A Cooperative Agreement (#2624084) with NOAA NCCOS

"A Web-Based Interactive Decision-Support Tool for **Adaptation of Coastal Urban and Natural Ecosystems** (ACUNE) in Southwest Florida"

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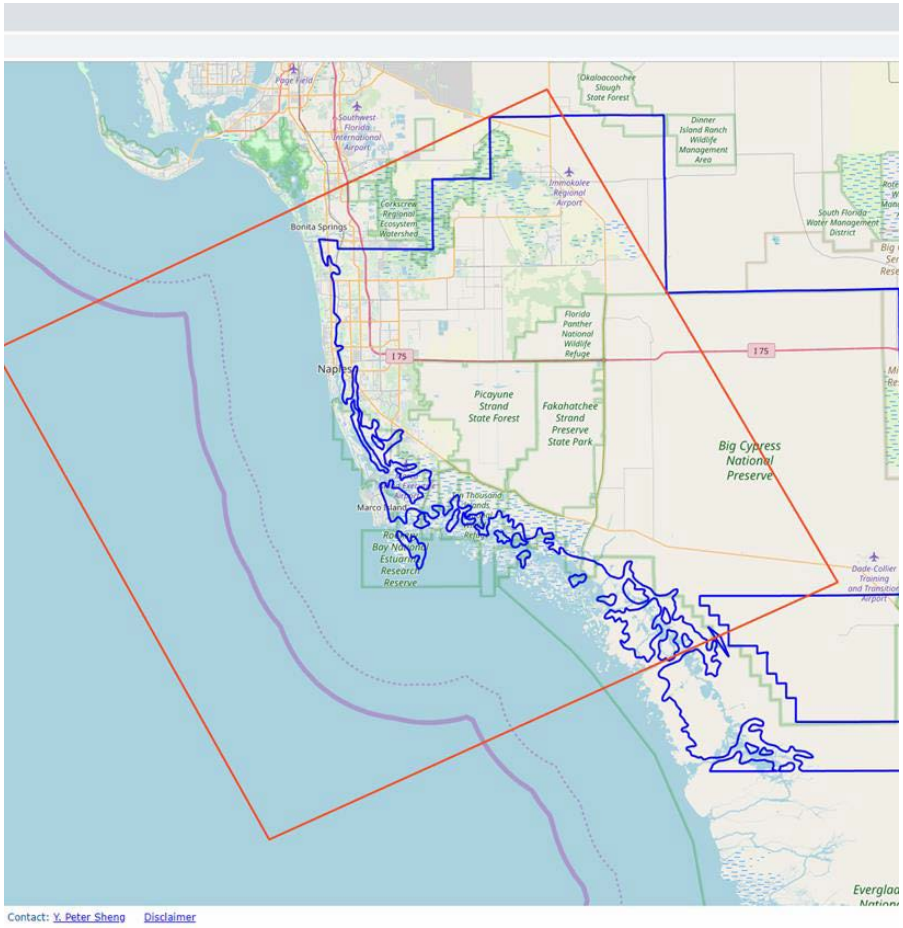
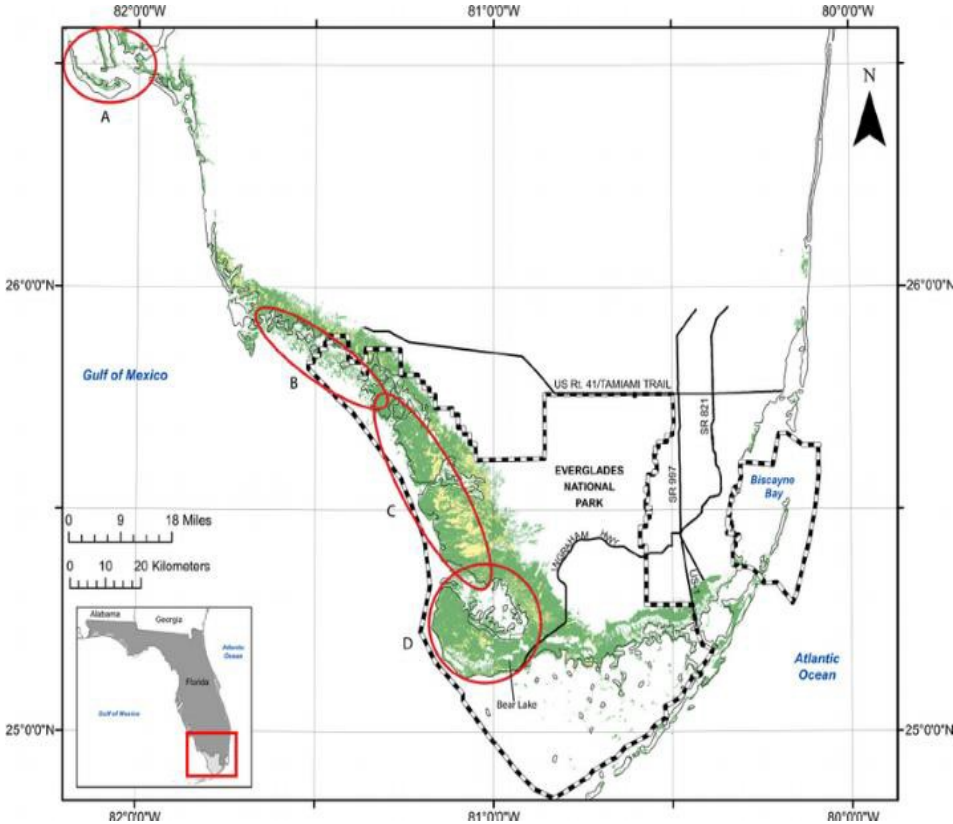
July 8, 2019

Big Cypress Basin Board Meeting

We are developing ACUNE to enable Adaption of Coastal Urban and Natural Ecosystems for A Sustainable & Economically Healthy SW Florida in the Context of Increasing Future Inundation Risk



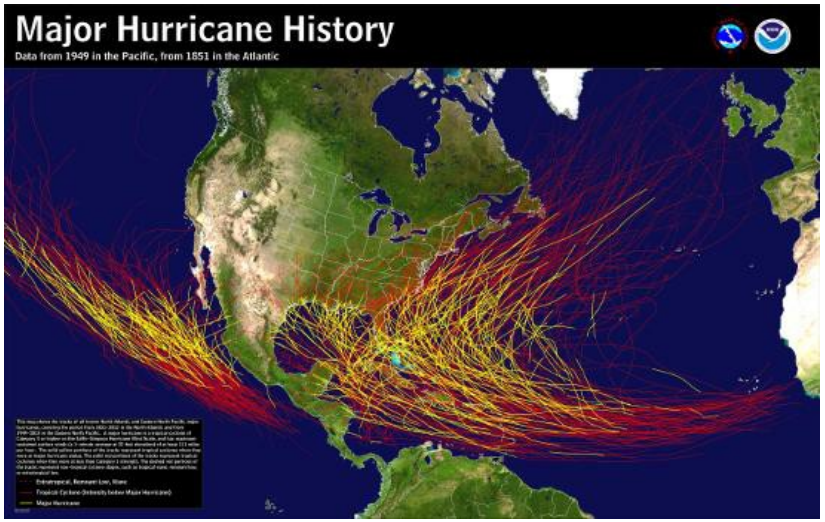
Study Domain covers most of BCB and some offshore water

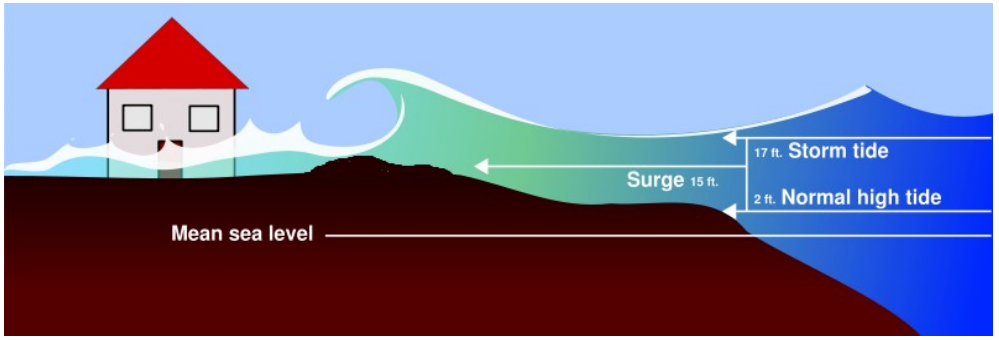


Largest Mangrove Forest in Gulf of Mexico region

Ecosystem Services: Ecosystem Diversity, Fishery Habitat, Flood Protection

Quantify Coastal Inundation Vulnerability due to storm surge, wave, and sea level rise





Storm Surge (1-28ft) + Tide (0-6ft) + Wave Setup (0-5ft) + Precipitation (0-4.5ft) + SLR (~1ft, 2ft, 6ft) for (2030, 2060, 2100)

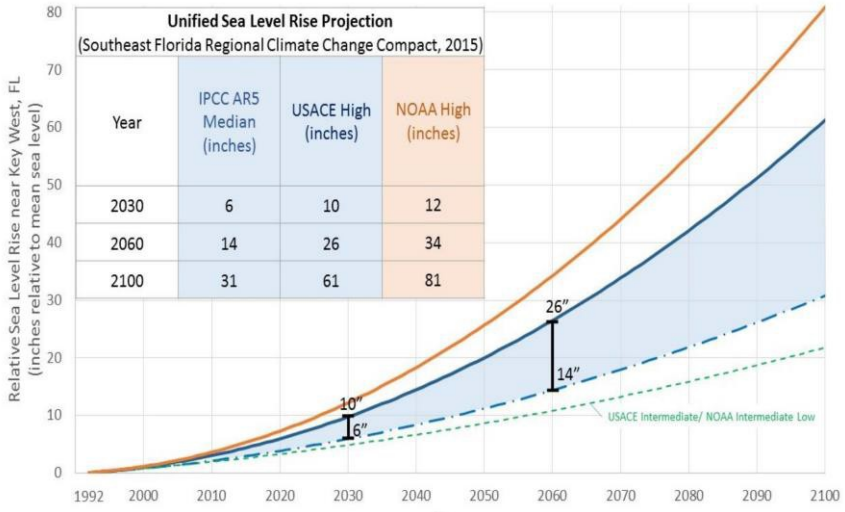
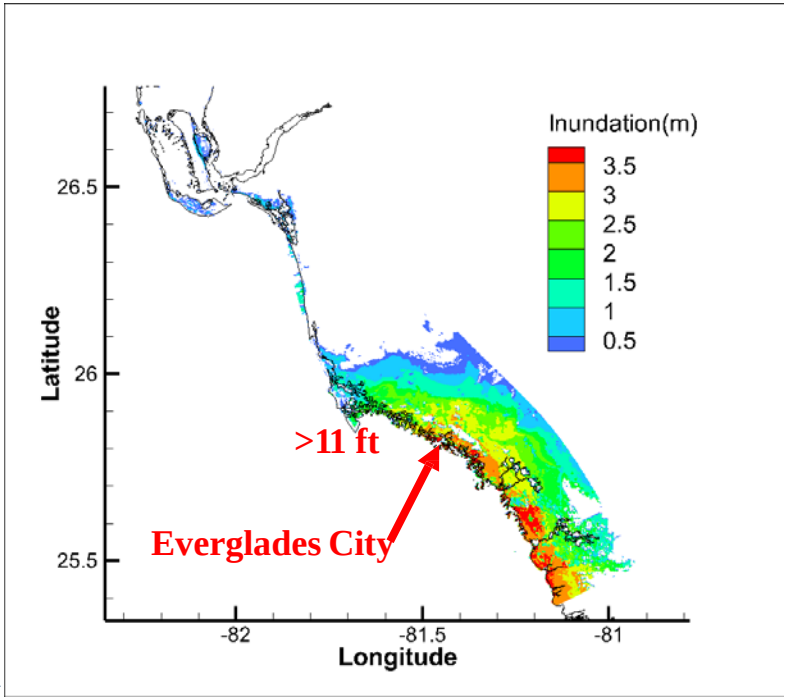


Figure 2. Southeast Florida sea level rise projections based on three global curves adapted for the region: the median of the IPCC AR5 RCP8.5 scenario (dashed blue), the U.S. Army Corps of Engineers (USACE) High curve (solid blue), and the NOAA High curve (orange). From Compact (2015).

Hurricane IRMA (2017) Maximum Inundation



ACUNE products (ACUNE2.0 products)

- **ACUNE** is an **integrated web-based tool**
- Developed with the **Best Available Climate, Coastal, and Ecological Sciences & significant End User Input**
- Guide end users to develop coastal resiliency plan for flood protection, estuarine preservation, and mangrove restoration
- ACUNE products:

  - ***Mangrove distribution maps in 2017, 2030, 2060, 2100***
  - ***Tropical cyclones for future climate (2030, 2060, 2100)***
  - ***Sea Level Rise scenarios (2030, 2060, 2100)***
  - ***Probabilistic coastal inundation maps for current and future climate (2030, 2060, 2100)***
  - ***Beach impact maps for 2030, 2060, 2100***
  - ***Maximum inundation maps and economic impact maps for IRMA***
  - ***Economic impact maps for future scenarios***

Sample Questions (Case Studies) could be answered by ACUNE

- *What is the 1% annual chance coastal flooding in the communities & infrastructures?*
- *Where is the best location in the region to build a new airport or an emergency shelter?*
- *Which highway is the most vulnerable to coastal flooding?*
- *Which part of Highway 41 will be inundated by 2060?*
- *How vulnerable is the 5th Avenue South business center to inundation?*
- *How well do NNBFs protect coastal communities from coastal flooding?*

- **Timeframe: Current, 2030, 2060, 2100**

What Happened Since ACUNE1.0?

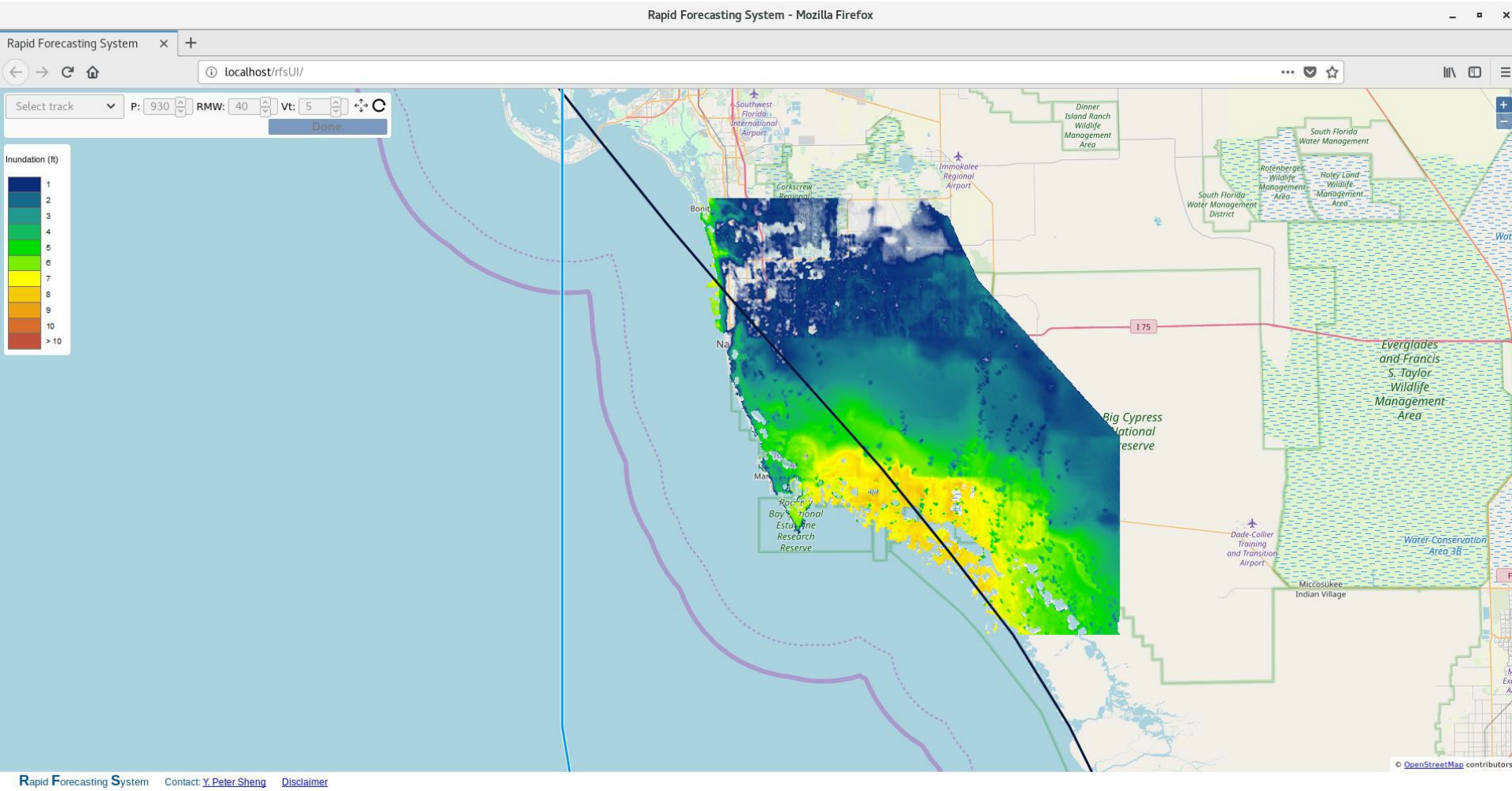
1. Enhanced a Rapid Forecasting System (RFS) of coastal flooding for SW FL

*An excellent tool for developing inundation scenarios for planning

* Will only be provided to Collier Emergency Management Team for planning

*RFS was originally developed with Florida Sea Grant funding

User creates a hurricane track with parameters→
Rapid Forecast System generates a map in 1 minute!
Provides important and efficient planning tool.



2. Updated Sea Level Rise Scenarios based on RSL in NOAA (2017)

GMSL (Global Mean Sea Level) **RSL (Regional Sea Level)**

	ACUNE 1.0			ACUNE 2.0		
Period	**SLR, ft**			**SLR, ft**		
	Low	Medium	High	Low	Medium	High
Current	---	---	---	---	---	---
2030	0	0.5	1	0.39	0.72	1.15
2060	0.5	1.5	2.5	0.82	1.77	3.38
2100	1	3	6.6	1.28	3.77	8.36

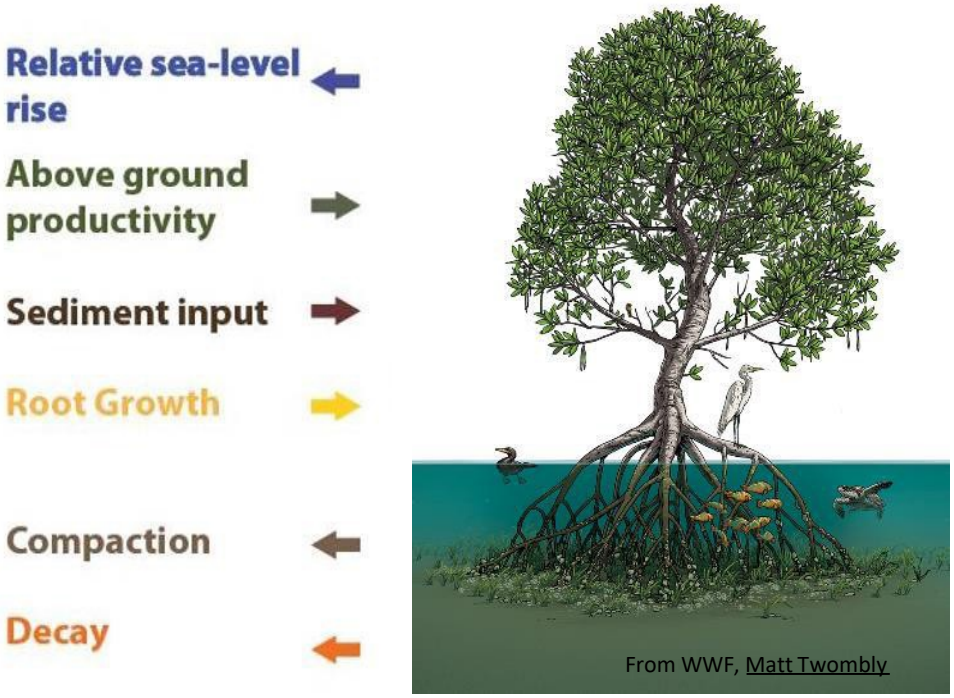
***Recommended by NOAA**
Accepted at workshop

3. WARMER-Mangroves (USGS) (Karen and Kevin)

Soil elevation & mangrove community response model being developed

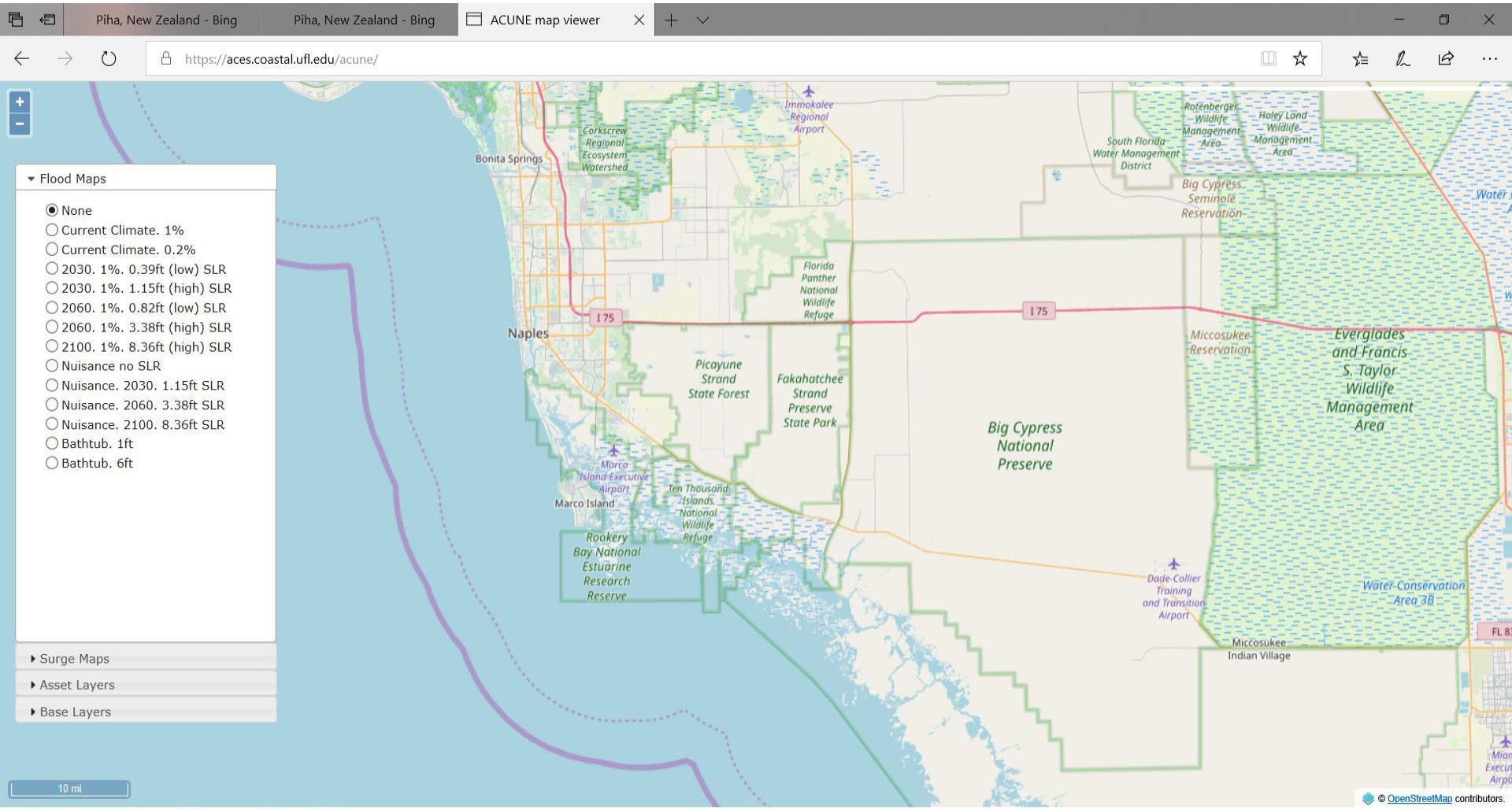
- Projects future elevations with sea-level rise
- Considers dominant below & above ground processes
- Mangrove community response
- Calibrated with local accretion data (cores, SETs)
- Requires digital elevation model & water level data

Preliminary model results expected by September

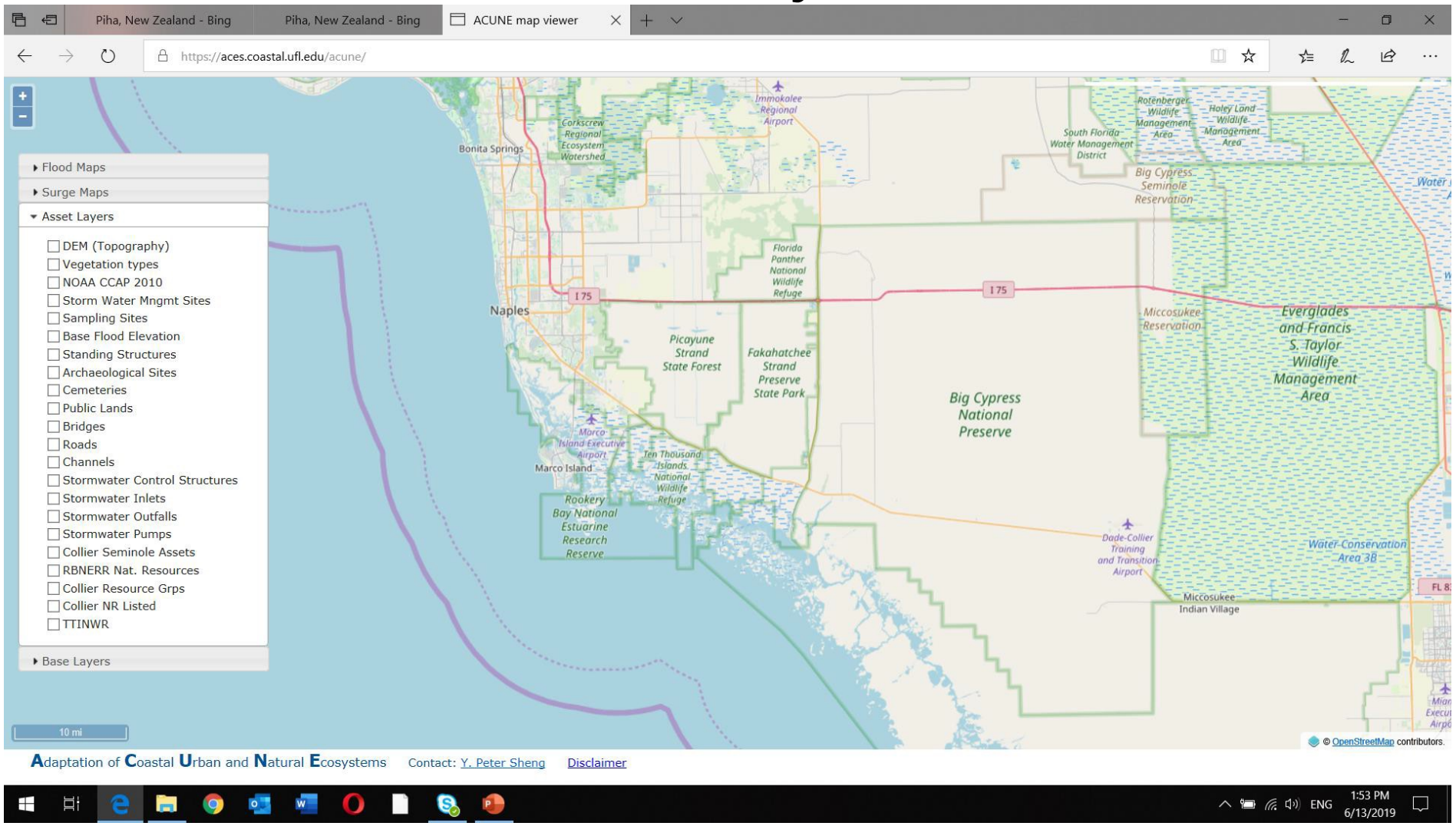


aces.coastal.ufl.edu/acune

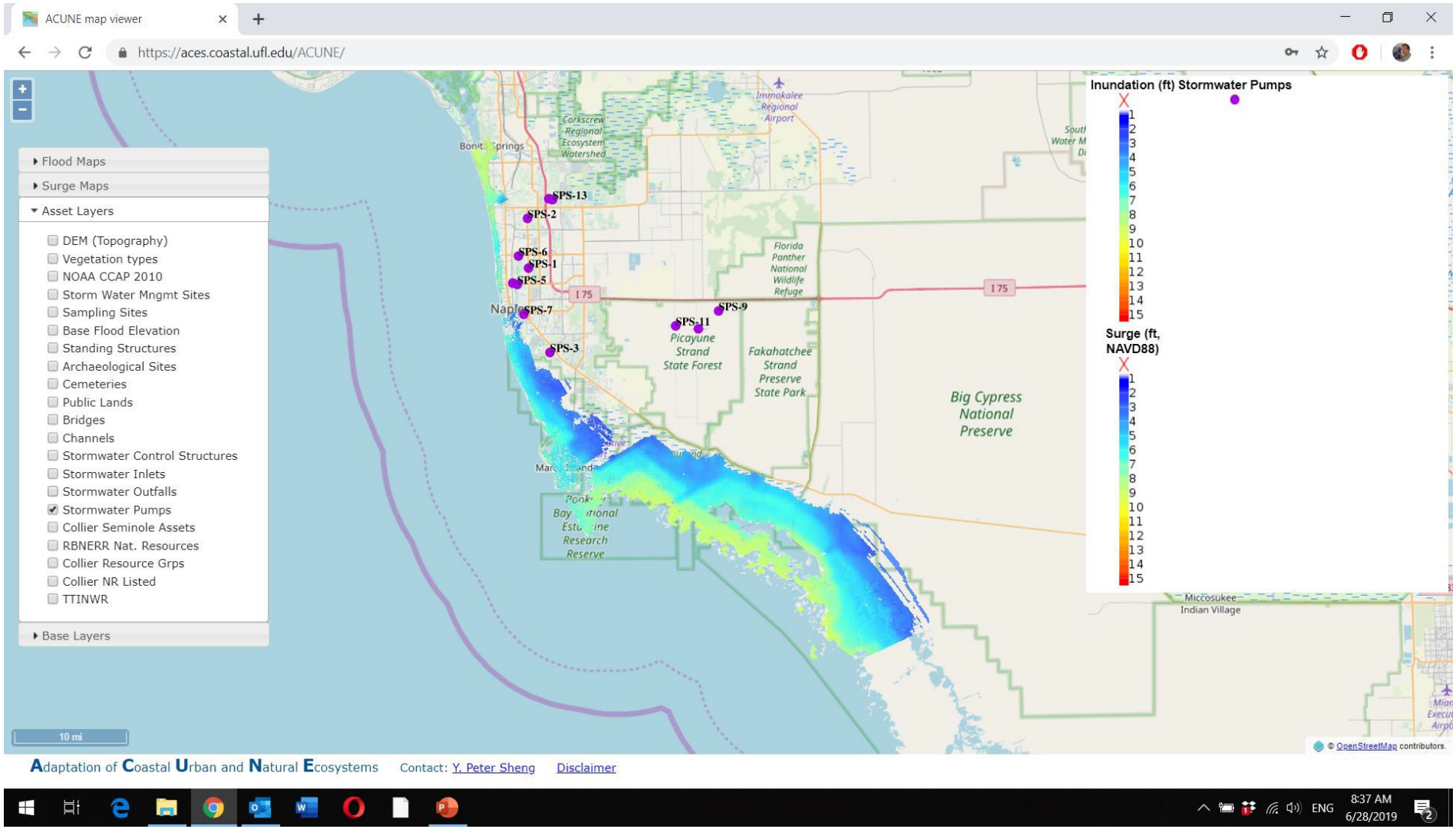
5. A Web-Based Decision Support Tool – ACUNE2.0



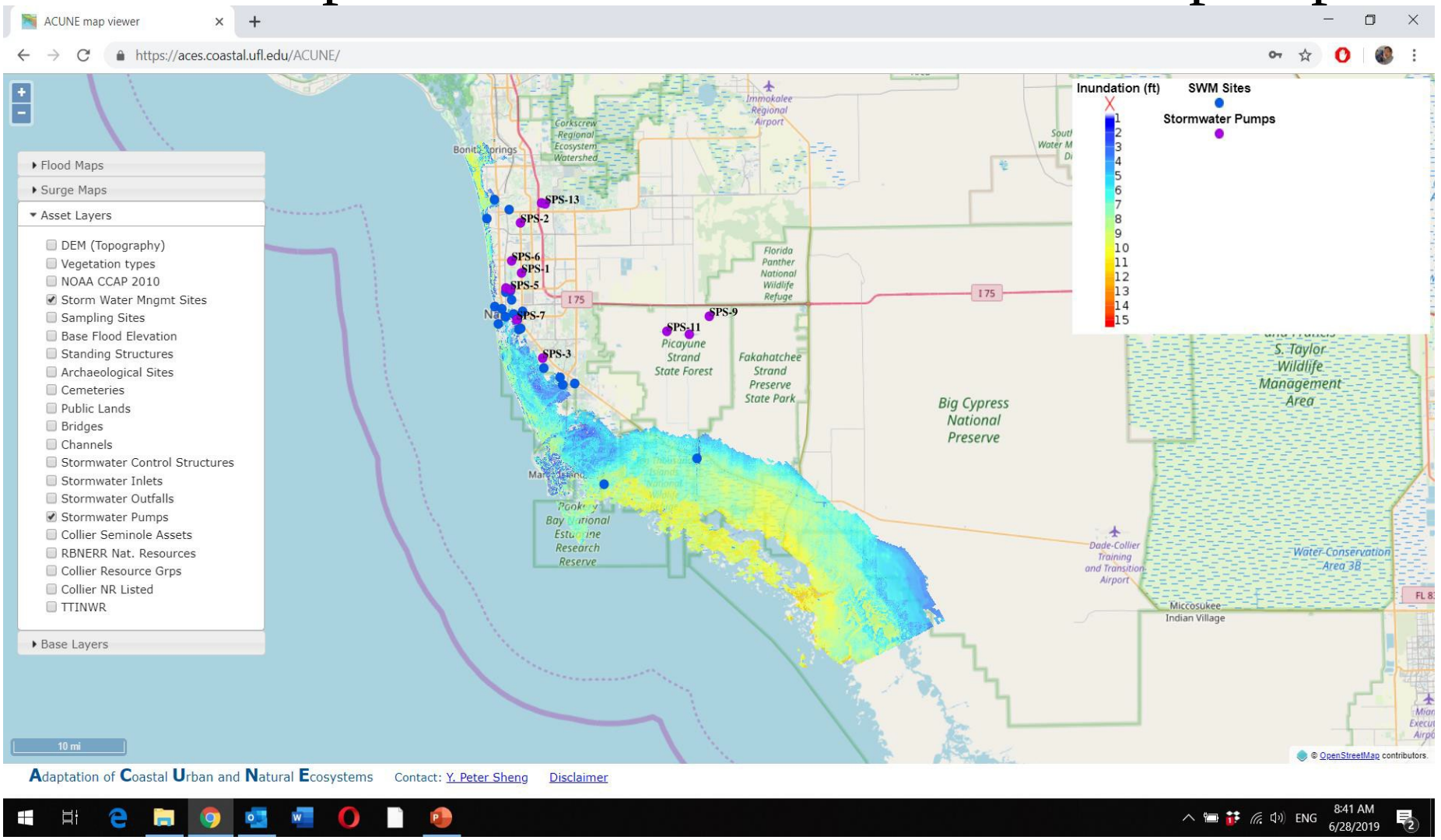
Asset Layers



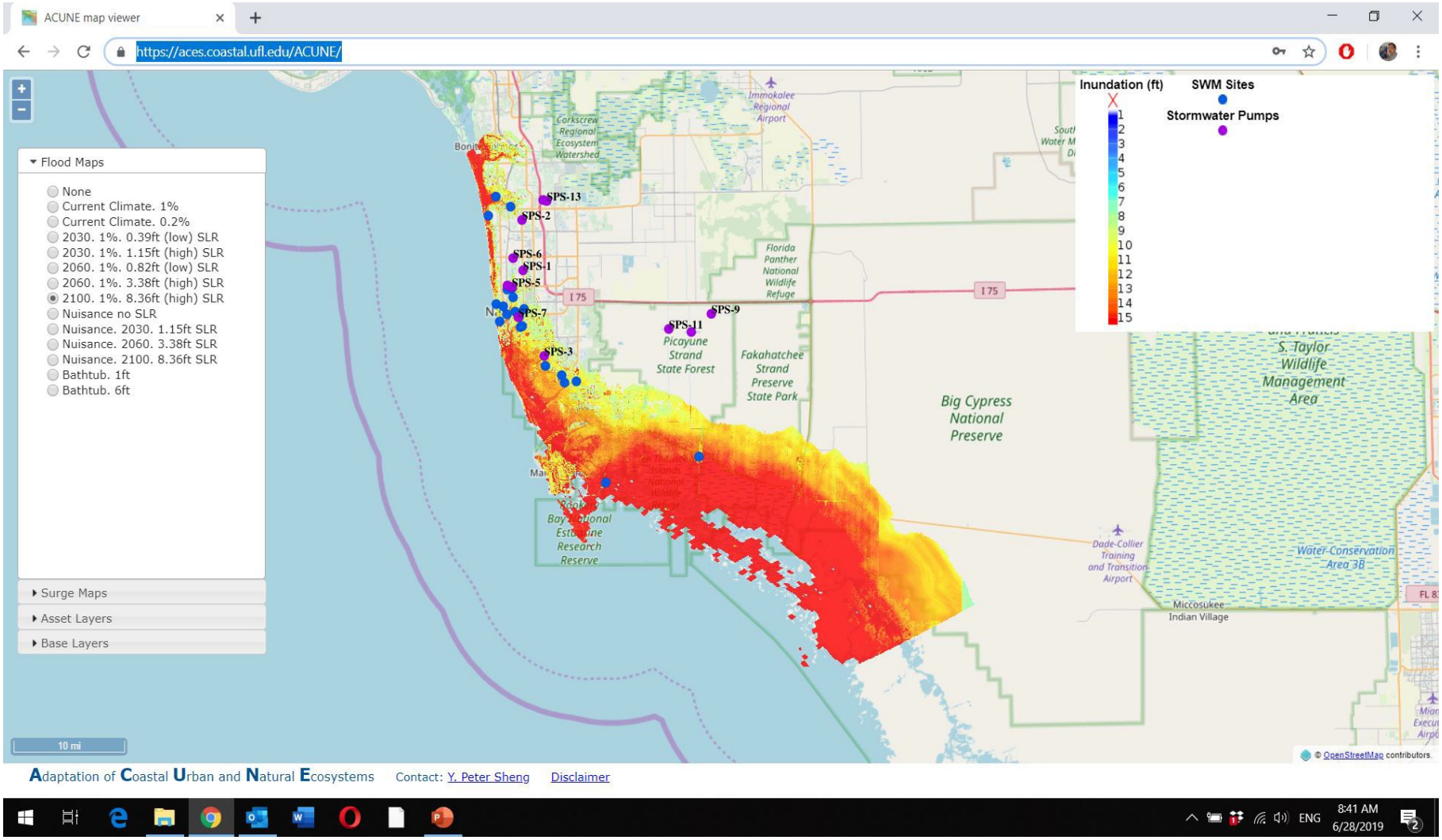
1% flood map with SW pumps



1% flood map in 2060 with SWM sites and pumps



1% flood map in 2100 with SWM sites and pumps



6. Test Drive of ACUNE2.0

- Science Team sets up a complete ACUNE2.0 website
- End Users form two focus groups:
  - **Urban system focus group**
  - **Natural system focus group**

- Focus Groups will use ACUNE2.0 to try to answer a variety of questions for two months, create two case studies, and then report back to the Science Team on their findings and suggestions. Science Team will improve ACUNE2.0 based on Focus Group suggestions and organize a webinars with updated ACUNE and user training in Fall 2019.

A New NOAA Project – ACUNE+

- **We submitted a new proposal "ACUNE+" in March to NOAA EESLR (Ecological Effects of Sea Level Rise) Program**

UF, USGS, SFWMD, FGCU

- **Will integrate coastal flood model with stormwater and inland flood model and a dynamic mangrove response model**

The project has been recommended for funding!