BENEFICIAL USE OF DREDGE MATERIAL COASTAL RESTORATION CASE STUDY

Crab Bank Seabird Sanctuary

Core Partners

- Audubon South Carolina
- Coastal Expeditions Foundation
- South Carolina Department of Natural Resources (SCDNR)
- South Carolina Coastal Conservation League
- US Army Corps of Engineers (USACE)

Key Information

PROJECT LOCATION
Charleston, SC

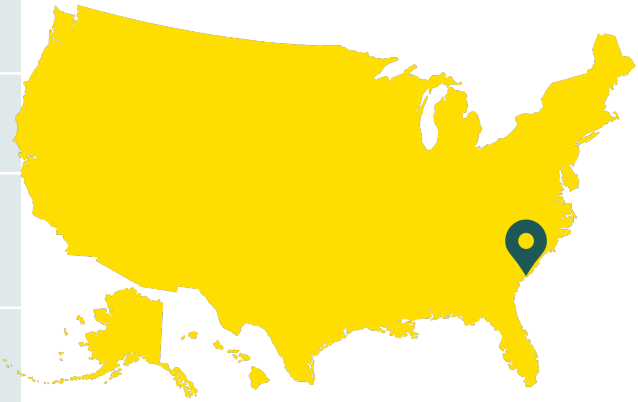
HABITAT
Sand Island

PROJECT SIZE
32 acres above high tide

USACE DISTRICT
Charleston

PROJECT WEBSITE
https://sc.audubon.org/conservation/crab-bank-seabird-sanctuary

PROJECT COMPLETED
Late 2021



ABSTRACT

The purpose of the Crab Bank Restoration Project in Charleston, South Carolina, was to restore and enhance the eroded Crab Bank Seabird Sanctuary. This initiative focused on replenishing habitat for nesting seabirds, supporting coastal wildlife, and bolstering ecological resilience. It aligns with conservation efforts to preserve critical habitats in Charleston Harbor, promoting biodiversity and sustainable natural environments. The site has supported waterbird nesting since at least 1979 and was designated a South Carolina Department of Natural Resources (SCDNR) Heritage Preserve in 1999 and a Seabird Sanctuary in 2006. A series of tropical storms in 2015, 2016, and 2017 ended shorebird nesting activity in 2017. The Crab Bank location was identified as an alternative site for dredge material placement in the Charleston Harbor Post 45 Deepening Project feasibility study in 2011. A multi-partner effort, headed by Audubon South Carolina, led to the development of a suitable restoration design and plan. Construction began in September 2021, utilized 660,000 cubic yards of dredged sandy material, and created 32 acres of nesting habitat for multiple species of colonial waterbirds and shorebirds.

PROJECT GOALS

The Crab Bank Seabird Sanctuary Restoration Project in Charleston Harbor aimed to rebuild and protect critical nesting habitat for coastal bird species that had been lost to erosion and storm damage. Using dredged material from the Charleston Harbor deepening project, the effort sought to restore the island's elevation and footprint to support successful breeding for species such as brown pelicans, royal terns, black skimmers, and American oystercatchers. Beyond habitat restoration, the project's goals included enhancing coastal resilience, supporting biodiversity, and fostering community engagement and stewardship through education and public outreach.

Goals include:

- Restore and re-establish seabird and shorebird nesting and roosting habitat
- Re-establish bird colonies and increase reproductive success
- Storm surge attenuation
- Erosion control and shoreline stabilization
- Recreation amenity (outside waterbird nesting season)

Focal species

The project supports and focuses on numerous colonial seabirds, shorebirds, and waders, including but not limited to brown pelican, least tern, royal tern, black skimmer, gull-billed tern, sandwich tern, common tern, laughing gull, Wilson's plover, American oystercatcher, willet, great egret, snowy egret, tricolored heron, and white ibis.

PARTNERSHIP DEVELOPMENT AND MAINTENANCE

From 2017 to 2021, Audubon South Carolina led the Crab Bank Seabird Sanctuary Restoration Project, coordinating a diverse coalition of partners. From the outset, Audubon fostered collaboration by bringing all stakeholders together, while Coastal Expeditions helped establish the project's foundation and develop strategies to gauge public support and raise funds. Partners participated in weekly fundraising calls, shared contacts, and collaborated on outreach.

The South Carolina Department of Natural Resources (SCDNR) served as the primary liaison with the U.S. Army Corps of Engineers (USACE), streamlining regulatory navigation and sharing updates with the group. In 2017, Audubon South Carolina applied for, and managed, a National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund (NCRF) grant, awarded in 2019. Project bids for construction ranged widely, with final bid being $377,000. Formal agreements assigned partners specific tasks, including community and local government engagement, educational signage, monitoring equipment, and studies such as an economic valuation. The South Carolina Coastal Conservation League led outreach in Mount Pleasant, while Coastal Expeditions Foundation connected the public to the project through pre- and post-construction site visits.

The USACE Continuing Authorities Program Section 204, aquatic habitats protection and restoration process, effectively unified the partnership, and established a memorandum of understanding (MOU) to clarify roles. While partner engagement levels varied, all shared in the project's success. Input from a Congresswoman prompted a minor shift in the island's location; in hindsight, earlier engagement with the Town of Mount Pleasant could have further streamlined planning and strengthened local buy-in.

General project contact: Erin Rogers, erin.rogers@audubon.org

PARTNER ROLES

Audubon South Carolina: project lead. Acquired and managed NFWF grant and subawards. Coordinated partners. Performed outreach. Stewarded Crab Bank first year post-construction to help enforce breeding bird closures and educate public.

Coastal Expeditions Foundation: Audubon's NFWF grant sub-awardee, and provided match. Led many public boat tours. Supported documentation of project by working with videography company (Jewell & Ginnie LLC).

SC Coastal Conservation League: Audubon's NFWF grant sub-awardee, and provided match. Involved in Pelicam setup. Conducted stakeholder and community engagement. Provided communications support to promote the project. Led some public boat tours in partnership with Coastal Expeditions Foundation.

SC Department of Natural Resources: acted as a primary liaison with USACE. Audubon's NFWF grant sub-awardee, and provided grant match. Acted as the non-federal sponsor for CAP 204. Conducts annual shorebird monitoring.

Monitored physical conditions 1-year post-construction using unmanned aerial vehicles (UAVs). Involved in Pelicam setup.

US Army Corps of Engineers: in charge of the Charleston Harbor deepening project that supplied sediment for Crab Bank. Provided federal cost-share under CAP 204. Selected dredging contractor.

Norfolk Dredging: contractor for construction.

SC Wildlife Federation: provided project match through staff time-- working on project fundraising, public education, and attendance at restoration planning meetings.

Mount Pleasant Radio: involved in Pelicam setup through independent contractor agreement.

Harbor Pilots: involved in Pelicam setup.

Town of Mount Pleasant: engaged throughout the project process for public feedback and project awareness.

College of Charleston: Conducted the economic valuation study of Crab Bank through independent contractor agreement.

Appalachian State University: Conducted the economic valuation study of Crab Bank through independent contractor agreement.

Water Environment Consultants: Conducted a wave impact analysis study through independent contractor agreement.

Southwings / Green Eyes Aero: aerial monitoring/photos of the project.

Jewell & Ginnie LLC: worked with Coastal Conservation League to document the restoration process via film.

Ducks Unlimited: contributed funding.

The Post and Courier: contributed funding.

South Carolina Ports Authority: contributed funding.

Boeing SC: contributed funding.

Many private donors: donated to project to help cover costs (extra funds stayed in the Coastal Bird Fund for future bird conservation projects)

Image 1. Crab Bank Restoration Project in Charleston, South Carolina

Restoration Outcomes and Lessons Learned

RESTORATION OUTCOMES

The project successfully rebuilt approximately 32 acres of critical nesting habitat in Charleston Harbor using dredged material from the Charleston Harbor deepening project. The restored island now provides elevated, mammalian predator-free nesting areas for thousands of coastal birds. Post-construction monitoring has documented rapid recolonization by target species and increased nesting success. The project enhanced coastal resilience by restoring a natural buffer against waves and erosion, and strengthened community connections to the site through public outreach, education, and engagement activities.

LESSONS LEARNED

- Clearly defining partner roles at the outset is essential. Establish a memorandum of understanding (MOU) with participating organizations and ensure that all partners receive recognition. This can include using a branded partner slide in presentations to highlight their contributions.
- Plan for a long-term commitment—projects of this scale typically require about five years from start to finish. Set clear expectations early and communicate them openly with all parties involved. Building strong relationships with local partners well in advance will help lay the groundwork for success.
- Meticulous record-keeping is critical. Track every receipt and document all in-kind contributions for reporting requirements, particularly when working with funders such as the National Fish and Wildlife Foundation (NFWF).
- Successful projects rely on early planning, creative problem-solving, and open communication. Make sure stakeholders understand the "why," "how," and "when" of the work. While public comment periods are important, be prepared to address additional issues as they arise. Ultimately, the success of the project comes down to the people involved.

Advice for similar restoration projects

- Recommend that you have multiple conceptual sediment placement areas for the National Environmental Policy Act (NEPA) process. Help with outside partners. Look at design longevity, acres, habitat, etc.
- Be ready for owls, have cameras ready to document. Proximity to the mainland is close. If birds abandon nests at night, it can be a big issue.

Unexpected situations that arose during project

- Limited up-front information regarding Charleston Harbor bottom sediments which included a lot of fossils, shark teeth, and relics that drew people to the island.
- There were over 150 people on the island for Opening Day—mostly due to the marketing of Fossil Hunting Tours—even though no access is allowed above the high water tidal line. More signage and outreach need to be implemented to clarify rules.
- Had to plan and engage with Law Enforcement regarding the rules—due to bird nesting activity, this Preserve is closed to public use from March 15 thru October 15. The area may be viewed from boats during these months and is accessible to the pubic below the high water tidal line from October 16 thru March 14. Closed one hour after sunset to one hour before sunrise.Coastal Conservation—two live feed cameras from the island—working out technical issues.
- Contracts were delayed. A contested contract and had to be rebid. Delays helped the project.
- Coastal Bird Conservation Fund—set up for donations to meet non-federal share. The fund persists.

Data sources and decision support tools used

- Drone monitoring
- Sediment sampling and other geotechnical investigations.

PLANNING	
Overall cost	The restoration was completed at a total cost of $377,000. This was significantly lower than the initial estimate of $4 million due to competitive bidding and the use of local resources.
Cost summary	• Federal Contribution: The U.S. Army Corps of Engineers covered 65% of the costs, amounting to approximately $245,000, CAP 204. • Non-Federal Contribution: The remaining 35% (about $132,000) was funded through community efforts, grants, and private donations, including support from organizations like the National Fish and Wildlife Foundation
Link to USACE dredge project	Yes
Beneficial use	Yes. USACE considered Shutes Folly, Morris Island, and Crab Bank as alternatives. Audubon did an action alert to members to comment on the USACE open comment period as to where they preferred to see the dredge material deposited.
Funding sources	• NFWF NCRF ($700,000) • Boeing SC, BP, Ducks Unlimited, Post & Courier Foundation, S.C. Ports Authority, hundreds of individual citizens • As a part of the fundraising efforts, the SCDNR established the Coastal Bird Conservation program under the Nongame and Natural Areas Trust Fund (SC Code of Laws §50-1-280). The program established a means for SCDNR to collect donations to support the successful renourishment of Crab Bank and ensure any excess in funds collected but needed by the Crab Bank project could draw interest and help finance and leverage grant dollars to support projects for a variety of waterbirds—from pelicans and terns to wood storks and black rails—up and down the South Carolina Coast. These funds are available for use by SCDNR for critical projects to help protect and restore habitats, address information and research needs, provide education and outreach for waterbird awareness, and increase nesting success. • Coastal Expeditions Foundation staff suggested establishing the fund. Raised ~ $300,000-400,000 above the $700,000 NFWF grant. Had a commitment of $700,000 match for NFWF—staff time, volunteer time, etc.
Mechanics of the logistics and coordination	USACE Charleston District and SCDNR have a great working relationship with similar view of the importance of Crab Bank. Would not be where we are without USACE being willing to think creatively. Constructive interactions with National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA NMFS) regarding essential fish habitat concerns.
Type of project	Bird Island Restoration
Placement coordination mechanism	Coastal Carolinas Blueprint mapping has not occurred yet. The site is on the Audubon Important Bird Area, SC Seabird Sanctuary list. Not identified in any other plans.
Alternate sediment reclocation if Beneficial Use of Dredge Material (BUDM) project hadn't happened	The Federal Standard least cost option was offshore disposal. US Army Corps of Engineers Continuing Authority Program (CAP) 204 provided funds for beneficial use planning and implementation. SCDNR was in on early meetings. Meetings had been going on for a long time prior.
Project championed by	Team Effort—SCDNR, Audubon, Coastal Expeditions, Coastal Conservation League. SCDNR was a non-federal sponsor. Collective effort for everyone.
Public outreach/education efforts	Outreach campaign plan developed—social media as well as less formal press release plan.
Public perception challenges	• Community concerns regarding smell associated with the organic content of the islands. • Navigation concerns regarding silt potentially coming off the island and shoaling. Some shrimp boat captains thought the creek channel would have siltation issues.

PERMITS	
Required permits	• U.S. Army Corps of Engineers (USACE) Permits: As the primary agency overseeing dredging and sediment placement, the USACE issued the necessary permits for dredging and disposal of material. This included approval for using sediment from the Charleston Harbor Deepening Project and placing it on Crab Bank. • Environmental Protection Agency (EPA) and State-Level Permits: The project had to meet environmental standards for water quality and habitat preservation. This involved working with the South Carolina Department of Health and Environmental Control (SCDHEC) for the necessary environmental clearances, ensuring that the placement of dredged material did not adversely affect water quality or aquatic life. • Section 404 Permit: This permit, issued under the Clean Water Act, was required for activities involving the discharge of dredged or fill material into U.S. waters. Since the restoration involved filling a portion of the seabird sanctuary, it fell under this regulation. • Coastal Zone Management Act (CZMA): The project also required approval under the CZMA, which ensures that federal actions are consistent with state coastal zone management plans. SCDNR worked with federal and state authorities to ensure the project was aligned with South Carolina's coastal management goals.
Responsible party	SCDNR. Consulted with Living Shoreline Team at SCDNR. CAP 204 and 206: 204 allows the federal government to enter into cost share with non-federal partners; 206 supports ecosystem restoration
Adaptive management	No
Policy incentives and regulatory barriers	No. Only challenges encountered were differing opinions on regulatory interpretation and implementation.
Impact on design or implementation	None

MAINTENANCE AND MONITORING	
Dredging to provide future material	Potential maintenance dredging could provide material in future.
Monitoring includes	Funding provided to the SCDNR Marine Resources section to do one year of post construction monitoring via Unmanned Aerial Vehicle (UAV) focusing on shoreline change and sediment analysis. Long term monitoring—SCDNR conducts biological monitoring due to Seabird Sanctuary. Audubon conducted one year of people monitoring after construction to keep track of people and divert. Conducted some proactive education—handed out information to boat rental companies, launch points, etc.
Short and long-term maintenance and monitoring	Maintenance plan not developed. Physical monitoring was funded by a NFWF grant. Have management units set up - used for drone flight and census. Have a contract with Thompson Island (USACE Dredge Spoil island—veg control via herbicide).

DESIGN/CONSTRUCTION ELEMENTS	
Lifespan of project	~50 years
Materials used	Sand (Outlined in Environmental Assessment USACE - harbor deepening project sub report)
Volume of material used	660,000 cubic yards
Sediment volume and composition sufficient or augmented	Amount sufficient
Key design elements	The planned elevation for the sediment placement on Crab Bank was designed to be approximately 6.5 feet above mean high water (MHW). This elevation was chosen to ensure that the restored island would remain above tidal influence, providing ideal conditions for seabird nesting and minimizing the impact of flooding or erosion.
Protective measures	These techniques included controlled dredging practices that allowed for the careful placement of the sediment in a controlled manner. These methods were crucial for maintaining the integrity of the restored island, ensuring the material was placed at the correct elevation while preventing erosion and unwanted spreading.
Equipment required	Hydraulic cutterhead suction dredge, bulldozers
Distance material was transported	About a mile
Method of sediment suitability assessment	The dredged material needed to meet specific criteria to ensure it was appropriate for use in habitat restoration. The U.S. Army Corps of Engineers, in collaboration with environmental experts, conducted testing to verify that the sediment was free of contaminants and had proper grain size to provide stable ground for nesting birds

Sources

SCDNR—Bird Sanctuaries (https://www.dnr.sc.gov/birdsanctuaries/crabbank.html)

Crab Bank Seabird Sanctuary | Audubon South Carolina (https://sc.audubon.org/conservation/crab-bank-seabird-sanctuary)

Crab Bank Seabird Sanctuary: A landmark legacy (https://www.sac.usace.army.mil/Media/News-Stories/Article/2901290/crab-bank-seabird-sanctuary-a-landmark-legacy/)

Crab Bank FAQ | SCCBC (https://www.sccoastalbirds.org/crab-bank-faq)

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