

V. STEWARDSHIP PLAN

A. Stewardship Program Overview

Per its authorizing legislation, the Coastal Zone Management Act (CZMA), the 27 National Estuarine Research Reserves are to be managed to ensure that Reserve ecosystems continue to be available for long-term estuarine research, education, and interpretation. The North Carolina National Estuarine Research Reserve (NCNERR) is also directed by state law to maintain, protect, and preserve the designated components for National Estuarine Research Reserve System (NERRS) purposes, while providing public access and allowing compatible traditional uses consistent with primary Reserve objectives. Implementation of the stewardship plan maintains the NCNERR as a scientific and educational resource and information base, designated to foster more informed management of estuaries.

The overall goal of stewardship in the NCNERR is to protect or restore the natural integrity of each site and ensure a suitable environment for coastal research and education. The NCNERR stewardship plan provides a coordinated, proactive framework to address Reserve management responsibilities and federal/state obligations. This plan also constitutes the resource protection plan. Stewardship policies regarding recreation, off-road vehicle access, fishing and hunting, disposal of dredge material, habitat restoration, feral horses, and surveillance, enforcement and maintenance are located in Appendix R.

B. NCNERR Stewardship Objectives

The NCNERR stewardship activities address the following Reserve objectives (Figure 1; Table 1):

- **Objective 1.1:** Education programs will deliver information on N.C. coastal resources to formal and informal educators, and K-12 and college students to foster environmental stewardship and informed decision-making.
- **Objective 1.2:** The greater community, including the general public, visitors, and pre-school children, will receive educational programming.
- **Objective 2.1:** NCNERR research products will be used by the coastal management community.
- **Objective 3.1:** NCNERR habitat and watershed maps will inform management of the sites and improve understanding of watershed connections.
- **Objective 3.2:** Restored NCNERR habitats will provide improved water quality and ecological function.
- **Objective 4.1:** Effective Reserve site management will ensure a suitable environment for research and education.

- **Objective 4.3:** Coastal systems and their value will be interpreted and access to the Reserve sites will be directed to representative habitats to reduce impacts on sensitive habitats.
- **Objective 5.4:** The NCNERR will assess use of the sites by various education, research, and commercial entities.
- **Objective 5.8:** NCNERR needs will be more fully met by volunteers and volunteers will be trained in coastal issues.

Stewardship objectives are presented in bold, italic text with the objective number that refers to Figure 1 in parentheses. Objective activities are presented beneath each objective.

C. Public Access Activities in Support of NCNERR Stewardship Objectives

The goals of public access activities in the NCNERR are to provide access to and educate the public about estuarine systems. An informed public will understand the natural systems found in the NCNERR, the role human activities play in the integrity of these systems, and what relevancy the systems have to their lives. Increased public understanding can lead to increased participation in NCNERR volunteer programs, which can in turn lead to improved collaboration with other groups to which the NCNERR volunteers also belong and to the community at large. To accomplish the public access goals, the NCNERR will utilize several approaches. This section constitutes the public access plan.

1. Education programs will deliver information on N.C. coastal resources to formal and informal educators, and K-12 and college students to foster environmental stewardship and informed decision-making (1.1)

Provide student field trips and hands-on programs

The K-12 student education program provides student field trips to Reserve components, in coordination with site managers. The field trips are ecology-based tours that present basic estuarine concepts. These trips increase exposure of the NCNERR and provide hands-on opportunities for the participants to learn more about estuarine systems. Site managers support this endeavor by captaining the boat and leading the field trips when education staff are unavailable.

Design Field-based Site Management Projects

Stewardship staff will work with education staff to integrate field-based site management projects into K-12 student education programs. Field-based projects provide students with hands-on experience in the field and a heightened sense of appreciation of estuarine resources, while enhancing management of the NCNERR sites. Projects may include trash clean-ups, invasive species management (*e.g.*, Tamarisk tree mapping and removal), bird surveys, and osprey nest platform construction. Initially these efforts will take place on the Rachel Carson site, due to its

proximity to the Reserve education staff, yet may expand to the other Reserve components pending success, need, and resources.

2. The greater community, including the general public, visitors, and pre-school children, will receive educational programming (1.2)

Plan and coordinate public educational field trips

Summer public field trips are currently conducted bi-weekly on the Rachel Carson component during the summer months. The stewardship staff of the Reserve will work in concert with the education staff to expand these public field trips to the Reserve's southern and northern components when resources allow. Field trip manuals will be compiled for use by interns or volunteers assisting with these trips.

Site managers will also look for opportunities to offer occasional public educational programs. These may occur in conjunction with partner organizations or may be centered on a specific stewardship-related topic. Educational programs of this type will further support the goal of increasing public understanding of the NCNERR, its sites and its mission while requiring limited amounts of resources. Where possible, these programs will make use of trained volunteers.

3. Coastal systems and their value will be interpreted and access to the Reserve sites will be directed to representative habitats to reduce impacts on sensitive habitats (4.3)

Identify, designate and protect critical habitats on the Reserve sites

Using the results of the habitat mapping project (Objective 3.1), critical habitats will be identified and management objectives for each habitat type will be developed. These objectives will outline strategies for protection. Known threats such as overuse by visitors, feral and invasive species, and dredging will be addressed.

Install structures and signage to provide for public access and use while minimizing impacts

Using a science-based approach and data obtained from Reserve staff monitoring and external researchers, stewardship staff will provide public access to NCNERR sites. This effort will direct traditional visitor uses of the Reserve to areas that do not interfere in the Reserve's research and education activities and protect critical habitats.

Excessive visitor use can have a detrimental effect on Reserve ecosystems, particularly those that are fragile. Use of barriers, boardwalks and trails will guide visitor activities to those areas best able to withstand heavy use. Where necessary and allowable, site managers will install structures to provide for access and use while minimizing impacts. Examples of structures designed to minimize impacts include camping platforms, ramps, boardwalks, and designated trails. This effort will balance visitor needs and NCNERR habitat and program needs.

Signage is a critical component in guiding visitor use. The stewardship sector will identify opportunities to protect the resources of the Reserve through posting of signs and markers. All

Reserve sites will be properly marked with signage, including boundary markers and visitor use rule signs. Signs at each site will: provide guidance to visitors regarding the rules of and appropriate use of the sites; explain visitor impacts to the resources of the Reserve; identify the NCNERR and its mission; and provide site-specific information regarding protected habitats and species.

As site and seasonally appropriate, signs to designate critical habitats, including bird and turtle nesting areas and special plant areas will be posted. Reserve Geographic Information System (GIS), education, and stewardship staff will work together to identify proper locations for posting boundary signs and maps to be included on signage (*e.g.*, trails, access sites, etc.).

Develop interpretive signs for public access areas

Interpretive signs will be developed for public access areas where appropriate that educate visitors about the Reserve programs, estuarine concepts, local habitats, flora and fauna, proper use of the area, and management concerns. This will promote a better understanding of the resources and will result in better protection of the public access areas. Interpretive signs will be displayed and maintained on trails and boardwalks open to the public, such as the Currituck Banks boardwalk and the Rachel Carson boardwalk.

Develop use impact monitoring and establish minimum impact use policy

The NCNERR will establish a minimum impact visitor use policy. To date, visitors have very few restrictions on the sites. Site managers will identify the heaviest impacts caused by visitor use. Monitoring will take place as needed to quantify impacts and identify a use/impact threshold. These data will inform visitor use strategies for the sites as well as other public sites. If thresholds can be established, policies will be developed to reduce impacts to or below these thresholds. Policies will be developed in a coordinated fashion by stewardship staff, local advisory committees, and land management partners.

D. Resource Protection and Restoration Activities in Support of NCNERR Stewardship Objectives

1. NCNERR research products will be used by the coastal management community (2.1)

Conduct and promote site-based and watershed research that informs management of coastal ecosystems, including Reserve sites

Each Reserve component is a platform for coastal and estuarine research. The research needs assessment stressed the need for research in several areas, including shoreline dynamics, coastal dynamics, wetland restoration, invasive species, and benthic restoration. Working with the research sector, site managers will promote the use of the sites for research, especially in these and other key areas. Future studies on the NCNERR components as identified by the research sector may include understanding the impacts of sea level rise and exploring component historical ecology.

2. NCNERR habitat and watershed maps will inform management of the sites and improve understanding of watershed connections (3.1)

Map upland and emergent wetlands within NCNERR boundaries

The research and stewardship sectors will conduct a joint effort with the GIS Specialist to map the four NCNERR components using the NERRS Habitat Classification scheme. Field surveys and digital image analyses will be conducted to delineate habitats for the Masonboro Island, Zeke's Island, Rachel Carson and Currituck Banks sites, based on NERRS classification protocols and methods developed by the NCNERR. Baseline habitat maps and areal statistics have been produced for the 4 NCNERR sites. Methods and results are presented in the NCNERR Site Profile. The habitat classifications will be updated every 5 – 10 years, dependent on availability of appropriate aerial imagery and staff priorities. The updates will be used to evaluate changes in habitat distribution and condition for the four NCNERR components. This activity directly supports the System-wide Monitoring Program (SWMP) components II and III.

Map SAV distribution and condition within NCNERR boundaries

The North Carolina Coastal Habitat Protection Plan (CHPP) recognizes submerged aquatic vegetation (SAV) as one of the six habitats that supports coastal fisheries. Given the pristine nature of the components and staff expertise, the NCNERR is well situated to develop and test mapping protocols within its boundaries. The research, GIS, and stewardship sectors will collect existing information on submerged SAV distribution within the NCNERR sites, collaborate with researchers and partners (*e.g.*, the North Carolina SAV Monitoring Committee and NERRS Biomonitoring workgroup) to identify appropriate techniques for monitoring SAV, and map distribution and condition within the NCNERR. Field surveys have been completed for the Rachel Carson and Masonboro Island components. Significant SAV beds were mapped and conditions documented at Rachel Carson in the summers of 2006 and 2007. No SAV was found at Masonboro Island in the summer of 2007. Similar field surveys will be conducted for Currituck Banks and Zeke's Island. Significant SAV beds that are identified at any of the NCNERR sites will be periodically re-surveyed for extent and condition. The potential will be investigated for designating existing NCNERR beds as sentinel SAV sites as part of a long-term SAV monitoring program, if established for the State of North Carolina. This activity directly supports SWMP components II and III and also is one of the priorities for the CHPP's research and monitoring needs (Appendix P).

3. Restored NCNERR habitats will provide improved water quality and ecological function (3.2)

Identify habitats for restoration

This activity will identify benthic and wetland habitats in need of restoration within the Reserve. Habitat maps and other relevant data will be used to identify these areas. Potential areas requiring restoration include those impacted by invasive species, rising sea levels, and shoreline erosion.

Develop and implement science-based restoration plans

Following the delineation of areas suitable for restoration, the NCNERR will develop science-based restoration plans in collaboration with partners and other sectors. These plans will be completed in accordance with federal regulation 921.13. This effort will entail working with the NERRS Restoration Science Workgroup and state partners to determine the best approach for restoration. The intermediary product will be the development of specific restoration plans that will then be used to seek funding for restoration activities. These restoration plans will be used to mitigate deleterious impacts caused by increased coastal population, eutrophication, and invasive species.

4. Effective Reserve site management will ensure a suitable environment for research and education (4.1)

Evaluate existing policies and rules and update accordingly

The sites in the NCNERR are protected for research and education. Traditional uses are allowed as long as they do not interfere with these goals. Gaps in policies, rules and enforcement will be identified through systematic review of applicable state, county, and local ordinances. Clear procedures and actions will be developed utilizing the results of this review, as well as site manager experience and program, division, and departmental authority. Stewardship policies will be reviewed at annual local advisory committee meetings. If deemed necessary for protection of the NCNERR, changes or additions to existing policies and rules will be pursued.

Coordinate with enforcement agencies to ensure protection of Reserve sites using policies and rules

Enforcement of rules and policies is conducted through partnerships with municipalities and enforcement agencies. Regular communication with, and coordination between, the agencies will be used to ensure that enforcement gaps are identified and addressed. Gaps in enforcement will be addressed through Memoranda of Understanding (MOUs) with other agencies. Protection does not always require law enforcement action, but an ability to address negative impacts from a variety of agents is necessary, given the geographic range and diverse nature of the Reserve components. Through these agreements the NCNERR will effectively manage the Reserves against the threat of overuse or misuse associated with the increased coastal population.

Monitor condition of sites regularly

To adequately address protection of the NCNERR, the site managers will monitor each site on a regular basis as deemed appropriate based on season and use. Each site has a characteristic suite of communities and species, as well as a unique list of traditional uses and local threats associated with it, requiring that the monitoring schedule and protocols be site-specific. Monitoring may include assessment of any or all of the following: invasive species presence and condition, endangered species presence and condition, visitor use impacts, habitat change as a result of natural or anthropogenic disturbance, and condition of Reserve-owned equipment and structures. All of these monitoring activities will assist in maintaining the Reserves for use by researchers and educators against all of the threats listed in section I, C, 4.

Manage invasive species and feral animals

The NCNERR is host to both invasive plants and animals. Some of these may have the ability to affect ecological functions in the Reserve. To address these possible changes, invasive plant identification and removal efforts are continuous. Invasive plants will be identified within the habitat mapping effort and areas needing restoration will be prioritized.

Problems with invasive and feral animals vary by scale. Nutria are a coastal problem. Feral hogs and non-native red foxes constitute regional problems. Feral horses are a site problem. Each of these species presents challenges for removal from the Reserve components. Eliminating nutria would require a statewide effort. Likewise, removing feral hogs from Currituck Banks would require regional coordination. Eliminating red foxes from the Masonboro Island and Zeke's Island components would likely be ineffective without an ongoing regional effort. Eliminating feral horses from Reserve components is currently not an option due to citizen interest in maintaining their presence on the sites they inhabit. Consequently, ongoing efforts will focus on minimizing impacts to the sites by these animals, including developing and implementing management plans for the invasive and feral animal species at each component.

5. The NCNERR will assess use of the components by various education, research, and commercial entities (5.4)

Develop and implement a reservation and reporting system for educational and commercial users

The stewardship sector will work with the education sector to develop and implement a reservation and reporting system to better assess site usage. Usage statistics will then be used to inform site management decisions.

Develop and provide users with training and materials to support activities

The stewardship sector will work with the education sector to design and implement training and materials to support educational and commercial uses of Reserve components. Individuals and organizations using Reserve components for these types of activities will receive training

regarding: the NCNERR and its mission, the ecosystems, communities and organisms of the specific site, appropriate use of the site, and the reservation and reporting system.

6. NCNERR needs will be more fully met by volunteers and volunteers will be trained in coastal issues (5.8)

Develop, implement and evaluate a volunteer training program based on stewardship, education, and research needs and volunteer interests

The stewardship sector will work with the education sector to design and implement a community volunteer program. These individuals will work with the Reserve, other partners, and within their communities to champion the protection of coastal resources. Volunteers are an excellent source of help and necessary given that site management, stewardship, education and research tasks require more resources than are available internally. Recruitment of volunteers is most easily done by drawing interested parties to the Reserve through a field trip or publicly announced volunteer workday.

The first task is to identify volunteer needs of the Reserve and volunteer interests (phase 1) and develop a Reserve-wide training program (phase 2), recognizing that one reason people volunteer is to gain more knowledge about the natural environment. This Reserve-wide training program will be similar to the training currently offered to Rachel Carson component volunteers, which prepares volunteers for leading summer field trips and includes plant and animal species identification. Training will be specific to the volunteer opportunity and will be conducted in concert with the other Reserve component volunteer efforts. The training effort will reward volunteers and in turn benefit the NCNERR with a more knowledgeable group of volunteers serving as community stewards. Additionally, a coordinated program will provide continuity across the Reserve sites. As part of this task, evaluations of training and volunteer programs will be conducted (phase 3). Doing so will foster a sense of volunteer inclusion and will provide valuable feedback. Evaluations will be done at the program level to include all sites.

Implementation of the volunteer program will proceed in phases articulated above. The program will also require proper planning regarding volunteer recruiting, training, and recognition. A program-wide plan will support volunteer programs at each site, including volunteer forms that include contact information, skills, interests and availability. Specific volunteer job descriptions and required levels of time commitment will help make the volunteer program more effective for the NCNERR and rewarding for the volunteers. To facilitate regular communication, a volunteer email list will be kept for each site.

The Reserve will work with the Carolina Estuarine Reserve Foundation (CERF) to develop volunteer recruitment, retention, and recognition programs per CERF's strategic plan. These opportunities will support volunteers and their efforts with the NCNERR.

Increase on-site volunteer opportunities

Reserve staff from all sectors will work to develop on-site volunteer opportunities. Activities will include publicly announced volunteer workdays and support of specific stewardship and research tasks. Some specific examples of volunteer activities include leading field trips, conducting field studies, clearing and maintaining trails, cleaning parking areas, surveying for invasive species, and assisting with public education events.

Conduct local advisory committee meetings

The Reserve Manager and site managers will hold annual Local Advisory Committee meetings to solicit feedback and recommendations on site management, research, and education activities and policies at the components. Meetings will be held more frequently as need dictates.

E. Coordination and Partnerships

1. Coordination

a. NCNERR Components

Site managers will provide regular email updates to the Stewardship Coordinator and Reserve Manager. This communication will specifically focus on site management issues in order to create an ongoing record of issues and how they are addressed. Site managers and the Stewardship Coordinator will meet to discuss issues and solutions. This will lead to the development of management policies and procedures.

Site managers will consult with education and research staff regarding these activities at their sites. Site managers will seek assistance from education staff in developing and implementing education events and notify the Education Coordinator of outreach and education events conducted in the components under his or her supervision. These notifications will include the number of participants at the events. Site managers will also work with the Research Coordinator regarding plans for research and restoration activities at each site.

b. National and Regional NERRs

The NCNERR stewardship program is consistently reported to the National Oceanic and Atmospheric Administration's Estuarine Reserves Division through biannual progress reports. Additionally, upcoming stewardship activities are outlined in the annual NCNERR 315 grant application. The NERRS annual meeting and winter sector meeting are attended by the appropriate stewardship staff.

c. North Carolina Division of Coastal Management

Specific collaborations within the Division center on acquisition and site management guidance. Examples of current and potential collaborative projects include researching the legalities of property ownership for potential acquisitions and visitor use liability issues, revising policies regarding dredging material deposition methodology, and increasing internal understanding of DCM sections through stewardship presentations.

2. Partnerships

The NCNERR maintains ongoing partnerships with numerous educational, government, and private entities. These partnerships allow for greater community recognition of the NCNERR and its goals. The NCNERR continues to benefit from established partnerships and is continuously seeking additional partnership opportunities. Site managers will assist the Reserve Manager in identifying organizations and finding commonalities between the NCNERR programs and those of potential partners.

Because the NCNERR does not have the resources to offer extensive educational programming at each site, it is in the best interest of NCNERR to target education and outreach efforts to non-profit (*e.g.*, aquariums, museums) and commercial providers of these types of programs. Offering training and informational brochures to these entities will ensure that the NCNERR message is accurate and reaches the widest audience.

The NCNERR will continue working with partners, including CERF, N.C. Big Sweep and the Mother/Daughter Charity League to facilitate Reserve-wide clean-up efforts. The N.C. Big Sweep and other events of this sort can be used as a way to promote the NCNERR mission and programs.

Some NCNERR partners currently work under MOUs with the Reserve (Appendix J). MOUs help promote enforcement of Reserve policies and facilitate research and education. Site managers will facilitate updates or development of MOUs with relevant partners.

One of the primary benefits of the Reserve is that it serves as a natural comparison to surrounding development. As such, the Reserve can provide a platform to address current community-based environmental concerns such as stormwater runoff and water quality. Site managers will work with organizations and communities to share knowledge of the natural coastal systems as a way for citizens to understand current local environmental problems.

The needs assessment conducted by NCNERR identified coastal issues of highest concern and areas that need more attention, including brackish wetlands, freshwater coastal wetlands, non-point source pollution, invasive species, benthic habitats and conservation ownership. Additional key issues can be identified in collaboration with partners such as DCM and others in the coastal management community. Site managers will strengthen partnerships that exist and seek new partnerships with others in order to address the identified key issues.

Additional partnerships are described in the Activities section above. For a full listing of existing NCNERR partnerships, see Appendix L.

