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Working *with* nature will create a more sustainable storm resilience plan for Collier County.

The U.S. Army Corps of Engineers is seeking public input for their "Collier County Coastal Storm Risk Management" (CSRM) feasibility study. The purpose of the study is to recommend a plan to reduce the county's risk from storm surge and improve coastal resilience. Collier County is very susceptible to sea level rise and flooding because of low-lying typography and miles of development along the coast, rivers, and bays. Furthermore, scientists predict that hurricanes will increase in intensity and are likely to cause more rainfall, which means that another hurricane with the strength of Hurricane Ian, or even stronger, could hit our coast again. Thus, a plan to mitigate storm impacts and improve resilience is more important than ever.

If the CSRM study sounds familiar, it is. In 2020, the Corps designed a CSRM plan for Collier County that focused heavily on hardened structures proposed for much of our coastline. These structures included extensive floodwalls along a number of our roadways, and massive gated infrastructure at a number of our waterways, including Wiggins and Doctors Passes, designed to close during storm surge events. The visual, economic, environmental and quality of life impacts of this plan to our community cannot be overstated. However, in 2021, for numerous reasons, the Corps stepped away from this planning process.

Now that we have another bite at the apple, the Conservancy believes that the public should insist on a *better* plan for Collier County than was offered by the 2020 CSRM. A storm resilience plan must work in concert with nature not against nature. We believe it is possible to design a storm resilience plan with the goal of protecting life and property, as well as preserving and enhancing natural coastal resources, which are important for maintaining the many businesses and livelihoods that make up Collier County's robust economy.

Unlike the 2020 CSRM, a *better* plan would acknowledge Collier County's blue economy. "Blue economy" refers to all economic activities related to oceans, seas, and coasts, including estuaries, bays, beaches, and tributaries. Collier County's tourism and marine industries, fisheries, and our local way of life all depend upon the health of our world-renowned natural coastal resources. A healthy environment is also important for maintaining property values.[1]

The Conservancy is encouraging property owners and businesses, recreational and commercial anglers, ecotourism outfits, hoteliers, restaurant owners, natural resource managers, and local scientists and engineers, among others, to attend the meetings and provide input. It is important to understand that once a "Tentatively Selected Plan", or draft plan, has been created, the County's ability to significantly

[1] Florida Association of Realtors (2015, March). *The Impact of Water Quality on Florida's Home Values.* https://www.floridarealtors.org/sites/default/files/2018-11/FR_WaterQuality_Final_Mar2015_1.pdf

modify or change the plan is less likely. As an organization who works closely with the Corps' Jacksonville District, we understand that input at the beginning of the process is critical.

The Conservancy is hopeful that the public will *insist* on a storm resilience plan that achieves all of the following objectives:

1. **<u>The plan will be a Locally Preferred Plan or Locally Supported Alternative.</u>**

Collier County has the option to request a Locally Preferred Plan (LPP) or Locally Supported Alternative (LSA), which are alternative storm risk plans tailored to our community's needs and values and they integrate local priorities and best practices. With a locally supported alternative, the future character and landscape of our entire coastline will be better aligned with what our community wants.

However, because locally preferred or locally supported plans require additional time and stakeholder/public input, Collier County should inform the Corps of this choice, early in the process. Planning for a storm resilience plan is incredibly involved and complex, as the plan will require numerous solutions for multiple planning areas.

UPDATE: At the April 2023 public meetings and charrettes, the Army Corps stated that they will provide a "Local Preference Alternative" within the array of alternative plans, which is great. However, it is important that *<u>all</u>* alternatives are aligned with the community's interests. Ask the Army Corps to ensure that the entire array of alternative plans are aligned with local preferences.

2. **<u>Input from local experts must be integral to the plan.</u>**

Local knowledge and preferences should drive all resilience and adaptation planning for Collier County. The Army Corps team, while very knowledgeable, again are based out of headquarters located in Virginia and northeast Florida, so they are unlikely to have the local expertise that our Southwest Florida professionals have.

Collier County is fortunate to have an abundance of experienced scientists and engineers from our own backyard who understand Collier County's unique coastal geology, hydrology, coastal habitats, and climate change risks. These professionals have the tools and expertise to aid the Army Corps in creating a locally-led alternative plan aimed at protecting lives and minimizing property damage, while preserving ecosystems that are important for storm protection, water quality, habitats, and for maintaining the abundant recreational opportunities that locals enjoy. However, because locally supported plans require additional time and stakeholder/public input, Collier County should inform the Corps of this choice early in the process.

TAKE ACTION: Local experts were at the table at the April 2023 charrettes. Ask the Army Corps to continue to invite local experts as part of the entire study process.

3. **<u>Integrate Nature-based solutions/Natural and Nature Based Features (NNBF):</u>**

Nature-based solutions for coastal protection are strategies that use nature to protect us from wind, waves, flooding, and erosion. Natural and Nature Based Features (NNBF) is another term for nature-based solutions, used by the Army Corps. **Mangrove planting and restoration** is an example of a nature-based solution or NNBF. Mangroves are our first line of defense against storms and hurricanes. As waves roll into a mangrove forest, the mangroves' dense tangled roots and trunks reduce that wave energy. A wave can lose up to 66% of its energy after moving just 328 feet (100 meters) into a

mangrove forest.[2] The thicker and deeper the mangrove forest, the bigger the reduction in wave and wind energy.

Nature-based solutions/NBBF's are often less expensive than structural measures, provide ecosystem services, and produce economic and social benefits. For instance, in addition to providing protection from wind and waves, mangroves are nurseries for fish, they sequester carbon, they provide erosion control, and they increase tourism and recreation. Other examples of nature-based solutions and NBBFs include **oyster reef restoration**, **salt marsh restoration**, **dune restoration,** and **barrier islands (both man-made and natural)**. Oyster reefs buffer coasts from waves while filtering pollutants and provide habitat for crabs, fish, and shrimp. Salt marshes store floodwater, reduce wave energy, and provide fish and crustacean habitat. Dunes with native plantings are important for reducing storm surge impacts and providing a barrier between the water's edge and inland areas, while also providing shorebird and sea turtle habitat. Barrier islands protect the mainland coast by absorbing wave energy of oncoming storms while providing shorebird nesting habitat, fish and crustacean habitat, and recreational opportunities.

Oyster reef restoration project in Naples Bay. Photo: https://www.naplesgov.com/naturalresources/page/restoring-oyster-reefs-naples-bay

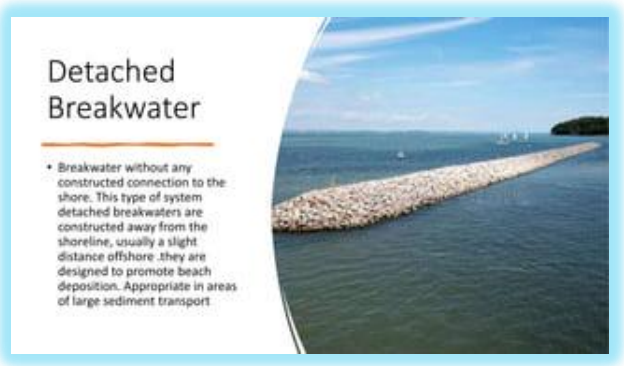
Barrier Islands. Photo: https://www.terragalleria.com/parks/np-image.ever56532.html

Nature-based solutions/NNBFs could replace structural measures or they could work in tandem with hardened infrastructure as a hybrid solution. As example, **artificial reef** projects combine natural solutions with engineered solutions. Artificial reefs mimic the structure and function of a natural reef, support marine life while buffering coasts from wave, storms and floods.

Living shorelines and **living breakwaters** are other examples that may use hybrid approaches for coastal protection. Living shorelines utilize plants or other natural elements planted along a sloping shoreline, sometimes in combination with hardened structures, like riprap. Living shorelines stabilize estuarine coasts, bays and tributaries, while providing wildlife habitats for fish, birds, and crustaceans. Living Breakwaters are partially submerged rubble structures located approximately 800 to 1,800 feet from shore designed to reduce storm risk and provide habitat for local marine life.

[2] McIvor, A. L., Moller, I., Spencer, T. *et al.* (2012). *Reduction of Wind and Swell by Mangroves*. The Nature Conservancy and Wetlands International. Natural Coastal Protection Series: Report 1.

Living shoreline project in Pensacola, FL. Photo: https://www.pnj.com/story/news/2018/07/15/living-shorelines-popularity-florida-seawall-natural-



Breakwater. Photo: https://www.slideshare.net/DEVNAIK7/jetties-and-breakwaterpptx

Living breakwater: Dinner Key Breakwater, City of Miami. Photo: City of Miami

TAKE ACTION: Let the Army Corps know that you strongly support Nature-Based solutions and Natural and Nature Based Features (NNBFs).

4. **Implement Multiple Line of Defense Strategy (MLODS)**.

A Multiple Line of Defense strategy is a multi-layered approach to coastal resilience, which includes a combination of several features to reduce coastal storm risk. MLDOS could often combine "gray" (hardened) and "green" (natural) infrastructure to improve resilience, while providing habitats and maintaining a healthy coastal ecosystem. The figure below shows and example of a multiple line of defense strategy using multiple types of gray and green infrastructure.

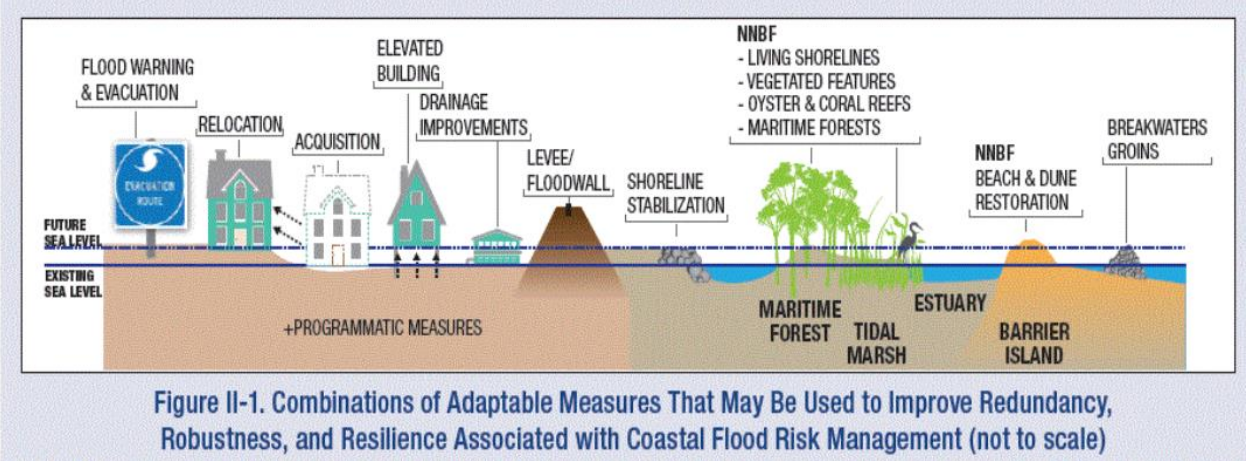


Figure 1: Illustration of Multiple Lines of Defense Strategy provided by U.S. Army Corps of Engineers Headquarters.

TAKE ACTION: Insist that the Multiple Line of Defense Strategy be a focus of the CSRM.

5. **<u>Army Corps' Engineering with Nature (EWN) team must be engaged in creation of the plan</u>.**

In addition to involving local experts, Collier County should insist on engaging the Army Corps' team of scientists, engineers, and practitioners who work for the "Engineering with Nature" (EWN) program. The Army Corps defines *Engineering With Nature* as the "intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaboration." In other words, EWN team integrates engineering with nature to help communities become more resilient against climate change.

Although the Army Corps' EWN team did not participate in the 2020 CSRM study, we believe Collier County should request that the Army Corps formally invite the EWN team to the table now, during initial plan formulation. We understand that without this request EWN team will not participate.

UPDATE: At the April 2023 meetings, the Army Corps representatives stated that EWN will be part of the CSRM study process! Thank the Army Corps for inviting the EWN team to be a part of the team of experts.

6. **<u>Any selected plan must address water quality and hydrological impacts.</u>**

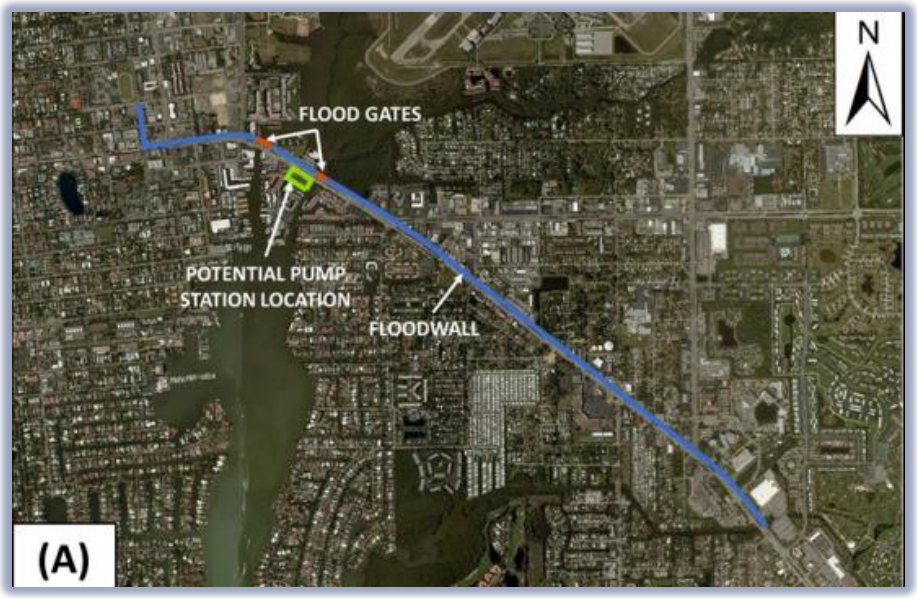
The 2020 TSP focuses on storm surge while other hydrologic issues are secondary, such as:

- Inland flooding and rainwater/stormwater runoff impoundment due to the proposed walls and gates;
- Seaward flooding, storm surge stacking and wave displacement seaward of the walls and gates;
- Water quality impacts associated with stormwater impoundment and mass releases of polluted floodwater post-storm when gates are reopened, and;
- Other impacts to estuaries (tidal flow, salinity, sediment transport, saltwater intrusion, curtail fish migration).

The public should insist that the 2023 CSRM feasibility address and provide solutions for the following issues of the 2020 CSRM:

a. Inland Flooding: The 2020 CSRM proposed three floodwalls, at Tamiami Trail E, Bonita Beach Road, and Seagate Drive. We understand that the Corps' 2021 Plan recommended a fourth floodwall off Vanderbilt Beach Rd. What happens to homes located on the inland side of the wall when sheet flow from torrential hurricane rains cannot escape due to gate closures? In addition, the storm surge barriers at Wiggins Pass and Doctors Pass would block sheet flow from entering the Gulf of Mexico during the gate closures, which could flood properties east of the structures. The Army Corps admits that the "project alignment can often aggravate the problem of interior flooding by blocking drainage outlets."[3] Collier County should not accept any plan that would exacerbate inland flooding.

The Conservancy is particularly concerned with the proposed 12-foot Tamiami Trail E. floodwall, which appears to be 2.6 miles long.[4] Gate closures could block the southwesterly path of sheet flow, which could likely result in flooding of homes located on the northeast side of the wall. (See figures below)



Location of proposed Tamiami Trail floodwall.

[3] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Collier County Coastal Storm Risk Management Feasibility Study. Appendix B: Engineering Appendix* p. 70 or pdf p. 135/152. https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14941
[4] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Collier County Coastal Storm Risk Management Feasibility Study. Appendix B: Engineering Appendix*. https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14941 Table 5.30 Structural Project Alignment Quantities (TSP). p. 74.

Example of T-Wall provide by Army Corps. Height of this wall not known.

b. Flooding seaward of the floodwalls: What will happen to homes and businesses located seaward of the floodwall? When storm surge rolls in from the Gulf of Mexico, floodwaters naturally travel up the rivers, bays, and tributaries. However, the proposed floodwalls would block off those natural pathways and force floodwaters to disburse in other directions. This could cause or exacerbate flooding to neighborhoods seaward of the floodwall that otherwise may have been spared damage.

As example, the figure below shows results of preliminary storm surge modeling by the Army Corps for the Tamiami Trail floodwall, based on a 100-year storm event. The model anticipated a 12-foot high floodwall and a 24-hour gate closure. The pink line is the location of the proposed two and half mile floodwall. The blue areas are the locations where the model predicted flooding without the projects. The green areas are where the model predicted flooding with the projects in place, which are the floodwall and gate system, pump system, and berm. The results show significant flooding south of the floodwall with the projects in place, including much of downtown Naples, Tin City, Aqualane Shores, Port Royal, Windstar, Royal Harbor, and portions of Bayshore.[5]

While the modeling also appears to show flooding in those locations without the project, it is unclear whether the floodwall would exacerbate flooding to those areas. Robust flood modeling, with input provided by local scientists and engineers, should be completed before any plan includes floodwalls. It should also be noted that the below model results only consider surge and do not take into account impacts from rainwater and stormwater runoff that would be impounded due to these structures.

[5] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Appendix B: Engineering Appendix Coastal Storm Risk Management Feasibility Study*. pdf. page 290/424.

Figure 7.6 HEC-RAS Results Tamiami Trail

Flooding due to 100-year storm event. Areas in blue show areas flooded without Tamiami floodwall. Areas in green show flooding with project.

c. Water Quality: Any storm protection plan should not exacerbate water quality issues, but this is not likely the case with the 2020 plan. The 2020 CSRM study predicts that the surge barriers and sluice gates would be closed "during substantive storm events, no more than approximately ten times a year" and "for an estimated average of five days at a time (but up to a maximum of approximately 10 days)".[6] The report also states that during gate closures there will be no tidal exchange between the embayments and nearshore coastal waters, which will cause "declines in water quality in the embayments, as salinity is expected to decrease and nutrients are expected to increase." Gate closures will collect and hold back polluted stormwater. Once the gates are opened, the polluted water will rush into the bays all at once, affecting water quality and the aquatic ecosystem and potentially exacerbating any red tide and other harmful algal blooms in the area. The Army Corps states,

> *"The construction, operation, and maintenance of the surge barriers, sluice gate, jetties, floodwalls, and associated pump stations would result in a range of temporary to permanent impacts to aquatic resources and habitats that range from moderate to potentially significant."*[7]

d. Other impacts to estuaries (changes to tidal flow and salinity, sediment transport, saltwater intrusion, curtailed fish migration): A recent study synthesized available literature on surge barriers.[8] The study showed that storm surge barriers, even when the gates are open, may result in significant changes in tidal flow and sediment transport, and changes to salinity and stratification within estuaries. The study also states that barriers also curtail fish migration and ecosystem connectivity.

[6] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Environmental Appendix D. Collier County Coastal Storm Risk Management Feasibility Study*. https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14944 p. 99/296.
[7] Army Corps of Engineers. (2020, July 31). *Draft Integrated Feasibility Study and Environmental Impact Statement*. Collier County, Florida Coastal Storm Risk Management. pdf page 125 of 296.
[8] Orton, P., Ralston, D., van Prooijen, B., Secor, D., Ganju, N., Chen, Z., et al. (2023). Increased utilization of storm surge barriers: A research agenda on estuary impacts. *Earth's Future*, 11. e2002EF002991. https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2022EF002991

Furthermore, potential issues with saltwater intrusion were not analyzed in the 2020 CSRM. The engineering appendix states that the floodwalls and surge barrier walls are proposed to extend 10 feet below grade to mitigate the effects of uplift forces from wind and waves. How would the 10-foot floodwall depths interfere with the water-table aquifer in Collier County, which can be at a depth of 10 feet or less?

The City of Naples in their September 2020 letter[9] to the U.S. Army Corps, stated that any proposed storm risk plan should address "surface/groundwater connectivity and how the proposed measures will impact water flow, saltwater intrusion, the aquifer, inundated septic systems, wastewater infrastructure, etc." We agree. Furthermore, the other impacts to estuaries, such as sediment transport issues and curtailed fish migration, should also be addressed.

Procedurally, in order for the Army Corps to address these compound flooding issues, authorization must come from their top leadership, the Assistant Secretary of the Army, through what is referred to as a Section 8106 authorization. The good news is that once Collier County requests that a Section 8106 authorization for compound flooding and other related issues to be address, such permission can be quickly given. Therefore, it is imperative for Collier County to ask early in the process for such Army Corps authorization.

TAKE ACTION: Insist that any selected plan be holistic and consider other aspects of flooding. Ask the Corps to encourage Collier County to request Section 8106 so that storm resilience plans do not exacerbate inland or seaward flooding, cause water quality impacts, or negatively affect estuaries.

7. The importance of natural capital must be considered in any storm risk reduction plan.

The Corps requires that the tentatively selected plan must provide a net positive economic benefit. In other words, the benefits provided to the community, in terms of the value of the structures protected, must outweigh the yearly average costs for design, construction, and maintenance of the project.[10]

Natural infrastructure is cheap, or even free, compared to the millions of dollars engineered solutions cost, such as pumps, floodwalls, and storm barriers. However, the 2020 CSRM and tentatively selected plan did not value the economic benefits of ecosystem services, which was a huge weakness of the study. The Army Corps stated, *"[W]e have not included an evaluation on ecosystem services for this project."*[11] As shown in Section 3 of this report, nature provides numerous services that protect us from wind, waves, flooding, and storms.

It is possible to quantify ecosystem services so that the benefits of nature-based solutions can be compared to engineering solutions from a cost-benefit perspective. As example, the Nature Conservancy found that mangrove forests protected more 626,000 Floridians from flooding due to

[9] City of Naples letter to United States Army Corps of Engineers (September 14, 2020) re: Collier County Coastal Storm Risk Management Feasibility Study.
[10] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Economics Appendix C.* Collier County Coastal Storm Risk Management Feasibility Study. https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14943
[11] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Environmental Appendix D. Collier County Coastal Storm Risk Management Feasibility Study*. pdf page 287 of 296. https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14944

Hurricane Irma and prevented $1.38 billion of property damage just within Lee and Collier County.[12] They also found that coral reefs provide $675 million in flood protection every year in Florida.[13]

Natural coastal ecosystems provide many vital services pertaining to storm risk reduction and flood protection.

TAKE ACTION: Insist that natural ecosystems are recognized for their ability to mitigate storm impacts, flooding and wind damage and, thus, be included in formulations of project alternatives.

8. Avoid significant impacts to Essential Fish Habitats

Essential Fish Habitat (EFH) are "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" and include "all marine waters and substrates (mud, sand, shell, rock, hardbottom, and associated biological communities) from the shoreline to the seaward limit of the EEZ (Exclusive Economic Zone)" of the Gulf of Mexico.[14] The 2020 CSRM anticipates unacceptable significant impacts to EFH. The report states:

> *Direct and indirect impacts to EFH, including sea grasses, mangroves, and coral reef/life/hardbottom habitats, as well as managed species and fish resources,* ***would be adverse and both temporary and permanent, ranging from moderate to potentially significant for the following EFH managed species, and their prey: corals, red drum, shrimp, reef fish, coastal migratory pelagic fish, and spiny lobster.***[15]

The 2020 CRSM states that **thirty-one reef fish** and **two corals (black and stony)** would be adversely affected.[16] The four coastal migratory pelagic species found within the Action Area that would be affected include **cobia, Spanish mackerel, and king mackerel**.[17]

These impacts are unacceptable.

TAKE ACTION: Insist that any storm risk plan for Collier County *enhance* essential fish habitats, not degrade them.

9. Avoid impacts to endangered and threatened sea turtle and shorebird species.

The 2020 CSRM proposes unacceptable impacts to numerous listed species, including sea turtles and shorebirds. The 2020 CSRM Environmental Appendix states that *"Implementation of Alternative 4A",* which is the Tentatively Selected Plan, *"may affect, and is likely to adversely affect"* the following ***nine*** federally endangered or threatened marine species: **giant manta ray, Gulf sturgeon, small tooth sawfish, green sea turtle, hawksbill sea turtle, Kemp's ridley, leatherback sea turtle, and loggerhead sea turtle.**

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[12] Narayan, S., Thomas, C., Matthewman, J., Geselbracht, L. Nzerem, K., and Beck, M. W. (2022). *Valuing the Flood Risk Reduction Benefits of Florida's Mangroves.* UC Santa Cruz, Nature Conservancy and Risk Management Solutions (RMS). RMS is company that provides catastrophic modeling to insurers and reinsurers.

[13] The Nature Conservancy. (2021). Resilience Action Plan for Florida's Coral Reef 2021-2026. https://www.nature.org/content/dam/tnc/nature/en/documents/Resilience-Action-Plan-for-Floridas-Coral-Reef-2021-2026.pdf

[14] U.S. Army Corps of Engineers. (2020, July 31). Draft Integrated Feasibility Study and Environmental Impact Statement. Collier County, Florida Coastal Storm Risk Management. p. 54

[15] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Environmental Appendix D. Collier County Coastal Storm Risk Management Feasibility Study*. pdf page 104 of 296. https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14944

[16] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Environmental Appendix D. Collier County Coastal Storm Risk Management Feasibility Study*. pdf page 104 of 296.

[17] Army Corps of Engineers. (2020, July 31). *Draft Integrated Feasibility Study and Environmental Impact Statement*. Collier County, Florida Coastal Storm Risk Management. p. 87 of 476.

In addition, the 2020 CSRM is *"likely to adversely modify"* **loggerhead sea turtle critical habitat.** Miles of loggerhead sea turtle critical habitat are located within the planning areas, including eight miles of beaches from Wiggins Pass to Doctors Pass.[18] The critical habitat units require special management considerations for beach sand placement and shoreline alterations, although we found no mention of this.

The report also states, "Alternative 4A is likely to adversely affect" the following endangered and threatened bird species: **the piping plover, red knot, wood stork.**

TAKE ACTION: Insist that any selected plan must avoid any impacts to sea turtle and shorebird nesting season or impacts to critical habitat.

10. Collier County's Blue Economy must be included in the Cost-Benefit analysis.

As mentioned, the Army Corps requires a cost-benefit analysis for each alternative proposed, the results of which informs their selection of a tentatively selected plan. While the cost-benefit analysis for the 2020 CSRM considered the value of property protected by the plan and the economic benefits of the projects, there was no analysis of the economic impact to Collier County's blue economy.

Tourism, fisheries, and the marine industry are major sectors that contribute to our blue economy. As example, the Army Corps states:

> *Collier County's commercial fisheries are of significant value to the local economy; the number of people employed by the marine economy generally ranges from nearly 17,000 to 26,000, which comprises between 12 and 18 percent of total employment in Collier County (Schmees 2019). In 2016, businesses supporting the marine economy contributed approximately $954.4 million in Gross Domestic Product to Collier County (Schmees 2019).*[19]

The Army Corps also states that,

> *"The diverse assemblage of fishes found in and adjacent to the ROI [Region of influence] is vital to the health of the marine ecosystem, which supports commercial and recreational fishing as well as various ecotourism activities."*[20]

While the Corps acknowledges that commercial and recreational fisheries contribute significantly to Collier County's economy, the 2020 CSRM excluded any analysis of the economic impact resulting from the anticipated adverse impacts to fish species, benthic fauna, essential fish habitats, sea turtles, and shorebird species.

TAKE ACTION: Support the requirement that any cost-benefit analysis for a storm risk plan include an economic analysis of the potential impacts to the county's blue economy, including economic impacts to kayak and boating tour businesses, sailboat excursions, sunset cruises, nature tours, boat rental companies, and recreational and commercial fishing operations.

11. All storm risk plans must protect the aesthetics of our coast

Collier County's beaches are simply beautiful, which is why so many tourists flock to our region and why residents are willing to spend millions of dollars for homes on or near the beaches and bays.

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[18] United States Government. Federal Register. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of Loggerhead Sea Turtle. A rule by the Fish and Wildlife Service on July 10, 2014.
[19] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Collier County Coastal Storm Risk Management Feasibility Study. Draft Integrated Feasibility Study and Environmental Impact Statement* p. 67.
[20] *Ibid.*

However, the proposed structures would drastically change the character of Collier County's beaches and bays. The massive concrete and metal storm surge structures and floodwalls proposed for the county's coasts and inlets are massive and unsightly. They would be an eyesore to those whose property faces them and would impede beautiful serene bay and Gulf views from homeowners and business owners who purchased their slice of paradise simply because of the view. Furthermore, what would these structures do to property values?

Below is an illustration, provided by the Army Corps, of what the proposed storm surge barriers could look like for Wiggins Pass and Doctors Pass. Although the images are not an exact rendering of what was proposed for those two locations, they would look similar.

Nature-based solutions and NNBF as the visually and aesthetically superior alternative and, yet, another reason for the public and the County to request working with nature.

TAKE ACTION: Support storm resilience plans that protect the aesthetics of our coast.

12. **<u>Purchasing, protecting, and preserving natural areas and green space should be an integral part of any storm protection plan for Collier County.</u>**

Although land acquisition was not part of the 2020 CRSM strategy, preserving land is critically important for protecting our communities from the worst impacts of climate change. Over 95% of Collier County's land lies within the 100-year flood plain. Extreme rainfall events (days with over 3 inches of rain) have been increasing since 1900 and have the potential to cause extensive damage to inland homes.[21] As example, Hurricane Harvey dumped 20 trillion gallons of rain over 5 days, enough water to raise all of the Great Lakes by one foot![22] Wetlands act as a natural sponge, retaining water during heavy rains, while slowly filtering and releasing water. One acre of wetland can store between 1 and 1.5 million gallons of floodwater.[23]

[21] U.S. National Climate Assessment. https://nca2018.globalchange.gov/chapter/19/
[22] NOAA. U.S. Climate Resilient Toolkit. (2022, April 12 updated) "Inland Flooding" "Hurricane Harvey: How much Water?" https://toolkit.climate.gov/topics/coastal-flood-risk/inland-flooding Accessed November 22, 2022.
[23] United States Environmental Protection Agency. Office of Water, Wetlands, Oceans and Watersheds. *Functions and Values of Wetlands.* (September 2001). EPA 843-F-01-002c. Webpage accessed on October 19, 2022: https://www.epa.gov/sites/default/files/2016-02/documents/functionsvaluesofwetlands.pdf

Forests, grasslands, and other open spaces are also important for providing flood attenuation by stopping or slowing rushing water from reaching coasts after a hurricane or major storm event.

Furthermore, over 90% of Florida's population relies on fresh groundwater from aquifers for our drinking water supply.[24] Saltwater intrusion of the Floridan aquifer, a freshwater drinking source for Collier County, is already an issue.[25] Sea level rise will exacerbate the issue. Undeveloped lands are important for allowing rainwater to percolate through the soil and replenish precious groundwater supplies.

In addition, as we previously mentioned, dunes, salt marshes, mangroves and other coastal ecosystems are critically important for flood and storm protection.

TAKE ACTION: Encourage Collier County, local municipalities and state and federal agencies to buy and protect as many acres of wetlands, forests, parks, dunes, urban preserves, and open space as possible to reduce vulnerability of current and future generations from storm impacts.

Conclusion: We need all hands on deck! The Conservancy is urging all citizens to participate in this vitally important storm resilience planning process that will forever shape the future of Collier County's coast. The window of opportunity for the public to engage on this issue is limited. **Please TAKE ACTION by participating and commenting in the CSRM study. Comments to the Army Corps are due June 7, 2023 and are to be submitted here: Collier-csrm@usace.army.mil .**

The future of Collier County depends on YOU!

[24] University of Florida IFAS Extension. Groundwater Recharge from Agricultural Areas in the Flatwoods of South Florida. http://ufdcimages.uflib.ufl.edu/IR/00/00/15/42/00001/AE39900.pdf

[25] U.S. Army Corps of Engineers Norfolk District. (2020, July). *Environmental Appendix D. Collier County Coastal Storm Risk Management Feasibility Study*. pdf page 292 of 296.