

# Final Evaluation Findings

## Great Bay National Estuarine Research Reserve

June 2010 to July 2019

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## Executive Summary

The Coastal Zone Management Act (CZMA) requires the National Oceanic and Atmospheric Administration (NOAA) to conduct periodic evaluations of the performance of state programs participating in the National Estuarine Research Reserve System. This evaluation examined the operation and management of the Great Bay National Estuarine Research Reserve (Great Bay Reserve) by the New Hampshire Fish and Game Department, the designated lead agency, for the period from June 2010 to July 2019. The evaluation focused on three target areas: Building regional capacity to address the challenges facing Great Bay, science program progress and development, and staff and facilities visioning.

The findings in this evaluation document will be considered by the NOAA Office for Coastal Management in making future financial award decisions concerning the reserve. The evaluation came to these conclusions:

**Accomplishment:** Great Bay Reserve staff members take leadership roles in local, state, and national projects while fulfilling NOAA core National Estuarine Research Reserve System requirements at the highest quality. The Great Bay Reserve not only utilizes its staff to the fullest potential, but also functions as a strong integrated team, serving as a trusted resource producing relevant tools to the management community. The Great Bay Reserve has established itself as a regional and national leader, and has reached the full potential in its current footprint in terms of staff, programming, and facilities.

**Accomplishment:** Through proactive proposal preparation with partners, the leadership and staff of Great Bay Reserve are highly regarded collaborators who are skilled at identifying the enabling conditions needed by partners and have excelled at securing funding during this review period to meet these needs.

**Accomplishment:** The Great Bay Reserve is recognized as a local and national leader in salt marsh work through local application of models that helped communities identify vulnerable areas, understand migration pathways, and undertake viable salt marsh restoration efforts in light of sea level rise scenarios. Building from biomonitoring and sentinel site data collected within the reserve, a landscape-scale product was developed to assess marsh resilience and used to create a spatial model of the relative resilience for all marshes in the US.

**Accomplishment:** The Great Bay Reserve team is recognized for participating in projects to address upcoming research needs and apply new techniques for the betterment of the reserve system as a whole, demonstrating a team approach, foresight, and leadership.

**Accomplishment:** The Great Bay Reserve is recognized for its efforts to upgrade the current facilities at the Great Bay Discovery Center, including remodeling of office and education space, replacement of the boardwalk, adding handicap accessibility to the waterfront, and building a new picnic pavilion.

**Recommendation:** NOAA encourages the reserve to explore ways to expand the number of full-time staff members to ensure sustained, quality expertise at the reserve, given increasing programming and land management demands, current small size and temporary status of staff, and anticipated needs for conducting strategic succession planning.

**Recommendation:** The Great Bay Reserve should undergo a visioning process to assess the suitability of building and location options to accommodate future program needs, thinking about the legacy that current staff members would like to leave for future generations of stewards for Great Bay. It is imperative that Great Bay Reserve's mission and programming are central to the future use of the new property at Great Bay Farms.

**Recommendation:** NOAA encourages the reserve to work with the Great Bay Stewards to finalize the updated memorandum of agreement, identify how to work with New Hampshire Fish and Game to overcome human resource challenges associated with adding staff for the reserve, and continue to work in collaboration to align fundraising with the needs of the reserve.

**Necessary Action:** The Great Bay Reserve must finalize the updated management plan to be compliant with the Coastal Zone Management Act requirements and must work with the Office for Coastal Management to complete the plan by August 31, 2020.

## Program Review Procedures

The National Oceanic and Atmospheric Administration (NOAA) evaluated the Great Bay Reserve in fiscal year 2019. The evaluation team consisted of Susie Holst Rice, evaluation team lead, NOAA Office for Coastal Management; Betsy Nicholson, North regional lead, Office for Coastal Management; Michael Shirley, director, GTM Research Reserve; Adrienne Harrison, site liaison, Office for Coastal Management; Jamie Carter, regional geospatial coordinator, Office for Coastal Management; and Rebecca Newhall, site liaison, Office for Coastal Management. The support of reserve program's staff members was crucial in conducting the evaluation, and their support is most gratefully acknowledged.

NOAA sent a notification of the scheduled evaluation to the executive director of the New Hampshire Fish and Game Department, published a notice of "Intent to Evaluate" in the *Federal Register* on May 22, 2019, and notified members of the New Hampshire congressional delegation ahead of the evaluation site visit. The coastal management program posted a notice of the public meeting and opportunity to comment in *Foster's Daily Democrat* on May 30, 2019.

The evaluation process included a review of relevant documents, a survey of stakeholders, the selection of three target areas, and discussions with staff members and stakeholders about the target areas. In addition, a public meeting was held Tuesday, July 23, 2019, at the Hugh Gregg Conservation Center, 91 Depot Road, Greenland, NH 03840 at 5:00 p.m. to provide an opportunity for members of the public to express their opinions about the implementation of the reserve program. Stakeholders and members of the public were also given an opportunity to provide written comments. A summary of the written comments received and the NOAA Office for Coastal Management's responses are included in Appendix A. NOAA then developed draft evaluation findings, which were provided to the reserve program for review, and the program's comments were considered in drafting the final evaluation findings.

Final evaluation findings for the research reserves highlight each reserves' accomplishments in the target areas and include recommendations, which are of two types:

**Necessary Actions** address programmatic requirements of the Coastal Zone Management Act (CZMA) and its implementing regulations. These must be carried out by the date specified. Failure to address necessary actions may result in a future finding of non-adherence and the invoking of interim sanctions, as specified in CZMA §312(c).

**Recommendations** are actions that the office believes would improve the program, but which are not mandatory. The state is expected to have considered the recommendations by the time of the next evaluation or dates specified.

## Evaluation Findings

The Great Bay National Estuarine Research Reserve (Great Bay Reserve) is a highly functioning reserve program, a critical partner within the landscape of the Great Bay region, and a national leader on several fronts. For example, the leadership by the Coastal Training Program coordinator to foster municipal decision-makers with the information they need to understand, adapt, and prepare for climate change impacts affecting the region through the nationally recognized Coastal Adaptation Workgroup has resulted in “climate literate communities.” These communities are capable of explaining relevant climate science and converting climate change deniers. Also, the stewardship coordinator successfully completed a sentinel site plan for Great Bay, initiated biomonitoring of salt marsh habitat, and integrated it with habitat mapping to produce useful and innovative tools for understanding marsh vulnerability and marsh migration at local to national scales to inform resource managers. The water quality data from the System-Wide Monitoring Program, produced through an effective collaboration between the Great Bay Reserve and the University of New Hampshire Jackson Estuarine Laboratory, serves as cornerstone information for partners in the region, including the Piscataqua Region Estuary Partnership, the New Hampshire Department of Environmental Services, the Northeastern Regional Association of Coastal Ocean Observing Systems, and several municipalities surrounding Great Bay. The Great Bay Reserve has been tremendously successful at securing awards from the National Estuarine Research Reserve System Science Collaborative during the review period, and many of these projects have been executed in collaboration with and have directly benefited regional partners, making the reserve a model for regional collaboration as it works to inform data and informational gaps in the region. Finally, the reserve provides and curates an education program so popular that all spaces for the year are filled within 90 minutes of being offered; participants come from as far away as Vermont. All of these achievements are a result of excellent leadership, mature sector programs, a small but dedicated staff, highly trained and engaged volunteers, and collaborations with a multitude of partners, including the reserve’s friends group, the Great Bay Stewards.

**Accomplishment:** Great Bay Reserve staff members take leadership roles in local, state, and national projects while fulfilling NOAA core National Estuarine Research Reserve System requirements at the highest quality. The Great Bay Reserve not only utilizes its staff to the fullest potential, but also functions as a strong integrated team, serving as a trusted resource producing relevant tools to the management community. The Great Bay Reserve has established itself as a regional and national leader, and has reached the full potential in its current footprint in terms of staff, programming, and facilities.

The Great Bay Reserve has much to be proud of and spends a generous amount of energy in buoying its partners. That said, attention needs to be turned back to the reserve and the completion of its own management plan to ensure its future success. Ahead of the evaluation site visit a draft management plan was submitted to NOAA, and that is acknowledged; however a final plan remains out of date since last adopted in 2010.

**Necessary Action:** The Great Bay Reserve must finalize the updated management plan to be compliant with the Coastal Zone Management Act requirements and must work with the Office for Coastal Management to complete the plan by August 31, 2020.

## **Building Regional Capacity to Address Issues Facing Great Bay**

Throughout this evaluation, a tremendous amount of evidence was presented to show how the Great Bay Reserve contributes to local and regional collaborations. Through every instance of support, stakeholders and partners recounted the consistent ability of reserve leadership and staff to identify and provide the unique conditions needed to facilitate success within the community across many activities and issue areas. Because the seacoast region is compact (only 18 miles of coastline plus Great Bay) and there are many entities with complementary missions, the reserve has come to know its partners well and works with them to address numerous issues facing Great Bay. Additionally, the reserve works well with the other reserves in New England, providing additional regional partnership opportunities to solve common issues.

Staff share their expertise with New Hampshire Sea Grant, New Hampshire Coastal Program, Piscataqua Region Estuary Partnership, The Nature Conservancy, and the reserve, along with other partners, to enable these organizations to develop shared projects and successfully apply for funds to meet those needs. Examples include acquiring coastal fellows, resilience grants, and projects of special merit that benefit the Great Bay region, but the Great Bay Reserve has proven to be especially skilled at acquiring funding from the National Estuarine Research Reserve System Science Collaborative (NSC) and either led or advised on 15 projects awarded during the review period. Often these funds were further leveraged as they were distributed across partnerships in the region to build their capacity.

**Accomplishment:** Through proactive proposal preparation with partners, the leadership and staff of Great Bay Reserve are highly regarded collaborators who are skilled at identifying the enabling conditions needed by partners and have excelled at securing funding during this review period to meet these needs.

Below are a few specific examples of ways the reserve has built capacity in the region:

The education program staff at Great Bay Reserve recognized funding as a barrier for lower income schools to access its educational programming and worked with the Great Bay Stewards to develop Estuary Exploration Funds in response. This program is targeted toward schools with 40% or more of students that receive free or reduced cost lunches. Four schools used these funds in fall 2018 and spring 2019. NOAA commends the reserve and Great Bay Stewards for establishing this program and encourages the reserve to continue to look for opportunities to make programs accessible, affordable, and inclusive.

Buffers on the Bay, a National Estuarine Research Reserve Science Collaborative project, addressed nitrogen as a critical management issue facing Great Bay. The reserve successfully translated science to management applications, and partners cited meaningful and useful products that supported the use of buffers by state and local communities to improve water quality. Although the project was not set up for regulatory use, it spurred an offshoot project funded via the National Estuarine Research Reserve Science Collaborative (Credit for Going Green) to gather data to develop pollutant load reduction performance curves for various buffer options. These performance curves can now be used by the New Hampshire Department of Environmental Services to evaluate buffers alongside structural best management practices within their nonpoint pollution program.

Partnerships expand the reach and impact of reserve staff members and the efforts they pursue. In 2009 the Great Bay Reserve was the original convener of climate education and outreach organizations in New Hampshire, which turned into the New Hampshire Coastal Adaptation Workgroup, a nationally recognized model that has been replicated in Maine and Massachusetts. The reserve continues to host workshops and the Coastal Training Program coordinator co-leads the Coastal Adaptation Workgroup, which enables the Great Bay Reserve to leverage the resources, skills, and relationships of partners, enabling meaningful impact along the entire New Hampshire seacoast.

The reserve's Teachers on the Estuary (TOTE) program hosted approximately 100 participants during the evaluation period and continues to build programming that is relevant to science curriculums. Building from the good work of the Coastal Adaptation Workgroup and local expertise on climate issues, the most recent delivery focused on climate education and featured a partnership with University of New Hampshire Sea Grant Cooperative Extension on a climate education initiative to target 5th and 6th graders and improve climate education for families of these young school students. This



initiative, which brought current research to the classroom, addressed a recognized gap, since many teachers don't feel comfortable teaching climate issues. The effort received very positive feedback.

Through the efforts of the reserve's volunteer coordinator, the reserve has built a team of dedicated volunteers with a very high retention rate of 85%. This impressive retention rate provides high-quality and experienced volunteers that add capacity to the reserve's programs. Staff members prepare volunteers to be successful, with program leads training interested volunteers across the sectors of the program. The volunteer coordinator works to ensure they are matched with programs according to their interests, conducts reflection sessions to understand ways to improve the volunteer experience, and provides two recognition events each year, which makes volunteers feel valued as colleagues.

While the information and feedback received on the reserve's performance over the review period was very good overall, we heard a few things the reserve may want to consider. The following opportunities are provided to inform future work that builds on current efforts and could further increase the capacity in the Great Bay region and beyond.

*Opportunities:*

- In an effort to increase capacity and cultivate emerging leaders, continue to look for opportunities and develop strategies for engaging high school, college-aged students, and young adults. Capitalize on the Margaret A. Davidson fellowship for graduate students to bring additional science capacity to Great Bay. Also, investigate the potential to partner on future fellowships such as the Coastal Fellow or the University of New Hampshire Climate Fellow.
- Continue delivering high-quality products and services within the immediate Great Bay area, but start to consider how to influence stakeholders in upstream locations and contributing watersheds.
- Continue to ensure local impact by building a component into future projects that requires science translation in the form of a useable product for decision makers, such as a template for an ordinance.
- Continue to look for opportunities to reflect on behavior change that has resulted from programs to date and build measurable behavior change into future projects and programs.

## Science Program Progress and Development

At the foundation of the research sector is the System-Wide Monitoring Program (SWMP), and the Great Bay Reserve has an unconventional model compared to other reserve sites. Through a grant award, the core monitoring work is completed by the University of New Hampshire (UNH) Jackson Estuarine Laboratory, including submitting required data to the Centralized Data Management Office, University of South Carolina. Although this arrangement is not the standard across the reserve system, it works very well for the Great Bay Reserve and numerous partners in the region that depend upon it. There are two UNH staff members at the Jackson Lab that run the monitoring program, and before Great Bay Reserve hired the new research coordinator for the reserve, part of his job responsibilities at UNH was to help with the SWMP. As a result, the research coordinator is a familiar face at Jackson Lab and fully understands the monitoring protocols and technical considerations of the program, which has made for a smooth transition and established trust across this partnership. As a result of this additional workforce with UNH data collection and processing, the research coordinator is free to develop a research program for the reserve that addresses some of the fundamental data and information gaps of the Great Bay community, including leading the development of a white paper regarding potential for eelgrass restoration and recovery of Great Bay, monitoring for invasive crabs, establishing a baseline for ocean acidification, and pioneering methods to measure the biodiversity of the bay using eDNA.

One of the reasons this arrangement works so well is the fact that standards used for SWMP are then used for all additional water quality monitoring sites and sensors provided by partners, including the New Hampshire Coastal Program/Department of Environmental Services, the Piscataqua Region Estuary Partnership, U.S. Environmental Protection Agency, and the Municipal Coalition, including Durham, Newmarket, Dover, and Rochester. All data are collected and managed by the same lab at UNH, which allows for the integration of data from multiple funding sources to inform additional research, management, and regulatory needs. Furthermore, the Quality Assurance/Quality Control protocols for the SWMP water quality data are carried out by UNH for all data, and then the Piscataqua Region Estuary Partnership pays for the data to be served to the management community through the New Hampshire Department of Environmental Services.

Without the UNH partnership for SWMP, the reserve would not be able to partner as effectively with other local and federal entities, and additional opportunities for collaboration on emerging issues would be reduced if the research coordinator spent his time on SWMP. With UNH providing the role of “expert impartial data providers” for the SWMP responsibilities, the Great Bay Reserve has been able to grow partnerships and support applied research and monitoring to guide decisions affecting water quality (specifically nitrogen inputs), watershed management

(through data synthesis and options for buffer management) and habitat and species management (via contributions to the 2015 updates to the Wildlife Action Plan and inclusion of estuarine species and habitat). Importantly, much of this work was supported through NSC awards. NOAA commends the Great Bay Reserve's implementation of SWMP monitoring to serve as the backbone for additional water quality monitoring in the Great Bay area and, through partnerships and collaborations, make this data available to the public. The importance of the UNH partnership for continued success of the reserve's SWMP monitoring implementation is recognized by NOAA. The only downside of this arrangement worth noting is that the technicians at UNH are only responsible for the SWMP program and these positions do not have the flexibility of SWMP techs at other reserves to assist with additional research and monitoring needs of the reserve. There may be ways to strengthen this partnership further through pursuing awards to secure lab time or support additional research staff members for the reserve, and fostering successful work by future Davidson fellows while in residence at the Great Bay Reserve.

During the review period, the stewardship coordinator completed both the Sentinel Site Plan and Habitat Map for the reserve, and established the tidal datum using the research reserve's tide gauge. Biomonitoring of salt marsh habitat has been underway since 2010 to determine the inundation regime with vegetation transects established, and the reserve worked with UNH to take sediment elevation table measurements at these same marshes, with plans in 2019 to complete the vertical control aspects of the sentinel site requirements. The continued work through the review period on better understanding salt marsh habitat and its response to sea level rise has been recognized as pivotal for resource managers in the region

Additionally, the stewardship coordinator's innovative approach using GIS to detect habitat change at the local level and model marsh migration has been scaled up, using sentinel site data, to the landscape scale through partnerships with other reserves in New England, as well as nationally through a reserve system national product. The systematic approach shows how marshes compare within the contiguous U.S. and allows for smart management, land protection, and land use, and informs additional science and monitoring of salt marshes. As we heard during the site visit, some of the map products coming out of this work are "game changers" for the management community. Even more, through recent technical assistance from the Office for Coastal Management's regional geospatial analyst, new high-resolution lidar data are available to provide new inundation mapping products for Great Bay that will allow for restoration planning in critical areas.

**Accomplishment:** The Great Bay Reserve is recognized as a local and national leader in salt marsh work through local application of models that helped communities identify vulnerable areas, understand migration pathways, and undertake viable salt marsh restoration efforts in

light of sea level rise scenarios. Building from biomonitoring and sentinel site data collected within the reserve, a landscape scale product was developed to assess marsh resilience and used to create a spatial model of the relative resilience for all marshes in the US.

The Great Bay Reserve not only leads collaborative research projects but also participates in projects to inform other reserves on applications of new technologies, collect new types of data in the reserve system, and develop new ways of improving estuarine science. The Great Bay Reserve has been participating in a project to use eDNA methods to monitor invasive species and biodiversity in estuaries. In addition the reserve participated in a project to evaluate thin-layer sediment placement as an adaptive strategy to enhance coastal marsh resilience. The reserve is also participating in a pilot project to collect baseline information on ocean acidification in the New England reserves. It was noted by the management community in the Great Bay region that virtually nothing is known about how ocean acidification may be impacting the bay and, with the increased use of Little Bay for aquaculture, this information will be important to inform this potential industry.

**Accomplishment:** The Great Bay Reserve team is recognized for participating in projects to address upcoming research needs and apply new techniques for the betterment of the reserve system as a whole, demonstrating a team approach, foresight, and leadership.

As the new research coordinator continues to build a research program for the reserve, there are opportunities to pursue stronger partnerships with the New Hampshire Fish and Game Department on emerging issues such as eDNA, oysters, eelgrass, and ocean acidification. Building stronger linkages while addressing the programmatic needs within the department will serve the reserve well and may potentially lead to stronger connections with the lead agency overall, which could address personnel needs associated with activities that align with ongoing work done by the department. Additionally, the evaluation team heard that subtidal biomonitoring would be useful to help understand how eelgrass and macroalgae respond to environmental conditions in the bay. The reserve ought to continue working with partners to include subtidal biomonitoring in sentinel site surveys and work with partners to determine which organization is in the best position to lead this effort.

## **Staff and Facilities Visioning**

The Great Bay Reserve works with many stakeholder communities in the area and provides meaningful support that is tailored to their diverse needs. A critical element needed to assist with building capacity in the region is staff, and the Great Bay Reserve has a lean staff of only six full-time employees and four part-time staff members who work together seamlessly to carry out the core functions of the reserve. Praise for staff members was repeated throughout the evaluation, and they function as a well-oiled machine to keep the environment in the forefront as they leverage partners, train volunteers, work with stakeholders, collaborate on

needed research, and provide highly sought after educational programming. Many staff members have been in their roles for over a decade and were instrumental in shaping mature programs that serve the reserve and the surrounding communities. With significant historical knowledge in place, it is a good time to reflect on their success, capture lessons learned, and conduct a forward-looking succession-planning process to describe the legacy that current staff members would like to leave for future generations of stewards for Great Bay.

Also, within the evaluation period, the reserve hired the current manager, who has provided extraordinary leadership for the reserve and for partners in the region, creating an environment where no one works in a silo and everyone feels supported. She has built a great working relationship with the leadership of New Hampshire Fish and Game Department and strengthened the role of the Great Bay Stewards to expand opportunities for the reserve by accepting external funding and working with the board to collaboratively achieve joint priorities. She has also made a huge impact as the chair of the Piscataqua Region Estuary Partnership Management Committee—numerous comments were received that credit her with doing a phenomenal job in this role. Given her background with NOAA before becoming manager of Great Bay Reserve, she was positioned exceptionally well to excel in this new role and she clearly has done so. NOAA commends the great work she is doing at the reserve, her outstanding performance with receiving competitive funding awards from the National Estuarine Research Reserve Science Collaborative, and her leadership and collaborative approach to addressing the challenges to Great Bay.

Given the small number of full-time staff members at Great Bay Reserve, and up to 5,000 visitors per year to the exhibit room at the Discovery Center, the work of the volunteer coordinator is essential to foster a community of volunteers to pitch in across the sector programs and make sure that visitors receive a good experience. Through the coordinator's work, the reserve has an extremely well-trained, knowledgeable, and passionate volunteer corps, with high retention rate and longevity of service. As a testament to her hard work, in the past six years the total volunteer hours increased by 40 percent, and in 2018 a record 3,893 volunteer hours were logged. The reserve's volunteer program was noted as exceptional, and during the stakeholder meeting with a subset of current volunteers, it is clear that the coordinator is endeared by her volunteers. As one of them said, "Something outstanding is happening here."

**Recommendation:** NOAA encourages the reserve to explore ways to expand the number of full-time staff members to ensure sustained, quality expertise at the reserve given increasing programming and land management demands, current small size and temporary status of staff, and anticipated needs for conducting strategic succession planning.

One of the essentials needed to provide capacity to the local community is a space to convene meetings and workshops. The Hugh Gregg Conservation Center at the Great Bay Discovery Center was identified numerous times during the evaluation as a critical space provided by the reserve that had a positive impact on regional partnerships. It is one of the few meeting venues in the region that can hold a large number of participants, and it is also a very pleasant space that is maintained well by reserve staff. Due to its popularity and unique qualities, it is a very busy venue. During the evaluation period, a number of additions and upgrades were completed at the Discovery Center with an aim to improve the visitor experience and provide improvements for the staff as well.

**Accomplishment:** The Great Bay Reserve is recognized for its efforts to upgrade the current facilities at the Great Bay Discovery Center, including remodeling of office and education space, replacement of the boardwalk, adding handicap accessibility to the waterfront, and building a new picnic pavilion.

The evaluation team noted that office space at the Discovery Center is limited and doesn't provide an ideal working environment for all staff members. Storage space is inadequate and lab space is nonexistent. The recent acquisition of Great Bay Farms Wildlife Management Area (Great Bay Farms) presents the reserve with an opportunity to grow. This new location could provide the reserve with potential for enhanced programming, public access to Great Bay with a boat ramp, connection to a major population center (Portsmouth, New Hampshire), office space for all staff, sufficient storage space, and housing for future graduate students, TOTE participants, Americorps volunteers, and other New Hampshire Fish and Game Department needs. To fully take advantage of this opportunity, a thoughtful visioning process is needed to inform any construction and use of the site. This visioning for Great Bay Farms should be considered in tandem with the information that comes from proactive succession planning mentioned earlier in this section to allow the form of any new facilities to follow their future needed function. As the New Hampshire Fish and Game Department begins planning for Great Bay Farms, NOAA encourages the department to engage in the visioning process and ensure future use aligns with the mission of the reserve.

**Recommendation:** The Great Bay Reserve should undergo a visioning process to assess the suitability of building and location options to accommodate future program needs, thinking about the legacy that current staff members would like to leave for future generations of stewards for Great Bay. It is imperative that Great Bay Reserve's mission and programming are central to the future use of the new property at Great Bay Farms.

Due to the tidal regime of Great Bay, neither the Discovery Center nor Great Bay Farms provide deepwater boat access to the bay. During the facilities visioning process, a decision should be made regarding suitable lab space and access to the bay for the research coordinator and any future graduate students or Margaret A. Davidson Fellows. This may include formalizing space at the Jackson Lab, since there is already a cohort of academic professionals there who could serve as mentors, collaborators, or partners in future research on Great Bay. Discussions with the new director of the UNH Marine School and NOAA staff members in the region may be worthwhile to establish contact and provide information on the breadth of the reserve's partnerships and the work it supports in Great Bay. Such conversations may potentially identify areas of future collaboration, as well as explore funding options for mutually beneficial facility improvements for lab space and storage at the Jackson Lab to support continued SWMP success and future research projects on the bay, including studies conducted by Davidson Fellows.

The reserve has an extraordinary ability to successfully compete for external funds through multiple sources; however, it is handicapped in its ability to provide match for these types of proposals or add staff capacity, given its restrictions within the New Hampshire Fish and Game Department. To enable the reserve to continue to grow and serve the seacoast, the Great Bay Stewards has become increasingly important in its ability to serve as a fiscal agent or bring in donations to support contract staff and facility needs. Through its timely revision of the memorandum of agreement with Great Bay Stewards, the reserve needs to consider how to best position the partnership for creative use of external funds where the department has limitations to assist. Over the review period the Great Bay Stewards has grown to serve a critical role in adding capacity through its own leadership, development staff, and support of contractor staff to the reserve. Additionally, the Great Bay Stewards was recognized by education program staff members as critical for supporting their programs and allowing them to go above and beyond by extending the reach of the programs through the Estuary Exploration Funds.

**Recommendation:** NOAA encourages the reserve to work with the Great Bay Stewards to finalize the updated memorandum of agreement, identify how to work with New Hampshire Fish and Game to overcome human resource challenges associated with adding staff for the reserve, and continue to work in collaboration to align fundraising with the needs of the reserve.

## Evaluation Metrics

During this evaluation period the national estuarine research reserves tracked two sets of evaluation metrics, one set of metrics was tracked during 2012-2017, and another set of metrics was established in 2017 for tracking until 2022.

### Set 1: 2012-2017

Beginning in 2012, national estuarine research reserves began tracking their success in addressing three evaluation metrics specific to their programs. The evaluation metrics include a five-year target and provide a quantitative reference for each program about how well it is meeting the goals and objectives it has identified as important to the program. Goals and Objectives are from the Great Bay NERR Management Plan (2006-2010).

#### Metric 1

**Goal:** Provide for the long-term conservation and restoration of native biodiversity within the Great Bay watershed. (Management Plan page 21)

**Objective:** By 2017, develop invasive species monitoring and control strategies

**Strategy:** The reserve will work to increase the restoration of native vegetation throughout the Great Bay watershed by developing and promoting an invasive species plant removal “tool loan library.” The tool loan library will facilitate mechanical removal of woody stemmed invasives and establishment of native plants by making available weed wrenches, mattocks, and planting bars, to conservation partners and community members. Users of the program will be required to report species, number, and spatial location of invasive plants using an online survey before borrowing the tools to complete their restoration. This will allow us to include accurate and measurable data reporting by users. The target number, and the way plants will be counted aligns with protocols used by the Invasive Plant Atlas of New England (University of CT). See Great Bay Reserve Management Plan 2006-2010, Chapter VI, page 64. The Reserve currently has no invasive species monitoring plan.

**Performance Measure:** By 2017, number of invasive plants removed within the Great Bay watershed through the use of the tool loan program.

**Target:** By 2017, 10,000 invasive plants removed within the Great Bay watershed through the use of the tool loan program.



**Results:** Between 2012 and 2017, a total of 65,700 invasive plants were removed from the Great Bay watershed.

**Discussion:** The efforts to remove invasive species surpassed the 5-year target in its first year with 13,977 invasive plants removed in 2012. This level of removal activities was sustained over the 5-year period, and every year more than 10,000 invasive plants were removed. This was a clear success and the 5-year target was perhaps a little low given the annual removals documented. All in all this was a job well done.

## **Metric 2**

**Goal:** Design and implement a comprehensive program of education, outreach and interpretation based on solid scientific principles that strengthen understanding, appreciation and stewardship of estuaries, coastal habitats, and associated wetlands throughout the Great Bay watershed.

**Objective:** By 2017, increase the awareness and understanding of the value of the Great Bay estuary and estuarine systems by the public living in the Great Bay watershed.

**Strategy:** Increase capacity to offer more public programs through the use of additional volunteers and student interns, and develop new exhibit experiences that address ecological functions, values, and services. For the purposes of this metric, “public” is defined consistently with the National Estuarine Research Reserve System Education Performance Measures guidance for Education Output Indicators.

**Performance Measure:** From 2012 to 2017, number of individuals who participate in public outreach programs and visitor center exhibit experiences.

**Target:** From 2012 to 2017, 16,000 individuals will participate in public outreach programs and visitor center exhibit experiences.

**Results:** Between 2012 and 2017, a total of 34,011 individuals participated in public outreach programs and visitor center exhibit experiences.

**Discussion:** The target was more than doubled over the 5-year period. This is a testament to the hard work by Great Bay Reserve staff to provide excellent programming and high-quality experiences at the visitor center. In addition to staff, the volunteers at Great Bay Reserve deserve credit for their work with the programs and support with the Discovery Center exhibits.

The volunteers play an integral part of the public experience at Great Bay Reserve, and the volunteer coordinator does an excellent job to ensure that the volunteers are engaged in work that is meaningful to them.

### **Metric 3**

**Goal:** Build community resilience and capacity to manage related issues affected by a changing Climate.

**Objective:** Increase the capacity and participation of towns in the Great Bay Watershed to address climate-related issues by 2017.

**Strategy:** Promote and facilitate research that addresses climate informational needs, increase awareness and understanding of climate change issues, and provide technical assistance to towns to aid in the development of their Master Plans through NH Coastal Adaptation Workgroup (NHCAW). Currently Great Bay Reserve is involved in four research projects that have climate change components (NHFG WAP, National Estuarine Research Reserve System Sentential Site, CICEET 100 Year Flood, NHCF Climate Change Assessment), the CTPC is the founder and Co-chair of NHCAW, and Great Bay Reserve implemented its first local climate summit in late 2011. All of these efforts contribute to the identification of research gaps and needs. Great Bay Reserve CTPC involvement with NHCAW is a significant contribution to Reserve efforts to increase awareness and understanding of climate change issues and the main avenue in our efforts to provide technical assistance to towns.

Further discussion and detail about climate adaptation goals and building community resilience can be found in the 2011 National Estuarine Research Reserve System Climate Change Initiative document.

There are 42 towns in NH that are in the Great Bay Watershed. As of 2012 only one town, Portsmouth, is currently incorporating climate change into their Master Plan. Portsmouth's effort is due in part to their strong participation in NHCAW as a founding member and the strong participation of numerous decision makers from Portsmouth in NHCAW workshops. Portsmouth's current project is to specifically incorporate climate change into their Master Plan and is being funded by a grant from CSC. Currently within NHCAW, there are 4 submitted grant proposals that if funded would assist 8 or more towns in climate adaptation planning, and NHCAW is currently working with three coastal towns on an economic analysis modeling sea level rise impacts.

**Performance Measure:** By 2017, number of towns incorporating climate adaptation strategies into Master Plans, addressing resiliency and capacity to deal with the effects of a changing climate.

**Target:** By 2017, 21 towns in the Great Bay Watershed will incorporate climate adaptation strategies into their Master Plans, addressing resiliency and capacity to deal with the effects of a changing climate.

**Results:** Between 2012 and 2017, a total of 8 towns incorporated climate adaptation strategies into Master Plans.

**Discussion:** Despite good work during this 5-year period, the target was not met. There may be external factors that prevented the reserve from achieving this target, since each town has different circumstances, such as timing for renewing their master plans, elections for relevant officials, and degree of knowledge and buy-in to climate adaptation strategies of these officials. The reserve continues to work with a number of communities to incorporate these strategies and has expressed a desire to better understand how to increase action at the local level.

## **Set 2: 2017-2022**

The goals and objectives are from the Draft Great Bay Reserve Management Plan (submitted July 2019).

### **Metric 1**

**Goal:** People make personal and professional decisions that help restore and protect ecosystem function and advance social priorities (Great Bay Reserve Management Plan Integrated Goal 2).

**Objective:** People recognize that they are an integral part of the GB ecosystem (Great Bay Reserve Management Plan Objective 2.4).

**Strategy:** The reserve has had a strong volunteer program for several years, with high return rates. The majority of Great Bay Reserve programs occur at the campus in Greenland, but the reserve manages over 2,000 other acres on parcels distributed around the watershed. Each property has unique features that reinforce our mission. Connecting citizens to Great Bay by getting them outdoors is an important aspect of fostering personal decisions that can help restore and protect Great Bay, and staff would like to encourage a managed increase in public education and interpretation at the “other” reserve properties. Reserve staff have found that our volunteers have a deep connection to the Bay, and are our greatest ambassadors in sharing their enthusiasm. Having a trained volunteer lead guided tours of reserve properties will

increase both the participant's and docent's appreciation of the resource, and will also expand the type of volunteer opportunities at the reserve. This program will boost the overall knowledge base of our volunteer group and build a stronger community connection to the entire reserve. This performance metric will reflect two things: a commitment to maintaining the strong volunteer numbers (hours and participants) that we have had historically, plus adding additional hours for volunteers to spend interpreting reserve properties. The target is set for Volunteer hours, but we anticipate that this effort will also lead to increases in the number of people reached through public outreach activities.

**Year 1: Planning and Organization:** Reserve staff will develop a long term plan for 8 guided walks over five years, volunteer recruitment and training, and gathering details about topics to highlight , in order to have a theme for each walk. This planning effort will engage staff from all sectors.

**Year 2: Pilot Program:** We will recruit and train 2 volunteers and advertise for 2 walks. A reflection session or another formative evaluation will be conducted with volunteers and guided walk participants to make improvements to the program as needed.

**Years 3 and 4: Implementation:** Reserve staff will organize and recruit for guided walks at a minimum of two different reserve properties, using feedback from previous years to adjust as necessary.

**Year 5: Analysis and Review:** Reserve staff will evaluate the success of the projects (Did the volunteers increase their range of knowledge and experience? Did walk participants gain new knowledge or appreciation for Great Bay and the NERR?) The goal will be to implement an ongoing annual series of guided walks, each focused on a different reserve property. Volunteer hours will be reported through the "Volunteer Index" performance measure.

**Performance Measure:** From 2017 to 2022, total volunteer hours.

**Target:** From 2017 to 2022, 14,100 total volunteer hours.

**Results:** Volunteer hours in an education role, 2017-2018 (2019-2022 not yet reported), 4,212 volunteer hours. [The value for the first half of 2018 is estimated at 918.] There are no values reported in the Coastal Training Program for other volunteer values.

**Discussion:** The reserve has begun this effort and has over 4,000 hours logged in the first two years. As implementation goes into full swing we expect that the number of volunteer hours will increase. The Office for Coastal Management anticipates smooth implementation and encourages the reserve to consistently track the hours for reporting purposes.

## Metric 2

**Goal:** People make personal and professional decisions that help restore and protect ecosystem function and advance social priorities (Great Bay Reserve Management Plan Integrated Goal 2)

**Objectives:** We understand how people make professional and personal decisions that could impact Great Bay (Great Bay Reserve Management Plan, Integrated Goal 2, objective 2.1)

People have clear information that translates local science (including uncertainty) (Great Bay Reserve Management Plan, Integrated Goal 2, objective 2.2)

**Strategy:** Conservation Action Education (CAE) programs are those that focus primarily on fostering behavioral change that leads to resource conservation and advances the mission of the Reserve. CAE programs are those that are specifically designed with the INTENTION of creating behavior change and/or fostering wise stewardship of estuaries. CAE programs focus on audiences whose personal choices directly impact the integrity of our estuaries and their associated watersheds. Target audiences include, but are not limited to, residents of the watershed (adult and children) and recreational users of the Reserve.

Working synergistically with research, stewardship and/or coastal training program sector leads, CAE programs will be developed for a variety of ages throughout the 5-year reporting period. Specifically, education staff will address key issues identified as priorities within these sectors, for example, an early detection and eradication plan for a specific key invasive species, or working with land owners to support buffer work being done with the CTP program. During this period effective evaluation techniques and methods will be explored for use with CAE programs.

CAE programs are a new National Estuarine Research Reserve System initiative. These programs take more time and attention from the staff and group sizes are smaller compared to other public education programming.

**Performance Measure:** From 2017 to 2022 number of Conservation Action Education participants.

**Target:** From 2017 to 2022, 100 Conservation Action Education Program participants.

**Results:** Fiscal Year 2017: 7 participants, Fiscal Year 2018: 26 participants

**Discussion:** With only two years of results at the time of this evaluation it appears that the reserve is off to a good start towards reaching their target of 100 participants with 33

participants. The Office for Coastal Management encourages the reserve to continue with this effort to increase behavioral changes to improve stewardship of the Great Bay reserve.

### **Metric 3**

**Goal:** People make personal and professional decisions that help restore and protect ecosystem function and advance social priorities (Great Bay Reserve Management Plan Integrated Goal 2)

**Objective:** People have clear information that translates local science (Great Bay Reserve Integrated Objective 2.2)

**Strategy:** The goal of the Great Bay Reserve CTP is to enhance informed decision making on the Great Bay ecosystem on the state level, in municipalities, and within watershed and environmental organizations. The Coastal Training Program provides science based training and resources to decision makers in the NH Coastal Watershed. An emerging need that has been identified is the lack of basic municipal board skills and environmental knowledge. The Reserve CTP has been working in partnership with the local NEP on developing a “Board Empowerment Series”; a suite of workshops that address both issue competence and decision making confidence on municipal land use boards. This effort has been piloted over the past twelve months, and the demand is high for continuing and expanding the series. The Coastal Training Program delivers information through workshops, trainings, summits, coordinating Advisory Committees for research projects, and through direct technical assistance or education. CTP will address this PM by assuring that each training has the highest quality science based materials, that presenters are well prepared, that needs of municipal boards are continually assessed, that the reserve expands partnership opportunities with the state-wide association of Conservation Commissions and related groups, and that each workshop is evaluated and debriefed with all partners.

**Performance Metric:** From 2017 to 2022, the number of training events delivered by the Coastal Training Program.

**Target:** From 2017 to 2022, the Great Bay NERR Coastal Training Program will deliver 40 training events.

**Results:** Fiscal Year 2017: 14, Fiscal Year 2018: 4 programs

**Discussion:** In the first two years of implementing this metric, the reserve has nearly reached the halfway point towards the target. The reserve is on track, and the Office for Coastal Management is pleased that the reserve is working to engage with the municipal boards in the watershed through the Board Empowerment Series to improve environmental knowledge and decision-making confidence.

## Conclusion

For the reasons stated herein, I find that the New Hampshire Fish and Game Department is adhering to the programmatic requirements of the Coastal Zone Management Act and its implementing regulations in the operation of its approved Great Bay National Estuarine Research Reserve.

These evaluation findings contain one necessary action and three recommendations. The necessary actions are mandatory and must be completed by the dates given. Recommendations must be considered before the next regularly scheduled program evaluation but are not mandatory at this time. Recommendations that must be repeated in subsequent evaluations may be elevated to necessary actions.

This is a programmatic evaluation of the Great Bay National Estuarine Research Reserve that may have implications regarding the state's financial assistance awards. However, it does not make any judgment about or replace any financial audits.

*signed by John R. King for*  
Jeffrey L. Payne, PhD  
Director  
NOAA Office for Coastal Management

*dated November 21, 2019*  
Date

## Appendix A. Written Comments

Dolores Leonard, Principal, Roca Communications+

“I have had the pleasure of collaborating with the staff of the Great Bay NERR since 2004. My interactions with GBNERR [Great Bay Reserve] staff first occurred when I was part of two NOAA-sponsored funding programs at the University of New Hampshire (UNH), the Cooperative Institute for Coastal & Estuarine Environmental Technology and the UNH/NOAA Science Collaborative.

During my tenure with these programs, the GBNERR was a partner or intended user on many grant-funded collaborative research projects. In that capacity, they were an invaluable resource for research teams working on science to support regional coastal management. In particular, the research, training, and stewardship program staff were much sought after partners for these projects given their extensive knowledge of the people, the places, and the science that underpins of the Great Bay region. Since I left University of New Hampshire, I have worked with GBNERR on two sponsored projects—one an integrated assessment of policy related to buffer management in the Great Bay region and the other a knowledge transfer project to convene an expert panel to develop recommendations that allow constructed buffers to receive credit under MS4 permits for NH communities. In both cases, I was able to experience the value of GBNERR’s network and knowledge of the region firsthand. Both projects led to useful products and strengthened relationships that GBNERR staff are actively using to advance the science and stewardship of buffer areas in Great Bay

GBNERR has an extraordinarily high participation rate in sponsored projects, despite the fact that they received little to no compensation from the grants. While this is great for local scientists and communities, it places a great deal of uncompensated responsibility on GBNERR staff. I know the current and past managers of GBNERR have worked hard to address this issue and have been challenged by the constraints of their administrative structure. Anything their federal partner NOAA or state partner NHFG could do to help them address this issue would be helpful not only to GBNERR staff, but to the many organizations that want to work with them to advance mutual goals for regional management. This is an organization that does an amazing amount of good with the limited resources they have—it would be to everyone’s benefit to see how far they could advance their mission with more appropriate funding.

I also have worked with GBNERR staff in my capacity as communications contractor with the National Estuarine Research Reserve Association. As part of this work, I have been able to



witness firsthand the close collaboration that GBNERR enjoys with the NH Coastal Program and the Piscataqua Region Estuaries Partnership (NH NEP). The way these groups coordinate to communicate the value of their individual programs and the power of their partnership to Congress is remarkable and would be a good model for other states.”

**NOAA Office for Coastal Management’s Response:** The NOAA Office for Coastal Management thanks Ms. Leonard for her comments.