MEMORANDUM OF UNDERSTANDING FOR COOPERATIVE EDUCATION, IMPLEMENTATION, RESEARCH AND MONITORING OF LIVING SHORELINES AND THE MANAGEMENT OF *PHRAGMITES AUSTRALIS* IN COASTAL NORTH CAROLINA

Among the

North Carolina Department of Environmental Quality

Albemarle-Pamlico National Estuary Partnership

Division of Coastal Management

Division of Marine Fisheries

Division of Water Resources

University of North Carolina-Wilmington

University of North Carolina-Institute of Marine Sciences

East Carolina University

Duke University

North Carolina Sea Grant

North Carolina Coastal Federation

The Nature Conservancy

National Marine Fisheries Service

National Center for Coastal Ocean Science

This Memorandum of Understanding (MOU) is entered into by the North Carolina Department of Environmental Quality (NCDEQ) [Albemarle – Pamlico National Estuary Program (APNEP), Division of Coastal Management (DCM), North Carolina National Estuarine Research Reserve (NCNERR), Division of Marine Fisheries (DMF), Division of Water Resources (DWR)}; The University of North Carolina at Chapel Hill - Institute of Marine Sciences (UNC-IMS); The University of North Carolina Wilmington (UNC-W); North Carolina Sea Grant (NCSG); East Carolina University (ECU); North Carolina Coastal Federation (NCCF); The Nature Conservancy (TNC); National Marine Fisheries Service (NMFS); and National Center for Coastal Ocean Science (NCCOS).

**PURPOSE**

This MOU establishes the general framework for cooperation and participation among the cooperators in the education, implementation, research and monitoring of living shorelines along the coast of North Carolina. It also establishes a general framework for cooperation and participation among the cooperators to explore and develop a management strategy for *Phragmites australis* in coastal North Carolina.

**Living Shorelines**

Living shorelines are a suite of shoreline stabilization techniques that incorporate live components such as marsh plants, frequently in combination with rock or oyster sill structures. According to the N.C. Coastal Habitat Protection Plan (CHPP), wetland and shell bottom habitat along the shoreline have declined in many areas due to natural erosion and vertical shoreline hardening with bulkheads. Living shorelines offer an alternative for protecting waterfront property, while restoring fish habitat and ecosystem services. Since 2005, progress has been made in documenting, through scientific studies, the benefits and limitations of living shorelines. Research in North Carolina has shown that living shorelines support a higher diversity and abundance of fish and shellfish than bulkheaded shorelines, effectively deter erosion, and survive storm events well. Education and outreach efforts have been done to increase awareness of this technique to the public and contractors. Nonprofit organizations and DCM have constructed demonstration projects. Despite these efforts, approximately 60 living shorelines have been permitted coastwide, in contrast to 93 miles of bulkheads (based on 2012 DCM mapping). The CHPP Steering Committee requested that efforts continue to focus on encouraging living shorelines to protect property, restore shoreline habitat, and improve water quality.

The development of incentives and the use of cost share programs may make it easier to design, permit, fund and construct living shorelines and may help motivate landowners to restore shoreline property. Technical assistance and education can demonstrate that living shorelines are a viable option for shoreline stabilization.

***Phragmites australis***

Management of the non-native *Phragmites australis*, or the Common Reed is difficult and complex. Once *Phragmites* becomes firmly rooted, it aggressively spreads and grows up to 12 feet high and can diminish a marsh’s natural productivity and habitat diversity, and be nearly impossible to eradicate. On July 17, 2017, various groups joined together for a working meeting hosted by the NCCF to discuss the growth of *Phragmites* in North Carolina’s coastal marshes. It was concluded and the participants generally agreed that more effort is needed to develop an effective management strategy for *Phragmites*. Future needs were identified, including a solid mapping effort, more North Carolina-specific scientific studies, methods to educate property owners on early identification and treatments, a better understanding of the effect of the plant community on the coastal region and the effects of the current management approaches on the ecology and on human health. Identifying partners for a working group, obtaining additional funding sources, and creating a pilot management program are the next step in this process.

**ACTION PLAN**

The undersigned state government, federal government, academic, and non-government organizations will establish a collaborative and comprehensive long-term program with the following goals: (1) To organize the efforts of these partners to manage estuarine shorelines by promoting the use of natural and constructed living shorelines where appropriate, in order to maintain natural and productive estuarine and riverine ecosystem processes; and (2) To establish a coordinated strategy to manage *Phragmites australis*.

To achieve goal (1), the partners under this MOU will work together to reach the following objectives:

a. Actively engage and enhance communications with contractors, realtors, and homeowners’ associations about living shorelines through workshops, educational materials, educational incentives and demonstration projects.

b. Facilitate the development of incentives and communicate to property owners about any potential funding assistance and cost share programs.

c. Continue research to evaluate efficacy and performance of living shorelines and construction materials.

d. Continue mapping estuarine shorelines to help improve the establishment of appropriate shoreline stabilization methods.

To achieve goal (2), the partners under this MOU will work together to reach the following objectives:

a. Investigate mapping/detection methods and develop a mapping strategy to identify and monitor populations of *Phragmites* and potential unaffected habitat that may be impacted in the future.

b. Develop research priorities to better understand the ecological effects of *Phragmites* on fish, wildlife, invertebrates, birds and the plant community and the effects of different management approaches on the environment and on human health.

c. Develop education materials for property owners to help improve the understanding of identification, introduction and spread of *Phragmites*.

3. The undersigned agencies will establish committees to plan and coordinate each objective

4. This program will encompass the estuarine shoreline of North Carolina.

5. For living shorelines, work will include the following types of activities:

a. Education and Outreach through

* workshops
* educational materials
* demonstration sites
* incentive development

b. Research on structural materials and performance

c. Continued analysis of existing estuarine shoreline mapping inventory and the development of a geospatial model that matches appropriate shoreline stabilization methods with shoreline type.

6. For Phragmites Management, work will include the following types of activities:

a. Education and Outreach through

* workshops
* educational materials

b. Research on the

* effects of the plant community on the coastal region
* effects of the current management approaches on the ecology and on human health

c. Mapping

7. The Albemarle-Pamlico National Estuary Partnership in the North Carolina Department of Environmental Quality and the North Carolina Coastal Federation will provide management and coordination for the cooperative Living Shoreline and *Phragmites* Management programs.

8. Nothing in this Memorandum of Understanding shall obligate any of the signatories to expend funds. However, all partners in this program are encouraged to work together to pursue funding and other assistance to accomplish the program’s goals.

**STEERING COMMITTEE MEMBERS**

**Co-Chair**

Trish Murphey, Watershed Manager

Albemarle – Pamlico National Estuary Program

North Carolina Department of Environmental Quality

North Carolina Coastal Reserve and National Estuarine Research Reserve

101 Pivers Island Rd,

Beaufort, NC 28516

**Co-Chair**

Lexia Weaver, Coastal Scientist and Central Regional Manager

North Carolina Coastal Federation

3609 Highway 24

Newport NC 28570

252-393-8185

Jimmy Johnson, Coastal Habitats Coordinator

Albemarle – Pamlico National Estuary Program

North Carolina Department of Environmental Quality

943 Washington Square Mall

Washington, NC 27889

252-948-3952

Todd Miller, Executive Director

North Carolina Coastal Federation

3609 Highway 24

Newport NC 28570

252-393-8185

Daniel Govoni, Policy Analyst

Division of Coastal Management

North Carolina Department of Environmental Quality

400 Commerce Avenue

Morehead City, NC 28557

252-808-2808

Rebecca Ellin, Coastal Reserve Program Manager

North Carolina Coastal Reserve and National Estuarine Research Reserve

Division of Coastal Management

North Carolina Department of Environmental Quality

101 Pivers Island Rd

Beaufort NC, 28516

252-838-0880

Whitney Jenkins, Coastal Training Program Coordinator

North Carolina Coastal Reserve and National Estuarine Research Reserve

Division of Coastal Management

North Carolina Department of Environmental Quality

101 Pivers Island Rd

Beaufort NC, 28516

252-838-0882

Anne Deaton, Habitat Coordinator

Division of Marine Fisheries

North Carolina Department of Environmental Quality

P.O. Box 769

Morehead City, NC 28557

252-726-7021

Karen Higgins, 401 & Buffer Permitting Branch Supervisor

Division of Water Resources

North Carolina Department of Environmental Quality

1617 Mail Service Center

Raleigh, NC 27699-1617

919-807-6360

Dr. Niels Lindquist, Joint Professor

The University of North Carolina at Chapel Hill – Institute of Marine Sciences

3431 Arendell Street

Morehead City, NC 28557

252-726-6841, ext. 136

Rachel Gittman, Assistant Professor

Department of Biology

Institute for Coastal Science and Policy

East Carolina University

Greenville, NC 27858-4353

252-328-9986

Reide Corbett, Professor

Department of Geological Sciences,

Institute of Coastal Science and Policy

East Carolina University

Greenville, NC 27858

252-328-1367

Brian Silliman, Rachel Carson Professor of Marine Conservation Biology

Duke University Marine Laboratory

Nicholas School of the Environment and Earth Sciences

135 Duke Marine Lab Road

Beaufort, NC 28516-9721

252-504-7655

Brian Boutin, Program Director

The Nature Conservancy

701 west Ocean Acres Drive

Kill Devil Hills, NC 27948

252 441 2525 ext. 6

Spencer Rodgers, Coastal Construction and Erosion Specialist

North Carolina Sea Grant

University of North Carolina-Wilmington

Center of Marine Science

5600 Marvin K. Moss Ln.

Wilmington, NC

910-962-2491

Carolyn Currin, Research Ecologist

NOAA National Ocean Service

National Centers of Coastal Ocean Science

101 Pivers Island Rd.

Beaufort, NC 28516

252-728-8749

Fritz Rohde, Fish Passage & Diadromous Fish Restoration

NOAA National Marine Fisheries Service

101 Pivers Island Rd.

Beaufort, NC 28516

252-838-0828

Devon Eulie, Assistant Professor

Department of Environmental Sciences

University of North Carolina-Wilmington

Center of Marine Science

5600 Marvin K. Moss Ln.

Wilmington, NC

919-962-3230

Paul Wojoski, Senior Environmental Specialist

Division of Water Resources

North Carolina Department of Environmental Quality

1617 Mail Service Center

Raleigh, NC 27699-1617

919-807-6364

**MODIFICATION**

This MOU may be amended from time to time by mutual, written agreement of the parties.

**EFFECTIVE DATE**

**SIGNATURES**