

# Sea level rise

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Global sea level rise is the most obvious manifestation of climate change in the ocean. As ocean waters warm with increasing air temperatures, water expands, and sea levels rise. Heat-driven expansion of ocean water accounts for about half of the global sea level rise in the past century. The other major contributor to sea level rise is water from melting ice caps, polar ice sheets and mountain glaciers. Sea levels have generally risen along the California coast, consistent with global observations.

Rising sea levels threaten California's coastline communities and ecosystems. More than 70 percent of California's residents live and work in coastal counties, where almost 86 percent of the state's total gross domestic product is generated.

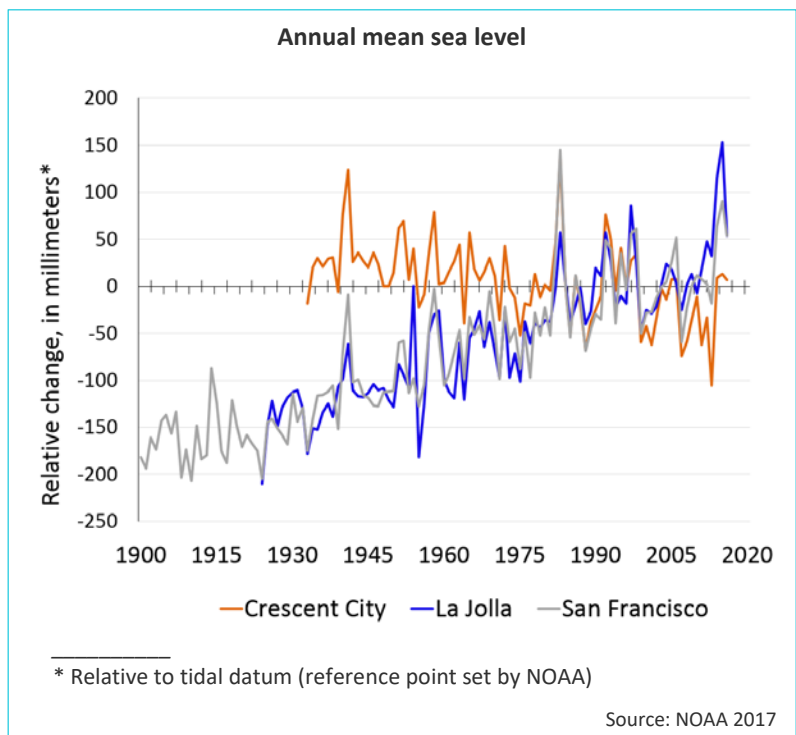
## What does the indicator show?

The graph shows changes in annual sea level at three tide gauges along the California coast. Sea level has risen by about 180 millimeters (mm) (7 inches) since the year 1900 at San Francisco and by about 150 mm (6 inches) since 1924 at La Jolla. Sea levels show year-to-year variability, but are rising overall at these and almost all other tide gauge locations in California.

The exception occurs at Crescent City, where sea level has dropped by about 70 mm (3 inches) since 1933. In this region, the uplift of land due to geological processes is producing opposing sea level trends. Local sea levels measured at tide gauges reflect the combined

effects of regional sea level change and vertical land movement. At Crescent City, uplift of land is occurring at a faster rate than regional sea level rise. The net result is a decrease in local sea level. In contrast, at North Spit in nearby Humboldt Bay (about 70 miles south of Crescent City) where land is subsiding, the *highest* rate of sea level rise in California has been recorded.

Sea levels generally peak during years when El Niño conditions cause the waters of the eastern Pacific Ocean to warm. Levels at all three locations on the graph rose in 2014 and 2015, possibly due to unusually warm sea surface temperatures in the Pacific Ocean during that period (during the marine heat wave nicknamed the "warm blob").

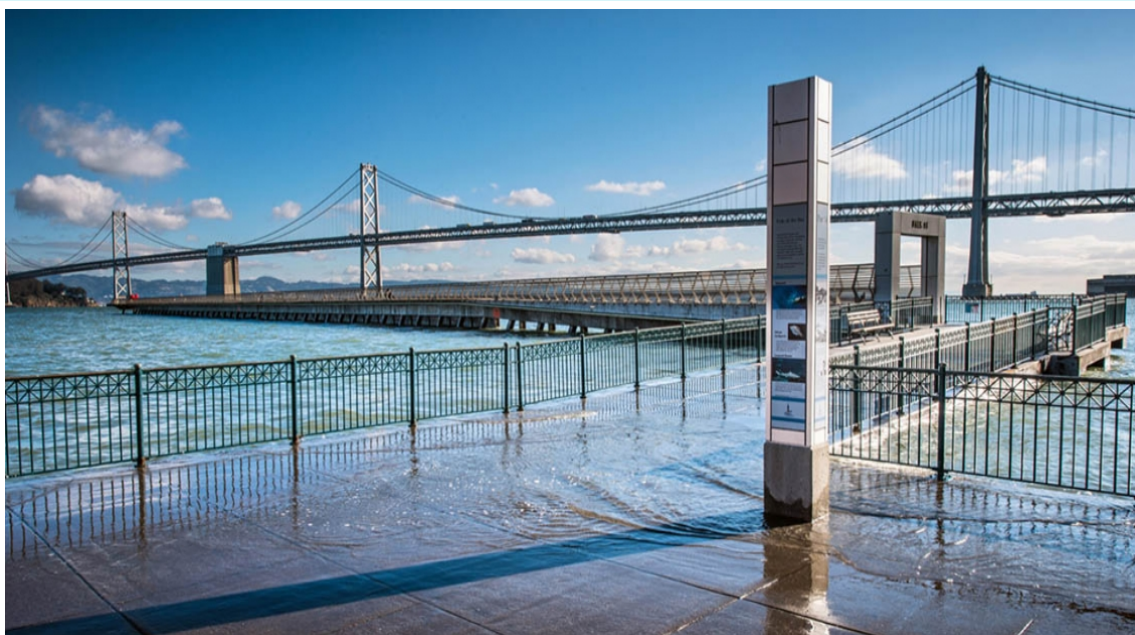




### Why is this indicator important?

California's hundreds of miles of scenic coastline contain expansive urban centers, ecologically fragile estuaries, and fisheries that would be impacted by changes in sea level. Natural gas lines, power plants, waste water treatment plants and other critical infrastructure in coastal areas are increasingly more vulnerable to the impacts of rising sea levels. Other concerns posed by rising sea levels are:

- The risks of flooding, coastal erosion, and shoreline retreat increase with sea level rise.
- Rising sea levels can disrupt wetlands, estuaries and other coastal ecosystems. These environments support wildlife habitat, species biodiversity and a fishing economy. They also provide flood protection and water treatment opportunities.
- During storms and high water flood events, higher sea levels increase the likelihood of Delta island levee failures in the Sacramento-San Joaquin Delta. Encroaching sea waters can increase the Delta's salinity, putting the water supply for over half of California's population and much of the Central Valley's agriculture at risk. Saltwater intrusion into groundwater can also increase with sea level rise, putting further pressure on limited drinking water supplies.
- Sea level rise may affect certain populations disproportionately. Lower income households often lack resources to recover from flooding events. The loss of local public beaches and recreational areas reduces the already limited options for low-cost recreation available to communities.



*A King Tide at San Francisco's Embarcadero. "King Tides" are exceptionally high tides that typically occur during a new or full moon. With sea level rise, they are expected to reach higher levels and extend further inland.*

Photo: NOAA

For more information about this and other climate change indicators, visit:

<https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california>

