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1.) Introduction

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to testify today on U.S. coastal resiliency issues, particularly those in my home state of Florida. My name is J.P. Brooker and I am the Senior Manager and Policy Counsel for Florida Conservation for Ocean Conservancy based in St. Petersburg, Florida. I am a native Floridian born and raised on the Indian River Lagoon in Brevard County, and my family first came to Florida from the Bahamas in the 1850s. I am an active attorney admitted to the Florida Bar and the Middle and Southern United States District Courts of Florida. I serve on the Coral Advisory Panel for the Gulf of Mexico Fishery Management Council and the Governmental and Public Policy Advocacy Committee of the Florida Bar.

Ocean Conservancy is a charitable not-for-profit organization headquartered here in Washington, D.C and with offices in coastal communities around the country. For more than 40 years, we have developed science-based solutions to protect the ocean – and coastal communities – from today's greatest global challenges.

The lives of coastal residents around the country are intertwined with the ocean and coast. In Florida, it is no different. Culturally, residents of the Sunshine State identify with beaches, sun, sand, and surf. Economically, coastal tourism makes up the largest segment of visitors to the state, outpacing visitors to theme parks. Ecologically, it is a unique maritime state, with a diversity of ecosystems - from the spartina grasses of northeast Florida, to the tropical reefs of South Florida and the Keys, to the mangrove forests of the Everglades, and the coastal dune ecosystems of the panhandle.

But Florida - like many coastal areas around the country - is at a crossroads. Our nation's ocean and coast is facing unprecedented challenges, and for many, the issue has reached a critical mass.

My testimony will first focus on the coastal and marine ecosystem traits that make Florida's shorelines indicative of coastal communities around the country. Then, I will outline the serious challenges threatening the integrity and quality of the coastal and marine ecosystems and coastal communities. Importantly, my testimony will also describe what resilient coastal communities should look like. Finally, I will highlight how legislation currently before the Committee will improve the resiliency of coastal communities, as well as describe other actions Congress can take to protect coastal communities in the face of changing ocean, coastal, and climate conditions.

2.) The Coastal Environment

Like many coastal states, Florida is blessed with incredible ocean and coastal environments that provide enormous benefit to human communities. The state is unique in the length of its coastline (the longest in the contiguous United States), its peninsular shape, its low elevation (the highest point is around 300 feet above sea level), and its karst topography of porous limestone bedrock. These characteristics combine to create a place with diverse and interconnected freshwater and saltwater resources.

90% of Florida's 21 million residents rely on groundwater for their water supply. Two quadrillion gallons of water flow through Florida's underground aquifer and fill Florida's springs. The state's saltwater resources are connected to three large marine ecosystems: the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. Florida's waters, both salt and fresh, above ground and below, permeate the state in interconnected and deeply interdependent systems.

Beyond the water itself, Floridian beaches are iconic and are both culturally and economically important. Millions of tourists flock to Florida every year to soak up sun on the beaches, driving $2 billion in impacts. But Florida beaches are also critical habitat for creatures including sea turtles that lay 40,000 to 80,000 nests every year. Florida is also home to diverse, thriving habitats, such as coral reefs, seagrass beds, and mangroves that create a rich, diverse set of coastal ecosystems that are critical to marine life and provide recreation and commercial value to Florida's residents and visitors.

Similar to other coastal areas, Floridians have additionally created vast infrastructure to connect the various parts of the state, including iconic bridges such as the Sunshine Skyway over Tampa Bay and the Seven Mile Bridge in the Florida Keys. Coastal highways such as A1A on the East Coast, 30A in the Panhandle, and the Tamiami Trail connecting Tampa and Miami are iconic scenic highways that connect historic coastal communities and are the lifeblood of these parts of Florida.

3.) Coastal Resiliency Threats

Coastal resiliency is a problem not only in Florida, but in coastal states around the country. Although there are many state-specific threats that are important to mention, many of the resiliency challenges facing Florida are indicative of coastal challenges nationally.

Water Quality and Quantity

Starting in the early 1900s, people have built complicated water control systems to drain wetlands, control flooding, irrigate crops and provide water to growing cities and towns throughout Florida. The result has been a dramatic change to the way fresh water flows throughout the inland areas of the state, and in the lakes, rivers, and estuaries that flow into the sea, eventually impacting coastal communities and marine life.

As coastal development and population growth increased in Florida over the 20th Century and into present-day, humans have significantly altered the flows of freshwater all the way up to the Kissimmee River. Water that historically flowed out of Lake Okeechobee into the Everglades now sits in the lake and nutrients accumulate – the lake which once sustained important freshwater commercial fisheries, is choked with vegetation and clogged with a deep layer of nutrient rich muck. Water that should be flowing South, being filtered through the Everglades and ultimately into the ocean, is diverted for use in vast agricultural plantations South of the lake. In order to manage flooding of the agricultural communities surrounding Lake Okeechobee, nutrient rich water is regularly discharged West through the Caloosahatchee River and East through the St. Lucie River.

These altered flows of fresh water, combined with significant nutrient pollution inputs and other threats, pose an ongoing risk to Florida's waterways and coastal resiliency.

Harmful Algal Blooms

Intrinsically connected to water quality and quantity issues are harmful algal blooms. Algae of a variety of different species occur naturally in Florida waters in both freshwater and marine ecosystems.

However, as water temperatures rise due to a warming climate and as nutrient inputs increase from septic, agricultural, and urban sources, the naturally occurring algae can bloom into uncontrolled masses that starve other organisms of oxygen and can be toxic to plants, animals, and humans.

2018 was a record year for harmful algal blooms in Florida. The state has been plagued by three main types of algal blooms:

Blue-Green Algae

Blue-green algae is a naturally occurring organism, and in its typical background levels it poses no threat and is an important component of the food chain. However, since the organism feeds on nutrients such as nitrogen and phosphorus, spikes in those nutrients from human sources can cause them to bloom profusely.

The 2018 blue-green algal bloom event that occurred in the St. Lucie and Caloosahatchee rivers and originating in Lake Okeechobee were the worst on record, creating thick plumes that were so dense that they were colloquially referred to as "guacamole algae" blooms. Guacamole algae clogged waterways and impeded navigation, spoiled waterfront communities with its awful appearance and disgusting odor, and killed countless fish, native plants, shellfish, and other animals.

Red Tide

Red tide is caused by a bloom of a naturally occurring microorganism, which often exists in background concentrations throughout the year in waters in the Gulf and Southeastern U.S. Although red tide events are naturally occurring, the root causes of red tide blooms are still being understood by scientists – in fact, red tide is named *Karenia brevis* for dinoflagellate researcher Dr. Karen Steidinger who currently works and conducts her research at the Florida Fish and Wildlife Research Institute. It is thought that one such contributing factor is airborne dust from Saharan Africa that is carried by strong winds in the atmosphere, eventually, falling into the Gulf of Mexico and providing nutrients for the red tide microorganism to bloom. Current research is also being conducted to learn about the causal links between waterborne nutrient inputs such as phosphorus and nitrogen and red tide events and even whether blue green algae blooms are exacerbating red tides.

2018 saw a massive red tide event that encompassed Florida's southwest coast and then spread to the Atlantic Coast and up to the panhandle. This event had over $70 million impacts to the tourism economy of Southwest Florida alone, as well as massive environmental impacts including killing hundreds of sea turtles, manatees, and dolphins, even a whale shark. In total area, the 2018 red tide event was as large as the state of Connecticut, and the lasting impacts are still being calculated. For example, certain offshore species of grouper come inshore to seagrass flats and mangroves as juveniles to grow up before moving offshore later in life – iconic Floridian species such as gag grouper, which are commercially and recreationally significant, may lose an entire year class of recruits due to the impacts of the 2018 red tide event, which will impact future spawning and rebuilding of a stock that is already facing considerable rebuilding uncertainty.

Brown Algae

While the blue green harmful algal bloom and red tide events drove a great deal of the public narrative in 2018, there are other harmful algal blooms that attract less media attention but still need addressing. Brown algae, which can be released in ballast water discharges, has been known to bloom in the Indian River Lagoon on Florida's East Coast, and as recently as 2016 massive brown algae related fish kills put

charter fishermen out of business, crushed coastal tourism, fouled boats, and impeded navigation. Further, the Indian River Lagoon has seen record manatee and dolphin mortalities, and shellfish and seagrasses have seen considerable dieoff, which may be related to harmful algal bloom events and poor water quality.

Coral Disease and Bleaching

Coral, which is a living animal, forms the bedrock of the reef ecosystem. It makes up the physical substrate that the rest of the reef grows out of, and that fish and other organisms are attracted to for food and protection.

The Florida Coral Reef Tract, which extends from Martin County on the East Coast of Florida down to Key West, is the only living barrier reef in the United States and is one of the largest barrier reefs in the world. It provides critical habitat to fish, mammals, corals, marine reptiles, and invertebrates. Beyond the tremendous biodiversity, it also provides invaluable services to humans – tourists flock to Florida to dive and fish on the reef tract, and commercial fishermen that harvest spiny lobsters and countless species of finfish rely on the reef for their business. Coral reefs also buffer the coast from the impacts of storms by diffusing wave strength offshore before reaching the coast, thereby reducing erosion and other damage to the shore.

But coral, like all animals, suffer from diseases due to viruses and bacteria that naturally occur in the water. An unprecedented outbreak of stony coral tissue loss disease started in southeast Florida in the fall of 2014, and has now expanded over at least 200 linear miles of reef, stretching along the entire expanse of the Florida Coral Reef Tract. Half of Florida's 45 reef-building species have been affected.

In addition to disease, coral is also affected by bleaching, which occurs when the coral expels the tiny symbiotic algae that give the reef its color and give coral oxygen. Stress due to warming ocean temperatures is the primary cause of bleaching events worldwide, and is also a root cause of coral bleaching events in Florida. Run-off and coastal water quality issues may also exacerbate coral bleaching, and overexposure to sunlight and extreme low tides can contribute.

Sea Level Rise and Flooding

The National Oceanic and Atmospheric Administration (NOAA) has recently issued a report that details how sea level rise is impacting coastal communities here in the U.S. 40 locations have been identified as facing accelerating high tide flooding trends, and includes cities such as Washington, D.C. which experienced 20 or more days of high tide flooding.

In Florida, citizens often refer to high tide flooding as "sunny day flooding," in juxtaposition to the flooding that may occur more normally during storms (storm surge). Sunny day flooding has become so commonplace that municipalities are now marking streets to indicate the occurrence of saltwater flooding.

A prime example of the future impacts of saltwater flooding comes from Miami Beach, where an octopus climbed through storm drains that emptied into Biscayne Bay during a routine King Tide (an unusually high but anticipated tide) event and into a typically dry parking garage. This perfectly illustrates the scope of threats that will come as sea-level rise makes sunny day flooding more and more common. It is forecast that Miami Beach alone will spend $400 million over the next 20 years to keep saltwater flooding off of city streets and out of city infrastructure.

The frequency of high tide flooding is anticipated to increase over the next year. By April 2020, high tide flooding will have occurred roughly twice as frequently as it did in 2000. By 2030, it is expected that there will be an average of 7-15 days of high tide flooding, and 25-75 days by 2050. Florida may see a significantly higher frequency of flooding days.

Extreme Weather

Florida is used to hurricanes and tropical weather that has been pummeling the state in an annual cycle for eons. Storms have shaped the coastline, cut inlets and passes, and are a natural part of the state's remarkable weather. However, as water temperatures increase and sea levels rise due to a changing climate, the impacts of hurricanes and tropical weather will become more frequent, more severe, more damaging to ecosystems and habitat both on the coasts and inland, and more costly to human life and property.

When Hurricane Michael came ashore in Mexico Beach, Florida on October 10, 2018, it was initially classified as a Category 4 storm. The National Weather Service, however, retroactively upgraded the storm's intensity to a Category 5, making it the strongest storm to hit the United States since Hurricane Andrew hit Florida in 1992, and the strongest storm on record to hit the Florida Panhandle.

The resulting impacts from such an extreme weather event were immense, and are likely to worsen as weather events become even more severe. The storm hit an area famous for its beautiful sugar sand beaches and valuable tourism economy, causing billions of dollars in impacts. But the effects were also felt far inland, where forestry products drive a large part of the regional economy – vast tracts of pine forest, carefully planted and managed and harvested, were laid flat by Hurricane Michael as far as 50 miles or more inland.

4.) **A Snapshot of Resilient Coastal Communities**

Resilient shorelines and waterfronts are the foundation of healthy coastal communities. In order to protect the natural environment and places of work and play, policymakers must take bold action to ensure clean and abundant water, healthy beaches, thriving habitat, and resilient infrastructure in the face of coastal change.

Clean and Abundant Water

The lives of coastal residents are shaped by the waters that surround them. The same rings true in Florida: hauntingly beautiful springs, iconic coastal waters, the mammoth Lake Okeechobee and the one-of-a-kind Everglades.

Clean fresh water with strong, natural flows through native watersheds leads to healthy coastal and offshore water. Clean and abundant water serve important human needs, such as tourism, recreation, transportation, fisheries, and desirable places to live. They also support many fish species and provide habitat for migratory birds, marine mammals, corals, sea turtles, and submerged aquatic vegetation.

Healthy Beaches

The beach is a coastal community's backyard. It's where we play and relax. It's where we fish, surf, dive, swim, and sail. For Floridians, it forms a critical aspect of our identity from the Panhandle to the Keys to Amelia Island. But of the 825 miles of beaches in Florida, 485 miles are experiencing active erosion that threatens their mere existence.

Healthy beaches can be ephemeral, shifting and moving over time. Because of their transient nature, beaches should not be seen as locations for permanent development, and buildings should be situated a set distance inland from the dunes, and should only be a few stories tall – tall buildings directly on the coast can impact local microweather patterns, and lights from buildings can negatively impact sea turtle nesting by confusing the animals who rely on moonlight for geographic orientation.

Healthy beaches are free of trash and debris and support sustainable human activities such as sunbathing, swimming, and wildlife viewing that requires minimal infrastructure and development. Healthy dunes and dune vegetation provides important protection from flooding and storm surge, and healthy coral reefs offshore help protect the sandy beaches from excessive erosion by knocking down wave action.

Thriving Habitats

Coastal communities are home to a huge diversity of unique ecosystems that are critical to coastal and marine life and provide recreation and commercial value to residents and visitors alike.

Mangroves protect upland areas from storm impacts such as wind, waves, and flooding that can cause significant erosion and can damage buildings and infrastructure. Mangroves also help stabilize shorelines and filter water and maintain water quality and clarity while also providing essential nurseries for juvenile fish, and critical habitat for shellfish and other organisms.

Some of the most extensive seagrass beds in North America occur in two areas on Florida's coast – in Florida Bay, and in the Big Bend area stretching from near Tarpon Springs up to the Eastern Panhandle on the Gulf of Mexico. Seagrasses provide essential habitat for a huge variety of fish species, they provide food for manatees and sea turtles, and they help clean and oxygenate the water.

Plenty of other coastal habitat, including oyster beds, coral reefs, and spartina marshes, provide similar services to ecosystems and to humans. Protecting existing habitat and restoring degraded habitat fosters coastal resilience.

Resilient Infrastructure

Across the country, but particularly in coastal communities, there is a major need for modern, functional infrastructure that is capable of withstanding routine environmental threats. Infrastructure should be capable of preventing exacerbation of environmental degradation – for example, storm-water systems should be capable of handling runoff and surface water in order to keep land based nutrients out of coastal waters.

Roads and bridges need to be strong enough to withstand increased storm activity in addition to increased traffic as the state's population grows. Sewage systems, storm-water infrastructure, and septic systems all pose major threats to coastal water quality, and sea level rise and flooding coupled with increased storm activity elevate those threats significantly.

5.) Recommendations for Congressional Action

Generally speaking, there is a three pronged approach to making communities resilient: 1) Protect against impacts already occurring, 2) Plan for new impacts, and 3) Mitigate current activities that could be contributing to coastal resiliency issues.

The bills currently under consideration by the committee provide some important advancements that will help coastal communities work towards resiliency, and the committee should be applauded on this work. With that said, coastal communities in Florida are in a very precarious situation and face an uncertain future, and these bills just scrape the surface on what needs to be done.

H.R.335: South Florida Clean Coastal Waters Act of 2019

Florida is facing the drastic consequences that harmful algal blooms can have on coastal communities, marine life, and local economies. Although we have an understanding of what might reduce harmful algal blooms in Florida, additional analysis of the causes and consequences of these events will better inform how policymakers can take action to ensure the resilience of coastal communities.

The South Florida Clean Coastal Waters Act of 2019 would provide this much needed analysis. Additionally, the bill would require the Inter-Agency Working Group on Harmful Algal Blooms and Hypoxia to develop an action plan for reducing harmful algal blooms and hypoxia in South Florida that is based on the integrated assessment. This plan would address monitoring needs identified in the assessment, propose a plan to implement a remote-monitoring network and early warning system for alerting local communities to human health risks caused by harmful algal blooms, and be a collaborative product from multiple levels of government, researchers, academics, and interested stakeholders.

Importantly, this is not a new approach. Congress has previously utilized this model for other regions of the country, such as the Great Lakes. The language in H.R.335 is a near mirror of the language contained in the Harmful Algal Bloom and Hypoxia Research and Control Act that requires an integrated assessment and action plan to address harmful algal blooms and hypoxia in the Great Lakes.

If approved by the Committee and enacted into law, this bill holds hope for Floridians that help is on the way to ensure that communities are resilient and that action is being taken to better understand, address, and prevent harmful algal blooms. Although further action will surely be needed based upon the results of the integrated assessment and the implementation of the action plan, this bill is an important step toward better understanding and addressing this harmful coastal resiliency threat once and for all.

H.R. 3115: Living Shorelines Act of 2019

Communities in Florida and around the nation face severe resiliency threats from extreme weather, flooding, and sea level rise. One of the biggest implications of these threats is coastal erosion, or the loss of important landmass into the sea. Although coastal erosion is a natural process, many valuable resources and communities border Florida's shoreline, and they need protection and stabilization from the damage caused by coastal threats.

Shorelines have often been stabilized by hardened infrastructure, like concrete seawalls. According to Florida Sea Grant, however, these structures can "increase the rate of coastal erosion, remove the ability of the shoreline to carry out natural processes, and provide little habitat for estuarine species."[1] Living shorelines, on the other hand, help restore or stabilize shorelines by using natural materials and systems to create buffers that protect the shore from threats that cause coastal erosion while supporting coastal ecosystems and habitats. For example, mangrove restoration not only provides protection against erosion, it also provides habitat for bird rookeries and nursery habitat for inshore and offshore fish and shellfish. Shellfish bed restoration can improve water quality by enhancing the

[1] https://www.flseagrant.org/florida-living-shorelines/

filtration capacity in an estuary, while also protecting against wave action. In Florida, living shorelines include dunes, salt marshes, mangrove forests, oyster beds, and similar ecosystems.

Although NOAA already encourages the use of living shorelines as a stabilization technique for coastal communities, more can be done to encourage their use. The Living Shorelines Act of 2019 would authorize NOAA to make grants to state and local governments and non-governmental organizations for carrying out living shoreline projects that protect coastal communities by supporting ecosystem functions and habitats. Importantly, the bill requires that these projects be resilient in the face of changing climate conditions.

Stabilizing shorelines in Florida and in coastal communities throughout the nation will help to ameliorate some of the damage already being seen and will allow coastal communities to increase resiliency and plan for future threats by proactively restoring shorelines to natural states.

H.R. 3541: Coastal State Climate Preparedness Act

Impacts from carbon pollution and climate change are touching virtually every aspect of Florida's ocean and coasts – from sea level rise, ocean acidification, warming waters, and coral die-offs. Climate change is one of the most pressing issues facing humanity, and policymakers at all levels must act to mitigate further carbon pollution and develop tangible, implementable action plans and projects to help communities adapt to changing climate conditions.

The Coastal State Climate Preparedness Act would amend the Coastal Zone Management Act of 1972 to require the establishment of a coastal climate change adaptation preparedness and response program. This program would provide assistance to coastal States to develop climate change adaptation plans to help minimize the consequences resulting from climate change in the coastal zone. The program would also provide financial and technical assistance and training to enable coastal States to implement such plans.

Under H.R.3541, the established program would have the ability to make grants to coastal States to develop coastal climate change adaptation plans. These plans would include the identification of public facilities and services, working waterfronts, coastal resources, coastal waters, energy facilities, and other land and water uses in the coastal zone that are likely to be impacted by climate change; adaptive management strategies for land use and ocean-based ecosystems and resources; and requirements to initiate and maintain long-term monitoring of environmental change to assess coastal zone adaptation and adjust management strategies when necessary.

Additionally, the bill would allow the program to make grants to coastal States to carry out projects and strategies emanating from coastal climate change adaptation plans. These projects could include activities to address physical disturbances within the coastal zone, activities to address the loss, degradation, or fragmentation of wildlife habitat, and projects to reduce, mitigate, or address likely impacts caused by natural hazards in the coastal zone, including sea level rise, coastal inundation, erosion, storm water management, and severe weather events. Funded activities can also include projects to adapt existing infrastructure and provision of technical training and assistance to local coastal policymakers.

The development of a coastal climate change adaptation preparedness and response program is wise. In Florida, even very small communities have already begun to develop such plans. Yankeetown, in the Big Bend area on Florida's Gulf Coast, is a very small community that has seen large tracts of trees dying off due to saline condition. The town has a proactively designated "Adaptation Action Areas" within the

community within which they will actively plan for new and potentially worsening environmental conditions. Facilitating the expansion of this type of planning to more communities will be beneficial to residents and the ecosystem.

Given the expansiveness of the threats to coastal resilience, the creation of additional grant-making abilities under the Coastal Zone Management Act to address and create adaptive management strategies and to deal with erosion, invasive species, disease organism, habitat loss, sea level rise, coastal inundation, storm water management, and infrastructure adaptation is very welcome.

H.R. 3596 Keep America's Waterfronts Working Act

Working waterfronts are the backbone of many Floridian coastal communities. Towns like Madeira Beach, Cedar Key, Stock Island, Mayport, Destin, Everglades City and Port Canaveral all have historic connections to the maritime industry and coast-wide economy, and it is important to chronicle the economic, social, cultural, ecological, geographic, and resource concerns those communities face.

Florida has seen rampant coastal development that has consumed many historic coastal communities, resulting in the devastation of not only the community culture and history, but also in the destruction of the ecosystem that was the initial underpinning of those communities' existence. Policymakers at all levels of government can and need to take action to help preserve the resiliency of working waterfronts and coastal communities.

The Keep America's Waterfronts Working Act is an important step forward. The bill requires the Secretary of Commerce to establish a task force to work directly with coastal states, user groups, and coastal stakeholders to identify and address critical needs with respect to working waterfronts. Additionally, H.R.3596 would require the Secretary to establish a Working Waterfront Grant Program under which the Secretary may make a grant to any coastal State for the purpose of implementing a working waterfront plan. The bill also establishes a Working Waterfronts Preservation Loan Fund to make loans to coastal States to implement such working waterfront plans.

In Florida, policymakers have already taken action to help preserve working waterfronts throughout the state. The Waterfronts Florida Program within the Florida Department of Economic Opportunity was established to help address the physical and economic decline of traditional working waterfront areas. Since 1997, a total of 24 communities in Florida have received designation as Waterfronts Florida Partnership Communities, which involves the creation of a community-designed vision plan to guide the revitalization of the community's designated waterfront area[2].

If approved by the Committee and enacted into law, H.R.3596 would be an important component of empowering local communities to take action to ensure the revitalization and resiliency of working waterfronts and coastal communities.

6. CONCLUSION

Our nation's shorelines are at an all-hands-on-deck moment. U.S. coastal communities, beaches, waterways, and wildlife are precious, unique, and in grave need of help and protection.

[2] http://www.floridajobs.org/community-planning-and-development/programs/community-planning-table-of-contents/waterfronts-florida-program

In Florida, this couldn't ring more true. These unrivaled natural resources are the lifeblood of Florida's tourism industry, the beating heart of the coastal and maritime economy, and the memory and identity that Floridians love and embrace. The impacts Floridians are facing from numerous coastal threats are indicative of communities nationwide, and provide important context for policymakers as you consider what resilient coasts should look like, and adopt and implement policies to make that vision a reality.

Residents of coastal communities want action, and we want Congress, alongside fellow citizens, businesses, state and local lawmakers and government officials, to step up and do what is right so that we can all enjoy our coastal places forever. This hearing is a crucial step towards making those protections a reality, but is the first of many on a long journey.

Mr. Chairman, I am honored to have been given the opportunity to provide my testimony, and I look forward to working with you to protect our ocean and coasts.