to monitor and protect those resources. One method of doing this is beginning each service-learning program at the McKenzie Field Station with a formal presentation on the ACE Basin NERR. Moving forward, it is a priority of the sector to create new and creative strategies for introducing the public to the functions of the NERR. To do this, Stewardship will continue to seek and create new partnerships with organizations and communities within the ACE Basin.

Program Evaluation

The Stewardship sector collects visitor use data through archery permits, camping permits, visitor logs, and campsite monitoring. As land stewardship progresses, information needed to monitor and assess habitats can include wildlife surveys, controlled burn surface areas, post-disturbance succession monitoring, or invasive and native plant percent cover.

Outreach efforts are evaluated by gathering outputs and outcomes for educational opportunity. Output information gathered includes number of participants, the number of those wait-listed, and audience demographics. Outcome information is gathered via surveys to understand information gain, utilization of information, and desired future offerings by participants.

Needs and Opportunities

As public land acquisition continues to increase within the Reserve, the potential for land stewardship projects also increases. The Stewardship sector currently functions with two full-time staff members located within the Reserve at the McKenzie Field Station. To improve land protection and enhancement and to develop new monitoring efforts, the sector would need additional staff capacity and resources.

To properly understand the anthropogenic impact on wildlife management areas within the Reserve, the Stewardship sector needs to research and develop more comprehensive methods for tracking visitor use. Currently, permit and log collections track how visitor use has changed over time (i.e. number of

visitors or moving from consumptive to non-consumptive uses), but does not provide a holistic understanding of visitor use impact on wildlife and habitat.

Related Objectives and Actions

The following ACE Basin NERR goal, objectives, and actions will drive the efforts of the T&E programs and products from 2026-2031.

Goal 1. Enable South Carolina’s communities, residents, and visitors to protect coastal resources.

Objective 1. South Carolina residents and visitors understand the value of coastal and estuarine ecosystems and take actions to protect them.

- Encourage a stewardship ethic by providing educational and experiential activities for adult audiences at Reserve and partner sites.
- Encourage program participants to make a commitment to protect their coastal areas and resources by providing actionable stewardship practices.
- Deliver science-based, timely, audience-driven information to support the public in understanding, appreciating, and protecting resources.
- Maintain and develop relationships with stewardship partners and resource users to facilitate dialogue between stakeholders and researchers.
- Inventory, evaluate, and update existing publications and resources to increase public knowledge and skills to protect coastal ecosystems.

Objective 2. Volunteers contribute to outreach and citizen science.

- Recruit and train volunteers to participate in outreach, stewardship, and research activities.
- Enhance volunteers’ knowledge and skills by providing hands-on educational experiences about coastal issues.

Goal 2. Advance knowledge about coastal and estuarine ecosystems through research and monitoring.

Objective 1. Broaden the Reserve’s research portfolio by encouraging and enabling non-SWMP research activities.

- Facilitate access to the Reserve for research by providing a field station and logistical support to visiting scientists.
- Track research projects submitted by researchers to better understand the findings and outcomes of each project.
- Participate in local, regional, and national science networks and partnerships to understand current research.

Goal 3. Apply science and stewardship to balance long-term protection of the ACE Basin’s natural and cultural resources with enjoyment by current and future generations.

Objective 1. Protect the coastal and estuarine ecosystems that are under the Reserve’s management.

- Monitor general site condition of Reserve-managed lands.
- Manage Reserve lands principally for the benefit of native wildlife and compatible public uses.
- Respond to events of concern by coordinating with law enforcement, state and federal

agencies, and other partners.

- Support land protection initiatives throughout the ACE Basin watershed.
- Support efforts to assess and update recreational use and land management regulations and policies to ensure that the Reserve's interests are upheld.

Objective 2. Manage ACE Basin lands to promote high quality habitats.

- Develop proactive management strategies and participate in partner-based protection and initiatives.
- Conduct and facilitate resource inventories on Reserve-managed lands.
- Participate in partner-led efforts to monitor, inventory, and manage species of concern.
- Support partners to and lead efforts to identify, monitor, and manage for invasive species.
- Implement and support partners in the implementation of habitat restoration and improvement.

Objective 3. Work to improve understanding of human use and activities on Reserve properties.

- Assess human use and activities on Reserve managed lands.
- Maintain visitor use permits for day-use, camping, and hunting.
- Develop an understanding of use on remote properties with multiple points of access.
- Build and maintain partnerships with ecotour and other commercial outfitters who facilitate nature-based recreation within the Reserve.

Objective 4. Facilitate uses that are appropriate and compatible with Reserve objectives.

- Provide public access for uses that are appropriate and compatible with Reserve and state partner-managed lands
- Promote traditional resource uses (i.e. hunting, fishing, and non-consumptive resource use)
- Facilitate public access by providing access points, signage, trails, and information to guide visitors.
- Provide information to user groups to promote safe, appropriate, and minimally impactful use of Reserve sites.

Administration Plan



Figure 17. Aerial View of the Marine Resources Division offices at Fort Johnson.

Organizational Framework

The administrative framework for the Reserve was developed with recognition of the need for a high level of intra- and inter-agency cooperation and coordination to achieve effective management. This framework is intended to foster cooperation by establishing avenues and regular opportunities for discussion and evaluation of Reserve management programs, issues, and needs, as well as coordinating activities.

Administration of the Reserve is a cooperative state/federal partnership between the National Estuarine Research Reserve System and the South Carolina Department of Natural Resources (SCDNR). The Office for Coastal Management (OCM) within NOAA administers the Reserve System. OCM is responsible for ensuring that the Reserve is managed according to the System's policies and regulations (Title 15 of the Code of Federal Regulations, Part 921), and according to federal grant award conditions, including performance and financial criteria. OCM is also responsible for periodic site visits and evaluations as required by Sections 312 and 315 of the Coastal Zone Management Act of 1972, as amended (CZMA).

The overall operation and management of the Reserve is the responsibility of the Marine Resources Division (MRD) of the South Carolina Department of Natural Resources (SCDNR). A Memorandum of Understanding between NOAA and SCDNR formally recognizes SCDNR as the entity responsible for development and implementation of the management plan, day-to-day operation of the Reserve, and serving as the fiscal agent in receiving and administering funds from NOAA (Appendix A). The mission of the SCDNR is to serve as the principle advocate and steward for the state's natural resources. This

mission is well-aligned with that of the Reserve's; to sustain the ecological health of the ACE Basin's estuaries and provide natural areas for research, education, stewardship, and compatible human uses.

The MRD was designated in 1972 by Governor Robert McNair as the laboratory for coastal zone research in South Carolina. The Marine Resources Division, located in Charleston, SC is one of the largest and most sophisticated marine and estuarine research and management facilities on the East Coast.

MRD is co-located on the same campus at the College of Charleston's Grice Marine Laboratory and NOAA's Hollings Marine Lab.

The Reserve is located programmatically within two sections of MRD (Figure 18), the Coastal Stewardship Section (CSS) and the Marine Resources Research Institute (MRRI). The CSS section generally contains the Division's outreach and land management functions, the marine turtle conservation program, and MRD's Sportfish Restoration programs. Specific to the Reserve, this section houses the Education Program, Stewardship Program, Training and Engagement Program, and Reserve Administration. The MRRI, the research arm of MRD, includes more than 90 marine scientists, biologists, and technicians housed in a cooperative research facility. The Reserve's Research and Monitoring Program is housed within the MRRI.

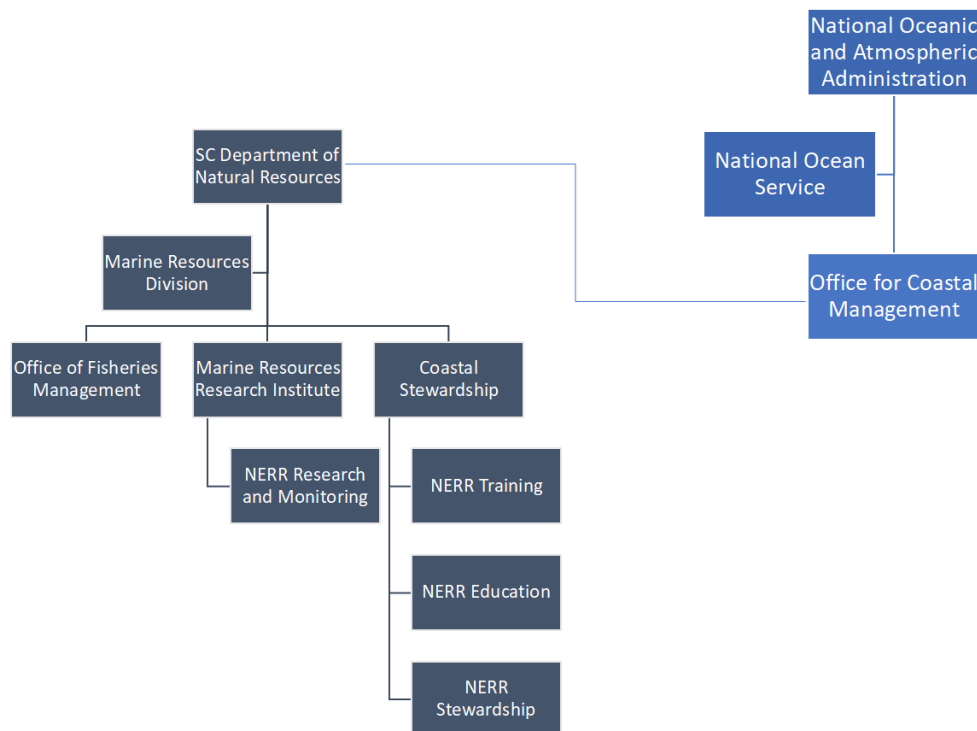


Figure 18. ACE Basin NERR Organizational Framework.

Geographically, the Research and Monitoring, Education, and Training and Engagement sectors of the Reserve as well as most Reserve Administration are located at the MRD headquarters in Charleston, SC. The Stewardship sector staff are housed at the McKenzie Field Station in Bennett's Point, in the heart of the ACE Basin Reserve. The Botany Bay Volunteer Coordinator is housed at Botany Bay Plantation Wildlife Management Area/Heritage Preserve on Edisto Island, SC.

Strategic Partnerships

South Carolina Department of Environmental Services-Bureau of Coastal Management (SCDES-BCM) is the designated lead for the state's Coastal Zone Management Program under the Coastal Zone Management Act. BCM provides surveillance and enforcement to ensure compliance with the Coastal Zone Management Program and the approved management plan. A BCM representative also serves on the Reserve's advisory committee and provides input into the research and educational priorities of the Reserve. The Reserve provides training and support to BCM's coastal management goals as needed.

South Carolina Department of Parks, Recreation, and Tourism (SCPRT)

Edisto Beach State Park, operated by the South Carolina Department of Parks, Recreation, and Tourism (SCPRT), is the location for many of the Reserve's education and interpretive activities. A MOU between SCDNR and SCPRT provides a framework for cooperation to aid, promote and manage interpretive, historical, scientific, educational, and recreational activities based at the Edisto Environmental Learning Center (Appendix B). Programs within the two entities are complementary and, through close cooperation in operating the Edisto Environmental Learning Center, the public's understanding, appreciation, and stewardship of coastal resources have strengthened.

The enabling language of SCPRT specifies that the Agency "promote the general health and welfare of the people of the State by developing and expanding new and existing recreational areas, including the State Park System" (51-1-60; 1967). Edisto Beach State Park is one of the earliest designated parks in the State Park system, established in 1935. Explicit to the State Park Service mission today is to "provide resourced-based recreational and educational opportunities that emphasize the conservation, protection and interpretation of the state's natural and cultural resources." Interpretation has been an important part of the State Park Service since 1968. SCPRT and the Reserve are committed to increasing the percentage of visitors who receive interpretation during their visit to the Edisto Learning Center.

U.S. Fish and Wildlife Service

The Reserve and the U.S. Fish and Wildlife Service (USFWS) are partners through the ACE Basin National Wildlife Refuge (NWR). The Service is also a member of the ACE Basin Task Force (described in the Resource Protection and Land Acquisition Plans), which provides guidance for the ACE Basin Project. The Refuge currently encompasses approximately 18,000 acres, and the complex located in the Edisto River area is within established boundaries of the Reserve.

The Charleston Ecological Services Field Office oversees the South Carolina Coastal Program, which works as an essential partner in the conservation of fish, wildlife, plants and their habitats along the coastal plain of South Carolina and Georgia. The Coastal Program works with state natural resource agencies, NGOs, and private landowners to improve habitat for threatened, endangered, or at-risk species.

Both USFWS and NOAA-OCM programs share the common goals of providing federal leadership and support in protecting, restoring, and enhancing coastal and estuarine resources through management, research, monitoring, and education. This requires a collaborative process involving parties at the federal, state, and local levels, as well as the private sector.

South Carolina Lowcountry Sentinel Landscape

Partners, including the ACE Basin NERR, also established the South Carolina Lowcountry Sentinel Landscape in 2023 to work on protecting ecologically significant areas, drinking water supplies, and working farmlands, all with the goal of maintaining long-term military readiness and climate resilience across the landscape. The South Carolina Lowcountry Sentinel Landscape supports immense biodiversity, encompassing more than 2.2 million acres of longleaf pine forest, ranchlands, salt marsh, forested

wetlands, and unbroken wildlife corridors in the southeastern corner of South Carolina. Adjacent to the ACE Basin NERR, these two entities protect land from the Edisto River to the Savannah River.

Non-Profit Partners

The Reserve maintains a strong working relationship with The Nature Conservancy, Ducks Unlimited, the SC Coastal Conservation League, the Lowcountry Land Trust, the Edisto Island Open Land Trust, and the Beaufort Open Land Trust. These partners have been instrumental in land acquisition negotiations and providing technical, legal, and financial support. These entities are also involved as partners in the ACE Basin Task Force, the group that guides land conservation in the ACE Basin.

Advisory Committee

To provide for effective coordination and cooperation among all interests involved with the Reserve, an ACE Basin NERR Advisory Committee was established following designation in 1992. The committee meets as needed, and the Deputy Director for the Marine Resources Division chairs the committee. The Reserve Manager and other sector coordinators support planning and implementation of meetings. The Chairperson, as needed, may appoint sub-committees to support sectors or Reserve initiatives. The committee strives to represent key ACE Basin stakeholder groups and may consist of representatives from:

- Marine education
- Scientific community
- Local landowners
- Local government
- Environmental interests
- Commercial fishing
- Recreational fishing
- Conservation Non-governmental Organization
- State and Federal agencies active in the ACE Basin
- Private sector

Duties and responsibilities of the Advisory Committee are to:

- Advise the Reserve Manager on matters of policy relating to planning for and operation of the Reserve.
- Provide guidance for establishing priorities for research, education, training, and stewardship efforts in the reserve and review information and educational materials generated by staff.
- Review, monitor and advise on specific program activities conducted in the reserve to ensure that they are consistent with goals and objectives set forth in the management plan.
- Advise ACE Basin NERR on implementation of land acquisition strategies and provide guidance on land protection efforts.
- Review and advise on facilities development.
- Represent the interests of users of the Reserve and its neighbors.

Current Staffing and Needs

An adequate staff is essential to implement the management plan and to achieve the Reserve's research and monitoring, education, training, and stewardship objectives. The Reserve's full-time permanent staff currently includes Reserve Manager, Education Coordinator, Training and Engagement Coordinator, Stewardship Coordinator, Research Coordinator, Research Biologist, two SWMP Biologists, Stewardship Biologist, Natural Resource Technician, two Education Specialists, and Volunteer Coordinator (Figure 19).

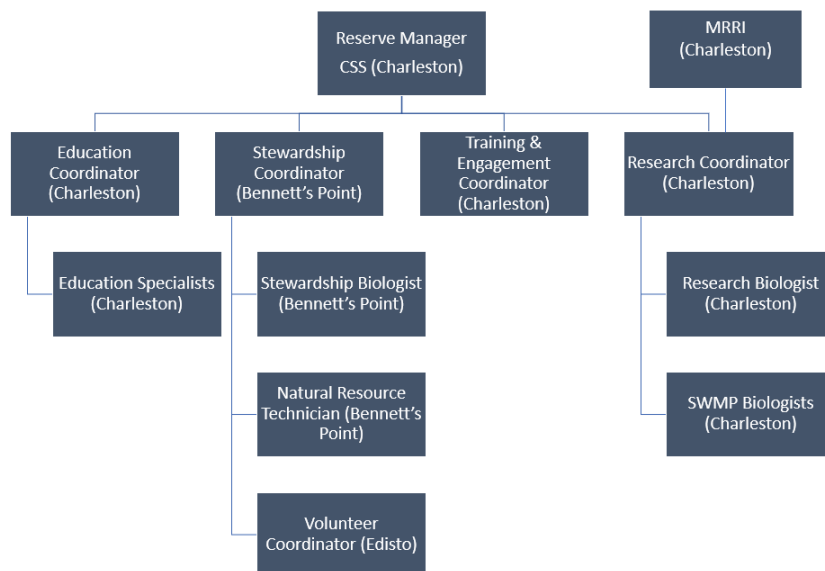


Figure 19. ACE Basin NERR Organizational Chart including Full-time Permanent Employees.

Specific duties and responsibilities of core staff include:

Reserve Manager

- Ensure that the Reserve fulfills its mission, goals, and objectives
- Direct the day-to-day operation of the Reserve program under the broad policy direction of SCDNR's Marine Resources Division
- Seek and administer federal, state, and private grants, contracts, and budget appropriations
- Provide oversight of the Reserve's research, monitoring, education, outreach, and stewardship programs to meet management plan goals
- Maintain responsibility for all activities, lands, and facilities within the Reserve including the McKenzie Field Station and the Reserve's interest in the Edisto Environmental Learning Center
- Serve as liaison to local, state, and federal agencies, advisory councils, and other partners to improve cooperation and coordination in management of the Reserve
- Serve as principal contact and represent the Reserve and SCDNR at state, regional, and national NOAA, NERRS, and CZM program meetings, conferences, and workshops
- Assume principal responsibility for preparation of and implementation of the Reserve's federally approved management plan
- Receive and evaluate input from the Reserve Advisory Committee and citizen groups
- Coordinate with the ACE Basin Task Force and the SCDNR Habitat Protection Committee to identify and pursue funding for key lands for protection
- Oversee site selection, facilities development, land acquisition and changes in Reserve boundaries as needed
- Coordinate special Reserve activities with other sections and divisions within SCDNR
- Oversee the volunteer program and coordinate with SCDNR's Wildlife and Freshwater Fisheries Division on management issues and activities at Botany Bay HP/Wildlife Management Area

All of the Reserve's Sector Coordinators share several common responsibilities:

- Coordinate with Reserve Manager and other Sector Coordinators to develop and implement initiatives which further the goals of the Reserve management plan
- Represent the Reserve at regional and national NOAA, NERRS, and CZM meetings, conferences, and workshops
- Pursue external funding sources and manage grants and contracts related to Reserve priorities

- Provide training and supervision of staff, students, and volunteers who support the sector
- Coordinate and collaborate with other Reserve sectors and Reserve Manager as appropriate to ensure consistent messaging and integration of science-based information into programming and resources
- Develop and maintain partnerships to enhance programs
- Collect data and prepare reports to satisfy NERR and SCDNR reporting requirements
- Seek training, formal or informal, that expands skills, knowledge, and capabilities appropriate to the position

Research Coordinator

- Coordinate research, monitoring, and habitat mapping activities at the Reserve in accordance with the Reserve management plan as well as NERR and SCDNR mandates and protocols
- Design, conduct, and/or supervise research and monitoring activities that address Reserve priority issues as well as local, state, regional, and national coastal management needs
- Develop and maintain working relationships with other reserves, research institutions, laboratories, universities, and related organizations
- Facilitate use of the Reserve for research by making information, equipment, and resources available to researchers
- Administer Reserve research permits
- Maintain the Reserve's scientific equipment and research and monitoring databases
- Coordinate with appropriate sector staff to develop and disseminate information about the Reserve's research and monitoring activities and findings to target audiences including scientific and coastal management communities
- Work with Stewardship staff to identify, prioritize, and plan research projects to address resource management needs

Education Coordinator

- Coordinate education activities at the Reserve in accordance with the Reserve management plan as well as NERR and SCDNR mandates and protocols
- Develop, oversee, and conduct educational programs of the Reserve, NERRS, and SCDNR for students, teachers, environmental educators, and general audiences
- Develop and disseminate educational materials and resources related to SCDNR and the Reserve's priority issue areas
- Participate in the development of interpretive exhibits and materials related to the Reserve and coastal resources
- Coordinate marine and estuarine education efforts in the ACE Basin watershed and nearby communities with related SCDNR offices (Coastal Stewardship, Office of Education, Outreach, and Information), SCPRT, and other key partners
- Serve as the primary contact for education and interpretation in the Reserve
- Provide training and supervision of volunteers who assist in education programs

Training and Engagement Coordinator

- Coordinate training, technical assistance, and stakeholder engagement activities at the Reserve in accordance with the Reserve management plan as well as NERR and SCDNR mandates and protocols
- Enhance decision-maker understanding of scientific information and current best management practices by providing technical assistance and by developing new or providing access to existing science-based training and resources

- Provide training and social science assistance to meet specific needs of SCDNR employees and programs
- Enhance decision-maker understanding of scientific information and current best management practices by providing access to science-based training, technical assistance, and resources
- Conduct formal and informal census of audience needs
- Maintain relationships with partners through participation in common initiatives and actively seek relationships with new partners to advance common goals
- Promote collaboration between the Reserve, local governments, the private sector, and other key stakeholders
- Ensure that T&E programs reinforce the core concepts found within research, stewardship, and education programs

Stewardship Coordinator

- Coordinate land protection and management activities at the Reserve in accordance with the Reserve management plan as well as NERR and SCDNR mandates and protocols
- In coordination with the education coordinator and specialist, plan and implement stewardship outreach to ACE Basin audiences
- Manage the Saint Helena Sound HP/Wildlife Management Area and the South Fenwick Island Wildlife Management Areas
- Oversee operation of the McKenzie Field Station
- Provide education and outreach regarding the Reserve and priority issues to groups visiting the Reserve and/or the Field Station
- Work with community leaders and local stakeholders to conduct periodic formal and informal census of stewardship needs
- Facilitate access to Reserve facilities and lands for partners, researchers, and others
- Provide opportunities for involvement of other sectors in activities of the stewardship program
- Act as Reserve liaison to partners and stakeholders in the ACE Basin

Research Biologist

- Coordinate and implement the Reserve's long-term monitoring programs
- Coordinate and implement the Reserve's habitat mapping effort
- Provide support for researchers working in the Reserve
- Primary responsibility for collection, quality control, and storage of Reserve research data
- Assist with preparation of NERR research reports

SWMP Technician

- Responsible for day-to-day implementation of the SWMP Program
- Maintain associated field and laboratory equipment
- Collect and report high-quality data

Stewardship Biologist

- Manage day-to-day onsite operation of the McKenzie Field Station
- Coordinate field support and accommodations for researchers, partners, university groups and others utilizing the Field Station and the Reserve
- Provide field support for Reserve sectors as needed
- Provide educational support for the education and stewardship sector programs within the Reserve as needed and for groups utilizing the field station

- Coordinate the maintenance and use of Field Station equipment, boats, vehicles and other assets
- Perform resource management activities to maintain or improve habitat such as species monitoring, prescribed burning, mowing, discing, invasive species control, and other activities as approved for environmental compliance
- Maintain safe public access to Reserve sites including installing signage, maintaining and improving access areas, and surveilling Reserve lands to ensure compliance with SCDNR rules and regulations

Education Specialists

- Support the Education sector by implementing K-12 education programs as well as teacher workshops
- Support the Stewardship sector by developing and implementing public outreach activities and resources
- Enhance coordination between the Education and Stewardship sectors
- Formally and informally assess ACE Basin audience information needs
- In coordination with the Stewardship Coordinator, develop and implement a public event series for general audiences focusing on Reserve related priority issues

Volunteer Coordinator

- Develop and implement the volunteer program throughout the Reserve
- Supervise volunteers who are performing outreach, maintenance, and property management functions
- Track volunteer service and time
- Coordinate with SCDNR's Wildlife and Freshwater Fisheries Division to assist with day-to-day management of Botany Bay HP/WMA
- Develop and disseminate outreach materials related to Botany Bay

In addition to core responsibilities, Reserve staff work plans enable assisting others with tasks that may fall outside of the direct scope of work as needed.

The Reserve enjoys a highly collaborative relationship with other SCDNR MRD programs. Because of this relationship, the Reserve also receives support from several other full and part-time positions that are shared among other functions within MRD. The positions include: education assistants that support education programming, an administrative assistant to support operation of the McKenzie Field Station, a natural resource technician to support the Botany Bay volunteer program as well as provide field assistance to the Stewardship program, several biologists to support Reserve research and monitoring programs, and a communications specialist to support all Reserve programs and communication needs. The Reserve also regularly partners with the College of Charleston to utilize graduate research assistants.

The Reserve has grown in terms of staffing over the last several years which has allowed for expanded programming. However, areas for growth remain and the Reserve should work towards identifying funding and collaboration opportunities to implement them. Staffing needs listed below are not necessarily in order of priority and are subject to change based on priority needs at the time of funding:

Training and Engagement Program Specialist: The T&E sector staffing has remained relatively static since its inception with one full-time coordinator and an occasional part-time assistant or graduate student. There is great potential to expand services as the program expands audiences to include groups not

previously targeted such as real estate agents and marine contractors. A full-time specialist is needed to continue the program's growth.

Assistant Reserve Manager: The purpose of an Assistant Manager would be to support the Reserve Manager in day-to-day operation of the Reserve, implementation of the Reserve's management plan and annual work plans, and ensure compliance with SCDNR and NERR performance measures, protocols, and requirements. The addition of an Assistant Manager would allow for increased engagement with the NERR community as a whole and would benefit the Reserve through implementation of new projects and initiatives.

Communications Specialist: While the reserve receives support from the communications staff of SCDNR, there are many additional needs. The addition of a Communications Specialist would allow reserve staff to create more science communication products and messaging to foster stewardship of our estuaries and the Reserve. With online platforms, the capability of reaching more audiences is endless with a devoted staff member.

Objectives and Actions

The goals, objectives, and actions that the administrative functions of the Reserve contribute to most directly are listed below. In addition to participating in these specific actions, administrative staff play a key role in implementing all goals, objectives, and actions, employed by the Reserve by helping to establish priorities, identify and allocate resources, and facilitate communication.

Goal 3. Apply science and stewardship to balance long-term protection of the ACE Basin's natural and cultural resources with enjoyment by current and future generations.

Objective 1. Protect the coastal and estuarine ecosystems that are under the Reserve's management.

- Monitor general site condition of Reserve-managed lands.
- Manage Reserve lands principally for the benefit of native wildlife and compatible public uses.
- Respond to events of concern by coordinating with law enforcement, state and federal agencies, and other partners.
- Support land protection initiatives throughout the ACE Basin watershed.
- Support efforts to assess and update recreational use and land management regulations and policies to ensure that the Reserve's interests are upheld.

Objective 2. Work to improve understanding of human use and activities on Reserve properties.

- Assess human use and activities on Reserve managed lands.
- Maintain visitor use permits for day-use, camping, and hunting.
- Develop an understanding of use on remote properties with multiple points of access.
- Build and maintain partnerships with ecotour and other commercial outfitters who facilitate nature-based recreation with the help of a full-time Communications Specialist for the Reserve.

Goal 4. Enhance the capacity of the Reserve to contribute to the ACE Basin community, SCDNR, and the NERRS through effective operations and communication.

Objective 1. Coordinate and collaborate to advance common goals of the ACE Basin NERR and partners.

- Engage fully in the ACE Basin NERR Advisory Committee and sector-specific committees.
- Ensure that the NERR Advisory Committee includes representation from all regions of the watershed and from key stakeholder groups.
- Participate fully in partner coordination networks (i.e. ACE Basin Task Force, the South Carolina Coastal Information Network, SCMEA, etc).
- Participate in initiatives of common interest with partners.
- Share expertise and resources with Reserve staff and partners.
- Provide high quality facilities, equipment, and services for partners.

Objective 2. Reinforce programmatic connections between the Reserve and NOAA/OCM as well as other Reserves.

- Coordinators attend the NERR Annual meeting as well as sector meetings.
- Staff serve on Reserve-level and sector-level committees as appropriate.
- Appropriate staff participate in NERR/NOAA regional meetings.
- Communicate with site liaison to develop annual cooperative agreements and performance reports.

Objective 3. Constituents and partners recognize staff as leaders in their programmatic area.

- Provide staff opportunities to maintain current skills and develop new knowledge and skills that support their role.
- Staff participate in core required trainings each year as well as strive to participate in a minimum of two additional trainings per year appropriate to their role and responsibilities.
- Encourage staff to participate in local, regional, state, and national workgroups and committees.
- Promote Reserve programs and expertise through participation in local, regional, and national conferences.

Objective 4. Provide the administrative structure needed to fulfill the Reserve's mission.

- Ensure adequate funding and staffing to accomplish the full range of responsibilities of the NERR program.
- Provide an administrative structure that encourages sector integration.
- Use a collaborative process to make decisions about Reserve strategies and direction.
- Ensure a safe work environment by providing staff and volunteers with workplace safety procedures, training, and equipment.

Facility Development and Improvement Plan

Current Facilities

The ACE Basin NERR's facilities provide functional space for the Reserve's work and programming. The Reserve is involved in several facilities in a variety of capacities: the Michael D. McKenzie Field Station, the Edisto Beach State Park Environmental Learning Center, the Marshlands House, and the Marine Resources Research Institute at the SCDNR Marine Resources Division Headquarters in Charleston, and the office building at Botany Bay Plantation HP/WMA (Figure 10). This section describes these facilities as well as addresses challenges and needs.



Figure 20. ACE Basin NERR Facilities.

Michael D. McKenzie Field Station – Bennett's Point, Colleton County, SC

The Reserve established the Michael D. McKenzie Field Station at Bennett's Point, Colleton County, SC (Figure 21) in 2003 as a "gateway to the natural environment." This core facility is the on-site headquarters for a number of Reserve staff and is a staging area for research and educational activities in the Reserve. It is located on Mosquito Creek in the community of Bennett's Point within the ACE Basin Reserve. Bennett's Point is a very small, rural community that houses several permanent residents, second homes and a seafood market, public boat landing, and fire station.



Figure 21. The McKenzie Field Station.

The Field Station is a 4,100 square foot, mixed-use building which contains offices, a classroom, a laboratory, and dormitory space. The building's design includes sustainable elements. The three office rooms can support work stations for at least four staff members and currently house the Stewardship Coordinator, Stewardship Biologist, Natural Resource Technician, and a work station for the Reserve Manager or other staff working temporarily at the Field Station. The classroom serves to support education and outreach functions as well as Reserve and partner meetings and capacity is 40 people. The wet/dry laboratory supports research for SCDNR and other visiting scientists as well as education opportunities. The capacity of the dry laboratory is 35 people and the wet laboratory is 10 people. The dormitory space includes two rooms, each accommodating six guests, as well as a kitchenette.

In addition to the main building, the station also includes an outdoor classroom which was constructed in 2006 to add capacity for educational programming, a pole shed for safely storing boats and other equipment, and a dock. The dock is on Mosquito Creek and consists of a 40-foot aluminum gangway and a 20-foot floating dock attached to steel pilings. The dock is used to accommodate the Educational Vessel *Discovery* as well as other Reserve boats and SCDNR and other visiting Research vessels. The Reserve's meteorological station is also located on-site.

The following boating equipment is housed at the Field Station: a 30' CAMI Landing Craft, a 28' Skiff, a 18' McKee craft, 17' Boston Whaler, a john boat as well as the associated motors and trailers. Other equipment includes: two Coastal Stewardship Section pool vehicles, John Deere tractor, two trailers, Kubota mower, Honda rancher ATV, Fimco boomless sprayer, Stihl gas trimmers, Stihl electric backpack blower, and two chainsaws.

The Reserve operates and maintains the Field Station through its operations award. Staff from the stewardship and administrative sectors are responsible for maintaining the facility and for managing the activities taking place therein.

As the facility is nearly 20 years old, major repair and maintenance needs are emerging. First and foremost, the facility is constructed along a low bluff on Mosquito Creek, which is severely eroding. Adjacent neighbors have addressed the erosion through a variety of stabilization methods, which has only increased the rate of erosion in front of the Field Station. The erosion is nearing the point of major structural damage to the dock and gangway. In July 2021, the Reserve received a NOAA PAC award to address this erosion using a hybrid approach of a stabilizing seawall and living shoreline and the project was completed in 2026.

The second major need is an overhaul of the existing geothermal HVAC system. Although the system was considered forward-thinking and sustainable at the time of construction, it has proved problematic and relatively inefficient over the years. Essentially, the unit is designed to pump groundwater through a network of pipes underneath the facility for heating and cooling purposes. The heavy concentration of minerals and other elements in the groundwater render the pumps less effective and more prone to failure than should be expected. When considering its longevity, the Reserve also has to contend with sea rise and the possibility of saltwater intrusion into the groundwater table, which would be catastrophic for the system. Compounding the issue is that the required pumps are no longer manufactured, requiring replacements to be custom-built, an expensive and time-consuming process. Additionally, despite multiple measures to mitigate freezing temperatures, the outdoor water pipe system suffers breaks each year due to freezing. Ultimately, the system needs to be replaced with a high-efficiency standard HVAC system or with an alternative heating and cooling system. The Reserve has received funding and is working with SCDNR maintenance managers to replace the systems.

Edisto Environmental Learning Center – Charleston County, Edisto Island, SC

The ACE Basin NERR, in cooperation with the South Carolina Department of Parks, Recreation, and Tourism (SCPRT), designed and built a Learning Center specializing in estuarine education and interpretation in 2003 (Figure 22). The Center is located at Live Oak Landing within the Edisto Beach State Park on Edisto Island, SC. Edisto Island is a rural sea island community in close proximity to the tourist destination of Edisto Beach.



Figure 22. The Edisto Environmental Learning Center.

The Learning Center is operated by the SCPRT within the Edisto Beach State Park, and the Reserve maintains a MOU with SCPRT (Appendix C) to outline current roles and responsibilities as well as to foster cooperation in providing educational programming.

The Learning Center is approximately 7,500 square feet and includes offices, a conference room, an exhibit hall including an aquarium, a classroom, restrooms, outdoor decks, interpretive trails, and a dock. Dormitories were added at a later date to accommodate seasonal staff, interns, visiting researchers, and partners. The building contains sustainable elements and was designed with minimal environmental and viewshed impact, and it is designated a LEED Platinum building.

This facility provides a location for diverse indoor and outdoor educational programs and exhibits that encourage the responsible exploration, use, and stewardship of coastal resources by fostering awareness and appreciation of the ACE Basin. Explicit to the mission of this facility is the provision for natural resource-based recreational opportunities with emphasis on conservation, education, and interpretation of the natural, cultural, and historical resources of the ACE Basin.

Currently, no Reserve staff are permanently housed at the Edisto Learning Center, but the Reserve staff utilizes office space there periodically. The education staff utilizes the Center regularly to provide educational programming, either in the classroom and/or exhibit hall or utilizing the dock for programs on the *E/V Discovery*.

The exhibit hall within the Center provides context to the visitor about the ACE Basin including natural and cultural history, key species, NERR research, and promotes a sense of coastal resource stewardship. Most of the exhibits are approaching twenty years old and in need of updating. In the last twenty years, best practices for exhibit design have changed and advancements in technology have improved the way in which visitors interact with content. In 2022, the Reserve and SCPRT staff worked together to create a SWMP water quality exhibit and are planning for exhibit upgrades in the future.

Marshlands House – Charleston County, Charleston, SC

The Marshlands House (Figure 23) is a former plantation home located on the SCDNR Marine Resources Division campus at Fort Johnson on James Island in the Charleston metro area. It was constructed in 1810 as a plantation home along the Cooper River before it was barged to its current location to serve as office space for the state agency.



Figure 23. The Marshlands House.

Currently, the building contains seven shared offices, a classroom, and storage space. Additionally, an outdoor classroom is adjacent to the Marshlands House and is utilized often for educational programming. The Marshlands House is the headquarters for MRD's Coastal Stewardship (CSS) Section, and as such houses offices for the Reserve Manager, Education Coordinator, Training and Engagement Coordinator, and those two sector's support staff members. The building is maintained on a day-to-day basis by MRD support staff and operations funding is shared among programs associated with CSS.

There is no Reserve equipment stored at the Marshlands House, but the 45' *E/V Discovery* is stationed in the boat slip at the Fort Johnson campus.

As Reserve staffing grows, especially in education and outreach capacity, additional office space will be required. The Marshlands House is currently at capacity, so creativity will be required to either manage the existing space to accommodate more workstations or to utilize other SCDNR or partner space.

The Marshlands House, like many other buildings on the Fort Johnson campus, is situated adjacent to the Charleston Harbor, and is threatened by sea rise. This issue is further discussed in the MRRI section below.

Marine Resources Research Institute – Charleston County, Charleston, SC

The Marine Resources Research Institute (MRRI) houses the research arm of MRD. It is a 50,000 square foot building that contains 18,000 square feet of wet and dry laboratory space, a classroom, an auditorium, a computer center, and the College of Charleston's Marine Resources Library (Figure 24). It was constructed in 1972 with an addition in 1977.



Figure 24. Left: MRRRI Building entrance. Right: MRRRI building and adjacent marsh and living shoreline.

The Reserve's research sector staff offices and laboratories are stationed in the MRRRI building. All Reserve staff utilize the classroom and auditorium for various meetings and educational programming. The building is maintained on a day-to-day basis by MRD support staff and operations funding is shared among programs associated with the MRRRI.

Reserve research equipment housed within the MRRRI includes a dedicated office space for the coordinator and biologists, a dedicated research laboratory, and a shared research laboratory. The dedicated research space allows for calibration of the data sondes and storage of all equipment. The shared space houses the fluorometer and acid bath used for preparing nutrient samples, running chlorophyll and acid washing nutrient bottles. Two research vessels are devoted to the ACE Basin research staff use including a 20-foot privateer and a 20-foot privateer with a cabin.

The Fort Johnson campus property is experiencing a range of shoreline issues. The portion of the shoreline from the Administration building to the Grice Marine Laboratory has been hardened with bulkheads and/or large riprap. The area in front of the MRRRI and Marshlands House is experiencing saltwater encroachment. In particular, the MRRRI building, in places, is only a few feet away from the critical area and some saltwater encroachment is occurring during Kings Tides. To the west of the Marshlands House, the shoreline is primarily undeveloped, but this area is experiencing significant erosion of a forested bluff. Flooding and storm surge are a significant concern for MRD with numerous living shorelines installed along the north facing shoreline to increase the marsh platform and provide some protection; however, additional measures will be necessary. The agency completed a shoreline stabilization project in 2026 to limit the intrusion adjacent to the building and has created a campus-wide master plan to prepare for future scenarios.

The Office at Botany Bay Plantation Heritage Preserve/Wildlife Management Area - Charleston County, Edisto Island, SC

Botany Bay Plantation Wildlife Management Area/Heritage Preserve contains a former property owner's home that is currently used as the on-site office building (Figure 25). The building contains three offices, a kitchen, and living space for up to three temporary employees or interns. The Reserve's Botany Bay Volunteer Coordinator is stationed here.



Figure 25. Office Building at Botany Bay Wildlife Management Area and Heritage Preserve.

The building is operated by SCDNR's Wildlife and Freshwater Fisheries (WFF) Division with support from the Reserve in terms of volunteer time, effort, and donations. Additionally, the Reserve supports routine building operation and maintenance funding as needed and appropriate.

In addition to the building, the Reserve coordinates with WFF to maintain trail networks and interpretive signage across the 4,687-acre property. Reserve equipment housed at Botany Bay includes a Kubota gator and interpretive signage.

The office space is sufficient for one staff member and no additional needs beyond routine maintenance and upkeep are foreseen.

Planned Facilities

The vision of the ACE Basin NERR involves a network of interpretive, educational, recreational, and research facilities throughout the ACE Basin. There are many currently existing facilities within the Reserve today, either operated by the Reserve, operated in partnership with another entity, or operated by partners. They include but are not limited to: the McKenzie Field Station (ACE Basin NERR), the Edisto Environmental Learning Center (SCPRT), Hunting Island State Park (SCPRT), Donnelly and Bear Island Wildlife Management Areas (SCDNR WFF), Botany Bay Plantation Wildlife Management Area/Heritage Preserve (SCDNR WFF and ACE Basin NERR), and the ACE Basin National Wildlife Refuge (U.S. Fish & Wildlife Service).

Because of this network of opportunities for recreation, interpretation, and learning within the ACE Basin NERR, at this time, the Reserve does not anticipate the development of new facilities, but rather a focus on updating existing facilities and addressing resiliency issues. However, should the need for facility development arise, the following guidelines will be followed:

The ACE Basin NERR's facilities are created and operated to meet the goals of the Reserve while protecting natural resources to the maximum extent possible. Thus, the Reserve will be guided by the following set of principles in development of facilities:

- All facilities will, at a minimum, comply with the requirements of the Americans with Disabilities Act.
- Facilities and access routes will create minimum visual or environmental impacts.
- To the greatest extent possible, facilities will be designated and located to support multiple Reserve goals.
- Planning for any significant new facility will solicit input from representatives of groups expected to use or be affected by the facility including Reserve staff, local advisory committees, local government, site users, and local residents.
- Wherever possible, facility construction will incorporate sustainable design elements, strive for energy efficiency, and anticipate advances in technology.
- Planning for any significant new facility will consider long-term resilience to flooding and changing environmental conditions.

Resource Protection Plan



Figure 26. Aerial photo of the salt marsh.

The resource protection plan is a required element of the management plan, per the Code of Federal Regulations, 15 CFR 921.13. The Reserve System regulations (15 CFR 921.1) specify that reserves shall be open to the public to the extent allowed by state and federal law; multiple uses are allowed to the degree compatible with reserve purpose and use levels prescribed in the management plan; and the management plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited.

Management Authority

ACE Basin NERR management and statutory authorities are derived from federal and state sources including:

- Coastal Zone Management Act (CZMA) Section 315, Federal Code of Regulations 15 CFR 921,
- South Carolina 1976 Code of Laws Section 50 – Fish; Game and Watercraft
- South Carolina Code of Laws Section 51-17; Heritage Trust Program
- South Carolina Code of Regulations, Chapter 123 Department of Natural Resources
- Department of Natural Resources Policy #203.04 – Recreational Use of SCDNR Properties
- National Estuarine Research Reserve System Strategic Plan

Additionally, the coastal resources of the ACE Basin NERR are protected by regulations and policies implemented under the South Carolina Coastal Zone Management Program, executed under the SC Coastal Management Act in 1977.

Critical Area Alterations - The SC Coastal Management Act defines the critical area as all coastal waters, tidelands, beaches, and primary ocean front sand dunes within the coastal zone of the state. A permit is required for any activity that impacts a critical area. Essentially, the policies for wetland areas prohibit permanent alteration of productive salt, brackish, or freshwater wetlands unless there is an overriding public interest, no feasible alternatives, and all environmental impacts are minimized. Regulated activities include not only major activities such as dredging and filling, but also activities such as pipelines, power lines, docks, piers, intact structures, and many others.

Upland Alterations (Non-Critical Areas) - The Federal CZMA and the SC Coastal Management Program require consistency of all direct and regulated state and federal activities that occur in the designated coastal zone of South Carolina. This includes the entirety of all eight coastal counties. Therefore, any activity that requires a state or federal permit must undergo a CZM consistency determination by SCDES-BCM before the permit can be issued by the issuing state or federal agency. The policies used to make a consistency determination are like those required for critical areas. The entirety of the ACE Basin NERR falls within the coastal zone of SC, and much of it falls within the critical area. Therefore, any activity that requires a Section 404, Section 401, Wastewater, Air Quality, Landfill, State Navigable Water, or U.S. Coast Guard Bridge permit must be consistent with the CZM Program as well as specific policies of the NERR.

Management Philosophy

The ACE Basin NERR resource protection plan provides a coordinated, proactive framework to address Reserve responsibilities as well as the federal and state obligations outlined above. We seek to maintain a healthy, productive, and resilient ecosystem, maintaining and enhancing these resources in the face of natural and human stressors. Management decisions will consider ecological, economic, and social factors in determining how to best maintain and enhance natural resources and will also consider the guiding principle that the Reserve facilitates compatible human uses per SCDNR policy #203.04.

Areas where the Reserve exercises primary management authority are managed according to specific policies designed to protect the habitat integrity while allowing for continuation of appropriate and compatible uses (see Allowable and Unallowable Uses section below). Management of formally designated and protected conservation areas within the Reserve boundaries (i.e. Wildlife Management Areas and Heritage Preserves) is conducted according to established site-specific management plans. In general, management includes trail and other public access maintenance, invasive species management and control, prescribed burning to manage habitats, fostering native plants, timber management, and setting of hunting and camping seasons and restrictions. Private lands formally protected through conservation easements, management agreements, etc. in the Reserve are managed exclusively according to guidelines established in said agreements and by the organization holding the easement.

The Reserve's general management approach to common concerns is outlined below. This list is not necessarily comprehensive, nor is it static. The Reserve maintains the flexibility to develop and implement actions around new issues as they arise.

Traditional Uses – Traditional recreational and commercial uses of natural resources within the Reserve shall be allowed to continue as long as they do not disrupt the natural integrity of the site or interfere with research and educational activities. Traditional uses include hunting for migratory game birds including waterfowl, white tail deer, wild turkey, mourning dove, bobwhite quail, and other game species; wildlife viewing, recreational fishing in the rivers, creeks, and impoundments; commercial fishing in Reserve waters; boating, agriculture, and silviculture. Each of these activities is subject to state regulation through required licenses, permits, boundaries, seasons, bag limits, catch limits, size limits, and other laws.

Management of the Reserve does not change the existing laws and regulations concerning these or any other traditional uses of the Reserve. Boundaries of the Reserve will not be used now or in the future to change or relocate established fishing grounds.

Fish and Wildlife – Game and non-game species are managed to preserve overall health of various populations within the Reserve and to maintain important fish and wildlife habitat. Reserve staff work cooperatively with private landowners to establish wildlife management plans. Further, Reserve staff coordinate with and seek the expertise of SCDNR biologists on species and habitat-specific issues.

Endangered and Threatened Species – Areas within the Reserve identified as possessing endangered or threatened species are managed to preserve and protect the species. The presence of an endangered or threatened species does not necessarily preclude compatible uses of an area. The ACE Basin NERR will integrate the protection of natural areas and sensitive species into decision-making and increase relevant scientific knowledge through coordination with appropriate agencies and natural resource experts on requirements of sensitive species.

Wetlands – Wetlands in the Reserve serve to enhance water quality, mitigate flooding, and produce a wealth of productive and diverse habitats. All tidal and non-tidal wetlands including bogs, swamps, isolated freshwater wetlands, tidal and non-tidal impoundments, unvegetated flats, and tidal marshes, located within or along Reserve boundaries are protected. Wetlands are largely intact within the Reserve and should be maintained as such.

Impoundments – The functional resource values of well-managed impoundments are recognized in the context of manipulated wetland ecosystems. Water level control has historically been used and will continue to be used in the Reserve buffer area for waterfowl management activities. Reserve staff provide technical guidance to private impoundment owners so as to enhance related habitat values to waterfowl and other wetland-dependent species. Construction of new or physical alteration of existing impoundments are regulated through SCDES-BCM. Any such alterations in the Reserve are evaluated under existing authority with careful consideration of effects on the whole system.

Forest Management – Timber management of Reserve lands is directed towards development and preservation of significant old growth stands. Disease, insect or exotic plant control and stand improvement considerations are controlling factors behind timber harvesting. Any harvesting of timber is conducted in accordance with guidelines established by SCDNR and other partnerships in the ACE Basin. SCDNR works with appropriate state and private concerns in developing inventories and evaluations of standing timber in the Reserve. Timber management should meet or exceed Best Management Practices established by the South Carolina Forestry Commission.

Fire – Fire is a natural process in forest ecology and an invaluable tool in wildlife management practices in the region. Any prescribed burning within the Reserve's managed lands will be under supervision of certified prescribed fire managers. Significant resources and structures, which are sensitive to fire damage, will be protected where possible.

Mining and Excavation – Excavation, mining, or removal of loam, gravel, rock, sand, petroleum, or minerals or alteration of topography are not permitted in the Reserve core area except as related to collection of geological and geophysical data. This policy does not affect activities grandfathered in the 1992 Final Management Plan/Environmental Impact Statement. All permits are subject to monitoring by SCDNR's Land and Water Resources Division.

Air Quality – No industrial activities are permitted in the Reserve that have the potential to cause air pollution which exceeds acceptable air quality standards as determined by SCDES. Prescribed burning

of impoundments and forest lands within the established boundaries will continue in accordance with statewide air quality standards.

Shorelines – Shorelines in the Reserve-managed areas are preserved in their natural state and existing condition. Restoration of severely eroded shorelines in key areas will be considered on a case-by-case basis, with every effort being made to mitigate the shoreline using a “living shorelines,” or natural approach to the extent practicable. Additionally, the Reserve’s shorelines may serve as research sites to investigate natural approaches to shoreline management. All activities are evaluated by SCDES-BCM and are subject to permitting.

Disposal of Dredge Materials – Dredge material disposal shall be allowed to continue as a pre-existing use in the buffer but not in the established core area. Such activity will be restricted to existing disposal areas and designated easements. All spoil operations must comply with SCDHEC-OCRM and undergo the specified review process. Spoil disposal sites must be located, designed, and managed to prevent sedimentation of marshes, intertidal flats, and submerged lands. All dredge materials shall be placed in a manner consistent with the best technology available for the protection of resources. All dredging proposals shall be reviewed by Reserve staff and coordinated through SCDES-BCM. Appropriate public input will be solicited during the review process.

Industrial Activities – No industrial activities shall be conducted in the core area of the Reserve, with the exception of commercial fishing. Industrial forest operations may continue in the buffer zone with a recommendation that they meet or exceed BMP’s for the state and fall within existing laws governing such practices.

Manipulative Research – In order to preserve and protect the natural integrity of the Reserve, no manipulative research activities with a significant or long-term impact on Reserve resources will be allowed in the core area.

Cultural Resources

Cultural and Archaeological resources in South Carolina are primarily protected through regulations and policies implemented by the South Carolina State Historic Preservation Office (SHPO), which “encourages responsible stewardship of South Carolina’s irreplaceable historic and prehistoric places.” Additionally, the SCDNR provides archaeological support to agency programs including the ACE Basin NERR through the Cultural Heritage Trust Program.

It is a priority of the Reserve to protect cultural and archaeological resources in perpetuity during both normal and emergency management activities. Therefore, avoidance is the preferred management strategy. Should avoidance of these resources during management activities become impossible, the Reserve will consult with SCDNR Heritage Trust Archaeologists as well as the SHPO.

Some activities conducted by the Reserve have little to no potential to affect historic properties and are categorically exempt from review by the SHPO:

- Routine grounds maintenance such as mowing and tree trimming
- Landscaping such as in-kind paving repair and minor plant removal/replacement
- Rehabilitation of existing trails with in-kind materials
- Paving existing roads or parking areas with grading limited to 0-8 cm (0-3 in.), or repaving with in-kind materials without grading or removal of existing surface

- Placement, maintenance, or replacement of utility lines, transmission lines, and fences within existing easements. If these are new utility lines, transmission lines, and fence posts, an archaeological monitor from SCDNR will be present during ground-disturbing work.
- Routine forestry and timber management activities limited to the following:
 - Plowing existing firebreaks
 - Prescribed or controlled burns where no above ground architecture is present
 - Timber harvesting without mechanical equipment
 - Herbicide application
 - Pesticide application
- Routine roadway, roadside, and drainage system maintenance activities
- Construction or placement of buildings that require minimal site grading 0-8 cm (0-3 in.), no foundations, and no dug footings

During catastrophic events such as hurricanes or wildfires, the Reserve follows guidelines established in SCDNR emergency management plans, with immediate rescue and salvage efforts to preserve life and property being exempt. Currently, the SCDNR strategy is to restore infrastructure as quickly as possible, followed by site evaluations, and timber salvage operations which are guided by the forest management plan.

Immediately after a catastrophic event, Reserve staff will assess obvious damage to historical structures and take preventative measures to reduce further damage. Reserve staff will notify the Heritage Trust Archaeologist, who will coordinate with SHPO and Native American groups to afford seven days to comment on activities. If SCDNR determines that circumstances do not permit seven days to comment, the Archaeologist, SHPO, and Native American groups will be invited to comment during the available time. During the recovery and restoration period, Reserve staff will consult with the Heritage Trust Archaeologist, who will be present on-site, and efforts will be made to avoid impact to cultural and archaeology sites.

Occasionally, previously unknown cultural or archaeological resources may be discovered. These sites will be brought to the attention of the Heritage Trust Archaeologist, and ground activities will cease in the immediate area until consultation with SHPO can occur. Sites will be entered into the Statewide Archaeological site database and they will be evaluated for significance under the National Register of Historic Places Criteria.

If Native American remains or funerary objects are discovered, Federal Law stipulates that Section 3 (d) of the Native American Graves Protection and Repatriation Act (NAGPRA) (P.L. 101-601) shall apply. To address this mandate, SCDNR has developed a standard operating procedure:

- Notification: In the event human burial or skeletal remains are encountered during archaeological activities, SCDNR will immediately stop work within 5 meters of the remains and/or funerary objects, secure the area with caution tape, leave the remains and/or funerary objects in place, place a protective cover over the remains and/or funerary objects (e.g., tarps, plywood), prohibit the use of all media (e.g., social media, photography, video, audio), and implement the following notification procedures:
 - Contact the SC Heritage Trust Archaeologists Meg Gaillard and Dr. Karen Smith by telephone and email [Meg: 803-528-1455, Karen: 803-394-0571] and by email [Meg: GaillardM@dnr.sc.gov, Karen: SmithKY@dnr.sc.gov]. Contact the SHPO [Brad Sauls] by telephone [803-896-6172] and in writing via email bsauls@scdah.sc.gov]. All written correspondence shall be directed to: Brad Sauls, Supervisor of Survey, Registration & Grants, State Historic Preservation Office (SHPO), SC Department of Archives & History,

8301 Parklane Road, Columbia, SC 29223. Should the contact noted above be unavailable, the second contact shall be Elizabeth Johnson, Director, Historic Services, D-SHPO [803-896-6168 and EJohnson@scdah.sc.gov].

o Contact the Local Police Department (Edisto Beach depending on reserve location) by phone [843-549-2211] and Charleston County Coroner's Office by phone [843-746-4030] or Colleton County Coroner's Office by phone [843-549-7852] to report the remains and request a visit to confirm that any human remains present are not modern and/or part of a potential crime scene. If the human remains are modern and/or part of a potential crime scene, the Police will assume jurisdiction over the remains. If the remains are not modern and/or part of a potential crime scene, SCDNR will assume jurisdiction and initiate consultation. SCDNR will request that the Police Department and Coroner's Office not take photographs of the human remains while conducting their assessment.

- Consultation: Within 48 hours of the determination that the human remains are not modern and/or part of a potential crime scene, the following Tribal Nations will be notified. If the human remains can be avoided or protected in place, then this notification is consultation. If the human remains are not in situ, then this notification is for the purpose of initiating consultation under NAGPRA. This will include and email and a phone call to all parties:

- Catawba Indian Nation
Wenonah George Haire, DMD

Tribal Historic Preservation Office 1536 Tom
Steven Road
Rock Hill, SC 29730 (803) 328-
2427 ext 224
wenonah.haire@catawba.com

- Eastern Shawnee Tribe of Oklahoma
Brett Barnes

Tribal Historic Preservation Office Eastern
Shawnee Tribe of Oklahoma 12705 S. 705 Road
Wyandotte, OK 74370
(918) 666-2435 ext. 1845
bbarnes@estoo.net

- Muscogee Nation
Emman Spain
NAGPRA Coordinator

Tribal Historic Preservation Office Muscogee
Nation
PO Box 580
Okmulgee, OK 74447
(918) 732-7733, (918) 732-7852
emspain@muscogeenation.com
Raebutler@muscogeenation

- Alabama Quassarte Tribal Town Historical Program
Brina Willams

Program Director
(405) 452-3987
Brina.williams@alabama-quassarte.org

- **Resuming Activities:** The activity that resulted in inadvertent discovery may resume thirty (30) days after certification by the notified SHPO of receipt of the written confirmation if the resumption is otherwise lawful. The activity may also resume, if otherwise lawful, at any time that a written, binding agreement is executed between the SCDNR and the affiliated Native American tribes or organizations that adopts a recovery plan for the excavation or removal of the objects to be carried out in accordance with the NAGPRA and in consultation with the tribe.

Regarding archaeological research and investigations, the Reserve will encourage research and study opportunities. Archaeological investigations will be allowed when reviewed and approved by the Reserve Manager or designee, the Heritage Trust Archaeologist, and the SHPO. Request by professional archaeologists to work on the property must be submitted via the Reserve's Research Form which collects information on study location and design. The archaeologist must meet or exceed the Standards of the Secretary of the Interior (48 F.R. 44738-44739) and act pursuant to the criteria set forth by the SHPO Guidelines and Standards for Archaeological Investigations.

Allowable and Unallowable Uses

Resource-based recreational activities are encouraged on Reserve-managed properties. Activities may include hiking, wildlife observation and photography, hunting, fishing, camping and other activities compatible with the primary management objectives. These activities may be temporally or spatially restricted as needed to ensure proper stewardship of the natural and cultural resources located within the Reserve and to avoid conflicts with educational programming and research or monitoring.

Appropriateness and Compatibility Determination

Because of the need to balance resource protection with wise use, the Reserve will follow the guidelines set forth in the SCDNR "Recreational Use of SCDNR Properties" Policy. That policy provides a framework for determining appropriate recreational uses of SCDNR properties and provides the procedure for determining if appropriate uses are compatible on a property.

SCDNR defines "appropriate use" as a proposed or existing use on an SCDNR property that meets at least one of the following conditions:

1. The use is a Natural Resources–Dependent Recreational Use, defined as a compatible natural resources use of a property involving: (1) hunting; (2) fishing; (3) wildlife or other natural resource observation; (4) wildlife or other natural resource photography; (5) environmental education; or (6) environmental interpretation.
2. The use contributes to maintaining the essential character and fulfilling the property purpose as described in the Management Plan.

Other General Public Uses that are not natural resources-dependent recreational uses as described herein, and do not contribute to the fulfillment of property purposes or goals or objectives as described in the Management Plan are the lowest priorities for SCDNR property managers to consider. These uses are likely to conflict with Natural Resources-Dependent Recreational Uses and divert property management resources away from the Department's responsibilities to protect and manage fish, wildlife and plants and their habitats, and cultural resources. Therefore, policy and practice have a general

presumption against allowing such uses on SCDNR properties. These uses may be considered on a case by case basis; however, an appropriateness determination must also be made.

A property use is appropriate if the use meets all of the following criteria:

- It is a Natural Resources-Dependent Recreational Use of a property.
- The SCDNR has jurisdiction over the use and therefore authority to permit or allow the use.
- The use complies with all applicable laws and regulations (Federal, State and local).
- The use is consistent with applicable State and SCDNR policies.
- The use is consistent with public safety. If the use creates an unreasonable level of risk to visitors or SCDNR staff, or if the use requires SCDNR staff to take unusual safety precautions to assure the safety of the public or other SCDNR staff, the use is not appropriate.
- The use was evaluated under previous administrative review, was deemed appropriate, and conditions have not changed that would warrant further review (if applicable).
- The use contributes to the public's understanding and appreciation of the property's natural or cultural resources, or the use is beneficial to the property's natural or cultural resources.

The property manager shall consider the above criteria and complete the Appropriate Use Determination Form for each property use subjected to the appropriateness test. The findings shall be forwarded to the appropriate Regional Coordinator and through the chain of supervision to the Deputy Director, or designee, for concurrence. This will serve to promote consistency in determining appropriate uses of SCDNR lands. The SCDNR Director has final authority in appropriate use determinations.

Uses that are determined to be appropriate will then be evaluated for compatibility to determine if the use will be allowed, and under what conditions the use will be allowed. The property manager is required and expected to exercise sound professional judgment in making these determinations.

Compatibility determinations are inherently complex and require the property manager to consider their field experience and knowledge of the property's resources, particularly its biological resources. When a property manager is exercising sound professional judgment, the property manager will use available information that may include consulting with others both inside and outside the SCDNR. At a minimum, the property manager should consider the following questions:

- Will the use materially interfere with or detract from the fulfillment of the SCDNR or Reserve mission?
- Is the use consistent with property goals and objectives in an approved Management Plan or other documents? If the proposed use, either itself or in combination with other uses or activities, conflicts with a property goal, objective or management strategy, the use is generally not compatible.
- Is the use manageable within available budget and staff? If a proposed use diverts management efforts away from the proper and reasonable management of a property or natural resources-dependent recreational use, the use is generally not compatible.
- Will the use be manageable in the future within existing resources? If the use would lead to recurring requests for the same or similar activities that will be difficult to manage in the future, then the use is generally not compatible. If the use can be managed so that impacts to natural and cultural resources are minimal or inconsequential, or if clearly defined limits can be established, then the use may be compatible.
- Can the use be accommodated without impairing priority general public use or reducing the potential to provide high quality recreational use in the future?

- If a use is not compatible as initially proposed, can it be modified with stipulations that avoid or minimize potential adverse impacts, making the use compatible?

The property manager shall consider the above questions, and any other information deemed necessary to make a determination based on sound professional judgment and complete The Compatible Use Determination Form for each property use subjected to a compatibility determination. The findings shall be forwarded to the appropriate Regional Coordinator and through the chain of supervision to the Deputy Director, or designee, for concurrence. This will serve to promote consistency in determining compatible uses of SCDNR lands. The SCDNR Director has final authority in compatible use determinations.



Figure 27. Fishing from the shore.

Allowed and Prohibited Activities

Per South Carolina Statute and Regulations, certain activities are explicitly allowed or prohibited in certain areas. The following is a list of common activities and their status. This list is not comprehensive, and it is subject to change. Users should refer to current State Regulations.

- Bicycling – Bicycles may be ridden on roads open to motorized vehicles, established roadbeds, and designated bicycle trails unless otherwise posted.
- Camping – Camping is allowed only within areas designated as campsites by the Department.
- Consumption of alcohol – Alcoholic beverages may be consumed by a person of lawful age only at a designated campsite, designated facility, residence, or other designated location.

- Firearms – All firearms must be unloaded and secured in a weapons case except while legally hunting.
- Gathering, damaging, or destroying plants, fallen vegetation, animals and fungi - the Department may authorize the collection of certain material upon issuance of a permit.
- Gathering, damaging, or destroying rocks, minerals, fossils, artifacts, geological formations, or ecofacts – The Department may authorize the collection of certain material upon issuance of a permit.
- Hiking – Allowed. The use of all designated trails, except for posted multi-use trails is restricted solely to foot travel and the legitimate activities associated with the pursuit of hiking.
- Horse riding – Allowed, except during any open hunting periods, pursuant to Regulations 123-203 G 1-11.
- Off road Vehicles – Motorized vehicles, all-terrain vehicles, and off-road vehicles may be operated only on open maintained roads and parking areas except as otherwise established by posted notice or as approved by the Department.
- Pets – Pets may enter Department land and accompany an individual on allowed activities if each pet is under actual control of the owner or possessor.
- Special Events, Permit Requirements and Procedures, and Exceptions - A special event permit is required for all events occurring on Department land if one of the following conditions exists: (1) the exclusive use of a facility or a specified land or water area is required; (2) an organized or advertised competition will be conducted; (3) sound will be amplified which may disrupt area users; or (4) temporary structures, other than blinds or common camping equipment, will be erected. Permits may not be issued for events that are commercial in nature, where entrance or similar fees are charged, or where vendors are present for the purpose of selling any items. The Department may refuse to issue a special event permit if the proposed event would: (1) not be compatible with intended uses of the area; (2) result in misuse or damage to facilities, structures or the natural environment; or (3) pose a threat to public health, safety or welfare.
- Swimming – Allowed only in designated areas, which includes any State or Federal navigable waterway abutting or flowing through Department land.
- Use of fire – Open fires may only be started at campsites designated by the Department.

In addition to the above general regulations that apply to designated Wildlife Management Areas, Heritage Preserves, and undesignated SCDNR properties, the following property-specific regulations apply:

South Fenwick Island WMA

- Primitive camping is allowed by permit within designated areas. Permits available from DNR through the McKenzie Field Station.
- Deer hunting by permit only. Permits available from SCDNR through the McKenzie Field Station.
- Property is closed to other users during scheduled deer hunts.
- Archery Deer Hunts October 1-10.

St. Helena Sound HP/WMA (Ashe, Beet, Big, Otter, Warren, Buzzard, and North and South Williman Islands)

- No dogs are allowed on Otter Island.
- Camping by special permit only and on Otter Island only. Primitive camping is restricted to designated areas and will be allowed only between November 1 and April 30.
- Deer hunting by permit only obtained at McKenzie Field Station. No small game hunting.

- Ashe, Beet, Warren, Otter, Big, Buzzard, and North and South Williman Islands: Archery Deer Hunts Sept. 15 - Jan. 1.

Botany Bay Plantation HP/WMA

- No camping is allowed.
- All-terrain vehicles are prohibited except those permitted by the Department for special management activities.
- The Fig Island shell rings are closed to all public access except organized scientific, management or educational activities permitted by the Department.
- Access to the beach is by foot, bicycle, or boat; no horses allowed on the beach. No dogs allowed on the beach. No collection, removal or possession of shells, fossils, driftwood, or cultural artifacts is permitted.
- Sea Cloud Landing on Ocella Creek and all other designated access points are restricted to non-trailer watercraft.
- All hunters, fishermen and visitors must obtain and complete a day use pass upon entering the area and follow instructions on the pass.
- Closed to public access 1 hour after sunset to 1 hour before sunrise except for special events regulated by the Department.
- No person may gather, collect, deface, remove, damage, disturb, destroy, or otherwise injure in any manner whatsoever the plants, animals (except lawful hunting), fungi, rocks, minerals, fossils, artifacts, or ecofacts including but not limited to any tree, flower, shrub, fern, moss, charcoal, plant remains, or animal remains. The Department may authorize the collection of certain material upon issuance of a permit.
- Shore-based fishing, shrimping, and crabbing is allowed only on the front beach and in designated areas.
- The Department reserves the right to close specific areas as needed for management purposes.
- Alcoholic beverages are prohibited on the area.
- Fishing in the Jason's Lake complex and all other ponds is adult/youth catch and release only on designated days. For adult/youth fishing, youth must be accompanied by no more than two adults 18 years old or older. Adult may also fish.
- Hunting in designated areas only. Hunting access by boat is prohibited.
- Archery Deer Hunts Sept. 15 - Oct. 10, Mon. - Sat. during the week of Thanksgiving, Mon. - Sat. during the week of Christmas.
- Still Gun Hunts for Deer: Hunters selected by drawing. Total 3 deer, either-sex but only 1 buck
- Hunters are required to have permit in possession and must sign in and sign out (Name, permit # and deer killed each day) at the designated check station. All harvested deer must be checked in at the designated check station.
- Small Game (no fox squirrels or foxes) Jan. 2 - Mar. 1 (Wed. through Sat. only). Game Zone 3 bag limits. Dogs allowed during gun seasons only.
- Turkey hunting Apr. 1 - May 5. Bag limit 1. Youth hunting by draw only.

Furthermore, to ensure the protection of important wildlife resources and key research areas, entry and harvest of horseshoe crabs is prohibited from the following islands or within 200 yards of their shorelines at any tide stage (Statutory Authority 51-17-40, SC Code of Laws): Otter Island, Warren Island, Ashe Island, Big Island, Beet Island.

Surveillance and Enforcement Capacities

Enforcement of laws and regulations is an essential component of resource protection. SCDNR maintains an active Law Enforcement Division, whose conservation officers patrol coastal lands and waters on a daily basis. ACE Basin NERR staff maintain a relationship with the conservation officers stationed in the ACE Basin area. They are responsive to Reserve needs and there is regular exchange of information between staff and officers.

SCDES-BCM manages enforcement of the CZM Program laws and regulation. Weekly flights and daily routine ground patrolling by enforcement officers represent the first level of enforcement. SCDES- BCM also works collaboratively with SCDNR conservation officers.

Resource Protection Challenges

The size of the ACE Basin Reserve presents a major preventative enforcement challenge. Recognizing such limited coverage, the enforcement philosophy favors “interpretive enforcement” where voluntary compliance is sought by informing users through educational messages before they adversely impact natural resources. Presently, this is accomplished through websites and other electronic communications, signage, and direct contact with users while Reserve staff and SCDNR conservation officers are on patrol.

Resource Protection Objectives and Actions

ACE Basin NERR Strategies and actions pursuant to resource protection goals and objectives are largely led by the Stewardship and Administrative sectors as identified below.

Goal 2. Advance knowledge about coastal and estuarine ecosystems through research and monitoring.

Objective 2. Broaden the Reserve’s research portfolio by encouraging and enabling non-SWMP research activities.

- Facilitate access to the Reserve for research by providing a field station and logistical support to visiting scientists.

Goal 3. Apply science and stewardship to balance long-term protection of the ACE Basin’s natural and cultural resources with enjoyment by current and future generations.

Objective 1. Protect the coastal and estuarine ecosystems that are under the Reserve’s management.

- Monitor general site condition of Reserve-managed lands.
- Manage Reserve lands principally for the benefit of native wildlife and compatible public uses.
- Respond to events of concern by coordinating with law enforcement, state and federal agencies, and other partners.
- Support land protection initiatives throughout the ACE Basin watershed.
- Support efforts to assess and update recreational use and land management regulations and policies to ensure that the Reserve’s interests are upheld.

Objective 2. Manage ACE Basin lands to promote high quality habitats.

- Develop proactive management strategies and participate in partner-based protection and initiatives.
- Conduct and facilitate resource inventories on Reserve-managed lands.
- Participate in partner-led efforts to monitor, inventory, and manage species of concern.

- Support partners to and lead efforts to identify, monitor, and manage for invasive species.
- Implement and support partners in the implementation of habitat restoration and improvement.

Objective 3. Facilitate uses that are appropriate and compatible with Reserve objectives.

- Provide public access for uses that are appropriate and compatible with Reserve and state partner-managed lands
- Promote traditional resource uses (i.e. hunting, fishing, and non-consumptive resource use)
- Facilitate public access by providing access points, signage, trails, and information to guide visitors.
- Provide information to user groups to promote safe, appropriate, and minimally impactful use of Reserve sites.

Public Access and Visitor Use Plan



Figure 28. Volunteers at Botany Bay Heritage Preserve/Wildlife Management Area.

Because of the conservation vision of the original ACE Basin Project members, the ACE Basin region of South Carolina boasts vast expanses of open, publicly accessible land and waterways. As the largest undeveloped estuary on the East Coast, much of the ACE Basin offers the opportunity to experience nature in relative quiet and solitude. Many visitors report that they visit the ACE Basin to get away from the more populated natural areas associated with the Charleston and Beaufort/Hilton Head areas to the north and south, respectively.

Like much of the entire area, the ACE Basin NERR provides the public with valuable sites to pursue recreational interests. The Reserve fosters public use of Reserve resources because we see experiencing this special place first-hand as a key tool for fostering stewardship. However, there is an ever-increasing demand for public access and nature-based activities on public lands and fostering use must also be balanced with the protection of those resources. This plan combined with the resource protection plan address that challenge.

Current Public Access

Within the ACE Basin NERR, many resource-dependent recreational activities occur. The most common activities are boating including along the Intracoastal Waterway, fishing, birding and other wildlife viewing, nature and landscape photography, hiking, camping, and hunting.

Within the Reserve, publicly available recreational and access points of interest include:

- Those provided by the Reserve: Saint Helena Sound Heritage Preserve/Wildlife Management Area (HP/WMA), South Fenwick Island WMA, Reserve lands and marshes not associated with these WMA's
- Those provided in partnership with the Reserve: Edisto Environmental Learning Center, Botany Bay Plantation HP/WMA
- Those provided by partners: Bear Island WMA, ACE Basin Wildlife Refuge, Edisto Beach State Park, Hunting Island State Park
- Those provided by the commercial sector: Ecotour operators and other outfitters offering experiences in the ACE Basin including boat access to remote islands, fishing charters, canoe and kayak tours, sailing trips, and hunting trips
- Public and private boat landings and marinas
- Lodging, primarily through short-term rentals
- Restaurants that reflect the local character
- Historic sites and museums

All ACE Basin NERR sites are free for the public to visit. Most are available for access at any time and do not require permission or notification with a few notable exceptions:

- Botany Bay Plantation Heritage Preserve/Wildlife Management Area is open from 1 hour before sunrise to 1 hour after sunset. Additionally, it is closed to public access every Tuesday and during scheduled hunts. Visitors are required to obtain a day pass upon arrival.
- South Fenwick Island WMA is open from 1 hour before sunrise to 1 hour after sunset, with the exception of visitors who possess a camping permit.
- Saint Helena Sound HP/WMA is open from 1 hour before sunrise to 1 hour after sunset, with the exception of visitors who possess a camping permit.
- Primitive camping on Otter Island and South Fenwick Island: both locations require a camping permit which can be obtained by calling the McKenzie Field Station. Camping on South Fenwick Island is available year-round, while camping on Otter is open November 1 – March 31.
- Deer hunting is available by permit in the St. Helena Sound and South Fenwick Island Wildlife Management Areas. Permits are obtained by calling the McKenzie Field Station. Otter Island accommodates archery hunts from September 16 – January 1. South Fenwick Island accommodates deer archery hunting through a lottery in the fall.
- The Reserve maintains the right to close all or portions of properties for resource protection and management as needed in accordance with SCDNR laws, regulations, and policies.

Traditional natural resource-dependent commercial uses also occur within the Reserve boundaries the most common of which include shrimping, fishing, and crabbing, wild oyster harvesting, and ecotourism. As new commercial uses emerge, the Reserve considers the activity in the context of existing Reserve uses, resource protection, and facilitation of access.

Horseshoe crab harvesting is limited within the Reserve to ensure protection of related research areas. Permit conditions state that “entry and harvest of horseshoe crabs is prohibited from the following islands within the ACE Basin National Estuarine Research Reserve or within 200 yards of their shorelines at any tide stage (Statutory Authority 51-17-40, SC Code of Laws): Otter Island Warren Island, Ashe Island Big Island, Beet Island.”

An emerging coastal commercial use is shellfish mariculture. Currently, two oyster mariculture floating cage operations are permitted within the Reserve boundary. However, the industry is growing and as permitted operations in more developed areas are increasingly debated, the Reserve expects the more

undeveloped areas to attract the attention of potential permittees. The Reserve has provided the following exclusion areas to the SCDNR Shellfish Management Section, which has been incorporated into the public mariculture siting map application:

- 1,000-meter buffer around SWMP sites to ensure that aquaculture does not influence water quality at these long-term monitoring sites,
- Long-standing trawling locations to protect access to these sites for educational purposes,
- A cultural protection area at the New-Old Chehaw Loop to protect wilderness characteristic.

Public Access Challenges and Opportunities

The primary challenge that the ACE Basin NERR faces in terms of public use is the increasing coastal population and tourism. Wildlife-related recreational activities are prevalent among South Carolinians and contribute significantly to the state's economy. According to a 2022 US Fish & Wildlife Survey, 41 million people participated in a wildlife-related activity in the South Atlantic region: 8 million fished, 2 million hunted, and 31 million wildlife-watched (US Fish and Wildlife Service 2022). The ACE Basin offers all of these opportunities in abundance and although the Reserve encourages this type of interaction with natural resources, increasing visitation does increase pressure on these resources.

Because of the large size of the Reserve, multiple points of entry, and lack of a requirement for visitation notification, the vast majority of visitors to the Reserve will not interact with a Reserve staff member, or even realize that they are within a NERR. Therefore, our indirect communication with visitors must be informative and engaging enough for visitors to be able to visit safely and effectively. Communication tools currently include the website, on-location signage, and flyers or other handouts placed in visitor locations.

The Reserve is large with unlimited points of entry and with only a handful of mechanisms to collect visitor information. Therefore, data about the amount and character of Reserve visitation is lacking. Research to assess visitor use, attitudes, and perceptions within the reserve was conducted in 2024 through the Margaret A Davidson Fellowship. It is imperative that we better understand current uses so we can anticipate and manage for changes in the future, and ensure equitable access to the reserve.

Finally, the Reserve is relatively remote and large portions are accessible only by boat. Although there are land-based Reserve properties and facilities available, and the Reserve does provide limited public opportunities to visit boat-based sites, those wanting to visit an island location who do not have access to a boat typically must employ the services of an ecotour or similar nature-based outfitter. The reserve recognizes that these outfitters are providing a valuable service to everyone's mutual benefit. However, like all uses, it is imperative to ensure that ecotours do not negatively impact the resources that are the focus of our management. To protect natural and cultural resources, the reserve may limit the number of visitors, areas available, and times available.

To address commercial use, the Reserve is guided by SCDNR policy #203.04, 'Recreational Use of SCDNR Properties,' and the following principles:

- Activities must abide by all applicable laws and regulations, and not present an impediment to achieving the goals of the Reserve, SCDNR, or NOAA
- The use must not interfere with the use and enjoyment of the property by others
- In situations where access is limited, private citizens visiting the property on their own will be given priority over commercial use
- Programs must present accurate information that encourages positive stewardship
- All activities must be coordinated with the reserve

- Limits on location, timing, and number of tours may be prescribed as needed to mitigate impacts to natural and cultural resources, infrastructure, existing educational programming, or research and monitoring activities
- A fee may be assessed to mitigate costs associated with implementation of the program and impacts to infrastructure

The Reserve currently hosts a free workshops for ecotour guides located in Charleston and Beaufort counties. The purpose of these workshops is to indirectly manage natural and cultural resources by providing the most up-to-date research, hands-on learning tools, laws, and guidelines to the individuals who are regularly interacting with these resources and visitors interested in nature-based activities. The program is exploring expanding the offerings to new audiences, as well as offering a variety of additional topic areas that resonate with these audiences.

Opportunities to maintain and expand additional recreational opportunities include partnering with and training ecotour operators, maintaining partnerships with and encouraging network of educational sites, and continuing to work with other SCDNR sections including legal counsel to better understand our role related to commercial use.

Land Acquisition Plan



Figure 29. An oyster reef at Botany Bay Heritage Preserve/Wildlife Management Area.

Key land and water areas comprising the ACE Basin NERR represent the most tangible and enduring aspects of the Reserve program. Permanently protected, minimally disturbed examples of estuarine habitats are crucial to long-term land conservation. A well-conceived land acquisition plan is essential to ensuring long-term stability of the natural systems found within the ACE Basin NERR. The Reserve is guided by the habitat protection criteria set forth by SCDNR and the land protection principles of the ACE Basin Task Force.

Unlike many coastal areas where the ownership pattern is diverse and highly fragmented, the ACE Basin watershed has a relatively small number of landowners with large, mostly undeveloped land holdings. Many of these properties are permanently protected through conservation easements. Most of this land is held as private plantations along the Ashepoo, Combahee, and Edisto Rivers and is a legacy from the antebellum days when cotton, indigo, and Carolina Gold rice were produced in the area. These current landowners are known to practice good stewardship and maintain a strong conservation ethic in management of these properties for traditional uses.

Acquisition Values

Recognizing the need to protect the exceptional resources of the ACE Basin watershed, in 1988, federal, state, and private conservation interests developed a unified approach to habitat protection and enhancement in the region. This unprecedented conservation initiative resulted in the ACE Basin Task Force, which is still active today, and consists of representatives from SCDNR's various land management programs including the ACE Basin NERR, the US Fish and Wildlife Service, The Nature

Conservancy, Ducks Unlimited, and private landowners. Since its conception, additional partners including Audubon South Carolina, the Coastal Conservation League, and local Land Trusts have also become engaged.

The effort was spurred as a response to the North American Waterfowl Management Plan, which created regional Joint Ventures made up of government agencies, private conservation groups, and individuals whose mutual purpose was to restore migratory bird populations to 1970's levels and to protect 6 million acres of priority wetlands throughout North America. Protection of the ACE Basin became a flagship project of the Atlantic Coast Joint Venture and a significant component of the North American Waterfowl Management Plan.

The ACE Basin Task Force outlined a series of principles that would guide conservation efforts in the ACE Basin including:

- Maintain the natural character of the Basin by promoting wise resource management on private lands and protection of strategic tracts by public conservation agencies.
- Continue traditional uses such as hunting, commercial and recreational fishing, forest management, and farming.
- Acquire land or easements only from willing sellers and participants. No condemnation procedures will be undertaken.
- Provide assistance in wildlife management to improve habitat.
- Maintain or improve public access.

As a keystone member of the ACE Basin Task Force, the Reserve has benefited significantly through application of these principles. Since its designation, this has provided the framework for land protection within the ACE Basin NERR. The ACE Basin Project enjoys broad-based public support, including endorsement of over 70 citizen groups within the first year. Supporting traditional land uses such as agriculture, timber production, and hunting and fishing has encouraged stability of the area's natural character while simultaneously discouraging industrial and resort development typical of much of the state's coastal zone in the past 30 years. Through land purchases from willing sellers, and through conservation easements granted to conservation organizations by private landowners, the Reserve has helped protect over 20,000 acres. Success of the ACE Basin NERR depends on the willingness of current landowners to conserve the larger ACE Basin area. Private ownership that protects and enhances habitat is fundamental to habitat diversity and connectivity in the watershed.

All potential property acquisitions within the SCDNR including those to be incorporated into the ACE Basin NERR are evaluated and prioritized utilizing a standard set of criteria including the following categories: fish and wildlife habitat; rare, threatened or endangered species; archaeological, cultural and historic resources; geologic features; riparian and water values; public recreation; imminent threat of conversion; manageability; and forest revenue sustainability.

For a parcel to be considered for acquisition, it must receive a threshold score or meet one or more of the criteria under the "Special Considerations" criterion. Projects that are determined to merit further review will be presented to the SCDNR Habitat Protection Committee for consideration prior to SCDNR Board review.

Priority Acquisition Areas

The majority of lands within the current ACE Basin NERR boundary are permanently protected either through a state, federal, or local agency, or through a private conservation easement. However, there

are opportunities both within and outside of the existing boundary for further protection of the ACE Basin estuarine ecosystem and enhancement of research, educational, and stewardship opportunities. The Reserve's acquisition priorities are as follows:

Remaining unprotected lands within the existing boundary

The Reserve places a priority on parcels that are within the existing NERR boundary. Of particular interest to the Reserve are the remaining private tracts of land within and immediately surrounding the ACE Basin core area, the Saint Helena Sound Wildlife Management Area/Heritage Preserve, the South Fenwick Island Wildlife Management Area, and Pine Island. The core of the Reserve is one of the few places along coastal South Carolina where visitors can achieve a wilderness experience and the Reserve seeks to preserve the ecological integrity and aesthetic and cultural heritage value of the area. The Saint Helena Sound HP/WMA, some of which falls within the core of the ACE Basin, the South Fenwick Island WMA, and Pine Island are under direct management of the Reserve and parcel inholdings are a priority to ensure continuity of habitats, public access, and management strategies.

*Lands within the ACE Basin NERR
Targeted Watershed Boundary*

The Reserve also prioritizes and would consider for selective acquisition and boundary expansion parcels that are within the ACE Basin Targeted Watershed (Figure 30), serve to further the goals of the management plan, meet SCDNR's habitat protection criteria, and the guidelines set forth by the ACE Basin Task Force. Parcels that are outside of, but adjacent to the Reserve's current boundary are a higher priority within this category.

*South Carolina Conservation Bank
Priorities*

The Reserve would also consider selective acquisition and boundary expansion to include parcels that are identified as priority through the South Carolina Conservation Bank (Figure 31) that fall within the ACE Basin watershed. The SC Conservation Bank is a state agency whose mission is to improve the quality of life in South Carolina through the conservation of significant natural resource lands, wetlands, historical properties, archaeological sites, and urban parks.

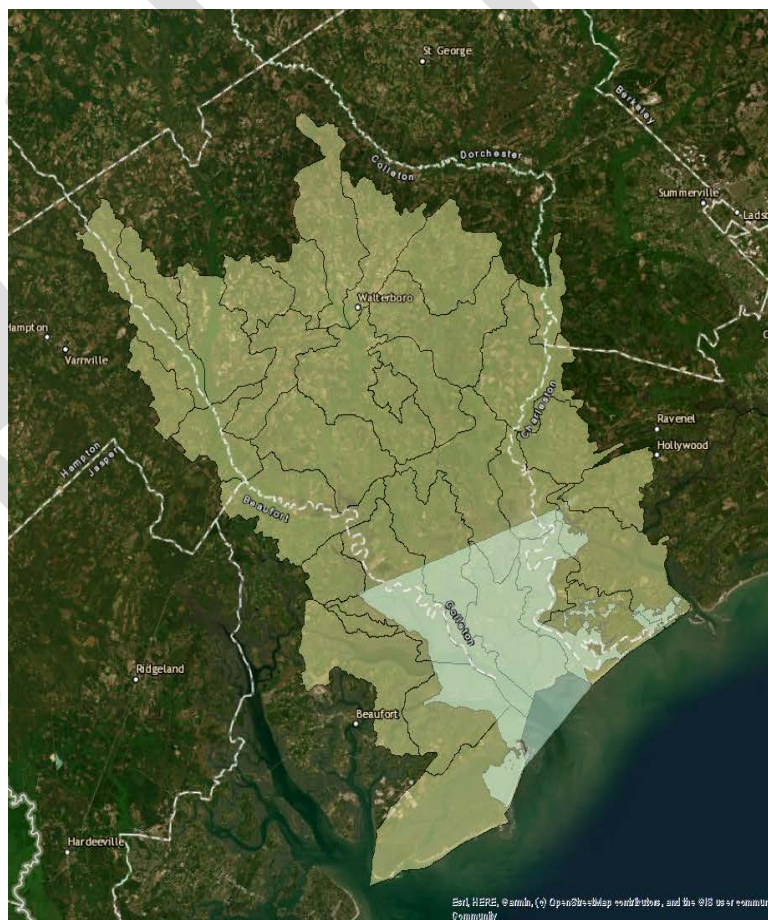


Figure 30. The ACE Basin Targeted Watershed Boundary (dark green) contains the Ashepoo and Combahee watersheds and parts of the Edisto River watershed. The light green area is the ACE Basin NERR Reserve Boundary.

The Bank coordinated with appropriate groups including SCDNR to integrate goals, plans, objectives, and initiatives, as well as land use patterns, into a statewide conservation map. The map identifies parcels of medium and high priority based on public access, ecological conservation, cultural resources, private working lands, and water resources. Because these priorities dovetail with those of the ACE Basin Reserve, SCDNR, and the NERRS, the Reserve will also consider the lands identified as priorities by the SC Conservation Bank, depending on available resources.

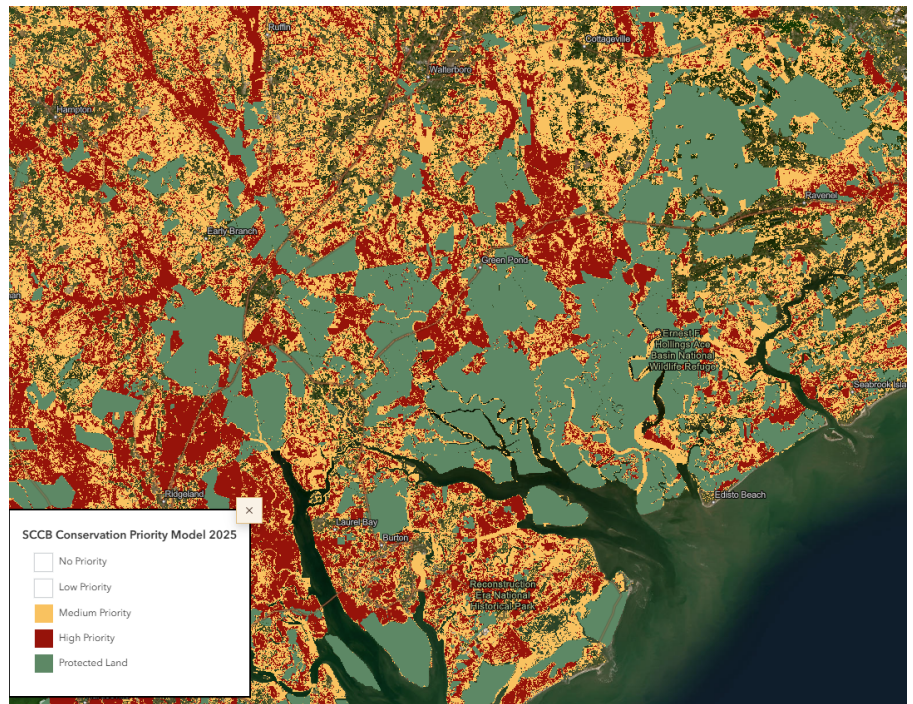


Figure 31. SC Conservation Bank prioritization of the ACE Basin area.

Acquisition Strategy

Land acquisition in the ACE Basin NERR has required a variety of strategies, generally grouped as “non-regulatory.” These options are typically accomplished in part by organizations and partnerships working outside of a formal government framework. For example, the ACE Basin Task Force (working in cooperation with state, federal, and local governments, non-governmental organizations, and private landowners) has proven extremely valuable in acquiring lands within the ACE Basin. Organizations such as the Lowcountry Open Land Trust, The Nature Conservancy, and Ducks Unlimited are tax-exempt, not-for-profit corporations. Therefore, donations and bargain sales to the conservation trust are usually considered charitable donations and may have federal and state tax consequences.

Organizations comprising the ACE Basin Task Force have provided expertise in arranging land transfers, drafting conservation easements, and explaining the advantages and disadvantages of real estate transfers to both land purchasers and sellers. They have coordinated with and solicited aid from various foundations; and in some cases, have provided funds up front for securing lands until grant monies can be obtained. They also serve as landowners and land stewards for protected lands in the ACE Basin NERR.

The ACE Basin NERR emphasizes that all land acquisition projects must have “willing sellers” as a first order of priority. Consequently, the Reserve focuses on six categories of land protection described below

Fee Title Acquisition - The simplest way to protect land is to buy it outright. Fee title acquisition can be accomplished through four variations:

- Purchase at fair market value: The buyer (SCDNR or NGO) pays the seller fair market value for the property as determined by a qualified real estate appraiser.
- Bargain sale: The purchase of the property below fair market value by a conservation organization. The difference between fair market value and the reduced price may qualify as a charitable deduction from income taxes for the seller.
- Installment purchase: The property is purchased over a period of years. Installment purchases allow the conservation buyer to spread the costs over a number of years.
- Reserved life estate: The property is transferred to the agency upon the death of the individual landowner. This option allows landowners to sell now, but to continue use of their property

during their lifetime and/or the lifetimes of other members of their immediate family. Because of the continued use, the purchase may be lower than fair market value.

Conservation Easement - The Conservation Incentives Act allows landowners to receive tax incentives for preserving their land through easements. With certain limitations the Act provides a state income tax credit for voluntary donations of land conservation, and for conservation easements that qualify as charitable deductions under federal tax law.

The ACE Basin NERR has worked with The Nature Conservancy, Ducks Unlimited, and the various Land Trusts in securing easements within the Reserve boundaries. All easements are tailored to the individual needs of the landowner and allow certain traditional uses (i.e. timber management, hunting, fishing, and agriculture). However, all easements restrict all or a portion of the land to limited development uses (number of houses, types of development, etc.). All easements in the Reserve specify that portions of the land remain undeveloped in perpetuity.

Land Donation - Private landowners occasionally donate land to SCDNR and to the Reserve. Gaylord Donnelly, owner of thousands of acres on the Ashepoo River, donated several maritime islands (~3,890 acres) to the ACE Basin NERR in 1989. The donation was valued at almost \$4.0 million and provided the required match for subsequent land acquisitions in the ACE Basin.

Life Estate - The property is bequeathed to the conservation organization upon the death of the landowner and/or the lifetimes of their immediate family members. Botany Bay Plantation, a significant 4,678-acre property, was bequeathed to SCDNR through a life estate in 2008 and was subsequently incorporated into the ACE Basin NERR boundary in 2011 upon approval of a boundary expansion.

Management Agreement - Long-term conservation is also possible through the implementation of management agreements. In some situations, this tool is more effective than fee title or management of conservation easements.

Private Capital - The ACE Basin NERR has successfully worked with public-private partnerships to protect land. Local governments may convince private developers or business to contribute to a land acquisition through cash donations or value of lands donated to the project.

Because of the commitment to focus on willing sellers, the Reserve's timeline necessarily remains opportunistic. The ACE Basin NERR staff continue to maintain positive relationships with landowners within the Reserve boundary, share information and resources, and ensure that public use of Reserve lands do not impact private property use.

Boundary Protection

The ACE Basin NERR will continue to protect and manage boundaries according to SCDNR laws (SC Code of Laws, Title 50) and NOAA's guidelines for establishing boundaries for NERRS (15 C.F.R. Part 921). Specific activities may include clearly and conspicuously identify all boundaries, delineating public access points, and protecting against illegal activities. Additionally, the Reserve will monitor public use impacts at existing access points and throughout the Reserve, especially in regards to vegetative changes, erosion, water quality, sensitive plant and animal populations, and impacts to research and monitoring projects.

Recent Acquisitions/ Proposed Additions to Protected Acreage within Boundary

Since the last management plan update, the State has purchased 12 parcels (Figure 7 and 32) that were previously privately-held tracts adjacent to the Reserve's current boundary. As noted under "Priority Acquisition Areas", the Reserve places a priority on these parcels within the existing boundary to protect the core area and ensure continuity of habitats, public access, and management strategies. Figure 32 provides more details about the parcels acquired since 2011.

Figure 32. Parcels acquired since 2011 and proposed to be incorporated into the Reserve Boundary.

Parcel (APN)	Acres	Year Acquired	Funding Source	Core or Buffer	Habitats	Prior Use	Anticipated Use
South Fenwick Island (Colleton County)							
345-00-00-001.000	32.84	2017	TNC	Buffer	Pine forest, maritime forest, salt marsh	unknown	Habitat connectivity; study of habitats recreational use; restoration
345-00-00-004.000	6.46	2017	TNC	Buffer	Pine forest, maritime forest, salt marsh	unknown	Habitat connectivity; study of habitats; recreational use
345-00-00-003.000	2.09	2017	TNC	Buffer	Pine forest, maritime forest	unknown	Habitat connectivity; study of habitats; recreational use
345-00-00-009.000	22.86	2017	TNC	Buffer	Pine forest, open fields	Agriculture, livestock grazing	Habitat connectivity; study of habitats; recreational use; restoration
345-00-00-010.000	321.99	2017	TNC	Buffer	Pine forest, maritime forest, grassland, freshwater ponds, water impoundments	Agriculture, livestock grazing, duck hunting, deer hunting, camping	Habitat connectivity; study of habitats; restoration; control of invasive species; recreational use
345-00-00-021.000	4.27	2017	TNC	Buffer	Pine forest, maritime forest, grassland	unknown	Restoration of upland and grassland habitats; recreational use; control of invasive species
345-00-00-026.000	1.19	2017	TNC	Buffer	Pine forest, maritime forest, salt marsh	Home site	restoration of upland and grassland habitats; recreational use
345-00-00-022.000	0.99	2020	NERRS PAC	Buffer	Salt marsh; Grassland	Agriculture; Duck hunting club on low-lying areas	Wetland and grassland restoration; demolition of house; recreational use
345-00-00-023.000	1.00	2020	NERRS PAC	Buffer	Pine forest, maritime forest, grassland	Agriculture	Control of invasive species; recreational use

Parcel (APN)	Acres	Year Acquired	Funding Source	Core or Buffer	Habitats	Prior Use	Anticipated Use
345-00-00-024.000	5.00	2020	NERRS PAC	Buffer	Pine forest, maritime forest	Deer hunting	Upland restoration, control of invasive species; recreational use
TMS 345-00-00-027.000	0.9	2020	NERRS PAC	Buffer	Pine forest, maritime forest	Deer hunting	Upland restoration, control of invasive species; recreational use
South Hutchinson Island (Colleton County)							
344-00-00-005.000	240	2021	NERRS PAC	Core	Salt marsh; marsh hammock	None	Salt marsh migration space; recreation, habitat management, research and education activities.
TOTAL:	639.59						

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