CONSERVANCY of Southwest Florida
OUR WATER, LAND, WILDLIFE, FUTURE
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A Changing Climate in SWFL: Flooding

Many Florida communities, both inland and coastal, have been noticing heightened flooding from multiple sources. Climate modeling also suggests many of these may increase in magnitude over time.

Sea Level Rise

Globally, increases in sea levels are primarily due to two influences. The first is "thermal expansion," which refers to the tendency of water molecules to move farther apart from each other when warmed up. This has been happening especially in the top layer of the ocean as sea surface temperatures rise. The second is the addition of water when land-locked ice, like glaciers, melts. Additional factors – like how water circulates around coastlines or if land is rising or sinking over time – can contribute to local rates of sea level rise that differ from larger regional and global patterns.

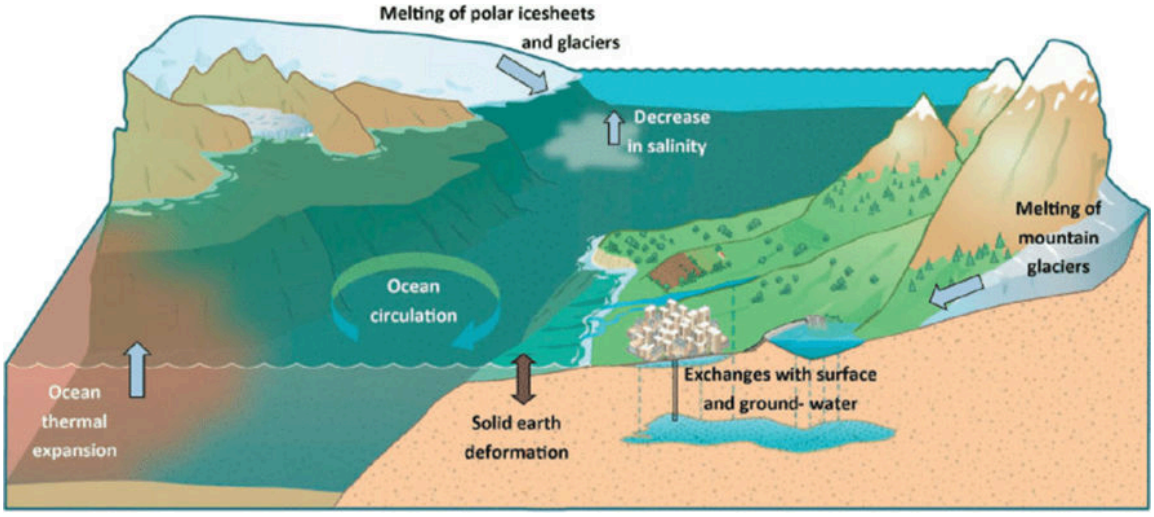


Image Credit: Cazenave and Cozannet, 2013

To see what's predicted for our area in the future, we can look at projections for sea level rise based on data from local NOAA (National Oceanic and Atmospheric Administration) tide gauges. Here's a figure based on the gauge for Naples:

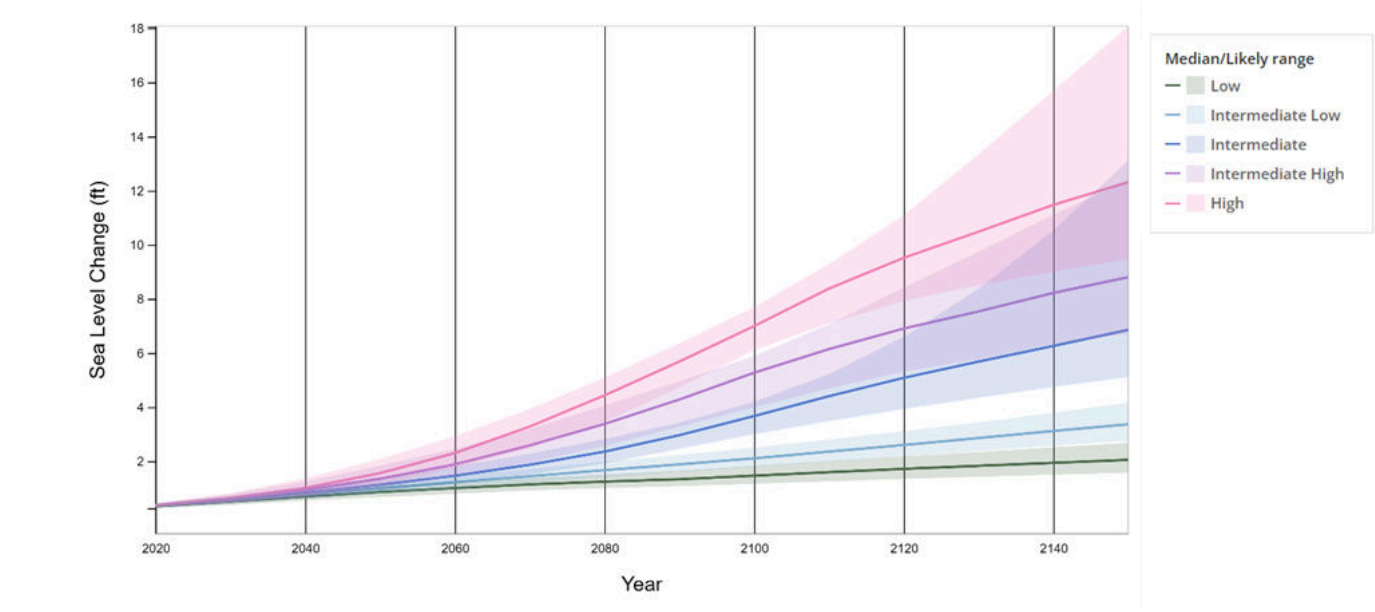
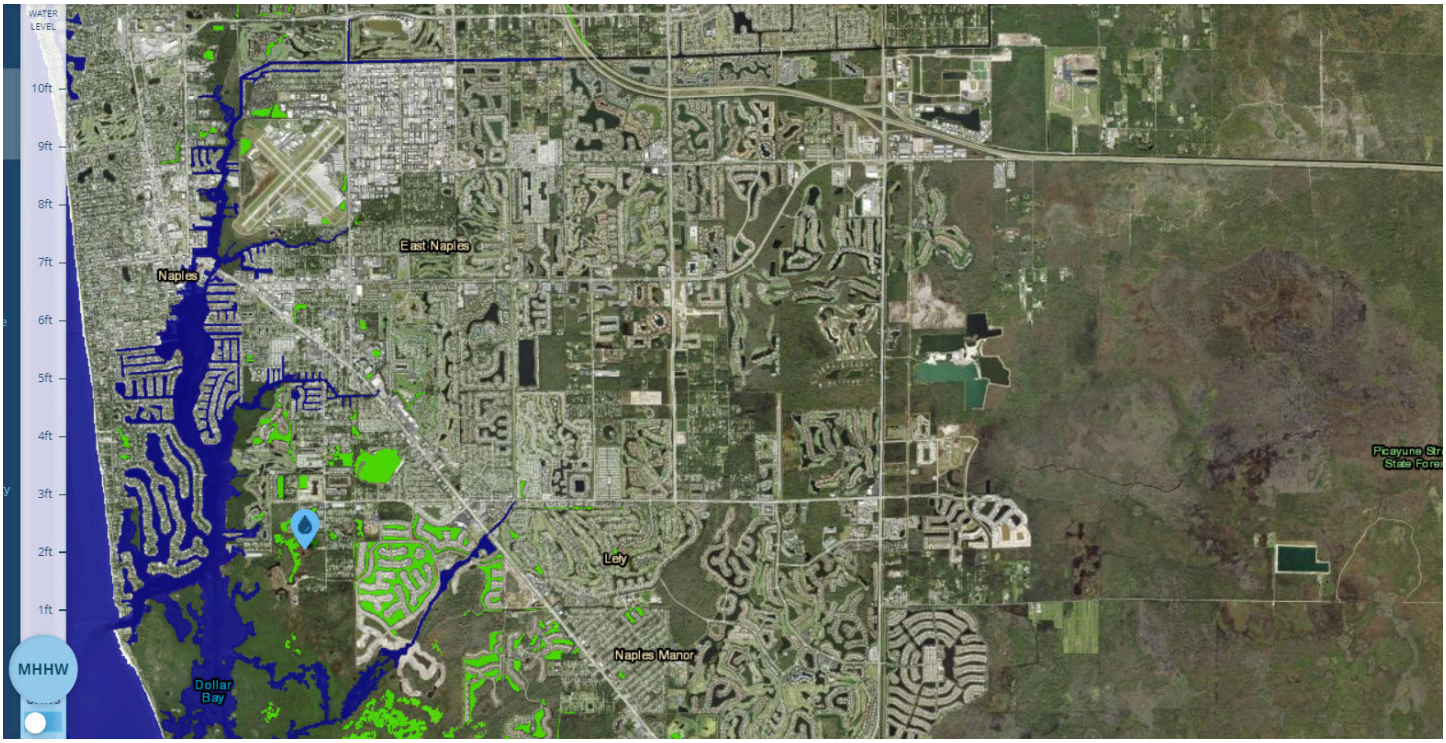


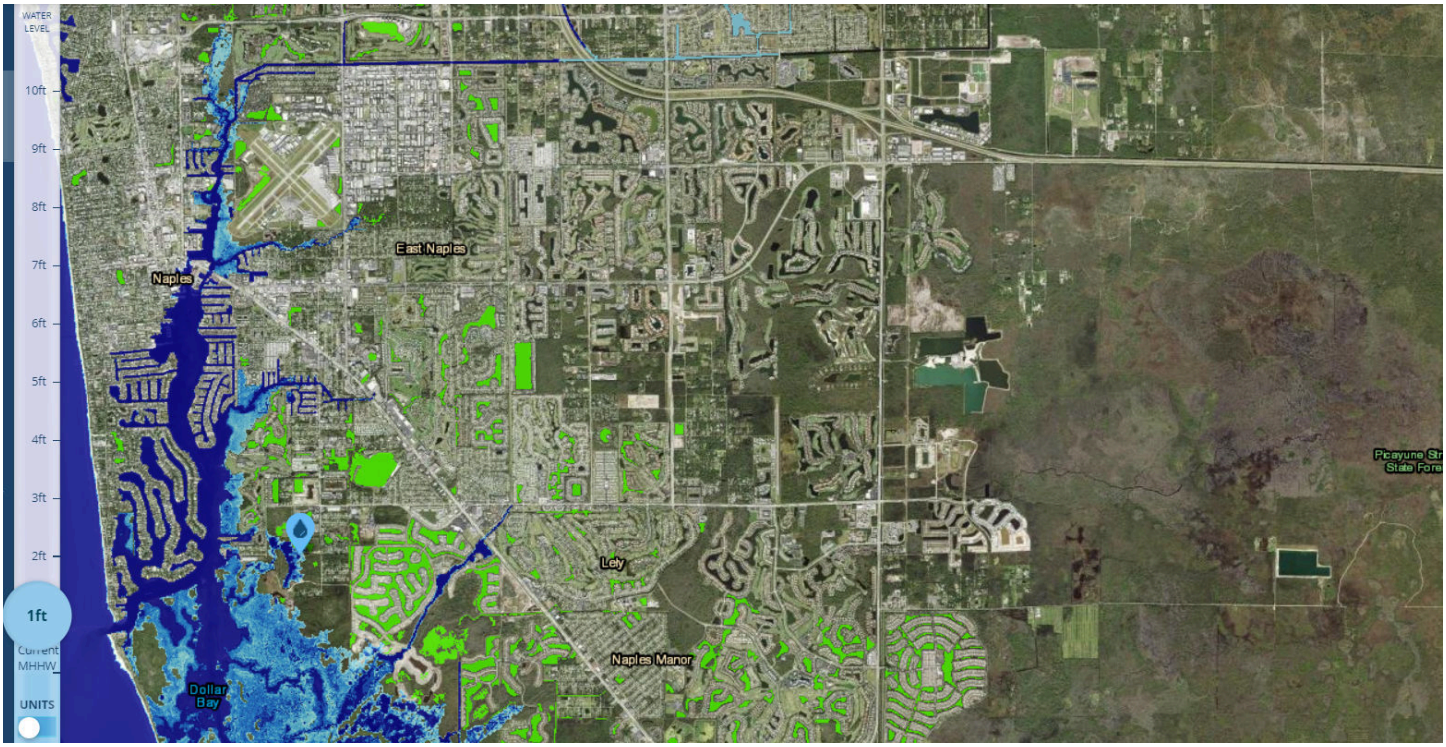
Image Credit: *[Interagency Sea Level Rise Scenario Tool]*

You may notice that there are multiple lines on the graph indicating possibilities for how sea level might behave over time. You can think of these as a series of "possible futures." These futures take into account sources of uncertainty. The first source is scientific uncertainty around how certain influences like melting glaciers may unfold over time. The second takes into account how future emission rates of greenhouse gases, which are linked to the warming that contributes to rising seas, may change in response to human behavior. In all of these scenarios, you'll notice the lines become more curved and less straight over time, suggesting faster rates of sea level rise in the future.

Because Florida is very flat, even minimal flooding can have outsized impacts. The NOAA Sea Level Rise Viewer simulates the flooding that can occur based on different depths of sea level rise. The following shows current conditions in a portion of the Naples area, and illustrates where you can expect water during mean higher high water (MHHW) – the highest high tides of the day:



The following image shows new areas that will start to be inundated during the highest high tides of the day with the addition of 1 foot of sea level rise. (Green areas represented low-lying locations that are not connected to bodies of water but could still potentially flood). According to the series of possible futures shown earlier, we might expect this to occur somewhere between roughly 2040 and 2060:



Other Sources of Flooding

Sea level rise is not the only process contributing to current and future flooding in the State. The increase in more intense and slower hurricanes that are more likely to rapidly intensify translates into more potential exposure to high levels of **storm surge**. **Heavy rain events** are also becoming more frequent and dropping more water in a single event. Rising seas can cause water tables to rise and worsen **groundwater flooding**.

Many of the communities working on adapting to flooding are considering solutions that address some or all of these sources as well as instances of **compound flooding**, where more than one type of flooding happens at the same time.