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North Carolina Coastal Federation

35 years working together for a healthy coast

STRATEGIC PLAN FOR CREATING A ROBUST COASTAL ECONOMY WITH COASTAL RESTORATION

DEVELOPED BY THE NORTH CAROLINA COASTAL FEDERATION

3609 N.C. 24 (OCEAN)

NEWPORT, NC 28570

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This is a strategic plan developed by the North Carolina Coastal Federation with help from numerous individuals, organizations and funders. The content, views and recommendations expressed within this document are those of the federation, and do not necessarily reflect the opinions of anyone who helped formulate this report. This plan is a framework and strategy for improving the economy and environment of coastal North Carolina, and serves as a working document that will evolve based upon real world experiences and feedback.

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Todd Miller, Executive Director
March 2017

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ABSTRACT

Coastal N.C. presents a unique set of economic assets, challenges and opportunities. Much of our coast remains rural, and many of those areas are losing population. The rural coast's most important existing employment sectors are agriculture, the military, tourism and fishing. Elsewhere in more urbanized areas, the development of second homes and retirement communities along with some heavy industry and academic activities support service and tourism enterprises. All of these sectors heavily depend on the continued stewardship of the coast's natural resources, working lands and waters -- our farms, forests, ocean and estuaries. While traditional conservation efforts are needed to protect these vital economic activities, recent fiscal impact studies have documented that strategic investments in coastal habitat preservation, restoration, and shellfish aquaculture help to increase and protect long-term economic prosperity for our coastal communities. This plan outlines an economic development strategy for the N.C. coast that:

I. Builds upon and enhances the state's coastal environmental assets,
II. Provides sustainable and improved economic opportunities and quality of life, and
III. Ensures the sustainability of our coastal ecosystems, economies and communities.

VISION STATEMENT

The main goal of this strategic plan is to protect and create new long-term sustainable jobs for the coast while protecting and restoring its environment. This vision illustrates the potential for coastal N.C. to nurture and expand its existing economic base through conservation and restoration of its natural assets. This strategy will help the N.C. coast become the "Napa Valley" of oysters by using its clean and productive estuaries to fuel economic growth. This initiative will challenge our state to become more competitive in attracting federal and private conservation funding dollars to protect and enhance our coastal economy.

Nurturing a thriving natural resource based economy will make our prized N.C. coast an even more attractive place for expanding compatible industries. Investors and workers will be attracted by a healthy environment and rich cultural traditions to expand marine science research and related enterprises, conduct cleantech enterprises that can often be performed at home, as well as expand recreational, retirement and second home development.

Furthermore, a healthy natural coast, where urban encroachment does not interfere with military operations, is essential if the U.S. Department of Defense is to continue investing in the region's economy.

BACKGROUND

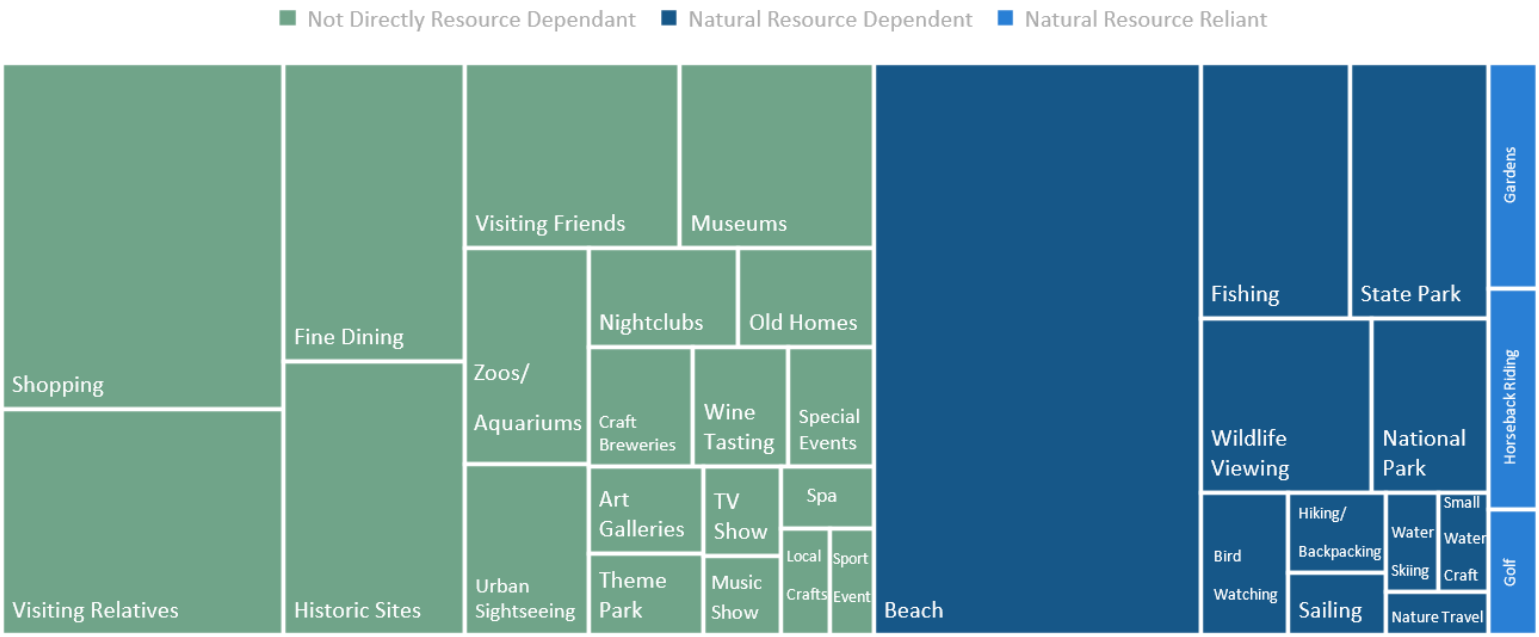
For too long, coastal protection and restoration was seen as a one-dimensional effort by environmentalists and government regulators, focused on environmental quality with little appreciation for the other incentives that a healthy environment brings to the economy and public quality of life. Independent studies of both state-funded and private, nonprofit restoration efforts on the coast reveal that these efforts have created hundreds of jobs and millions of dollars in both short and long-term economic activity. These studies also confirm that restoration benefits *all* sectors the coastal economy.

Despite the long-term success of restoration in sparking economic growth, its effectiveness as an economic strategy remains largely unknown to many of the state's key policymakers, state agencies and organizations involved in economic development.

*…tourism accounts for a huge chunk of the state's entire economy, bringing over **$20 billion** per year… almost a **quarter of all tourism** occurs on the coast.*

Understanding this potential begins with understanding N.C.'s coastal economy. Of course, tourism accounts for a huge chunk of our state's entire economy, bringing in over $20 billion per year, involving more than 40,000 businesses and supporting 200,000 jobs.[1] Less well known is that almost a quarter of all tourism occurs on the coast. Compared to visitors traveling to other parts of the state, coastal visitors stay longer and spend more money. [2] In a N.C. Department of Commerce Travel Summary, over two thirds of overnight coastal visitors designated beach go-ing as the number one activity. In addition to enjoying the beaches, coastal tourists engaged in the following activities that are natural resource dependent; Fishing (ranked 7th), State Parks (ranked 9th), Rural Sightseeing (ranked 10th), Wildlife Viewing (ranked 11th), National Parks (ranked 14th), Other Nature (ranked 15th) Bird Watching (ranked 19th) , Hiking/Backpacking (ranked 27th), Sailing (ranked 29th), Canoeing and Kayaking (ranked 35th) and Nature Travel/ Ecotourism (ranked 37th). [3]

COASTAL VISITOR ACITIVITY RANKING



[Coastal visitor activities listed by ranking. Size of each activity square indicates its relative ranking compared to all other activities. Activities are not mutually exclusive. For example if a visitor went to the beach he/she could have also gone shopping and partaken in fine dining. Categories determined by the N.C. Department of Commerce.][2]

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1 www.nccommerce.com/tourism

2 N.C. Department of Commerce. 2015. *2015 North Carolina Regional Travel Summary*.

3 Id.,

More than ten percent of all coastal visitors participate in some form of fishing.[2] In 2015, 480,854 coastal recreational fishing licenses were issued, resulting in 4.6 million coastal fishing "trips" (from boat, beach or pier) yielding nearly 11.9 million pounds of finfish.[4]

*In 2012, commercial fishing supported approximately **3,500 jobs** and produced **$51 million in income** statewide.*

In addition to the importance of recreational fishing to our state's tourist economy, the health of fisheries is vital to our commercial fishers. In 2012, commercial fishing supported approximately 3,500 jobs and produced $51 million in income statewide.[5] Hard blue crabs are the largest and most economically important commercial fishery, accounting for nearly 32 percent of the value of all landings.[6]

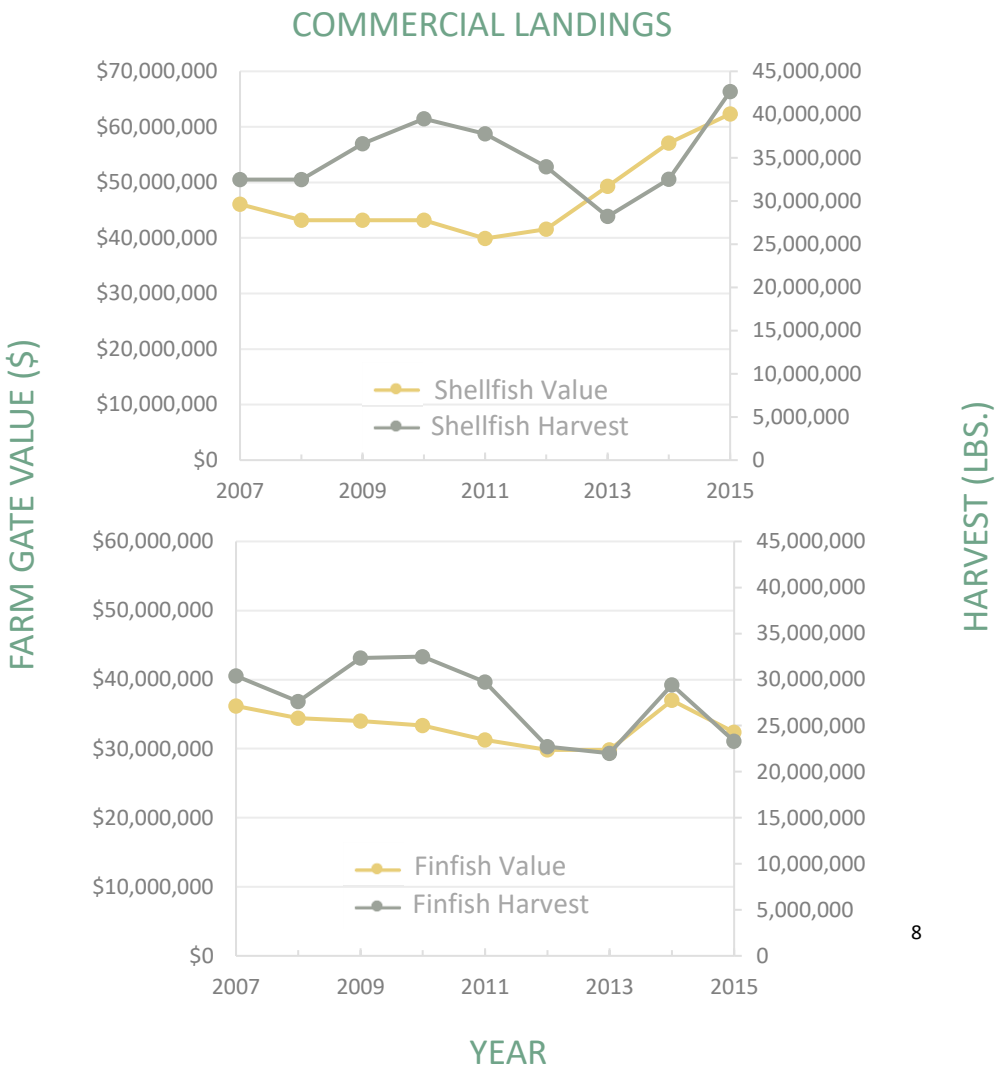
Overall, in 2015, commercial fisheries landed 66 million pounds: 23.3 million pounds of finfish and 42.7 million pounds of shellfish (including 31 million pounds of hard blue crabs and 6.3 million pounds of brown shrimp). The industry brought in a total dollar value of $94.7 million ($30 million just from hard blue crabs). In 2010, the harvest was 72 million pounds: 32.5 million pounds of finfish and 39.5 million pounds of shellfish (including 29.8 million pounds of hard blue crabs and 4.2 million pounds of brown shrimp), with a total dollar value of $79.9 million. [7]

[4] N.C. Division of Marine Fisheries. 2016. *License and Statistics Section 2016 Annual Report*. pg. 194 (III-16).

[5] McInerny, Hadley. 2014. N.C. Division of Marine Fisheries. *An Economic Profile Analysis of Coastal Commercial Fishing Counties in N.C.* http://portal.ncdenr.org/c/document_library/get_file?uuid=b13dbf57-2c73-44df-882a-d64984853208&groupId=38337 N.C. DMF estimates that the commercial fishing industry " had a total economic impact of $116 million in 2012.The economic impact estimates presented should be viewed as conservatively low, as they solely represent the harvesting sector of the commercial fishing industry."*Id.*

[6] N.C. Division of Marine Fisheries.2016. *License and Statistics Section 2016 Annual Report*. pgs. 51 & 54 (II-7 &11-10).

[7] N.C. Division of Marine Fisheries.2016. *License and Statistics Section 2016 Annual Report*. pgs. 51-55 (II-7-11-11).



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*N.C.'s fisheries **depend** on good water quality and habitat.*

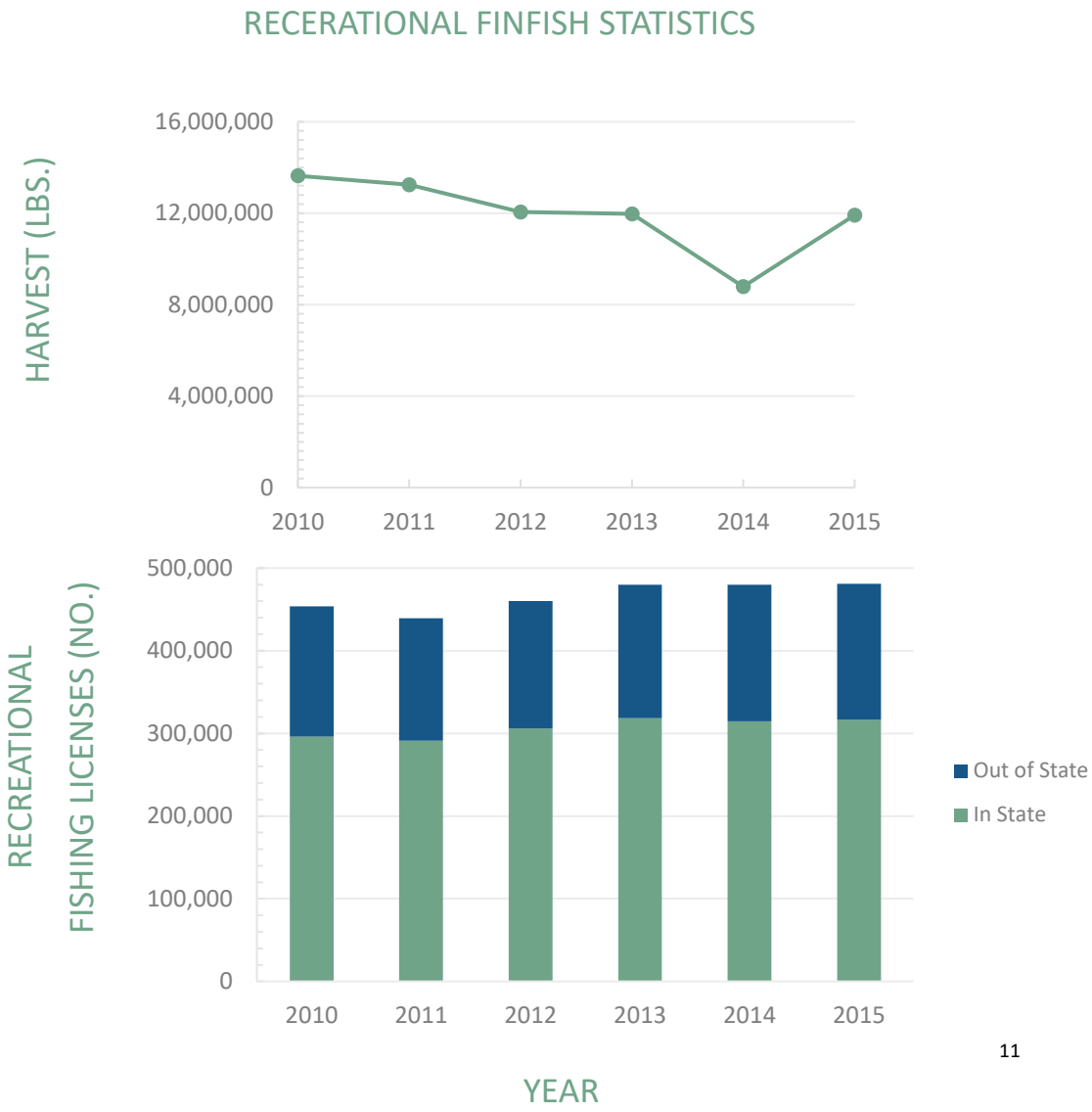
N.C.'s fisheries depend on good water quality and habitat. Crabs and other shellfish are particularly sensitive to the destruction of submerged aquatic vegetation and degraded water quality,[9] which frequently results from poor coastal management methods. In the past ten years, the harvest of crabs has declined by 20 percent statewide.[10]

[8] N.C. Division of Marine Fisheries. 2016. *License and Statistics Section 2016 Annual Report*. pg. 51 (II-7).

[9] Sartwell, T. 2009. *What Can Be Done To Save The East Coast Blue Crab Fishery*? Masters project submitted in partial fulfillment of the requirements for the Master of Environmental Management degree in the Nicholas School of the Environment of Duke University, May 2009 http://www.scottsbt.com/catalog/store/images/pennparts/schematics/tws2_mp_final2009.pdf (internal citations omitted)

[10] N.C. Division of Marine Fisheries. 2016. *License and Statistics Section 2016 Annual Report*. pgs. 54-59 (II-10-II15).,

In addition to the declines in commercial landings, recreational landings have also decreased. From 2010-2015, the total pounds of recreationally landed fish decreased by 26 percent. During that time the issuance of in-state and out-of-state recreational licenses increased by 6.8 and 4.5 percent respectively, with the individual number of fish landings increasing by roughly 3 percent.[11]



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[11]N.C. Division of Marine Fisheries. 2016. *License and Statistics Section 2016 Annual Report*. pg. 194 (III-16)., N.C. Division of Marine Fisheries. 2015. *License and Statistics Section 2015 Annual Report*. pg. 118 (III-14).

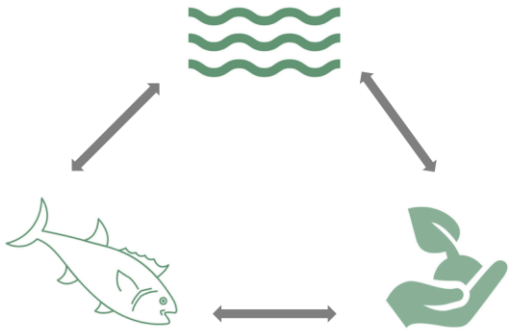
While coastal tourism in N.C. has huge potential to grow in the future, so do its working lands and waters. Agriculture and forestry will remain a mainstay of its economy *if* prudent steps are taken to adapt and mitigate the challenges that these industries face. In addition, strategic efforts to enhance both wild and farmed shellfish provide vast potential to significantly grow the shellfish industry.

TYPES OF ENVIRONMENTAL RESTORATION IN COASTAL N.C.

With so much of the coast – and the state's – fishing and tourism economies dependent on a clean environment, activities that protect and restore the coast's natural resources provide BOTH short and long-term economic benefits. In the short term, these projects create jobs, often in rural communities where job development is particularly difficult to achieve. In the longer term, restoring the state's oyster beds as well as its shoreline and near-shore wetlands, has a direct, positive, measureable and long-term economic benefit on recreational and commercial fishing as well as tourism. Indeed, numerous studies of coastal restoration in N.C. as well as other coastal regions, confirm this long and short-term return on investment.

This economic development strategy aims to restore and maintain the health and productivity of the N.C. coastal environment to provide a strong foundation for sustaining and expanding the region's economy. To achieve this goal, this strategy focuses on environmental management and restoration activities that are essential for perpetuating three very important resources:

I. Clean water
II. Productive fisheries
III. Working lands



Restoring degraded water quality, depleted shellfish beds and underproductive fisheries habitats are key to executing this economic strategy. There are a number of ways to achieve these goals – all of which have been documented to improve the coastal economy in both the short and long-term.

SHELLFISH RESTORATION

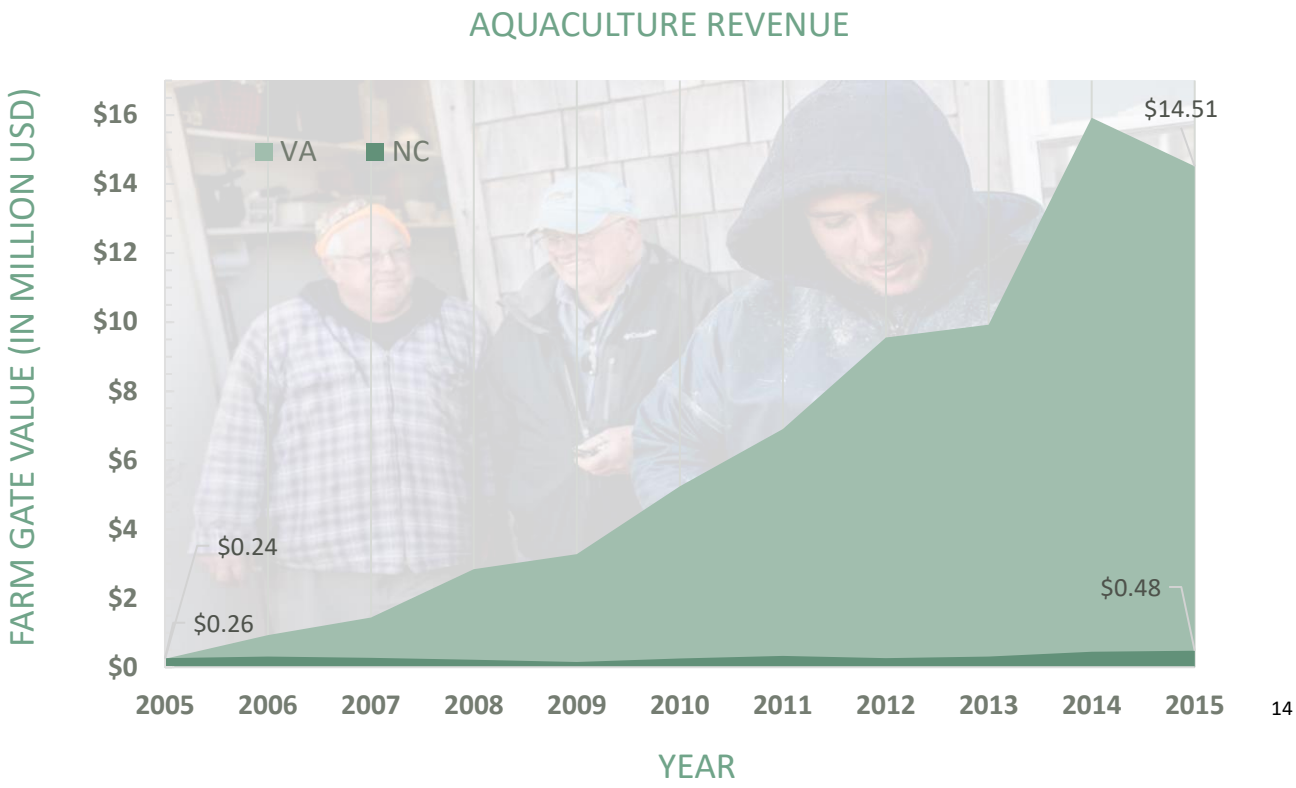
Revitalization of N.C.'s shellfish harvest has particular promise for improving water quality and seafood landings. Many people believe that N.C. has the potential to become known as the "Napa Valley of Oysters." Oyster production has decreased an astounding 90 percent compared to its peak harvest a century ago, yet N.C. still has some of the best waters for shellfish habitat in the world.[12] Revitalization of oyster stocks, including the promotion of shellfish aquaculture, not only stimulates that industry but also has a marked effect on water quality. A single oyster can filter 50 gallons of water a day.[13]

[Due to its multifaceted benefits, the oyster is sometimes referred to as the "Ultimate Clean Tech".]

[12] Dr. Louis B. Daniel, III, Director, NC Division of Marine Fisheries, NC DENR (*The History of Oyster Management over the Past Century*, N.C. Oyster Summit, March 10-11, 2015)

[13] NOAA, Chesapeake Bay Office, *Oysters,… Role in the Ecosystem.* http://chesapeakebay.noaa.gov/fish-facts/oysters

Virginia is a perfect example of a state that has invested in shellfish aquaculture and has seen profoundly successful results. Between 2005 and 2015, Virginia's oyster aquaculture revenues grew from $240,000 to $14.51 million, while N.C.'s remained relatively static, growing from $257,000 to $478,856.[14]



[14]

The N.C. Division of Marine Fisheries developed a strategic plan in 2016 for restoring oyster populations and landings. It includes:

- Restoring 500 acres of oyster sanctuary reefs in Pamlico Sound,
- Maintaining 2,000 acres of rotational harvest reefs throughout the coast, and
- Fostering shellfish aquaculture.

[14] North Carolina data acquired by a data request performed by Alan Bianchi. N.C. Division of Marine Fisheries. Marine Biologist Supervisor. January, 2017., Virginia values were calculated by average yearly price per oyster by total number estimated to be sold, extrapolated from Murry and Hudson. *Virginia Shellfish Aquaculture Situation an Outlook Report* (s). March 2011-2016. Photograph by Daniel Pullen Photography.

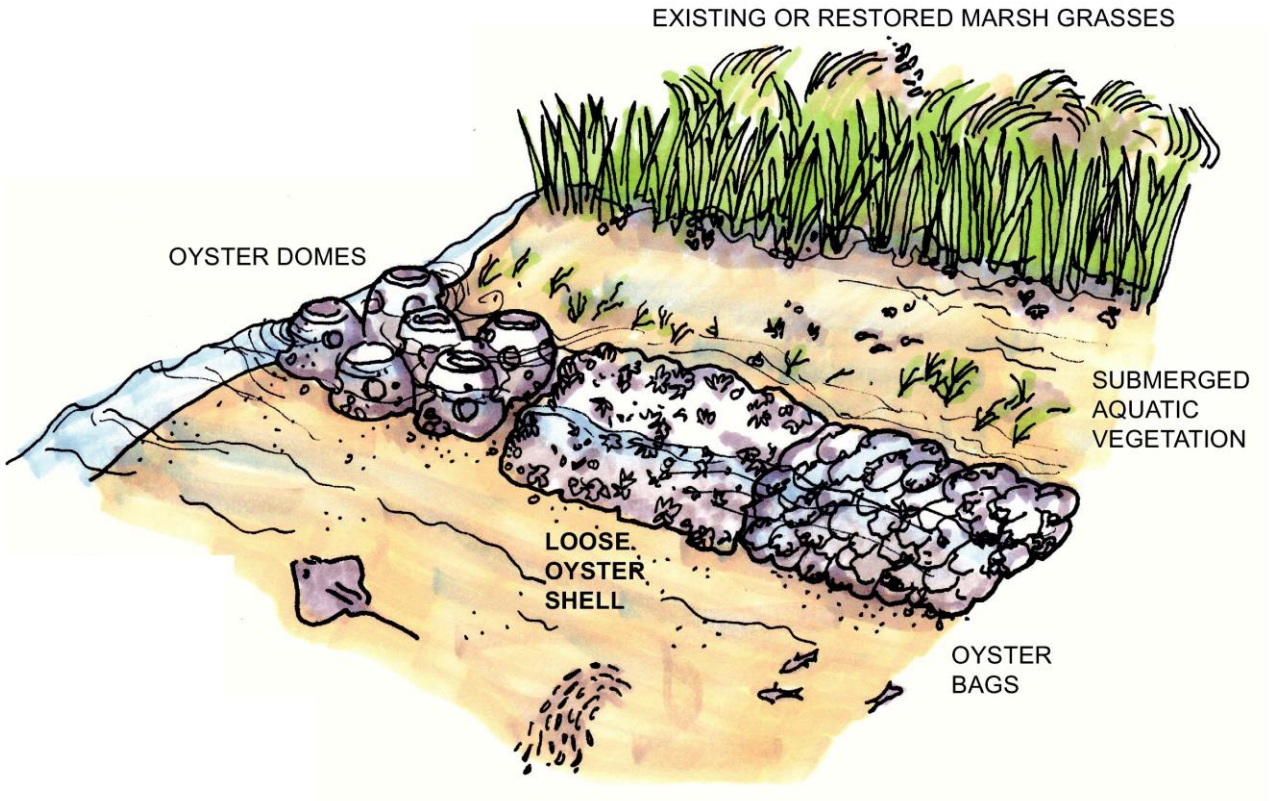
In addition, stakeholders involved in restoring shellfish have outlined other forms of coastal restoration priorities that will be necessary to maintain clean and productive estuarine waters. These are outlined as specific goals and actions in the *Oyster Restoration and Protection Plan: A Blueprint for Action 2015-2020*.[15]

Estuarine waters are also the critical breeding grounds and nurseries for a wide array of commercially and recreationally desirable species. As a result, improved shellfish habitat increases the stocks of all of these species, benefiting recreational and commercial fishers. This benefit has been demonstrated by a study concluding that in the Southeastern United States, 1 acre of oyster reef yields 23,000 *additional* pounds of seafood per year.[16] These and other multifaceted ecosystem benefits of restoring oyster beds were documented in a recent study by the UNC Institute of Marine Sciences finding the economic value of ecosystem oyster reef services (excluding oyster harvest) to be $11,000 per acre per year. This study also found that the return on investment of restoring an oyster reef in N.C, based on the value of the ecosystem services, occurs anywhere between 2-14 years.[17]

Oyster habitat restoration's return on investment has also been quantified through its impact to the local economy. This has been shown through a recent study concluding $8M invested in habitat restoration created 166 temporary full time jobs with $13.8 M resulting coastal revenue.[18]

[15] North Carolina Coastal Federation. 2014. *Oyster Restoration and Protection Plan for North Carolina, A Blueprint for Action 2015-2020.*
[16] Peterson C. H., Grabowski J.H., Powers S. P. 2003. *Estimated enhancement of fish production resulting from restoring oyster reef habitat: quantitative valuation.* Marine Ecology Progress Series. 264: 249-264.

[17] *Economic valuation of ecosystem services provided by oyster reefs - American Institute of Biological Sciences. doi:- 10.1525/bio.2012.62.10.10*
[18] *Lawrence S. et al.* 2015. *Coastal Restoration and Community Economic Development in North Carolina Final Report. RTI International. Prepared for North Carolina Coastal Federation.*



[This figure illustrates one type of living shoreline. Living Shorelines are typically composed of an offshore sill in combination with the planting of native marsh grasses. Offshore sills are low profile and can be made of oysters (shown above), rock, marl, vinyl or wood. Gaps within the sill structure allow for water flow and the passage of aquatic organisms.]

Along the N.C. coast, there are countless opportunities to restore saltmarshes that are critical to the oyster and other fisheries but that have been degraded by past land use practices. Use of coastal restoration practices known as "Living Shorelines" is one of the best restoration techniques for wetland restoration and improvement of shellfish breeding areas. Living shorelines are an erosion control method that are proven to be effective for landowners seeking erosion control solutions and improved water quality. Living shorelines also provide effective protection against storm-related damage. A recent survey following Hurricane Irene in N.C. demonstrated that living shorelines in many areas had provided *superior* protection for shoreline properties, compared to hardened structures.[19] Healthy wetlands have also been shown to accrete (raise the

[19] Gittman R., Popowich A., Bruno J., Peterson C. 2013. *Marshes with and without sills protect estuarine shorelines from erosion better than bulkheads during a Category 1 hurricane*. Ocean & Coastal Management. Available at http://dx.doj.org/10.10161/j.ocecoaman.2014.09

elevation of the shoreward portion of the marsh), thus allowing the marsh to maintain its elevation relative sea level rise.[20]

Traditional development of estuarine shorelines has used hardening (bulkheads or riprap) to protect terrestrial property from erosion and storm damage.[21] Researchers from UNC-Chapel Hill and NOAA recently found that nearly 12,500 miles (or 14 percent) of U.S. shorelines have been hardened -- 66 percent of which is along the South Atlantic and Gulf coasts.[22] N.C., too, is seeing a dramatic increase in hardening of its estuarine shorelines.

Compelling scientific data shows that shoreline hardening hurts estuarine ecology, including water quality and fisheries viability.[23] Simply put, hardened structures reflect wave energy, scouring the adjacent bottom, destroying the natural marsh and the offshore submerged aquatic vegetation. Indeed, a comprehensive body of scientific research shows that, when estuarine shorelines are armored with bulkheads, their function, resiliency, productivity and ecosystem values are diminished.[24] The use of bulkheads can also steepen and shorten shallow intertidal habitat over time, resulting in the loss of foraging habitat for shorebirds and commercially and recreationally valuable fish and crustaceans.[25]

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[20] Gittman R., Popowich A., Bruno J., Peterson C. 2013. *Marshes with and without sills protect estuarine shorelines from erosion better than bulkheads during a Category 1 hurricane*. Ocean & Coastal Management. Available at http://dx.doj.org/10.10161/j.ocecoaman.2014.09

[21] Currin C.A., et al. 2010. *Developing Alternative Shoreline Armoring Strategies: The Living Shoreline Approach in N.C.*. Available at http://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254_chap10.pdf

[22] Gittman R.K., et al. 2014, August 15. Presentation at the 99th ESA Annual Meeting, Prevalence and impending ecological consequences of shoreline hardening along US coasts. http://eco.confex.com/eco/2014/webprogram/Paper50391.html

[23] Currin C.A., et al. 2010. *Developing Alternative Shoreline Armoring Strategies: The Living Shoreline Approach in N.C.*. available at http://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254_chap10.pdf

[24] Currin C.A., et al. 2015. *Shorelines Change in the New River Estuary, N.C.: Rates and Consequences*, 31 JOURNAL OF COASTAL RESEARCH 1069. 1076; Dugan J. E., et al.2011. *8.02 Estuarine and Coastal Structures: Environmental Effects, a Focus on Shore and Nearshore Structures*. 8 TREATISE ON ESTUARINE AND COASTAL SCIENCE 17, 36 (Eric Wolanski and Donald McLusky eds. 2011); Titus, J.G. 1998. *Rising Seas, Coastal Erosion, and the Takings Clause: How to Save Wetlands and Beaches Without Hurting Property Owners.* 57 MD. L. REV. 1279, 1305-06;Ruppert, T.K. 2008. *Eroding Long-Term Prospects for Florida's Beaches: Florida's Coastal Management Policy*, Sea Turtle Grant Program 1, 14, 39; 2015. U.S. ARMY CORPS OF ENGINEERS & YELLOWSTONE RIVER CONSERVATION DISTRICT COUNCIL, YELLOWSTONE RIVER CUMULATIVE EFFECTS ANALYSIS 1, 246 1, 246.

[25] Dethier M.N., et al. 2016. *Multiscale Impacts of Armoring on Salish Sea Shorelines: Evidence for Cumulative and Threshold Effects*, 175 ESTUARINE, COASTAL, AND SHELF SCIENCE 106, 116;. Dugan J.E., *et al*. 2008. *Ecological Effects of Coastal Armoring on Sandy Beaches*, 29 MARINE ECOLOGY 160, 169.

Failure rates of coastal armoring -- from scour, undermining, outflanking, overtopping, and battery by storm waves -- are high. Even large, well-engineered structures can experience overtopping by waves and catastrophic failure, creating huge risks not only to infrastructure, but also to public safety.[26] Studies also demonstrate that bulkheads, unlike living shorelines, suffer significant damage from hurricanes. For example, a survey of the N.C. coast following Hurricane Irene indicated that *76 percent of bulkheads were damaged by the hurricane, while no visible damage was observed at living shoreline sites*.[27]

> *… **76% of bulkheads were damaged** by the hurricane, while **no visible damage** was observed at **living shoreline sites**.*

The strategic use of living shorelines to combat erosion on the more than 12,000 miles of estuarine shorelines in N.C. will help to restore oyster and fish habitat. This restoration is essential to perpetuating and expanding fisheries productivity, improving water quality, and enhancing economic activities that depend on a high quality coastal environment. Living shoreline techniques, which have the additional benefit of often being less costly to landowners than armoring, can support a suite of related industries: designers, engineers, installers, and nurseries (for the plants installed).

[26] Gittman R.K., et al. 2014. *Marshes with and without Sills Protect Estuarine Shorelines from Erosion Better than Bulkheads During a Category 1 Hurricane*. 102 Ocean & Coastal Management 94, 99.

[27] Id.,

WATERSHED MANAGEMENT AND RESTORATION

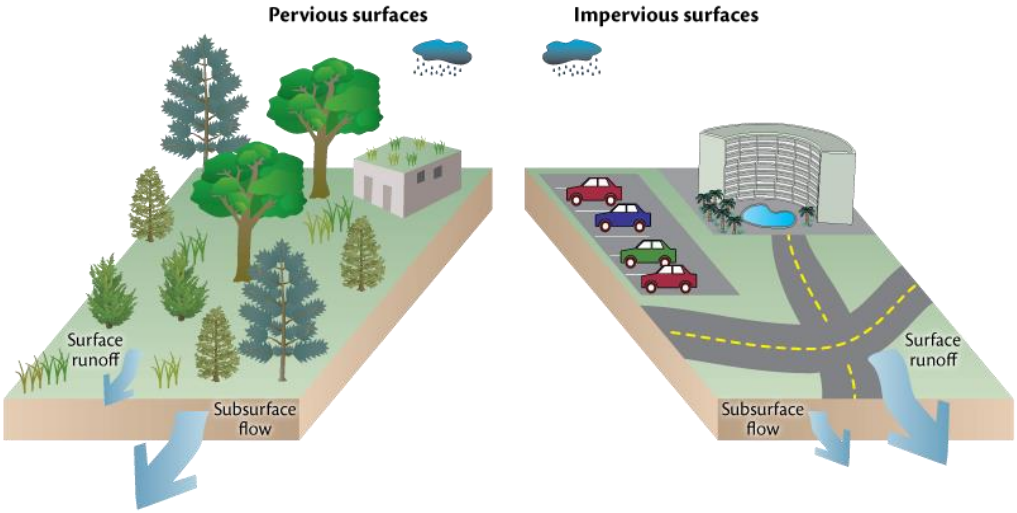
A healthy prosperous coast cannot be sustained without clean estuarine waters. Traditional land use practices in the coastal zone have frequently involved significant ditching and drainage of the landscape. These modifications to the hydrology not only degrade downstream coastal water quality, but also can cause unanticipated problems for many land uses. For example, rising sea levels and more frequent storms can cause saltwater to intrude upstream as well as higher groundwater levels. This hurts the productivity of coastal lands for agriculture and forestry.

Restoring or replicating natural hydrology of coastal watersheds can promote the cleanliness of our waters, and serve to keep coastal landscapes more productive as working lands. Coastal areas have undergone significant changes as land use practices have intensified through the increase in agriculture, forestry and urban development. Conventional land use practices circumvent natural hydrologic processes. Rainwater is transported rapidly over impervious surfaces and through connected conveyance systems, including ditches, pipes, parking lots and yards. Excess surface water from a rain event is known as stormwater. As a result from changes in land use practices, during and after storm events, rainwater passes quickly over the landscape, collecting pollution before flowing directly into coastal waters. Stormwater runoff results in a variety of chemical, organic, nutrient, bacterial and sediment water pollution.

Conventional runoff management methods rely on peak flow storage, but do not mitigate pollution and cannot keep up with increased pressure from land use. As the intensity of land uses increases, hydrology is altered and can lead to an increase in sedimentation and erosion, ecosystem degradation and loss, loss of aquatic biodiversity, degradation of water quality and increased flooding.

Rather than focusing on reducing sources of contamination or attempting to treat and remove bacteria and other pollutants from stormwater runoff, the most cost effective restoration strategy is to focus on reducing the overall volume of stormwater runoff, and subsequently limiting the conveyance of runoff from the land into our coastal waters. This is best achieved through watershed planning efforts that identify opportunities to update and re-design drainage systems that work to serve the purposes of landowners and the environment at the same time. In an era of rising sea levels, traditional drainage infrastructure is becoming increasingly obsolete and sometimes counterproductive—providing the opportunity to rethink and update aging infrastructure with new designs that better serve the needs of both coastal communities and the environment.

Low-impact development (LID) practices and land uses that follow LID design principles can provide a new solution to the problem of stormwater. LID practices mimic natural hydrology by increasing infiltration of water into soils, where pollution is filtered before it reaches coastal fisheries.



[Pervious surfaces such as grass, soils and "green roofs" allow water to infiltrate the ground, slowing and reducing runoff and recharging groundwater. Impervious surfaces such as cement, asphalt, and roofing prevent infiltration, increasing the volume and velocity of surface runoff, which carries nutrients and sediments with it. Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science.][28]

Restoring coastal watershed hydrology can take other forms as well. In rural watersheds that are dominated by agricultural and forestry land uses, strategic restoration of wetlands, stream buffers, and reworking land drainage systems so that runoff is not directly discharged into important coastal waters has proven to be effective. As sea level rises, many land drainage systems that were built decades or even centuries ago are becoming less and less effective. Re-investment in these drainage systems is required if working lands are to be kept in production. Strategic use of conservation dollars provided by the U.S. Farm Bill and other government programs can help landowners adapt to these global environmental changes, and create expanded economic opportunities, not only in restoring wetlands and oyster-related resources but also helping the agriculture and forestry industries as well as creating wildlife and hunting preserves for tourism.

[28] Dennison, W.C., *et al*. 2009. Shifting Sands: *Environmental and cultural change in Maryland's Coastal Bays*. IAN Press. University of Maryland Center for Environmental Science.

MANAGING PHRAGMITES AND OTHER INVASIVE SPECIES

Invasive plant and animal species can disrupt natural systems and degrade the productivity of the coastal environment. One invasive plant species of particular concern that should be the focus of this economy strategy is *Phragmites* sp. This large, coarse, perennial grass is changing the natural character of N.C.'s coastal fresh and brackish marshes, creeks and estuarine shorelines. Although scattered clumps of *Phragmites* provides some habitat value for small mammals and birds, it usually forms large, dense stands that provide little value for a diversity of wildlife. The exact abundance and current rate of spread of *Phragmites* in N.C. is unknown. However, it is increasing in abundance and distribution.

Phragmites has a thick stalk that can reach 13 feet in height. It has a large plume-like flower that persists throughout the winter. *Phragmites* most often spreads by creeping roots. The best method for controlling the spread of this invasive plant is to have an effective observation and monitoring program, and to quickly remove any newly established plants when they first appear and before roots become established. Once *Phragmites* matures and has been in place for five or more years, there are few control techniques that are fully effective when used alone, and reinvasion by *Phragmites* is likely when the management strategy is not maintained. The optimal methods for a particular site will depend upon existing conditions and management goals. Effective control of *Phragmites*, particularly larger well-established stands, is likely to require constant and multiple treatments using a combination of methods. Many landowners and managers now use herbicide treatments, prescribed fires and mechanical treatments.

In N.C., the N.C. Coastal Resources Commission defines coastal wetlands. These coastal marshes are protected from development activities, and prized for their habitat values. The definition of coastal marshes includes a specific detailed list of marsh plant species that excludes *Phragmites*. Thus, once a natural marsh is invaded by *Phragmites*, and natural marsh plants no longer characterize the coastal wetland, these wetland habitats are no longer protected by state coastal management regulations.

The N.C. Aquatic Weed Control Program defines *Phragmites* as a noxious aquatic weed. This program assists local government and their residents with aquatic weed infestations by employing a philosophy of early intervention in localized outbreaks of noxious weeds. However, because *Phragmites* is just one of 30 noxious weeds in N.C., there is still plenty of opportunity and need to develop a much more focused and coordinated management strategy to control the spread of this highly invasive plant along the coast. The federation is taking preliminary steps in 2017 to further investigate *Phragmites* science and management issues to help determine if a more responsive and effective control strategy to help protect and restore the productivity of coastal wetlands should be devised. If the answer to this question turns out to be yes, then it will take significant additional resources of people and funds to carrying out an effective control program in the coastal counties.

STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS INHERANT IN THE ECONOMIC DEVELOPMENT STRATEGY

In evaluating whether coastal restoration makes sense as an economic development strategy, it is critical to take stock of the strengths, weaknesses, opportunities and challenges of this approach to job creation in coastal communities. As with any economic development initiative, advancing this strategy will take leadership, investment, talent and persistence.

STRENGTHS

The strengths of this strategy for creating and maintaining jobs in coastal N.C. are easy to identify.

I. First, the N.C. coast is still very productive and remains one of the most pristine coastal regions in the nation. This factor makes maintaining and restoring the coast a doable job that does not involve unreasonable expenditures of capital. That said, the coast and its resources have been degraded by centuries of land use activities. There are countless needs for restoration of coastal hydrology, water quality and fisheries habitats throughout the region.

II. Eastern N.C.'s existing economy, which largely relies on its natural environmental assets, provides another strength. Thus, improving those assets will naturally improve economic opportunity, as well. Within the region, the workforce exists to engage directly in economic activities that will be generated by this strategy. Local people know how to fish, conduct marine construction, farm and grow trees, and are well prepared to participate directly in the array of economic spinoffs that coastal restoration generates. They are also in a position to work part-time on restoration projects as a way to supplement their existing incomes.

Many potential restoration activities are of a scale that is conducive for local people to conduct. These projects don't require advanced technology, can be done with existing equipment and infrastructure that resides in the region and tap the skills of the local workforce. In the region, within the existing commercial and academic communities, lies the expertise to manage, monitor and evaluate the success of restoration projects. Projects that engage local people, and that use existing coastal businesses and professionals, will enjoy strong support from local decision-makers and political leaders as well.

III. Another strength of this strategy is the existence of federal and state funding to make strategic investments in carrying it out. At the federal level, there are a multitude of funding sources within the federal Clean Water Act, Farm Bill and with various wildlife agencies that support coastal restoration programs. At the state level, funding from the N.C. Clean Water Act, the Attorney General's Environmental Enhance Fund and state appropriations support these types of restoration programs.

WEAKNESSES

Many of the existing drawbacks to using environmental restoration as an economic development strategy relate to the lack of leadership and investment to carry out successful rural economic development initiatives in the state. Addressing and overcoming these weaknesses should be the focus of this strategy so they do not impede forward progress. There should be a plan that connects all of the various components of this strategy and creates a cohesive leadership framework for carrying it out.

Regulatory disincentives exist that retard restoration projects or that make them potential liabilities for sponsors. Most standards for environmental permits were written to regulate traditional development activities and were not designed to facilitate or encourage environmental restoration activities. Designing permit rules to address the special needs and challenges of environmental restoration projects is needed.

Only in recent years have economists begun to recognize and document the economic benefits that result from environmental restoration projects. These benefits are still largely unrecognized by traditional economic developers and have not yet made their way into most economic development programs along the coast.

The lack of awareness of the positive economic impact that restoration projects can have on local communities means that state and local governments currently are not competing effectively for state and federal funds. Economic developers are not used to working with environmental experts, but more collaboration and partnership between these groups could help to stimulate more restoration in local communities.

For example, while N.C. ranks 10th in the nation in terms of its agricultural production, it ranks 30th in the amount of funds that the state receives from the federal Farm Bill for conservation programs. Much smaller agricultural states receive a lot more funding for conservation programs, and it's time for N.C. to become more competitive in receiving the funding dollars that our state deserves.

OPPORTUNITIES

Challenges mean opportunities *when it comes to using environmental restoration as an economic development opportunity.*

The key opportunities to advance this strategy include:

I. CULTIVATING LEADERSHIP

Increased interest by state lawmakers, continued engagement in restoration by the nonprofit environmental sector and research by the academic community provide a strong basis for reaching out to economic development professionals to develop stronger leadership for this strategy's success and the improved success of our coastal economy.

II. PROMOTING SUCCESS TO FUNDERS

The coastal environment and economy in N.C. are closely linked, and there's a proven track record that environmental restoration projects yield both: 1) jobs and 2) environmental improvements. These positive effects will help in attracting future environmental funding for restoration efforts.

III. INCREASING COMPETITIVENESS

Effectively marketing and selling environmental restoration and economic development opportunities as one package is still largely an untapped need. Significant results can be achieved when the state positions itself to better leverage its investments in environmental restoration. There is much potential in recruiting Congressional members from N.C. to work more diligently to attract federal investments for coastal environmental and economic restoration.

IV. EXPANDING FEDERAL REGULATORY MANDATES

Water quality degradation and declining populations of fish and wildlife are growing issues that will result in more pressure from federal agencies to improve environmental productivity and health. This strategic initiative will bring additional federal financial resources to the state, as it has done elsewhere around the country to address environmental challenges.

V. GROWING PRIVATE SECTOR INVESTMENT

Development professionals, as well as fishing and tourism interests, are recognizing the untapped economic potential of environmental restoration, aquaculture, and the general concept of relating environmental assets to tourism promotion. As has been demonstrated in Virginia over the past decade, there is great economic opportunity in expanding aquaculture operations, and in developing new businesses that undertake environmental restoration projects.

VI. ADDRESSING SEA LEVEL RISE

A large majority of infrastructure in coastal N.C. -- including drainage systems, sewers and roads -- is highly vulnerable to sea level rise and storm events. Funding for conservation can also help to relocate and re-engineer antiquated infrastructure. This strategy provides the opportunity to attract funding for updating and/or repairing and replacing this outdated infrastructure.

THREATS

Threats to the success of this economic development strategy are predictable and include:

I. If the government (federal, state and local) fails to do an adequate job in protecting the coast from pollution resulting from new development and harmful land use activities, economic and environmental benefits that result from restoration could be negated.

II. Because other states are also expanding their use of environmental restoration as an economic development tool, the competition for federal funding is likely to intensify over time.

III. Climate change resulting in more intensive rainfalls or droughts, and sea level rise, may outpace and challenge adaptation and mitigation efforts. These unavoidable factors could result in some failures of restoration projects. Projects that fail could give this strategy a “black eye”, undermining public confidence and support for this initiative. However, the threats posed by a changing climate and coastlines are universal.

IV. Finally, the failure to cultivate effective leadership for the initiative could result in poorly directed or wasted resources. Strong leadership and partnership across many sectors will be vital to ensuring the success of this initiative.

GOAL AND ACTION BENCHMARKS

THE GOAL OF THIS STRATEGY IS: TO CREATE AND NURTURE A ROBUST COASTAL ECONOMY BY PROMOTING A SUITE OF ENVIRONMENTAL RESTORATION INITIATIVES, SOUND ENVIRONMENTAL MANAGEMENT AND THE EXPANSION OF NATURAL RESOURCE BASED ECONOMIC ENTERPRISES THAT WILL THRIVE AS LONG AS THE COASTAL ENVIRONMENT IS HEALTHY AND PRODUCTIVE.

To accomplish this goal, the following benchmarks must be acted upon and realized in the next five years:

I. Expand executive branch engagement and leadership for the strategy;
II. Maintain and expand strong legislative support for oyster restoration;
III. Promote oyster restoration as an economic development strategy*;*
IV. Increase federal investments in coastal restoration in N.C.;
V. Support research and monitoring to inform strategic coastal restoration actions;
VI. Support the creation of financial incentives for restoration-related business development;
VII. Train and engage local workforce and communities needed to support restoration-related industries;
VIII. Link N.C. tourism development and promotion to the state's oyster industry;
IX. Modify laws and regulations to promote environmental restoration and natural resource based economic activities; and
X. Brand and market the N.C. coast and its seafood.

This section of the report lists the steps that should be taken to realize the goals and to create and nurture a vibrant coastal economy by restoring the state's coastal natural resources.

I. EXPAND EXECUTIVE BRANCH ENGAGEMENT AND LEADERSHIP ON THE STEERING COMMITTEE

To date, the North Carolina Coastal Federation has worked with a variety of federal, state, academic, non-profit and for-profit entities to convene a steering committee that provides leadership on oyster and related coastal restoration efforts. This committee meets several times each year, and has formed work groups to carry out specific agreed upon actions. This leadership has:

- Organized and overseen *The Oyster Restoration and Protection Pan for North Carolina, A Blueprint for Action*[29] (Blueprint) development process resulting in a five year agreed upon strategy for coastal restoration;
- Guided lobbying priorities for increased funding and regulatory reform at the state legislature;
- Focused communications by organizing workshops, conferences, and media outreach;
- Obtained state, federal and private funding for oyster and other coastal restoration efforts; and
- Accomplished numerous oyster, wetland, living shoreline and stormwater projects throughout the coast with a variety of local, state and federal partners.

While successes to date have been considerable, achieving the full economic potential of the oyster industry and coastal environmental restoration will require success in a variety of policy areas, including regulatory reform, state and federal interagency coordination, marketing and tourism, small business support and federal advocacy, to name just a few. Additional strong partners are needed in many of these policy areas, particularly marketing and tourism, small business support and other more traditional economic development spheres. Other organizations and key leaders need to be recruited to participate in oyster restoration efforts so that those organizations and individuals' credibility and resources can be leveraged with policymakers, funders and other key agencies and individuals.

One of the most important leadership development tasks facing the oyster restoration effort is to cultivate consistent, strong executive (gubernatorial) assistance at the state level. At a minimum, this assistance is needed to fully engage various state agencies in the coastal restoration strategies. High-level executive branch involvement on the steering committee will help make recruiting and engaging other stakeholders to this effort much easier.

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[29] North Carolina Coastal Federation. 2014. *Oyster Restoration and Protection Plan for North Carolina, A Blueprint for Action 2015-2020.*

State executive support is also very important because the state's rural economic development infrastructure, policy and leadership across the state is weak, uneven and in many rural coastal communities even nonexistent– making efforts to develop support for the oyster industry by starting at the local or grassroots level extremely time-consuming and most likely impossible to achieve.

Executive leadership is key to engaging the state's congressional delegation to obtain increased restoration funding from the U.S. Congress and federal agencies. Involving the executive branch is also essential to increasing N.C.'s share of federal restoration funding. Increasing this funding will require the support of the state's congressional delegation, federal agencies and the N.C. Department of Agriculture, among other individuals and agencies. Executive branch support will give N.C. restoration efforts more credibility with federal stakeholders and make obtaining their support much easier.

Expanding the number of stakeholders in the coastal restoration efforts will require retooling the decision-making process now being used to develop and execute strategies to support it. Currently, that process generally revolves around the Blueprint stakeholder group, and the projects and efforts that various stakeholders take on in smaller subgroups or individually to carry out recommended actions in the plan.

This report recommends expansion of the Blueprint stakeholder group to include new members.[30] In this model, the Coastal Federation and other very engaged stakeholders will continue to staff the stakeholder group. Expanded executive branch participation in the steering committee will help to recruit more consistent participation by federal agencies, congressional representatives, and other key stakeholders. New members of the executive branch of government that should be recruited to the steering committee include representatives of:

- N.C. Governor
- N.C. DEQ Secretary's office
- N.C. Department of Agriculture
- N.C. Trust Funds (Clean Water Management Trust Fund)
- N.C. Attorney General's Office
- N.C. Division of Water Resources
- Visit N.C.

[30] Current members include representatives of North Carolina Coastal Federation, N.C. Division of Marine Fisheries, N.C. Division of Coastal Management, N.C. Department of Commerce, N.C. Economic Development Partnership, NOAA, U.S. Army Corps of Engineers, N.C. Sea Grant, UNC Institute of Marine Sciences, NSUS CMAST, UNC-W, The Nature Conservancy, Carteret Community College, Albemarle-Pamlico Estuary Partnership, N.C. Shellfish Growers Association.

Once these members are recruited, then an effort should be made to recruit participation from additional key stakeholders, including representatives of:

- N.C. General Assembly
- U.S. Fish and Wildlife Service
- U.S. EPA
- Natural Resources Conservation Service
- U.S. Congressional Delegation

This expanded representation on the steering committee will help it have the clout to provide effective leadership for coastal oyster and broader restoration efforts. It will be important to work with the executive branch to ensure that the Governor's future budget proposals to the N.C. General Assembly adequately support restoration priorities and plans.

II. MAINTAIN AND EXPAND STRONG LEGISLATIVE SUPPORT FOR OYSTER RESTORATION

A strong cadre of coastal legislators who understand and support the oyster industry and related coastal restoration priorities is crucial to establish and protect recurring state funds for the oyster industry. With the exception of a handful of lawmakers, the state's coastal legislative delegation is largely unaware of the promise of state's oyster industry, the progress made to date it in developing it, the major goals and stakeholders in this effort, or the history of state investment in oysters.

To obtain recurring support for the oyster industry, proponents of this economic strategy for the coast must be able to rely on both rank and file coastal legislators as well as those in the leadership to advocate for the industry. Investing time in both new and veteran legislators will maintain existing partnerships with veteran legislators while also building new relationships with new lawmakers who can be more influential as they become seasoned lawmakers.

Building legislative support requires consistent and frequent efforts to brief and update individual coastal legislators about oyster efforts. While grassroots work with legislators can be time consuming, there is simply no substitute for this kind of face-to-face, one-on-one communication. Fortunately, the state's coastal legislative delegation is relatively small and the task of meeting with them can be divided among key stakeholders that are part of the steering committee team. In addition to office meetings, periodic field trips, tours, socials and other outreach educational events need to be planned and executed to give lawmakers exposure to work that is ongoing to implement this economic development strategy.

Each year the steering committee needs to establish clear measurable priorities for legislative actions that are needed to advance restoration efforts. These goals should include needed statutory changes as well as appropriation requests. It is incumbent upon the steering committee to be selective and realistic in its priorities, and not overwhelm lawmakers with long wish lists that have little chance of successful implementation.

One mechanism for identifying and prioritizing legislative actions to help expand farm raised oyster businesses in N.C. is completion of the study requested by the 2016 Legislative session from UNC. This requested study will help to sort out what statutory changes and regulatory changes, as well as appropriations, will be necessary to fully grow this enterprise along the N.C. coast. Steps are already underway to integrate the UNC study within the work of the steering committee so that lawmakers receive a consistent and complete set of recommendations when the study is completed.

Ultimately, a well-thought-out plan with clear accountability for performance is necessary to attract and sustain support and funding among state lawmakers. Plans that are developed with direct involvement by lawmakers are easier to promote. The work that was done to gain state legislative support for restoring oysters in 2015 and 2016 provides an excellent blueprint for how to conduct this outreach for other restoration and economic development initiatives. Getting lawmakers to request studies, plans, and proposed budgets are all ways to get the N.C. General Assembly directly engaged in this strategy.

III. PROMOTE OYSTER RESTORATION AS AN ECONOMIC DEVELOPMENT STRATEGY

The progress made to date in expanding political and financial support for the oyster industry in N.C. is a direct result of the decision to promote it as an effective economic development strategy for the state's coast. To build on this success, the steering committee should continue to expand support for coastal restoration generally by promoting the economic benefits of oyster restoration specifically.

While this recommendation may seem obvious, it is important to understand that many N.C. policymakers, economic development officials and private sector supporters of oyster restoration think of oyster restoration as an economic development strategy focused narrowly on the shellfish industry. While some may understand that restoring the state's oyster fishery will require other restoration activities – such as wetlands restoration – most do not.

As a result, oyster restoration efforts should not assume – nor require – all its allies to support a broad coastal restoration agenda. Keeping the restoration effort focused on oysters will allow for the broadest variety of stakeholders to support the oyster restoration work – and allow it to expand support for a broader restoration agenda over time.

Toward that end, the steering committee should:

- Continue to promote the Research Triangle Institute's two reports on the economic benefits of oyster and coastal restoration, particularly to policymakers. These two reports released in 2015 and 2016, are not well known among policymakers and remain confirmation of the economic potential of oyster and other forms of coastal restoration.
- Develop economic benefit estimates for all coastal restoration projects going forward. These estimates are vital to communicating the impact of oyster and other forms of coastal restoration on the coastal economy to public and private funders, policymakers, the media and other important stakeholders. If possible, these estimates should allow for easy comparison between different restoration efforts (oysters and wetland restoration projects, for example).
- Recruit private sector supporters and/or beneficiaries of the oyster industry to support oyster restoration investments to policymakers. Private sector business people are the most important and credible authorities on economic development in North Carolina policy circles, particularly among legislators. To be successful, the oyster restoration effort must be able to count on these private sector leaders for support.
- Tell stories about private sector oyster economic development. These narratives are extremely effective in helping policymakers and other stakeholders understand and support complicated policy issues such as coastal restoration. Oyster industry success stories should be integrated into all restoration communication materials, meetings and forums.
- Consider setting restoration goals that include specific benchmarks for restoration AND job creation. For example, using the conclusions and methodology of the 2015 RTI report, estimate the number of jobs/FTE that will be created during the 2017 sanctuary oyster bed restoration effort funded with state and NOAA funding – and use these estimates to support continued funding during the 2017 legislative session.
- Similarly, when developing annual, statewide, regional or other goals for various forms of restoration – coastal wetlands, for example – develop a methodology for estimating the economic impact of achieving these goals and include estimated economic impact goals in planning and communication materials.

Integrating oyster restoration and promotion of the state's shellfish industry into the state's economic development and rural economic development efforts has been a goal since release of these RTI reports. Yet to date there is no strategy or action plan to accomplish this goal. At least in part, the lack of such a strategy is the result of the state's lack of an easily understandable, transparent strategy - beyond recruiting large employers – for homegrown, economic development in the state, particularly for its rural areas. In this environment, it is no surprise that it is difficult to understand what the most effective strategy might be and to execute it.

Given the decentralized structure of the state's economic development infrastructure – including rural economic development – a grassroots effort to build support for the oyster industry at the community level is likely to take a great deal of time. The best strategy for integrating restoration into the N.C. economic development efforts is to recruit the right individuals from the appropriate state and private agencies to participate in the stakeholder group and guide its planning and strategy for partnering with state economic development organizations.

Specific steps that should be taken to help connect oyster and coastal restoration efforts with economic development initiatives include:

- Create communication materials that quickly and graphically summarize the findings of the RTI report for policy-makers;
- Profile N.C. businesses and other private sector success stories associated with oyster restoration;
- Identify private sector business supporters of oyster and coastal restoration to speak in support of these strategies to decision-makers, the media and others;
- Continue to prepare and publish an annual report documenting the economic impact of N.C. oyster restoration efforts and the state's shellfish industry;
- Explore estimating the economic benefit of the 2017 oyster sanctuary project before its completion;
- Develop a data collection template for all restoration projects to facilitate analysis and comparison of the projects' economic development impact;
- Invite leadership from the N.C. Department of Commerce, the N.C. Economic Development Partnership and the state's travel and tourism leadership to speak at the 2017 oyster summit in March in Raleigh;
- Maintain and constantly update the NCoysters.org oyster restoration website;
- Evaluate if a request should be made to the N.C. General Assembly to fund a small business development plan for restoration businesses and/or shellfish growers, including workforce development, training, branding, tourism promotion, financing and incentives; and

- Catalogue restoration and oyster impacts in Tier 1 coastal communities.

IV. INCREASE FEDERAL INVESTMENTS IN COASTAL RESTORATION IN N.C.

Both federal agencies and the U.S. Congress need to be consistently educated, informed, and engaged in helping to carry out this strategy in N.C. The on-the-ground projects associated with this initiative cannot happen on an ad hoc basis. Engagement efforts need to be strategic, based upon collective priorities, and ultimately, designed to be rewarding for decision-makers.

State funds provide critical match or leverage for federal dollars, and such match is frequently a condition on getting federal grants. Thus, having consistent state funding is key to being competitive for federal funds. The state agencies handling these funds should devise a coordinated accounting system that tracts these expenditures and keeps tabs on which state dollars have been used or are available to serve as match for federal grants and appropriations.

At the federal level, N.C. needs to look at what other "bay" states along the east coast do to cultivate federal support for restoring estuaries. Most conservation dollars are going to places that don't have nearly the need or potential to restore water quality and habitat that our state possesses.

In these other states, governors and state agencies routinely work with their Congressional delegations to seek support and guidance in obtaining federal help and resources. State leaders must collaborate with nonprofit organizations, corporations, and other decision-makers to develop a routine system of elevating coastal restoration needs to the top of the agenda of our Congressional delegation. This strategy should include periodic and regular briefings, interactions with staffers, tours, fish fries, seafood sampling events, and other outreach activities that increase awareness of the importance of our coastal ecosystems and economies.

The Albemarle-Pamlico Estuary Partnership should help coordinate and fund some of this educational outreach to Congress. The partnership has funding for education and experience in marketing the needs of its nationally designated estuaries with key leadership. The policy committee for this program and the N.C. Department of Environmental Quality should use this partnership to foster increased understanding about this economic development strategy within N.C. Congressional delegations.

The following actions should be planned and executed by members of the steering committee each year:

- Cultivate congressional delegation to make our coast a priority for funding;
- Build partnerships with conservation organizations with federal advocacy experience and an interest in coastal conservation to obtain help identifying federal funding strategies and develop a federal advocacy strategy focused on expanding funding for N.C. coastal restoration;
- Identify members of N.C. Congressional delegation with an interest and/or influence in coastal restoration funding and develop outreach strategy to their offices and key staff;
- Identify key federal agency funders of coastal restoration and develop an outreach strategy to educate these individuals and agencies about N.C. oyster restoration achievements and opportunities;
- Invite coastal Congressional delegation members and staff to the 2017 oyster conference;
- Maintain an inventory of federal coastal restoration and shellfish industry funding sources;
- Include in this strategy's annual report a summary of federal investments in coastal restoration and the N.C. shellfish industry and comparing those investments to other states for the media and policymakers;
- Develop requests for N.C. Governor and/or N.C. Agriculture Commissioner to support to N.C. Congressional delegation and/or federal agencies for coastal restoration funding;
- Host in-district meetings of N.C. coastal congress members and/or staff to educate them about economic development and oyster restoration;
- Consider partnerships with other coastal states if these partnerships will increase federal restoration funding in N.C.;
- Form a federal advocacy and monitoring subcommittee to advise the N.C. Oyster Blueprint stakeholder group about federal funding opportunities and strategies;
- Encourage the Natural Resources Conservation Service (NRCS) to provide cost-share programs for growers and public/private shellfish nurseries; and
- Consider developing a separate small business development plan for oyster and restoration in Tier 1/low-income rural coastal communities.

V. MODIFY REGULATORY LAWS AND GUIDANCE

Every year a variety of local governments, state agencies, federal agencies, private companies and conservation organizations apply for federal and state regulatory approval to restore coastal resources and

to conduct aquaculture operations. Despite the fact that these projects are expressly designed to improve the environment, the process used to evaluate and approve them by regulatory agencies often applies laws, policies and rules that were designed for traditional development activities with no consideration of the special needs of restoration type endeavors. The result can be unnecessary regulatory uncertainties, delays and higher costs that often create significant obstacles to undertaking and completing restoration projects.

To expedite the use of environmental restoration and oyster aquaculture activities to improve the economy of coast, the N.C. General Assembly and state environmental agencies need to work to adopt laws and programs that encourage environmental enhancement projects, and then streamline the process of approving them. This can be accomplished by:

- Defining "restoration" in state laws and policies for the purpose of state environmental management and permitting programs as a positive activity that is in the public interest and that should be promoted and encouraged;
- Requesting that the N.C. Department of Environmental Quality (DEQ) form a task force to assist with the development of "best management practices" to ensure that various types of restoration projects don't cause unnecessary environmental harm, and to recommend a suite of general permits at both the federal and state level that would incorporate best management practices and expedite the issuance of regulatory approvals;
- Encourage the U.S. Army Corps of Engineers, Wilmington District, to adopt a regional general permit for living shoreline projects;
- Encourage the N.C. Coastal Resources Commission to amend its living shoreline general permit so that the N.C. Division of Coastal Management can expedite regulatory approval of living shoreline projects;
- Amend the state shellfish lease program based upon the recommendations of the UNC study requested by the N.C. General Assembly after extensive input from all stakeholders. These recommendations should balance N.C.'s strong public trust doctrine for its coastal waters with the need to allocate some areas within our estuaries for growing shellfish in commercial operations. All management options should be evaluated including leasing and permitting approaches.

VI. SUPPORT RESEARCH AND MONITORING TO INFORM STRATEGIC COASTAL RESTORATION ACTIONS

Scientific monitoring and research informs management actions and ensures that resources are not wasted or used inefficiently. Water quality monitoring is necessary to protect public health and to have a reliable market place for shellfish. An aggressive research and development component to this strategy using our state's academic and professional communities will ensure that investments are made using the

best science and technology. This includes research into oyster seed stocks, disease resistant issues with fish and shellfish, grower technology related to shellfish aquaculture operations, management of invasive species and environmental monitoring. Researchers and their funding sources should be fully informed about what research questions and monitoring needs are being encountered as this strategy is implemented, and the leadership of this strategy should adapt their management strategies in a timely way as past efforts are evaluated.

The following monitoring and research needs are a priority in implementing this plan:

- Expand shellfish water quality monitoring into areas where oysters are either growing, or can be cultivated;
- Maintain a robust water quality monitoring network in all shellfish growing waters;
- Develop oyster seed stocks that are best adapted for specific coastal waters and that are disease resistant;
- Devise efficient and effective aquaculture technology;
- Study the effect of aquaculture operations and cultch management areas on submerged aquatic vegetation;
- Monitor shellfish cultch management areas and shellfish aquaculture operations, and document the ecological services these sites provide under different management strategies;
- Research environmental and economic benefits of oyster aquaculture operations;
- Study how best to manage *Phragmites* invasion in N.C.;
- Study alternative options for allocating public trust areas for shellfish aquaculture for-profit operations;
- Determine appropriate management measures for harvest in cultch sites;
- Document economic impacts of coastal restoration and NC shellfish industry; and
- Develop a data collection template for all restoration projects to facilitate analysis and comparison of the projects' economic development impact.

VII. SUPPORT THE CREATION OF FINANCIAL INCENTIVES FOR RESTORATION-RELATED BUSINESS DEVELOPMENT

Restoration projects and aquaculture operations require all kinds of people-skills, equipment and capital funds to occur. Creating a business climate that removes barriers to entry and provides financial incentives for these enterprises is crucial.

Grants and low interest loans provide incentives that enable residents to become engaged and invested in businesses that are part of this economic development strategy. They can be designed in order for the economic benefits to reach the existing coastal workforce. For example, in Virginia a state program provided $10,000 in grants to individual fishermen with commercial licenses to buy the necessary equipment to start small scale but economically viable oyster aquaculture operations. These fishermen completed state provided training to ensure that they knew how to use this equipment appropriately.

The N.C. General Assembly in 2016 directed the N.C. Department of Commerce to explore use of Community Development Block Grant funds to help stimulate oyster aquaculture development. This program holds a lot of promise for helping to jumpstart aquaculture operations. In addition to this creative use of federal dollars, the state should also explore the return on investments of using some of its economic development incentive dollars to help local coastal enterprises expand into businesses that depend on a well-managed and restored coast. The N.C. Department of Commerce and the N.C. Economic Development Partnership should work with coastal stakeholders to identify opportunities for strategic investments of seed money into new enterprises such as farmed oysters, and then seek to provide those needed resources using new or existing federal or state funding sources.

In other states, the Natural Resources Conservation Service (NRCS) provides cost-share funding under the federal farm bill to help oyster growers expand their operations. These funds help growers get established by providing funding for purchasing oyster shells and other aquaculture equipment that are used in their operations. For this type of assistance to become available in N.C., the state office of NRCS would have to include oyster restoration within its adopted state conservation plan.

Another option for carrying out coastal restoration projects is to use public-private partnerships. These partnerships generally reduce costs, improve quality control, and expedite delivery of services. Local and state governments around the country are facing significant challenges in financing and constructing stormwater retrofits and other restoration projects. A public-private partnership model provides an alternative for the finance, design, construction, and operation and maintenance of restoration projects. Private companies as well as not-for-profit groups can invest in staff and the capital equipment necessary to successful design, build and maintain projects instead of having to build that capacity within a

single government entity. Engaging the private sector in these projects provides direct employment within the coastal economy.

Specific actions that are necessary to provide more financial assistance include:

- Develop state approved contracting regulations that allow state agencies to form multi-year public-private partnerships to design, build and monitor restoration projects;
- Catalogue financial incentives offered to other N.C. businesses – commercial fishing industry, farmers, for example – but not currently available to N.C. restoration business owners;
- Survey N.C. restoration business owners on their needs, suggestions for incentives;
- Ask the N.C. General Assembly to fund a study to develop a small business development plan for restoration businesses and/or shellfish growers, including workforce development, training, branding, tourism promotion, financing and incentives;
- Work with NRCS to include shellfish restoration and aquaculture, and other coastal restoration projects, within its adopted conservation plan for N.C.; and
- Use the Community Block Grant funding to expand shellfish aquaculture.

VIII. TRAIN AND ENGAGE LOCAL WORKFORCE AND COMMUNITIES NEEDED TO SUPPORT RESTORATION-RELATED INDUSTRIES

Jobs created by environmental restoration projects are both short-term and long-term in nature. Short-term jobs are akin to construction jobs, but as the restoration initiatives gain momentum, the workers in this field should, like traditional construction workers, find regular, continuing employment in this field. Others jobs are inherently long-term, such as nursery workers and design professionals and consultants. Some are seasonal (such as living shoreline installations), but seasonal jobs may dovetail with other seasonal industries already in the area (tourism, agriculture, fishing).

An RTI study of the federation's North River Farms project concluded that the $2.4 million spent on this project generated $5.2 million in business revenue, $1.8 million in household income, and 55 jobs.[31]

[31] RTI International. 2015. *Coastal Restoration and Community Economic Development in N.C.*.

Analyses of similar projects around the country have revealed the significant impact that environmental restoration efforts have had on local communities and economies.[32]

Having a local workforce that is trained and engaged in either the short-term or long-term employment opportunities is critical to the success of using restoration as an economic development strategy. It is vital to hire local people that live and reside in the coastal communities where these investments occur. The community college system already provides training opportunities that dovetail with this strategy, and it is critical to connect these schools and their curriculum to emerging trends and opportunities with environmental restoration projects as well as improved and more productive fisheries that will support expanding seafood trades and tourism.

The following actions need to be accomplished to move this benchmark forward:

- Partner with N.C. Sea Grant aquaculture demonstration sites to educate workforce developers, local communities, community colleges and other workforce stakeholders about restoration and shellfish economic opportunities in N.C.;
- Consider lobbying 2017 N.C. General Assembly to fund a study to develop a small business development plan for restoration businesses and/or shellfish growers, including workforce development, branding, tourism promotion, training, financing and incentives;
- Catalogue current workforce development resources within the community college system, and stakeholders available to N.C. coastal restoration and shellfish industry;
- Survey restoration business owners and shellfish growers about their workforce development needs;
- Develop workforce development plan and budget for N.C. restoration and shellfish industry;
- Research if oyster and coastal restoration efforts in Tier 1/low-income communities can leverage additional federal and/or state support; and
- Consider developing separate coastal restoration and shellfish development strategies for Tier 1/low income NC counties to leverage potential funding and/or other advantages and incentives in those communities.

[32] U.S. Fish & Wildlife Service. 2015. *Coastal Restoration Returns* (In 2011, $2.8 million in federal spending on coastal programs was leveraged by $16.4 million from other sources, created 473 jobs, and generated $35.6 million additional economic stimulus.)

IX. LINK N.C. TOURISM DEVELOPMENT AND PROMOTION TO THE STATE'S OYSTER INDUSTRY

The coastal environment is already a major tourism catalyst, and this economic development strategy provides numerous opportunities to further develop and expand this industry. There are almost unlimited opportunities to provide and enhance visitor access to protected and restored natural areas and working waterfronts. The mechanisms for expanding this economic activity include creative advertising of visitor opportunities along the coast, developing interpretative trails for visitors to experience the coast in hands-on and interesting ways, working with local watermen to develop expanding guide service opportunities; and further developing hunting and fishing access on restored wetlands and shorelines.

Virginia has demonstrated the tourism potential of linking tourism with oyster aquaculture by developing and promoting oyster trails for its visitors. These trails allow visitors to see how oysters are cultivated, and then provide culinary experiences in local areas where seafood is landed and shipped.

The tourism potential of this economic development strategy needs to developed and coordinated by a broad cross section of stakeholders. This includes *Visit N.C.*, local county tourism authorities, non-profit conservation agencies, as well as the owners of large tracts of property that provide opportunities for eco-tourism.

- Recruit engagement by VisitNC and county tourism authorities on the Blueprint stakeholder group and/or one of its work groups;
- Develop oyster trails similar to what has been done in Virginia;
- Work with the N.C. Restaurant Association to promote N.C. shellfish and fish as a tourist attraction;
- Work with *Our State* magazine on including a visitation map in its June coastal edition that highlights coastal restoration projects and oysters;
- Consider hosting a fact-finding trip to Virginia to educate key travel and tourism policymakers about Virginia's shellfish promotion efforts;
- Locate and profile N.C. businesses that profit from oyster-related travel and tourism;
- Develop plan for oyster branding, tourism development and promotion in N.C.;
- Develop data and communication materials that focus on restoration and shellfish industry's impact and potential in Tier 1/low-income rural coastal communities specifically;
- Research if oyster and coastal restoration efforts in Tier 1/low-income communities can leverage additional federal and/or state support.

X. BRAND AND MARKET N.C. OYSTERS

Compared to other states, N.C. has fallen behind in connecting consumers to the natural assets of its coast. Local efforts such as N.C. Catch are underway, but it will take further expansion of seafood products such as farm-raised oysters for the state to catch up with Virginia and other states and countries that have now already branded their seafood products within the Tar Heel state. N.C. Catch, Visit N.C., local tourism authorities, N.C. Department of Commerce, N.C. Sea Grant, N.C. Coastal Federation, universities, and other stakeholders need to work in concert on a branding and marketing strategy and program that is carried out in a coordinated manner concurrently with other elements of this strategy.

Specific actions that need to be taken include:

- Catalogue other states' efforts to promote their oyster industries to visitors;
- Consider hosting a fact-finding trip to Virginia to educate key travel and tourism policymakers about Virginia's shellfish promotion efforts;
- Locate and profile N.C. businesses that profit from oyster-related travel and tourism;
- Recruit N.C. businesses that profit from oyster-related travel and tourism to engage policymakers to support increased oyster promotion efforts; and
- Develop plan for oyster branding, tourism development and promotion in N.C.

IMPLEMENTATION STRATEGY

Over the past year, a group convened by the North Carolina Coastal Federation has been collecting facts and identifying proof points for this strategy. This phase of this effort has included building the business case for this approach to economic development along our coast, and developing consensus to create credibility for this work. Participants in this effort have included business and community leaders in the state, fishermen, federal and state agencies, not-for-profit entities, and academic researchers.

The next phase is to establish much broader public support and ownership of this strategy. The goal is to get stakeholders to understand and embrace the strategy, and to feel end-to-end ownership of it. It will take diverse participation of many public and private partners to this strategy to take root, and become an important part of the economic activities with N.C.'s coastal counties. Capital investments made by government in research and development, green infrastructure, and environmental management and monitoring will serve as the seed corn for much larger and sustainable private investments that will ultimately propel this strategy forward. It will be essential to create a "business climate" that is supportive of private on-going investments in business enterprises that understand their success will always depend on a clean and productive coastal environment. None of this can be done unless state political leaders embrace this initiative, and they ensure it has the support and leadership it needs to stay directed, focused and moving forward.

Finally, as with any business strategy, it is essential to put into place metrics that measure progress and hold participants accountable for getting a maximum return on using and protecting the coast's natural assets. These metrics need to place high value on environmental quality, community engagement by coastal residents, job creation, tourism and ensuring the N.C. gets its fair share of federal resources to help leverage state investments in this strategy.