

# **Marine Fisheries and the COVID-19 Pandemic: Calendar Year 2020 Survey Data and Analysis**

Edward Glazier, Eric Thunberg, Matthew McPherson, Michael Jepson, and Lisa L. Colburn



U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service

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# 1 Introduction

Social interaction is intrinsic to the contemporary fishing industry in the United States. Persons working on commercial fishing vessels, small and large, typically interact closely and repeatedly at sea, and often regularly on land. Commercial captains also work closely with seafood dealers and processors, gear suppliers, vessel and engine repair specialists, and others who also interact with each other on a consistent basis to complete their jobs. Similarly, for-hire captains and crew members regularly interact with each other and with their clientele, and typically on small vessels with limited space. Even an individual fishing alone for commercial or recreational purposes is dependent on the many social interactions inherent in the design, manufacture, transport, and transaction of rods, reels, nets, hooks, lures, line, vessels, motors, and other fishing essentials.

Such is the social nature of domestic fisheries and the labor and supply chains that enable their normal functioning. But the first year of the COVID-19 pandemic was far from normal for participants in the nation's marine fisheries, as regional lockdowns, precautionary mandates and guidelines, fears about the disease, and the disease itself, dramatically altered the way participants normally interact. This macro-social shift in human behavior induced a strong initial dampening effect on the production of various fishery goods and services. As discussed by NOAA Fisheries in a variety of early assessments, the pandemic has generated major social and economic impacts across an overall economic sector that, in years just prior to the event, generated over \$200 billion in annual sales, and employment opportunities for some 1.7 million workers (NOAA Fisheries, 2021).

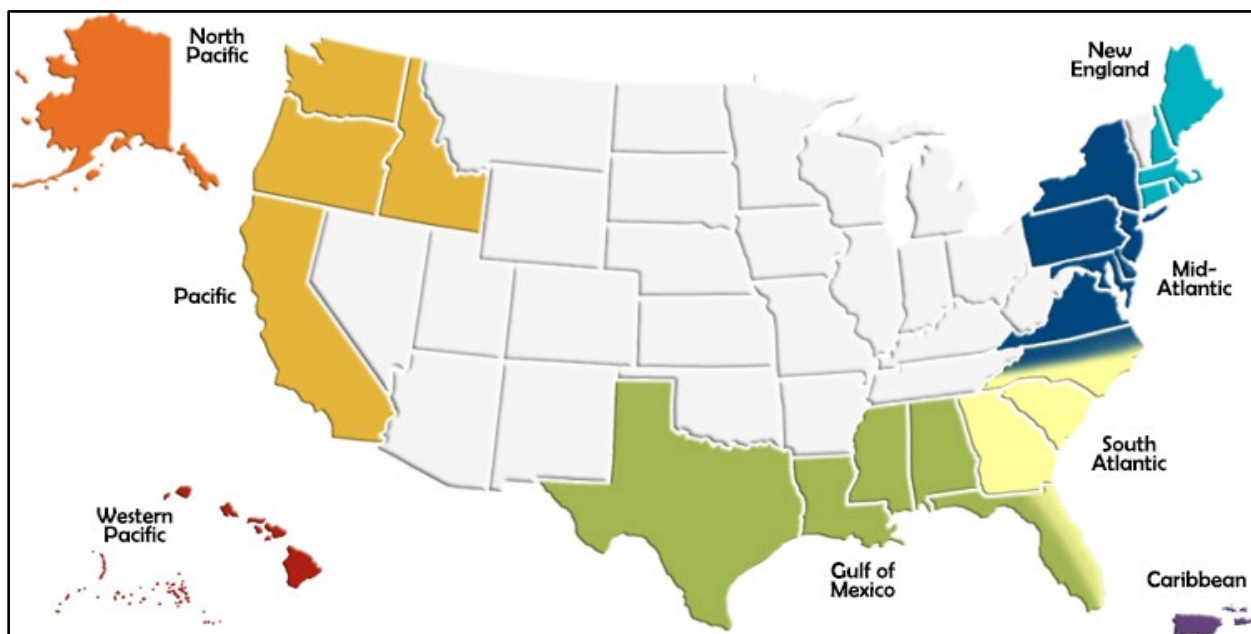
This report describes elements of a large-scale survey program implemented by NOAA Fisheries to examine domestic fishery impacts associated with the COVID-19 pandemic at the year-one mark of the pandemic in the United States. The origins of this project relate to NOAA's need for information regarding the impact of COVID-19 on the fishing industry and fishing dependent businesses across the United States, knowing that the novel coronavirus COVID-19 would generate profound challenges across the various domestic fishing and seafood distribution sectors. NOAA Fisheries' leadership made a request to the Economics and Human Dimensions program to conduct multiple COVID-19 impact assessments in 2020 and early 2021. Survey instruments<sup>1</sup> were subsequently designed, tested, and implemented with stratified random samples of participants active in the commercial, for-hire, and seafood processing and distribution sectors around the nation. The Northeast and Southeast Fisheries Science Centers teamed up to conduct surveys covering their combined jurisdictions which includes the New England, Mid-Atlantic, South Atlantic, Caribbean, and Gulf of Mexico fishery management regions (Figure 1). By examining pandemic-related changes in the nation's marine fisheries through consultation with participants across broad regions, the research and research findings provide encompassing insight into the shifting status of a critically important domestic source of

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<sup>1</sup> Survey instruments providing interview content for each sector were developed by NOAA Fisheries and approved by the Office of Management and Budget (OMB) under Control Number 0648-0767.

food, jobs, and recreation, and an initial baseline for assessing pandemic-related fishery impacts in the future.

NOAA Fisheries’ pandemic-focused survey work along the East Coast, Gulf of Mexico, and U.S. Caribbean regions was conducted in two phases, resulting in an overall sample of some 4,200 participants. The first phase of work queried respondents about their business operations and the nature of pandemic impacts occurring between January and June 2020. The resulting data and interim analysis are provided in Glazier et al. (2021). The second phase of work queried a second group of randomly selected respondents about the same and similar variables in relation to the entire calendar year of 2020. This report provides tabulated survey data resulting from this most recent effort, along with discussion of essential project context, research methods, and research findings for the New England, Mid-Atlantic, South Atlantic, and Gulf of Mexico regions (results of the U.S. Caribbean survey will be covered in a separate report). As such, the following pages provide new insight into the shifting status of a particularly challenging period in the history of the nation and its marine fisheries.



**Figure 1. Geographic purview of the nation’s regional Fishery Management Councils.**

## 1.1 Project Scope

The intent of this report is necessarily modest in analytical terms. The pandemic continues to impact the nation, and the ways it is affecting marine fisheries are many, complex, and continually changing. The focus here is to provide readers with useful information regarding identifiable regional changes occurring in conjunction with the COVID-19 pandemic during calendar year 2020. Important background context is provided where possible to supplement key figures and the qualitative discussion that accompanies the survey data. As discussed in NOAA Fisheries pandemic updates (NOAA Fisheries, 2021), impacts on commercial and for-hire



fisheries in other regions, and on the nation's recreational fisheries, are also being examined and monitored by the agency.

## 1.2 Overview of Pandemic Disease

Pandemic disease is not uncommon in human history. The most recent prior event with widespread impacts in the United States was an H1N1 avian-borne virus, colloquially known as the Spanish flu. Between 1918 and 1920, the event infected some 500 million persons and took the lives of more than 50 million worldwide, including some 675,000 persons in the U.S. (Centers for Disease Control and Prevention, 2020). Influenza pandemics subsequently occurred in 1957 and 1968, with a variant known as H1N1 (a type of influenza A) spreading around the world in 2009. The severe acute respiratory syndrome (SARS) viral event in 2003, and the global spread of HIV/AIDS during the 1980s and 1990s are additional recent examples.

Morens et al. (2009) provide a useful definition of the term pandemic, differentiating between outbreaks or relatively localized increases in the incidence of a given disease; epidemics, or outbreaks that spread over a large geographic area; and pandemics, which are defined as epidemics that extend across continents. Based on this definitional logic, pandemics are increasingly likely to occur and difficult to mitigate as humans move around the world more readily than in centuries past, bringing new and evolving pathogens with them. Notably, the spread of a given communicable disease may recur at pandemic levels over time. For example, the causative bacterial agent of bubonic plague, *Yersinia pestis*, was recently found to have occurred in a neolithic (5300-5050 BP) hunter-fisher-gatherer population in what is now Latvia (Susat et al., 2021). The plague first impacted human populations on a large scale in Central Africa, Egypt, and the Mediterranean during the first century A.D. It then reemerged in much of the Old World during the 14<sup>th</sup> century, ultimately taking 25 million lives in Europe alone. A third plague pandemic originated in China during the late nineteenth century, eventually spreading around the world until diminishing in 1959, having caused more than 15 million deaths over six decades (Frith, 2012). The disease remains a problem in parts of the world to the present day (Glatter and Finkelman, 2021).

Numerous communicable diseases, including smallpox, influenza, measles, and others, heavily impacted indigenous societies in the Americas soon after contact with European visitors and settlers. Such events in total can be considered pandemic in nature, having originated as large-scale epidemics in Europe, Africa, Asia, and elsewhere in the Old World. As originally discussed by Crosby (1976), high rates of infection, morbidity, and mortality are typical among societies not previously exposed to viral pathogens (Bourdon et al., 2020; Piret and Boivin, 2021). This is presently the case with COVID-19.

The viral proteins that cause disease in humans have little significance of themselves. But when linked to a human host, replication can be rapid and extensive, prompting a debilitating immune response in certain people (Halpert and Shoenfeld, 2020), including severe respiratory problems in the short-term, and persistent neurological and other sequelae in some cases (Spudich and Nath, 2022). These effects and outcomes are presently occurring in association with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, also known as COVID-19). Spread of

COVID-19 and its variants has thus far been rapid within and across human populations,<sup>2</sup> causing physical suffering and death, financial hardship, and major challenges to systems of health care, economy, governance, and education, among others. Originating in China, the virus spread quickly to other parts of the world, including the United States, where the first case was documented in January 2020. The first COVID-19 death recognized by the CDC in the U.S. occurred during February 2020 in Washington State.

### **1.3 Pandemic Disease in the Context of Marine Fisheries**

The initial data collection component of the phased survey work discussed in this report was completed during mid-September 2020. At that point, the daily number of reported coronavirus cases in the U.S. was estimated to be around 35,000, after a previous peak of some 75,000 daily cases nationwide during mid-July. Cases and deaths rose precipitously during October 2020, and by the one-year mark of the pandemic early in February 2021, when the second round of survey work was being implemented for the project described herein, over 27 million cases of the virus had been identified around the nation. By that point in time, the official death toll in the U.S. exceeded 463,000 persons (Centers for Disease Control and Prevention, 2021a).

From a public health perspective on COVID-19, every human behavior that enables unhindered movement of respiratory viral proteins between host and prospective host is highly problematic. Of importance in the context of the current pandemic, the situation has led to a reordering of the way people can or do interact. That is, in addition to morbidity and mortality associated with infection, public health measures advocated or established to quell transmission of the virus and loss of life (such as early stay-at-home orders, distancing between individuals, and the wearing of masks), have unavoidably disrupted normal behaviors that developed over many millennia of human evolution (Hall, 1959; Welsch et al., 2020). People around the world today, including those involved in marine fisheries and the social networks in and through which fishery participants interact, continue to adjust to greater and lesser degrees to this major source of change.

The effects of past pandemics on domestic fisheries are not well-documented. Regarding the Spanish flu pandemic, it is known that the virus reached the Bristol Bay region of Alaska in 1919, just as indigenous fishermen began to undertake socially interactive summer fishing activities around the region. According to deValpine (2015), by the end of the salmon season that year, as many as 1,000 Nushagak villagers succumbed to the disease, leaving behind 238 parentless children (VanStone, 1967). As asserted by Greenberger (2018), key lessons from the Spanish flu include the fundamental value of avoiding infection through physical distancing and the use of masks. A vaccine for influenza was not licensed for public use until 1945 (Centers for Disease Control and Prevention, 2021b).

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<sup>2</sup> COVID-19 is the seventh coronavirus known to impact humans. Four such viruses (229E, NL63, OC43, and HKU1) cause symptoms of the common cold, while MERS-CoV, SARS-CoV, and SARS-CoV-2 can induce severe respiratory problems and sometimes death, with rates of fatality reaching 5, 10, and 37 percent respectively (Huang et al., 2020).

As noted at the outset of this report, the act of fishing and conducting seafood-related business involve extensive social interaction, often in close physical proximity. As such, the present-day pandemic, and response strategies deemed essential for containing the virus, have led to a variety of challenges for participants in the nation's marine fisheries. Problems occur most directly when commercial harvesters, guides, processors, and/or other participants do not or cannot conduct normal activities due to: (a) decisions and/or guidelines intended to prevent infection of self and others; (b) the actual infection of self or others and the constraints this sets in motion; (c) changes in incentive, such as those related to constrained channels of seafood distribution and shifting market conditions; and (d) changes in capacity, such as those imposed by missing personnel and/or diminished availability of essential supplies and services such as gear, bait, and vessel and engine parts and maintenance.

It should be kept in mind that COVID-19 specific vaccines remained in development during the first year of the pandemic, making social-behavioral changes the only available lines of defense against the virus. Thus, each of the problems noted above relate in some way to the basic challenges and implications of maintaining enough physical distance and/or a sufficient respiratory barrier between people so that viral transmission could be minimized—as recommended in the science-based literature addressing mitigation of domestic respiratory disease events (see Sim et al., 2014; Centers for Disease Control and Prevention, 2014; Homeland Security Council, 2005). Because medical specialists and officials were initially uncertain about key virological and epidemiological dimensions of the novel coronavirus, the common response strategy during its early appearance was highly proactive. That is, many governments around the world mandated or strongly encouraged people to isolate in household settings, at least until more was known about transmissibility, severity, and other key attributes of the virus. Social interactions were thereby dramatically limited in the U.S. during early periods of uncertainty about the virus, with major impacts on social and economic institutions and activities across the 50 states.

All states in the nation declared public health emergencies in response to the emerging pandemic. Further, as noted in Table 1.1 below, all of the East Coast and Gulf states addressed in the current study issued stay-at-home orders during late March and early April 2020. Many such states also implemented policies intended to limit the spread of COVID-19 by interstate travelers. All such measures impacted key domestic industries during the late winter and early spring months of 2020, most certainly including the nation's marine fisheries (, 2021).

Given the close connection between eateries and the seafood industry, state-mandated closures of restaurants and bars undoubtedly had a profound effect on seafood production, sales, and market conditions early in the pandemic. As discussed by Guy et al. (2021), prohibition of on-premises dining was essentially universal during the early months of the pandemic in the U.S., with 49 state governments and the District of Columbia establishing such prohibitions between March and April 2020. Indeed, as discussed in Curtis (2021), when examined in relation to the prior three quarters, foodservice sale of seafood products in the U.S. fell by 40% during the period March through May 2020.

Based on regional landings and revenue data, NOAA Fisheries (2021) makes clear the extent of initial fishery-specific pandemic impacts, noting that early closures and stay-at-home orders triggered a series of economic shockwaves across the seafood industry. For example, domestic commercial landings revenue in total fell 19% below the March average for the previous five years. The situation continued to deteriorate across the nation’s commercial fisheries into mid-summer, with landings revenue diminishing to 45% below the five year average in July.<sup>3</sup>

**Table 1.1 Initial pandemic response policies implemented by states in the study regions**

<b>State (north to south)</b>	<b>Stay-at-Home Orders/Mandates*</b>	<b>Initial Strictures on Travel from other States</b>
Maine	April 2 to May 31	Mandatory quarantine
New Hampshire	March 27 to May 31	Mandatory quarantine
Massachusetts	March 24 to May 18	Mandatory quarantine
Rhode Island	March 28 to May 20	Mandatory quarantine
Connecticut	March 23 to May 20	Quarantine recommended
New York	March 22 to May 28	None
New Jersey	March 21 to June 9	None
Delaware	March 24 to May 31	Mandatory quarantine
Maryland	March 30 to May 15	Mandatory quarantine
Virginia	March 30 to June 10	None
North Carolina	March 30 to May 22	None
South Carolina	April 7 to May 3	Limited quarantine
Georgia	April 3 to April 30	None
Florida	April 3 to April 30	Limited quarantine and screening
Alabama	April 4 to April 30	None
Mississippi	April 3 to April 27	None
Louisiana	March 23 to May 15	None
Texas	April 2 to April 30	Limited quarantine

Sources: Mervosh et al., 2020; Mendelson, 2020; \*Re-opening dates refer to date of generalized re-openings

This pattern was also noted of the for-hire sector early in the pandemic (Thunberg, 2021), when social congregation was most stringently restricted in the respective states. For example, combined rates of for-hire fishing activity in New England and the Mid-Atlantic fell from a 2015-2019 early spring baseline average of some 26,700 angler trips, to a mere 714 trips for the same period in 2020. Diminished activity continued in these regions during May and June, when some 212,000 angler trips were taken. This figure is 35% below the seasonal baseline (2015-2019) average of 327,500 trips. For-hire fishing trips and revenue declined profoundly during the initial pandemic months in the Southeast as well (McPherson et al., 2021).

When the economic implications of full closures came into focus, and as physical distancing and masking gradually became more commonplace around the U.S., stay-at-home orders and mandates began to be lifted. This occurred in the study regions between late April and early

<sup>3</sup> Annual commercial landings revenue averaged \$5.8 billion in the U.S. during the period 2015 to 2019 (NOAA Fisheries, 2021).

June of 2020 (Table 1.1). Full prohibitions on restaurant dining were lifted in all states in the U.S. and the District of Columbia by mid-June of 2020 (Guy et al., 2021). Although concerns about infection remained widespread, and many local governments established guidelines to facilitate social distancing and masking in dining establishments around the nation, the industry began a slow recovery. This was furthered as many restaurateurs initiated and/or emphasized food delivery, takeout, and curbside pickup arrangements. As such, and as noted in Curtis (2021), available data indicate that some limited recovery of seafood sales in the foodservice industry occurred during the latter part of 2020 across the United States, including the study region. Based on findings reported in the same source, however, such gains were slight in comparison to a notable overall increase in retail transaction of seafood during calendar year 2020, during which time frozen seafood sales increased by 36% above the previous three quarters, and fresh seafood sales increased by 25% (Blank, 2021). This speaks to the apparent overall tendency of Americans to buy seafood from the grocery store and eat at home during the first year of the pandemic (Curtis et al., 2021).

Partial resumption of normal societal activities led to some rebounding of business activity among commercial harvesters during the final quarter of 2020. But as discussed in Curtis (2021), the gains were slight and limited to certain fleets and regions. The for-hire sector of the nation's marine fisheries was also heavily impacted during 2020, although this too appears to have varied by region, and with some recovery noted by the third and fourth quarters of the year. The number of documented for-hire fishing trips in the New England region during the entire calendar year 2020 decreased by 27% relative to a five-year baseline, but by only 5% in the Southeast, where initial impacts were profound, suggestive of a significant rebound in the latter region during the concluding part of 2020 (Thunberg, 2021; McPherson et al., 2021).

Regional differences in landings and market conditions during 2020 undoubtedly relate to a range of factors, including variable restrictions on social activity, shifting regional waves of hospitalization and death, differing perceptions about the virus and course of the pandemic, and related responses to the situation. In any case, normal patterns of commercial and for-hire fishing and seafood transactions continued in a state of general disruption into the autumn months of 2020, when the pandemic began to worsen across the nation.

#### **1.4 Survey Methods, Sampling Approach, and Sample Outcomes**

The expansive scope and scale of pandemic impacts to fishing and seafood businesses during the initial months of the COVID-19 pandemic were considered by NOAA Fisheries staff to be worthy of rapidly implemented research and long-term monitoring. Based on a growing literature and deepening knowledge of the social and economic implications of disasters among individuals and communities involved in marine fisheries, NOAA Fisheries scientists working in the study regions collaborated to refine survey instruments that could effectively indicate the nature and scale of impacts resulting from the pandemic in the commercial harvest, for-hire, and seafood processing and distribution sectors of the overall industry. The instruments facilitated collection of information about the extant economic and social status of the businesses, and pandemic impacts, at the six-month point of the event (project phase one), and at the end of calendar year 2020 (project phase two). Both phases of survey work employed the same

stratified random sampling approach and achieved similar overall sample sizes. However, the first phase of survey work emphasized the use of hybrid approach using a “push to web” mail survey supplemented by a telephone survey, whereas the second phase was administered exclusively as a telephone survey. The figures presented in the following description are provided in reference to the second phase of survey work.

Sampling frames and contact information for individuals working in the sectors of interest were obtained from the Atlantic Coast Cooperative Statistics Program (ACCSP) and Gulf States Fisheries Information Network (Gulf FIN). NOAA Fisheries permit data were also used to help establish and verify the frame and associated contact information for participants in commercial fisheries around the study regions. Duplicate or incomplete phone numbers were eliminated from the frame, resulting in a total universe of 19,508 prospective survey participants with viable phone numbers. Accounting for incorrect or disconnected phone numbers resulted in an adjusted frame of 15,826 prospective respondents. This universe was subsequently stratified to ensure statistically representative input from prospective respondents in fishery sector in each state across the study regions. From north to south, these states include Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

Prospective respondents were randomly selected, and the second phase phone survey was initiated in earnest during late January 2021. The nature and purpose was explained to prospective respondents, with full assurance that their identities would remain anonymous, and that all discussion and data would be kept strictly confidential as per federal requirements and norms that are fundamental to the ethical conduct of all social science research.

Each valid contact number was attempted up to four times during the course of the survey. As shown in Table 1.2, interviews were ultimately attempted with 4,016 fishery participants, or 21.1% of the total sampling frame. Of the individuals who did answer the initial survey call, 2,268 refused to participate and 20 individuals (<1%) could not participate due to language difficulties. After four contact attempts, 74% of all eligible participants with valid contact information did not respond to the survey, with overall no response rates ranging from a low of nearly 68% for South Atlantic-based seafood processors or distributors, to just over 80% for commercial harvesters in New England (Table 1.3). Notably, all but five of the 1,828 individuals who undertook the phase two survey carried it through to completion, with an overall completion rate of nearly 12%. When compared to other sectors, rates of completion tended to be higher among for-hire operators across all study regions, ranging from 15% to nearly 18% completion. Refusal rates were accordingly lower among for-hire respondents than for the other sectors. Refusal rates tended to be highest among seafood processor/distributors, ranging from 16% in the Mid-Atlantic to 19% in the South Atlantic.

It was determined that 200 completed interviews for each study region and sector would provide sufficient data for statistically representative analysis. This represents seven percent of the sample frame for commercial harvesters in New England, to more than 80% of the frame for seafood processors/distributors in the Mid-Atlantic region (Table 1.4). Once the targeted number

of interviews was achieved for each region or sector, no additional interviews were attempted. Between 75 and 100% of the 200-interview goal was achieved in all regions for the commercial harvest and for-hire sectors. The goal was achieved in full for the Gulf of Mexico seafood processor/distributor sector. Response rates for the processor/distribution sector were lower in other regions, reaching 37% of the target in New England and 13% in the Mid-Atlantic. These rates are reflective of the limited number of businesses in the sample frame, particularly in the Mid-Atlantic and the South Atlantic regions. As can be noted in Table 1.4, the completion rates for seafood processor/distributors are not unusually low and, in some cases, were higher than those for other sectors.

**Table 1.2 Disposition of survey calls by region and sector, calendar year 2020 assessment**

Study Region	Study Sector	Sample Frame	Completed Interviews	Refusals	No Answer	Message Only	Wrong Number or Disconnected
Gulf of Mexico	Dealer/Processors	1,874	153	262	617	432	406
Gulf of Mexico	Commercial Harvest	3,099	201	316	1,011	728	829
Gulf of Mexico	For-Hire	1,094	179	107	401	323	84
Mid-Atlantic	Dealer/Processors	301	26	39	57	121	58
Mid-Atlantic	Commercial Harvest	1,946	183	312	318	813	320
Mid-Atlantic	For-Hire	1,525	201	159	337	637	191
New England	Dealer/Processors	824	73	89	162	350	150
New England	Commercial Harvest	3,566	203	357	771	1,521	714
New England	For-Hire	1,377	162	133	378	572	132
South Atlantic	Dealer/Processors	596	55	86	108	198	148
South Atlantic	Commercial Harvest	2,116	200	278	365	704	568
South Atlantic	For-Hire	1,190	192	130	246	540	82
All Regions	Dealer/Processors	3,595	307	476	944	1,101	762
All Regions	Commercial Harvest	10,727	787	1263	2,465	3,766	2,431
All Regions	For-Hire	5,186	734	529	1,362	2,072	489
All Regions	All Sectors	19,508	1,828	2,268	4,771	6,939	3,682

**Table 1.3 Summary of response rates by study region and sector**

Study Region	Study Sector	Adjusted Frame	Completed/ % Rate	Refused	Refusal Rate	No Response/ % Rate
Gulf of Mexico	Dealer/Process.	1,468	153/10.4	262	17.8%	1,053/71.7
Gulf of Mexico	Commercial Harvest	2,270	200/8.8	316	13.9%	1,753/77.2
Gulf of Mexico	For-Hire	1,010	179/17.7	107	10.6%	724/71.7
Mid-Atlantic	Dealer/Process.	243	26/10.7	39	16.0%	178/73.3
Mid-Atlantic	Commercial Harvest	1,626	183/11.3	312	19.2%	1,131/69.6
Mid-Atlantic	For-Hire	1,334	200/15.0	159	11.9%	974/73.0
New England	Dealer/Process.	674	73/10.8	89	13.2%	512/76.0
New England	Commercial Harvest	2,852	200/7.0	357	12.5%	2,292/80.4
New England	For-Hire	1,245	162/13.0	133	10.7%	950/76.3
South Atlantic	Dealer/Process.	448	55/12.3	86	19.2%	307/68.5
South Atlantic	Commercial Harvest	1,548	200/12.9	278	18.0%	1,070/69.1
South Atlantic	For-Hire	1,108	192/17.3	130	11.7%	786/70.9
All Regions	Dealer/Process.	2,833	307/10.8	476	16.8%	2,050/72.4
All Regions	Commercial Harvest	8,296	783/9.4	1,263	15.2%	6,246/75.3
All Regions	For-Hire	4,697	733/15.6	529	11.3%	3,434/73.1
All Regions	All Sectors	15,826	1,823/11.5	2268	14.3%	11,730/74.1

**Table 1.4 Interview target outcomes by study region and sector**

Study Region	Sector	Adjusted Frame	% of Frame Targeted	Number Complete	% of Target	% of Adj. Frame
Gulf of Mexico	Dealer/Processor	1,468	13.6	153	76.5	10.4
Gulf of Mexico	Commercial Harvest	2,270	8.8	200	100.0	8.8
Gulf of Mexico	For-Hire	1,010	19.8	179	89.5	17.7
Mid-Atlantic	Dealer/Processor	243	82.3	26	13.0	10.7
Mid-Atlantic	Commercial Harvest	1,626	12.3	183	91.5	11.3
Mid-Atlantic	For-Hire	1,334	15.0	200	100.0	15.0
New England	Dealer/Processor	674	29.7	73	36.5	10.8
New England	Commercial Harvest	2,852	7.0	200	100.0	7.0
New England	For-Hire	1,245	16.1	162	81.0	13.0
South Atlantic	Dealer/Processor	448	44.6	55	27.5	12.3
South Atlantic	Commercial Harvest	1,548	12.9	200	100.0	12.9
South Atlantic	For-Hire	1,108	18.1	192	96.0	17.3



## **2 Calendar Year 2020 Survey Data and Findings to Date**

This section of the report provides key findings from survey work conducted with persons who maintain commercial and for-hire fishing operations, and seafood processing and distribution businesses in each state along the U.S. East Coast and Gulf of Mexico. While there can be considerable overlap between these sectors in certain communities, they are treated here as distinct for purposes of sampling, data collection, and analysis.

Business owners or operators in each fishery sector very often are highly knowledgeable specialists. Many interact on a regular basis and are therefore knowledgeable of each part of the industry. Such persons were consulted using the previously described telephone-based survey research methods to inform understanding of pandemic impacts among fishing and seafood operations throughout the study regions.

Section 2.1 below provides basic descriptive statistics to represent: (a) core characteristics of commercial and for-hire fishing operations maintained by respondents in each study region; and (b) the nature of varying operational changes and responses resulting from or associated with the pandemic. Section 2.2 provides the same forms of information to describe characteristics of the sampled seafood processing and distribution firms, and the nature of impacts across that sector. Information was collected from all sectors and respondents to better understand core characteristics of the respective business operations. The summary descriptive statistics reported throughout the report include the number of survey participants who provided valid responses to any given question, with sample sizes tending to vary since all participants were offered the opportunity to decline to answer any particular question for any reason, and because no additional information was collected in cases where participants reported that their business had not been affected by the pandemic. Brief discussion of variability in survey response between regions is provided where appropriate.

### **2.1 Commercial Harvest and For-Hire Fishing Operations**

The nature and scale of commercial fishing operations vary extensively across the study states and regions. For example, some captains use relatively small vessels, simple hook-and-line gear, and just a helper or two to pursue various marketable species relatively close to shore. By contrast, others operate relatively large vessels with multiple crew members and prodigious longline or trawl gear to pursue benthic and pelagic species well into the offshore zones. For-hire fishing operations also vary within and across the study regions. For example, solo fishing guides may at times bring even a single patron aboard a small center console vessel, while captains and multiple crew members may provide a fishing experience to many patrons at a time aboard vessels referred to as either “head” or “party” boats. The survey and survey results described here capture such differences to greater and lesser extents, with the basic intent to represent pandemic impacts across a wide range of regional fishing operations.

#### **2.1.1 Select Characteristics of the Sampled Fishing Operations**

Tables 2.1 to 2.9 depict basic aspects of the fishing operations maintained by survey respondents active in the commercial harvest and for-hire sectors of the various regional fisheries. Findings

reveal that respondents tend to be well-seasoned captains overall, with an average of more than 24 years as owners of commercial and/or for-hire fishing vessels (Table 2.1). Table 2.2 makes clear the predominance of fishing as the primary source of income among commercial harvesters, with positive responses ranging from 67.2% in the Mid-Atlantic to nearly 80% in New England.

Gulf of Mexico-based respondents working in the for-hire sector also report particularly high levels of reliance on fishing. Over 82% of respondents in this region reported that for-hire fishing activities constituted their main source of household income. But for-hire participants in other regions indicate a relatively greater tendency to combine fishing with other sources of income. Response rates for reported primary reliance on fishing ranged from 61.3% in the South Atlantic to 40% in the Mid-Atlantic. As indicated in Table 2.3, most respondents reported fishing both in state jurisdiction waters (0 to three miles offshore) and federal jurisdiction waters (which start beyond three miles). Very few respondents reported fishing solely in federal waters.

**Table 2.1 Average number of years as vessel owner by type of operation and region\***

Council Region	Commercial Harvesters	For-Hire Operators	valid <i>n</i> overall
Gulf of Mexico	24.2 ( <i>n</i> =189)	23.2 ( <i>n</i> =176)	365
Mid-Atlantic	30.7 ( <i>n</i> =178)	27.1 ( <i>n</i> =199)	377
New England	29.6 ( <i>n</i> =195)	24.8 ( <i>n</i> =159)	354
South Atlantic	28.2 ( <i>n</i> =195)	24.0 ( <i>n</i> =187)	382
All Regions	28.2 ( <i>n</i> =757)	24.8 ( <i>n</i> =721)	1,478

\*Based on the question “How many years have you been a vessel owner?”

**Table 2.2 Percentage of respondents for whom fishing is the primary source of income\***

Council Region	% Commercial Harvesters	% For-Hire Operators	valid <i>n</i> overall
Gulf of Mexico	74.9 ( <i>n</i> =199)	82.5 ( <i>n</i> =177)	376
Mid-Atlantic	67.2 ( <i>n</i> =180)	47.7 ( <i>n</i> =199)	379
New England	79.9 ( <i>n</i> =199)	40.0 ( <i>n</i> =160)	359
South Atlantic	73.4 ( <i>n</i> =199)	61.3 ( <i>n</i> =186)	385
All Regions	74.0 ( <i>n</i> =777)	58.0 ( <i>n</i> =722)	1,499†

\*Based on the question “Is fishing your primary source of income?” †Commercial and/or for-hire fishing are the primary sources of income for 63.5% of the overall sample.

The number and basic characteristics of commercial and for-hire fishing vessels provide an indication of the level of investment and nature of activities undertaken by a given fishing operation. As depicted in Table 2.4 below, about 54% of all responding commercial harvesters across all regions reported owning only one fishing vessel. New England-based respondents were most likely to own only a single vessel, and this was the case for both commercial harvesters (70.8%) and for-hire participants (73.2%); although as noted in Table 2.5, these vessels were the largest length overall (LOA) reported in all regions. Commercial and for-hire

respondents hailing from the South Atlantic region were most likely to own two or more fishing vessels. As can be noted in both Tables 2.5 and 2.6, reported size of commercial fishing vessels is greater than that for vessels used in for-hire operations. Among respondents owning or using multiple fishing vessels, the smallest vessel sizes on average were reported by commercial and for-hire respondents in the South Atlantic region, with the largest LOA reported for both categories in the Mid-Atlantic (Table 2.6).

**Table 2.3 Jurisdictional areas in which survey participants conduct their fishing operations\***

Council Region	State Waters Only		Federal Waters Only		Both Zones		valid <i>n</i>
	Commercial	For-Hire	Commercial	For-Hire	Commercial	For-hire	
Gulf of Mexico	50.0% ( <i>n</i> =198)	33.5% ( <i>n</i> =179)	6.1% ( <i>n</i> =198)	8.4% ( <i>n</i> =179)	46.2% ( <i>n</i> =222)	58.1% ( <i>n</i> =179)	377
Mid-Atlantic	64.3% ( <i>n</i> =182)	32.0% ( <i>n</i> =200)	8.2% ( <i>n</i> =182)	4.5% ( <i>n</i> =200)	28.6% ( <i>n</i> =188)	63.5% ( <i>n</i> =200)	382
New England	20.0% ( <i>n</i> =200)	24.7% ( <i>n</i> =162)	7.0% ( <i>n</i> =200)	8.6% ( <i>n</i> =162)	53.0% ( <i>n</i> =66)	66.7% ( <i>n</i> =162)	362
South Atlantic	57.1% ( <i>n</i> =198)	33.2% ( <i>n</i> =190)	3.5% ( <i>n</i> =198)	4.7% ( <i>n</i> =190)	36.4% ( <i>n</i> =139)	62.1% ( <i>n</i> =190)	388
All Regions	47.4% ( <i>n</i> =778)	31.0% ( <i>n</i> =731)	6.2% ( <i>n</i> =778)	6.4% ( <i>n</i> =731)	50.1% ( <i>n</i> =996)	62.5% ( <i>n</i> =731)	1,509

\*Based on the question “Do you fish in state/territorial waters, federal waters, or both?”

**Table 2.4 Number of fishing vessels owned by commercial and for-hire respondents\***

Council Region	% Owning One Vessel		% Owning Two Vessels		% Owning Three or more Vessels		valid <i>n</i>
	Commercial	For-Hire	Commercial	For-Hire	Commercial	For-Hire	
Gulf of Mexico	47.9% ( <i>n</i> =90)	67.0% ( <i>n</i> =118)	31.4% ( <i>n</i> =59)	21.6% ( <i>n</i> =38)	20.7% ( <i>n</i> =39)	11.4% ( <i>n</i> =20)	364
Mid-Atlantic	58.4% ( <i>n</i> =104)	72.7% ( <i>n</i> =144)	22.5% ( <i>n</i> =40)	21.2% ( <i>n</i> =42)	19.1% ( <i>n</i> =34)	6.1% ( <i>n</i> =12)	376
New England	70.8% ( <i>n</i> =138)	73.2% ( <i>n</i> =115)	23.6% ( <i>n</i> =46)	20.4% ( <i>n</i> =32)	5.6% ( <i>n</i> =11)	6.4% ( <i>n</i> =10)	352
South Atlantic	40.0% ( <i>n</i> =78)	59.0% ( <i>n</i> =111)	33.8% ( <i>n</i> =66)	25.0% ( <i>n</i> =32)	26.2% ( <i>n</i> =51)	16.0% ( <i>n</i> =30)	383
All Regions	54.2% ( <i>n</i> =410)	67.9% ( <i>n</i> =488)	27.9% ( <i>n</i> =211)	22.1% ( <i>n</i> =159)	17.9% ( <i>n</i> =135)	10.0% ( <i>n</i> =27)	1,475

\*Based on the question “How many vessels do you own that are used for fishing?”

As depicted in Table 2.7 below, respondents from the Mid-Atlantic reported owning and/or operating longer vessels than respondents from the other regions. To some extent this indicates the specific ocean conditions and operational demands of pursuing marketable species in or from the region. Notably, this set of questions did not address beam or width of vessel, which also is an indicator of level of investment and manner of use of the vessel in question. As can also be discerned from the table, the largest vessel owned by respondents who also own one or more

other fishing vessels tended to be ten to 15 feet longer than the smallest vessel in that fleet, suggesting multiple, potentially differing conditions, target species, gear, and so forth. A common scenario here would involve use of a larger vessel equipped to pursue pelagic or benthic species in relatively distant offshore waters, and use of the smaller vessel to pursue species of economic interest in the nearshore and/or inshore zones. This capacity has implications for the potential of commercial and for-hire operators to effectively adapt to regionally variable situations of biophysical, economic, or management-related change (Stoll et al., 2017), with further implications for fishing-specific response during the COVID-19 pandemic.

**Table 2.5 Vessel length overall among respondents owning a single fishing vessel\***

Council Region	LOA among Owners of a Single Commercial Fishing Vessel			
	Average LOA	Median LOA	Std. Deviation	valid <i>n</i>
Gulf of Mexico	31.8	27.5	13.8	88
Mid-Atlantic	34.3	27.0	16.8	104
New England	38.3	38.0	10.5	138
South Atlantic	31.6	22.0	18.7	77
All Regions	34.5	34.0	14.9	407
Council Region	LOA among Owners of a Single For-Hire Fishing Vessel			
Gulf of Mexico	28.4	25.0	9.2	118
Mid-Atlantic	39.1	38.0	11.0	144
New England	31.3	30.0	9.3	115
South Atlantic	29.5	25.0	11.2	111
All Regions	32.5	30.0	11.1	488

\*Based on the question “What is the length of your fishing vessel?”

**Table 2.6 Smallest vessel among commercial and for-hire respondents with multiple vessels\***

Council Region	LOA of Smallest Vessel for Owners of Multiple Commercial Fishing Vessels			
	Average LOA	Median LOA	Std. Deviation	valid <i>n</i>
Gulf of Mexico	24.8	20.0	15.6	96
Mid-Atlantic	28.6	23.0	15.9	74
New England	24.9	20.0	14.5	57
South Atlantic	21.1	19.0	8.6	117
All Regions	24.4	20.0	13.7	344
Council Region	LOA of Smallest Vessel for Owners of More than One For-Hire Fishing Vessel			
Gulf of Mexico	22.9	21.0	10.0	58
Mid-Atlantic	24.3	21.5	10.5	54
New England	22.4	20.5	6.7	42
South Atlantic	21.7	20.0	8.0	77
All Regions	22.7	20.0	8.9	231

\*Based on the question “What is the length of your smallest vessel (in feet)?”

Finally, Table 2.8 depicts the mean number of crew members reported to be working on the respondents' fishing vessel(s) at the time of the survey. These data also provide a basic indication of the size and nature of the sampled fishing operations, most of which are of a relatively limited scale, thereby requiring few crew members on board.

Although relatively small crew sizes do typify the vast majority of commerce-generating fishing operations along the East Coast and Gulf of Mexico, somewhat larger commercial harvest operations are also active in the regions. The sampling frames for the current project include pelagic charter fishing operations with far offshore capabilities, high-capacity head or party boats, and relatively large commercial operations that utilize longline, trawl, dredge, and other specialized gear. Each of these vessels require a larger number of crew members on board than typical for most fishing operations in the study regions. For instance, scallop dredge operations in the Mid-Atlantic region can involve up to seven crew members, given the challenges of the gear involved, and because shucking is done by hand at sea.

Of specific relevance in the context of this report, crew size also indicates the number of persons potentially exposed to COVID-19 and who may or may not be protected by appropriate/effective mitigation measures while on board. Obviously, size and configuration of vessel also come into play here, wherein more densely occupied vessels obviously are more problematic from a public health perspective than vessels operated alone or with relatively few trusted crew members. The variable nature of collaborative fishing activities and regional or operation-specific cultural factors are also important considerations in terms of social interaction during the pandemic.

**Table 2.7 Largest vessel among commercial and for-hire respondents with multiple vessels\***

Council Region	LOA of Largest Vessel among Owners of Multiple Commercial Fishing Vessels			
	Average LOA	Median LOA	Std. Deviation	valid <i>n</i>
Gulf of Mexico	35.3	31.0	17.8	96
Mid-Atlantic	45.1	40.5	22.4	74
New England	42.7	42.0	16.5	57
South Atlantic	31.3	25.0	14.0	116
Across Regions	37.3	32.0	18.3	343
Council Region	LOA of Largest Vessel among Owners of More than One For-Hire Vessel			
Gulf of Mexico	34.1	31.0	15.0	58
Mid-Atlantic	38.2	38.0	12.5	54
New England	37.2	33.5	15.9	42
South Atlantic	33.7	26.0	17.5	77
All Regions	35.5	31.0	15.6	231

\*Based on the question "What is the length of your largest vessel (feet)?"

**Table 2.8 Number of crew employed in the commercial harvest and for-hire sectors\***

Council Region	Number of Crew Members Working on Commercial Fishing Vessels			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	3.0	2	3.0	122
Mid-Atlantic	4.3	2	9.5	115
New England	2.0	2	1.6	142
South Atlantic	2.2	2	1.4	118
Across Regions	2.8	2	5.0	497
Council Region	Number of Crew Members Working on For-Hire Fishing Vessels			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	2.4	1	2.4	80
Mid-Atlantic	1.9	1	1.6	104
New England	2.5	1	3.7	74
South Atlantic	2.9	1	4.3	76
Across Regions	2.4	1	3.1	334

\*Based on the question: How many crew/employees do you currently employ on all your vessels combined (not including yourself)?

The present survey effort reveals that the median number of crew members was two for the commercial harvester sector, and one for the for-hire sector (Table 2.8). Readers are reminded that respondents owning and/or operating more than one vessel are likely to employ a relatively higher number of crew than owners and/or operators of single vessels. In most cases, the average overall number of crew members was above the median, and very clearly so in the Mid-Atlantic, as might be expected based on the above discussion regarding expanded crew requirements aboard vessels using certain gear types. The average number of crew members (approximately 4) was highest among commercial fishing operations active in the Mid-Atlantic region. The average number of crew members (approximately 3) employed in the for-hire sector was highest among operations active in the South Atlantic region. Considerable deviation from the mean number of crew members is noted, especially in relation to Mid-Atlantic commercial fishing operations and for-hire operations in the South Atlantic and New England regions.

### **2.1.2 Pandemic Impacts on Regional Commercial and For-Hire Fishing Sectors**

As noted earlier in this report, and as discussed in NMFS (2021) and other NOAA Fisheries research products (Benaka and Thunberg, 2021), the pandemic generated extensive fishery impacts across the nation’s coastal zones during the first six months of the event in the U.S. Indeed, the vast majority of business owners contacted during the first round of NOAA’s regional survey work reported that the pandemic and related stay-at-home orders, closures, and other mitigating measures had generated significant impacts to their fishing and seafood operations. Indeed, the following data and related discussion make clear that the overwhelming majority of commercial harvesters (87.7%) and for-hire operators (86.6%) experienced significant impacts to their fishing operations during the course of calendar year 2020 (Table 2.9).

The highest rates of reported impacts in the study region were documented among the Gulf of Mexico commercial harvest sector (90.4%) and the Gulf of Mexico for-hire sector (95%). While interactive effects between the pandemic and recent large-scale disasters cannot be established based on the survey data provided here, these are highly likely. Extremely disruptive disaster events occurring in the Gulf region just prior to the pandemic include but are not limited to the Bonnet Carre freshwater intrusion disaster in 2019, and major Hurricanes Hanna, Laura, Sally, Delta, and Zeta, which made landfall along the U.S. Gulf of Mexico coastline during 2020.

Perhaps the most cogent of pandemic impacts is the induced closure of a given fishing operation, however temporary. This first-year pandemic outcome was reported by 82% of commercial harvesters and 86.4% of for-hire operators responding to the survey, with little deviation across the study regions (Table 2.10). This speaks to the unprecedented cross-regional enormity and variable nature of domestic small business impacts related to COVID-19 (Wilmoth, 2021).

**Table 2.9 Percentage of commercial and for-hire operators reporting pandemic impacts\***

<b>Council Region</b>	<b>% Commercial Harvesters Reporting Impacts</b>	<b>% For-Hire Operators Reporting Impacts</b>	<b>valid <i>n</i> overall</b>
Gulf of Mexico	90.4 ( <i>n</i> =198)	95.0 ( <i>n</i> =179)	377
Mid-Atlantic	84.4 ( <i>n</i> =180)	86.2 ( <i>n</i> =196)	376
New England	87.9 ( <i>n</i> =199)	85.8 ( <i>n</i> =162)	361
South Atlantic	87.8 ( <i>n</i> =189)	87.5 ( <i>n</i> =192)	381
Across Regions	87.7 ( <i>n</i> =766)	86.6 ( <i>n</i> =729)	1,495

\*Based on the question “Has your fishing operation been affected by the COVID-19 pandemic?”

**Table 2.10 Percent of commercial and for-hire operators ceasing fishing due to pandemic\***

<b>Council Region</b>	<b>Commercial Harvesters Who Stopped Fishing</b>	<b>For-Hire Operators Who Stopped Fishing</b>	<b>valid <i>n</i> overall</b>
Gulf of Mexico	85.3 ( <i>n</i> =177)	86.9 ( <i>n</i> =168)	345
Mid-Atlantic	80.1 ( <i>n</i> =151)	85.7 ( <i>n</i> =168)	319
New England	77.6 ( <i>n</i> =173)	82.6 ( <i>n</i> =138)	311
South Atlantic	84.9 ( <i>n</i> =166)	86.9 ( <i>n</i> =168)	334
Across Regions	82.0 ( <i>n</i> =667)	86.4 ( <i>n</i> =642)	1,309

\*Based on the question “Did you stop fishing (operating) for any period of time due to the COVID-19 pandemic?”

Among respondents who reported that they stopped fishing due to the pandemic and related mitigation measures, more than half of respondents in both the commercial harvest (51.2%) and for-hire (59.2%) sectors reported suspending fishing activities for between one and three months (Table 2.11). Nearly 25% of respondents in both sectors reported suspending business operations for more than three months.

The pandemic was not without business casualties at the one-year mark, when approximately 2% of respondents reported having shut down operations entirely during calendar year 2020. Moreover, 7% of commercial harvest respondents and over 8% of for-hire respondents stated that they had not yet resumed operations at the one-year mark of the event. It should be noted here that such prolonged suspension of business activity has long-term implications for small business viability in any economic sector. While the ultimate fate of fishing businesses that were forced by circumstance to cease operating for prolonged periods of time is not readily known, pre-pandemic financial fragility coupled with pandemic impacts (and the effects of other regional and macro-level sources of change) during 2020 undoubtedly presented major challenges for many, and terminal challenges for some. See Bartik et al. (2020) for insightful discussion of this topic as it relates to small business establishments around the nation.

**Table 2.11 Reported duration of suspended commercial and for-hire fishing operations\***

Duration of Suspended Fishing Activities	% of Commercial Fishery Respondents Reporting Suspended Ops				
	Gulf of Mexico	Mid-Atlantic	New England	South Atlantic	All Regions
Less than 1 month	10.1% (n=15)	18.1% (n=21)	17.4% (n= 23)	13.9% (n=19)	14.6% (n=78)
1 to 3 months	42.6% (n=63)	55.2% (n=64)	59.8% (n=79)	48.9% (n=67)	51.2% (n=273)
More than 3 months	33.8% (n=50)	19.0% (n=22)	18.2% (n=24)	26.3% (n=36)	24.8% (n=38)
Indefinitely, to resume	9.5% (n=14)	6.9% (n= 8)	4.5% (n=6)	7.3% (n=10)	7.1% (n=38)
Went out of business	4.1% (n=6)	0.9% (n=1)	0.0% (n=0)	3.6% (n=5)	2.3% (n=5)
Duration of Suspended Fishing Activities	% of For-Hire Respondents Reporting Suspended Ops				
	Gulf of Mexico	Mid-Atlantic	New England	South Atlantic	All Regions
Less than 1 month	4.9% (n=7)	7.7% (n=11)	10.6% (n=12)	6.0% (n=9)	7.1% (n=39)
1 to 3 months	63.2% (n=91)	58.0% (n=64)	57.5% (n=65)	57.7% (n=86)	59.2% (n=325)
More than 3 months	24.3% (n=35)	22.4% (n=22)	11.5% (n=13)	30.9% (n=46)	23.0% (n=126)
Indefinitely, to resume	5.6% (n=8)	9.1% (n=8)	17.7% (n=20)	4.0% (n=6)	8.6% (n=47)
Went out of business	2.1% (n=3)	2.8% (n=4)	2.7% (n=3)	1.3% (n=2)	2.2% (n=12)

\*Based on the follow-up question “For how long did you stop fishing?”

In addition to prolonged suspension and even cessation of business activity, the pandemic and related factors also induced reductions in the extent of day-to-day fishing operations. When calculated for the full sample in relation to levels of activity achieved during 2019, commercial



harvesters reported a 57.1% reduction in overall activity during 2020. For-hire respondents reported even greater changes, with stated reductions reaching 63.9% for this sector (Table 2.12).

**Table 2.12 Reported reductions in business: commercial harvest and for-hire sectors\***

Council Region	% Reduction in Commercial Fishing Activity			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	50.2	50	24.5	158
Mid-Atlantic	57.9	60	23.2	144
New England	63.9	70	25.4	160
South Atlantic	56.5	60	24.4	158
All Regions	57.1	60	25.1	620
Council Region	% Reduction in For-Hire Fishing Activity			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	51.1	55	22.9	159
Mid-Atlantic	55.2	50	23.7	148
New England	56.4	60	26.6	119
South Atlantic	59.3	60	25.1	155
All Regions	55.4	60	24.6	581

\*Based on the Question “On a scale of 0% to 100%, at what level of fishing activity did you operate at for calendar year 2020 in comparison to calendar 2019?”

**Table 2.13 Reported changes in business performance between July and December 2020\***

Council Region	Reported Performance Changes Since July: Commercial Harvesters			
	% Improved	% Stayed Same	% Worsened	Overall <i>n</i>
Gulf of Mexico	17.0 (n=30)	33.5 (n=59)	49.4 (n=87)	166
Mid-Atlantic	19.3 (n=59)	32.0 (n=48)	48.7 (n=73)	166
New England	42.5 (n=87)	28.1 (n=47)	29.3 (n=49)	136
South Atlantic	29.6 (n=48)	24.7 (n= 40)	45.7 (n=74)	166
All Regions	27.2 (n=148)	29.6 (n=194)	43.2 (n=283)	634
Council Region	Reported Performance Changes Since July 2020: For-Hire Operators			
	% Improved	% Stayed Same	% Worsened	Overall <i>n</i>
Gulf of Mexico	42.2% (n=70)	27.7 (n=46)	30.1 (n=50)	166
Mid-Atlantic	36.1% (n=60)	30.1 (n=50)	33.7 (n=56)	166
New England	39.0% (n=53)	34.6 (n=47)	26.5 (n=36)	136
South Atlantic	48.8% (n=81)	27.7 (n=46)	23.5 (n=39)	166
All Regions	41.6% (n=264)	29.8 (n=189)	28.5 (n=181)	634

\*Based on the question “Since July 2020, has your fishing business improved, stayed the same, or gotten worse in comparison to the first half of 2020 (January – June 2020)?”

As can be seen in Table 2.13, the overall majority of commercial harvesters participating in the survey stated that fishing business worsened during the last two quarters of 2020. The sole regional exception relates to the New England sample, with the majority of respondents in this

region stating that business performance levels had actually improved during the period. The source of improvement is not readily apparent, although a regionally specific increase in landings revenue (relative to a 2015-2019 baseline) was documented only in the Northeast study region during calendar 2020; this occurred in October of that year (NMFS, 2021). Notably the vast majority of for-hire fishery respondents reported improved business performance during the third and fourth quarters of 2020.

The COVID-19 pandemic has forced a rapid paradigm shift in global human behavior. The direct human health effects of COVID-19, along with individual, cultural, and governmental response to the disease, have forced an encompassing shift in long-standing patterns of social interaction. All manner of industry and small business activity has been affected at home and abroad. Marine fisheries are no exception, and the facts that (a) the virus is transmitted largely through respiration at close proximity, (b) small fishing vessels often force social interaction at close proximity, and (c) the domestic industry is highly reliant on global supply chains, combine to render the industry particularly vulnerable to problematic pandemic impacts. This section of the report draws from survey data and supporting literature to examine some of the ways the pandemic is affecting the experiences of commercial harvesters and owners/operators of for-hire operations around the regions.

Table 2.14 is a percent frequency table depicting the reported incidence of indirect pandemic effects among respondents in commercial harvest and for-hire fishing sectors. Of note in the table is the particular importance respondents appear to place on the costs of personal protective equipment (PPE—masks or other virus-mitigating items). This item was included in the exercise since, during the first year of the pandemic, quality masks were relatively scarce and subject to cost uncertainties, though not well-understood or specified in terms of mitigating effect (e.g., see WHO, 2020; OECD, 2020). As can be noted in the table, the incidence of this effect was very frequently indicated by respondents. This may relate in part to the fact the timing of the survey discussed in this report coincided with a requirement issued by the Centers for Disease Control and Prevention that masks be universally worn on all public conveyances, including commercial and for-hire fishing vessels (Centers for Disease Control and Prevention, 2021b). This mandate became effective on February 3, 2021. Frequently selected pandemic effects occurring during the first year of the event also include: outcomes from government restrictions, reductions in the number of fishing trips that could be taken, and additional effects not specified by respondents.

The survey also provided an opportunity for business owners and/or operators in both the commercial harvest and for-hire sectors to assess which pandemic-generated factors had the greatest effect on their fishing operations during calendar year 2020. The results are provided in Table 2.15. Factors deemed by respondents to be particularly impactful across both regions and sectors include: (a) government restrictions (incorporating requisite health and safety measures such as masking); (b) difficulty retaining crew members (due in parts to disease, fears of disease, disease-mitigating restrictions, and alternate income sources); (c) the costs of personal protective equipment; and (d) difficulty identifying sources of bait for use during regular fishing operations.

Travel to and from coastal and other tourist destinations was officially limited in some states around the nation during the first half of 2020. Travel was also constrained by public concerns about the disease. As such, and as discussed earlier in this report, patronage of hotels, restaurants, and bars across the coastal study regions declined. Patronage of such establishments by local residents also declined. These eventualities disrupted formerly reliable economic connections between commercial harvesters, seafood dealers, and restaurateurs. As indicated in NMFS (2021), the problem appears to have been offset—at least to some extent—by increasing retail sales of seafood associated with expanded patterns of home consumption. Moreover, the problem diminished somewhat in certain regions as periods of lockdowns and closures eased and as citizens slowly adapted to or at least accepted the challenges of the new global situation.

**Table 2.14 Incidence of pandemic effects among commercial and for-hire fishing operations\***

Select Pandemic Effects	% of Commercial Harvesters Reporting Effect				
	Gulf of Mexico (n=176)	Mid-Atlantic (n=151)	New England (n=172)	South Atlantic (n=164)	All Regions (n=663)
Difficulty Finding Bait/Supplies	5.7%	3.3%	12.8%	4.9%	6.8%
Difficulty Accessing Facilities	1.1%	0.7%	1.7%	0.6%	1.1%
Affected by Gov't Restrictions	4.5%	6.6%	5.2%	9.8%	6.5%
Told Not to Fish (e.g., by owner)	1.1%	4.6%	4.7%	1.2%	2.9%
Seafood Market or Pricing Issues	11.9%	14.6%	15.1%	14.0%	13.9%
Loss of Crew Members	9.7%	15.9%	15.7%	15.9%	14.2%
Affected by Costs for PPE	24.4%	26.5%	23.8%	22.0%	24.1%
Had to Reduce Number of Trips	14.8%	9.3%	8.7%	11.6%	11.2%
Unspecified Other††	26.7%	18.5%	12.2%	20.1%	19.5%
Select Pandemic Effects	% of For-Hire Operators Reporting Effect				
	Gulf of Mexico (n=169)	Mid-Atlantic (n=167)	New England (n=137)	South Atlantic (n=165)	All Regions (n=638)
Difficulty Finding Bait/Supplies	4.7%	1.2%	0.7%	1.2%	2.0%
Difficulty Accessing Facilities	1.8%	0.6%	2.2%	1.8%	1.6%
Affected by Gov't Restrictions	20.7%	18.0%	17.5%	20.6%	19.3%
For-hire Market or Pricing Issues	10.7%	2.4%	2.2%	6.1%	5.5%
Loss of Crew Members	5.9%	9.0%	7.3%	6.1%	7.1%
Affected by Costs for PPE	18.9%	36.5%	34.3%	23.6%	28.1%
Had to Reduce Number of Trips	20.7%	9.0%	8.8%	15.8%	13.8%
Unspecified Other††	16.6%	23.4%	27.0%	24.8%	22.7%

\*Based on the question “How were your normal business operations affected by the COVID 19 pandemic over the entire calendar year compared to the 2019 calendar year if only temporarily? (check all that apply)” †Including fishing gear, ice, parts, and other elements essential to commercial and for-hire fishing operations.

Failing linkages between for-hire fishery participants and hotels or other businesses advocating guide, charter, and head boat-based fishing opportunities undoubtedly also generated business problems in the for-hire sector. But such problems clearly also occurred among independent for-hire fishery participants as well, only some of whom were adequately prepared to accommodate numerous patrons on-board. But again, problems began to diminish as patrons and captains began to adapt. Certain captains were observed stressing the positive aspects of the open-air fishing experience, and certain patrons were observed either ignoring common concerns or adapting with masks or seeking trips involving few fellow patrons. In any event, patterns of business were anomalous when viewed in relation to calendar year and portions thereof, with impact and slow recovery from impact characterizing the year in total.

**Table 2.15 Top fishing-specific factors impacting commercial and for-hire fishing businesses\***

Top Impacting Factors	% Incidence of Factors Having the Greatest Impact on Commercial Fishing Businesses				
	Gulf of Mexico (n=79)	Mid-Atlantic (n=71)	New England (n=79)	South Atlantic (n=79)	All Regions (n=308)
Loss of Crew Members	22.8%	22.5%	31.6%	25.3%	25.6%
Reduced Number of Trips	7.6%	26.8%	19.0%	22.8%	18.8%
Government Restrictions	17.7%	14.1%	3.8%	19.0%	13.6%
Finding Bait	7.6%	11.3%	17.7%	2.5%	9.7%
PPE Costs	19.0%	2.8%	8.9%	7.6%	9.7%
Top Impacting Factors	% Incidence of Factors Having the Greatest Impact on For-Hire Fishing Businesses				
	Gulf of Mexico (n=61)	Mid-Atlantic (n=81)	New England (n=67)	South Atlantic (n=65)	All Regions (n=274)
Government Restrictions	45.9%	40.7%	35.8%	35.4%	39.4%
PPE Costs	8.2%	21.0%	20.9%	12.3%	16.1%
Loss of Crew	8.2%	12.3%	11.9%	16.9%	12.4%
Finding Bait	13.1%	8.6%	9.0%	12.3%	10.6%
Marina Access	9.8%	2.5%	4.5%	6.2%	5.5%

\*Based on the request “For those factors affecting your business, please select the top three”

Tables 2.16 and 2.17 provide additional measures of pandemic-induced disruption to normal patterns of fishing and associated business activity. Table 2.16 depicts rates of change in employment of crew members and other participants during calendar year 2020. Notably, only 11 of the 1,291 owners and/or operators responding to the question “Has the number of crew/employees changed because of the COVID 19 pandemic?” reported any increase in the number of persons on the payroll since the pandemic started. The majority of respondents reported no change in the number of employees kept on the payroll, with the remainder reporting losses in this regard. As such, hiring was essentially frozen during the period. As can be noted in Table 2.17, employee losses per operation were particularly high in the Gulf of Mexico commercial harvest sector, and South Atlantic for-hire sector.

**Table 2.16 Reported changes in employment of crew members and other workers\*†**

Council Region	Commercial Fishing Sector		For-Hire Fishing Sector	
	% Reporting No Change	% Reporting Decrease	% Reporting No Change	% Reporting Decrease
Gulf of Mexico	60.2%	38.1%	80.7%	18.1%
	(n=176)		(n=166)	
Mid-Atlantic	67.5%	31.8%	81.6%	17.7%
	(n=173)		(n=158)	
New England	75.1%	24.3%	78.1%	21.2%
	(n=130)		(n=137)	
South Atlantic	67.7%	31.1%	81.9%	18.1%
	(n=111)		(n=166)	
All Regions	67.6%	31.3%	80.7%	18.7%
	(n=664)		(n=627)	

\*Based on the question: “Has the number of crew/employees changed because of the COVID 19 pandemic?” †Valid n overall=1,291.

**Table 2.17 Reported employee losses during calendar year 2020\***

Council Region	Reported # of Employees Lost per Commercial Fishing Operation			
	Average	Median	Std. Deviation	valid n
Gulf of Mexico	3.1	2	3.2	52
Mid-Atlantic	2.4	2	3.04	41
New England	1.8	1	1.4	36
South Atlantic	2.2	2	1.7	36
All Regions	2.5	2	2.6	165
Council Region	Reported # of Employees Lost per For-Hire Fishing Operation			
	Average	Median	Std. Deviation	valid n
Gulf of Mexico	2.4	2	1.6	25
Mid-Atlantic	2.4	2	1.9	26
New England	2.3	2	1.5	23
South Atlantic	3.0	2	2.4	25
All Regions	2.5	2	1.9	99

\*Based on the question “How many fewer people have you employed?” †Among those captains or owners reporting changes in employee status; counts of responding harvesters are provided in parentheses (valid n overall=264).

As noted previously, existing patterns of social and economic interaction within and between commercial fishing and seafood sectors were seriously disrupted, particularly during the first six months of the pandemic. This, in turn, relates to linkages with the larger economy and society, obviously also compromised by the pandemic in various ways. Far fewer citizens were eating out and traveling during 2020 than in previous years and decades, with detrimental implications for businesses that normally land, process, and provide seafood products. Although the overall industry began to experience an increase in business activity during the second and third quarters of the year, this clearly did not offset the revenue losses documented for the entire year.

Indeed, as can be seen in Table 2.18, a very small percentage of survey participants (<3% of commercial harvesters and <5% of for-hire operators) reported any gain in revenue above that of the same (non-pandemic) time period in 2019. The overwhelming majority (nearly 90% of respondents in both fishing sectors), reported loss of revenue during calendar year 2020. Reported percentage losses were considerable (Table 2.19), with respondents reporting a nearly 46% reduction in revenue in the overall commercial harvest sector, and 45% in the overall for-hire sector, when compared with revenues earned in 2019.

**Table 2.18 Reported changes in commercial fishing revenue: calendar year 2020\*†**

Council Region	% of Respondents Reporting Changes in Commercial Fishing Revenue		
	No Change	Revenue Gain	Revenue Loss
Gulf of Mexico (n=179)	8.4%	3.9%	87.7%
Mid-Atlantic (n=151)	6.6%	2.0%	91.4%
New England (n=173)	8.1%	1.2%	90.8%
South Atlantic (n=164)	9.8%	2.4%	87.8%
All Regions (n=667)	8.2%	2.4%	89.4%
Council Region	% of Respondents Reporting Changes in For-Hire Fishing Revenue		
	No Change	Revenue Gain	Revenue Loss
Gulf of Mexico (n=167)	6.0%	0.0%	94.0%
Mid-Atlantic (n=166)	3.0%	7.2%	89.8%
New England (n=139)	10.1%	4.3%	85.6%
South Atlantic (n=166)	9.6%	4.8%	85.5%
All Regions (n=638)	7.1%	4.1%	88.9%

\*Based on the question: “During calendar year 2020 (January-December), how were your revenues affected by the COVID-19 pandemic?”

Across all regions reported nominal revenue losses for calendar year 2020 averaged over \$200,000 for commercial harvesters and just over \$90,000 for for-hire operators (Table 2.20). Notably, average revenue losses for both commercial and for-hire operators in the Gulf of Mexico was nearly identical at \$158,000. In all other regions, for-hire average revenue losses were less than that of commercial harvesters, although these differences are much less pronounced at median revenue losses across regions and sectors.

While revenue loss was nearly universal among fishery respondents within and across the study regions, reported rates of application for and receipt of financial assistance were relatively low. With the exception of New England commercial harvesters and Gulf of Mexico for-hire operators, barely half of the overall pool of respondents requested assistance during calendar year 2020 (Table 2.21). The most commonly requested forms of assistance were the Paycheck Protection program and standard unemployment benefits. About 9% of respondents in the commercial harvest sector, and 12% of respondents in the for-hire sector applied for but were deemed ineligible for financial assistance.

**Table 2.19 Percentage change in revenue: commercial harvesters and for-hire operators\***

Council Region	Percent Reduction in Revenue: Commercial Harvest Sector			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	51.4	50.0	23.1	142
Mid-Atlantic	46.6	42.5	20.6	130
New England	38.2	30.0	22.5	144
South Atlantic	45.7	40.0	24.2	139
All Regions	45.4	40.0	23.1	555
Council Region	Percent Reduction in Revenue: For-Hire Fishing Sector			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	49.1	45.0	23.0	152
Mid-Atlantic	50.5	50.0	25.4	143
New England	52.5	50.0	29.9	116
South Atlantic	48.0	40.0	25.0	137
All Regions	49.9	45.0	25.7	548

\*Based on the questions: “By what percent would you say your calendar year 2020 revenues have decreased compared to calendar year 2019?”

**Table 2.20 Reported reductions in fishing revenue: commercial harvest and for-hire sectors\***

Council Region	Reductions in Commercial Fishing Revenue, in Dollars			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	\$158,500	\$40,000	\$66,584	103
Mid-Atlantic	\$118,903	\$30,000	\$19,816	93
New England	\$333,106	\$60,000	\$173,340	110
South Atlantic	\$204,590	\$24,000	\$95,936	103
All Regions	\$208,064	\$35,000	\$107,690	409
Council Region	Reductions in For-Hire Fishing Revenue, in Dollars			
	Average	Median	Std. Deviation	valid <i>n</i>
Gulf of Mexico	\$158,241	\$30,000	\$94,076	114
Mid-Atlantic	\$80,081	\$23,000	\$22,245	105
New England	\$44,004	\$20,000	\$7,349	81
South Atlantic	\$62,915	\$25,000	\$13,350	100
All Regions	\$90,759	\$25,000	\$52,059	400

\*Based on the question: “What is your dollar estimate of the change in calendar year 2020 revenues compared to calendar year 2019?”

Disaster situations are known to generate profound social and psychological impacts among certain persons who are dependent on the harvest of natural resources (Bene et al., 2015). Various mechanisms can be used to help the affected persons cope with such major life disruptions, including important mediating social connections, such as family, friends, church, and community (Clay et al., 2016). The COVID-19 pandemic may be seen as a type of

prolonged disaster that disrupts normal lifeways on a persistent and shifting basis over time, with the potential for a variety of immediate and lingering personal and social challenges.

**Table 2.21 Receipt of financial assistance in the commercial and for-hire fishing sectors\***

Type of Assistance	% of Commercial Fishing Respondents Receiving Assistance				
	Gulf of Mexico n=168	Mid-Atlantic n=140	New England n=167	South Atlantic n=152	Across Regions n=627
Bank Loan/Credit	2.4%	5.0%	1.2%	4.6%	3.2%
SBA Loans	4.8%	3.6%	4.8%	2.6%	4.0%
Paycheck Protection	6.5%	10.7%	21.0%	6.6%	11.3%
Unemployment Benefits	13.7%	11.4%	17.4%	4.6%	12.0%
Other Assistance	4.2%	12.9%	19.8%	12.5%	12.3%
Denied Assistance	10.7%	8.6%	5.4%	15.1%	9.9%
None Requested	57.7%	47.9%	30.5%	53.9%	47.4%
Type of Assistance	% of For-Hire Fishing Respondents Receiving Assistance				
	Gulf of Mexico n=160	Mid-Atlantic n=157	New England n=131	South Atlantic n=161	Across Regions n=609
Bank Loan/Credit	2.5%	1.9%	1.5%	1.9%	2.0%
SBA Loans	13.8%	1.9%	3.1%	7.5%	6.7%
Paycheck Protection	10.6%	5.7%	9.2%	5.0%	7.6%
Unemployment Benefits	10.0%	7.6%	14.5%	11.8%	10.8%
Other Assistance	6.3%	8.9%	7.6%	8.1%	7.7%
Denied Assistance	16.3%	11.5%	9.9%	11.8%	12.5%
None Requested	40.6%	62.4%	54.2%	54.0%	52.7%

\*Based on the request “Please indicate if this business has received loans/financial assistance from any of the following since January 2020 (check all that apply).”

Table 2.22 depicts some of the important social, psychological, and economic means survey respondents were using to cope with the pandemic and associated challenges during calendar year 2020. The importance of social connections is made clear in the table, especially with regard to relief provided through connections with family and friends. It is also notable that respondents reported relying on their own personal savings as a particularly important means for addressing the pandemic-related problems and challenges. Notably, a substantial number of respondents also reported coping with the pandemic by undertaking other forms of employment. The importance of such coping mechanisms are underscored in Table 2.23, which reveals that family and friends, personal savings, other forms of employment, and government assistance were almost universally chosen, in that order, as the most important mechanisms for addressing pandemic challenges during calendar year 2020.



Pandemic-induced economic problems were mitigated to varying extents during calendar year 2020 by the federal Paycheck Protection Program. Enacted through the Coronavirus Aid, Relief, and Economic Security (CARES) Act, and administered through the Small Business Administration (SBA), disbursement of an initial programmatic allotment of some \$349 billion during April 2020 helped offset pandemic problems in households across the nation. Notably, while the CARES Act eventually provided for economic relief specifically among qualifying fishery participants, these funds were not yet available in 2020.

**Table 2.22 Coping mechanisms used by those in the commercial and for-hire fishing sectors\***

Type of Coping Mechanism	% of Commercial Fishing Respondents Utilizing One or More Coping Mechanism				
	Gulf of Mexico n=76	Mid-Atlantic n=76	New England n=122	South Atlantic n=74	All Regions n=348
Family and Friends	13.9%	11.3%	13.6%	17.5%	14.1%
Church, Community Groups	4.6%	5.6%	3.0%	6.9%	5.0%
Employees or Crew	0.6%	4.2%	1.2%	3.1%	2.2%
Fishing Association, Co-op	1.7%	1.4%	5.3%	3.1%	3.0%
Government Assistance	7.5%	5.6%	8.3%	2.5%	6.1%
Personal Savings	32.9%	38.7%	33.1%	34.4%	34.6%
Worked a Different Job	22.5%	18.3%	18.3%	19.4%	19.7%
Other Mechanisms	16.2%	14.8%	17.2%	13.1%	15.4%
Type of Coping Mechanism	% of For-Hire Fishing Respondents Utilizing One or More Coping Mechanism				
	Gulf of Mexico n=101	Mid-Atlantic n=65	New England n=61	South Atlantic n=79	All Regions n=306
Family and Friends	14.5%	17.0%	11.2%	16.0%	14.8%
Church, Community Groups	2.4%	1.3%	0.7%	5.6%	2.6%
Employees or Crew	2.4%	0.6%	1.5%	3.1%	1.9%
Fishing Association, Co-op	1.2%	1.9%	6.0%	0.6%	2.3%
Government Assistance	4.2%	1.9%	6.7%	3.7%	4.0%
Personal Savings	38.2%	25.8%	21.6%	35.2%	30.6%
Worked a Different Job	18.8%	36.5%	32.8%	21.0%	26.9%
Other Mechanisms	18.2%	15.1%	19.4%	14.8%	16.8%

\*Based on the question “What has helped you cope personally with the effects of the COVID 19 pandemic? (select all that apply).”

**Table 2.23 Coping mechanisms most helpful to commercial and for-hire sectors\***

Coping Mechanisms	% Distribution of Top 3 Coping Mechanisms Used by Commercial Fishing Respondents				
	Gulf of Mexico n=72	Mid-Atlantic n=74	New England n=95	South Atlantic n= 76	All Regions n=317
1. Family and Friends	38.9%	36.5%	46.3%	32.9%	39.1%
2. Personal Savings	27.8%	28.4%	23.2%	31.6%	27.4%
3. Government Assistance	11.1%	8.1%	11.6%	10.5%	10.4%
3. Worked a Different Job	11.1%	6.8%	6.3%	18.4%	10.4%
Coping Mechanisms	% Distribution of Top 3 Coping Mechanisms Used by For-Hire Fishing Respondents				
	Gulf of Mexico n=84	Mid-Atlantic n=76	New England n=67	South Atlantic n=85	All Regions n=312
1. Family and Friends	39.3%	43.4%	38.8%	38.8%	40.1%
2. Personal Savings	36.9%	23.7%	20.9%	28.2%	27.9%
3. Worked a Different Job	6.0%	18.4%	22.4%	14.1%	14.7%

\*Based on the question “Which has been the most helpful to you in coping with the effects of the COVID-19 pandemic?”

## 2.2 Seafood Processing and Distribution Sectors

Persons involved in the commercial harvesting of seafood are, in business terms, typically highly reliant on those who own and/or operate seafood processing firms, wholesale and retail seafood markets and marketing businesses, and firms that otherwise specialize in the transportation and distribution of seafood products. This overall constellation of firms and services is alternatively termed the seafood business sector and the seafood processing and distribution sector in this report.

### 2.2.1 Characteristics of the Sample

As depicted in Table 2.24, survey participants active in the seafood business sector are fairly evenly distributed between (a) seafood dealers, first receivers, and wholesalers, and (b) persons who perform each of these roles in conjunction with seafood processing. In keeping with the multiple roles typically undertaken by persons involved in this overall sector, relatively few respondents report involvement solely in processing activities that variously include icing, cleaning, shucking, scaling, butchering, packaging, and otherwise preparing safe and marketable seafood for consumption. As can be noted in Table 2.25, virtually all respondents report extensive experience in their manner of seafood business, ranging from nearly 22 years of experience in the Mid-Atlantic to nearly 30 years in the South Atlantic region.

**Table 2.24 Type of seafood business in which the respondent is presently engaged\***

Council Region	Type of Business in the Processing and Distribution Sector*			valid <i>n</i>
	% Dealers/First Receivers/Wholesalers	% Processors Only	% Both Dealers and Processors	
Gulf of Mexico	50.0	3.4	46.6	146
Mid-Atlantic	62.5	4.2	33.3	24
New England	52.9	1.5	45.6	68
South Atlantic	35.3	3.9	35.3	51
Across Regions	59.4	3.1	43.3	289

\*Based on the question “What kind of business do you engage in?” †Percentage of regional total, not including respondents who preferred not to answer.

**Table 2.25 Average years of experience in specific seafood business operations\***

Council Region	Average Years of Experience	Median Years of Experience	Std. Deviation	valid <i>n</i>
Gulf of Mexico	23.2	20.0	15.2	153
Mid-Atlantic	21.9	20.0	14.7	26
New England	24.8	25.0	14.8	71
South Atlantic	29.0	30.0	14.1	55
Across Regions	24.5	22.0	15.0	395

\*Based on the follow-up question “How many years of experience do you have with this business?”

Table 2.26 depicts the broad regions in which owners and/or operators of the sampled businesses tend to market and distribute their seafood products. The survey data provided here reveal that most such persons market their products within their home state or territory, with fewer marketing elsewhere in the nation. Of note in the table is the relatively high percentage of New England-based respondents who market nationally and internationally. In other regions, 22% to 38% of the respondents sell at least some of their products in national market settings, although no more than 9% of respondents distribute to markets outside the U.S.

**Table 2.26 Seafood marketing destinations\***

Council Region	Area(s) Where Seafood is Marketed*			valid <i>n</i>
	% One State/Territory	% Nationally	% Internationally	
Gulf of Mexico	77.0	22.3	4.7	148
Mid-Atlantic	76.9	26.9	7.7	26
New England	55.6	45.8	22.2	72
South Atlantic	60.0	38.2	9.1	55
Across Regions	68.8	31.2	10.0	301

\*Based on the question “Where do you market your product? – (Check all that apply)”

Table 2.27 reports employment by seafood processing and distribution firms across the samples. As can be noted here, at the time of the survey, the average number of reported on-site employees ranged from about six among seafood processing and distribution firms in the South Atlantic region, to 13 in the Mid-Atlantic region.

**Table 2.27 Employment patterns among regional seafood processing and distribution firms\***

Council Region	Average Number of Employees	Median Number of Employees	Std. Deviation	valid <i>n</i>
Gulf of Mexico	9.2	3	25.1	125
Mid-Atlantic	12.8	4	45.4	24
New England	6.9	3	9.8	61
South Atlantic	5.9	2	9.4	46
Across Regions	9.2	3	23.4	256

\*Based on the question “How many full-time/part-time people do you currently employ on-site (not including yourself)?”

### 2.2.2 Pandemic Impacts in the Seafood Processing and Distribution Sectors

During the early months of the pandemic, and while implementation of response strategies intended to diminish transmission of the virus were first being implemented, regional fisheries were heavily affected in a variety of ways. Impacts lingered and evolved throughout the year. As such, 85% of respondents active in the seafood processing and distribution sectors of the commercial fishing industry reported experiencing impacts from the COVID-19 pandemic during calendar year 2020 (Table 2.28). A particularly high percentage of respondents (96%) in the Mid-Atlantic region reported pandemic impacts. By contrast, 82% of respondents operating and/or owning seafood processing and distribution businesses around the Gulf of Mexico reported pandemic impacts during calendar year 2020.

**Table 2.28 Percentage of businesses impacted by the pandemic during calendar year 2020\***

Council Region	% of Dealer Processors Impacted	% of Dealer Processors Not Impacted	valid <i>n</i>
Gulf of Mexico	82.2%	17.8%	152
Mid-Atlantic	96.0%	4.0%	25
New England	86.1%	13.9%	72
South Atlantic	87.0%	13.0%	54
All Regions	85.1%	14.9%	303

\* Based on the question “Has your business operations been affected by the COVID-19 pandemic?”

The percentage distribution of respondents reporting cessation of business operations is depicted in Table 2.29. Despite the relatively low reported overall incidence of pandemic impacts among Gulf of Mexico-based respondents active in the seafood sector, a relatively high percentage (55.2%) of business owners/operators in the same region reported business closures during 2020. This indicates regional variation in closures as a viable response to the pandemic and a concurrently widespread incidence of impacts. Meanwhile, a relatively small percentage of business owners and/or operators in the Mid-Atlantic region reported ceasing operations during calendar year 2020, with this outcome potentially relating to somewhat greater stability in seafood market conditions in that study region.

Among seafood processing and distribution operations that did close for some period of time, the majority were closed for one to three months (Table 2.30). Nearly 31% of businesses in the Gulf of Mexico were closed for more than three months and just over 4% of Gulf of Mexico-based seafood distributor/processors permanently closed during 2020 due to the pandemic. Similarly, almost 5% of firms closed permanently in the South Atlantic region. By contrast, none of the responding seafood distributor/processors reported going out of business in the New England or Mid-Atlantic regions.

**Table 2.29 Percent of respondents in processing and distribution sectors ceasing operations\***

<b>Council Region</b>	<b>% of Business Owners Stopping Operations Due to the Pandemic</b>	<b>valid <i>n</i></b>
Gulf of Mexico	55.2	125
Mid-Atlantic	34.8	23
New England	46.8	62
South Atlantic	48.9	47
All Regions	50.2	257

\*Based on the question “Did you have to close your business operations at all due to the COVID-19 pandemic?”

**Table 2.30 Duration of business closures: seafood processing and distribution firms\***

<b>Council Region</b>	<b>&lt;1 month</b>	<b>1-3 months</b>	<b>&gt; 3 months</b>	<b>Closed Indefinitely</b>	<b>Closed Permanently</b>	<b>valid <i>n</i></b>
Gulf of Mexico	13.2%	42.6%	30.9%	8.8%	4.4%	68
Mid-Atlantic	25.0%	62.5%	12.5%	0.0%	0.0%	8
New England	21.4%	50.0%	17.9%	10.7%	0.0%	28
South Atlantic	19.0%	57.1%	4.8%	14.3%	4.8%	21
All Regions	16.8%	48.0%	22.4%	9.6%	3.2%	125

\*Based on the question “For how long did you close your business?”

The impacts of business closures throughout 2020 are reflected in Table 2.31. Here readers may note major reductions of overall business activity in all study regions as a result of the pandemic, with a range of between -64% among respondents based in the Mid-Atlantic, and -55% among respondents based in New England. The percent reduction in sector-specific business activity overall was -58%. Notably, as shown in Table 2.32, nearly 40% of respondents reported that business activity had worsened during the last two quarters of 2020 when compared to performance during the first part of the year.

**Table 2.31 Reported reduction in seafood business activity: 2019 and 2020 compared\***

Council Region	Average % Reduction	Median % Reduction	Std. Deviation	valid <i>n</i>
Gulf of Mexico	-56.6	-50.0	26.6	120
Mid-Atlantic	-63.8	-70.0	24.1	24
New England	-55.1	-56.0	26.7	60
South Atlantic	-61.5	-60.0	27.5	45
Across Regions	-57.8	-60.0	26.6	249

\*Based on the question “On a scale of 0% to 100%, at what level of business activity did you operate during calendar year 2020 in comparison to calendar year 2019?”

**Table 2.32 Change in business performance: first and second half of 2020 compared\***

Council Region	No Change	Improved	Worsened	valid <i>n</i>
Gulf of Mexico	26.8	31.7	41.5	123
Mid-Atlantic	25.0	29.2	45.8	24
New England	24.6	42.1	33.3	57
South Atlantic	32.6	30.2	37.2	42
Across Regions	27.1	33.6	39.3	258

\*Based on the question “Since July of 2020, has your fishing business improved, stayed the same, or gotten worse in comparison to the first half of 2020 (January–June 2020)?”

Survey respondents report that their seafood business operations were impacted by a variety of factors during the pandemic. As depicted in Table 2.33, “government restrictions” were most consistently identified as having affected seafood businesses during the first year of the pandemic in the U.S.

**Table 2.33 Principal factors impacting regional seafood processing and distribution firms\***

Factors Impacting Operations	% of Respondents Reporting Factor as Most Impactful				
	Gulf of Mexico <i>n</i> =66	Mid-Atlantic <i>n</i> =15	New England <i>n</i> =39	South Atlantic <i>n</i> =22	Overall <i>n</i> =142
Government Restrictions	33.3	10.5	30.8	18.2	27.4
Cost of PPE Measures	15.2	31.6	7.7	27.3	17.1
Reduced Business Hours	15.2	31.6	2.6	31.8	16.4
Loss of Employees	16.7	10.5	17.9	0.0	13.7
Low Seafood Market Prices	10.6	10.5	20.5	9.1	13.0
All Other	9.1	5.3	20.5	13.6	12.3

\*Based on the “Of the COVID 19 factors that affecting your business, choose the top three that have had the largest impact on your business during 2020?”

As can be seen in Table 2.34, about 40% percent of all respondents active in the seafood processing and distribution sector reported that they were forced by the pandemic to lay off at least some of their employees. This outcome was widely considered to be an unfortunate but

necessary measure for keeping businesses viable until conditions improved. The proportion of respondents reporting layoffs ranged from 33% among Mid-Atlantic-based respondents to 48% of respondents based in New England.

Among the 87 respondents who reported a loss in the number of persons employed by their business, those in the Mid-Atlantic reported losing the greatest number during 2020 (about 8 employees on average). This is depicted in Table 2.35. Notably, an average of nearly six persons per business in this sector lost their job during 2020.

**Table 2.34 Seafood sector employment trends as reported for calendar year 2020\***

Council Region	% Reporting No Change in Number of Employees	% Reporting Increased Number of Employees	% Reporting Decreased Number of Employees	valid <i>n</i>
Gulf of Mexico	57.7	4.1	38.2	123
Mid-Atlantic	66.7	0.0	33.3	24
New England	46.8	4.8	48.4	62
South Atlantic	56.5	0.0	43.5	58
All Regions	55.7	3.1	41.2	255

\*Based on the question “Has the number of full-time/part-time on-site employees changed because of the COVID 19 pandemic?”

**Table 2.35 Reduction in number of employees during calendar year 2020†\***

Council Region	Average Number of Workers Lost	Median Number of Workers Lost	Std. Deviation	valid <i>n</i>
Gulf of Mexico	5.1	3	5.3	39
Mid-Atlantic	8.0	4.5	8.9	6
New England	5.7	3	7.4	25
South Atlantic	6.6	3	8.5	17
Across Regions	5.8	3	6.8	87

†Among those business owners or operators reporting a loss in the number of employees on payroll. \*Based on the question “How many fewer people have you employed (in 2020 than in 2019)?”

Data in Table 2.36 indicate the dramatic economic impact of the pandemic on seafood processing and distribution firms across the study regions. Very few respondents reported any gain in revenue during calendar year 2020, and the vast majority reported revenue losses. The reported percentage decreases in revenue are consistent and extensive, ranging from a 44% loss on average among respondents based in the South-Atlantic region, and a 47% loss on average among the Gulf of Mexico sample (Table 2.37).

**Table 2.36 Reported change in business revenue during calendar year 2020\***

Council Region	% Reporting No Change	% Reporting Revenue Gains	% Reporting Revenue Losses	valid <i>n</i>
Gulf of Mexico	8.0	8.0	84.0%	125
Mid-Atlantic	4.5	22.7%	72.7%	22
New England	1.6	8.2%	83.6%	61
South Atlantic	10.6	2.1%	87.2%	47
Across Regions	6.7	8.2%	83.5%	255

\*Based on the question “In the calendar year 2020, how were your revenues affected by the COVID-19 pandemic?”

**Table 2.37 Reported percent reduction in business revenue during calendar year 2020 †\***

Council Region	Average % Reduction in Business Revenue	Median % Reduction in Business Revenue	Std. Deviation	valid <i>n</i>
Gulf of Mexico	47.2	50.0	23.8	98
Mid-Atlantic	44.1	40.0	20.2	15
New England	45.0	40.0	22.3	48
South Atlantic	43.9	40.0	24.0	39
Across Regions	45.8	40.0	23.1	200

†Among respondents reporting reductions in business revenue during calendar year 2020; \*Based on the question “By what percent would you say your calendar year 2020 revenues have decreased compared to calendar year 2019?”

These figures translate to revenue losses that varied widely. Further analysis of the data revealed a skewness coefficient of 5.6, which means that the distribution of revenue losses has a number of large values in the upper tails of the distribution. This means that average revenue losses are influenced by the presence of outliers. For example, revenue losses averaged nearly \$14 million across all regions but of the 137 seafood processors or distributors, 90% (123) reported reductions in revenue of \$3.5 million or less, of which 75% reported revenue losses of less than \$400,000 for calendar year 2020. To account for outliers, a Winsorized mean was calculated by setting *i* values in the upper and lower tails of the distribution equal to the (*i*+1)<sup>th</sup> smallest and largest value. For this study *i* was set to 10% of the upper and lower values for lost revenue. The Winsorized mean was selected because it retains all observations and is preferred with large outliers as compared to a trimmed mean (Jose and Winkler, 2008)<sup>4</sup>. As shown in Table 2.38, Winsorized business revenue reductions averaged \$95,000 in the South Atlantic but averaged \$6.2 million among New England seafood processor and distribution businesses.

<sup>4</sup> The Winsorized mean is calculated by setting *i* values in the upper and lower tails of the distribution equal to the (*i*+1)<sup>th</sup> smallest and largest value. For this study *i* was set to 10% of the upper and lower values for lost revenue.



**Table 2.38 Reported dollar reductions in seafood business revenue: calendar year 2020†\***

<b>Council Region</b>	<b>Winsorized Average Revenue Loss</b>	<b>25th Percentile</b>	<b>Median</b>	<b>75th Percentile</b>	<b>Winsorized Standard Deviation</b>	<b>valid <i>n</i></b>
Gulf of Mexico (i = 7)**	\$238,968	\$20,000	\$100,000	\$300,000	45,582	63
Mid-Atlantic (i = 1)	\$258,333	\$40,000	\$50,000	\$400,000	14,009	9
New England (i = 4)	\$6,176,286	\$100,000	\$220,000	\$3,000,000	2,540,925	35
South Atlantic (i = 3)	\$95,400	\$10,000	\$50,000	\$125,000	26,149	30
Across Regions (i = 14)	\$562,823	\$30,000	\$100,000	\$400,000	105,086	137

†Among respondents reporting reductions in business revenue in dollars during calendar year 2020; \*Based on the question “What is your dollar estimate of change in overall revenue during calendar year 2020 compared to calendar year 2019?” \*\*Parentheses denote the number of observations used in the Winsorized average.

An important consideration in systematic response to disaster situations on the part of participants in the nation’s marine fisheries is the degree to which the businesses in question are financially prepared for major disruptions in the business cycle. Based on survey findings in Table 2.39, about 60% of all respondents reported having enough cash-on-hand to maintain operations for a period of between 3 to 4 weeks up to more than three months after the start of the pandemic. New England- and Mid-Atlantic-based seafood business owners/operators reported having relatively higher levels of cash-on-hand than their Gulf of Mexico and South Atlantic counterparts.

Despite the broad and extensive socioeconomic and public health impacts of the pandemic, 81% of the overall pool of survey respondents active in the seafood business sector reported that they did not miss any payments during calendar year 2020 (Table 2.40). This situation is fairly consistently distributed across regions, though some disparity is indicated in the range between respondents active in the Gulf region, nearly 23% of whom reported missing payments, and respondents in the Mid-Atlantic, only 9.1% of whom reported missing payments. The potential for missed payments in the Mid-Atlantic was likely diminished in part by the relatively long temporal buffer noted of the group in Table 2.39, and perhaps also by use of the Paycheck Protection Program discussed below.

**Table 2.39 Cash-on-hand as a temporary buffer against pandemic impacts\***

Time Period Covered	% of Respondents Reporting Cash-on-Hand Buffer				
	Gulf of Mexico <i>n</i> =112	Mid-Atlantic <i>n</i> =21	New England <i>n</i> =54	South Atlantic <i>n</i> =42	Overall <i>n</i> =229
1-7 Days	9.8	4.8	1.9	16.7	8.7
1-2 Weeks	14.3	4.8	18.5	9.5	13.5
3-4 Weeks	9.8	19.0	14.8	23.8	14.4
1-2 months	29.5	19.0	35.2	16.7	27.5
3 + Months	14.3	28.6	25.9	9.5	17.5
No Buffer	22.3	23.8	3.7	23.8	18.3

\*Based on the question “How would you describe the current availability of cash-on-hand for this business, including any financial assistance or loans? Currently, cash on hand will cover: (select only one period)”

**Table 2.40 Incidence of seafood business payments missed due to the pandemic\*†**

Council Region	% of Respondents Missing Payment	% of Respondents Not Missing Payment	valid <i>n</i>
Gulf of Mexico	22.8	77.2	123
Mid-Atlantic	9.1	90.9	22
New England	16.4	83.6	61
South Atlantic	17.0	83.0	47
Across Regions	19.0	81.0	253

\*Based on the question “Since January 2020, has this business missed any scheduled payments due to the COVID-19 pandemic?” †Figures do not include those respondents who preferred not to answer.

Roughly one-third of seafood business owners and/or operators contacted during the phase of survey work described in the present report stated that they did not apply for financial assistance during calendar year 2020 (Table 2.41). Some regional variation can be noted here, however, especially with regard to application for Paycheck Protection Program benefits which, as part of the CARES Act of 2020, provided direct incentives for small businesses to keep workers on payroll.<sup>5</sup> Of note, while relatively few seafood business owners or operators based in the South Atlantic region reported using this program, it was more widely used in other regions, particularly in New England, where 53% of respondents received financial assistance through this program. The relatively greater tendency for respondents based in the New England region to seek out financial aid during 2020 holds for all forms of assistance. Meanwhile, the highest rate of assistance avoidance is noted of respondents in the Mid-Atlantic region, at 48%, and in the South Atlantic, where nearly 48% of respondents reportedly did not seek external forms of aid.

<sup>5</sup>The program was administered by the Small Business Administration (SBA). The program specified that SBA would forgive the loans if all employee retention criteria were met, and if the funds were used for eligible expenses. The loans were administered with an interest rate of one percent.

**Table 2.41 Reported receipt of financial assistance among regional seafood businesses\*\*†**

Type of Assistance	% of Seafood Business Respondents Receiving Assistance				
	Gulf of Mexico <i>n</i> =114	Mid-Atlantic <i>n</i> =21	New England <i>n</i> =54	South Atlantic <i>n</i> =40	Overall <i>n</i> =229
Private Bank Loans/Credit	5.0	0.0	1.7	8.9	4.5
SBA Loans	12.5	9.5	6.8	8.9	10.2
Paycheck Protection	26.7	38.1	52.5	15.6	31.8
Other Forms of Assistance	9.2	0.0	16.9	13.3	11.0
Denied Assistance	11.7	4.8	5.1	15.6	10.2
No Assistance Requested	35.0	47.6	16.9	37.8	32.2

\*Based on the request “Please indicate if this business has received loans or other financial assistance from any of the following since January 2020 (check all that apply).” †Number of respondents providing an answer.

As is the case for all fishery participants who rely on living marine resources and ecosystems for their livelihoods, major disruption to any part of the system can generate major life challenges for persons who operate seafood businesses. Social and economic mechanisms that help such business owners and operators address or adapt to such disruptions are welcomed by many participants. Table 2.42 depicts rates of use of such mechanisms in and around the study regions. As provided in the table, family and friends, personal savings, and government assistance were particularly important coping mechanisms among respondents in the seafood industry during calendar year 2020. Notably, the same sources of support were also identified as particularly important to respondents in this overall sector during the first (6-month) phase of survey work.

**Table 2.42 Coping mechanisms used by respondents in the seafood business sectors†\*\***

Type of Coping Mechanism	% of Harvester-Respondents Utilizing Coping Mechanisms				
	Gulf of Mexico <i>n</i> =119	Mid-Atlantic <i>n</i> =21	New England <i>n</i> =61	South Atlantic <i>n</i> =46	Overall <i>n</i> =247
Family and Friends	58.5	54.8	55.7	50.0	54.3
Church, Community	17.0	9.7	11.5	14.3	15.7
Employees at the Firm	28.2	9.7	29.5	10.7	21.7
Industry Associations	9.0	6.5	19.7	17.9	13.6
Government Assistance	25.0	22.6	34.4	16.1	24.8
Personal Savings	56.9	29.0	50.8	62.5	49.3
Other Unspecified Mechanisms	8.0	12.9	9.8	8.9	8.6

† Number of unique respondents providing an answer; \*\*Based on the question “What has helped you cope personally with the effects of the COVID-19 pandemic? (Check all that apply).”

The rankings data provided in Table 2.43 provide further evidence of the ongoing importance of key social and economic coping mechanisms across the study samples and regions. While the overall importance of support provided by family and friends indicated in the data provided here is indisputable, its expression is considerably higher among respondents based in the South Atlantic region. Meanwhile, use of personal savings as a coping mechanism is expressed at relatively higher rates in the Gulf of Mexico and Mid-Atlantic. These and other differences

noted in the survey data generated through this project are suggestive of regional sociocultural variability, the full analysis of which exceeds the scope of this report. Variability in survey findings always also relates to the sample and sampled respondents, and the degree to which interview data represent the actual experiences and perspectives of the study populations. This issue is discussed again in the following conclusions, though its full exploration also exceeds the scope and intent of this calendar year-one report.

**Table 2.43 Pandemic coping mechanisms deemed most helpful: seafood business sector\***

Council Region	% Distribution of Top 3 Coping Mechanisms		
	1. Family and Friends	2. Personal Savings	3. Government Assistance
Gulf of Mexico (n=55)	52.7%	23.6%	10.9
Mid-Atlantic (n=12)	50.0%	25.0%	8.3
New England (n=30)	56.7%	13.3%	16.7
South Atlantic (n=18)	72.2%	11.1%	0.0
Across Regions (n=115)	56.5%	19.1%	10.4

\*Based on the question “Which has been the most helpful in coping with the effects of the COVID-19 pandemic?”

### 3 Summary Conclusions

#### 3.1 Overview

The survey data and related analytical discussion provided in this report make clear the extensive and broadly distributed nature of pandemic-induced fishery impacts during calendar year 2020. As discussed here and in Glazier et al. (2021), social interaction suddenly and universally became limited during the initial months of the event, when widespread shut-downs, quickly spreading respiratory disease, and public fears and uncertainties about COVID-19 were first being experienced. This led to immediate and acute impacts among business sectors supporting the nation’s fishing and seafood industries, including those in the regions addressed by the present study.

Although early conditions of severe economic shock relented to some extent when closures and restrictions were lifted in the study states during the spring months of 2020, the majority of respondents active in the commercial fishing sector around the study regions reported a continuation of depressed business performance during the entirety of the calendar year. An exception to this situation is noted of participants in the New England commercial fishery sector, who, as noted by Smith et al. (2020), appear to have identified early means for adapting to market challenges in the region. An indication of improving business performance during the latter part of 2020 is also noted of the for-hire sector businesses consulted during this study. This shift likely also relates to adaptive marketing and on-board strategies undertaken by owners and operators in the sector, coupled with a growing public perception that outdoor activities offer respite from the threat of disease. Limited trends toward recovery notwithstanding, it should be noted that adaptation of itself requires creativity, time, and resources. As such, early stay-at-home orders and business closures, and the persistent overall shift in macro-social and economic

conditions around the nation and beyond, functioned to heavily impact all fishery sectors across the study regions during 2020.

Given widespread initial uncertainty about the virus, early emergency response measures were logical, and undoubtedly saved lives. But a variety of factors continued to challenge domestic industries well after early closures and shut-downs were phased out. For example, physical distancing and the wearing of masks, and the difficulties in undertaking these steps, continued to impact many forms of industry around the nation throughout 2020 and beyond. Marine fishery sectors were no exception in that virtually all dimensions of fishing and seafood processing and distribution typically involve close-proximity interactions between participants and/or between participants and their customers. Numerous harvesters working on small commercial fishing vessels, line workers interacting in seafood processing plants, workers preparing and selling seafood in small retail markets, and captains, mates, and patrons fishing from small charter vessels or large head boats, are examples of such situations. Of note, close-proximity interactions such as these are at once normal and, in the context of the pandemic, potentially dangerous to those involved. Direct observation of select East Coast commercial and for-hire fleets during 2020 made clear that such dangers were addressed through various mitigation measures by some business owners and operators, while being ignored or downplayed by others.

Importantly, fishery supply chains are also subject to the effects of pandemic disease and the associated challenges of social distancing, masking, and related mandates, restrictions, and guidelines. Business owners in the commercial harvest, for-hire, and seafood business sectors often discuss supply chain challenges in the context of the pandemic, and this was clearly the case during the latter portions of 2020. Most such discussions revolve around the perspective that, as the event progressed in the U.S., certain items and services that are essential for well-functioning business operations became increasingly hard to acquire. Given the variable nature of pandemic-induced challenges among manufacturers and distributors based in local, distant-domestic, and international locations, the outcomes of this problem on the ground and at sea undoubtedly differ across the study regions. In any case, the problem illustrates the unique nature of pandemic-related problems for all industries. That is, by definition, a pandemic and its effects are global in scope, and increasingly so given the progressively interrelated dimensions of modern industry and society.

The massive scale of domestic recreational fisheries and related business activity exceeds the analytical intent of the current study. Nevertheless, pandemic-related challenges in the various commerce-oriented study sectors were in certain ways intensified by concurrent pandemic-induced shifts in the recreational fishing industry. For example, the pandemic led to dramatic increases in the sale of recreational fishing vessels and fishing gear during the summer months of 2020 (Marine Manufacturer's Association, 2021). Again, this trend relates to the apparent interest of coastal residents in outdoor activities that could be undertaken in solitude or with trusted friends and family members during the pandemic. While not documented or analyzed here in full, the situation initiated a variety of observable effects relevant to commercial and for-hire business operations in the Southeast U.S. during 2020, including heightened strain on fishing-related supply chains, increasingly limited availability of vessel and engine repair

services and essential parts, and shifting patterns of vessel traffic at sea, inlets, drawbridges, and places of mooring and drydock.

### **3.2 Key Survey Findings**

A wide range of challenges surfaced to affect the domestic marine fishing industry during the first year of the pandemic in the U.S. Initial and ongoing changes documented by the survey discussed in this report were many, various, and extensive, both within and across study sectors and regions. A variety of particularly notable outcomes resulting from the pandemic and related shifts in social behavior and economic activity are indicated. Key pandemic outcomes and impacts documented for the commercial harvest and for-hire sectors during the study include the following:

- Pandemic-induced impacts to fishing operations were widespread during 2020, with approximately 87% of respondents in both the commercial harvest and for-hire sectors reporting the incidence of such impacts;
- Some 82% of sampled commercial fishery participants and 87% of sampled for-hire fishery participants reported that they were forced to shut down their operations for some period of time during the first year of the pandemic;
- Most businesses owners/operators in both the commercial harvest (51.2%) and for-hire sectors (59.2%) reported having to cease operating due to the pandemic and related mitigation measures for a period of between one and three months;
- 9.3% of respondents in the commercial fishing sector, and 10.8% of respondents in the for-hire sector reported that they ceased operating either permanently or indefinitely during calendar year 2020;
- Pandemic-forced reductions in business activity were reported at similar rates across fishing sectors, with 57.1% of respondents in the commercial fishing sector and 55.4% of for-hire respondents reporting such reductions;
- The fishing-specific pandemic factor ranked as most impactful by business owners in the commercial fishing sector was “loss of crew members,” while “pandemic-related government restrictions” was ranked as most impactful by participants in the for-hire fishing sector;
- Pandemic-induced revenue losses during calendar year 2020 were widespread across study regions and sectors, with 89.4% of all respondents in the commercial fishing sector, and 88.9% of all respondents in the for-hire sector reporting such losses;

- Average reported revenue losses for calendar year 2020 totaled \$208,064 across the full sample of respondents active in the commercial fishing sector ( $n=409$ ), and \$90,759 across the full sample of respondents active in the for-hire fishing sector ( $n=400$ ).

Prodigious impacts following from the pandemic during 2020 were also documented in relation to seafood business operations within and across the study regions. Key survey findings deriving from survey work in this sector include the following:

- 85% of all sampled respondents active in the seafood processing and distribution sector reported experiencing pandemic impacts during calendar year 2020;
- Just over half of all sampled respondents active in the seafood processing and distribution sector reported some cessation of business operations during calendar year 2020;
- Among seafood business owners and operators who were forced by the pandemic to cease operations, the average duration of the closure was between one and three months;
- Nearly 13% of all sampled seafood business owners reported either indefinite or permanent closures due to the pandemic;
- The reported overall percent reduction of business activity among respondents in the seafood processing and distribution sector was nearly -58%;
- 39.3% of all respondents in the seafood business sector asserted that business had worsened during the second and third quarters of 2020 when compared to the first part of the year;
- “Government restrictions” were considered to be the most impactful of select pandemic impacts when ranked by all respondents in the seafood processing and distribution sector;
- Some 40% percent of all respondents active in the seafood processing and distribution sector reported that conditions during the pandemic forced the temporary layoff of employees;
- Reported percentage decreases in revenue during 2020 were consistent and extensive in the seafood business sector, ranging from a 44% loss on average among respondents based in the South-Atlantic region, to a 47% loss on average among the Gulf of Mexico sample.

### **3.3 Concluding Discussion**

Challenges abound across the commercial and for-hire fishing and seafood industries in the United States. Direct impacts of the pandemic notwithstanding, it is important to recognize that business operations associated with marine fisheries are conducted in challenging biophysical

and socioeconomic contexts that are continually in flux. In the case of the broadly conceived commercial fishing industry, the act, effort, and cost of fishing in various regulatory contexts; processing and distribution arrangements; and the status of support sector supply chains are but a few of the factors business owners and operators must consider and address even in the best of times. For-hire fishing is similarly challenging, with an ongoing need for effective marketing; possession of the equipment, skills, and knowledge required to provide patrons with an enjoyable fishing trip; and a reasonably good track record of finding and landing fish in often unpredictable marine conditions and shifting regulatory contexts.

Such challenges are complicated by a wide range of fundamental problems arising from the pandemic. But unfortunately, the situation can be complicated even further by additional intervening events and processes. For example, major weather events heavily impacted fishing and seafood businesses across coastal portions of Louisiana and other Gulf states just prior to and during pandemic year one. These included major problems associated with persistent storms in the Midwest and resultant flooding of the Mississippi River in 2019, and the landfall of major Hurricanes Laura and Zeta in 2020. Other interactions may be less obvious but similarly profound for those affected. For instance, the timing of pandemic-induced disruptions to important commercial fishery supply chains, along with diminished demand for restaurant-provided seafood, heightened economic losses during months that, in many years, would otherwise yield a relatively high percentage of annual operational income.

Further, the scope and magnitude of problems resulting from the pandemic and its intersection with other challenges may be further worsened or mitigated as per the preexisting status of a given business operation. As confirmed through long-term observation and discussions with commercial and for-hire operations in North Carolina, for example, some business owners were operating in the black prior to the pandemic, while others were anticipating and needing a profitable 2020 to maintain viability of the businesses in question. Notably, as indicated by the survey results provided in this report, certain harvesters and for-hire operators in this state and others ceased operating during the initial months of the pandemic, and relatively few demonstrated an immediate capacity for finding new seafood markets or for-hire business opportunities in a context of formally restricted and voluntarily limited social interaction.

Pandemic complications abound, and the complexity of associated problems means that the survey work described in this report should be seen as science-in-progress. While this phase of research does not examine interaction between pandemic impacts and other sources of change, or fully examine regional variabilities in pandemic impacts, it does provide the fundamental data needed to initiate such work in earnest. By eliciting and describing year-one pandemic impacts across numerous broad fishery management regions, the work also begins to clarify the process and implications of rapid and complex macro-economic change for domestic fisheries as a whole. This is particularly important in the context of fisheries management in that many management decisions are based on potential biological, economic, and social outcomes that are best understood in historical context. When that context involves local or regional perturbations of various sorts, fishery managers must adjust the way in which the time-series data in question are considered. In this regard, the pandemic represents a form of social and economic perturbation that is both poorly understood and clearly worthy of sufficient monitoring.



As discussed by various scholars specializing in the study of disasters and related effects on persons and social groups involved in the pursuit and use of natural resources, disaster scenarios and related response strategies may be envisioned as occurring in cyclic phases (e.g., see Fakhruddin et al., 2020). These include: (1) a period in which disaster preparedness measures are emphasized, (2) the point at which the disaster incident occurs, (3) a period of response to the event; (4) a period of recovery from the event, and (5) a period during which prevention and mitigation measures are undertaken by society in advance of the prospective next event. Inasmuch as disease pandemics can be understood in relation to more generally conceived disaster events, which themselves can be defined as rapid and unexpected departures from a baseline of normal social process, the nation continued to straddle the incident and response stages of the disaster at the end of calendar year 2020.

Although certain of the data generated through the survey program described in this report do indicate some initial recovery of fishing and seafood businesses from the impacts of early lockdowns and other initial response measures, in reality the industry was facing a range of new and evolving pandemic challenges at the end of calendar year 2020. This is reflective of the unique nature of pandemic disease. It is deeply disturbing to society, it is protracted in nature, and it is global in reach. In the historical context of disaster research, the present situation is unique, and while the scope and scale of challenges presented by the pandemic itself are unsurpassed in the last century, the potential utility of new understanding generated by research and monitoring of the event are equally profound. As such, the present study and its findings may best be seen as an initial step toward comprehensive insight into an event with an as yet indeterminate end point and range of complex human impacts.

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