

**Hurricane Irma Damage Assessment:  
Provisional Results for the Florida Commercial and For-hire Fisheries and Associated Businesses**

**Evaluación de los daños Causados por el Huracán Irma: Resultados Provisionales para la  
Industria Pesquera Comercial y de Alquiler y las Empresas Asociadas en el Estado de Florida**

**Évaluation des Dégâts Causés par l'Ouragan Irma:  
Résultats Provisoires pour l'Industrie des Pêcheries Commerciales  
et Récréatives et les Entreprises Associées dans l'État de Florida**

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**ABSTRACT**

In the weeks after Hurricane Irma crossed Florida on September 10 – 11, 2017, NOAA Fisheries' Southeast Fisheries Science Center organized a rapid assessment of damages to the fishing industry and support businesses in the state. Preliminary fieldwork began in late September and by early October 2017 NOAA Fisheries staff was in the field conducting interviews with affected business owners and commercial and recreational fishermen. Fieldwork covered the highest impact areas extending from Naples on the west coast, south through the Florida Keys, and up to Ft. Lauderdale on the eastern shore. Data for other impacted areas of the state was gathered through an online survey on the Florida Fish and Wildlife website and a statewide phone survey that was contracted out and implemented after the fieldwork phase was completed. A total of 1713 businesses and individuals participated one of the three surveys in Florida. Damage assessment totals for specific business sectors and areas of Florida are presented along with information regarding the federal disaster declaration, allocation of funds by the US Congress and the State of Florida, and post-storm recovery in the high impact areas.

KEYWORDS: Natural disasters, rapid assessment, fisheries, Florida, National Marine Fisheries Service

**INTRODUCTION**

The Magnuson–Stevens Fishery Conservation and Management Act (MSA) Section 315 requires that within two months (60 days) after a catastrophic regional fishery disaster the Secretary of Commerce, through NOAA Fisheries, will provide the governors of affected states an economic and socio-economic evaluation of the affected region's fisheries using the best information available. The purpose of the evaluation is to assess the impacts of the disaster on affected communities involved in commercial or for-hire fishing, and characterize the effects of the disaster on fishing-related businesses and infrastructure. Despite having a similar purpose, in practice assessments for different disasters can vary in scope and breadth due to the fact that the impact of disasters like hurricanes can cover areas that differ substantially in terms of geographic area, population, infrastructure and fishing activity. Furthermore, data collection can entail mixed methodologies and be quite wide-ranging in trying to capture all affected parties.

In the past, as in the case of Hurricane Katrina, NOAA Fisheries relied mostly on independent firms to conduct disaster assessments (Impact Assessment, Inc. 2007). The amount of time it took to find and contract a suitable firm along with the need to mobilize and carry out fieldwork proved to be impractical in light of NMFS 60 day reporting requirement and the general desire to provide key stakeholders with timely information regarding the magnitude of a disaster's impacts on the fishing industry. As a result, after Hurricane Sandy devastated many coastal areas of the northeastern United States in 2012, NOAA Fisheries decided to conduct the disaster assessment using NOAA personnel to expedite the data collection and reporting. This approach significantly reduced the amount of time that it took to put teams in the field and collect data and it also allowed NOAA to centralize the information quality control and analysis process, ensuring a timelier reporting of results (NOAA 2013, Colburn et al. 2015). For that reason, after Hurricanes Harvey and Irma hit Texas and Florida in the summer of 2017, NOAA Fisheries deployed personnel to those states essentially following the same protocols that were used for Hurricane Sandy. In this document, the data collected and results from the Hurricane Irma assessment in Florida are discussed with some insights for future assessments.

**METHODOLOGY**

Hurricane Irma struck Florida on September 10, 2017, making first landfall in the lower Florida Keys as a Category 4 storm and then moving up Florida's Gulf Coast, passing east of Tampa on September 11. It was the most intense hurricane to strike the continental US since Hurricane Katrina in 2005. The brunt of wind and storm surge damage occurred in the southernmost areas of Florida, including the Florida Keys and Collier County in the southwest, and caused considerable devastation to areas that for many years have been subject to high levels of coastal development. Moody's Analytics estimated economic losses from Irma as between \$58 billion to \$83 billion (Evans 2017).

Florida's commercial fisheries accounted for \$262 million in landings revenue and saltwater anglers spent \$1 billion on fishing trips in the state in 2016 (National Marine Fisheries Service 2018). The local economies of coastal communities in the areas of Florida most affected by Irma depend on fisheries to different degrees. However, indicators of commercial and recreational fishing engagement and reliance suggest that Hurricane Irma's direct path crossed many areas of Florida that are among the state's most dependent on commercial and recreational fishing (NOAA 2018). Without these important industries, the economic base for many of these coastal communities would be less diverse and robust, so understanding the scope of damage and geographic range of impacts is essential.

To understand the effects of the storm on the fishing industries within the affected coastal area, NOAA Fisheries worked with the Florida Fish and Wildlife Conservation Commission (FWC) to conduct a rapid appraisal of damage from Hurricane Irma<sup>1</sup>. The appraisal used in-person, online and phone surveys and was conducted primarily in those areas that suffered the most damage from the storm. By early October 2017, NOAA staff from the Southeast Fisheries Science Center was in the field conducting preliminary reconnaissance of damages and interviews with affected business owners and commercial and recreational fishermen in the Florida Keys. A number of NOAA Fisheries employees from around the country were also recruited to support fieldwork, which continued throughout coastal areas of Miami-Dade and south Broward Counties, along the southwest coast of Florida from Everglades City to Fort Myers and in the Jacksonville area (north) through the first half of November. During the fieldwork phase an online survey was also developed and placed on the FWC website. Furthermore, once the fieldwork phase was completed, a phone survey was developed and contracted out to a Florida firm to contact vessel owners and other businesses throughout the state that were not interviewed in earlier fieldwork or through the web interface.

The phone survey provided the largest dataset, covering 29 Florida coastal counties from the Florida/Georgia border in the east to the Florida Panhandle in the west and excluding only the six "Emerald Coast" counties in the Panhandle that reports clearly indicated did not suffer any impacts from Hurricane Irma. Individuals or businesses that previously had completed surveys through fieldwork or the online form were removed from the phone survey sample frame. Due to time and cost limitations,

sampling was also stratified to ensure adequate coverage of the counties that were most heavily impacted by Irma according to 4 impact zones. The sampling rate ranged from 20 – 100% of the total sample populations in each of the zones.

More than 1700 interviews were conducted through all phases of data collection (in-person, on-line and phone surveys) through November 17, 2017. A total of 1553 records were determined to meet the criteria for inclusion in the data analysis, including 372 qualified businesses and 1181 qualified commercial or for-hire fishing vessel owners. An average loss method of obtaining overall estimated damages to the various industries was used to calculate total loss estimates by multiplying the total population of each zone/sector by the average loss values derived from the survey samples for that zone/sector<sup>2</sup>. To avoid overestimations, there were some nuanced differences in the way the total losses were calculated for some sectors to account for the different modes of contact and statistical designs that were used to compile the information. For the most part, the telephone survey responses formed the basis of the statistical analysis due to their superior statistical properties.

Overall, 54% of businesses that participated reported some type of damage and 41% of vessel owners reported damages related to Irma impacts. Total damages estimated from the analysis to businesses and vessels exceeded \$95 million, including nearly \$43 million in damage losses to commercial fishing vessel owners and \$14 million in damage losses to for-hire vessel owners. Similarly, estimated total revenue losses for all sectors were nearly \$98 million with over \$53 million in revenue losses for commercial fishing vessel owners and \$18 million revenue lost to for-hire vessel owners. There were also an estimated 1677 immediate job losses attributed to the storm, most of which (1169) occurred in commercial fishing operations<sup>3</sup>.

### THE IMPACT TO COMMERCIAL FISHERIES

Total estimated damages to commercial vessels and gear were approximately \$26.2 million with another \$16.5 million in damages to facilities associated with their business operations, which included docks and other related buildings. As was to be expected, the average reported losses varied considerably by impact zone, ranging from \$44,589 in physical damages/losses in Zone 1, the area that suffered the most direct and intense Irma impacts (Monroe and Collier Counties) to \$5,996 in Zone 4 (Jacksonville area) which primarily experienced storm surge impacts. Although many commercial fishing

<sup>1</sup>A similar protocol was implemented in Puerto Rico and USVI after Hurricanes Maria and Irma, with the major difference being that NOAA Fisheries served more of a coordination and advisory role and did not conduct any of the fieldwork with NOAA staff.

<sup>2</sup>For example, if 50 for-hire fishing respondents out of 100 reported having vessel damages and our overall sample frame had 300 commercial fishermen, the average damage per vessel would first be calculated for the 100 interviews by summing all of the reported damages and dividing by 100. Then the average damage rate per vessel would be multiplied by 300 to provide an estimate of total vessel damages across the whole population of commercial vessels.

<sup>3</sup>The number of immediate jobs lost was not considered permanent as many workers were unable to work for a variety of reasons, some of which could be resolved over time.

operations affected by Hurricane Irma suffered damages to their vessels, of equal or greater impact was the loss or destruction of gear, primarily lobster traps. Spiny lobster fishers that are concentrated in Irma's highest impact areas of South Florida generally reported losing 25 – 50% of their traps although some reported losses as high as 90%. Furthermore, significant costs in time and money were incurred by fishers searching for traps moved by the storm as well as in dealing with their own household impacts and helping family, friends and neighbors.

Informal conversations with fishermen and the survey data indicate that some of the commercial fishing sectors remained resilient in the face of the hurricane, even in the highest impact areas. For example, in Monroe County (Florida Keys) 58% of commercial vessel owners reported no vessel damage from Irma, 13% never stopped fishing and 45% had resumed fishing by the middle of November (two months after the storm). However, resilience and recovery rates differed by fishery. Yellowtail snapper fishermen reported minimal equipment damage and excellent fishing conditions in the immediate aftermath of Irma, which was confirmed by above normal yellowtail landings in the months after the storm. In contrast, spiny lobster landings were considerably lower in the months following Irma than in the same months of 2015 and 2016, and there was a \$10 million decline in the value of lobster landed in 2017 in comparison to 2016. Nevertheless, many lobster fishermen reported that the fact that the storm passed before the start of the stone crab season allowed them to focus on recovery of their lobster gear soon after the storm and then, to generate revenue, move into stone crab fishing when the season opened approximately one month after the storm hit.

Hurricane Irma affected seafood dealers and processors primarily through damage to facilities, loss of seafood, and damage to equipment, piers and docks. Many dealers outside of the main impact areas did not experience any damage to facilities but they still lost power for a number of days and lost product as a result of the lack of ice or refrigeration. Overall, seafood dealers and processors reported average total damages of \$41,178 and average revenue losses of \$80,990. Total damages to facilities were estimated to be close to \$5.6 million and damages to equipment was around \$3.7 million, with total seafood losses estimated at around \$4.3 million.

Seafood retailers (markets and restaurants) represented a small portion of the total sampling frame and for that reason we could not calculate reliable estimates of damages to this sector. Retail seafood businesses were affected by a loss of product due to power outages, a decline of local fish in the marketplace, and damage to facilities and equipment. Even if these businesses could open, in areas such as the Florida Keys revenues and sales continued to be affected by the reduction in clientele related to the temporary decline in the local population, especially due to decreased visitation by tourists and owners of second homes.

## THE IMPACT TO RECREATIONAL FISHERIES

Hurricane Irma had a substantial impact on the Florida for-hire fleet, which includes inshore fishing guides, charter businesses and headboats. Although only 16% of for-hire vessels in the survey reported damages overall, damage levels were much higher in Monroe and Collier counties, where 36% of vessels reported damage. Similarly, although recreational fishing businesses were estimated to have suffered \$13.9 million in physical damages overall, the losses were concentrated in the high impact areas, with an average of \$24,702 in losses per vessel in Zone 1 compared to \$1,564 in Zone 4. Damaged docks and a lack of fuel and bait further curtailed for-hire fishing operations, with damages to facilities estimated at \$8.0 million, or 58% of total reported damages.

For-hire fishing is a tourism activity so ongoing impacts to the for-hire fleet are tied to the rate of recovery of the local tourist industry, including the rebuilding of infrastructure such as hotels, docks and marinas that provide marketing support and channel clients to for-hire operators. In the months after the hurricane, of greatest concern for the for-hire sector was the cancellation of pre-booked fishing trips and loss of potential clients due to the storm event and the subsequent clean-up, repair and redevelopment. Renowned sport fishing towns such as Islamorada and Marathon, Florida were in the direct path of Irma and heavily damaged, and many hotels remained closed for repairs or refurbishment, curtailing the availability of accommodations and hampering the flow of tourists for many months after the storm. Conversations with charter captains over a year after Irma passed through the Florida Keys revealed that many still were struggling to return to pre-storm business levels due to the fact that some of the major tourist infrastructure in those communities had yet to be reopened.

Of the bait and tackle shops surveyed, at least 50% sustained damages with an average of \$12,710 per shop and with total damages to facilities, equipment and docks estimated to be near \$1.5 million. Other for-hire support businesses that appeared in the survey included marinas, boatyards and marine supply facilities. Some 66% of these types of businesses in the survey reported damages, with overall physical damages to facilities, equipment and product averaging \$107,479 per business. Substantial damage was seen to have occurred to docks and dry storage facilities especially throughout the keys and in some areas of Collier County. On average, marinas and related businesses reported a \$50,329 loss in revenue and total estimated damage to facilities of \$7.6 million. Reported total losses to equipment and bait & seafood were estimated to be \$2.1 million and \$400,000 respectively. Only marinas and other businesses that were identified as directly supporting commercial or for-hire fishing activities were included in the sample. Therefore, the figures reported here do come close to accounting for all of the impacts along the coast that Irma caused to thousands of private marinas, marine supply shops, boat storage and repair businesses and other marine-related businesses.

## DISCUSSION

In October, 2017 Florida governor Rick Scott requested that the Secretary of Commerce declare a fisheries disaster in the state and on February 9, 2018 Commerce Secretary Wilbur Ross declared a commercial and catastrophic fishery failure under Magnuson Stevens Act Section 315 and the Interjurisdictional Fisheries Act Section 308(d). In May, 2018 the U.S. Congress allocated \$200 million for fishery disaster funds for Hurricanes Harvey, Irma and Maria and other smaller scale fisheries disasters around the country. In June 2018, using estimates provided from the rapid assessment as input, the Secretary of Commerce allocated nearly \$45 million dollars for relief to the State of Florida. However, as of January, 2019 those funds had yet to be distributed pending a final review of the state's spending plan and actions by the Florida State Legislature. The length of time required to disburse federal fishery disaster relief funds indicates that these funds should be viewed as contributing to longer-term rebuilding of the fisheries in the years after a disaster. However, as in this case, our experience to date indicates that these funds should not be counted on as a solution for relief support immediately after a disaster. In order to survive and get their businesses back up and running in the short-term, fishing businesses often have to deplete their personal savings and struggle to secure other sources of support from sources such as FEMA small business loans, state emergency relief funds, loans from friends and family members, and private bank loans.

Based on the experiences conducting impact assessments for Hurricanes Sandy, Irma, Harvey and Maria, NOAA Fisheries will be meeting in the coming year to continue to try to make the assessment approach more efficient. The likelihood of an increase in the frequency and intensity of storms in the future exacerbates the challenge of placing NOAA personnel in the field to collect data. The complexity of on the ground fieldwork is amplified by the fact that, as in the case of Irma in Florida, hurricane impacts can spread across a huge geographical area and cover hundreds of communities of different sizes and levels of urbanization. NOAA Fisheries does not have personnel that are dedicated to disaster assessment. Therefore, organizing teams of individuals who can set aside other priorities to do fieldwork and conduct analysis can prove to be logistically challenging and costly. In addition to staff from the Southeast Fisheries Science Center in Miami, FL, NOAA personnel who conducted fieldwork for the Hurricane Irma assessment included individuals from the Southeast Regional Office (St. Petersburg, FL), Headquarters (Silver Spring, MD), and the Northwest (Seattle, WA) Science Centers.

Our experience with the Irma assessment indicates that phone surveys may work well as long as enough time has passed after the storm for telephone services to have been restored and for vessel and business owners to have conducted preliminary assessments of their damages. NOAA Fisheries is also exploring the possibility of expanding partnerships with other NOAA line offices and federal and state agencies to conduct rapid appraisals of hurricane impacts soon after they occur without having to put new personnel in the field. In light of our goals of

increasing the timeliness of reporting damage assessments to our constituents, effectively meeting our reporting responsibilities under the MSA and improving our understanding of the impacts of hurricanes on the fishing industry, NOAA Fisheries will continue to revise methods and techniques to efficiently and effectively conduct these rapid assessments.

## LITERATURE CITED

- Colburn, L.L., P.M. Clay, T. Seara, C. Weng, and A. Silva. 2015. NOAA Technical Memorandum NMFS-F/SPO-157. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service August 2015.
- Evans, S. 2017. *Hurricane Irma Economic Losses \$58 - \$83 Billion: Moody's Analytics*. <https://seekingalpha.com/article/4106987-hurricane-irma-economic-losses-58-83-billion-moodys-analytics>. Accessed July 16, 2018.
- Impact Assessment, Inc. 2007. *Final Technical Report: Preliminary Assessment of the Impacts of Hurricane Katrina on Gulf of Mexico Coastal Fishing Communities*. [https://sero.nmfs.noaa.gov/sustainable\\_fisheries/social/documents/pdfs/publications/2013/katrina\\_impacts.pdf](https://sero.nmfs.noaa.gov/sustainable_fisheries/social/documents/pdfs/publications/2013/katrina_impacts.pdf), accessed March 7, 2019.
- National Marine Fisheries Service. 2018. *Fisheries Economics of the United States, 2016*. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-187. 243 pp.
- NOAA. 2013. *Regional Impact Evaluation: An Initial Assessment of the Economic Impacts of Sandy on New Jersey and New York Commercial and Recreational Fishing Sectors*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service NOAA Fisheries, Office of Science & Technology and Northeast Fisheries Science Center. 34 pp.
- NOAA. 2018. Hurricane Irma Damage Assessment: Provisional Results for the Florida Commercial and For-hire Fisheries and Associated Businesses. <https://www.fisheries.noaa.gov/resource/document/hurricane-irma-damage-assessment-provisional-results-florida-commercial-and-> Accessed March 12, 2019.