

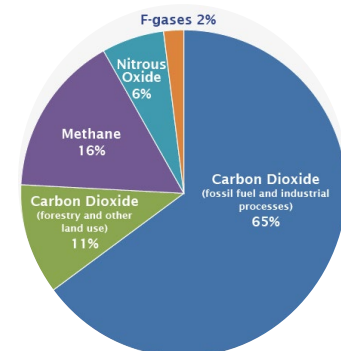


Sea levels are rising.

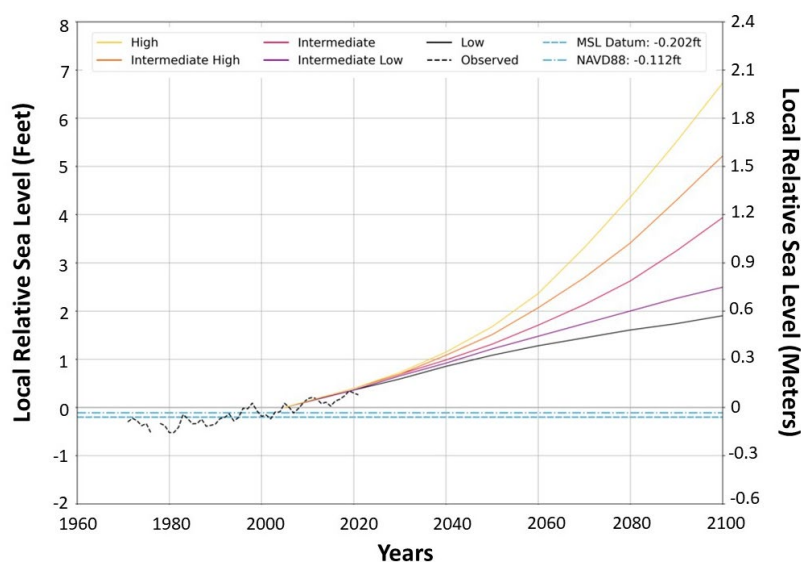
Two phenomena related to climate change contribute to accelerated global sea level rise:

- Thermal expansion: global atmospheric and ocean temperatures are rising, and water expands as it absorbs heat.
- Ice melt: melting glaciers and ice sheets increase freshwater runoff into oceans.

Greenhouse gases trap heat in our atmosphere resulting in rising ocean temperatures. Sources of greenhouse gases include the use of fossil fuels such as coal, oil, and natural gas to power our societies, which releases carbon dioxide and methane into the atmosphere; methane sources also include emissions from landfills and agriculture.



Greenhouse Gas Emissions by Gas

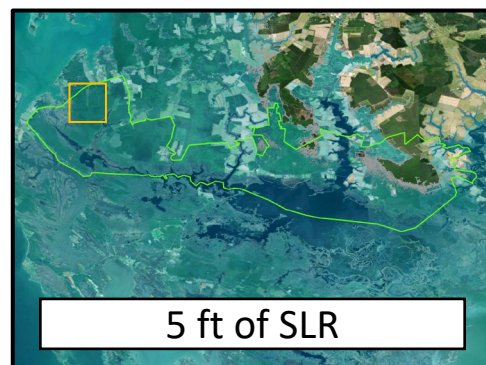
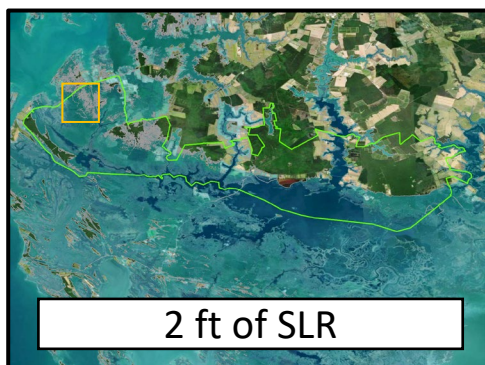
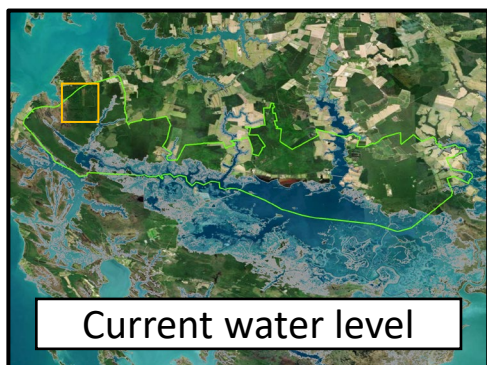


The figure to the left shows the station's annual mean sea level since 1960 and five regionalized sea level rise scenarios plotted relative to a 1996-2014 baseline period, with the year 2005 as the 'zero' for the figure. Under the intermediate high scenario, sea level could rise by as much as 5.28 feet by 2100. This figure is based on data from the Cambridge, MD tide gauge, which is operated by the National Oceanic and Atmospheric Administration (NOAA).

What is the future of sea level rise at Harriet Tubman Underground Railroad NHP?

NOAA Projections ¹	2040	2050	2100
Intermediate Low	+0.98 ft	+1.28 ft	+2.56 ft
Intermediate	+1.05 ft	+1.38 ft	+4.00 ft
Intermediate High	+1.15 ft	+1.57 ft	+5.28 ft

This table shows projected sea level heights at the seashore compared to today's mean sea level. These projections were developed by NOAA in 2022 based on different climate change scenarios. Projections are a way of visualizing a range of possible futures. They can aid in park planning by helping managers determine which resources are most threatened by sea level rise.



From left to right, these images show the Harriet Tubman Underground Railroad National Historical Park (boundaries in green) with its current water level, with two feet of sea level rise, and with five feet of sea level rise. The yellow box outlines the area of the park where the Jacob and Dinah Jackson Home Site is located.



How is sea level rise impacting Harriet Tubman Underground Railroad NHP?

Harriet Tubman Underground Railroad National Historical Park was founded to commemorate the life of Harriet Tubman and protect the cultural landscape where she was born, lived as an enslaved person, escaped, and later risked her life to guide 70 other enslaved people north to freedom. The park's landscape encompasses over 11,000 acres of wetlands, forests, and fields on the Eastern Shore of Maryland. It is framed by the Choptank River to the north, the Transquaking River to the east, and the Blackwater River to the south. The park's proximity to the Chesapeake Bay, where sea level is rising at almost twice the global rate, and its low elevation make it particularly vulnerable to sea level rise impacts, such as marsh loss, habitat conversion, increased erosion, and saltwater intrusion. In addition to impacting the park's natural resources, sea level rise also impacts the park's nationally significant cultural landscape, cultural and archeological resources, and infrastructure.

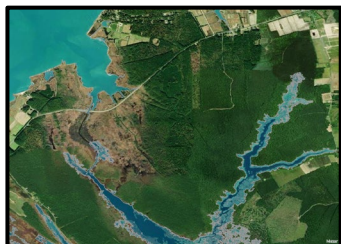
- The park's undeveloped dry land, upland forests, inland freshwater marsh, freshwater and tidal swamps, and irregularly flooded brackish marshes are its most vulnerable habitats. For example, it is predicted that over 50% of the park's inland freshwater marsh will be converted to salt marshes by 2050. Additionally, over 8,900 acres of the park's tidal marsh habitat will likely be converted to open water by the end of the century.
- The Jacob and Dinah Jackson Home Site is a 480-acre section of the park that protects the marshes, fields, and canals where a free black farmer and veterinarian, Jacob Jackson, lived with his wife, Dinah Jackson. The Jacksons were closely associated with the Tubman family and provided assistance to Harriet Tubman with her efforts to guide others to freedom. The actual footprint of the Jacob and Dinah Jackson farm is 114 acres within the larger Home Site. The site protects cultural and archeological resources, diverse wildlife habitats, and an important historic landscape. This site is projected to lose 80% of its current upland areas and 47% of its freshwater wetlands by the end of the century due to rising waters and saltwater intrusion.



Trees die off in the park due to saltwater intrusion caused by rising sea levels [MD Department of Natural Resources]



A view of the Joseph Stewart's Canal near the Jacob and Dinah Jackson Home Site, which is located at the stand of trees in the background [NPS]



The photos above show the Jacob and Dinah Jackson Home Site area of the park with its current sea level (left) and with just one foot of sea level rise (right), which is consistent with the amount of sea level rise predicted by the Intermediate Low scenario for 2040. Sea level is rising rapidly in this area of the country. Much of the park is made of wetlands and has low elevation. These factors combined mean that in just 20 years, much of this area could be inundated.

What can you do to help?

- Reduce your carbon footprint: power down electronics or reduce your thermostat. Go to carbonfootprint.com to calculate your carbon footprint and find ways to make changes.
- Volunteer with organizations working to protect coastal habitats that provide natural defenses against sea level rise.
- Support climate mitigation and adaptation policies. Contact your representatives in Congress to let them know you care.
- Visit coastal areas and support the parks and communities that are taking actions to prepare for sea level rise.

Additional Resources

1. <https://coast.noaa.gov/slr/>: A NOAA SLR viewer tool to access local sea level rise projections at tide gauges and visualize sea level rise scenarios (2022).
2. <https://tidesandcurrents.noaa.gov/>: Access water levels, tide predictions, and other conditions along coasts.
3. [NOAA Coastal Flood Exposure Mapper](#): A tool to visualize coastal hazards as well as societal, infrastructure, and ecosystems exposure to those hazards
4. [Harriet Tubman Underground Natural Resources Condition Assessment](#): An NPS report on the natural resources of the park.

Note: The sea level rise projections, storm surge projections, and other information presented here are for general educational and awareness purposes only. They should not be used for site-specific analysis, navigation, permitting, or legally binding activities.