FLORIDA HURRICANE LOSS MITIGATION PROGRAM

2019 ANNUAL REPORT

January 1, 2020

Prepared by

Florida Division of Emergency Management

Ron DeSantis
Governor

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Director

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EXECUTIVE SUMMARY

This document satisfies subsection 215.559 (6) Florida Statutes (F.S.), by providing a full report and accounting of activities and evaluation of such activities. The time period covered by this report is July 1, 2018- June 30, 2019 or State Fiscal Year (SFY) 2019. Based on section 215.559 (1), F.S., the Hurricane Loss Mitigation Program is established in the Division of Emergency Management. The Division receives an annual appropriation of $10 million from the investment income of the Florida Hurricane Catastrophe Fund authorized under the Florida General Appropriation Act and Section 215.555 (7) (c), F.S. The Public Shelter Retrofit Program, Tallahassee Community College's (TCC) Mobile Home Tie-Down Program, Florida International University's (FIU) Hurricane Research Program and Mitigation Program, account for a combined $6,500,000 or sixty-five (65%) percent of the SFY 2019 $10 million appropriation. The remaining thirty-five (35%) percent is used to distribute a community mitigation grant that includes both flood and wind retrofits of Florida residences and public outreach for education about retrofits to citizens and local government officials and their staff.

The Shelter Retrofit Program and TCC's Mobile Home Tie-Down Program have separate reporting requirements as stated in Section 252.385, F.S., and Section 215.559 (2) (a), F.S., respectively. Inclusive of this report is a project analysis of the Public Shelter Retrofit Program, expenditure report for the Tallahassee Mobile Home Tie-Down Program, summary of FIU's Hurricane Research Program progress, programmatic analysis of the Hurricane Loss Mitigation Program, and program description of outreach initiatives completed within the fiscal year.

BACKGROUND

In the aftermath of Hurricane Andrew, the Florida Legislature created a series of programs to stabilize the economy and insurance industry. These programs consist of the following:

- Citizens Property Insurance Corporation (formed from a merger of the Florida Windstorm Underwriting Association and the Florida Residential Property and Casualty Joint Underwriting Association), the state insurance plan for residents unable to obtain a conventional homeowners insurance policy;

- The Florida Hurricane Catastrophe Fund, section 215.555 F.S., a re-insurance fund established to limit insurance exposure after a storm;

- The Bill Williams Residential Safety and Preparedness Act, which in 1999 created the Hurricane Loss Mitigation Program, section 215.559 F. S., with an annual appropriation of $10 million.

Based on Section 215.559 (1) F. S., the Hurricane Loss Mitigation Program is established in the Division of Emergency Management. The Division receives an annual appropriation of $10 million from the investment income of the Florida Hurricane Catastrophe Fund authorized under the Florida General Appropriation Act and Section 215.555 (7) (c) F. S. The purpose of the $10 million annual appropriation is to provide funding to local governments, State agencies, public and private educational institutions, and nonprofit organizations to support programs that improve hurricane preparedness, reduce potential losses in the event of a hurricane, and to provide research and education on how to reduce hurricane losses.

The funds are also to be used for programs that will assist the public in determining the appropriateness of particular upgrades to structures and in the financing of such upgrades, or to protect local infrastructure from potential damage from a hurricane.

Specific Program Areas and Funding Levels

Shelter Retrofits - According to Section 215.559 (2) (a) F. S., $3 million of the annual $10 million appropriation for the Hurricane Loss Mitigation Program is directed to retrofit existing public facilities to enable them to be used as public shelters. An annual report of the state's shelter retrofit program, entitled the Shelter Retrofit Report, is prepared annually and separately submitted to the Governor and the Legislature pursuant to section 252.385 F.S. The remaining $7 million of the $10 million appropriation is allocated according to different subsections in Section 215.559, F. S., as described below.

Tallahassee Community College (TCC) - As required by section 215.559 (2) (a) F. S., TCC is given an annual allocation of $2.8 million or 40 percent of the remaining $7 million. The funds are administered by TCC and are to be used to mitigate future losses for mobile homes, and to provide tie-downs to mobile home in communities throughout the State of Florida. Please see Appendix A for TCC's 2017-2018 Annual Report.

Florida International University (FIU) - As required by Chapter 215.559 (3), F. S., FIU is allocated $700,000, or 10 percent of the remaining $7 million. The funds are administered by FIU and dedicated to hurricane research at the Type I Center of the State University System to support hurricane loss reduction devices and techniques. Please see Appendix B for FIU's 2018-2019 progress report.

Hurricane Loss Mitigation Program (HLMP) – Of the remaining appropriation, up to $3.5 million is awarded to governmental entities, nonprofit organizations, and qualified for-profit organizations as a means to improve the resiliency of residential, community, and government structures. The HLMP advertises funding through a Request for Proposal (RFP). Proposals are scored based on their proposed project plans, project teams, and needs justifications. Selected projects must also pass a benefit-cost analysis (BCA).

SHELTER RETROFIT PROJECT ANALYSIS

Shelter Retrofit Funding -

In mid-2017, the Hurricane Loss Mitigation Program began directing the Shelter Survey and Retrofit Program's grant management and contracting responsibilities. HLMP applied current grant management processes to existing and new projects being managed by the Shelter Retrofit Program. With the resources available within the Mitigation Bureau's Finance Unit, Shelter payments, contracting, and reporting has become a streamlined process within HLMP's daily operations.

The Hurricane Loss Mitigation Program has worked with the Mitigation Bureau's Technical Unit to design streamlined inspection and closeout processes for the Shelter Retrofit Program. Modernized Scopes of Work have been finalized with the collaboration of the Shelter Retrofit Program, Technical Unit, and Hurricane Loss Mitigation Program. New review processes and detailed requirements within the Scope of Work will strengthen regulation and monitoring while providing the recipient with a clearer understanding of their tasks and deliverables.

Program Activities

Funding that had not been expended in previous fiscal years is made available in the following years without requiring a request to re-appropriate funding. For this reason, the activities reported will reflect an increase in spending that exceeds the $3 million annual appropriation. Approximately $12 million remained un-allocated at the beginning of the 2018 FY.

As shown below, there are currently twenty-eight (28) active shelter retrofit agreements. Within these executed agreements, there are fifty-five (55) individual projects. The nine (9) electrical projects include the installation of generator switches, transfer switches and other electrical hook-ups and outlets. The four (4) engineering studies in progress will determine a structure's eligibility to receive retrofit funding. There are currently forty-two (42) hurricane shelters in the process of receiving full or partial envelope protection. Most of these hurricane shelters will be completed and usable within the next two years.

2018-2019 FY Shelter Retrofit Active Projects

Project	Building	# of Buildings	Project Type
HLMPSR17-001 Alachua County BOCC	Alachua Community Support Services	1	Shelter Retrofit
HLMPSR17-002 City of Gainesville	MLK Center Gym	1	Shelter Retrofit
HLMPSR17-003 Hillsborough County SD	D.G. Erwin Technical College	2	Shelter Retrofit
	McLane Middle School		
HLMPSR17-005 Glades BOCC	Ortona Community Center	1	Engineering Only
HLMPSR17-006 St. Johns County School Board	Creekside High School	1	Shelter Retrofit
HLMPSR17-011 Levy County	Bronson Middle-High School	3	Shelter Retrofit
	Joyce M. Bullock Elementary School		
	Chiefland Elementary School		
HLMPSR17-013 Alachua School District	Sydney Lanier Cente	1	Shelter Retrofit
HLMPSR17-019 St. Johns County BOCC	Switzerland Point Middle School	2	Shelter Retrofit
	Pacetti Bay Middle School		
HLMPSR17-020a Clay County BOCC	Orange Park High School	5	Shelter Retrofit
	Asbury Lake JHS		
	Oakleaf High School		
	Flemining Island High School		
	Keystone Heights High School		
HLMPSR17-020b Clay County BOCC	Thrasher Building	1	Shelter Retrofit
HLMPSR17-021 Seminole County BOCC	Layer Elementary School	2	Shelter Retrofit
	Bentley Elementary School		
HLMPSR18-001 City of South Bay	Emergency Shelter and Care	1	Engineering Only
HLMPSR18-005 Bay County Schools	Everitt Middle School	2	Shelter Retrofit
	R. Tommy Smith Middle School		
HLMPSR18-006 Okeechobee County	Okeechobee Health Department	1	Engineering Only
HLMPSR18-007 Flagler School District	Bunnell Elementary School	2	Electrical
	Rymfire Elementary School		
HLMPSR18-008 Holmes County	Bonifay K-8	1	Shelter Retrofit
HLMPSR18-009 Putnam County BOCC	PCHD South Annex	1	Shelter Retrofit
HLMPSR18-013 Martin County SD	Anderson Middle School	2	Shelter Retrofit
	Jensen Beach High School		
DEM-SR00001 Seminole County BOCC	Winter Springs High School	4	Shelter Retrofit
	Teague Middle School		
	Lawton Chiles MS		
	Lyman High School		
DEM-SR00003 Indian River State College	Indian River State College	1	Shelter Retrofit
DEM-SR00004 Orange County	Magic County Gyms (5)	6	Electrical
	South Econ Rec Gym		
DEM-SR00005 Orange County	Magic County Gyms (5)	10	Shelter Retrofit
	South Econ Rec Gym		
	West Orange Rec Gym		
	Silver Star Rec Gym		
	Meadow Woods Rec Gym		
	Goldenrod Rec Gym		

DEM-SR00006 Orange County	Bithlo Community Center	1	Engineering Only
DEM-SR00007 South Florida State College	South Florida State College	1	Shelter Retrofit
DEM-SR00009 University of Florida	SWRC 3150 Hull Road	1	Shelter Retrofit
DEM-SR00010 Walton County	Free Port High School	1	Electrical

Projects	**28**	
Buildings	**55**	
	9	Electrical
	4	Engineering Only
	42	Shelter Retrofit

Contract Execution and Project Closeout

Thirteen new shelter retrofit agreements were executed in FY 2018, totaling $4,181,821.40. In an effort to address the under-allocation, the program offered funding to more recipients with cost-effective projects, which exceeded the annual appropriation by $1,181,821.40.

	FY 2018 Recipients	Award Amount
	HLMPSR17-001 Alachua BOCC	$ 105,000.00
	HLMPSR17-002 City of Gainesville	$ 260,196.00
	HLMPSR17-014 Osceola County	$ 692,000.00
	HLMPSR17-019 St. Johns County SD	$ 1,268,116.00
	HLMPSR17-020a Clay County Multi	$ 782,901.00
	HLMPSR17-020b Clay County Thrasher	$ 16,000.00
	HLMPSR17-021 Seminole County	$ 440,000.00
	HLMPSR18-006 Okeechobee County	$ 15,000.00
	HLMPSR18-007 Flagler School District	$ 421,608.40
	HLMPSR18-008 Holmes County	$ 126,000.00
	HLMPSR18-009 Putnam County	$ 25,000.00
	HLMPSR18-010 Putnam County	$ 30,000.00
TOTAL	**12**	**$ 4,181,821.40**

Eleven new shelter retrofit grant agreements were executed during FY 2019. The awarded projects totaled $4,798,535, exceeding the annual appropriation by $1,798.535.

	FY 2019 Recipients	Award Amount
	DEM-SR00011 City of Palatka	$ 15,000.00
	HLMPSR18-013 Martin County	$ 450,000.00
	DEM-SR00001 Seminole County	$ 1,805,000.00
	DEM-SR00003 Indian River State College	$ 168,500.00
	DEM-SR00004 Orange County BOCC	$ 800,000.00
	DEM-SR00005 Orange County BOCC	$ 1,030,000.00
	DEM-SR00006 Orange County BOCC	$ 15,000.00
	DEM-SR00007 South Florida State College	$ 40,000.00
	DEM-SR00008 Flagler County	$ 15,000.00
	DEM-SR00009 University of Florida	$ 334,035.00
	DEM-SR00010 Walton County	$ 126,000.00
TOTAL	**11**	**$ 4,798,535.00**

By the completion of the FY 2018, four projects lists had been closed with a total expenditure of $1,147,576.40.

	Recipient Closeout FY 2018	Amount Spent
	HLMPSR17-007 Florida State University	$ 516,193.90
	HLMPSR17-010 Flagler County	$ 134,754.00
	HLMPSR17-011 Levy County SD	$ 411,352.00
	HLMPSR17-012 Okaloosa County SD	$ 85,276.50
TOTAL	**4**	**$ 1,147,576.40**

Eight project lists were closed in FY 2019, totaling $5,992,749.40.

Recipient	Amount Spent
HLMPSR17-001 Alachua County BOCC	$87,626.00
HLMPSR17-002 City of Gainesville	$217,802.41
HLMPSR17-003 Hillsborough County SD	$1,765,765.79
HLMPSR17-005 Glades BOCC	$7,923.55
HLMPSR17-006 St. Johns County School Board	$630,555.69

	HLMPSR17-009 Dixie County	$93,410.00
	HLMPSR17-011 Levy County	$411,352.00
	HLMPSR17-021 Seminole County BOCC	$437,052.82
	HLMPSR18-002 Brevard County	$1,169,709.13
	HLMPSR18-005 Bay County Schools	$685,753.01
	HLMPSR18-006 Okeechobee County	$12,900.00
	HLMPSR18-007 Flagler School District	$412,188.00
	HLMPSR18-008 Holmes County	$60,711.00
TOTAL	**8**	**$ 5,992,749.40**

The closing of $5,992,749.40 in grant funding for the FY 2019 is indicative of a **522%** increase in project performance from the previous grant cycle. **As of December 2019, all the cumulative appropriations have been allocated, aside from those pending contract execution. The under-allocation has been completely eliminated.**

HURRICANE LOSS MITIGATION PROGRAM PROGRAMMATIC ANALYSIS

Hurricane Loss Mitigation Grant Funding -

Following Hurricane Irma in 2017, it was the intent of the Division to support the counties most heavily impacted with FY 2019 HLMP grant funding. Discussions and efforts were made to develop a scoring method for an advertised proposal, however, the Request for Proposal (RPF) and project timeline proved too constricting to yield successful projects. As a result, a RFP was published for FY 2020 with accumulated funds from FY 2019 and FY 2020. The re-appropriated funding allowed the HLMP to extend the grant opportunity to twenty-four (24) of the thirty-seven (37) entities that submitted proposals. As of December 2019, twenty-three (23) of the twenty-four (24) awarded recipients have begun working on their proposed project lists.

Awarded Recipient	Award Amount	Project Type
DEM-HL00008 Vizcaya Museum and Gardens	$ 194,000.00	Historical Preservation Flood Mitigation
DEM-HL00009 City of Plantation	$ 194,000.00	Public Building Wind Mitigation
DEM-HL00010 City of North Lauderdale	$ 194,000.00	Residential Wind Mitigation
DEM-HL00011 City of Bradenton	$ 194,000.00	Residential Wind Mitigation
DEM-HL00012 ARC Tampa Bay	$ 194,000.00	Residential Wind Mitigation
DEM-HL00013 Eckerd College	$ 194,000.00	Multi-Building Wind Retrofit
DEM-HL00014 Deerfield Beach	$ 194,000.00	Residential Wind Mitigation
DEM-HL00015 Rebuild NW FL	$ 194,000.00	Residential Wind Mitigation
DEM-HL00016 St. Lucie	$ 194,000.00	Residential Wind Mitigation
DEM-HL00017 Empowerment Academy	$ 194,000.00	Residential Wind Mitigation
DEM-HL00018 Centro Campesino	$ 194,000.00	Residential Wind Mitigation
DEM-HL00019 Crisis Housing	$ 194,000.00	Residential Wind Mitigation

DEM-HL00020 Flagler County	$	194,000.00	Residential Wind Mitigation
DEM-HL00021 LASER	$	194,000.00	Residential Wind Mitigation
DEM-HL00022 Southwest Ranches	$	194,000.00	Community Drainage Project
DEM-HL00023 City of Sunrise	$	194,000.00	Residential Wind Mitigation
DEM-HL00024 City of Lauderdale Lakes	$	194,000.00	Residential Wind Mitigation
DEM-HL00025 Broward County	$	194,000.00	Residential Wind Mitigation
DEM-HL00026 Miami Dade	$	194,000.00	Residential Wind Mitigation
DEM-HL00027 Pompano Beach	$	194,000.00	Residential Wind Mitigation
DEM-HL00028 City of Carrabelle	$	194,000.00	Residential Wind Mitigation
DEM-HL00029 City of Coral Springs	$	194,000.00	Storm water Pump Station Hardening/Elevation
DEM-HL00030 Franklin County	$	194,000.00	Residential Wind Mitigation
DEM-HL00032 Emerald Coast Regional Council	$	194,000.00	Residential Wind Mitigation
TOTAL	**$**	**4,656,000.00**	

Tallahassee Community College Mobile Home Tie-Down Program -

Seventy-Five (75) site visits were completed throughout the year. These communities were evaluated utilizing a revised comprehensive assessment tool. The deliverables were completed during a process of interviewing management and/or homeowner association representatives, conducting visual inspections of homes within each identified community, and by performing intake training for the homeowners' association representative. During FY 2018, twenty (20) resident meetings were conducted by the Program Contractors. These meetings were conducted with homeowner's association board members, volunteers, and on many occasions, most residents of a particular community.

TCC completed two thousand seventy-four (2,074) homes this past year, as compared to two thousand three-hundred and ninety (2,390) homes in the previous fiscal year. FY 2018 utilized

additional funding that had forward from the unused portion of FY 2017 funding. The program completed twenty (20) mobile home communities across nine (9) Florida counties.

Florida International University Research Grant -

Florida International University (FIU) conducted research for the Division o in major areas that were identified by the International Hurricane Research Center (IHRC) team. The areas for hurricane research included flood analysis, structural mitigation analysis, socioeconomic research, and various educational outreach events and activities. In addition, graduate and undergraduate students received training in the areas of structural and wind engineering, which will help advance the State of Florida STEM workforce. Due to unforeseen circumstances that prevented FIU from completing pertinent sections of their research within their fiscal year, an extension to extend the research deadline through March 2020 was approved by the Division. Descriptions of the work in progress are reported on Appendix B.

PUBLIC OUTREACH

The Hurricane Loss Mitigation Program conducted public outreach by means of information sharing on the floridadisaster.org website, participation in the Public Outreach Sub-Committee, and through funding to the Florida International University's Research Area 6: Education and Outreach Programs to Convey the Benefits of Various Hurricane Loss Mitigation Devices and Techniques.

- Floridadisaster.org
    - The Hurricane Loss Mitigation Program maintains programmatic material on the Florida Division of Emergency Management's website. Information on HLMP's application and grant process, as well as information and links to TCC and FIU's funding purpose and processes are available to citizens and communities. https://www.floridadisaster.org/dem/mitigation/hurricane-loss-mitigation-program/
    - The Hurricane Retrofit Guide was available to the public in FY 2019. The digital construction guide was designed to help citizens make informed decisions about how to protect their homes from potentially damaging weather. This link was removed during the fiscal year, yet pertinent and updated information will be included in the outreach publication generated by the new Public Outreach Sub-Committee.
      https://apps.floridadisaster.org/hrg/
- Public Outreach Sub-Committee
    - The Public Outreach Sub-Committee was formed in summer of 2019. The Hurricane Loss Mitigation Program initiated the committee's board and reached out to emergency managers, floodplain managers, community planners, and other stakeholders across the state to recruit membership for the committee.
    - In the fiscal year's final quarter, goals of the committee had been identified, new outreach material had been created, and existing outreach material had

been collected for the upcoming FY 2020 social media campaign and community outreach toolkit.

- The Sub-Committee's management was moved under the Mitigation Bureau's Planning Unit at the conclusion of the fiscal year and HLMP maintains a presence on the board.

- FIU Research Area 6:

FIU's International Hurricane Research Center (IHRC) developed and coordinated education and outreach activities to build on the foundation of previous work under this grant.

- ***Eye of the Storm (Science, Mitigation & Preparedness) Event: May 18, 2019***

The Museum of Discovery & Science (MODS), located in Fort Lauderdale, FL, assisted the IHRC in facilitating the free admission public education event that highlighted special hands-on, interactive activities and demonstrations teaching hurricane science, mitigation and preparedness. 2,832 people attended Eye of the Storm, which was an event record. A total of 38 South Florida agencies, organizations and vendors also participated.

- ***Hurricane Mitigation & Preparedness at FIU: June 27, 2019***

IHRC coordinated hurricane mitigation and preparedness education on social media for the campus faculty, staff and 55,000 plus students. This social media education and outreach project included information on storm surge, evacuation, campus preparedness, campus emergency communication, and wind mitigation. In addition, research conducted at the Wall of Wind Experimental Facility was highlighted. The IHRC partnered with the FIU Office of Emergency Management and the FIU Division of External Relations and Social Media.

- Link to the Twitter thread: https://twitter.com/FIU/status/1144311883547070464

- Total Impressions: 61,481

- ***STEM – Distance Learning - Live Social Media Pilot Program: May 2019***

  IHRC did a pilot social media program for STEM Distance Learning for a select group of high school teachers and students from Miami-Dade County Schools. Educational content included hurricane science and forecasting, severe weather safety, mitigation and preparedness for protecting your family and home, evacuations, the role of local emergency management and the role of the National Hurricane Center and National Weather Service.

  - Facebook Live, May 15th, Museum of Discovery and Science (MODS), Joe Cox, CEO

    https://www.facebook.com/MODSFTL/videos/331001300881774/

  - Facebook Live, May 23rd, Broward County Emergency Management, Tracy Jackson, Director

    https://www.facebook.com/FIUExtremeEventsInstitute/videos/372571890029005/

  - Facebook Live, May 23rd, FIU NSF-NHERI Wall of Wind, Erik Salna, Associate Director, FIU International Hurricane research Center

    https://www.facebook.com/FIUExtremeEventsInstitute/videos/369399577254773/

  - Facebook Live, May 30th, NWS-Miami, Rob Molleda, Warning Coordination Meteorologist

    https://www.facebook.com/FIUExtremeEventsInstitute/videos/2402578306638834/

  - Facebook Live, May 31st, National Hurricane Center, Dan Brown, Senior Hurricane Specialist/Warning Coordination Meteorologist

https://www.facebook.com/FIUExtremeEventsInstitute/videos/2367281236651480/

- ***The National Hurricane Survival Initiative: Get Ready, Florida! Prepare. Recover. Rebuild.***

  The IHRC collaborated with the National Hurricane Survival Initiative (NHSI) and their annual hurricane preparedness campaign. For 2018-2019, the NHSI focused on Florida, with a 30-minute TV program: https://hurricanesafety.org/get-ready-florida/

  The IHRC contributed hurricane mitigation and preparedness information for protecting your family, home and business. The TV program aired in Florida's top ten media markets. Over 164,000 Florida residents viewed the TV program and the Total Publicity Value was over $571,000.

Appendix A

2018-2019 ANNUAL REPORT TALLAHASSEE COMMUNITY COLLEGE

MOBILE HOME TIE DOWN PROGRAM

The Mobile Home Tie-Down Program continued to be a popular and a successful program during the 2018-2019 fiscal year.

The program year started off a little hectic. Albert Wynn who directed the program the previous year was promoted to another position within the college. At the same time this lead position was vacant the program received extensive press, including radio, social media, news articles and evening news broadcasts. The press received was due to an excited homeowner that called their local news to share about the program. It was a grassroots effort thereon where many other individuals and news outlets picked up the information as part of their hurricane preparedness outreach. In addition to the grassroots media, critical assistance and advisement was provided by the Federation of Mobile Home Owners (FMO) and Florida Manufactured Housing Association, Inc. As most information previously shared had Mr. Wynn's direct phone line and email, TCC quickly adapted outreach materials to include a general office number and email address allowing a response team of five people to address questions and phone calls. Future outreach materials will retain the general address so that staff turnover does not impact our goal of superior customer service. In the first three months of the program 73 parks and 269 individual homeowner interest forms were received.

Seventy-Five (75) site visits were completed throughout the year. These communities were evaluated utilizing a revised comprehensive assessment tool and the following deliverables were completed during this process:

- Interviews with management and/or homeowner association representatives.
- Visual inspections of all homes within the community.
- Intake training for the homeowners' association representatives.

During the 2018-2019 program year twenty (20) resident meetings were conducted by the Program Contractors. These meetings were conducted with homeowner's association board members, volunteers and, on many occasions, most residents of a particular community.

The program continued as in the prior year of the grant:

- Multiple vendor contracts were renewed as allowed and stated in the 2017 RFP;
- The Individual Component of the program was renewed, but limited to about $150,000;
- The use of Quality Assurance Inspectors was continued, but only for the Individual Component; and
- The Florida Department of Highway Safety and Motor Vehicles (D.H.S.M.V), Division of Motor Vehicles, Manufactured Housing Section completed a random inspection of a minimum of 10% of the homes for the Parks Component. This inspection verifies the items

were actually installed by the vendor and installed according to the manufacturer's specifications.

The Advisory Council provided recommendation on three issues.

1. Serving homes with mortared skirting - In the past service was not provided due to the increased costs from vendors. One of the current vendors is willing to serve mortared skirting homes at no cost increase. The Council agreed that if the cost was the same, there was no reason not to serve mortared skirted homes.
2. Request to re-visit parks - Until such time that our listing does not include parks that have not been served we will not revisit or include homes on the individual listings.
3. Request to re-services homes - Until such time that our listing does not include parks or individuals that have not been served we will not re-service homes.

TCC completed two thousand seventy-four (2074) homes this past year as compared to two thousand three-hundred and ninety (2390) homes this past year. (The prior year received an additional $500,000 allocation). The program was successfully completed in twenty (20) mobile home communities (double from last year) across nine (9) different Florida counties. In all two million eight hundred thousand ($2,800,000) dollars were expensed on the grant spending 100% of the allocated funds.

Community/Park Name	Address	City	County	# Homes Served
BUTTONWOOD VILLAGE	701 AQUI ESTA DR	PUNTA GORDA	CHARLOTTE	59
CYPRESS LAKES ASSOCIATES LLC MHP II	10000 US HWY 98N	LAKELAND	POLK	137
GATEWAY MHP	10100 GANDY BLVD N	ST. PETERSBURG	PINELLAS	110
INDIGO ISLES	9181 GRIGGS RD	ENGLEWOOD	CHARLOTTE	65
PARK POINTE	7500 PARKE POINTE	ENGLEWOOD	CHARLOTTE	14
RIVIERA ESTATES	29141 US HWY 19 N	CLEARWATER	PINELLAS	68
TROPICAL PALMS	17100 TAMIAMI TRAIL	PUNTA GORDA	CHARLOTTE	160
NORTHGATE	3277 FIRST AVE	MIMS	BREVARD	96
SILVERSTAR	2530 HIAWASSEE ROAD	ORLANDO	ORANGE	111
FAIRWAYS COUNTRY CLUB (PT 2)	14205 PEBBLE BEACH BLVD	ORLANDO	ORANGE	52
CEDAR CREEK RESIDENTS INC	605 MICHIGAN BLVD	DUNEDIN	PINELLAS	70
SHALIMAR	6529 STONE RD	PORT RICHEY	PASCO	56
LAKES AT LEESBURG	10701 US HWY 441 S	LEESBURG	LAKE	259
HAMMOCK LAKE ESTATES MHP	1801 HWY 17 SOUTH	FORT MEADE	POLK	45

FT. MEADE CITY MHP	199 S EDGEWOOD DR	FORT MEADE	POLK	142
HOLLY FOREST	1000 WALKER STREET	HOLLY HILL	VOLUSIA	234
CHESAPEAKE POINT	800 CHESAPEAKE DR	TARPON SPRINGS	PINELLAS	35
HILCREST	2346 DRUID RD	CLEARWATER	PINELLAS	54
LAMPLIGHTER (PT 1)	3202 S NOVA RD	PORT ORANGE	VOLUSIA	35
BAYSHORE	15711 SHORELINE BLVD	NORTH FORT MYERS	LEE	194
Various Individuals	Detail provided in program reports			78

Moving Forward.

TCC has hired an individual (part-time) to correspond with homeowners and the general public helping to ensure a prompt and consistent response. A Coordinator has been assigned to the program. Staff and supporting operational costs are a component of the administrative fee. TCC is reliant on the expertise of the contractors and inspectors to ensure quality services are provided. We will be expanding the program to include service to homes with mortared skirting at no additional cost to the program as recommended by the Advisory Council.

Currently the database has a listing exceeding 150 parks and 281 individual homes. As the wait time exceeds 5 years, taking into consideration the capacity of the two vendors and TCC's ability to increase the number of vendors serving the program, consideration for additional funding is requested.

Additional Information

Currently statute restricts services to tie-downs. A current program vendor regularly provides low-cost carport reinforcement that may be of benefit should the program expand to additional mitigation activities. TCC has been provided detailed information on the materials, installation method, and engineering parameters related to the mitigation task.

Please refer any questions relating to this report or the Program in general to:

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Appendix B
Florida International University Grant Progress Report

Contract Number: B0022
Project Number: DEM-HL00005

Florida International University (FIU) conducted research for the Florida Division of Emergency Management (Division) in major areas that were identified by the International Hurricane Research Center (IHRC) team. The areas for hurricane research included flood analysis, structural mitigation analysis, socioeconomic research, and various educational outreach events and activities. In addition graduate and undergraduate student received training in the areas of structural and wind engineering, which will help advance the State of Florida STEM workforce. Work is still in progress as a No Cost Extension (NCE) was obtained extending the research deadline to March 30, 2020. A summary of the current progress and initial findings are included below:

Research Area 1: Experimental and Analytical Assessment of Wind Loads on Roof-to-Wall Connections for Residential Buildings (PI: Dr. Arindam Gan Chowdhury; Dr. Peter Irwin; Dr. David Prevatt; Dr. Kurt Gurley)

Wind-induced damage to low rise residential buildings is an important problem in U.S. coastal areas prone to strong hurricane winds, including Florida. Low-rise building roofs and their connections are highly vulnerable to wind damage due to the wind induced uplift. As revealed by hurricane damage reconnaissance, hardware-type roof-to-wall connections, such as hurricane clips or toe nail connections, are especially vulnerable to high wind suction. Failures of such connections can result in serious building safety and serviceability problems. There is only limited research on the assessment of wind loads on these roof-to-wall connections, which are important components of the load path. It is essential to have realistic estimates of wind effects on these connections to ensure safe design.

The objective of the proposed research was to experimentally and analytically assess wind induced loading on roof-to-wall connections for residential buildings with wood trusses. The wind loads on such connections as obtained from holistic experiments were compared with analytically obtained wind loads based on the ASCE-7 building standard.

A 1:4 large-scale model of a low-rise gabled roof residential wooden building was tested at the Wall of Wind Experimental Facility (WOW EF) at FIU. Fourteen load cells were mounted at the roof-to-wall connections (RTWCs) level, underneath seven roof trusses, to measure the net wind forces experienced by the roof for various wind directions. The opening effects on RTWCs were considered by conducting the testing for one enclosed building and two partially enclosed building configurations. The RTWC wind loads were corrected by using a partial turbulence simulation (PTS) technique to compensate for the missing low-frequency turbulence for large-scale testing. General characteristics of RTWC force coefficients were discussed and the measured RTWC loads were compared with ASCE 7-16 provisions.

The preliminary results of this study show that the RTWC wind loads follow Gaussian distribution for the ones located in the separation zone. For most of the cases, the wind loads experienced by RTWCs are larger when the connections are closer to the windward wall. The leeward corners experienced reduced force coefficients especially when the wind was acting perpendicular to the roof ridge, due to the 3D flow end effects.

The RTWC force coefficients experience a similar amount of increase for the partially enclosed buildings compared with the fully enclosed building. The location of the opening has a significant effect on the total uplifting force on the roof, but less effect on the individual RTWCs under trusses located near the gable end walls. The most unfavorable case pertaining to the overall roof uplift is for the partially enclosed configuration when the opening is located on the long side of the building.

In comparison to the building code, the experimental results are in between component and cladding (C&C: roofing membrane, wall siding, etc. that are not structural load carrying elements but part of the building envelope) and main wind force resisting systems (WMFRS: roof trusses, load bearing walls and columns, frames, etc. that support against the wind loading on the structure) values based on the ASCE 7-16 provisions. However, for the partially enclosed configuration, some force coefficient values slightly exceeded those suggested in the ASCE 7-16 C&C provisions. A difference in trends of the force coefficients for the two trusses near gable end wall was observed compared with testing and ASCE 7-16 provisions.

As data continues to be analyzed, the expected contributions to communities are: safer designs, enhanced built environment sustainability, development of hurricane-resilient communities, reduced risk to life and property, and greater economic competitive-ness of Florida. The research activities will also help in developing a trained workforce of professionals with needed expertise in hurricane damage mitigation. The multi-university research team at FIU and the University of Florida (UF) will facilitate the dissemination of project results through publications and reports to improve building practices for the state of Florida.

<u>Research Area 2:</u> Large-Scale Testing Investigation to Assess Elevated Houses Aerodynamics (PI: Dr. Amal Elawady)

Buildings constructed in coastal areas are frequently exposed to strong winds and flooding especially during hurricane seasons resulting in structural damage and damage of the interiors. In fact, hurricane-induced losses in the United States has increased from US$1.3 billion per year pre 1990 to US$ 36 billion per year post 2000. The failures observed during the reconnaissance after Hurricane Irma showed that coastal residential buildings (e.g. elevated houses and mobile homes) are the most vulnerable to hurricanes. Many retrofitting techniques for residential buildings (e.g. impact windows, innovative roofing systems) are endorsed to reduce hurricane-induced damage. Elevating coastal houses is one of the common retrofitting methods that enables flooding protection. However, ensuring the safety of an elevated house against hurricane winds is still hindered by the complexity resulting from the change in the aerodynamics created by the air movement beneath the elevated floor and the lack of information provided by building codes such as ASCE 7-16.

Generally, there are two elevation techniques: (1) lifting the house and extending the first floor columns or foundations (2) removing first floor walls and adding an upper floor. Lifting an existing house can cause disturbance to the material and may result in serious damages to existing resisting systems such as walls. This is particularly true in case of masonry structures due to their heavy weight and the construction complexity. On the other hand, wood buildings are relatively easier to be elevated. However, no specific conclusions are provided by building codes about the amount of elevation. Moreover, contractors and owners make the decision to select the elevation that results, in many cases,

in a larger reduction in the flood insurance rate (if available) without a careful consideration of the variation of the wind pressures and their distributions on the roof, walls, and the newly created lower floor.

Aerodynamic testing was conducted on a 1:5 scale model of a two story elevated building at the WOW EF. The two-story building model was tested under simulated atmospheric boundary layer conditions at four different scaled elevation heights: 0.0 in, 16.8 in, 28.8 in, and 40.8 in. The model was instrumented with 307 pressure taps to capture the fluctuating pressure distributions on the roof, wall, and floor surfaces.

The resulting wind pressure coefficients were found to be comparable or slightly lower on the two-story house compared to the results obtained during the previous single-story elevated building tests. The results indicated a concentration of relatively large suction pressures on the floor surface caused by flow separation around the stilts. These high suctions were particularly evident when the model was subjected to oblique wind directions. The pressure contour plots also showed significant regions of high suction pressures along the edges of the roof for all test cases. High suction pressures were also seen along both the top and bottom edges of the side walls when the model was elevated above ground level.

Comparison among the four elevated test cases demonstrated a general decrease in the maximum pressure coefficients along the roof and wall surfaces as the stilt height increased. On the contrary, there is a considerable increase in the suction pressures on the floor surface near the vicinity of the stilts as the elevation increases, particularly under oblique wind angles. These suction pressures can result in large cladding loads beneath an elevated structure that should be considered during the design process. Overall, the observed trends from the current round of experiments confirm findings from the previous Phase 1 experiments conducted on the single-story building model.

It is anticipated that the study will create new knowledge regarding estimation of wind forces on coastal elevated low-rise buildings during strong storms and hurricanes. This is expected to significantly advance design guidelines and consequently provide information that can assist to enhance the reliability of available loss models for the state of Florida. The proposed research will involve training graduate students in the field of hurricane-induced hazards on infrastructure which eventually will advance the state STEM work-force. The proposed research outcomes will be disseminated through publications and reports and will be discussed with building code and standards committees for potential inclusion in future editions. This will also improve coastal building practices for the state of Florida.

<u>Research Area 3:</u> Wind-induced Loads on Irregular Shaped Buildings (PI: Dr. Ioannis Zisis)

The United States has been impacted by different wind hazards including hurricanes, tornado and thunderstorm events that have caused considerable damages to civil engineering structures. According to data from Insurance Information Institute, about 37 hurricanes have hit the United States from 1998 to 2017 and the losses produced by these hurricanes have been enormous.

Wind engineering research has been conducted to mitigate the damages and impacts mentioned above, however, it has been found that most of the research carried out to study the wind effects on residential buildings has been mostly focused on simplified rectangular shapes. Some studies that have researched

the effects of wind on irregular shaped buildings (e.g. L-shaped, U-shaped), focused mostly on multi-story buildings using predominantly numerical simulations instead of experimental approaches. ASCE7 Minimum Design Loads of Buildings and Other Structures by the American Society of Civil Engineers does not give defined guidance for buildings having irregular shapes. Moreover, ASCE7 depicts all building sketches as having regular rectangular plans. Based on previous research, the distribution of pressures varies from shape to shape and general procedures may not be suitable for different shapes. Based on the research findings and the design standard of the U.S., there is a need for further research on the effect of wind on residential buildings with irregular shapes. The first task for this investigation was to perform a survey to find the most typical shapes of residential buildings in residential areas of Miami-Dade. Several aerial photos of residential neighborhoods were obtained. The aerial photos were visually analyzed, and it was found that irregular shapes are widely used with T, L and C shapes being the most common. There are other shapes that were observed, like S and H shaped buildings. However, they were not as popular as the previous shapes mentioned. Following this task, seven representative models of the most commonly identified building shapes were constructed and instrumented with pressure taps. These models were tested at the WOW EF. The configuration of the terrain was chosen to be open, mainly due to the wide usage in ASCE7 and for easier comparison of results. The wind angle of attack was increased by 15 degrees up to a certain angle. T-shaped and R-shaped models were tested up to 180 degrees while L-shaped and C-shaped were tested up to 345 degrees.

Results from the wind tunnel tests are presented in the form of mean and peak pressure (Cp) and force (Cf) coefficients. The preliminary comparisons of the roof mean Cp's revealed a clear effect of the shape of the models, where the shorter sections experience somewhat higher negative pressure coefficients at the edge of the roof sections. The mean wall Cf comparisons, also identified some interesting findings. For instance, for 0-degree wind angle of attack (i.e. perpendicular to the wall), the irregular shaped models attain higher values than the rectangular model, thus it can be stated that if a rectangular model results are used to design an irregular shaped building, it would underestimate the forces experienced by the windward wall.

The peak Cp and Cf analysis is ongoing and results will be compared to base cases and current building codes to draw important conclusions related to the design requirements of irregular shaped residential structures.

Results from this research will lead to the increased understanding of the wind-induced performance of more complex shaped residential buildings in addition to the enhancement of current building codes and wind standards. Findings will provide state policy makers to better understand coastal vulnerability and mitigation benefits and consequently to improve community planning, zoning, code development, and disaster response.

Research Area 4: Development of integrated storm tide and freshwater flooding model Phase 2 (PI: Dr. David Kelly and Dr. Yuepeng Li)

Storm surges, large waves, and freshwater flooding are the major causes of the loss of life and property damage during hurricanes. Information on maximum inundation depth, flow velocity, and hydrodynamic loads are essential for mitigating and insuring the property damage caused by freshwater and storm

surge flooding. This information is often obtained through the use of numerical models. Such data from numerical simulations can detail the severity of the hurricane and/or flood related hazard and the associated impacts. These impacts include threats to public safety and the need for emergency assistance, potential for monetary losses, disruptions to water supplies, sanitary provision, power and transportation systems, and general disruption to commerce. For example, the IHRC at FIU developed Coastal and Estuarine Storm Tide (CEST) and the Fully Adaptive Storm Tide (FAST) models for simulating storm surge flooding. The U.S. Environmental Protection Agency and U.S. Army Corps of Engineers developed the Storm Water Management Model (SWMM) and the Hydrologic Modeling System (HEC-HMS) for storm and freshwater flooding, respectively. Most flood models currently in use tend to simulate freshwater and storm surge floods separately. Freshwater flood models typically consider the effect of storm surge on freshwater flooding by adding storm surge input from a surge model at the boundary, and vice versa. In low-relief coastal urban areas, like Miami, the areas of freshwater and storm surge flooding often overlap one another and it is difficult, if not impossible, to separate the boundaries between freshwater and storm surge floods. Overland flooding from freshwater and storm surge floods can interact with each other to enhance or reduce overall impact. The separate treatment of freshwater and storm surge floods is often inappropriate and can result in significant uncertainty in assessing and predicting damage to property and infrastructure from combined coastal and inland flooding events.

In addition, the overflowing and breaching of river and canal banks in low-relief areas is not simulated dynamically in the SWMM and HEC-HMS models. This is due to the limited computational resource that was available when these models were developed. Moreover, the treatment of wetting and drying in many models currently in use is heuristic and well behind the current state-of-the-art. It is known that the accurate treatment of wetting and drying is extremely important as errors at wet-dry fronts can introduce profound errors into predictions of both velocities and water levels throughout the entire area of interest. Fortunately, both freshwater and storm surge overland floods are governed by the non-linear shallow water (NLSW) equations. The rapid increase in affordable computing power, that has occurred over the last decade, now enables us to solve the integrated shallow water equations for freshwater and storm surge floods in a reasonable time frame on a desktop computer.

The purpose of this project was to develop a directly coupled model combining storm surge with overland flooding caused by rainfall. A pilot study to develop an integrated storm surge and freshwater flood model for coastal urban areas was developed in FY 2017-18 by leveraging an existing and well established hydrodynamic model. The primary tasks completed during Phase I included (1) the parameterization of tidal forcing in a robust and stable manner, (2) the incorporation of hurricane wind driven forcing, (3) the incorporation of hurricane induced storm surge inundation, (4) the parametrization of freshwater overland flooding (due to hurricane induced rainfall), and (5) the preliminary validation of South Florida Basins with historical and hypothetical hurricanes. These parametrizations and modules have taken place in a newly developed model that is based on the open source TELEMAC hydrodynamic model.

Phase 2 of the model development during FY 2018-19 focused on verifying rainfall-runoff module and producing maps of any areas identified as being high risk in terms of vulnerability to storm surge and freshwater overland flooding in the South Florida Basin. The major tasks for further developing the combined storm surge and overland flooding model during this phase were:

- Refine the present model grid by improving the boundaries of rivers extracted from LiDAR data and water depths of the canals from Miami-Dade County data.

- Develop a module to generate 2-D gridded rainfall data using NASA's Tropical Rainfall Measuring Mission (TRMM) measurements and the rainfall gauge records for South Florida.
- Verify and calibrate the rainfall module and the model run-off module with data from the historical hurricanes Frances (2004), Wilma (2005), Matthew (2016), and Irma (2017) impacting South Florida.
- Produce the storm surge and freshwater inundation maps and hotspot flood maps using the improved model in ArcGIS format for Miami Beach.

As is well known, Florida has the longest coastline in the United States, and barrier islands can be found along more than 1,000 km of coast and on which more than 1,000,000 people live. The development of a robust state-of-the-art integrated storm surge and freshwater flooding model for barrier islands will provide the Florida Department of Emergency Management with quantitative information to help predict, respond to, and reduce the impacts of coastal flood disasters. Importantly, the developed model is efficient; and sensible runtimes (~30 minutes for a 4-day tide-surge-overland flood simulation) are possible on current high-performance desktop computers with multiple cores.

Research Area 5: Achieving Hurricane Resilience through Persuasive Messaging Development, Insights from Dynamic Decision Making, and Assessment of Resilient Housing Affordability (PI Dr. Jeffrey Czajkowski, Center for Insurance Policy and Research – National Association of Insurance Commissioners)

Principal investigator Jeffrey Czajkowski left the University of Pennsylvania for a new position at the National Association of Insurance Commissioners. As a result, the scope of work for Research Area 5 was modified. At the time of this progress report the prime award was still being amended. The new scope of work includes three main research efforts detailed below:

Increasing hurricane mitigation with targeted persuasive messaging (with Elissa Kranzler)
Residential properties are vulnerable to hurricane risk through a number of property attributes including the roof, windows, doors, walls, porches, attached structures, HVAC, yard structures, and chimneys. Accordingly, there are a number of construction improvements and retrofitting techniques that have been developed across these various property attributes to reduce the associated hurricane vulnerability. The overarching aim of the proposed research is to increase homeowners' willingness to retrofit their homes through persuasive messaging.

This work is predicated on the Integrative Model of Behavior Prediction, a socio-cognitive theory that has been used to explain behavioral performance by integrating fundamental components of other prominent theories of behavior change. This model posits that behavior is determined primarily by one's intentions to engage in the behavior, and that intentions are a function of attitudes (i.e., one's overall positive or negative feeling about performing a behavior), perceived norms (i.e., one's perception of what others think about the behavior), and self-efficacy (i.e., one's ability to perform a behavior). These constructs are, in turn, informed by behavioral, normative, and efficacy beliefs (respectively); these may include beliefs about the benefits and drawbacks of engaging in a given behavior, beliefs about what friends and family think about the behavior, and beliefs about one's ability to perform the behavior. Thus, to change the determinants of behavioral intention, one must address its underlying beliefs. The model also accounts for other factors that can influence behavior, such as skills and environmental constraints, and acknowledges a range of distal variables (e.g., age, race, risk perceptions) that may impact the relationship between behavior and its more proximal determinants. According to this model, a

fundamental strategy for behavior change is to craft persuasive messages that will influence beliefs most strongly correlated with the intention to perform a behavior. There is considerable empirical support for components of this model across a range of behaviors and applications, including behaviors related to natural hazards, suggesting the appropriateness of this theoretical model for the proposed research. Researchers will perform a series of studies that build on each other in service of our research aim.

NAIC has already conducted an elicitation survey and a baseline survey of property owners in coastal counties of Florida to determine beliefs (positive and negative) related to engaging in mitigation activities, intentions to mitigate, prior hurricane experience, and sociodemographic characteristics (e.g., age, sex, education) that may associate with mitigation. The purpose of these surveys was to identify the beliefs about mitigation that hold greatest promise for influencing mitigation behaviors; these beliefs will inform selection of messaging materials in subsequent tasks. In Study 1, researchers will examine these factors alone (e.g., the percentage of homeowners that are aware of retrofitting programs) and as they correlate with intentions to retrofit, so as to better understand what factors are most strongly associated with behavioral intentions in our target audience, and thus most promising as the basis for persuasive messages.

In Study 2, researchers will develop distilled text-based messages targeting specific knowledge or beliefs surrounding retrofitting, as determined by the findings of Study 1. Specifically, messages will target knowledge or beliefs that were most strongly associated with intention to retrofit in the survey sample, and that we believe can be influenced by persuasive messaging. Employing an experimental paradigm, we will recruit members of the target audience online and randomly assign them to read one of these text-based messages, then assess knowledge, beliefs, and intentions to retrofit, as well as sociodemographic variables. Researchers will then test whether these outcomes are significantly different by experimental group, and whether sociodemographic variables moderate these differences.

Hurricane Dorian real-time survey about individual risk reduction activities (with Wouter Botzen)
One way to limit hurricane losses is to improve individual preparedness for such disaster events. In order to design policies to improve disaster preparedness we need to have a better understanding of individual decision making during a threat of a disaster, and in particular obtain insights into why some people are well prepared and others not, which may be related to behavioral characteristics, like risk perceptions. However, most studies of individual natural disaster risk perceptions and their relation to risk reduction activities rely on cross-sectional data that is collected at one point in time after the disaster occurred, while risk perceptions and preparedness activities evolve over time. NAIC collected data on risk perceptions and preparations in real-time for five days during the direct threat of impacts from flooding and wind from Hurricane Dorian to obtain insights into how households prepared for this storm by taking risk reduction measures, evacuating or having insurance, and study factors that explain these decisions. Researchers intend to do a follow up survey of the same households a few months after the storm to examine how preparedness activities, risk perception, and other factors that drive disaster preparedness have changed after the near miss of potentially catastrophic storm Dorian.

On Thursday evening, August 29th 2019 a survey of coastal residents in Florida who were at risk of experiencing the impacts of Hurricane Dorian was launched. At that time Dorian was expected to make landfall in Florida as a category 2 or 3 hurricane, while on September 1st the storm was upgraded to being a category 5 hurricane after which it weakened to a category 2. Figure 1 displays the cone of the probable path of Dorian on the evening we launched the real-time survey. Figure 2 shows the cone of

Dorian on September 1st at its peak intensity. Maximum sustained winds reached 185 mph, tying the 2nd highest sustained wind speed among all Atlantic hurricanes. Figure 3 shows the cone of Dorian at the moment we stopped surveying on the evening of September 2nd.

In the end Dorian did not hit Florida directly, but the threat of storm surge flooding remained when it changed trajectory and moved along the coastline. The projected path of Dorian remained uncertain during the progression of the storm, however the survey sample was updated over time to include areas where flood impacts were expected to be largest. The sample included areas Jupiter up to Palm Bay as well as some areas situated in the northern Florida counties. In total 850 surveys were completed and all respondents are residents from Florida who live in areas that can potentially be flooded based on FEMA flood zone maps.

The main focus of the survey was on monitoring preparedness activities, including flood and wind insurance purchases, evacuation and a variety of measures people can take to minimize the impacts of wind and flood to their home and contents. Researchers asked questions related to factors that may influence these preparedness activities, such as risk perceptions; risk and time preferences; trust in flood defenses; previous disaster-related damages and expectations of financial relief from the government to cover these damages; psychological factors such as anticipated regret, locus of control and perceived general well-being; perceived social norms for implementing risk reduction measures; as well as perceived effectiveness of and ability to implement these measures.

NAIC will resurvey part of the original sample to track how risk perceptions and preparedness activities at the individual level have changed since we interviewed people during the first survey and the near miss of Dorian. This second survey will also focus on evacuation behavior, to examine whether people complied with evacuation orders or not. In addition to questions from the first survey for which researchers expect answers may change over time (like risk perceptions, preparedness activities and insurance purchase decisions), researchers will ask questions related to responses to stressful life experiences; and (social) media use throughout the storm.

Assessment of Resilient Housing Affordability (with Kevin Simmons and Charles Nyce)

In the face of such devastating financial loss now as well as predicted into the future, communities in at-risk regions look for public policy solutions to limit future damage. A seemingly obvious solution is to improve the resilience of built structures. One program aimed at achieving this objective is the Building Code Effectiveness Grading Schedule (BCEGS) that rates communities on the strength and enforcement of their local building codes.

This study has two primary objectives. First, researchers examine the impact stronger building codes have on the cost of home ownership. Cities who obtain high ratings from the BCEGS program do so by requiring adherence to high standards and rigorous enforcement. Ostensibly, this leads to higher cost to construct a home compared to cities with lower standards, and thus an increase in the cost of new construction and a reduction in home affordability. No study to date has examined the degree to which sales prices and thus affordability is affected. Real estate prices can be highly variable from one city to another and the difference in price is driven by a complex set of attributes ranging from the cost of land to proximity to jobs and cultural amenities. This objective aims to estimate the degree to which the cost of new construction and sales prices are influenced by high ratings in the BCEGS program.

To limit analysis solely to the increase in construction cost ignores the benefit of higher standards. Better built homes are more resilient to natural disasters thus lowering both the cost to insure over the lifetime of the structure and any out of pocket costs associated with potential future losses (e.g deductibles, uninsured losses). Therefore, it becomes unclear if the increase (if any) in initial costs are offset by the lower continuing costs of home ownership. Our second objective is to estimate the effect that high ratings from BCEGS has on property insurance rates, one component of the continuing costs of homeownership. Rates on insurance follow risk so if homes built to higher standards provide better protection from natural disasters, the expectation of reduced claims, all else being equal should provide lower cost of insurance. Reduced premiums could offset the increase in cost associated with high BCEGS ratings and actually make homeownership more affordable.

The study will utilize county level data from the state of Florida on residential real estate sales, insurance premiums and BCEGS ratings on all jurisdictions in Florida. The Florida Department of Revenue (and all county property appraisers) are required by Florida law to publish specific property tax information on their websites. These files contain the last sale date and sale amount for each property in the county. Insurance premium and coverage data for private property insurers is available at the county level from the Office of Insurance Regulation. Specific underwriting information and property level insurance data is available from Citizens Property Insurance Corporation (Citizens) the state's insurer of last resort. BCEGS rating data was provided by the Insurance Services Office (ISO) which manages the program.

The State of Florida has a number of ongoing and historical efforts aimed at developing a strong statewide natural disaster building code, increasing homeowner adoption of hurricane mitigation, and also substantial investments in the natural hazard experimental research facilities in the state. Results will help in tying these hurricane resilience priorities together, leading to overall more effective hurricane risk communication to residential property owners. Given that risk perception is a major driver of the adoption of protective risk mitigation measures, it is critical to effectively communicate the natural hazard risk to enable mitigation action to reduce current and future losses.

<u>Research Area 6:</u> Education and Outreach Programs to Convey the Benefits of Various Hurricane Loss Mitigation Devices and Techniques (PI: Erik Salna)

FIU's International Hurricane Research Center (IHRC) developed and coordinated education and outreach activities to build on the foundation of previous work under this grant.

Eye of the Storm (Science, Mitigation & Preparedness) Event: May 18, 2019

The Museum of Discovery & Science (MODS), located in Fort Lauderdale, FL, assisted the IHRC in facilitating the free admission public education event that highlighted special hands-on, interactive activities and demonstrations teaching hurricane science, mitigation and preparedness. 2,832 people attended Eye of the Storm, which was an event record. A total of 38 South Florida agencies, organizations and vendors also participated.

Hurricane Mitigation & Preparedness at FIU: June 27, 2019

IHRC coordinated hurricane mitigation and preparedness education on social media for the campus faculty, staff and 55,000 plus students. This social media education and outreach project included information on storm surge, evacuation, campus preparedness, campus emergency communication, and wind mitigation. In addition, research conducted at the Wall of Wind Experimental Facility was

highlighted. The IHRC partnered with the FIU Office of Emergency Management and the FIU Division of External Relations and Social Media.

- Link to the Twitter thread: https://twitter.com/FIU/status/1144311883547070464
- Total Impressions: 61,481

STEM – Distance Learning - Live Social Media Pilot Program: May 2019

IHRC did a pilot social media program for STEM Distance Learning for a select group of high school teachers and students from Miami-Dade County Schools. Educational content included hurricane science and forecasting, severe weather safety, mitigation and preparedness for protecting your family and home, evacuations, the role of local emergency management and the role of the National Hurricane Center and National Weather Service.

- Facebook Live, May 15th, Museum of Discovery and Science (MODS), Joe Cox, CEO https://www.facebook.com/MODSFTL/videos/331001300881774/
- Facebook Live, May 23rd, Broward County Emergency Management, Tracy Jackson, Director https://www.facebook.com/FIUExtremeEventsInstitute/videos/372571890029005/
- Facebook Live, May 23rd, FIU NSF-NHERI Wall of Wind, Erik Salna, Associate Director, FIU International Hurricane research Center https://www.facebook.com/FIUExtremeEventsInstitute/videos/369399577254773/
- Facebook Live, May 30th, NWS-Miami, Rob Molleda, Warning Coordination Meteorologist https://www.facebook.com/FIUExtremeEventsInstitute/videos/2402578306638834/
- Facebook Live, May 31st, National Hurricane Center, Dan Brown, Senior Hurricane Specialist/Warning Coordination Meteorologist https://www.facebook.com/FIUExtremeEventsInstitute/videos/2367281236651480/

The National Hurricane Survival Initiative: Get Ready, Florida! Prepare. Recover. Rebuild.

The IHRC collaborated with the National Hurricane Survival Initiative (NHSI) and their annual hurricane preparedness campaign. For 2018-2019, the NHSI focused on Florida, with a 30-minute TV program: https://hurricanesafety.org/get-ready-florida/

The IHRC contributed hurricane mitigation and preparedness information for protecting your family, home and business. The TV program aired in Florida's top ten media markets. Over 164,000 Florida residents viewed the TV program and the Total Publicity Value was over $571,000.

NOAA Hurricane Awareness Tour – Did Not Participate

NOAA's National Hurricane Center (NHC) tried to schedule Cape Canaveral as the Florida location on the 2019 Hurricane Hunter Awareness Tour, but was unsuccessful. Brunswick, GA was scheduled instead.