

MIAMI BEACH

City of Miami Beach, 1700 Convention Center Drive, Miami Beach, Florida 33139, www.miamibeachfl.gov

COMMISSION MEMORANDUM

TO: Mayor Dan Gelber and Members of the City Commission

cc: Rafael E. Granado, City Clerk

FROM: Jimmy L. Morales, City Manager

DATE: December 12, 2018

SUBJECT: **Discussion on Artificial Reefs**

BACKGROUND

At the City Commission meeting on May 16, 2018, the Mayor and City Commission referred a discussion to the Sustainability and Resiliency Committee (SRC) on artificial reefs. On November 28, 2018 the SRC requested staff develop an Artificial Reef Program Strategic Plan and recommended that staff explore using a portion of the annual \$1.5 million generated through the Miami Beach Redevelopment Agency funds that the city provides to Miami-Dade County for beach renourishment be used to fund installation of artificial reef structures.

ANALYSIS

The National Oceanic and Atmospheric Administration (NOAA) defines artificial reefs as manmade structures that mimic the characteristics of natural reefs. Artificial reefs act in a similar way as rock outcroppings, providing a hard surface for the potential growth of organisms like barnacles, corals, sponges and shellfish and through proper design can enhance coastal resilience by reducing wave energy that contributes to coastal erosion. There is significant interest from the insurance and re-insurance industries in incorporating these kinds of nature-based defenses into their models and calculations, and Miami Beach makes a great test case for how these new models might work. In addition, a communication and outreach strategy will also be developed to inform the stakeholders on the benefits of nature-based coastal defenses.

The Miami-Dade County Regulatory & Economic Resources (RER) manages the County's Artificial Reef Program and is the local sponsor for beach maintenance and restoration. In 2018, the Mayor and City Commission approved providing Miami Dade County to \$1.5 million each year for the next five years toward beach renourishment and restoration. The development of artificial reef structures in key erosional hotspot locations could help to reduce sand loss while also establishing new coral habitat.

The University of Miami's Rosenstiel School of Marine and Atmospheric Science (UM - RSMAS) operates a research-oriented coral restoration program, which includes a citizen science restoration program, called Rescue a Reef. The program focuses on propagating sustainable

coral stocks within underwater coral nurseries and transplanting them onto degraded reefs. The transplantation of the corals assists with the repopulation of certain coral species and recovery of habitat and ecological function. UM reef restoration scientists have been conducting coral propagation and reef restoration in Florida and the Caribbean for over 10 years, focusing on the propagation of threatened resilient corals such as *Acropora cervicornis* and *Acropora palmata*.

Furthermore, UM has a multidisciplinary team of experts - UM's Laboratory for Integrative Knowledge (ULINK) Coastal Resilience Team that is developing strategies to mitigate the impacts of sea-level rise, increased flooding, storm surge and ocean waves through the development of artificial reefs and reef restoration. The ULINK team is developing a project to test coastal resilience strategies adjacent to Miami Beach that combine grey and green infrastructures to reduce the vulnerability of coastal communities to these impacts. The project will investigate the role of healthy coral reefs on wave attenuation and how they impact mitigation on coastal structures using a set of tank-based validation tests through the Surge-Structure-Atmosphere-Interaction (SUSTAIN) laboratory.

In addition, the project's activities will focus on identifying the most vulnerable sections of the City of Miami Beach shoreline, while evaluating the risk to both people and property along these candidate shoreline sections and, developing and testing hybrid grey/green infrastructure options (such as artificial reefs) through laboratory and field tests. The Nature Conservancy is also a partner on this project and will provide physical modeling data to identify the shoreline sections of Miami Beach that are more susceptible to reef degradation and could benefit the most from reef restoration (based on bottom topography, beach elevation, hydrodynamics, wave regimes, and distance to the reefs). The ULINK team will then value and quantify the social and economic vulnerability of the urban sector delimited by these shoreline sections. Once the sections are determined, artificial reefs models populated with coral fragments of three to five different coral species will be deployed to test the performance of coral fragments mounted onto modules under natural conditions. Then, coral survivorship and growth will be monitored at these sites. The project will assist the city to identify places where nature-based solutions for coastal defense can be deployed cost-effectively. Currently, the project has funding for planning and design but funding will be needed for implementation.

CONCLUSION

Artificial reefs have the potential to create recreational benefits, provide natural habitat, and reduce the coasts impacts to storm surge. This is submitted to the Mayor and City Commission to provide background on the existing artificial reef program; to consider the SRC's recommendation to move forward with developing an Artificial Reef Strategic Plan; and request that the County utilize the beach renourishment funds received from Miami Beach to further develop an artificial reef program.

SMT/ESW