

Rebuilding Lahaina: Should Policy Decisions be Based on Facts....or Questionable Conjecture?

A Briefing Paper of The Practical Policy Institute of Hawaii (PPIH)

1. Background. The devastating wildfires that destroyed Lahaina left us all heartsick. Much has been written about how to rebuild Lahaina, and who gets a say. But less has been written about how to juxtapose rebuilding Lahaina “the way it was” vs. the myriad of State and county laws and regulations that perhaps conflict. Should laws and regulations pertaining to Special Management Areas and Shoreline Rules be rigidly enforced? Or waived in favor of property owners? Shoreline setback is a huge issue for Lahaina.

Shoreline setback takes you quickly to the subject of sea level rise (SLR). If conjecture that the sea is going to rise as much as some individuals and agencies want policy-makers to believe, it might be prudent to require setback vs. what was previously built. If, on the other hand, factual information and related trendlines indicate that conjectured SLR is greatly exaggerated, perhaps property owners should be allowed to rebuild what they had.

The purpose of this paper is to provide factual information on Maui’s SLR and to examine the source and credibility of conjectured SLR that individuals and agencies have put forth.

2. Facts vs. Conjecture as it Pertains to Maui. We’re fortunate to have 75 years of NOAA sea level data for Kahului. Attachment A shows the gradually increasing trend on Maui over this time period, **equivalent to less than 9 inches per century.** But what about the future? Computer models are used by climate scientists to project possible outcomes based upon assumptions. One model, which predicts a 3.2’ SLR from 2000 to 2100, has been promulgated by a UH Manoa professor and the various studies and agencies he has influenced. The 3.2’ SLR projection was recently adopted by the County of Maui and, unless the new Shoreline Rules are waived, will preclude the rebuilding of hundreds homes and businesses lost in the Lahaina fire.

Attachment B compares the continuation of the 75-year Kahului trend with the conjectured 3.2’-per-century computer model. As can be seen, there is a **huge divergence between the 9” factual trendline and the conjectured 3.2’ rise.** So who and what to believe? Before giving more credence to models than facts, we suggest that Maui County officials delve deeper into the credibility of the model being promulgated vs. unquestioning acceptance. Where does the conjectured 3.2’ of SLR come from?

Attachment C provides an excerpt from page 1,182 of a 2015 report (AR5) from the United Nations Intergovernmental Panel on Climate Change (IPCC). Table 13.5 shows the assumptions and resulting projections from five published models. Projections to 2100 vary from 11 inches to 3.2’. Clearly there is no scientific consensus. The RCP8.5 model depicts by far the highest level of SLR—plus a 25% contingency. It’s readily apparent that the 3.2’ of SLR has been cherry-picked from the table—most likely in an attempt to influence and persuade.

Maui County officials should also be aware of the controversy and discrediting of the RCP8.5 model. By author Roger Pielke's analysis, the CO2 increase and thus heating imbedded in the model "assumes a 7-8 times increase in coal consumption by 2100, implying the building of >30,000 new coal power plants this century—a rate of more than one per day coming online until 2100—implausible." He also notes that "In 2023 the IPCC warned that RCP8.5 should not be used as a reference scenario and a group of experts convened to start preparing a next generation of scenarios have largely left RCP8.5 behind." Yet the 3.2' of SLR from the model continues to be promulgated by the referenced UH Manoa professor.

Government officials statewide should apply their own critical thinking and good judgment as to the credibility of the curve resulting from the RCP8.5 model. The conjectured acceleration of SLR because of melting glaciers and other temperature-related factors is not being reflected in tide gauges—actual SLR continues to be linear, not geometric. NOAA's own tide chart for Kahului invalidates the projection. Relative to linear growth of 0.9 inches per decade, the modeled SLR since 2000 is already too high by about 3 inches. The modeled geometric compounding and rate of SLR is simply not happening.

The referenced UH Manoa professor is also on record saying "The potential for over 6 feet of sea level rise...is our new reality now." With the factual data indicating a continuation of slow linear growth, policy-makers should question the credibility of such a statement and its vested interest source.

3. Conclusion. An author once noted, "Sober findings get less attention than alarming and far-fetched speculation." The factual basis for SLR is far different from the conjecture. Another author lamented, "Much of the public portrayal of climate science suffers from...an effort to persuade rather than inform." Our view is that government officials should recognize the techniques and scare tactics being used to advance certain agendas.

Yes, the sea is gradually rising, but at a very stable and predictable rate. We view that conjecture about SLR should be a minor consideration in determining who and what can be rebuilt at Lahaina. Should long-time Lahaina residents, shop owners, and restaurant owners be hindered/deterred/blocked by onerous SMA permit requirements and the new Maui County Shoreline Rules? Based on our assessment of SLR facts vs. questionable conjecture, it is the position PPIH that Maui County should waive these requirements and Rules to enable property owners to rebuild Lahaina "the way it was."



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 **NOAA is monitoring water levels and winds for Potential Tropical Cyclone Four** (<https://tidesandcurrents.noaa.gov/inundationdb/cidstorm.html?stormname=Four>). **Click to view real-time water level and meteorological data.** 

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[Meteorological Obs. \(/met.html?id=1615680\)](/met.html?id=1615680)

[Phys. Oceanography \(/physocean.html?id=1615680\)](/physocean.html?id=1615680)

[Relative Sea Level Trend](#)

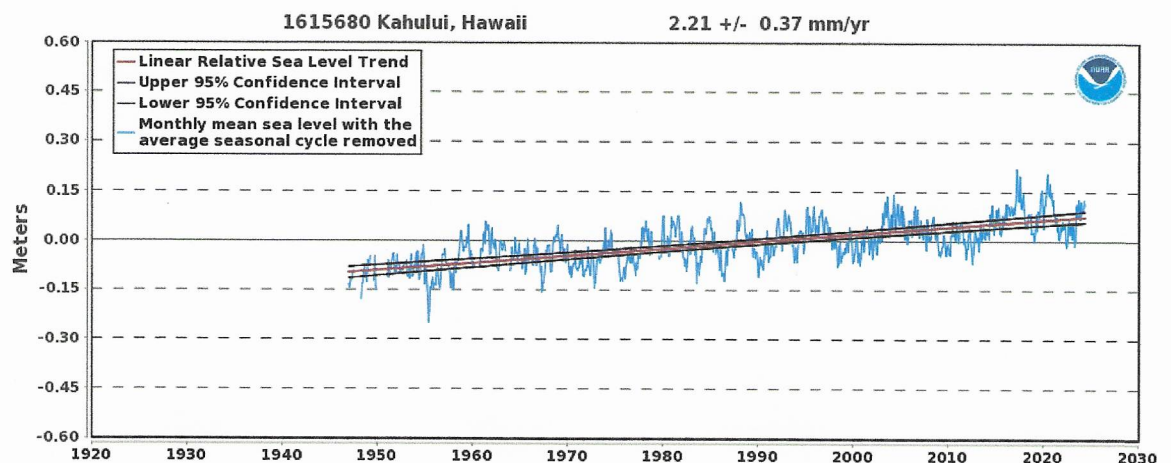
[Regional Scenarios](#)

[Interannual Variation](#)

[Average Seasonal Cycle](#)

[Variation Of 50-Year
RSL Trends](#)

Relative Sea Level Trend 1615680 Kahului, Hawaii



[EXPORT TO TEXT \(DATA/1615680_MEANTREND.TXT\)](#) |

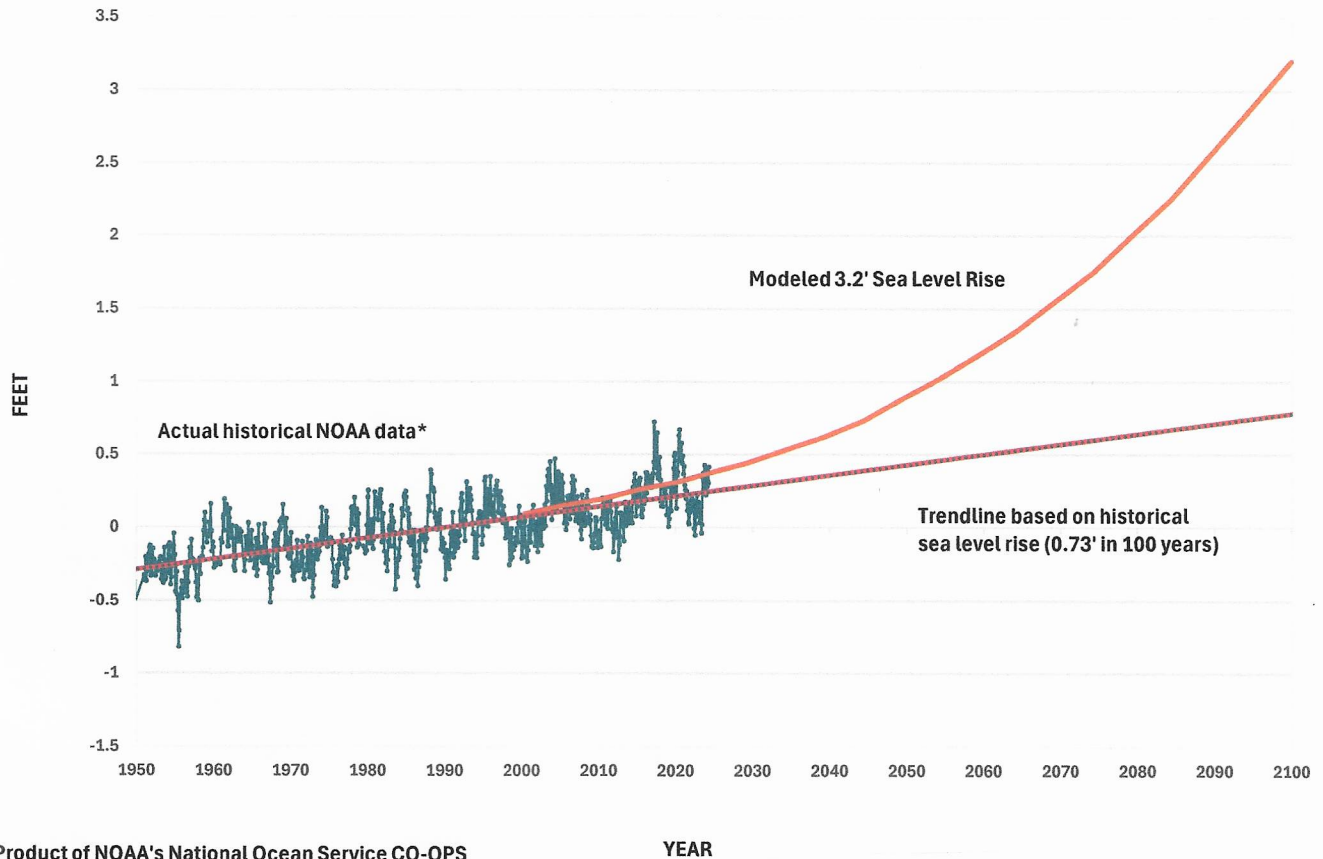
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[SAVE IMAGE \(PLOTS/1615680_MEANTREND.PNG\)](#)

The relative sea level trend is 2.21 millimeters/year with a 95% confidence interval of +/- 0.37 mm/yr based on monthly mean sea level data from 1947 to 2023 which is equivalent to a change of 0.73 feet in 100 years.

Plots show monthly mean sea levels without the regular seasonal fluctuations from coastal ocean temperatures, salinity, wind, atmospheric pressure, and ocean currents. The relative sea level trend is also shown with its 95% confidence interval. Relative Sea Level trends at the coast can be positive

Kahului Historical Sea Level Rise Actual Trendline vs. Modeled 3.2' Projection



*Product of NOAA's National Ocean Service CO-OPS
(millimeters converted to feet)

Source of the oft-repeated projection of 3.2' of sea level rise: model RCP8.5 selected from the 2015 United Nations Inter-Governmental Panel on Climate Change report (AR5). See graph from page 1,181 of the report to the right. Assumptions driving the projection are summarized below. The far left/top line adds an additional 25% of SLR as a contingency. This model, essentially without local debate as to its veracity, has been adopted by various Hawaii assessment reports and governmental entities.

- Sum
- Thermal expansion
- Glaciers
- Greenland ice sheet
- Antarctic ice sheet
- Greenland ice-sheet rapid dynamics
- Antarctic ice-sheet rapid dynamics
- Land water storage

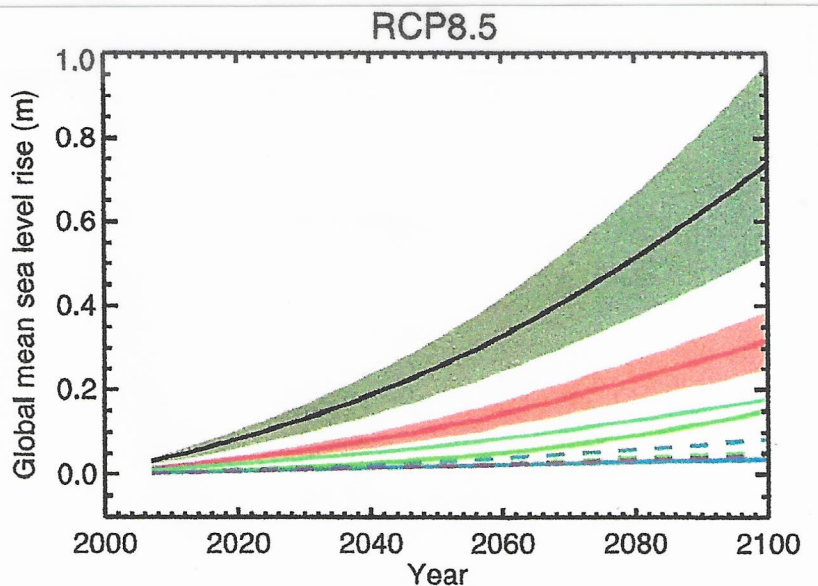


Table 13.5 | Median values and *likely* ranges for projections of global mean sea level (GMSL) rise and its contributions in metres in 2081–2100 relative to 1986–2005 for the four RCP scenarios and SRES A1B, GMSL rise in 2046–2065 and 2100, and rates of GMSL rise in mm yr^{-1} in 2081–2100. See Section 13.5.1 concerning how the *likely* range is defined. Because some of the uncertainties in modelling the contributions are treated as uncorrelated, the sum of the lower bound of contributions does not equal the lower bound of the sum, and similarly for the upper bound (see Supplementary Material). Because of imprecision from rounding, the sum of the medians of contributions may not exactly equal the median of the sum. The net contribution (surface mass balance (SMB) + dynamics) for each ice sheet, and the contribution from rapid dynamical change in both ice sheets together, are shown as additional lines below the sum; they are not contributions in addition to those given above the sum. The contributions from ice-sheet rapid dynamical change and anthropogenic land water storage are treated as having uniform probability distributions, uncorrelated with the magnitude of global climate change (except for the interaction between Antarctic ice sheet SMB and outflow), and as independent of scenario (except that a higher rate of change is used for Greenland ice sheet outflow under RCP8.5). This treatment does not imply that the contributions concerned will not depend on the scenario followed, only that the current state of knowledge does not permit a quantitative assessment of the dependence. Regional sea level change is expected in general to differ from the global mean (see Section 13.6).

	SRES A1B	RCP2.6	RCP4.5	RCP6.0	RCP8.5
Thermal expansion	0.21 [0.16 to 0.26]	0.14 [0.10 to 0.18]	0.19 [0.14 to 0.23]	0.19 [0.15 to 0.24]	0.27 [0.21 to 0.33]
Glaciers ^a	0.14 [0.08 to 0.21]	0.10 [0.04 to 0.16]	0.12 [0.06 to 0.19]	0.12 [0.06 to 0.19]	0.16 [0.09 to 0.23]
Greenland ice-sheet SMB ^b	0.05 [0.02 to 0.12]	0.03 [0.01 to 0.07]	0.04 [0.01 to 0.09]	0.04 [0.01 to 0.09]	0.07 [0.03 to 0.16]
Antarctic ice-sheet SMB ^c	−0.03 [−0.06 to −0.01]	−0.02 [−0.04 to −0.00]	−0.02 [−0.05 to −0.01]	−0.02 [−0.05 to −0.01]	−0.04 [−0.07 to −0.01]
Greenland ice-sheet rapid dynamics	0.04 [0.01 to 0.06]	0.04 [0.01 to 0.06]	0.04 [0.01 to 0.06]	0.04 [0.01 to 0.06]	0.05 [0.02 to 0.07]
Antarctic ice-sheet rapid dynamics	0.07 [−0.01 to 0.16]	0.07 [−0.01 to 0.16]	0.07 [−0.01 to 0.16]	0.07 [−0.01 to 0.16]	0.07 [−0.01 to 0.16]
Land water storage	0.04 [−0.01 to 0.09]	0.04 [−0.01 to 0.09]	0.04 [−0.01 to 0.09]	0.04 [−0.01 to 0.09]	0.04 [−0.01 to 0.09]
Global mean sea level rise in 2081–2100	0.52 [0.37 to 0.69]	0.40 [0.26 to 0.55]	0.47 [0.32 to 0.63]	0.48 [0.33 to 0.63]	0.63 [0.45 to 0.82]
Greenland ice sheet	0.09 [0.05 to 0.15]	0.06 [0.04 to 0.10]	0.08 [0.04 to 0.13]	0.08 [0.04 to 0.13]	0.12 [0.07 to 0.21]
Antarctic ice sheet	0.04 [−0.05 to 0.13]	0.05 [−0.03 to 0.14]	0.05 [−0.04 to 0.13]	0.05 [−0.04 to 0.13]	0.04 [−0.06 to 0.12]
Ice-sheet rapid dynamics	0.10 [0.03 to 0.19]	0.10 [0.03 to 0.19]	0.10 [0.03 to 0.19]	0.10 [0.03 to 0.19]	0.12 [0.03 to 0.20]
Rate of global mean sea level rise	8.1 [5.1 to 11.4]	4.4 [2.0 to 6.8]	6.1 [3.5 to 8.8]	7.4 [4.7 to 10.3]	11.2 [7.5 to 15.7]
Global mean sea level rise in 2046–2065	0.27 [0.19 to 0.34]	0.24 [0.17 to 0.32]	0.26 [0.19 to 0.33]	0.25 [0.18 to 0.32]	0.30 [0.22 to 0.38]
Global mean sea level rise in 2100	0.60 [0.42 to 0.80]	0.44 [0.28 to 0.61]	0.53 [0.36 to 0.71]	0.55 [0.38 to 0.73]	0.74 [0.52 to 0.98]
Only the collapse of the marine-based sectors of the Antarctic ice sheet, if initiated, could cause GMSL to rise substantially above the <i>likely</i> range during the 21st century. This potential additional contribution cannot be precisely quantified but there is <i>medium confidence</i> that it would not exceed several tenths of a meter of sea level rise.					

Notes:

- ^a Excluding glaciers on Antarctica but including glaciers peripheral to the Greenland ice sheet.
- ^b Including the height–SMB feedback.
- ^c Including the interaction between SMB change and outflow.

INCHES 11.0"
FEET 0.92'

INCHES 38.6"
FEET 3.22'

From page 1,182 of the 2015 WG1AR5 (Fifth Assessment Report of the Intergovernmental Panel on Climate Change)