Frequently Asked Questions

Q. How were the parks in this project selected?

A. Parks were selected after consultation with and approval of regional managers.

Q. What's the timeline of this project?

A. This is the culmination of a three-year project that was proposed in February 2012. Initial Fiscal year of funding was 2013.

Q. Where did you use data by Tebaldi et al. (2012)?

A. NOAA's Sea Lake and Overland Surge from Hurricanes (SLOSH) model does not include storm surge predictions for all of the parks used in this study. We used data from Tebaldi et al. (2012) where reasonable to provide data for park units in California, Oregon, Washington, and southern Alaska. The following parks used Tebaldi et al. (2012) data: Cabrillo National Monument, Channel Islands National Park, Ebey's Landing National Historical Reserve, Fort Point National Historic Site, Fort Vancouver National Historic Site, Golden Gate National Recreation Area, Klondike Gold Rush National Historical Park, Lewis and Clark National Historical Park, Olympic National Park, Port Chicago Naval Magazine National Scenic Trail, Point Reyes National Seashore, Redwood National Park, Rosie the Riverter WWII Home Front National Historical Park, San Francisco Maritime National Historical Park, San Juan Island National Historical Park, and Santa Monica Mountains National Recreation Area.

Q. Why don't all of the parks have storm surge maps?

A. Unfortunately some parks do not have enough data to complete a storm surge map. There were parks that were not modeled by NOAA's SLOSH MOM model or near any of the tide gauges used by Tebaldi et al. (2012). These parks are: Aniakchak Preserve, Bering Land Bridge National Preserve, Cape Krusenstern National Monument, Glacier Bay National Park and Preserve, Katmai National Park, Kenai Fjords National Park, Lake Clark National Park, Sitka National Historical Park, War in the Pacific National Historical Park, Wrangell – St. Elias National Park and Preserve.

Q. My park only has storm surge maps covering a few Saffir-Simpson categories. Why is that?

A. Some parks, particularly those in the Northeast Region, were not modeled by NOAA for the full range of Saffir-Simpson storm scenarios. This is because it is considered very unlikely that a Saffir-Simpson category 4 or 5 hurricane would be able to sustain itself into that region.

Q. Why are the storm surge maps in NAVD88?

That is the default datum for SLOSH data. This was a decision made by NOAA.

Q. What are the effects of NAVD88 on projections for some parks?

The North American Vertical Datum of 1988 (NAVD88) is a datum that is commonly used in North America. It uses a fixed value for the height of the sea level. While this is a popular datum for mapping, it has the limitation that it is based on the tidal benchmark for Rimouski, Canada. As you move further away from this benchmark you can expect actual sea level to differ from the reference benchmark. For locations such as California this can result in a significant difference between observed mean sea level and NAVD88. Your natural resource or GIS specialist will likely have further information about your specific location. Alternatively you can look up the differences in your region by checking the datum information for your nearest tide gauge station: https://tidesandcurrents.noaa.gov/stations.html?type=Datums

Q. Which sea level change or storm surge scenario would you recommend I use?

All parks are different, as are all projects. Your choice of scenario may depend on many different factors. The NPS has not yet released any guidance on which climate change scenarios to use for planning. We would recommend you contact the appropriate project lead, natural or cultural resource manager, or someone from the Climate Change Response Program for further guidance depending on your situation.

Q. How accurate are these numbers?

A. The accuracy of these data varies depending on the data source. SLOSH data has +/- 20% accuracy, although this is discussed in greater detail by Glahn et al. 2009. Further information about storm surge data generated by Tebaldi et al. can be found in Tebaladi et al. (2012). IPCC global sea level rise projections range between 0.26 m (RCP2.6 minimum likely range) and 0.82m (RCP8.5 maximum likely range) by 2100. The standard error of the IPCC is explained in greater detail in the chapter 13 supplementary material in AR5 (IPCC 2013).

Q. We have had higher/lower storm surge numbers in the past. Why?

A. The numbers given here are meant to represent an average storm surge number. As described above there is likely to be some deviation around that number. Certain periods are also likely to result in higher than average storm surges. For example, El Niño and La Niña years will impact sea level. Likewise, changes in the North Atlantic Oscillation and Pacific Decadal Oscillation will also affect ocean conditions. This must be taken into account when using these numbers. All of these factors vary temporally and geographically, so contact your natural resource manager if you are unsure how this could impact your particular park unit.

Q. What other factors should I consider when looking at these numbers?

A. These projections do not include the impact of man-made structures, such as levees and dams. They also do not take into account how smaller features, such as dune systems or vegetation changes could impact coastal flooding. There are many meso- and micro-scale factors that need to be taken into account such as differences in topography, the presence/absence of any wetlands etc. It should

also be expected that as sea levels change, areas of the shoreline will change accordingly, particularly due to erosion and accretion.

Q. Why don't you recommend that I add storm surge numbers on top of the sea level change numbers?

A. Sea level change is expected to have a significant impact on the geomorphology of the coastline. Changing water levels will lead to areas of greater erosion in some areas as well as increasing accretion in other places. Permanent inundation will change the way waves propagate within a basin in the future. As sea level changes, the fluid dynamics of a particular region will also change. This is not something NOAA takes into account in their SLOSH model.

Q. Where can I get more information about the sea level models used in this study?

A. https://www.ipcc.ch/report/ar5/wg1/

Q. Where can I get more information about the NOAA SLOSH model?

A. http://www.nhc.noaa.gov/surge/slosh.php

Q. So, based on your maps, can I assume that my location will stay dry in the future?

A. No. As explained above, these numbers are accurate within a certain range. Also, these maps are based on "bath tub" models where water is simulated as rising over a static surface. In reality, your coastline will change in response to storms and other coastal dynamics. These numbers are intended for guidance only.

Q. Why do you use the period 1986–2005 as a baseline for your sea level rise projections?

A. We are following the standard approach used by the IPCC, USACE, and much of the academic literature. If you would like your estimate to start from a specific year you can do one of two things: 1) subtract the observed rate of sea level rise since 1992 for your location, or 2) contact park, region, or Climate Change Response Program staff for assistance. It may be possible to downscale projections further to estimate the amount of rise the models estimate to have taken place between the baseline and whichever year you choose. We must caution that if you follow option 1 you will be introducing some inaccuracy to sea level projections, especially if you use data from a tide gauge that is not close to your location.

Q. The SLOSH/IPCC projections seem lower/higher than X source I've found. Why is that?

A. Projections can vary depending on a number of factors such as choice of model, approach, or the age of the study. We would recommend that you speak to a climate specialist when choosing between sources.

Q. What are other impacts from sea-level rise that parks should consider?

A. Impacts from sea-level rise could include, but are not limited to, increased erosion, damaged cultural resources, damage to above and below ground infrastructure, difficulty accessing inundated infrastructure, increased groundwater intrusion, altered groundwater salinity, diminished space for recreational activities (possibly leading to conflict between different recreational users), and the complete loss or migration of certain coastal ecosystems. For more information on the topic, please see the Coastal Adaptation Strategies Handbook at:
http://www.nps.gov/subjects/climatechange/coastalhandbook.htm