

Managing the Threat of Sea Level Rise at a Historic Waterfront Park

Jannek Cederberg, PE

ABOUT

CUMMINS | CEDERBERG
Coastal & Marine Engineering

Mission: To provide quality engineering services with an exclusive focus on coastal and marine environments. Our firm is built on an expertise in these environments and remains at the forefront of science, research and application in a constantly evolving industry



EXCLUSIVE FOCUS

We work only in
coastal and marine
environments



EMPLOYEE EXPERTISE

Coastal Engineers,
Marine Structural, Engineers
Construction Engineers,
Marine Biologists,
Former Regulators,
Oceanographer,
CAD Technicians



QUALITY SERVICE

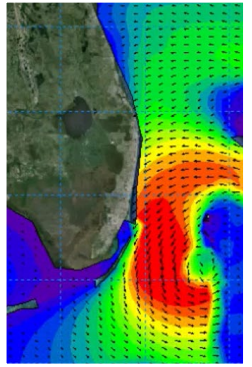
Organic growth
based on repeat
clients and referrals



FLORIDA OFFICES

South Miami
Fort Lauderdale
Jupiter
Tallahassee

WHAT WE DO



Coastal Engineering

- Sea level rise
- Wave analyses
- Hurricane and storm surge analyses
- Beaches and shoreline stabilization
- Vulnerability assessments



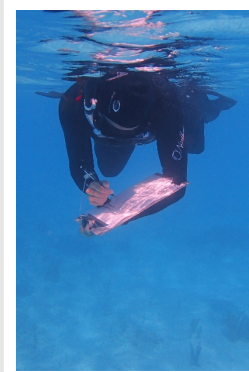
Marine Structures

- Marinas and seawalls
- Piers
- Ports
- Underwater investigations
- Construction administration



Environmental Permitting

- FDEP
- USACE
- SFWMD

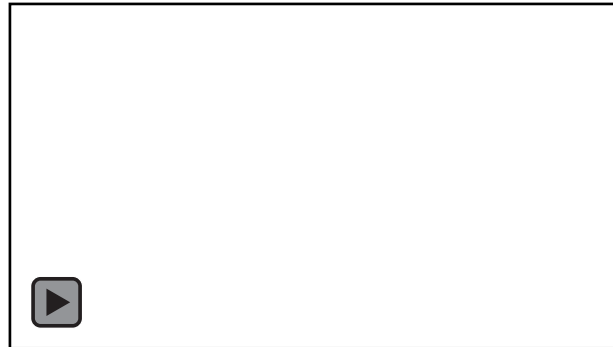


Biological Monitoring

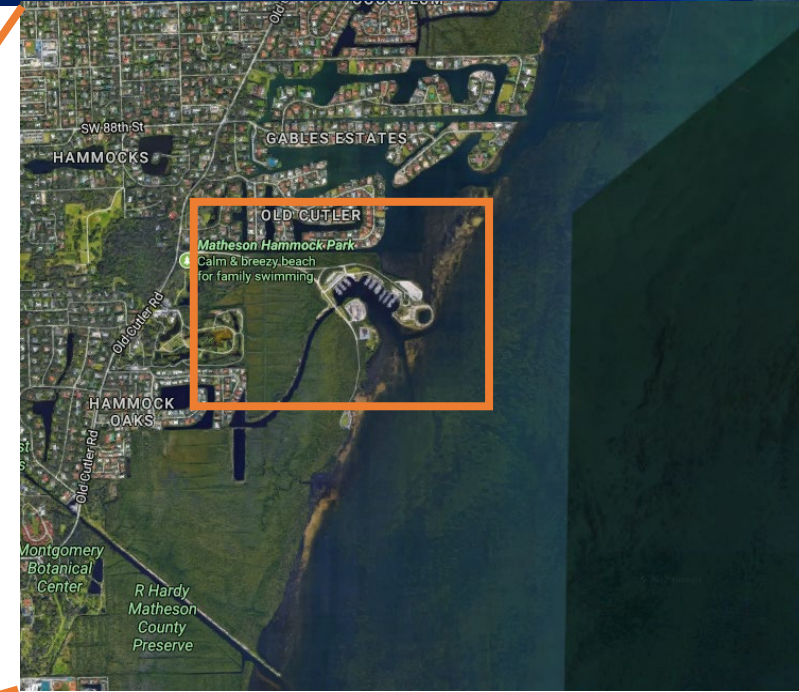
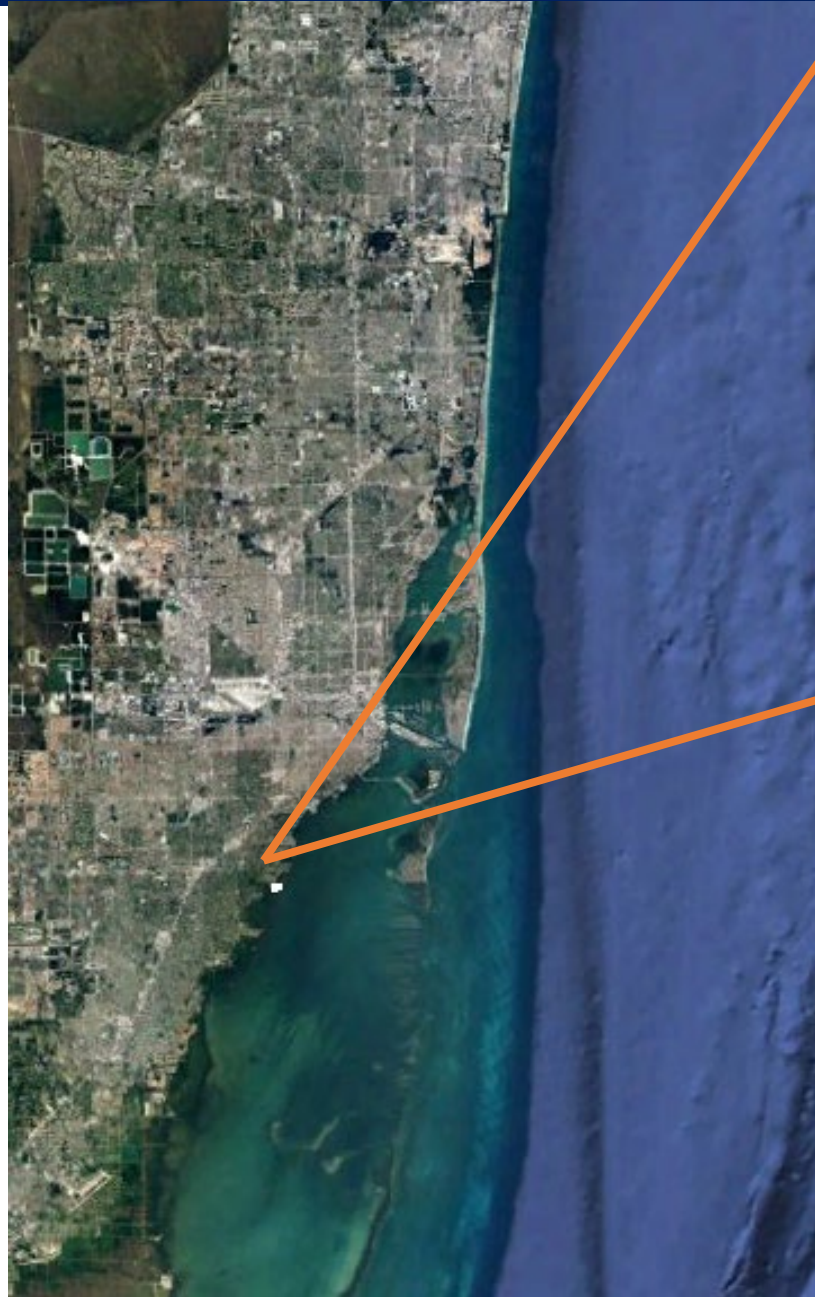
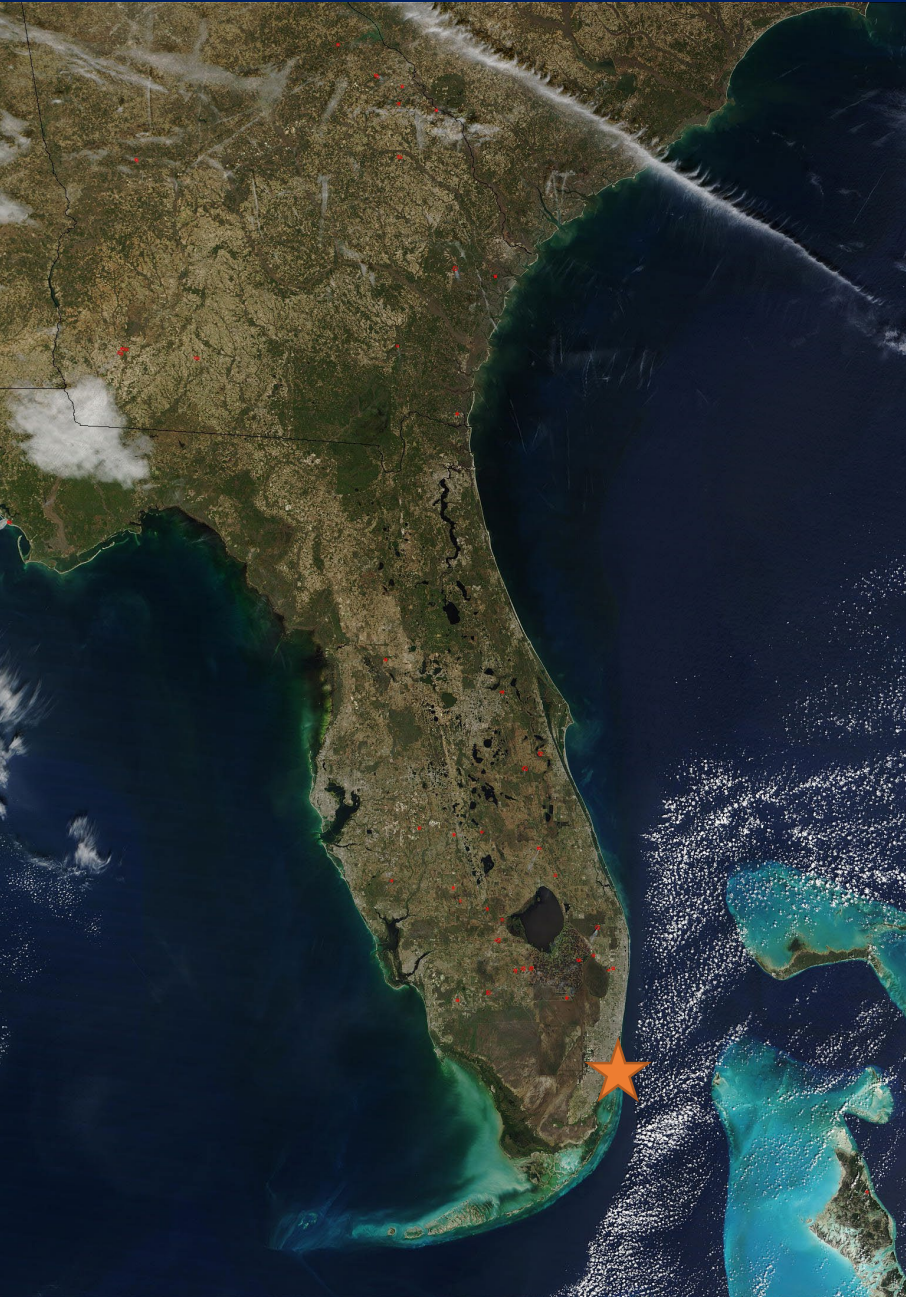
- Seagrass
- Coral
- Mangroves

COASTAL RESILIENCY

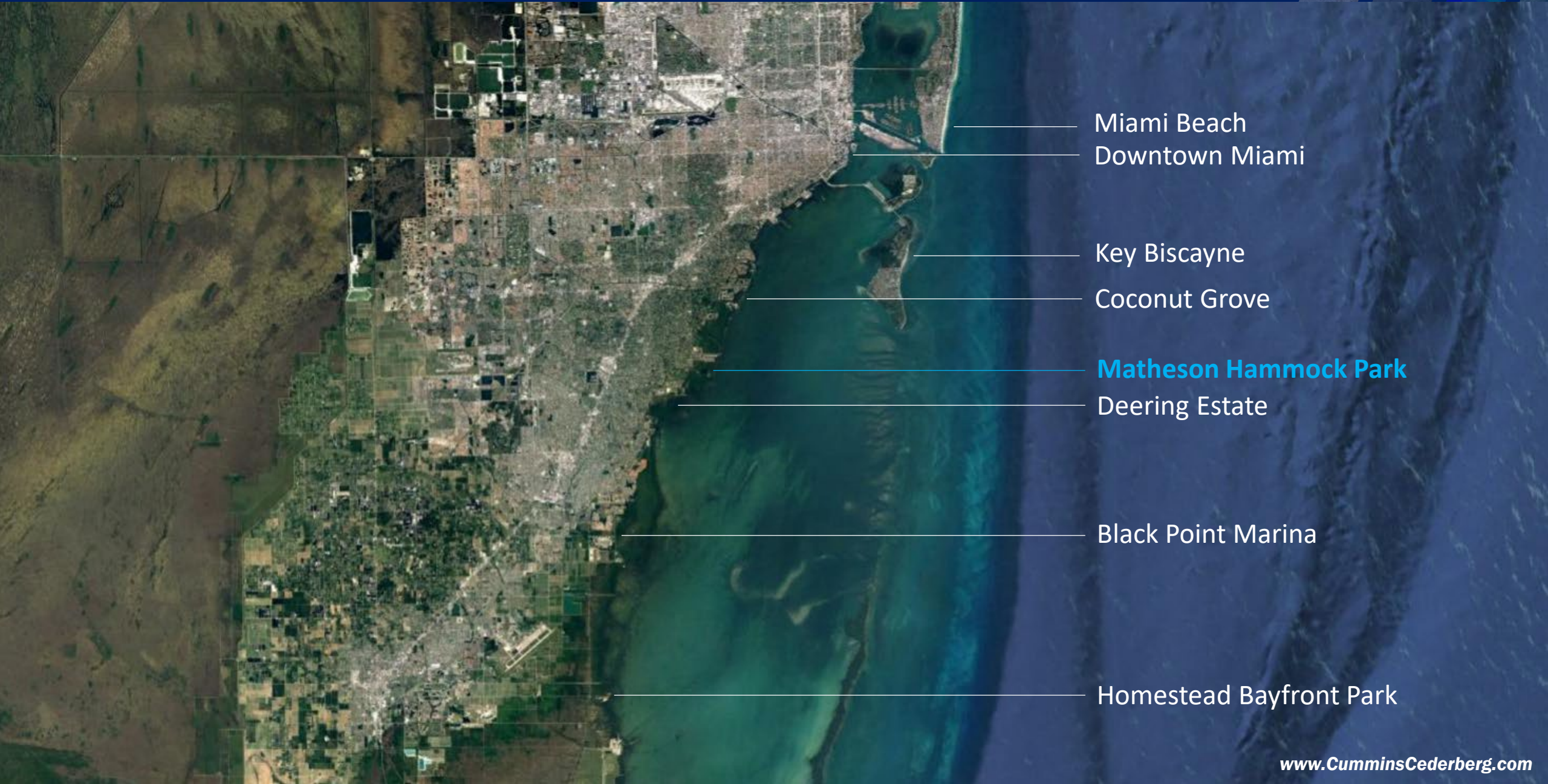
- ✓ Port of Miami Master Plan
- ✓ City of Marathon FDEP Vulnerability Grant
- ✓ Matheson Hammock Park Sea Level Rise Mitigation Study
- ✓ Haulover Park Sea Level Rise Mitigation Study
- ✓ Crandon Park Sea Level Rise Mitigation Study
- ✓ Town of Bay Harbor Islands Coastal Resiliency Study
- ✓ Brickell Key Island Coastal Vulnerability Study
- ✓ North Dade Wastewater Treatment Plant Coastal Vulnerability Study
- ✓ Ocean Cay Marine Reserve



Location Map – Matheson Hammock Park



Location Map – Matheson Hammock Park



Miami Beach
Downtown Miami

Key Biscayne
Coconut Grove

Matheson Hammock Park
Deering Estate

Black Point Marina

Homestead Bayfront Park



BOAT RAMP

SEAWALLS

MANGROVE TRAIL

ROADS

PARKING

ATOLL POOL





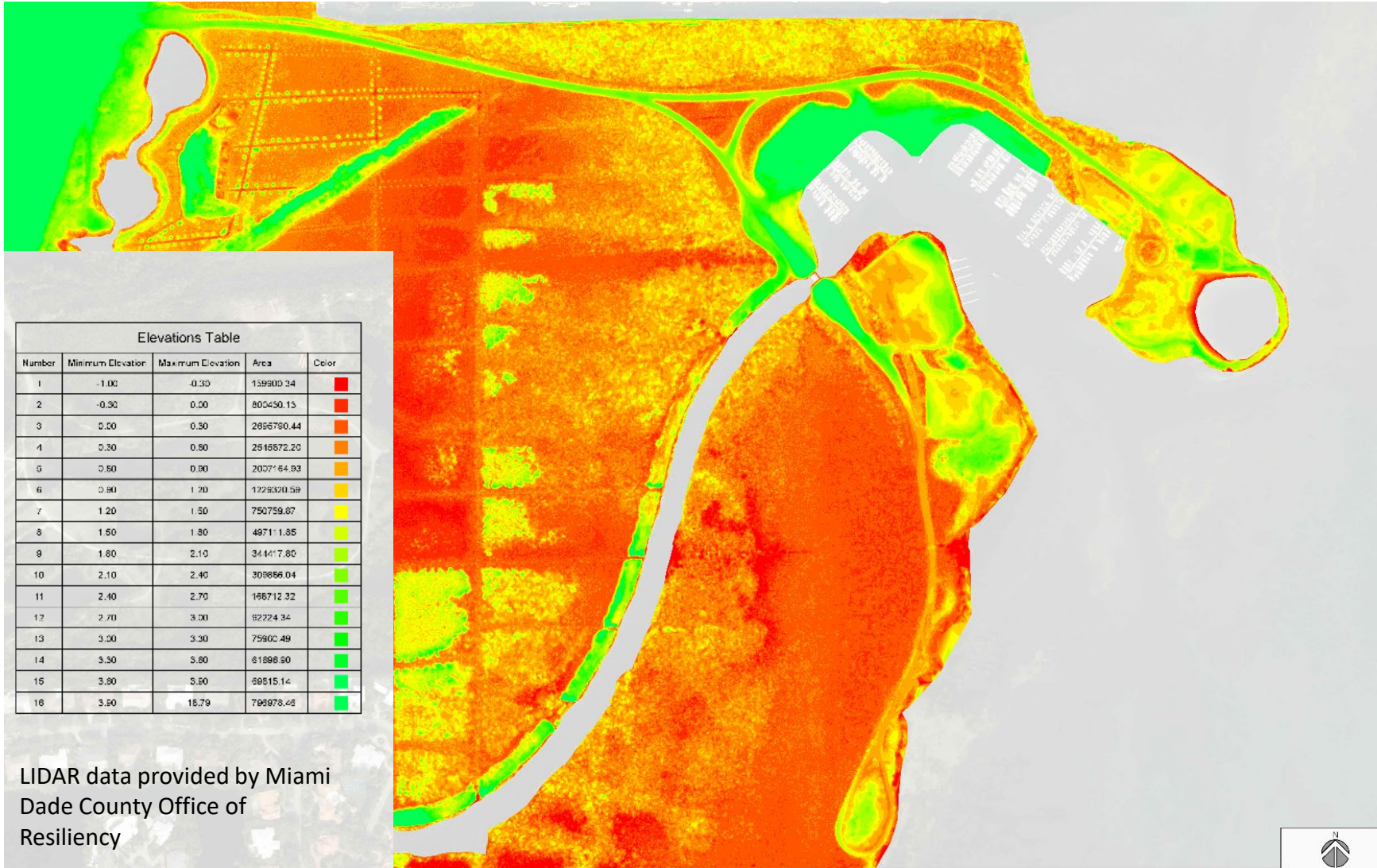




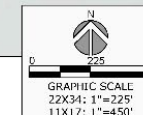


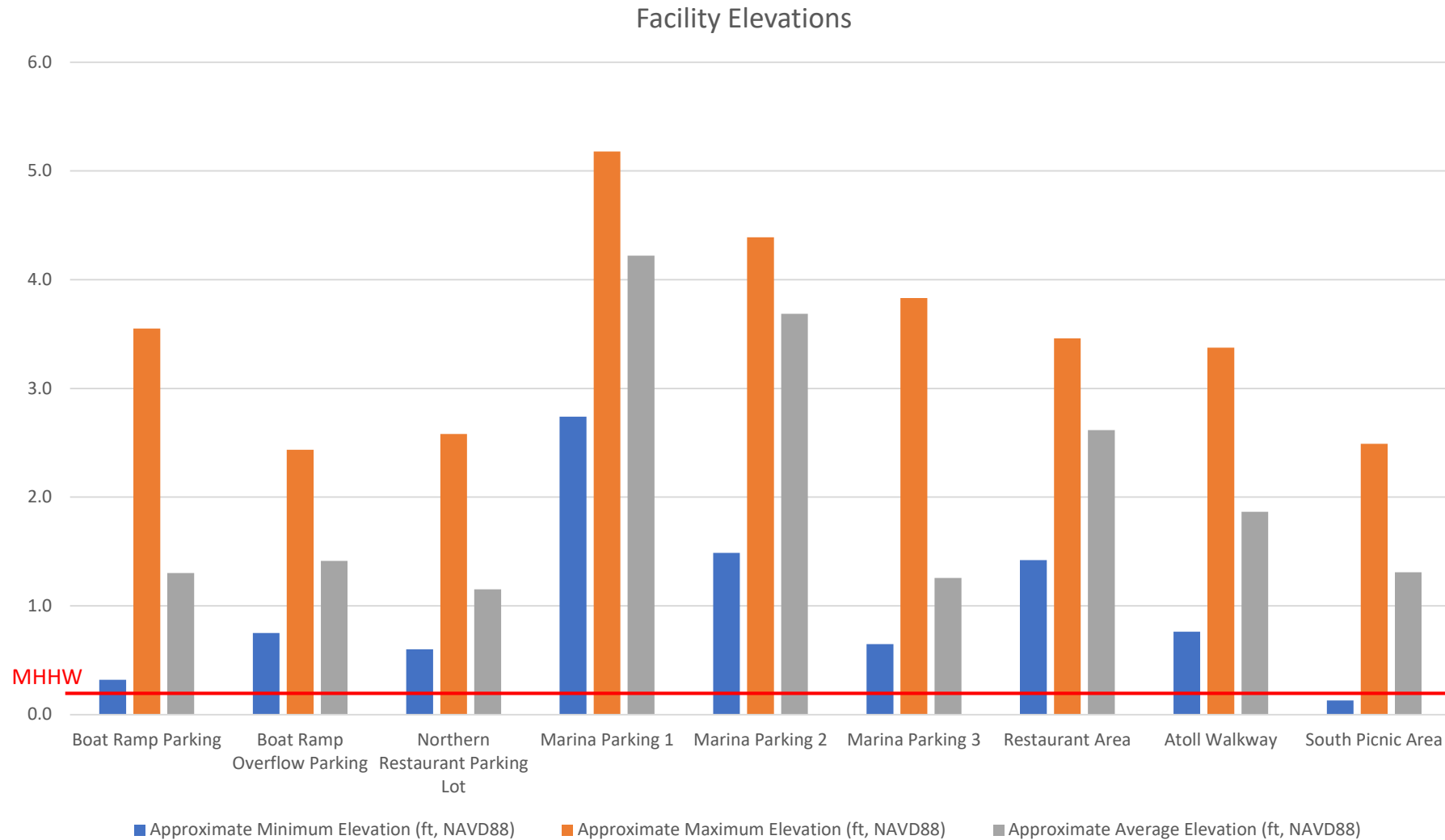


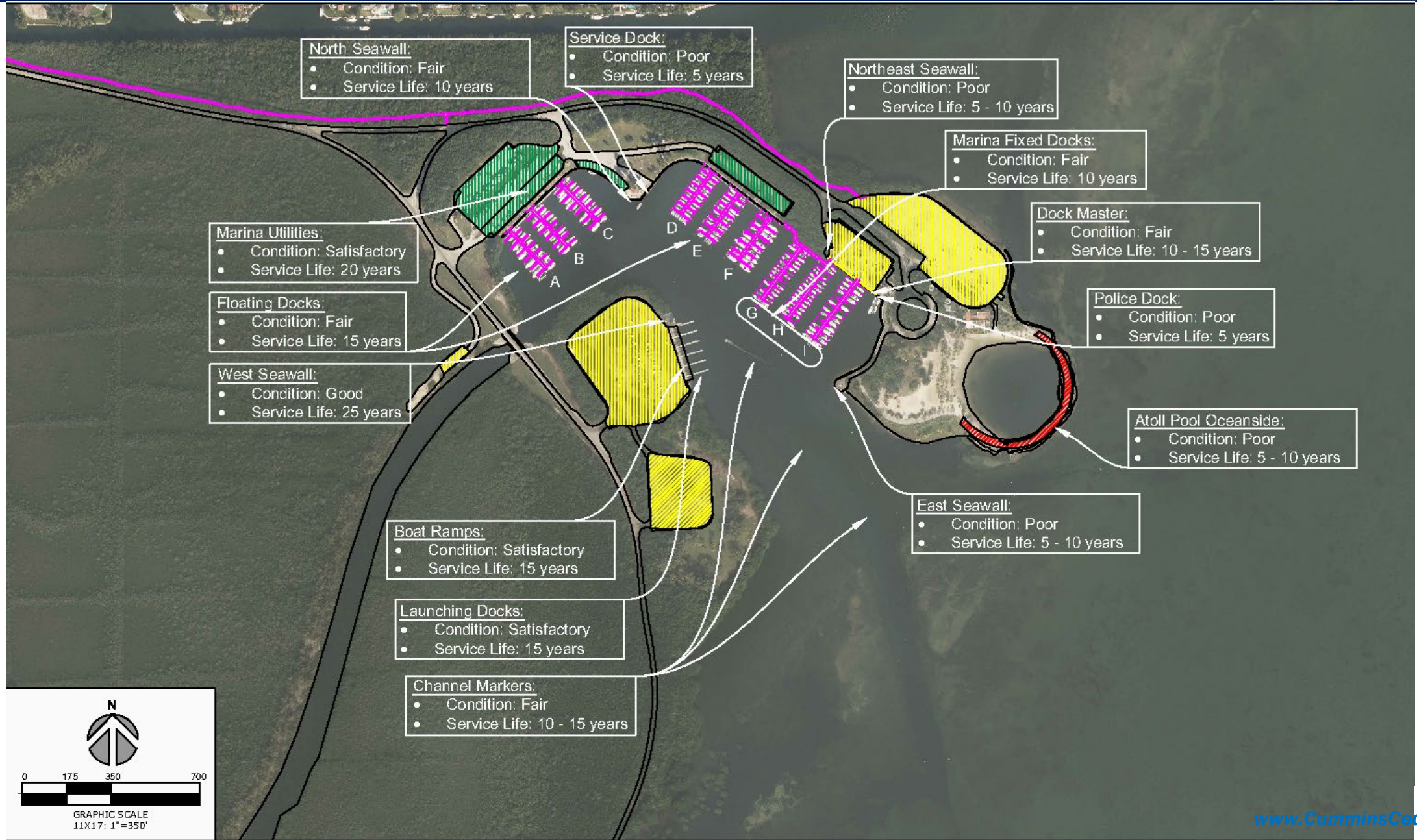




LIDAR data provided by Miami Dade County Office of Resiliency





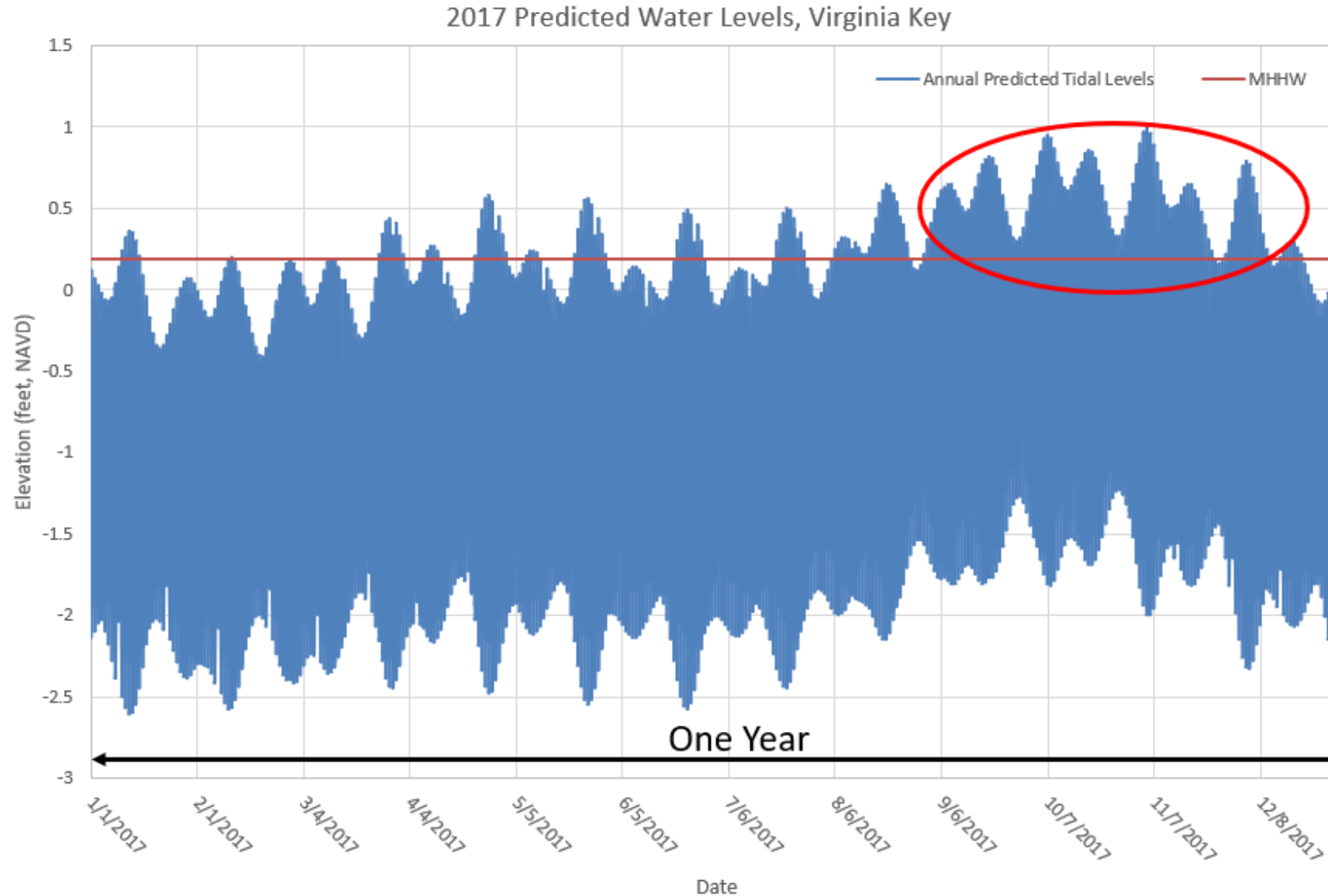


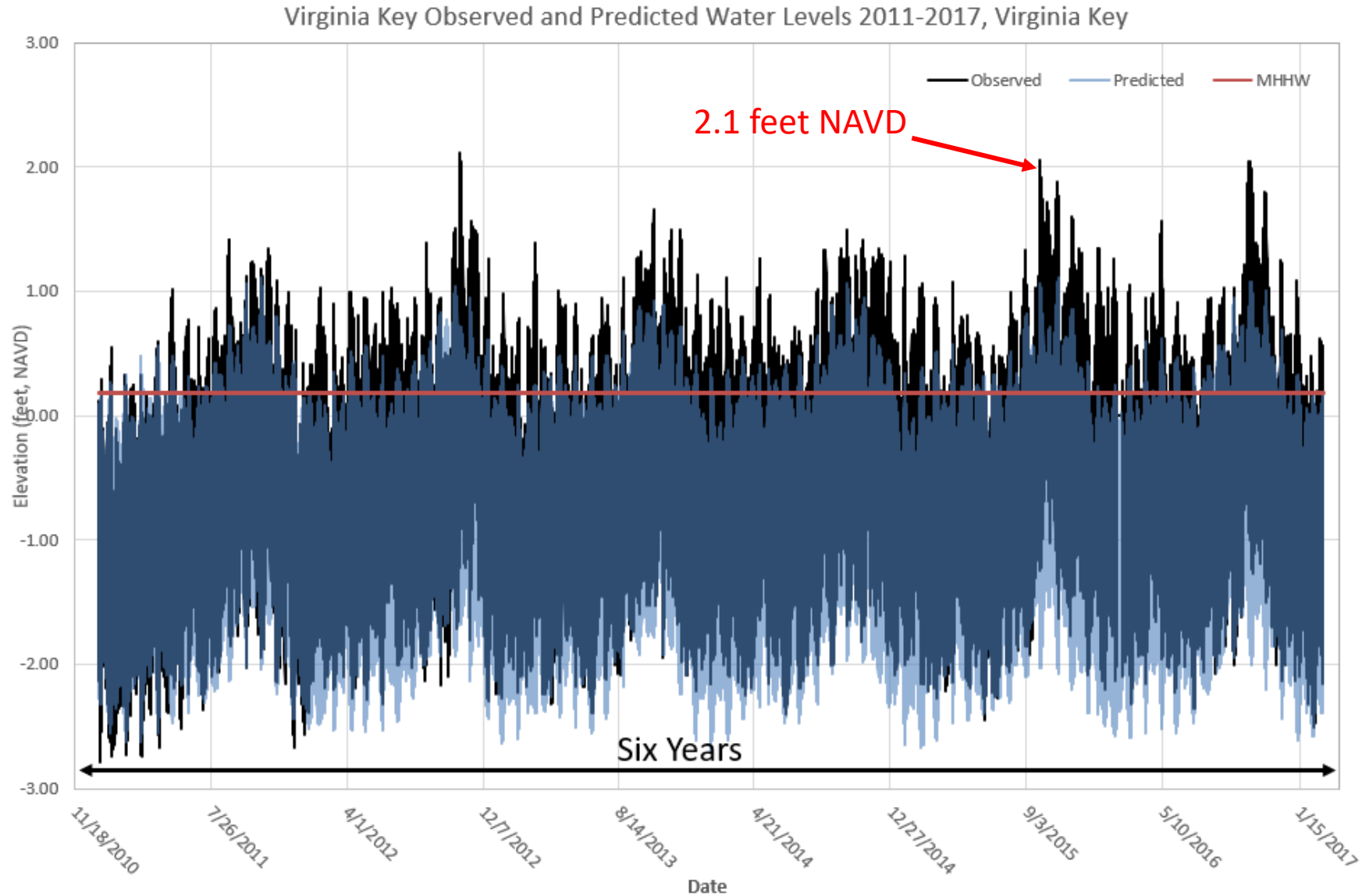


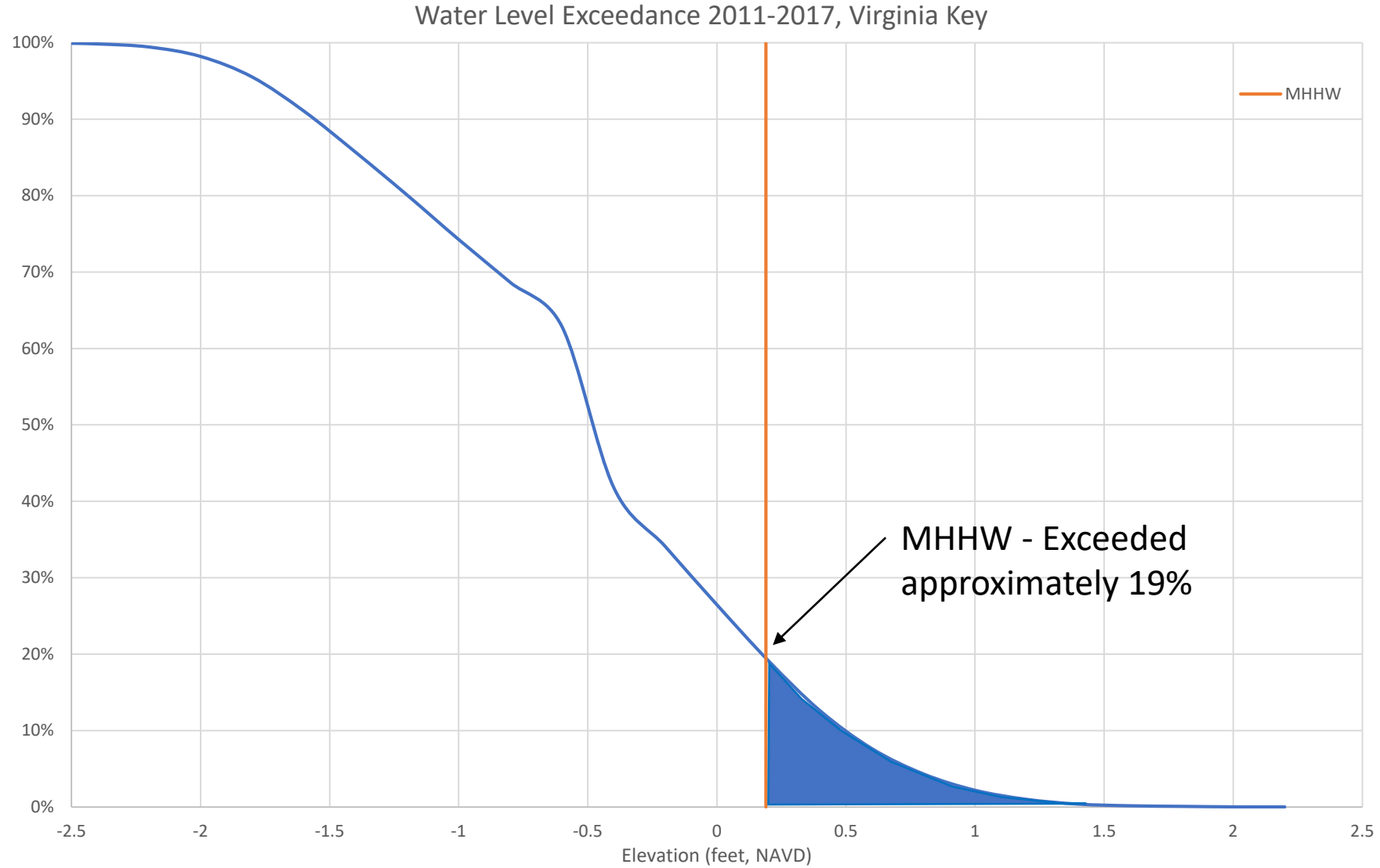
Tide Levels – NOAA Station 8723289

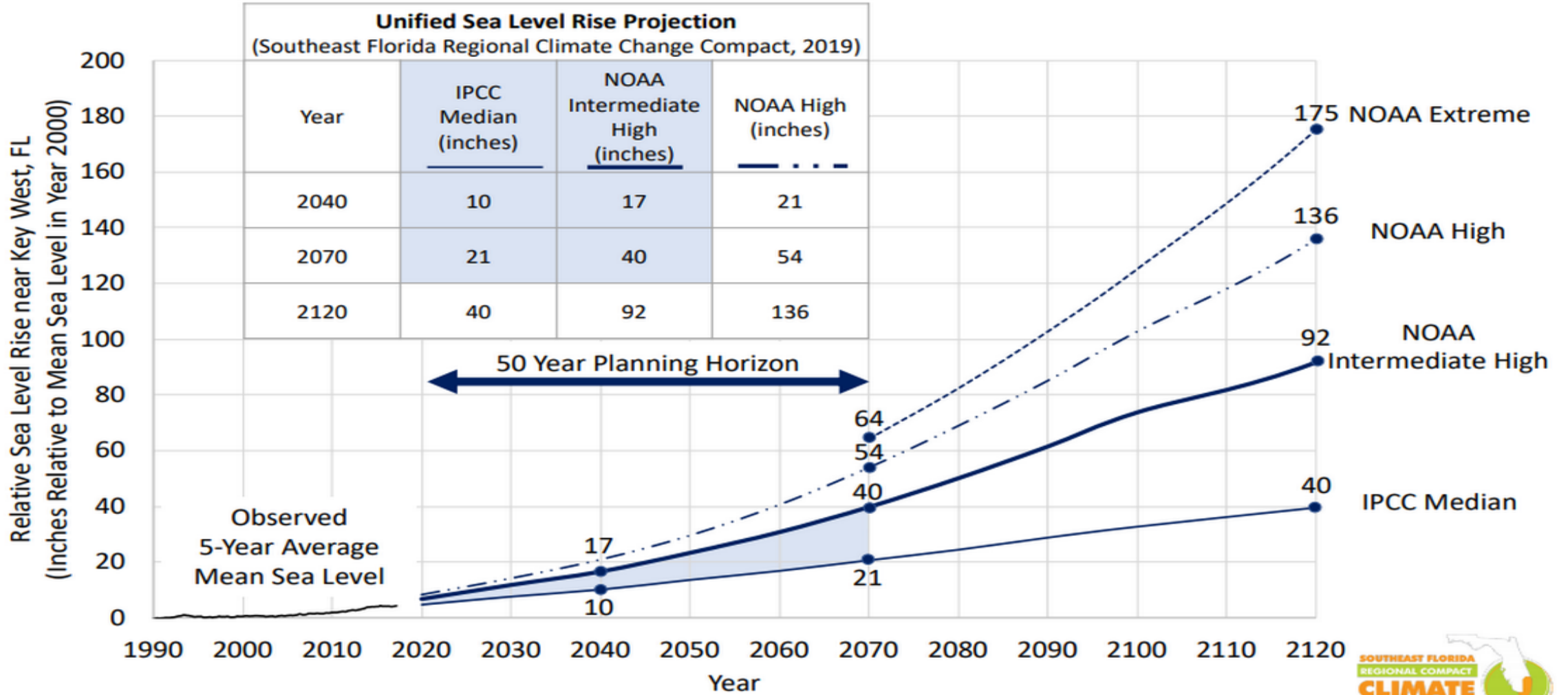
Datum	NAVD88 (feet)
Mean Higher High Water	0.19
Mean High Water	0.13
Mean Sea Level	-0.84
Mean Low Water	-1.81
Mean Lower Low Water	-1.94

These are established benchmarks, keyword is “mean”





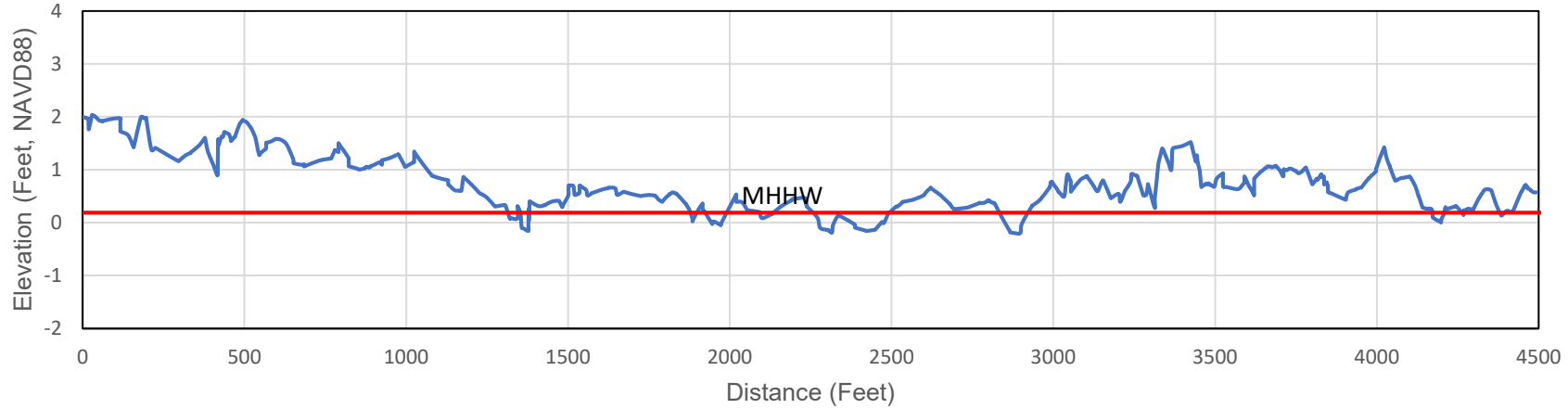




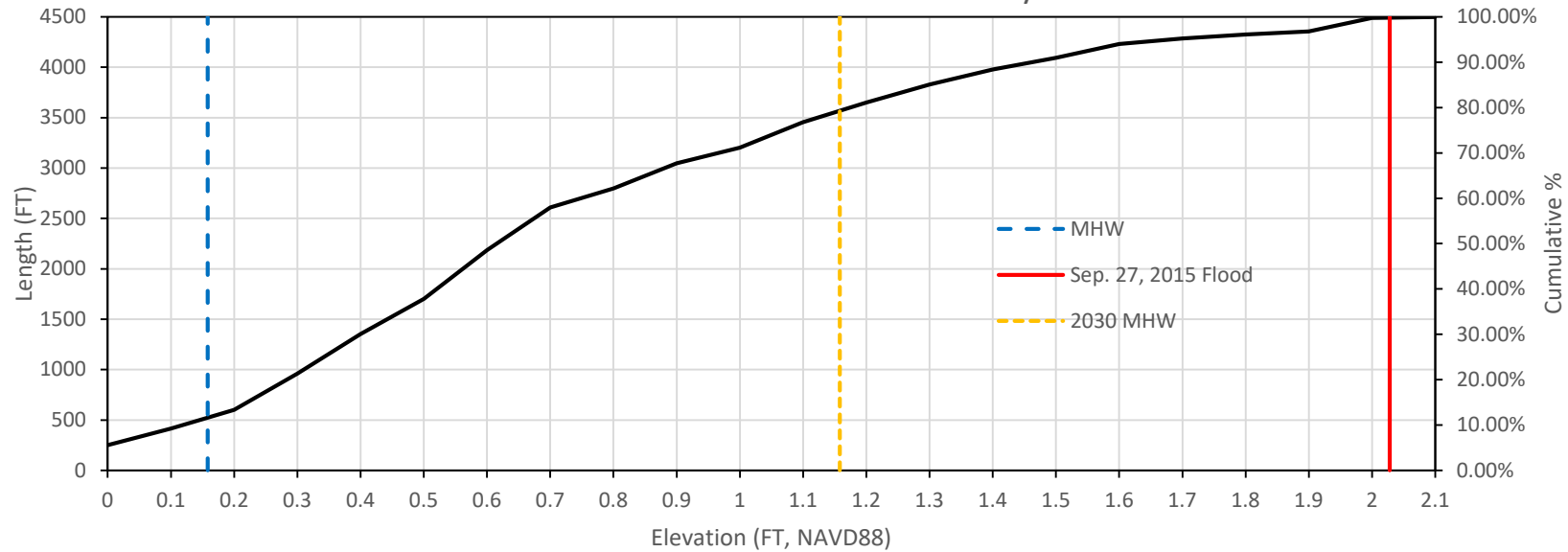


Base Scenario	2017	2025	2050	2075	2100
MHHW	5%	8%	63%	80%	81%
Extreme Tide	75%	79%	84%	95%	98%

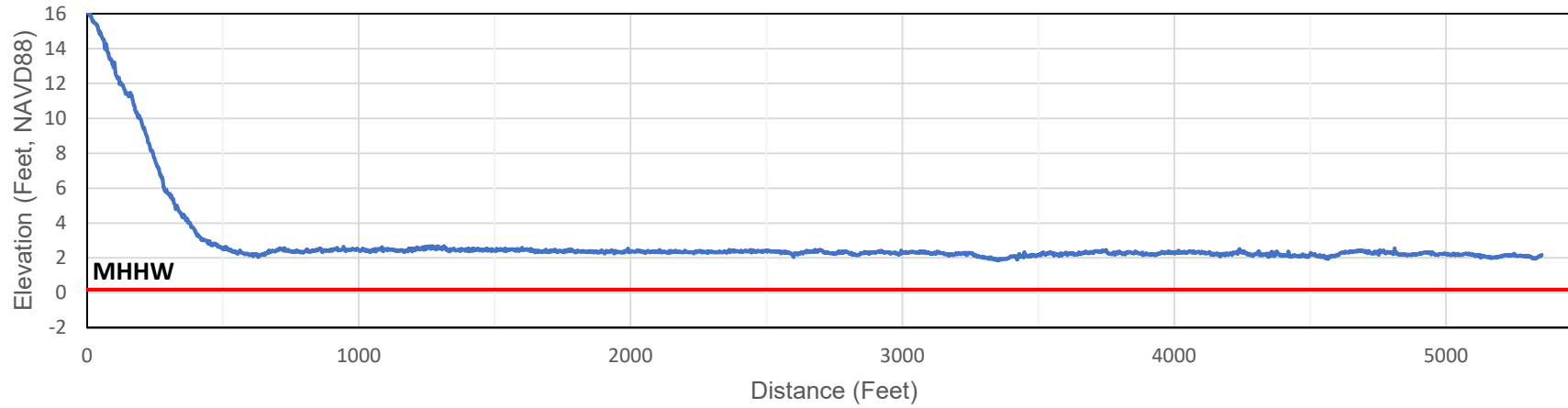
Mangrove Trail



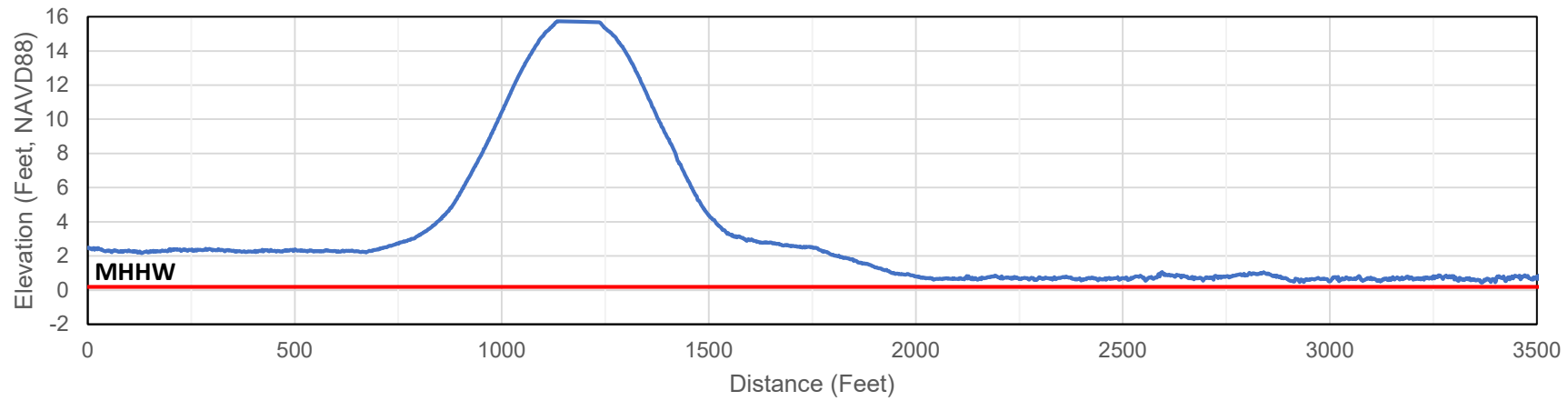
Matheson Hammock Park Trail Analysis

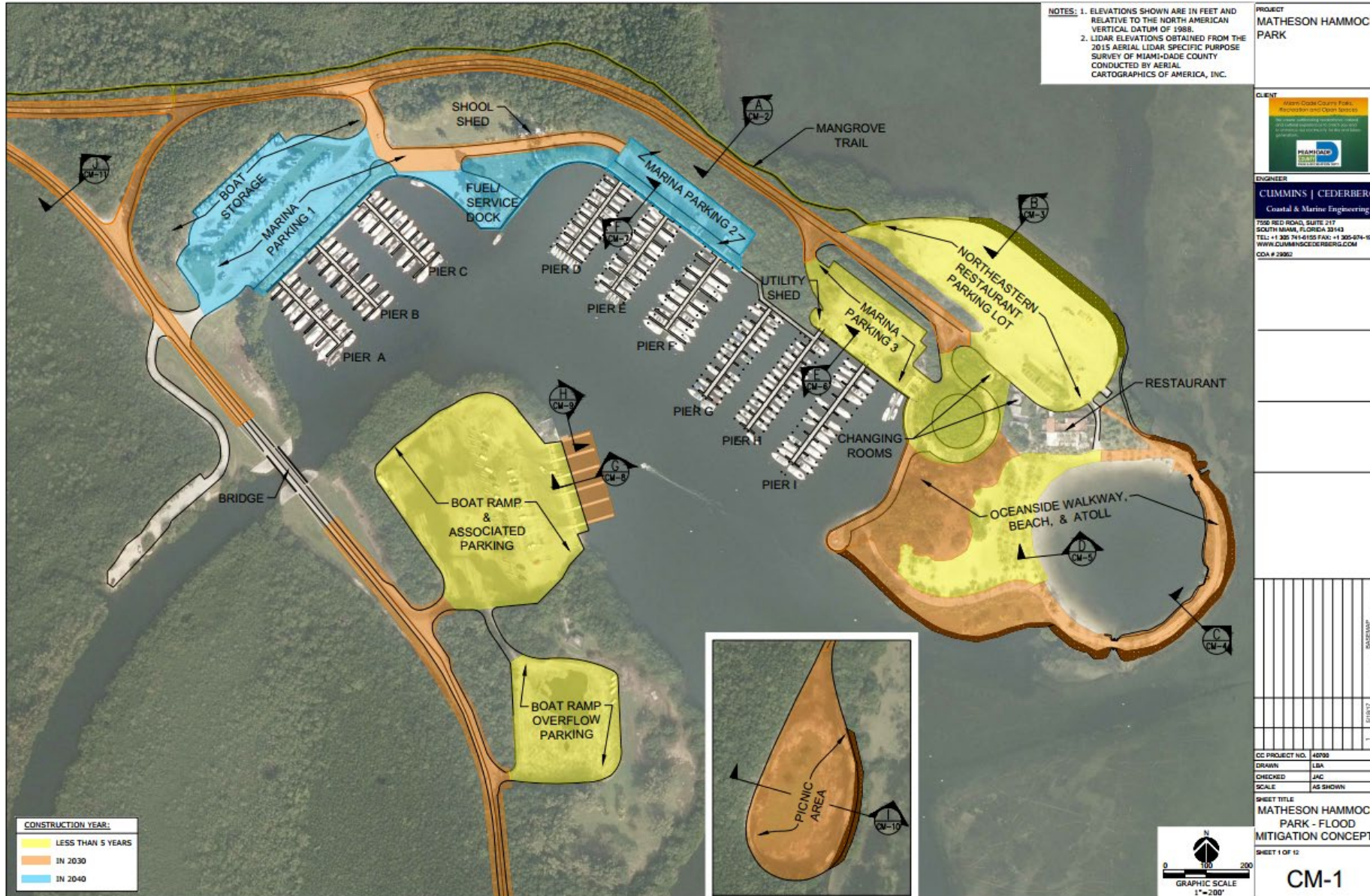


Main Road



Secondary Road



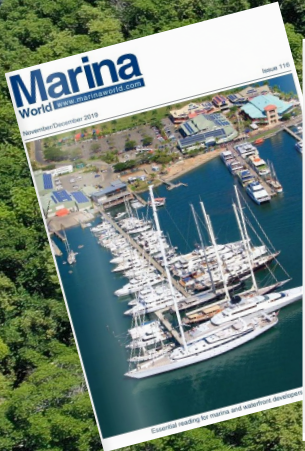


Location	Implementation Year								
	Less than 5 years	2030	2040	2050	2060	2070	2080	2090	2100
Mangrove Trail	3.5	3.5	4.5	4.5	5.5	5.5	6.5	6.5	7.5
Boat Ramp Parking	4.0	4.0	4.0	4.0	5.5	5.5	5.5	7.0	7.0
Boat Ramp Docks	No action	3.5	3.5	3.5	5.0	5.0	5.0	6.5	6.5
Restaurant Parking	4.0	4.0	4.0	4.0	5.5	5.5	5.5	7.0	7.0
Marina Parking 1	No action	No action	6.0	6.0	6.0	7.0	7.0	7.0	8.0
Marina Parking 2	No action	No action	6.0	6.0	6.0	7.0	7.0	7.0	8.0
Marina Parking 3	4.0	4.0	4.0	4.0	5.5	5.5	5.5	7.0	7.0
Atoll Walkway	5.0	5.0	5.0	5.0	6.5	6.5	6.5	8.0	8.0
Picnic Area	No action	4.0	4.0	4.0	5.5	5.5	5.5	7.0	7.0
Beach	3.0	3.5	4.0	4.5	5.0	5.5	6.5	7.0	7.5
Main Road	No action	5.0	5.0	5.0	6.5	6.5	6.5	8.0	8.0
Marina Docks	No action	Floating	Floating	Floating	Floating	Floating	Floating	Floating	Floating

Note:

1. Color change represents reconstruction of structure
2. Value is new elevation of component

Implementation Year	Description	Cost – Interim Solution	Cost – Long Term Solution
Less Than 5 Years	Mangrove Trail OP1	\$0.2M	\$2.6M/4.5M
	Restaurant Parking	-	\$4.6M
	Beach Section	-	\$0.6M
	Marina Parking 3	-	\$2.0M/\$1.4M
	Boat Ramp & Parking	-	\$5.3M
	Atoll Walkway	-	\$1.7M
2030	Boat Ramp Dock	\$0.2M	\$1.1M
	Picnic Area Road	-	\$2.4M
	Main Road	-	\$8.8M/9.9M
	Edge Between Marina & Atoll	-	\$1.0M
	Marina Docks	-	\$17.4
2040	Marina Parking 1 and 2	-	\$7.4M



Managing the threat of sea level rise at historic waterfront park

By James Cokerley

Miami Beach's historic waterfront park is facing a significant threat from sea level rise. The park, which is a major attraction for visitors, is located in a low-lying area that is vulnerable to flooding. The park's infrastructure, including its roads, buildings, and parking areas, is at risk of being inundated. To protect the park and its visitors, Miami Beach has implemented a series of measures, including the construction of a seawall and the installation of flood gates. These measures are part of a larger plan to protect the park and other low-lying areas in Miami Beach from the effects of sea level rise.

Roadmap to flood mitigation

For coastal communities, flood mitigation is a critical component of disaster management. It involves the implementation of measures that reduce the risk of flooding and minimize the damage that can be caused by flood events. This can include the construction of seawalls, levees, and other flood protection structures. It can also involve the implementation of land use regulations that restrict development in high-risk areas. Flood mitigation is an essential part of a comprehensive disaster management plan, and it is one that must be implemented in a timely and effective manner.

Flood mitigation schedule

The implementation of flood mitigation measures is a complex and multi-faceted process. It requires the coordination of various agencies and stakeholders, including local government, state and federal agencies, and the private sector. It also requires the development of a clear and comprehensive schedule for the implementation of these measures. This schedule should take into account the urgency of the situation, the availability of resources, and the potential impact of the measures on the community. A well-developed flood mitigation schedule is essential for ensuring that the community is protected from the effects of sea level rise.

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