

South Carolina COMMERCIAL FISHERIES

Infrastructure Needs Assessment



South Carolina Commercial Fisheries Infrastructure Needs Assessment

by

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INTRODUCTION

The South Carolina Seafood Alliance (SCSA), a professional association representing seafood industry stakeholders across multiple sectors, has a mission of “supporting the state’s seafood industry by growing the production of and enhancing demand for South Carolina seafood products.” However, a convergence of obstacles over recent years including: regulatory changes; import substitutes; and declines in working waterfront sites; have transformed this former stronghold of food security into a more stressed and vulnerable industry.

Through semi-structured interviews with dock owners and lessees of the South Carolina commercial shrimping industry, critical needs, threats, and impediments were identified. Using this data, this project aims to meet the following objectives: (1) identify and prioritize the infrastructure and operational needs of the commercial fisheries sector, (2) estimate the costs and benefits of the identified priorities, and (3) provide regional-specific strategic plans for achieving the prioritized needs.

The strategic plans will serve as a foundation for profitable and sustainable fisheries in South Carolina and will allow the industry to pursue financing opportunities opportunistically. These opportunities could then ultimately result in improved infrastructure, markets, market channels, and operations for a diverse supply of healthy seafood for South Carolina residents.

Participants provided a *total* needs estimate ranging from \$2.8 million to \$5.3 million. Over 80% of this cost is needed for icehouse/freezer/cold storage, docks, and adjacent buildings. The remaining 20% is needed for unloading equipment, packaging/processing equipment, and vehicles for the transportation of the product. Building and dock infrastructure have been identified as the most costly needs for South Carolina’s working waterfronts with a combined estimate ranging from \$2.1 million to \$3.2 million.

OBJECTIVE

For South Carolina seafood producers to become more significant providers of regional nutrition and protein, the industry must *strategically plan* to achieve a series of milestones including: upgrades to existing infrastructure; workforce enhancement; the identification of new markets and distribution channels; and investments in new operational strategies. With these obstacles and opportunities, the industry needed a systematic approach to making progress toward these critical needs. This report plans to meet the following objectives.

Objective 1: Identify and prioritize the infrastructure and operational needs of South Carolina seafood producers using in-person, semi-structured interviews of statewide commercial fishery stakeholders.

Objective 2: Estimate the costs and benefits of the identified priorities.

Objective 3: Using the cost-benefit analysis as a foundation, develop regional strategic plans for achieving seafood industry milestones.

RATIONALE

This proposed project intends to position the commercial fisheries sector in a way to capitalize on expected and unexpected future financing streams, primarily through the development of strategic plans. It is a preparedness activity and aims to build the foundation of the industry and increase the overall functional capacity for South Carolina’s sustainable seafood supply chain.

After a steady decline from the 1980s to the early 2000s, commercial landings value in South Carolina has remained consistently lower ever since (Figure 1).

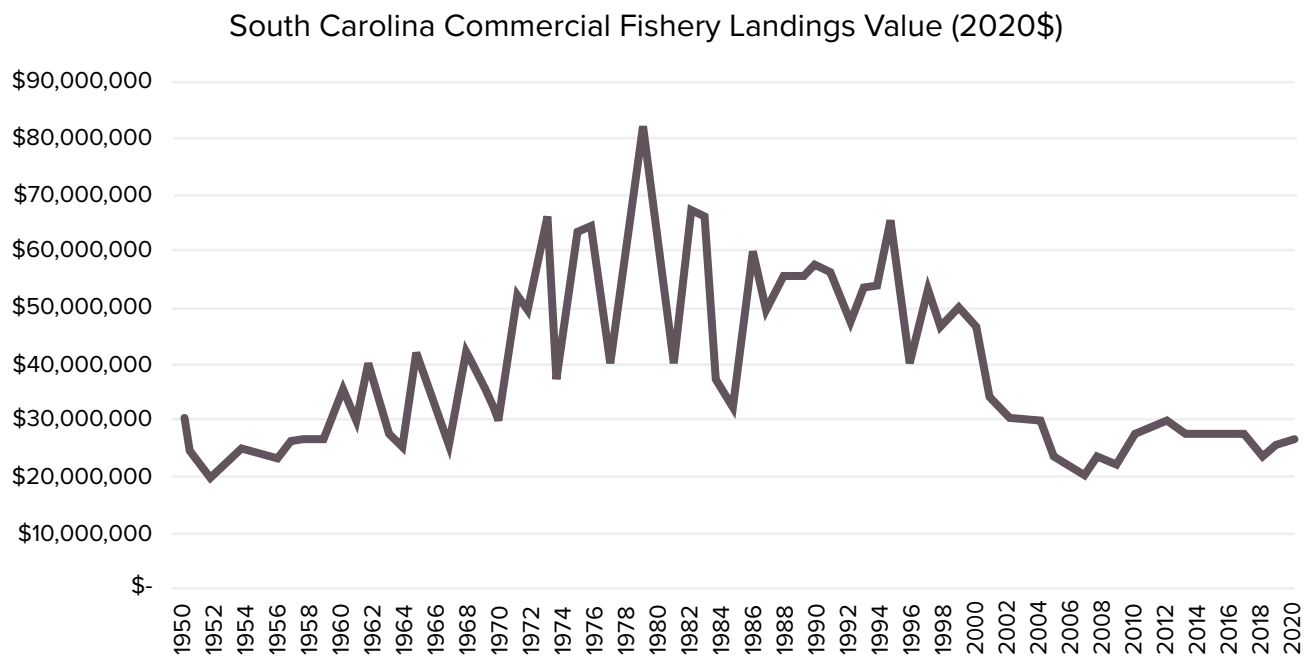


Figure 1: Commercial fisheries landings in South Carolina from 1950-2020. Data retrieved from NOAA (<https://www.fisheries.noaa.gov/foss/>)

The drivers behind this decline are complex, but fishermen and academics often allude to an increasingly complex regulatory environment, competition from low-cost seafood imports, a lack of workforce and assets transfer, declines in working waterfront infrastructure, and a devaluing of the profession (Fluech et al., 2022; Sweeney-Tookes and Fluech, 2018; Mirabilio, Fleming & Anderson, 2014; Nash, 2013). Notably, among South Carolina’s largest fisheries, the commercial shrimp fishery has seen roughly a 45% decline in active shrimp trawler licenses since 2004 (Figure 2).

Number of Active Shrimp Trawlers in South Carolina

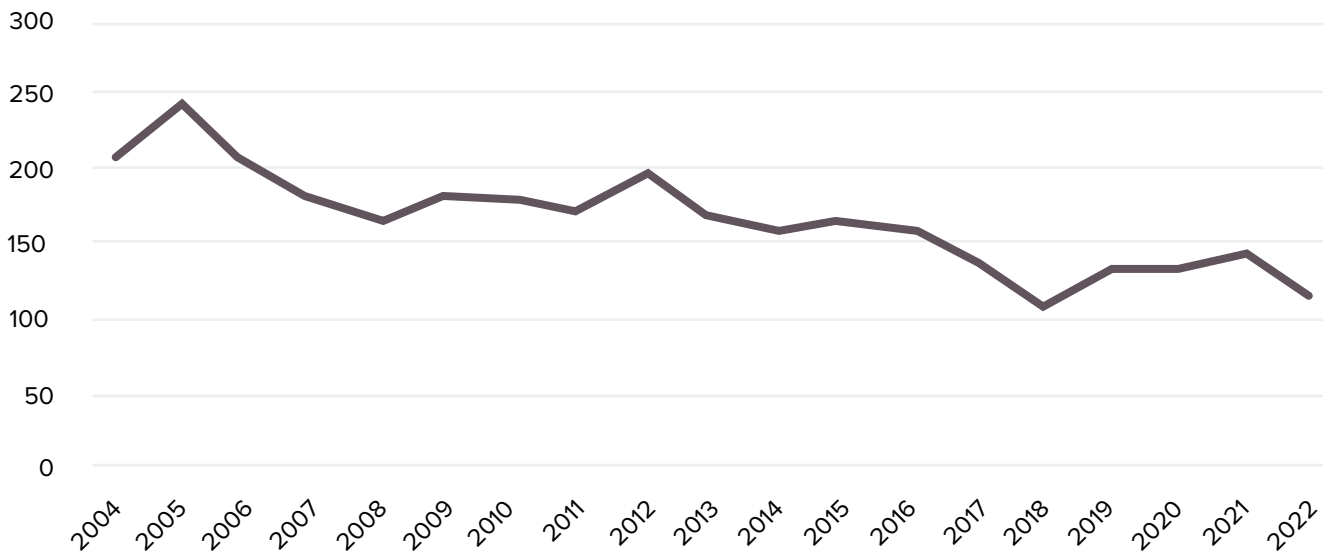


Figure 2: Total number of active shrimp trawlers in South Carolina each fiscal year (July 1 to June 30) since 2004. Provided by Chris McDonough, SCDNR.

While South Carolina fisheries remain financially valuable, there is still much potential for greater downstream economic impact by selling more fish locally and capturing the economic gains by local producers. This requires an analysis of the need to export fewer fish out-of-state. Rhodes & Pan (2014) estimated that about 67% of the 2012 *finfish* landings based upon dockside value were exported out of state and about 44% (\$10.6 million ~ a 2012 nominal dockside value) of South Carolina's *total* commercial fishery landings were exported to other U.S. states and/or countries in 2012. Of course, this is symptomatic of the fresh wholesale demand in major U.S. metro areas and international markets that provide needed cash flow for South Carolina harvesters.

While a commonly recognized explanation for this trend is low-priced imported substitutes, other reasons related to the high cost of domestic production include the following:

- The decline in the workforce committed to commercial fishing as older fishermen exit the industry with fewer individuals interested in replacing them, i.e., “Greying of the Fleet;”
- The rising price of waterfront real estate continues to incentivize developers to buy up the limited number of working waterfront sites to be converted to non-commercial fisheries uses (e.g. Rhodes et al., 2008)
- The adoption of strict U.S. federal and state fisheries regulations that maintain the

sustainability of fisheries stocks and habitats increases the cost of participation in these domestic fisheries.

Working waterfronts consist of water-dependent businesses that are located on land adjacent to water. They primarily include commercial fisheries, aquaculture, boat building, and marinas. These water-dependent businesses often operate alongside water-related and water-enhanced businesses. Water-dependent businesses, such as commercial fishing, require direct access to water. Many commercial fisheries also rely on water-related structures like ice houses, processing facilities, storage facilities, and markets which do not require direct access to water but directly support water-dependent businesses. This means that upland areas are equally important to working waterfronts (Ounanian, 2015).

The steady decline in commercial fishery landings value since the 1980s and the overall decline in participation has had a compounding effect on the industry as a whole – vessel maintenance, production equipment, and access to distribution channels all suffer as a result of the decline. To begin addressing these compounding factors, seafood producers will need to access new financial streams to reorganize, restructure, and reinvigorate the industry to compete in a rapidly changing market.

Some potential financial streams have already been publicly announced (USDA, 2021 and NOAA National Sea Grant Office, 2022) and this project directly complements the federal government’s recent Executive Order, Promoting American Seafood Competitiveness and Economic Growth (2020), which outlines the following policy priorities:

- (a) identify and remove unnecessary regulatory barriers restricting American fishermen and aquaculture producers;*
- (b) combat illegal, unreported, and unregulated fishing;*
- (c) provide good stewardship of public funds and stakeholder time and resources, and avoid duplicative, wasteful, or inconclusive permitting processes;***
- (d) facilitate aquaculture projects through regulatory transparency and long-term strategic planning;*
- (e) safeguard our communities and maintain a healthy aquatic environment;***
- (f) further fair and reciprocal trade in seafood products; and***
- (g) continue to hold imported seafood to the same food-safety requirements as domestically produced products.*

The immediate needs of South Carolina’s shrimping industry are best reflected in policy priorities (c), (e), and (f) above.

When considering new markets, as previously noted, an estimated 44% of South Carolina’s commercial fishery landings were sold to wholesale buyers serving major U.S. and international market segments in 2012 (Rhodes & Pan, 2014). This still begs the question: have possible local and/or other regional marketing opportunities been recently and systematically analyzed? This report will serve as the base foundation for analyzing those complex market systems and opportunities.

New approaches need to be developed to capitalize on new opportunities. An understanding of priorities (which would be a first for the industry at the statewide level in recent years) would allow a strategic approach to addressing the above challenges and reinvigorate the supply of and demand for local sustainable seafood. Anecdotal evidence and insight from seafood producers prior to this project have highlighted examples of needs that would benefit from public funding support:

- Production equipment in Beaufort, South Carolina that could be utilized by a cooperative arrangement of shrimpers may be one identified strategy in southern South Carolina.
- A possible training program for shellfish harvesting may satisfy the labor gap in northern South Carolina, and serve as the catalyst for an increased regional supply of shellfish.
- Recent studies and research currently underway have attempted to assess the market for direct delivery sales (Ratliff, 2018); this may be an avenue of high interest and this project could establish the groundwork for accessing that market, and perhaps expanding upon the Community Supported Fisheries (CSF) business models.

Recent years have shown that problems that continue to impede the success of the commercial fisheries industry in South Carolina are not sufficiently solved when approached individually; rather than a business-as-usual approach, an organized collaboration that maximizes available resources may yield more effective results. Understanding these solutions and prioritizing them requires stakeholder input, analysis, and planning, all of which this project provides.

PROJECT BENEFACTORS

Direct benefactors are industry stakeholders including commercial fishermen (primary producers) and primary seafood wholesalers (“dealers”) in South Carolina’s coastal region. While these benefactors number >600 including direct, indirect, and induced impacts (NOAA National Marine Fisheries Service, 2022), a targeted sampling of dock owners or lessees of the shrimping industry across a diverse range of coastal counties was reached through this project. Because many fishing businesses that target other local species also utilize the working waterfronts and critical infrastructure of shrimping operations, they too would be a direct

benefactor of this project.

When the strategic plans are implemented through expected funding streams, seafood products will become more efficiently produced and will find new market channels to satisfy the demand for local and regionally harvested seafood products. By developing public, private, and non-governmental organization (NGO) partnerships, South Carolina can position itself to address the needs identified in this project. By addressing those needs, indirect benefits are expected to be realized by the seafood-consuming public as a result of an increased supply of local seafood.

SHORT- AND LONG-TERM IMPACTS

Short-Term Impacts

The immediate outcomes of this project will be determined by the degree to which the analysis and strategies offered in this report are implemented. Upon implementation, these activities alone will lead to benefits immediately realized by the seafood-producing sectors, especially where collaboration among industry members is utilized. With a diminishing fishing sector in South Carolina (partly due to waterfront property being shifted away from traditional working waterfront uses), cooperation and collaboration among industry members have greatly declined. Port towns that used to host multiple docks now host one or none, and docks that used to host multiple vessels now host much fewer. This makes cooperation and collaboration much more difficult. This is damaging to operations such as sector-wide marketing campaigns, using shared facilities such as dock space and processing equipment, and forming storage hubs for easier and cheaper distribution logistics.

This report satisfies many of these voids because ideas and needs have been collectively shared and the inventory of the industry resources can be accounted for. The strategic plans will serve as the foundation for forums where the proposed strategies can be discussed, tweaked, and elaborated on. Opportunities for cooperative networks – both formal and informal – will present themselves through these interactions and will also be actively sought after, building upon the need for broader cross-industry collaboration. The realization of shared needs by a certain fishery and/or regional markets may motivate the formation of fishing co-ops, which could lead to further community-wide socioeconomic benefits. Moreover, opportunities for CSFs and/or related alternative shared markets (e.g. new farmer's markets) can be assessed at these forums.

Long-Term Impacts

Anticipated impacts of this project include (1) creating a more resilient commercial fisheries sector in South Carolina, (2) increased regional food security, and (3) positive social benefits

such as community connectivity and cultural enhancement. All outcomes are guided under a framework of community support for environmental and economic sustainability. The following are examples of how prioritized needs and strategic plans can manifest into different long-term benefits:

- As mentioned above, multiple obstacles have made commercial fisheries an extremely vulnerable industry. While this project is not a direct response to addressing COVID-19 impacts, the pandemic has highlighted specific vulnerabilities in the seafood supply chain. This project has identified those vulnerabilities and created strategies to navigate around the choke points within the supply chain. Alternative markets and marketing strategies are critical areas for analysis that this project addresses, with special attention given to filling the local demand for seafood that has historically relied on international distribution (Henry et al., 2008).
- Based on discussions with South Carolina fishery managers, the “Greying of the Fleet” continues to be a substantial concern for the South Carolina industry to provide regional consumers options to purchase locally harvested seafood. However, strategic plans developed by this project define specific measures to enhance the South Carolina seafood industry workforce, such as (1) identifying permit- and entry-friendly fisheries, (2) technical college collaboration for fisheries technology programs, and, (3) the development of fisheries-tourism partnerships. Strategic planning exercises could also explore other ways to engage the communities’ youth in commercial fishing enterprises, bringing job opportunities to those otherwise unexposed to fisheries’ potential. Community-owned and operated fisheries that operate at small and medium scales are evidenced to be low-impact, environmentally-conscious stewards of fishery resources (Gutierrez et al., 2011).
- South Carolina commercial fishermen and other South Carolina industry stakeholders have previously identified some of the apparent following problems affecting seafood production and regional distribution: a general lack of vessels with on-board freezing congruent with the realities of southern coastal fishing areas; a shortage in dockside ice machines; aging and/or broken primary processing and value-added equipment; no short-term cold storage to serve as a local distribution center; and poorly maintained landing space and facilities. All of these infrastructure and operational shortcomings directly impact the availability of local seafood supplies. Better equipment and time/temperature control processes would lead to a greater capacity to handle, process, and distribute fresh and frozen seafood regionally. Generally, the fewer the processing equipment and logistical infrastructure possessed (or locally available) by harvesters and processors, the more reliant they are on outside companies. This dependency pushes not only the seafood but the economic benefits derived from the seafood, away from the seafood-producing communities. In short, local harvesters and primary

processors need better facilities and equipment in order to better meet local needs for seafood and improve food security. Ideas have been discussed, with examples given by those in the seafood-producing sector. The next step is to bring those seafood sector stakeholders to the table to catalog these ideas and collectively agree on how to move forward. This is best carried out by a formal assessment of what exists and what is needed regarding infrastructure and operations, as is provided in this project.

POTENTIAL ADAPTATION OF PROJECT BY OTHERS

Coastal communities in Georgia, northern Florida, and much of North Carolina have similar seafood-producing obstacles as South Carolina, specifically pertaining to socio-economic obstacles and infrastructure integrity. Fishery efforts, gear types, environmental factors, and consumer bases are also quite similar. Therefore, we expect both the methodologies and results from this project to be beneficial to—and potentially utilized by—fishery managers/stakeholders throughout this Southeastern region.

The strategies proposed in this report could be adapted by other regions such as the identification of supply chain opportunities. These would benefit southern North Carolina and Georgia fishermen as much as South Carolina fishermen. The eventual establishment of cold storage in a centrally-located hub such as Charleston, South Carolina would have positive implications for seafood producers in nearby states. Models of CSF that could be designed as a result of this project could serve as blueprints in multiple Southeastern coastal cities with similar markets (i.e. Wilmington, NC, Savannah, GA, and St. Augustine, FL). Additionally, promoting the eating of local seafood via online marketing could have a desirable spillover effect on local seafood demand in nearby areas, both coastal and inland.

With the South Carolina Sea Grant Consortium serving as a critical partner on this project, there are currently multiple ongoing initiatives by the Consortium that align with this effort and, in turn, some that would benefit from incorporating results identified through this initiative. These projects include subject matters such as: addressing the “Greying of the Fleet”, aquaculture product marketing, shifting populations of shrimp species, a GIS-based mariculture siting tool, and data collection for federally managed snapper/grouper fisheries in the Southeast.

Additionally, the South Carolina Center for Cooperative and Enterprise Development administered by Clemson Extension - an entity dedicated to providing technical assistance to local food and agricultural businesses in South Carolina - is another institution that could make use of these results.

South Carolina Department of Natural Resources as well as the South Atlantic Fishery

Management Council could also utilize the findings of this report as they are the leading state and federal entities that research, manage and enforce fisheries activity in South Carolina.

Finally, because of the critical food supply implications, this report highlights as requiring support, the U.S. Department of Agriculture is another essential agency that could utilize and expand upon these findings in pursuit of its mission to strengthen rural and sustainable food systems.

METHODS

A semi-structured interview was conducted among shrimp industry stakeholders to gather specific information regarding the availability and condition of various types of working waterfront infrastructure. Per the recommendations of the South Carolina Sea Grant Consortium, this project targeted South Carolina's shrimping industry. The reason for this was because of the expansive nature of the infrastructure required for a shrimp-based working waterfront: (1) shrimp vessels are larger and require substantial docking capacity and (2) these working waterfronts are usually accompanied by several other types of infrastructure such as buildings, refrigerated or freezer storage, processing equipment, ice production, etc. Because of the infrastructure available, these businesses play host to many other commercial fishing sectors beyond shrimping such as mariculture, watermen, rod and reel, and longliners. Fourteen of these influential industry stakeholders are the basis of the data analyzed in this report— one in Hilton Head, four on Saint Helena Island, one in Bennetts Point, one on Wadmalaw Island, one in Folly, three in Shem Creek (two of which share the same address), two in McClellanville, one in Murrells Inlet.

Focusing on shrimping-related infrastructure also allowed the project to truly highlight the status of South Carolina's most valuable seafood sector. The Fisheries Economics of the United States 2019 report (Table 1) demonstrates that shrimp has been the highest revenue-generating species for the state for almost ten consecutive years (NOAA National Marine Fisheries Service, 2022). Due to the economic impact of shrimp, an assessment of the working waterfront infrastructure on which the industry relies was imperative.

2019 Economic Impacts of the South Carolina Seafood Industry (thousands of dollars)

	With Imports				Without Imports			
	#Jobs	Sales	Income	Value Added	#Jobs	Sales	Income	Value Added
Total Impacts	1,739	168,148	51,035	74,261	1,341	84,830	34,681	46,184
Commercial Harvesters	504	41,616	16,371	22,531	504	41,616	16,371	22,531
Seafood Processors and Dealers	117	10,546	4,125	5,305	102	3,587	3,587	4,613
Importers	217	70,968	11,374	21,634	0	0	0	0
Seafood Wholesalers and Distributors	81	9,697	3,407	4,475	36	1,511	1,511	1,985
Retail	821	15,758	15,758	20,316	700	13,211	13,211	17,055

Total Landings Revenue and Landings Revenue of Key Species/Species Groups (thousands of dollars)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	21,982	24,675	25,592	24,625	24,193	24,578	25,065	25,741	22,093	25,113
Finfish	6,775	8,864	7,023	8,325	6,770	7,481	7,044	8,453	6,161	6,645
Shellfish and Other	15,207	15,811	18,570	16,299	17,423	17,097	18,021	17,288	15,932	18,468
Key Species	-	-	-	-	-	-	-	-	-	-
Black Sea Bass	213	181	303	471	341	246	156	251	187	292
Blue Crab	3,592	5,084	5,800	6,368	5,822	4,831	5,538	5,569	5,143	5,158
Clams	980	823	583	699	585	570	726	434	580	245
Groupers	1,524	1,709	1,119	1,394	1,412	1,199	754	1,042	1,094	987
Oysters	1,906	1,975	2,153	2,402	2,243	2,258	2,321	2,612	2,967	3,725
Sharks	75	99	108	55	87	18	33	42	38	34
Shrimp	8,166	7,004	8,689	5,935	8,035	8,525	8,129	8,313	6,324	8,164
Snappers	1,079	1,085	1,334	1,075	948	1,067	1,090	1,116	1,156	1,236
Swordfish	2,289	3,628	2,105	2,370	1,298	1,437	1,785	1,815	1,614	1,724
Tilefish	117	8	148	404	538	537	NA	780	326	341

Table 1: Fisheries Economics of the United States 2019, National Marine Fisheries Service.

INFRASTRUCTURE AND OPERATIONAL NEEDS

OWNERSHIP

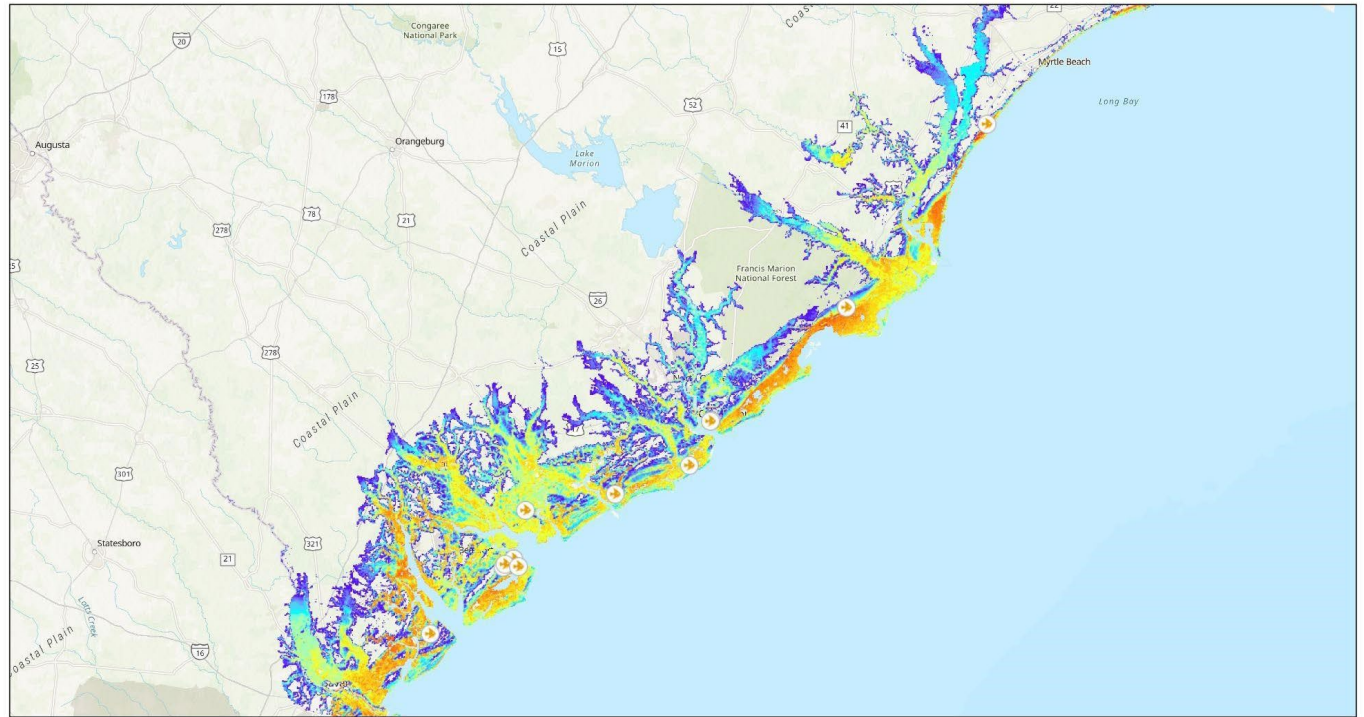
When planning for the future of South Carolina's seafood supply capacity, we must first turn to those participating in the fishery to assess their future plans. Naturally, the future of their operations is dependent on the future of their access to a functional commercial fishing dock. One discovery from this assessment is that there are few instances where a future plan of succession or even assurance of lease renewal (for those who are lessees) was in place.

Fortunately, 70% of survey respondents reported that they owned their docks. The remaining 30% are subject to an uncertain future. While this comes with both pros and cons, South Carolina is a state where there is not a designated state-owned and managed commercial fishing port, which means that self-owned docks provide an important degree of security that contributes to more effective business planning for securing the longevity of seafood production.

INSURANCE COVERAGE

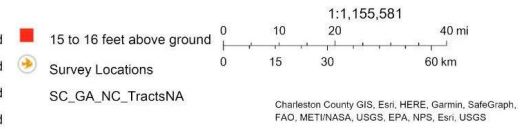
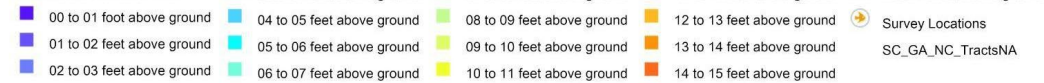
Forty percent of South Carolina's surveyed shrimping docks do not hold any insurance plans to protect their dock and land-based assets against natural disasters. These businesses occupy about 1,320 linear feet of waterfront that is at risk. A total of 55 commercial vessels (trawlers, longline, rod & reel, waterman) utilize these uninsured docks and waterfront infrastructure annually, and 153 people rely on these uninsured assets for a job. Cost and lease terms were the primary factors that prohibited these commercial seafood businesses from purchasing insurance policies against natural disasters. All these working waterfronts are in locations expected to be submerged by 7-12ft of water in the event of a CAT 2 hurricane at high tide (Image 1).

South Carolina Category 2 Hurricane



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MOM_Cat_2_HighTide_Clip



Esri, CGIAR, USGS | Charleston County GIS, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS | ArcGIS Web AppBuilder

Image 1: Shrimping dock locations along the South Carolina coastline under storm surge scenario during a CAT 2 hurricane at high tide. ([South Carolina Seafood Alliance ArcGIS Online Application 2022](#), provided by South Carolina Sea Grant Consortium in partnership with the College of Charleston.)

The remaining 60% hold insurance plans of varying coverages and complexity with some including flood insurance and others only being protected against damages incurred from high wind.

ICEHOUSES AND COOLING MECHANISMS

Due to the long warm season in the southeast, South Carolina commercial vessels and the broader South Carolina seafood supply chain have a greater demand for ice, freezers, and coolers to keep the catch at a safe and appropriate temperature. Ice is required to chill the holding tank with additional ice needed depending on the estimated catch. Ice is then needed again when the catch is offloaded and chilled for retail. Even the shortest of seafood supply chains have high ice and cooling requirements. As a commercial vessel can not harvest seafood without sufficient cooling mechanisms, it is a necessity for vessels that are not freezer boats.

Sixty percent of survey respondents reported their ice machines to be in fair or poor condition. These ice machines together should have a total maximum capacity of 93 tons of ice when properly working. A total of 91 commercial vessels and 285 people depend on these machines that are reported to be in fair or poor condition. A third of these fair or poorly operating machines are not insured against natural disasters.

The overall question of whether these working waterfront facilities have sufficient cooling mechanisms is concluded by assessing the condition of the ice machine, freezer, and coolers cumulatively.

Sixty percent of working waterfronts surveyed stated that two or more of the following: freezer, ice machine, cooler; were either fair, poor, or non-existent and needed. Forty percent of those surveyed stated that all three were fair, poor, or non-existent and needed.

Overall, the ice, freezing, and cooling capacity at working waterfronts in South Carolina requires upgrades and improvements. The total financial requirement for repairs and upgrades reported by all those surveyed ranges from a low-end total of \$590,000 to a high-end of \$1,074,000.

Refrigerated vehicles for transporting seafood are not included in these financial requirements, though the need was expressed and is addressed in subsequent sections.

DOCK NEEDS

The total docking capacity among the surveyed population ranges from 100-106 vessels. Seventy percent reported their docks in fair or poor condition. Those fair and poor condition docks require repairs and upgrades that come with financial requirements ranging from a low end of \$732,000 to a high end of \$1,220,000. Shrimping docks along the South Carolina coast are in locations 4-14ft above sea level and are expected to flood in the event of a CAT 2 hurricane during high tide (South Carolina Seafood Alliance ArcGIS Online Application, 2022). Sixty percent of surveyed docks already flood multiple times a year during storm surges and king tides.

BUILDING NEEDS

Building needs account for the most costly infrastructure needed in South Carolina's commercial fishing sector. These buildings provide essential services for seafood producers including cold storage housing, packaging and processing facilities, equipment storage, administrative offices, retail space, and mariculture operation housing. The presence of two or more buildings requiring repairs was reported at 44% of the sites surveyed. Seventy-eight percent of buildings across the surveyed population were in poor to fair condition. Those fair or poor condition buildings come with financial requirements ranging from \$1,180,000 to \$1,787,000 for critical repairs and upgrades. One respondent reported that their current building has

been condemned and is no longer usable. A predominant 88% of reported building needs were for the construction of new buildings or the expansion of existing buildings for increased operational space. All respondents reported needs for general repairs such as new doors, windows, flooring, and HVAC systems. Thirty percent of participants reported basic utilities needed for their buildings, such as the installation of electricity and plumbing. There is an industry-wide need for buildings to be raised, existing containment walls to be rebuilt, and other flood-proof engineering to be installed to reduce the impact of imminent flooding events as demonstrated in the South Carolina Seafood Alliance ArcGIS Online Application (2022).

VEHICLE NEEDS

Vehicles are an often overlooked but critical need for seafood producers. Without a dedicated vehicle for safe and reliable product transportation, the marketability and potential for revenue are decreased as seafood producers are not able to move their product past their dock. Ninety percent of the survey participants stated that their vehicles are in severe to fair condition. Two respondents reported that they currently outsource local deliveries to another company. All participants who do not currently have a company vehicle stated that they were in need of one. Only one business reported having a vehicle capable of delivering their product regional distances. Having a dedicated vehicle that is adequately equipped to handle both cold storage for food safety and wet products for vehicle longevity is paramount in order to maximize potential revenue for their product. Vehicle needs addressed by participants emphasized the need for vehicle replacements (63%) and upgrades to provide effective cold storage conditions (25%). The financial burden for replacing and repairing these vehicle needs range from a low-end estimate of \$265,000 to \$281,000.

STRATEGIC PLANNING

This report's strategic planning assets will begin with a cost-benefit analysis of South Carolina's working waterfronts— comparing the impact of complete funding to an intermediate funding plan and, finally, what would result if merely the status quo were maintained.

Complementary to this report, unique strategic plans have been provided for the southern, middle, and northern South Carolina coastal regions to respond to the individualized needs of each region. The southern region includes working waterfronts from the Savannah River through St. Helena Island, South Carolina. The middle region includes working waterfronts from the Combahee River of the ACE Basin through Mount Pleasant, South Carolina. The northern region includes working waterfronts from McClellanville, South Carolina through Murrells Inlet, South Carolina.

Each region's strategic plan will address the needs, threats, and impediments identified through

semi-structured interviews conducted with dock owners and lessees of the South Carolina shrimping industry. Strategies will then be divided into two sections addressing short-term needs for stability and long-term needs for resiliency. Within each section, responses have been categorized by theme: operational, economic, regulatory, and environmental. Both short- and long-term needs are then followed by strategies to address the specific responses given. Some responses show up in both the short-term needs section and the long-term section due to the immediate threat and the need for long-term monitoring and action. For these responses, both short-term and long-term strategies are provided.

The numerical figures in this section may look different from those quoted in various sections above because the strategic plans are developed regionally—and will be based on the needs identified by that region through the surveys, as well as conversations, anecdotes, and expert observation. Due to the availability of the targeted population, this sample is not equivalent to the entirety of the shrimping industry of South Carolina but represents a large and geographically representative share.

COST / BENEFIT ANALYSIS OF NEEDS

IDENTIFIED NEEDS

The semi-structured interviews conducted with South Carolina shrimping dock owners and lessees provided high and low-end estimates for the cost of critical repairs as well as the replacement of essential equipment and facilities.

Participants provided a *total* needs estimate of \$2.8 million to \$5.3 million.

Over 80% of this cost is needed for icehouse/freezer/cold storage, docks, and adjacent buildings. The remaining 20% is needed for unloading equipment, packaging/processing equipment, and vehicles for the transportation of product. Building and dock infrastructure have been identified as the most costly needs for South Carolina's working waterfronts with a combined estimate of \$2.1 million to \$3.2 million.

SCENARIO ONE

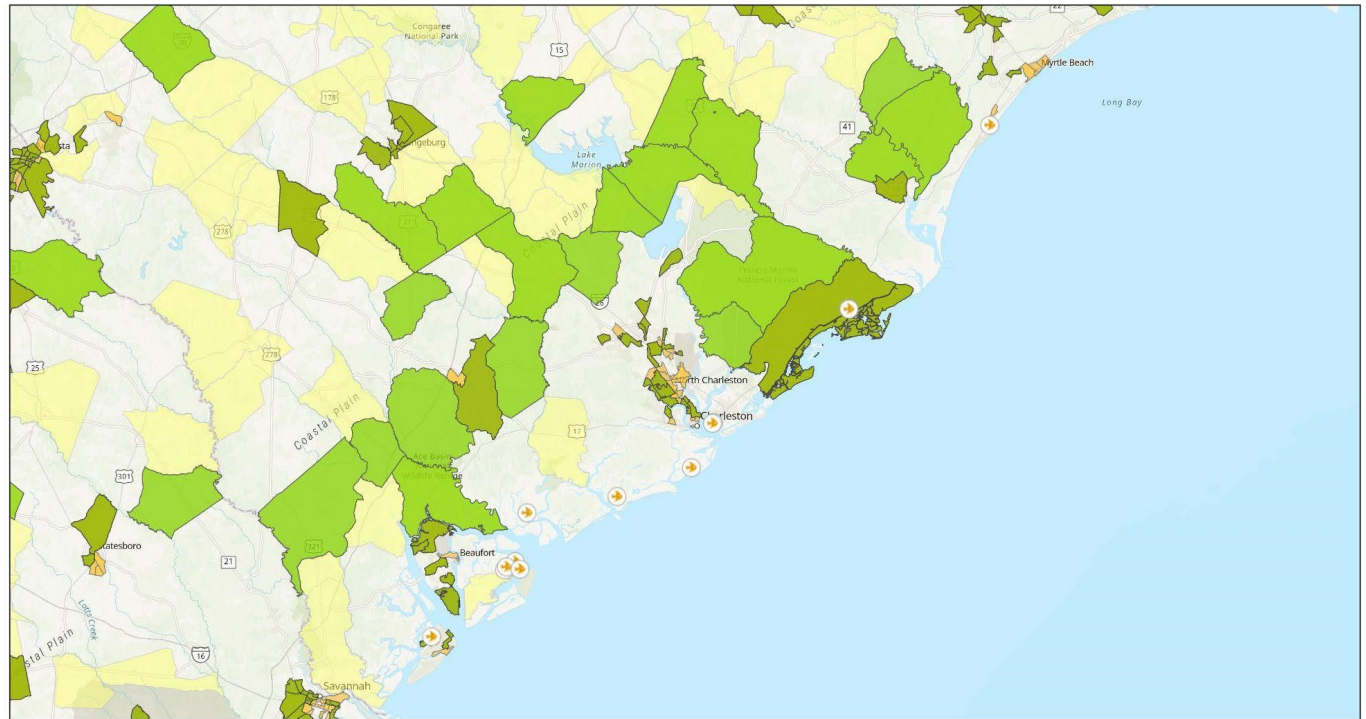
Interviews with South Carolina dock owners and lessees have identified a cumulative need of \$5.3 million in order to bring current infrastructure to safely and fully functioning working conditions including some expansion where those needs are critical for optimizing business operations. In addition to fiscal needs, this \$84 million industry (based on sales), primarily located in rural communities, depends on continued access to safe and sufficient waterfront facilities, reliable crew, and stable economic support, in order to secure a vibrant and flourishing future for South Carolina's sustainable seafood supply chain.

If the full \$5.3 million can be secured, this industry would, within about two years of receipt of those funds (accounting for potential permitting delays), be able to fully maximize its critical business infrastructure and operations. While \$5.3 million may initially seem a large investment for this industry, we must consider the long-term economic impact of South Carolina's seafood industry, whereby over the course of ten years, a minimum of \$840 million in economic revenue is secured by rural coastal communities based on the annual economic impact estimate for seafood industry sales in NOAA National Marine Fisheries Service, 2022. This investment secures that future and ensures the long-term viability of sustainable food operations by helping the industry shift toward growth-oriented business models rather than downsizing and potentially exiting the industry altogether.

- Those businesses interested in expanding to product transportation and direct-to-consumer marketing would be able to secure refrigerated vehicles and brick-and-mortar market space.
- Docks that are currently unsafe or otherwise dilapidated due to age and damage from extreme weather events would be repaired and restored to fully operational capacity which could include raising for flood prevention and extending. Dock expansion would accommodate more vessels and could, in turn, increase the anticipated seafood landings for the state of South Carolina. Increasing the South Carolina seafood landings further drives the growth of this rural economic engine by providing new jobs, securing existing jobs throughout the broader seafood supply chain, and increasing seafood sales and associated income.
- At this funding level, the freezer, ice production, and cold storage needs could be not only repaired and upgraded, but in some cases, expanded to accommodate the growing demand for local seafood. Ice and sufficient cooling are a basic necessity for this industry to adhere to safe food supply policies.
- Many buildings of South Carolina's working waterfronts are reported as condemned and in need of a complete rebuild. The remainder is in such perilous condition that they are at serious risk of significant damage or complete loss in the incidence of severe weather or flooding. Some reported that their buildings lack basic needs such as electricity and plumbing. The only solution for all these buildings to be restored to ideal operational condition is through the full funding of \$5.3 million.

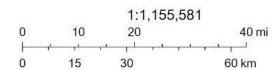
The benefits of these investments in South Carolina's seafood supply system are most poignantly illustrated when viewing the map of USDA-identified food deserts (image 2) which is viewable in the South Carolina Seafood Alliance ArcGIS Online Application (2022). These working waterfronts are often located in the same areas where food access is scarce. Six of South Carolina's shrimp docks are located in food deserts. Strengthening access to healthy and sustainable sources of protein in areas where food options are limited is beneficial to these

South Carolina Food Deserts



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-  Survey Locations
-  SC_GA_NC_TractsHalfAnd10
-  SC_GA_NC_TractsNA
-  SC_GA_NC_Tracts1and20
-  SC_GA_NC_tracts1and10
-  SC_GA_NC_TractsVehicle



Charleston County GIS, Esri, HERE, Garmin, SafeGraph, FAO, METINASA, USGS, EPA, NPS, Esri, USGS

ArcGIS Web AppBuilder
Esri, CGIAR, USGS | Charleston County GIS, Esri, HERE, Garmin, SafeGraph, FAO, METINASA, USGS, EPA, NPS |

Image 2: The green area above indicates low-income census tracts where a significant number or share of residents is more than 1 mile (urban) or 10 miles (rural) from the nearest supermarket. (USDA Food Access Research Atlas, 2022) from the South Carolina Seafood Alliance ArcGIS Online Application, provided by the South Carolina Sea Grant Consortium in partnership with the College of Charleston.

communities. The added value to this is the secondary outcome by which a new market is created where the more affordable, underutilized species could find appreciation.

More broadly, all facets of the food system benefit when the supply of healthy and sustainable sources of protein is strengthened. This comes with a beneficial impact on human health, rural economies, and the environment. Additionally, strengthening the shrimp-based working waterfronts has a ripple effect benefitting other seafood sectors as well. This is because shrimp docks do not only play host to shrimp. Many other local species utilize the working waterfronts of shrimping operations.

SCENARIO TWO

If funding limitations could only provide part of the total needs stated above, much of the current working waterfront infrastructure and needs would not be met. Priority would be given to the most essential equipment like icehouses and cold storage while docks and building infrastructure would continue to deteriorate, ultimately rendering them unfit for further operations and causing unsafe working conditions without further intervention. For example, with only \$1.4 million provided, which equates to half the minimum of the low-end estimated need of \$2.8 million, South Carolina dock owners and lessees could bring icehouse/cold storage to acceptable working conditions while still maintaining unloading equipment, packaging/processing equipment, and vehicle maintenance. This partial funding would not be sufficient to bring docks or adjacent buildings up to a safe and fully functional condition.

Under scenario two, partial funding, while helpful in addressing some urgent needs, is insufficient in ensuring the future viability of South Carolina's sustainable protein production. With limited funding, many business owners would run the risk of closing if and when a significant storm surge further destroyed these critical pieces of waterfront infrastructure. If this were to happen, in many cases, seafood businesses often end up losing their waterfront property to a tourism-centric developer— in which case that property will never serve as a working waterfront again. This has been witnessed numerous times over in the commercial fishing industry not only in South Carolina but throughout the nation. The South Carolina Hurricanes Comprehensive Summary by the South Carolina Department of Natural Resources (2022) states that the South Carolina coast has a 79.7% chance of being impacted by a tropical system each year. Further, 23.5% of all storms that have impacted South Carolina were CAT 1 or higher. It is well documented that climate change has resulted in increased sea surface temperatures, which can cause increased tropical cyclone frequency; and, especially when coupled with climate change-driven sea level rise, causes increased tropical cyclone severity (IPCC, 2022). This puts South Carolina at an increased risk of damages caused by severe weather. Thus, the scenario of working waterfronts closing their doors following damages from severe weather is not a matter of if, but when an industry-shattering storm will arrive.

It is true that, historically, this industry has been resilient in the face of much adversity. But now, with mounting pressures on all facets of commercial fishing such as the redevelopment of working waterfronts, habitat degradation, shifting population dynamics in marine ecosystems, competing with imported seafood from underregulated sources, lack of next-generation participants to take over operations from an industry nearing retirement, and the financial burden of infrastructure upkeep, it is unlikely that a damaging storm would leave the industry unscathed. With each hurricane season, this industry is at risk of dwindling further. Even without a storm, this industry is unlikely to maintain any reliable longevity without sufficient investment and financial support.

SCENARIO THREE

This scenario highlights the projected outcomes from simply maintaining the status quo. For this industry, unfortunately, maintaining the status quo when it comes to providing public support in the form of financing is minimal and in most cases non-existent for addressing the types of needs highlighted in this report. The funding available for South Carolina working waterfronts is limited at best, with only two participants reporting that they received prior public or private funding support. None of the participants reported receiving any current funding support. Some of the difficulties around identifying and securing funding for financing these needs include:

- There are currently insufficient funding opportunities that target the structural resiliency of infrastructure in highly threatened areas that are critical to food production.
- Funding options like grants and subsidies are not widely advertised or accessible to the working waterfront community.
- The individual businesses do not possess the necessary time, training, or personnel to apply for these complex funding opportunities.
- Often, individual businesses are less competitive than—and in some cases are ineligible when compared to—co-ops, associations, or other forms of organized entities when being evaluated for a public funding award.
- Often, the available funding awards are insufficient in value to properly address the need.

With the high value of waterfront property, once these working waterfronts fall beyond repair, it is unlikely that they will have the opportunity to rebuild. Maintaining the status quo would yield the same outcomes seen over the last twenty years, which is a consistent decline in fishery participants, seafood landings, and ultimately South Carolina’s local food security when it comes to the supply and production of sustainable protein. Cumulatively, these outcomes are seen through declining harvesting effort. This trend is illustrated in Figure 2. Note: “The dip that occurs in all figures during 2018 was the result of the winter freeze [shrimp] kill that occurred during January of that year, it accounted for an approximate 90% decline during the spring season in landings and a 57% decline in landings for the calendar year.” (Chris McDonough with SCDNR, personal communication, October 23, 2022)

TOP NEEDS AND STRATEGIES

Many of the needs and strategies addressed in individual regions are impacting all of South Carolina’s working waterfronts. One of the most immediate needs is community forums, held regionally, where all industry stakeholders, policymakers, and allied groups can collectively

pursue the strategies outlined in this document for the purpose of implementing new strategic efforts that respond to the industry's greatest needs.

NEED: CREW/GREYING OF FLEET

STRATEGIES

- Identify realistic retirement projections for existing owner/ operators to establish a timeline for attaining goals in the recruitment and training of next-generation industry participants
- Conduct an economic impact assessment investigating the scenario where business operations are discontinued in the event next-generation industry participant goals are not realized and the impact on natural resource management if there are no longer participants engaged in the fishery
- Pursue grant funding immediately for establishing a multi-faceted approach to remedying this issue:
 - Launch a PR campaign to uplift the image of commercial fishing as a livelihood and the diversity in what that career path could look like under various business structures
 - Investigate buy-out or permit-buy-back options or other solutions to ensure the retirement security of existing participants
 - Conduct socio- and economic risk scenarios if vessels, permits, and businesses are purchased by multinational entities or other foreign investors.
 - Establish large-scale, long-term programs for next-generation recruitment and training for all trades and skills associated with the seafood supply chain including marine mechanics, marketing, harvesting, environmental considerations, etc.
 - Develop internship opportunities to enhance the diversity of the mariculture workforce in South Carolina
 - Collaborate with schools or other youth development organizations to develop outreach programs that introduce youth (e.g. junior high, high school) to fishing, aquaculture, and/or other seafood careers.
 - Expand the geographic reach of usual recruitment areas
 - Identify pathways for existing industry participants to serve as educators (pre- and post-retirement), in the training for next-generation industry leaders.

NEED: INFRASTRUCTURE RESILIENCY

STRATEGIES

- Ensure the current infrastructure (dock, buildings, cooling mechanisms, product transportation vehicles, processing equipment) are all safe and properly functioning at a capacity that aligns with the vision toward future growth
- Conduct risk assessments and storm-impact scenarios on working waterfronts in their current status.
- Pursue solutions for rising costs of insurance for working waterfronts. This may include subsidies or facilitating learning exchanges between the seafood sector, agribusiness specialists, and insurance underwriters to work toward developing improved insurance options
- Collaborate with experts in marine/environmentally resilient architecture to build new facilities, prioritizing infrastructure where complete replacement is required with an eye toward longevity and resiliency.
- Include marine repair yards, marine railways, and the like, in the considerations of working waterfront access, resilience, and longevity.
- Identify special considerations for wooden hull vessels to respond to issues surrounding aging and lack of insurability including the possible financing of fiberglass enclosure over an existing wooden hull.
- Investigate the potential of state-owned and managed working waterfronts using successful models from other states as a guide whereby:
 - Docks, bulkheads, dredging, utilities, roads, and land lots are owned and maintained by the state of South Carolina.
 - Lease terms allow for long-term business planning of the seafood business.
 - Lease rates are affordable
 - Dumpsters and oil disposal are provided/subsidized by the state
- Through socio-economic analyses, investigate the potential diversification of seafood business ownership structure via partnerships with investors whose mission aligns with seafood harvesting, such as restaurant groups, for the purpose of filling funding gaps required to reinvigorate and restructure facilities and operations.
- Consider the restructuring of business operations/logistics to align with infrastructure redevelopment plans.

- Consider the restructuring of waterfront properties to align with infrastructure redevelopment plans. Potential flexing of eminent domain options federally authorized in the Coastal Zone Management Act of 1972 (CZMA) may be required. This would be carried out by the South Carolina Coastal Council via exercising the South Carolina Public Works Eminent Domain Law. Section 315 of CZMA authorizes grants to states to acquire lands for access to beaches and other public coastal areas of environmental, recreational, historical, aesthetic, ecological, or cultural value (South Carolina Coastal Zone Management Program, 1977) CZMA Section 307 (A) “Each participating coast state shall, to the extent practice-able, ensure that the acquisition of property or easements shall complement working waterfront needs.”

NEED: SEAFOOD MARKETING

STRATEGIES

- Prioritize the initiation of business operations that produce value-added products:
 - Securing processing machines that peel, devein, and IQF (individually quick frozen) seafood products
 - Provide/seek support for securing permits and infrastructure related to selling prepared foods
 - Pursue CSF business models that incorporate both under-utilized species and prepared products
- Expand and collaborate with the Certified South Carolina Seafood program to enhance consumer awareness of local seafood
- Build out the capacity for seafood businesses to grow their marketing efforts that uplift sustainability messaging
- Grow underutilized species demand among restaurant partners
- Engage conservation/ ecotourism groups for enhancing visibility with new consumer groups and sustainability messaging

NEED: ACCESS TO WATERFRONT

STRATEGIES

- Build public and private partnerships to preserve existing working waterfront spaces
- Pursue incentives such as tax incentives, subsidies, tax deferment, new zoning

preferences, and even the exercising of federally authorized eminent domain rights to secure sufficient availability of working waterfront properties. This is critical for offsetting the high cost of business overhead for owning/leasing waterfront on which these businesses depend, especially in areas where the cost of waterfront property is heightened from development pressures, or in rural areas where this industry is a critical provider of jobs and food. This aligns with the actions and priorities mandated in CZMA Section 307 (A): “Each participating coastal state shall, to the extent practicable, ensure that the acquisition of property or easements shall complement working waterfront needs.

- Refer to other states where these policies have been used to secure working waterfront access for this industry as a whole, including rural, culturally significant, and disadvantaged communities.

NEED: IMPROVED WATER QUALITY AND PROTECTION AGAINST HABITAT DEGRADATION

STRATEGIES

- We know that seafood harvesters are not the only industry/user group that interact or otherwise have an effect on marine ecosystems and species within those marine environments. Expanded efforts are required to ensure the health of South Carolina’s coastal marine habitats.

REGIONAL STRATEGIC PLANS

SOUTHERN REGION STRATEGIC PLAN

The southern region represents the working waterfronts of Port Royal and St. Helena Island and represents five working waterfronts. Most of the sites surveyed have been in business for 50 years or more. These docks host 5-25 boats per week with up to 50 businesses working out of a single site. Each dock supports 6-100 employees and has been a long-standing staple of the southern South Carolina coast. According to the South Carolina Sea Grant Consortium’s Working Waterfront Community Forum (2017), this region is on the cusp of change as Port Royal’s public shrimping dock is considered for redevelopment, yet it is unclear whether this redevelopment plan accommodates a future for the Port Royal commercial fishing fleet.

SOUTHERN REGION SHORT-TERM NEEDS AND THREATS

Short-Term Operational Needs

None of the infrastructure central to the operational needs of the industry in this region was described as being in excellent condition.

All of the surveyed population expressed concerns about the condition of their operational facilities and equipment. For this region, all icehouses, freezers, and cold storage have been described as fair to good condition with the exception of one cold storage facility that was described as poor. An important operational need expressed by dock owners and lessees in the southern region is the need for increased capacity in cold storage, which is critical for business growth and ensuring a stable supply of product.

Dock conditions are described as poor to fair as are packaging and processing equipment. The unloading equipment and buildings range from poor to good condition. One location expressed a need for a vehicle for local deliveries, however, no other vehicle conditions or needs were given for this region.

A recurring response within operational needs for the southern region is the need for labor. This includes the need for additional crew to address the “Greying of the Fleet” and the need for qualified technicians for maintaining facilities and equipment (e.g. net menders and engine mechanics). Participants have also identified the need for more accessible commercial maintenance and dry dock facilities within South Carolina.

Short-Term Economic Needs

The reported total fiscal needs estimate for the southern region amounts to \$300,000, though it should be noted that data collected for the southern region was poor in quality as this region had the least percentage of participation. In addition to the fiscal needs, the surveyed population expressed three urgent economic pressures:

- A reasonable line of credit in order to purchase business essentials and maintain existing equipment and facilities
- High fuel cost
- Competition with cheap seafood imports for under-regulated sources

Short-Term Regulatory Needs

There was only one immediate regulatory need expressed in the southern region. This was a plea for simplified record-keeping to reduce the public burden for remaining compliant and up-to-date with all regulatory agencies. This need for streamlining permitting and paperwork to ease the public burden includes a need to reduce barriers to entry for new fishery participants

as overly complex regulatory frameworks and approval processes ultimately have a negative impact on jobs and career viability for these rural communities.

Short-Term Environmental Threats

Survey respondents expressed immediate environmental concerns. The primary concern is a negative perception of the southern region's water quality which is an overarching theme in habitat degradation along the entire South Carolina coast. Additionally, many of the participants discussed increasing challenges with depredation from local shark populations, an issue that has been raised in other recent projects involving South Carolina fishermen.

All locations surveyed are at risk of significant flooding from a CAT 2 hurricane weather event at high tide with one location being subjected to a potential risk of 10ft of flood water (Appendix A). One location is on relatively high ground and does not experience flooding from king tides, while the remaining locations flood during king tides as well.

SHORT-TERM STRATEGIES FOR THE SOUTHERN REGION

- Funding should be sought for planning grants that help seafood-producing communities identify proactive steps toward building a more resilient waterfront in light of the threats of climate change. This should include conducting community outreach to educate these stakeholders about the real risk scenarios of damage incurred by severe weather events and offer business planning support to help plan and prepare for these scenarios.
- To address the need for more cold storage, the eventual establishment of a seafood hub that is centrally located is needed; however, there is an immediate need for ensuring the safety of the product. This can only be addressed through funding. Financial assistance through grants, subsidies, private funding, or increased fish market revenue is essential for the upkeep of this vital infrastructure component. Targeting grant programs that specialize in food safety and climate change resiliency for rural areas would be appropriate sources for securing this funding. The identification of those grant opportunities and their funding cycles, along with securing strong partnerships in the effort would be an important first step in remedying this issue.
- The steady decline in commercial fishery landings value since the 1980s and the overall decline in participation has had a negative-feedback effect on the industry as a whole, leaving reduced revenue for upkeep, market expansion, and investing in growth. Seafood producers will need to access new financial streams to reorganize, restructure, and reinvigorate the industry to compete in a rapidly changing market while also securing critical infrastructure repairs and upgrades. These financial streams are ones that currently exist but are usually overlooked. For example:

- historical societies that aim to preserve cultural landmarks of significance;
 - chambers of commerce who are able to secure grant funding on behalf of their membership toward achieving shared local business goals;
 - partnerships with technical colleges that have the ability to secure funding for training programs;
 - low-income communities are incentivized to buy local seafood through the acceptance of programs like the Supplemental Nutrition Assistance Program (SNAP);
 - private philanthropic groups that prioritize climate adaptation and resilience projects¹;
 - Federal agencies such as: the Federal Emergency Management Agency (FEMA); U.S. Department of Agriculture (USDA); U.S. Environmental Protection Agency (EPA); U.S. Economic Development Administration (EDA); U.S. Fish and Wildlife (FWS); National Oceanic and Atmospheric Administration (NOAA) and National Marine Fisheries Service (NMFS); U.S. Department of Transportation Maritime Administration (MARAD);
 - State agencies such as: the South Carolina Department of Agriculture; South Carolina Department of Natural Resources; South Carolina Department of Parks, Recreation and Tourism.
- With processing equipment and infrastructure pertinent to operations being costly financial investments, harvesters and processors often rely on outside companies for many activities that could be performed in-house, which would increase economic revenue for the seafood business. This dependency pushes not only the seafood but also economic benefits away from seafood-producing communities. Ownership and access to logistical infrastructures are crucial for the South Carolina seafood industry to maintain its authority and autonomy over this market while also keeping revenue and jobs in rural communities where food access is often scarce (Appendix B). Local harvesters and primary processors need funding for better facilities and equipment in order to better meet local needs for seafood and improve food security. This access to operational infrastructure could come from collaboration within the fisheries sector (e.g. through co-ops or associations), minimizing the need for each business to own and

¹ There are 1.1 million nonprofits in the U.S., and perhaps 5-10% of them are charitable with grant-making programs. Of these tens of thousands of grant-making nonprofits, the Sustainable Working Waterfront Toolkit's research identified only 24 that have stated objectives in assisting working waterfront themes. (2013)

maintain each piece of equipment.

- Models of CSFs should be implemented as a result of this project in order to serve as an important foundation for the promotion of local seafood consumption throughout the state of South Carolina. This could be accomplished by using a pre-existing toolkit, *Stating and maintaining Community Supported Fishery (CFS) Programs: A Resource Guide for Fishermen and Fishing Communities* (2012). Enhancing online marketing campaigns that couple with the CSF model could have a desirable effect on redirecting seafood buying trends toward local producers, thus further expanding the market potential for the product. The market for direct delivery sales may be an avenue of high interest to establish the groundwork for accessing new markets with a CSF model of seafood distribution. This model has been successfully executed by CSF leaders nationally. The realization of shared needs by a certain fishery and/or regional markets may motivate the formation of fishing co-ops, which could lead to further community-wide socioeconomic benefits.
- Most grant opportunities provided by the organizations and agencies above have complex application and reporting processes and many of these commercial entities have neither the capacity nor skill set embedded in their existing staffing to pursue such funding streams. In order to secure funding, industry members would benefit from utilizing pathways through memberships in nonprofits oriented toward seafood alliances, sustainable food systems, climate change resiliency, historic and cultural preservation, etc., which would have the ability to offer support in obtaining grants from these sources. State and local government entities could also be supportive in identifying and targeting grants while serving as strong partners on those projects.
- New markets comprised of wealthy residents who have recently moved to South Carolina, especially the metro-Charleston area, present untapped potential to be explored. Beyond the metro-Charleston area, the influx of newcomers from other states is causing the populations of most coastal South Carolina towns to continue to grow as well. Reaching these new consumers would widen the market base for producers and generate new streams of income, but would require strategic marketing to properly reach that demographic. By conducting a market analysis, producers could identify the characteristics of this consumer group and then broaden their existing marketing efforts to tap that new opportunity. Identifying those characteristics is a critical need as new trends in both the demographics of the consumers of South Carolina seafood have shifted as well as buying trends post-COVID 19. This would be a helpful activity that could align with recent oyster aquaculture marketing initiatives in the state, further broadening the project's benefactors. Partnering with groups who are already successfully targeting this demographic could be helpful, as a seafood producer could play an important role in adding value to their existing services and

programs. Additionally, the seafood businesses would gain exposure to their audience of newcomers. This symbiotic relationship could be achieved through the development of fisheries-tourism partnerships with restaurant associations, food groups, eco-tourism companies, and volunteer-based restoration/conservation groups. Community-owned and operated fisheries that operate at small and medium scales are evidenced to be low-impact, environmentally-conscious stewards of fishery resources (Gutierrez et al., 2011) which makes partnerships with eco-tourism and conservation-oriented groups appropriate for amplifying the sustainability of seafood products and operations to a new market of consumers. Positioning the product as a sustainable protein and offering consumers the ability to interact directly with the harvester or dock location offers added value that competes with the cheaper imported seafood options as many newcomers to South Carolina are looking for authentic experiences.

- Making strides toward supplying the industry with a next-generation crew is a need that will require a long-term effort, beginning with short-term steps to fill immediate crew needs. Strategies for satisfying urgent needs are outlined here:
 - Engaging communities' youth requires proper outreach. An important first step would be to clearly outline the requirements or basic qualifications that would be necessary for success in the industry.
 - Establishing local partnerships with organizations and institutions (such as technical colleges) that serve the younger generations would ease the lift of seafood businesses needing to conduct outreach to this population directly.
 - Preparing to make subtle modifications in daily operations to accommodate inexperienced youth learning day-to-day activities and responsibilities would help enhance the success of those new prospective crew members.
 - Assigning duties to younger generation crew members such as social media marketing support could help expand identified marketing efforts while also allowing the new crew to bring added value to operations.
- An important next step is to bring seafood stakeholders together for collaborative strategic forums for long-term planning. The strategies offered in these plans respond to identified priorities but the industry must collectively agree on how to move forward to achieve long-term viability. This should include collaboration with regulatory agencies as well as other fishery business owners.

SOUTHERN REGION LONG-TERM NEEDS AND THREATS

Long-Term Operational Needs and Threats

Two long-term operational needs were identified in the southern region. With coastal property at a premium, the first operational threat is diminishing access to waterfronts. The second long-term operational threat to southern working waterfronts is the “Greying of the Fleet”. Survey respondents described a lack of economic stability from inconsistent income streams which prohibit them from being able to provide consistent wages, the poor work ethic of employees, and limited drive for advancement to boat ownership, coupled with high-cost barriers to entry to boat ownership as reasons for poor recruitment of next-generation crew.

Long-Term Economic Threat

One long-term economic threat identified by the southern region is the ongoing competition with foreign imported seafood. With foreign seafood products being offered at a lower cost than local fresh seafood, it can be difficult to incentivize consumers to buy locally. Additionally, the lack of a no-interest or low-interest line of credit for these businesses significantly reduces their ability to invest in large upgrades and business expansion projects.

Long-Term Regulatory Threats

Survey respondents expressed concern about regulations that lead to poor management of commercial fish stocks and their habitats which are exacerbated by unsteady relations between industry participants and resource managers.

Long-Term Environmental Threats

Survey participants expressed concern about the observed decline in water quality in the southern region. Poor water quality has a direct impact on the availability and sustainability of local fish stocks.

LONG-TERM STRATEGIES FOR THE SOUTHERN REGION

- Production equipment in Beaufort, South Carolina that could be utilized through a cooperative arrangement with shrimpers may be one identified strategy in southern South Carolina. Sector-wide marketing campaigns, using shared facilities such as dock space, ice machines, and processing equipment, and forming storage hubs would make for easier and cheaper distribution and logistics.
- The eventual establishment of cold storage in a centrally-located hub such as Charleston, South Carolina would have positive implications for seafood producers in nearby states as well as South Carolina’s producers. It would help satisfy many needs including building transparency in the seafood supply chain, helping fishermen

capture a higher dollar for their catch, and reducing risk through the establishment of community partnerships. This upgrade would be best paired with significant amplification in local seafood marketing efforts, including the South Carolina Department of Agriculture's Certified South Carolina Seafoodbrand program.

- South Carolina state agencies could help identify funding to serve as either a revolving loan fund or other mechanisms through partnerships with financial institutions that can accommodate the need for no-interest or low-interest loans for upgrades or business expansion projects.
- Seafood businesses that are located in USDA-defined 'food deserts' should be embraced by state and federal agencies that are concerned with food supply chains (Appendix B). These seafood markets serve communities that struggle to source food. Many residents of these rural communities participate in the Supplemental Nutrition Assistance Program (SNAP) benefits. Seafood markets that are not currently supplying to this market of community members could begin accepting SNAP benefits, where underutilized species can find appreciation.
- Either tax incentives, subsidies, or new zoning preferences for working waterfront properties would help offset the high cost of business overhead for owning/leasing waterfront on which these businesses depend. In rural coastal communities, this industry is often one of the largest providers of jobs.
- Current activities are already in place to explore the potential for a long-term crew apprenticeship training program. This type of program would bring job opportunities to those otherwise unexposed to the fisheries' potential. Additionally, connecting youth and young adults with environmental-based industries also can help bridge connectivity to the coastal communities and environments that those industries depend on, encouraging a more cultural and environmental ethic. Identifying entry-friendly fisheries, and streamlining the permitting processes for those fisheries to help prospective industry participants find pathways toward establishing a foothold in the industry.

MIDDLE REGION STRATEGIC PLAN

The middle region represents the working waterfronts of Bennetts Point, Wadmalaw Island, Charleston, and Mount Pleasant and also represents six survey sites. All survey sites except one have been in business for at least 25 years, with one in operation for almost 90 years. These docks host 1-8 vessels per week with up to four businesses working out of a single site. Each dock supports 4-35 employees and includes one of the oldest fishing docks still in operation today along the South Carolina coast. According to the South Carolina Sea Grant Consortium's Working Waterfront Community Forum (2017), this region is experiencing "turbulent change" due

to losing waterfront access from development pressures as well as an increased cost of living. It is difficult for these working waterfront businesses to compete with alternative land uses that often provide higher economic returns. However, as mentioned throughout this document, the value of working waterfronts to coastal communities and the regional economy can exceed the real estate value of the property when taking into account things like preserving community cohesion and ensuring that shoreline users are environmental stewards.

MIDDLE REGION SHORT-TERM NEEDS AND THREATS

Short-Term Operational Needs

All of the surveyed population expressed concerns about the condition of their operational facilities and equipment. For this region, 46% of all icehouses, freezers, and cold storage have been described as fair. Thirty-eight percent were described as excellent, representing the youngest businesses surveyed in the region. Of the remaining cold storage facilities, one was listed as good with the last one described as poor. One location currently does not own a freezer and is in need of one. Dock conditions ranged from poor to excellent, with 60% rated as good or excellent and the remaining two sites needing entirely new docks. The unloading equipment responses were rated as either poor or good. All sites are in need of new or upgraded unloading equipment. Buildings were the largest need addressed in the middle region with five of the six survey sites lacking sufficient space for buildings. Other building needs included the rebuilding of condemned structures and protection against routine flooding. None of the survey respondents expressed a need for packaging equipment, however, all but one needed new or repaired processing equipment. Four of the sites surveyed use vehicles for transporting products with all but one listed in poor to severe condition requiring replacement. A recurring response within operational needs for the middle region is also the need for labor. This includes the need for additional crew to address the “Greying of the Fleet” and the need for qualified technicians for maintaining facilities and equipment (e.g. net menders and engine mechanics). Survey respondents in the middle region also expressed a need for marine railways and continued working waterfront access with 60% of this region’s respondents leasing dock space with uncertain longevity. Another concern addressed in the surveys is the need for repairs to crumbling infrastructure in order to continue their business practices.

Short-Term Economic Needs and Threats

The total fiscal needs estimate for the middle region amounts to \$2,180,000 – \$3,573,000. Like the southern region, the middle region has identified high fuel costs, lack of ability to gain a reasonable line of credit or capital, and competing cheap import prices as threats to the success of their businesses. In addition to these needs and threats, the middle region has also expressed concern about losing access to waterfronts due to high taxes, the cost of living within this area, and real estate development interests. Many expressed fear over the uncertainty of their lease terms, unsure if the leases will be renewed. This region also expressed

concerns about South Carolina's fishing industry as a whole stating that fluctuating fish prices are hindering reliable income, creating a "fishing in the red" effect. One survey respondent requested the need for education to commercial fishery owners on "how to capture the best value for their product".

Short-Term Regulatory Need

Middle region survey respondents expressed short-term concerns regarding commercial fishery regulations. Some stated that they would like assistance with understanding the regulations better. While another expressed concern about the cost differential of shrimping licenses between South Carolina and Georgia, giving out-of-state fishers an advantage when fishing in southeastern waters. Georgia resident shrimpers can buy out-of-state South Carolina fishing licenses at a lower cost than what South Carolina resident shrimpers pay for an out-of-state fishing license to harvest in Georgia waters. This means, to harvest from both South Carolina and Georgia waters, Georgia residents have a lower overhead cost compared to South Carolina residents when it comes to the price of entry for those licenses.

Short-Term Environmental Threats

Increasing sea level rise is a real problem in the middle region, with five of the six surveyed sites reporting regular flooding during storms and king tides, and the fifth site citing recent renovations with a two-foot dock rise as the reason they no longer flood regularly. All locations surveyed are at risk of significant flooding from a CAT 2 hurricane weather event at high tide with a potential risk of 7-12ft of flood water (Appendix A). In addition to flooding, the middle region respondents express concerns about rising water temperatures, poor water quality, and habitat degradation affecting the quality and quantity of available shrimp each year. Due to environmental factors affecting other states in the southeast (e.g. increased storm activity in North Carolina and red tide events in Florida), respondents also mentioned increased fishing competition in South Carolina waters as an issue. Additionally, in alignment with the southern region, the middle region is also experiencing difficulties with depredation by local shark populations.

Short-Term Strategies for the Middle Region

- Funding should be sought for planning grants that help seafood-producing communities identify proactive steps toward building a more resilient waterfront in light of the threats of climate change, as many sites have significant portions of their capital that are not covered by insurance. Since many seafood businesses in this region have uncertain futures in their leases, this effort would need to address the fact that some dock and infrastructure upgrades would need to be approved by the dock owners, which may be private individuals or municipalities. This planning grant should involve conducting community outreach to educate these stakeholders and the dock owners

about the real risk scenarios of damage incurred by severe weather events and offer business planning support to help plan and prepare for these scenarios.

- To address the need for more cold storage, the eventual establishment of a seafood hub that is centrally located is needed; however, there is an immediate need for ensuring the safety of the product. This can only be addressed through funding. Financial assistance through grants, subsidies, private funding, or increased fish market revenue is essential for the upkeep of this vital infrastructure component. Targeting grant programs that specialize in food safety and climate change resiliency for coastal communities (or rural areas in the case of areas outside of Charleston) would be appropriate sources for securing this funding. The identification of those grant opportunities and their funding cycles, along with securing strong partnerships in the effort would be an important first step in remedying this issue.
- The steady decline in commercial fishery landings value since the 1980s and the overall decline in participation has had a negative-feedback effect on the industry as a whole, leaving reduced revenue for upkeep, market expansion, and investing in growth. Seafood producers will need to access new financial streams to reorganize, restructure, and reinvigorate the industry to compete in a rapidly changing market while also securing critical infrastructure repairs and upgrades. These financial streams are ones that currently exist but are usually overlooked. For example:
 - historical societies that aim to preserve cultural landmarks of significance;
 - chambers of commerce who are able to secure grant funding on behalf of their membership toward achieving shared local business goals;
 - partnerships with technical colleges that have the ability to secure funding for training programs;
 - low-income communities are incentivized to buy local seafood through the acceptance of programs like the Supplemental Nutrition Assistance Program (SNAP);
 - private philanthropic groups that prioritize climate adaptation and resilience projects²;
 - Federal agencies such as: the Federal Emergency Management Agency

² There are 1.1 million nonprofits in the U.S., and perhaps 5-10% of them are charitable with grant-making programs. Of these tens of thousands of grant-making nonprofits, the Sustainable Working Waterfront Toolkit's research identified only 24 that have stated objectives in assisting working waterfront themes. (2013)

(FEMA); U.S. Department of Agriculture (USDA); U.S. Environmental Protection Agency (EPA); U.S. Economic Development Administration (EDA); U.S. Fish and Wildlife (FWS); National Oceanic and Atmospheric Administration (NOAA) and National Marine Fisheries Service (NMFS); U.S. Department of Transportation Maritime Administration (MARAD);

- State agencies such as: the South Carolina Department of Agriculture; South Carolina Department of Natural Resources; South Carolina Department of Parks, Recreation and Tourism.
- Most grant opportunities provided by the organizations and agencies above have complex application and reporting processes and many of these commercial entities have neither the capacity nor skill set embedded in their existing staffing to pursue such funding streams. In order to secure funding, industry members would benefit from utilizing pathways through memberships in nonprofits oriented toward seafood alliances, sustainable food systems, climate change resiliency, historic and cultural preservation, etc., which would have the ability to offer support in obtaining grants from these sources. State and local government entities could also be supportive in identifying and targeting grants while serving as strong partners on those projects.
- With processing equipment and infrastructure pertinent to operations being costly financial investments, harvesters and processors often rely on outside companies for many activities that could be performed in-house, which would increase economic revenue for the seafood business. This dependency pushes not only the seafood but also economic benefits away from seafood-producing communities. Ownership and access to processing-related infrastructures are crucial for the South Carolina seafood industry to maintain its authority and autonomy over this market. Local harvesters and primary processors need funding for better facilities and equipment in order to better meet local needs for seafood and improve food security. This access to operational infrastructure could come from collaboration within the fisheries sector minimizing the need for each business to own and maintain each piece of equipment. Funding could also be sought from business development grants targeted toward food systems. Shrimp processing machines such as peeling and deveining, coupled with Individually-quick-frozen (IQF) capabilities would help seafood producers capture a higher value for their product as well as expand their market share because peeled, deveined, and IQF shrimp is how consumers are familiar with purchasing it in grocery stores.
- Models of CSFs should be implemented as a result of this project in order to serve as an important foundation for the promotion of local seafood consumption throughout the state of South Carolina. This could be accomplished by using a pre-existing toolkit, *Starting and maintaining Community Supported Fishery (CFS) Programs: A Resource Guide for Fishermen and Fishing Communities* (2012). Enhancing online marketing

campaigns that couple with the CSF model could have a desirable effect on redirecting seafood buying trends toward local producers, thus further expanding the market potential for the product. The market for direct delivery sales may be an avenue of high interest to establish the groundwork for accessing new markets with a CSF model of seafood distribution. This model has been successfully executed by CSF leaders nationally. The realization of shared needs by a certain fishery and/or regional market may motivate the formation of fishing co-ops, which could lead to further community-wide socioeconomic benefits.

- New markets comprised of wealthy residents who have recently moved to South Carolina, especially the metro-Charleston area, present untapped potential to be explored. Reaching these new consumers would widen the market base for producers and generate new streams of income, but would require strategic marketing to properly reach that demographic. By conducting a market analysis, producers could identify the characteristics of this consumer group and then broaden their existing marketing efforts to tap that new opportunity. Identifying those characteristics is a critical need as new trends in both the demographics of the consumers of South Carolina seafood have shifted as well as buying trends post-COVID 19. This would be a helpful activity that could align with recent oyster aquaculture marketing initiatives in the state, further broadening the project's benefactors. Partnering with groups who are already successfully targeting this demographic could be helpful, as a seafood producer could play an important role in adding value to their existing services and programs. Additionally, the seafood businesses would gain exposure to their audience of newcomers. This symbiotic relationship could be achieved through the development of fisheries-tourism partnerships with restaurant associations, food groups, eco-tourism companies, and volunteer-based restoration/conservation groups. Community-owned and operated fisheries that operate at small and medium scales are evidenced to be low-impact, environmentally-conscious stewards of fishery resources (Gutierrez et al., 2011) which makes partnerships with eco-tourism and conservation-oriented groups appropriate for amplifying the sustainability of seafood products and operations to a new market of consumers. Positioning the product as a sustainable protein and offering consumers the ability to interact directly with the harvester or dock location offers added value that competes with the cheaper imported seafood options as many newcomers to South Carolina are looking for authentic experiences.
- Making strides toward supplying the industry with a next-generation crew is a need that will require a long-term effort, beginning with short-term steps to fill immediate crew needs. Strategies for satisfying urgent needs are outlined here:
 - Engaging communities' youth requires proper outreach. An important first step would be to clearly outline the requirements or basic qualifications that would

be necessary for success in the industry.

- Establishing local partnerships with organizations and institutions (such as technical colleges) that serve the younger generations would ease the lift of seafood businesses needing to conduct outreach to this population directly.
 - Preparing to make subtle modifications in daily operations to accommodate inexperienced youth learning day-to-day activities and responsibilities would help enhance the success of those new prospective crew members.
 - Assigning duties to younger generation crew members such as social media marketing support could help expand identified marketing efforts while also allowing the new crew to bring added value to operations.
- Engage regulators in South Carolina and GA to raise concerns over the difference in permitting costs between the two states with the goal of making sure South Carolina's out-of-state permitting costs are in line with neighboring states of the southeast.
 - An important next step is to bring seafood stakeholders together for collaborative strategic forums for long-term planning. The strategies offered in these plans respond to identified priorities but the industry must collectively agree on how to move forward to achieve long-term viability. This should include collaboration with regulatory agencies as well as other fishery business owners.

MIDDLE REGION LONG-TERM NEEDS AND THREATS

Long-Term Operational Needs and Threats

Long-Term operational needs in the middle region mirror those of the Southern region with concern about the loss of working waterfront access and lack of next-generation crew. In addition to these needs, the middle region also struggles with uncertain lease terms and hazardous infrastructure in need of replacement. This region also expressed a need for a marine railway in order to increase product distribution and accessibility.

Long-Term Economic Threat

There were many long-term economic threats to the middle region's success. First, the high cost of living coupled with high waterfront taxes and real estate development interests are limiting working waterfront access to these businesses which depend on it. This leads to uncertain futures for many of the survey respondents. Another economic threat is the fluctuating fish prices and the constant need to perform maintenance on outdated equipment. The last long-term economic threat to the middle region is the same one seen in all regions surveyed, competing with low-priced, foreign imports.

Long-Term Regulatory Needs

Long-term regulatory needs for the middle region include improved communication with business owners to ensure an understanding of all regulations and requirements. One surveyor expressed frustration with the frequent changes in regulations that make responsible business planning and budgeting “impossible”.

Long-Term Environmental Threats

Many of the participants in the middle region expressed concerns about the long-term decrease in available shrimp due to changes in water temperatures, water quality decline, and habitat degradation. Increasing storm activity and sea level rise are also long-term problems for these businesses which are already struggling to adapt to regular flooding.

LONG-TERM STRATEGIES FOR THE MIDDLE REGION

- The eventual establishment of cold storage in a centrally-located hub such as Charleston, South Carolina would have positive implications for seafood producers in nearby states as well as South Carolina’s producers. It would help satisfy many needs including building transparency in the seafood supply chain, helping fishermen capture a higher dollar for their catch, and reducing risk through the establishment of community partnerships. This upgrade would be best paired with significant amplification in local seafood marketing efforts, including the South Carolina Department of Agriculture’s Certified South Carolina Seafood brand program.
- South Carolina state agencies could help identify funding to serve as either a revolving loan fund or another mechanism through partnerships with financial institutions that can accommodate the need for no-interest or low-interest loans for upgrades or business expansion projects.
- Much of the western inland stretches of the Charleston-metro area have been identified by USDA as ‘food deserts’ (Appendix B). Seafood businesses that are currently serving or capable of reaching these communities should be embraced by state and federal agencies that are concerned with food supply chains. Many residents of these communities participate in the Supplemental Nutrition Assistance Program (SNAP) benefits. Seafood markets that are not currently supplying to this market of community members could begin accepting SNAP benefits, where underutilized species can find appreciation.
- In recent decades, the coastal areas of South Carolina have attracted large numbers of people, increasing the demand for waterfront property for residential/vacation housing and similar commercial development. An important response to reversing this land-use trend would be to establish a pathway for “incentivizing the conversion of non-working

waterfront land, particularly historic working waterfront infrastructure, back to working waterfronts” (Sustainable Working Waterfront Toolkit, 2013). This could be established through either tax incentives, subsidies, or new zoning giving preference to working waterfront properties. Implementing this in areas of high property values would help offset the high cost of business overhead for owning/leasing the waterfront on which these businesses depend.

- Current activities are already in place to explore the potential for a long-term crew apprenticeship training program. This type of program would bring job opportunities to those otherwise unexposed to fisheries’ potential. Additionally, connecting youth and young adults with environmental-based industries also can help bridge connectivity to the coastal communities and environments that those industries depend on, encouraging a more cultural and environmental ethic. Identifying entry-friendly fisheries, and streamlining the permitting processes for those fisheries to help prospective industry participants find pathways toward establishing a foothold in the industry.
- Identify tools that are used in other “place-based industries” that could serve as models for federal and state support for working waterfront preservation at the state and local level, especially where the cultural aspects of those industries and their role in the community are significant. (Sustainable Working Waterfront Toolkit, 2013)
- The collective knowledge base needed for effective policy decisions on working waterfronts is limited because they are not considered a discreet field of study. This could be remedied by conducting ongoing research on the major themes impacting working waterfronts, especially small-scale businesses. Building off of other states’ and regions’ working waterfront research and planning would help expand the field of knowledge while also identifying key trends.

NORTHERN REGION STRATEGIC PLAN

The Northern region represents the working waterfronts of McClellanville and Murrells Inlet which includes three shrimping sites. These historic docks have been in business for 27-63 years. These docks host 6-12 vessels per week with up to 12 businesses working out of a single site at any one time. Each dock supports 15-150 employees who depend on these working waterfronts for their livelihood. According to the South Carolina Sea Grant Consortium’s Working Waterfront Community Forum (2017), this region is divided between maintaining the historic charm in McClellanville and undergoing an “identity crisis” in Murrells Inlet due to the tourism-centric commercial waterfront expansion.

NORTHERN REGION SHORT-TERM NEEDS AND THREATS

Short-Term Operational Needs

All of the surveyed population expressed concerns about the condition of their operational facilities and equipment. For this region, all icehouses, freezers, and cold storage have been described as fair or poor with the exception of one icehouse facility that was described as excellent. The dock conditions are described as poor to fair with all sites needing some degree of major repair or replacement; making docks the second highest cost category for the northern region. The unloading equipment was rated as either poor or fair, with all sites needing to replace most of their unloading equipment. Buildings were the largest cost category for the northern region with all survey sites needing costly repairs, major upgrades, and flood protection. Only one of the survey respondents expressed a need for packaging equipment, however, all sites needed new or repaired processing equipment. All of the sites surveyed use vehicles for transporting products which were listed as poor to fair condition and several are in need of replacement. A recurring response within operational needs for the middle region is the need for labor. This includes the need for additional crew to address the “Greying of the Fleet” and the need for qualified technicians for maintaining facilities and equipment (e.g. net menders and engine mechanics). Survey respondents in the northern region also expressed a need for continued working waterfront access and enhanced insurance attainability. Additional concerns addressed in the surveys are the availability of marine supplies, vessel maintenance facilities, and the need for increasing the distribution and transportation of products. The last need identified in the northern region is the need for proper training to increase crew retention and safety.

Short-Term Economic Needs and Threats

The total fiscal needs estimate for the northern region amounts to \$859,500 – \$1,437,500. As seen in other regions, the northern region also identifies high fuel costs, increased cost of living, and needs for loans and capital as top priorities for continued business success. Another area of concern expressed by the northern region is high maintenance and labor costs which makes the upkeep of equipment and employee retention difficult. The inability to obtain vessel insurance is also a concern whereby complete vessel loss or damage could result in the closing of their business. The final economic need is assistance with marketing to promote South Carolina’s local seafood in order to compete better with foreign imports.

Short-Term Regulatory Need

Like the other two regions, the northern region also has concerns about fishery regulations. Most of the concerns evolve from permitting and approval processes that are too confusing and time-consuming. Another concern voiced by respondents is the lack of positive collaboration between fishery business owners and regulatory agencies. Many survey respondents in the

northern region expressed concerns about oyster poaching, limited access to oyster habitat, and difficulties completing the HACCP class in order to start oyster farming.

Short-Term Environmental Threats

Most of the environmental threats to the northern region involve water quality issues from pollutants, pesticides, herbicides, and the Santee-Cooper dam impacting water chemistry. Additionally, the northern region expressed concerns about increased boat traffic impacting oyster settlement and habitats which ultimately decreases yield. Increased storm activity and sea level rise are also posing a significant threat to the northern region's infrastructure with all respondents experiencing flooding monthly which is exacerbated when high tides are coupled with heavy rainfall. All locations surveyed are at risk of significant flooding from a CAT 2 hurricane weather event at high tide with a potential risk of 11-13ft of flood water (Appendix A). In concert with the rest of the survey regions, the northern region is also experiencing difficulties with depredation by the local shark population.

SHORT-TERM STRATEGIES FOR THE NORTHERN REGION

- Funding should be sought for planning grants that help seafood-producing communities identify proactive steps toward building a more resilient waterfront in light of the threats of climate change as critical infrastructure in this region is not covered by insurance. This planning grant should involve conducting community outreach to educate these working waterfront stakeholders about the real risk scenarios of damage incurred by severe weather events and offer business planning support to help plan and prepare for these scenarios.
- There is an immediate need for ensuring the safety of the product through the replacement or upgrade of cold storage facilities. This can only be addressed through funding. Financial assistance through grants, subsidies, private funding, or increased fish market revenue is essential for the upkeep of this vital infrastructure component. Targeting grant programs that specialize in food safety and climate change resiliency for rural areas would be appropriate sources for securing this funding. The identification of those grant opportunities and their funding cycles, along with securing strong partnerships in the effort would be an important first step in remedying this issue.
- The steady decline in commercial fishery landings value since the 1980s and the overall decline in participation has had a negative-feedback effect on the industry as a whole, leaving reduced revenue for upkeep, market expansion, and investing in growth. Seafood producers will need to access new financial streams to reorganize, restructure, and reinvigorate the industry to compete in a rapidly changing market while also securing critical infrastructure repairs and upgrades. These financial streams are ones that currently exist but are usually overlooked. For example:

- historical societies that aim to preserve cultural landmarks of significance;
 - chambers of commerce who are able to secure grant funding on behalf of their membership toward achieving shared local business goals;
 - partnerships with technical colleges that have the ability to secure funding for training programs;
 - low-income communities are incentivized to buy local seafood through the acceptance of programs like the Supplemental Nutrition Assistance Program (SNAP);
 - private philanthropic groups that prioritize climate adaptation and resilience projects³;
 - Federal agencies such as: the Federal Emergency Management Agency (FEMA); U.S. Department of Agriculture (USDA); U.S. Environmental Protection Agency (EPA); U.S. Economic Development Administration (EDA); U.S. Fish and Wildlife (FWS); National Oceanic and Atmospheric Administration (NOAA) and National Marine Fisheries Service (NMFS); U.S. Department of Transportation Maritime Administration (MARAD);
 - State agencies such as: the South Carolina Department of Agriculture; South Carolina Department of Natural Resources; South Carolina Department of Parks, Recreation and Tourism.
- Most grant opportunities provided by the funding organizations and agencies above have complex application and reporting processes and many commercial seafood entities have neither the capacity nor skill set embedded in their existing staffing to pursue such funding streams. In order to secure funding, industry members would benefit from utilizing pathways through memberships in nonprofits oriented toward seafood alliances, sustainable food systems, climate change resiliency, historic and cultural preservation, etc., which would have the ability to offer support in obtaining grants from these sources. State and local government entities could also be supportive in identifying and targeting grants while serving as strong partners on those projects.
 - Complex processing equipment that is capable of creating value-added seafood

³ There are 1.1 million nonprofits in the U.S., and perhaps 5-10% of them are charitable with grant-making programs. Of these tens of thousands of grant-making nonprofits, the Sustainable Working Waterfront Toolkit's research identified only 24 that have stated objectives in assisting working waterfront themes. (2013)

products is a costly financial investment. Harvesters and processors often rely on outside companies for many activities that could be performed in-house, which would increase economic revenue for the seafood business. This dependency pushes not only the seafood but also economic benefits away from seafood-producing communities which is damaging to rural coastal communities where food access is already scarce. Ownership and access to processing-related infrastructure are crucial for the South Carolina seafood industry to maintain its authority and autonomy over this market. Local harvesters and primary processors need funding for better facilities and equipment in order to better meet local and regional needs for seafood and improve food security in South Carolina. This access to operational infrastructure could come from collaboration within the fisheries sector minimizing the need for each business to own and maintain each piece of equipment. Alternatively, funding could also be sought from business development grants targeted toward food systems. Shrimp processing machines such as peeling and deveining, coupled with Individually-quick-frozen (IQF) capabilities would help seafood producers capture a higher value for their product as well as expand their market share because peeled, deveined and IQF shrimp is how most consumers are familiar with purchasing it in grocery stores.

- Models of CSFs should be implemented as a result of this project in order to serve as an important foundation for the promotion of local seafood consumption throughout the state of South Carolina. This could be accomplished by using a pre-existing toolkit, *Starting and maintaining Community Supported Fishery (CSF) Programs: A Resource Guide for Fishermen and Fishing Communities* (2012). Enhancing online marketing campaigns that couple with the CSF model could have a desirable effect on redirecting seafood buying trends toward local producers, thus further expanding the market potential for the product. The market for direct delivery sales may be an avenue of high interest to establish the groundwork for accessing new markets with a CSF model of seafood distribution. This model has been successfully executed by CSF leaders nationally. The realization of shared needs by a certain fishery and/or regional market may motivate the formation of fishing co-ops, which could lead to further sector-wide socioeconomic benefits. Of note, the McClellanville Watermen’s Association (MWA) in McClellanville have taken steps to organize itself to promote the interests of their working waterfront and their industry, and has expressed its commitment toward sustainability by signing off on the “McClellanville Watermen’s Association’s Collective Commitments to Sustainability and Ethical Fishing Practice.” While the watermen themselves have always been intentionally mindful of their ecological impact, it was determined that a collective set of guidelines will be an appropriate supplement to the direction that the MWA is taking—ensuring the industry and fisheries are sustained for future generations. The document highlights the watermen’s commitment to stewardship of coastal waters and fishing grounds; legal and ethical practices in seafood harvesting and sales; and ethical and non-discriminatory labor practices.

- The growing tourism sector of Pawleys Island and Murrells Inlet presents a potential market of consumers that could be explored. Reaching this new group of consumers would widen the market base for producers and generate new streams of income, but would require strategic marketing to properly reach that demographic. By conducting a market analysis, producers could identify the characteristics of this consumer group and then broaden their existing marketing efforts to tap that new opportunity. Identifying those characteristics is a critical need as new trends in both the demographics of the consumers of South Carolina seafood have shifted as well as buying trends post-COVID 19. This would be a helpful activity that could align with recent oyster aquaculture marketing initiatives in the state. Partnering with groups who are already successfully targeting this demographic could be helpful, as a seafood producer could play an important role in adding value to their existing services and programs. Additionally, the seafood businesses would gain exposure to their audience of newcomers. This symbiotic relationship could be achieved through the development of fisheries-tourism partnerships with restaurant associations, food groups, eco-tourism companies, and volunteer-based restoration/conservation groups. Community-owned and operated fisheries that operate at small and medium scales are evidenced to be low-impact, environmentally-conscious stewards of fishery resources (Gutierrez et al., 2011) which makes partnerships with eco-tourism and conservation-oriented groups appropriate for amplifying the sustainability of seafood products and operations to a new market of consumers. Positioning the product as a sustainable protein and offering consumers the ability to interact directly with the harvester or dock location offers added value that competes with the cheaper imported seafood options as many tourists coming to South Carolina are looking for authentic experiences.
- Making strides toward supplying the industry with a next-generation crew is a need that will require a long-term effort, beginning with short-term steps to fill immediate crew needs. Strategies for satisfying urgent needs are outlined here:
 - Engaging communities' youth requires proper outreach. An important first step would be to clearly outline the requirements or basic qualifications that would be necessary for success in the industry.
 - Establishing local partnerships with organizations and institutions (such as technical colleges) that serve the younger generations would ease the lift of seafood businesses needing to conduct outreach to this population directly.
 - Preparing to make subtle modifications in daily operations to accommodate inexperienced youth learning day-to-day activities and responsibilities would help enhance the success of those new prospective crew members.
 - Assigning duties to younger generation crew members such as social media

marketing support could help expand identified marketing efforts while also allowing the new crew to bring added value to operations.

- An important next step is to bring seafood stakeholders together for collaborative strategic forums for long-term planning. The strategies offered in these plans respond to identified priorities but the industry must collectively agree on how to move forward to achieve long-term viability. This should include collaboration with regulatory agencies as well as other fishery business owners.

NORTHERN REGION LONG-TERM NEEDS AND THREATS

Long-Term Operational Needs and Threats

The “greying of the fleet” and the need for next-generation crew is concerning for the northern region where the increased cost of living and lack of entry-level training is making it difficult to find reliable crew. Another major threat to this region is the loss of working waterfronts and increasing coastal development which was identified in the South Carolina Sea Grant Consortium community forums (2017).

Long-Term Economic Threat

For the northern region the increasing cost of living, lack of maintenance facilities, lack of insurance, real estate development interests, and the need for better marketing strategies are all critical long-term economic threats to this industry.

Long-Term Regulatory Threats

All of the long-term regulatory threats expressed in the northern region regard improvements in oyster management and the establishment of regulations for curbing activity that impacts oyster settlement and overall population health.

Long-Term Environmental Threats

Flooding and increased risk of storm damage are critical threats to the northern region. This region also has major concerns about water quality, habitat degradation, and increased boat traffic directly impacting the future yields of important fishing and shellfish harvesting grounds.

LONG-TERM STRATEGIES FOR THE NORTHERN REGION

- The establishment of a training program for shellfish harvesting and participation in other commercial fishery sectors would help satisfy the labor gap in northern South Carolina and serve as the catalyst for an increased regional supply of shellfish and other seafood products. This type of program would bring job opportunities to those otherwise unexposed to the fisheries’ potential. Additionally, connecting

youth and young adults with environmental-based industries also can help bridge connectivity to the coastal communities and environments that those industries depend on, encouraging a more cultural and environmental ethic. Identifying entry-friendly fisheries, and streamlining the permitting processes for those fisheries to help prospective industry participants find pathways toward establishing a foothold in the industry.

- Continue efforts to install new and expand existing living shorelines to restore and protect essential oyster habitat.
- The eventual establishment of cold storage in a centrally-located hub such as Charleston, South Carolina would have positive implications for seafood producers in nearby states as well as South Carolina’s producers. It would help satisfy many needs including building transparency in the seafood supply chain, helping fishermen capture a higher dollar for their catch, and reducing risk through the establishment of community partnerships. This upgrade would be best paired with significant amplification in local seafood marketing efforts, including the South Carolina Department of Agriculture’s Certified South Carolina Seafood brand program. McClellanville’s current local seafood marketing efforts could align well with this bigger initiative to direct South Carolina consumers towards local, South Carolina-produced seafood.
- South Carolina state agencies could help identify funding to serve as either a revolving loan fund or another mechanism through partnerships with financial institutions that can accommodate the need for no-interest or low-interest loans for upgrades or business expansion projects.
- Seafood businesses that are currently serving or capable of reaching USDA-identified ‘food deserts’ (Appendix B) should be embraced by state and federal agencies that are concerned with food supply chains. Many residents of these communities participate in the Supplemental Nutrition Assistance Program (SNAP) benefits. Seafood markets that are not currently supplying to this market of community members could begin accepting SNAP benefits, where underutilized species can find appreciation.
- In recent decades, Murrells Inlet has attracted large numbers of people, increasing the demand for waterfront property for residential/vacation housing and similar commercial development. An important response to reversing this land-use trend would be to establish a pathway for “incentivizing the conversion of non-working waterfront land, particularly historic working waterfront infrastructure, back to working waterfronts” (Sustainable Working Waterfront Toolkit, 2013). This could be established through either tax incentives, subsidies, or new zoning, giving preference to working waterfront properties. Implementing this in areas of high property values would help offset the

high cost of business overhead for owning/leasing waterfront property on which these businesses depend.

- Identify tools that are used in other “place-based industries” that could serve as models for federal and state support for working waterfront preservation at the state and local level, especially where the cultural aspects of those industries and their role in the community are significant (Sustainable Working Waterfront Toolkit, 2013).
- The collective knowledge base needed for effective policy decisions on working waterfronts is limited because they are not considered a discreet field of study. This could be remedied by conducting ongoing research on the major themes impacting working waterfronts, especially small-scale businesses. Building off of other states’ and regions’ working waterfront research and planning would help expand the field of knowledge while also identifying key trends. Applying lessons learned from other practitioners through the National Working Waterfront Network is another way to increase this collective knowledge base.

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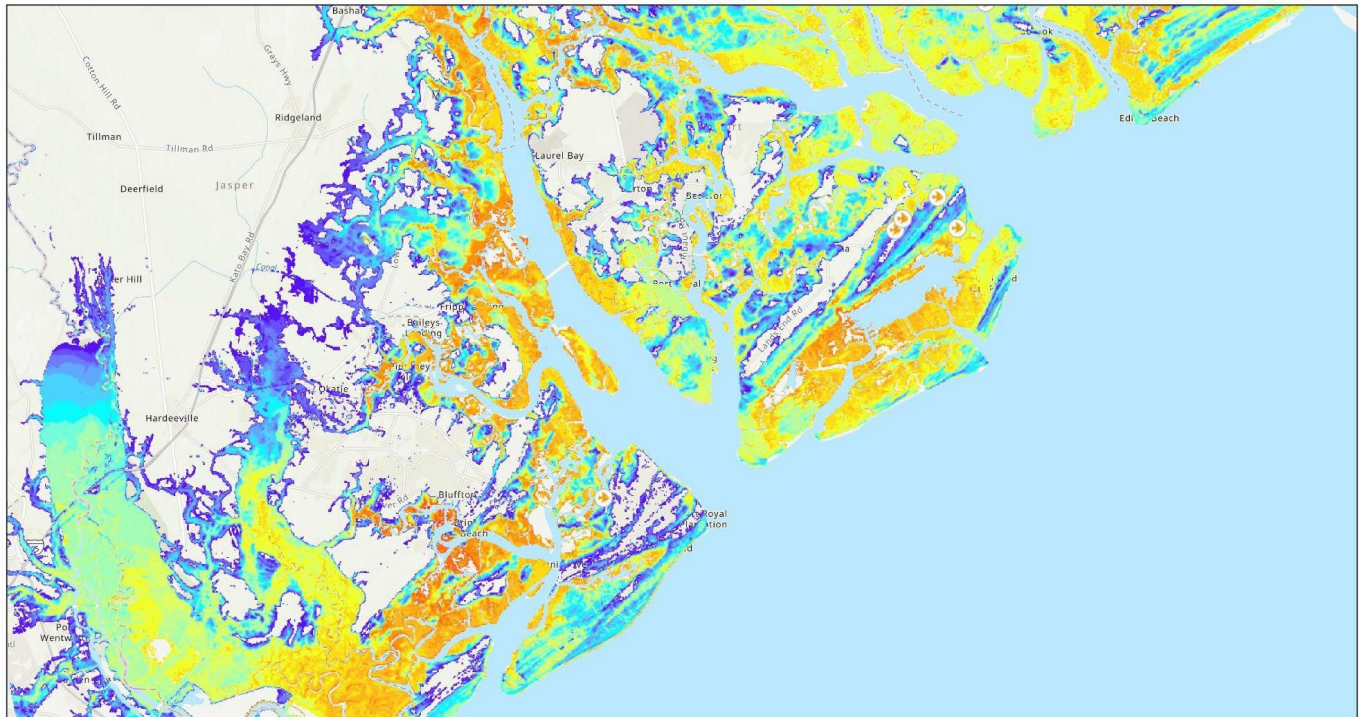
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APPENDIX A: REGIONAL FLOODING MAPS FROM A CAT 2 HURRICANE

These maps represent the flood water height (ft) above the ground during a CAT 2 hurricane at high tide.

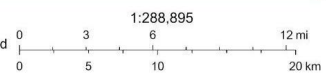
Southern Region Category 2 Hurricane



10/16/2022, 9:47:45 AM

MOM_Cat_2_HighTide_Clip

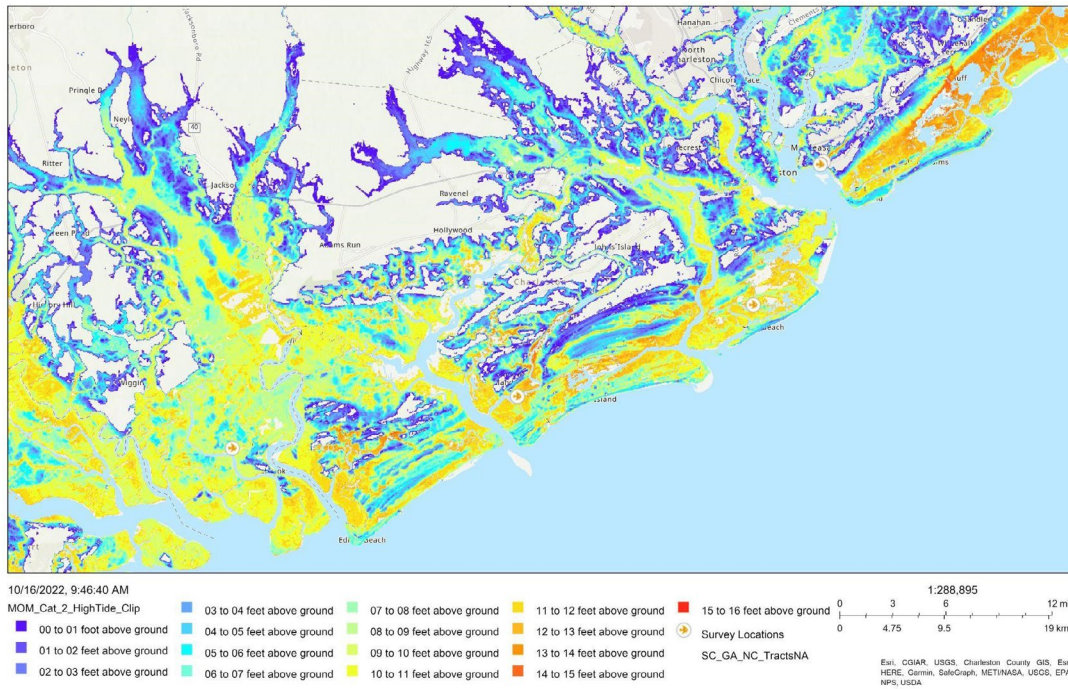
- | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 00 to 01 feet above ground | 03 to 04 feet above ground | 07 to 08 feet above ground | 11 to 12 feet above ground | 15 to 16 feet above ground |
| 01 to 02 feet above ground | 04 to 05 feet above ground | 08 to 09 feet above ground | 12 to 13 feet above ground | Survey Locations |
| 02 to 03 feet above ground | 05 to 06 feet above ground | 09 to 10 feet above ground | 13 to 14 feet above ground | SC_GA_NC_TractsNA |
| | 06 to 07 feet above ground | 10 to 11 feet above ground | 14 to 15 feet above ground | |



Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, Esri, CGIAR, USGS

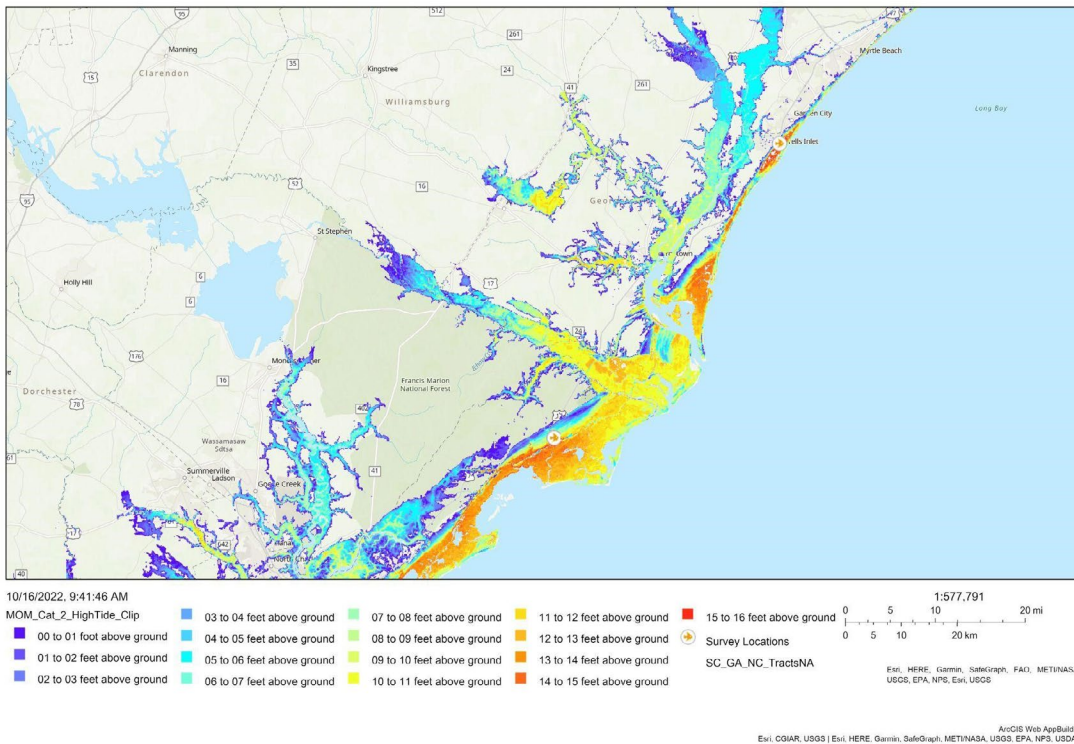
ArcGIS Web AppBuilder
Esri, NASA, NGA, USGS | Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, EPA, NPS, USDA |

Middle Region Category 2 Hurricane



ArcGIS Web AppBuilder
Exri, NASA, NGA, USGS | Charleston County GIS, Exri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METINASA, USGS, EPA, NPS, USDA |

Northern Region Category 2 Hurricane



All map images are from the South Carolina Seafood Alliance ArcGIS Online Application, provided by the South Carolina Sea Grant Consortium in partnership with the College of Charleston.

APPENDIX B: REGIONAL FOOD DESERT MAPS

The green areas below represent low-income census tracts where a significant number of residents is more than 1 mile (urban) or 10 miles (rural) from the nearest supermarket.

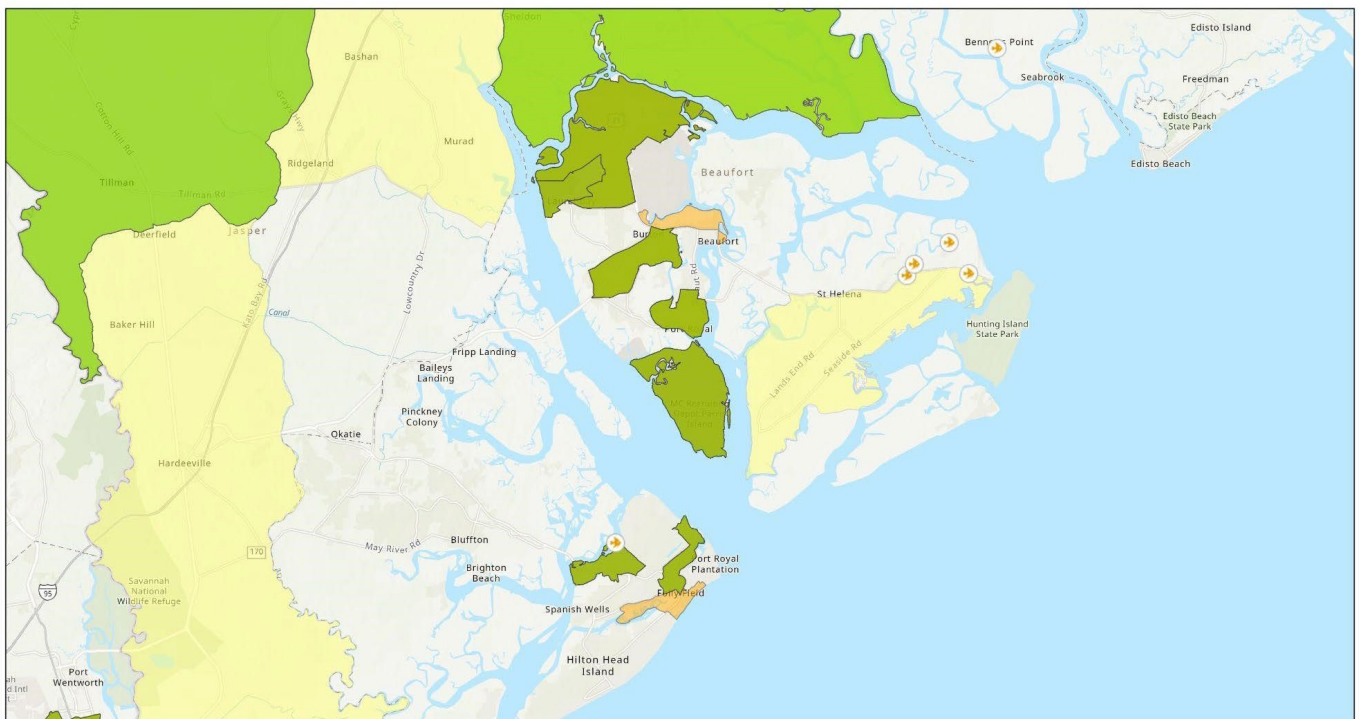
The orange areas below represent low-income census tracts where a significant number of residents is more than 0.5 miles (urban) or 10 miles (rural) from the nearest supermarket.

The red areas below represent low-income census tracts where a significant number of residents is more than 1 mile (urban) or 20 miles (rural) from the nearest supermarket.

The yellow areas below represent low-income census tracts where more than 100 housing units do not have a vehicle and are more than 0.5 miles from the nearest supermarket or more than 20 miles from the nearest supermarket.

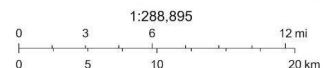
(Note: These colors overlap, so the darker green areas represent a combination of the lighter green, orange, red, and yellow areas.)

Southern Region Food Deserts



10/16/2022, 9:30:34 AM

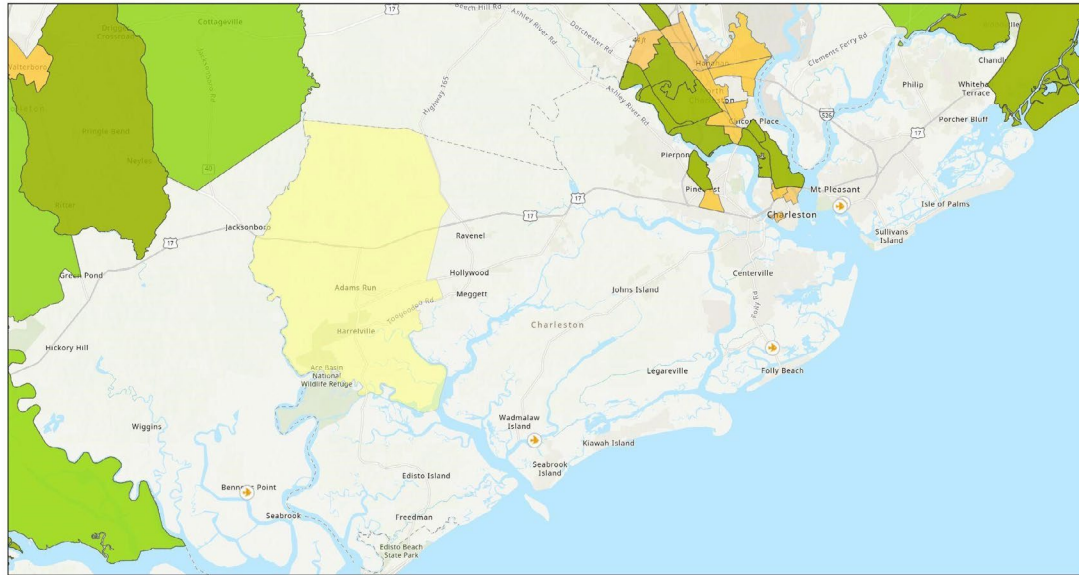
- Survey Locations
- SC_GA_NC_TractsNA
- SC_GA_NC_tracts1and10
- SC_GA_NC_TractsHalfAnd10
- SC_GA_NC_Tracts1and20
- SC_GA_NC_TractsVehicle



Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, Esri, CGIAR, USGS

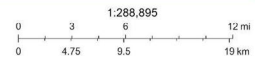
Esri, NASA, NGA, USGS | Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, EPA, NPS, USDA | ArcGIS Web AppBuilder

Middle Region Food Deserts



10/16/2022, 9:32:47 AM

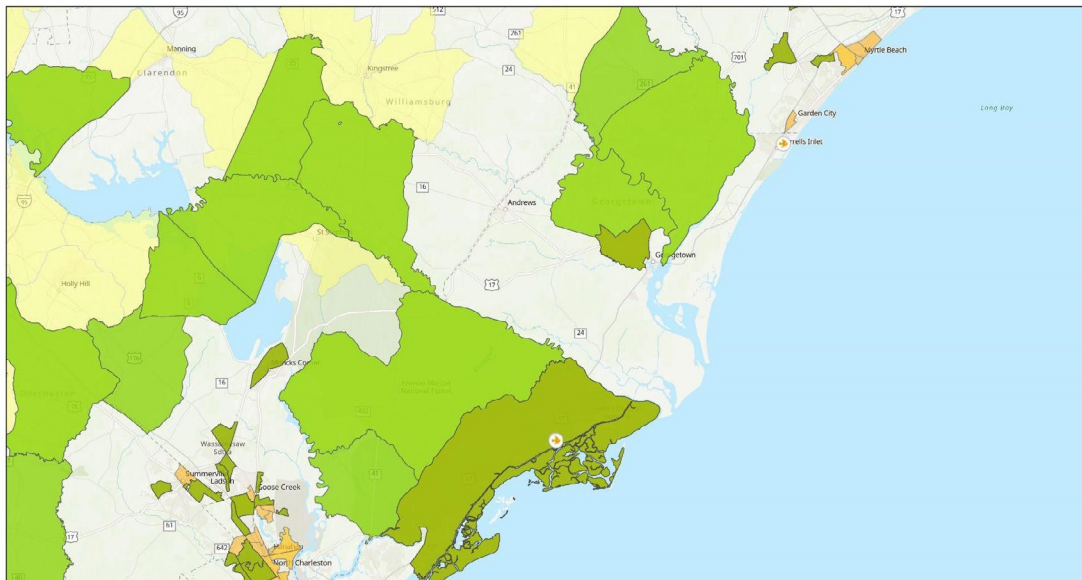
- Survey Locations
- SC_GA_NC_TractsHalfAnd10
- SC_GA_NC_Tracts1and20
- SC_GA_NC_tracts1and10
- SC_GA_NC_TractsVehicle



1:288,895
 Esri, CGIAR, USGS, Charleston County GIS, Esri, HERE, Garmin, SafeGraph, METNUSA, USGS, EPA, NPS, USDA

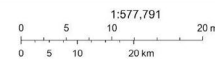
ArcGIS Web AppBuilder
 Esri, NASA, NOAA, USGS | Charleston County GIS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METNUSA, USGS, EPA, NPS, USDA

Northern Region Food Deserts



10/16/2022, 9:44:35 AM

- Survey Locations
- SC_GA_NC_TractsHalfAnd10
- SC_GA_NC_Tracts1and20
- SC_GA_NC_tracts1and10
- SC_GA_NC_TractsVehicle



1:577,791
 Esri, HERE, Garmin, SafeGraph, FAO, METNUSA, USGS, EPA, NPS, Esri, USGS

ArcGIS Web AppBuilder
 Esri, CGIAR, USGS | Esri, HERE, Garmin, SafeGraph, METNUSA, USGS, EPA, NPS, USDA

All map images are from the South Carolina Seafood Alliance ArcGIS Online Application, provided by the South Carolina Sea Grant Consortium in partnership with the College of Charleston.