



# THE RISKS OF SEA LEVEL RISE: PERCEPTIONS AND POLICY PREFERENCES AMONG HAWAII'S ELECTED OFFICIALS

DECEMBER 4, 2023





UNIVERSITY of HAWAII at MĀNOA

INSTITUTE *for* SUSTAINABILITY *and* RESILIENCE

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**The Risks of Sea Level Rise:  
Perceptions and Policy Preferences among Hawai'i's Elected Officials**

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## EXECUTIVE SUMMARY<sup>1</sup>

Due to its remote geographic location and extensive coastlines, the State of Hawai'i is particularly vulnerable to climate change and sea level rise (SLR). While Hawai'i was among the first states to officially recognize the climate crisis and has played a leading role in combating climate change, Hawai'i's lawmakers are still developing plans and policies to address predicted impacts of SLR. This survey explores the views of Hawai'i's elected representatives regarding the risks of SLR and favored approaches to adaptation.

The report presents the results of an online survey conducted between June and September of 2023, which was sent to all currently elected officials in the Hawai'i State Legislature and the State's four County Councils (State Legislature N=76; County Councils N=34). A total of 32 individuals responded (State Legislature n=18; County Councils n=14) for a combined response rate of 29%. This is slightly above the average response rate of 21% for surveys of political elites and considerably better than most surveys of elected officials in the United States (Vis and Stolwijk 2021; Broockman and Skovron 2018).

Overall, the survey results indicate the gap between perception and policy action regarding SLR in Hawai'i is both pronounced and perplexing. Despite the overwhelming consensus among Hawai'i's policymakers on the imminent threats posed by SLR and the lack of preparedness, it is not considered an urgent policy priority. Indeed, few policy recommendations that explicitly involve public expenditures are given much support. Although Hawai'i has made noteworthy strides in establishing foundational legal frameworks and planning tools for SLR, policymakers have an opportunity to bridge the divide between awareness and action. The stakes are undeniably high, but lawmakers can still meet this challenge through coordinated and rapid action.

### KEY FINDINGS

**All respondents believe SLR is happening, and 82% report SLR is already impacting coastlines in their districts.** A 52% majority say SLR is a result of a combination of human activities and natural processes, while 48% say SLR is the specific result of human activities. No respondents believe SLR is entirely the result of natural processes.

**The vast majority of policymakers are concerned about SLR and worry it will have significant or catastrophic impacts on the State within the next 50 years.** Nearly all respondents (94%) say they are concerned or very concerned about SLR. All respondents worry it will have serious impacts on Hawai'i's residents within the next 50 years. A 34% minority believe impacts on Hawai'i residents will be "catastrophic," while 66% think it will be "significant."

**Officials, especially at the county level, feel well informed about SLR, but there are gaps in their knowledge about State and county preparedness and policy options.** A majority of County Councilmembers (64%) feel well informed and 36% feel moderately informed. By contrast, the majority (61%) of State Legislators feel only moderately informed while 39% feel well informed. There is a notable level of uncertainty regarding the preparedness for SLR across the counties of Hawai'i. About 32% of survey participants are unsure of Hawai'i County's readiness, 30% are uncertain about Kaua'i's status, 27% about Maui County, and 10% lack information on Honolulu County's preparedness. Additionally, roughly one third of respondents say they are unclear about what policy options are available for dealing with SLR.

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<sup>1</sup> We are grateful to the many State and county policymakers who took the time to participate in this survey. We also thank Suwan Shen, Makena Coffman, Jennifer Kagan, Chip Fletcher, and Chris Koski for their thoughtful input; the research teams at the UH Mānoa's Institute for Sustainability and Resilience, the Climate Resilience Collaborative, and Sea Grant; the Pacific RISA team; the State of Hawai'i Climate Change Mitigation and Adaptation Commission; the State of Hawai'i Office of Planning CZM program; the City & County of Honolulu's Office of Climate Change, Sustainability and Resiliency, the Kaua'i County Office of Economic Development, and the Surfrider Foundation of Hawai'i, and the Yale Program on Climate Change Communication. We also thank the Climate Resilience Collaborative and the Institute for Sustainability and Resilience for providing support for making the survey possible. In particular, we would like to thank Conrad Newfield for his help deploying the survey. For helpful feedback on earlier versions of this report, we thank Leah Bremer, Juliette Budge, Kimberly Burnett, Sarah Chang, Dolan Eversole, Matthew Gonser, Zena Grecni, John Knox, Leah Laramée, Colin Lee, Christopher Wada, and Alexander Yee. Finally, we are grateful to Senator Sharon Moriawaki and Honolulu Councilmember Matt Weyer for encouraging their colleagues to participate in this survey.

**The vast majority of respondents believe SLR will have harmful impacts on Hawai'i in the next 50 years if action is not taken.**

- **Most respondents think there will be widespread negative impacts to the State's coastline.** Respondents believe the following impacts are virtually certain, very likely, or likely: frequent flooding in coastal areas (100%), coastline erosion (100%), loss of beaches (97%), groundwater inundation (94%), destruction of natural habitat (97%), loss of natural resources (69%), and contamination/reduction/ loss of freshwater resources (88%).
- **Most respondents believe SLR will have widespread negative socioeconomic impacts.** They believe the following are virtually certain, very likely, or likely: damage or loss of coastal properties (public and private) (100%), increases in insurance premiums (97%), disruption or losses in major tourism/resort areas (88%), loss of important cultural sites and practices, and loss of recreational spaces (both at 97%), public health issues related to cesspool leakage (90%), public health issues related to environmental contaminants (88%), forced relocation of communities (82%), insurance companies ending coverage due to high risk (78%), increased socioeconomic inequity (72%), and SLR-related migration into or out of Hawai'i (76%).
- **The strong majority of respondents think SLR will have widespread negative impacts on Hawai'i's infrastructure.** Respondents believe the following are virtually certain, very likely, or likely: damage or loss of coastal roads (100%), disruption of municipal utilities (97%), disruption of transportation (88%), more frequent overflows/disruption of sewer and wastewater infrastructure (88%), disruption of commercial ports (77%), disruption of military installations (75%), loss of viable agricultural land (69%), and disruption of energy imports (69%).

**No respondents believe the State of Hawai'i is well prepared or even moderately prepared for the impacts of SLR.**

In addition, no respondents believe that any of the counties are well prepared for sea level rise. Only 3% think Honolulu County and Kaua'i County are moderately prepared, and no respondents think Maui or Hawai'i counties are even moderately prepared. The strong tendency was to feel government is "underprepared" for SLR.

**Despite the high level of concern, Hawai'i's policymakers do not see SLR as a top priority.** Only 9% of total respondents rank SLR as a top priority, while 44% percent place it high on their list and 35% place it mid-list.

## Responses to possible SLR management policies

### Overwhelming (Near Consensus) Support

- Restore and promote living shorelines. All policymakers strongly support or somewhat support restoring and promoting living shorelines to buffer against SLR impacts.
- Protect critical public infrastructure. The vast majority (94%) of respondents strongly support or somewhat support providing government funding to protect or replace critical public infrastructure, equipment and utilities.
- Implement regulatory tools such as zoning and setback laws in affected coastal areas. Nearly all (91%) lawmakers favor changes to regulations such as zoning laws and increased "setback" or "buffer" distances to discourage building, improvements, and rebuilding in SLR-affected areas.
- Enforce Act 16. A strong majority (90%) of respondents support enforcement of Act 16, which prohibits property owners from building or reinforcing hardening structures in areas with beaches unless it is in the interest of the public.
- Encourage inland development over coastal development. Nearly all (90%) respondents support creating policies that encourage inland development.

### Strong Majority Support

- Use permitting tools to incentivize removal or relocation of damaged structures. A substantial majority of 75% support creating permitting conditions that require owners to remove or relocate vulnerable or damaged structures upon a triggering event; e.g., change in shoreline or seasonal waves flooding a dwelling.

- Mandate removal of seawalls where no beach is left. A majority of 65% of respondents support creating policy to create these mandates.
- Transfer of Development Rights (TDR). Most respondents (60%) favor using a TDR approach to enable relocation for coastal owners.

### Least Support

- Use public funds to construct walls and structural barriers along the shore. Only 28% express some support for this approach, while 53% of respondents indicate some or strong opposition to this policy approach (31% indicate that they were somewhat opposed to these policies and 22% strongly oppose this approach), and 16% remained neutral.
- Spend public funds to vacate homes. Respondents are largely unresponsive of using public funds to help property owners, regardless of socioeconomic level, to vacate their homes. While 22% support this policy, 25% are somewhat opposed and 22% strongly oppose this policy. By far and away, responding lawmakers judge this to be the least attractive policy solution among “managed retreat” SLR adaptation policies.

While policymakers support managed retreat adaptation policies, those involving government funds for buyouts of private property, especially without consideration for socioeconomic status, were the least popular among policy options provided in the survey.

### Obstacles to Progress

Survey results suggest a pressing need for improved funding for planning and implementation, information sharing, and coordination among counties on the one hand, and between counties and the State on the other. They also indicate a need for more urgent action in response to sea level rise. The top obstacles to SLR-related policy were as follows: 1) lack of funding to *implement* a plan (78%); 2) lack of coordination among agencies and stakeholders (72%); 3) lack of funding to *prepare* a plan (44%); 4) insufficient staffing resources to analyze/assess information (34%).

### Summary of Recommendations

Based on the survey findings, we offer the following recommendations to individuals and agencies working on SLR adaptation planning in Hawai‘i.

- **Implement Policies that Lawmakers Already Support.** Respondents largely agree on revising permitting and building codes to promote resilient construction practices and elevate buildings in vulnerable areas. They strongly support the enforcement of recently updated codes and coastal regulations, such as in Act 16, to prevent private property owners from building hard structures on beaches in most cases. They also strongly approve of nature-based solutions to SLR, such as restoring and promoting living shorelines. Additionally, lawmakers agree with (a) providing incentives for private purchase of coastal lands for restoration and (b) government purchase of coastal lands to maintain and restore natural areas.
- **Enhance Policy Coordination.** Survey respondents believe limited coordination among agencies and stakeholders is a significant obstacle to addressing SLR. Policymakers should consider creating comprehensive and collaborative governance structures and strategies to address SLR, which include federal, State, and county agencies, as well as non-profit organizations, corporations and community stakeholders.
- **Address Policy Knowledge Gaps and Lack of Analytical Capacity.** Respondents say they need more information about the available policy options and successful responses in other jurisdictions. To address this knowledge gap, experts and researchers should consider how they can better communicate with policymakers about effective SLR policies and how they can be adapted to the needs of Hawai‘i. Lawmakers also indicate that they need more staff to help them make sense of the data and policy response options for SLR adaptation. This lack of capacity could be

addressed by growing the number of research and planning staff at key agencies, particularly at the State's Office of Planning and Sustainable Development and the Office of Conservation and Coastal Lands, and at the various climate change and sustainability offices or their functional equivalents across the four counties.

- **Prioritize Planning and Funding for SLR Adaptation.** Hawai'i's leaders cite a lack of funding for planning and implementation as a significant obstacle to SLR adaptation. Although national political dynamics largely determine federal funding, Hawai'i should be prepared to capitalize on significant federal investments, such as the 2022 Inflation Reduction Act. Hawai'i's leaders could also consider new revenue streams for funding large- and small-scale adaptation projects, and work to overhaul State and county procurement systems. Finally, they can continue to explore public-private partnerships with corporations and nonprofits to ensure access to the best technology and community engagement practices.

## 1. INTRODUCTION

### 1.1 CURRENT AND PREDICTED SEA LEVEL RISE IMPACTS

By 2100, the National Oceanic and Atmospheric Administration (NOAA) expects the global mean sea level to rise by 3.8 feet (Sweet et al.), threatening the homes and livelihoods of approximately one billion people and resulting in asset losses of US \$8-14 trillion (USD 2011). In the United States alone, over 8 million people are threatened by sea level rise (SLR).

The situation is particularly acute for Hawai'i, an archipelago in the middle of the Pacific Ocean, which is already experiencing impacts of SLR. In 2017, the Honolulu tide gauge recorded 15 days that were 0.9 m above the flooding threshold (mean low water), which prior to 2017 had only occurred on 40 days total during the 112 year record (Yoon et al. 2019). Approximately 70% of beaches on Maui, Kaua'i, and O'ahu are eroding at a rate of -0.4 ft/yr. Among Maui, Kaua'i, and O'ahu, 9% of the total beach length studied was completely lost to erosion in the past century (Fletcher, Charles et al. 2012). Coastal highways on O'ahu, Maui, and Moloka'i have seen erosion and flooding from high tides and storm surge and SLR is expected to more than double the historical erosion rate by the end of the century (Anderson et al. 2015).

The effects of SLR extend beyond Hawai'i's eroding coastlines. SLR-induced groundwater inundation is currently affecting the State's water table and contributing to flooding and drainage problems (Habel et al. 2020). Groundwater inundation can also increase saltwater concentration in wetlands and estuaries, threatening coastal ecosystems and agriculture (Kane et al. 2015) and posing increased public health risks by overwhelming wastewater systems near the coast (McKenzie, Habel, and Dulai 2021).

According to NOAA's 2022 Sea Level Rise Technical Report, by 2050, sea levels in Hawai'i are expected to rise to between 0.97 feet and 1.23 feet (Sweet et al.), and by the end of the century SLR in Hawai'i is predicted to reach *at least* 3.2 feet, with the following impacts expected in Hawai'i:

- Half of Hawai'i's shorelines will be at risk of beach loss with 2.4 ft (0.74 m) of SLR (Tavares, Fletcher, and Anderson 2020).
- 3.2 ft of SLR on O'ahu would flood 9,400 acres of land, cause \$12.9 billion in economic damage due to structure and land loss, and flood 3,880 structures and 17.7 miles of major roads (Tetra Tech, Inc and State of Hawai'i Department of Land and Natural Resources, Office of Conservation and Coastal Lands 2017).
- As SLR reaches 3.2 feet, some 14,000 linear feet to 60,000 linear feet of potable water pipes owned by the City and County of Honolulu will be affected (Nakano et al. 2019).
- A 2019 Hawai'i Department of Transportation (HDOT) report found that 76 road segments were highly susceptible to infrastructure damage from increased coastal hazards associated with SLR (Francis et al. 2019).

## 1.2. WHY SURVEY HAWAII'S LAWMAKERS ABOUT SEA LEVEL RISE?

Identifying the perceptions and preferences of elected officials is necessary to understand the evolution of policy in any democratic system. Concerns about SLR are not new, but there has been little research on how elected officials perceive the threat of SLR and how they will prioritize responses to this unfolding crisis. Although most politicians are highly responsive to the wishes of their constituents, the decisions of lawmakers are influenced by many factors, ranging from personal experience and sources of information to ideology and political partisanship (Brody et al. 2008; Akerlof et al. 2019; Garvin 2001; Brewer 2012; Dunlap and Allen 1976). In addition, as the devastating wildfires on Maui demonstrated, SLR is but one of several devastating consequences of climate change. Because the impact of SLR will be experienced slowly over decades, it may be more difficult to secure the attention and funding needed for effective adaptation.

While a growing body of research has explored public perceptions about climate change, far fewer studies have specifically considered sea level rise and coastal adaptation. A recent assessment of Cornell University's Roper Center's iPoll database identified 3,400 national level (US) survey questions about climate change or global warming perceptions that were collected between 1997 and 2016, but only 28 questions asked about SLR (Akerlof, Covi, and Rohring 2017). As Covi (2014) suggests, this may be because researchers do not commonly distinguish sea level rise knowledge and risk perception from climate change.

Even fewer studies have considered how state and local officials are grappling with SLR. Although the national government will likely lead a comprehensive response to SLR, individual states and local governments play an essential role in addressing environmental issues in the US federal system (Yusuf, St. John, and Ash 2014). Furthermore, given that SLR will disproportionately impact coastal states and localities, elected officials in these vulnerable areas will be the first to face SLR as a major political and policy challenge.

Assessing the opinions of elected officials in Hawai'i offers a unique opportunity to understand how lawmakers think about SLR in a state that is already experiencing its impacts. Indeed, Hawai'i might be viewed as a "most likely" case for serious concern and aggressive policy responses to SLR for the following reasons:

- With over 750 miles of coastline, Hawai'i has the 4th most coastline of any state in the US (following Alaska, Florida and California, respectively).
- Hawai'i's entire population lives within 30 miles of the shoreline, making it uniquely vulnerable to SLR.
- The vast majority of legislative districts include some shoreline within their boundaries. In our sample, 66% of respondents indicated that their district includes extensive coastline, and another 22% have at least minimal coastline in their districts.
- Major destination and recreational beaches have experienced dramatic erosion over the past decade, making the effects of SLR highly visible to the State's population (Warner 2022).
- Longitudinal opinion studies indicate that Hawai'i's residents lead other states in recognizing the effects of climate change and are largely in favor of taking action.<sup>2</sup>
- The vast majority of Hawai'i's elected officials are Democrats, who, studies have shown, are more likely than Republicans to express concern about climate change (Linde 2020)
- Hawai'i's Public Trust Doctrine, enshrined in the State Constitution since 1978, provides a strong foundation for the creation of adaptation policies.

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<sup>2</sup> Yale University's Anthony Leiserowitz and the Center for Climate Change Communication have been conducting risk perception polling across the US since at least 2004. Their Hawai'i figures are based on models drawn from similar states rather than direct polling. <https://climatecommunication.yale.edu/visualizations-data/ycom-us/>

The perspectives of Hawai'i's elected representatives may offer important insights into how politicians address the policy implications of SLR in a region already facing its impacts and where the prevailing ideology promotes active measures.

## 2. SURVEY OVERVIEW AND METHODOLOGY

To better understand how politicians perceive the risks and consequences of SLR, we conducted a survey of Hawai'i's elected officials. The results presented in this report are based on a survey sent to all elected officials at the Hawai'i State Legislature and all four County Councils between June and September of 2023. We asked these policymakers questions about their knowledge, sources of information, and preferred policy solutions to SLR. All responses were anonymous.<sup>3</sup>

**Table 1**

Survey Recipient	Total Surveys Sent	Total Responses	Response Rate (%)
State Legislators	76	18	24
Senate	25	4	16
House	51	14	27
County Councilmembers	34	14	41
Hawai'i	9	5	55
Honolulu	9	4	44
Kaua'i	7	2	29
Maui	9	3	22
<b>TOTAL</b>	<b>110</b>	<b>32</b>	<b>29</b>

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As Table 1 shows, the overall response rate was 29%. We received responses from 24% of State Legislators and 41% of County Councilmembers. This is slightly above the average response rate of 21% for surveys of political elites and considerably better than most surveys of elected officials in the United States (Vis and Stolwijk 2021; Broockman and Skovron 2018).

It is important to be clear about the limitations of our survey results. Since elected officials are often reluctant to complete surveys, most surveys of policymakers suffer from significant response bias. Our survey is no exception. Notably, none of our respondents identified as a Republican. Although there are only eight Republicans in the State Legislature (County Councils are nonpartisan offices in Hawai'i), these results do not capture the full range of ideological views related to SLR. Indeed, anecdotal evidence suggests that lawmakers who are particularly interested in climate change and SLR were more motivated to complete this survey. Since public opinion and geography already make SLR a politically salient issue in Hawai'i, those who responded to this survey likely prioritize SLR adaptation policies far more than the median lawmaker in the United States. Furthermore, the survey results likely reflect the beliefs and attitudes of the subset of Hawai'i policymakers who are likely to be particularly engaged in developing State-level policies for SLR.

<sup>3</sup> Please see Appendix A for the full survey instrument.



The survey asked whether respondents represent districts with “extensive,” “minimal,” or “no” coastline in their districts to account for whether this factor impacted the survey responses. In all, 50% of State Legislators indicated they have “extensive” coastline in their districts; 28% have “minimal” coastline; and 22% indicate “no” coastline. Meanwhile, 86% of County Council respondents indicated “extensive” coastline, and 14% indicated “minimal” coastline. While research in other US states suggests a strong correlation between greater exposure to coastline and heightened risk perceptions about SLR, the number of respondents in this study who do not represent coastal districts is too small to make causal inferences.

### 3. BELIEF AND INFORMATION ABOUT SEA LEVEL RISE

#### 3.1 BELIEFS

In recent decades, public opinion about climate change has become increasingly polarized, often splitting across party lines. Perhaps due to the immediacy of SLR’s threat to an island state and the strongly Democratic orientation of Hawai‘i’s elected officials, there was no uncertainty about rising sea levels among our respondents. As Figure 1 shows, every policymaker who participated in the survey acknowledges that sea level rise is happening.

**Figure 1**

Global sea level rise refers to the average increase in the water level of the Earth’s oceans. Do you think sea level rise is happening?

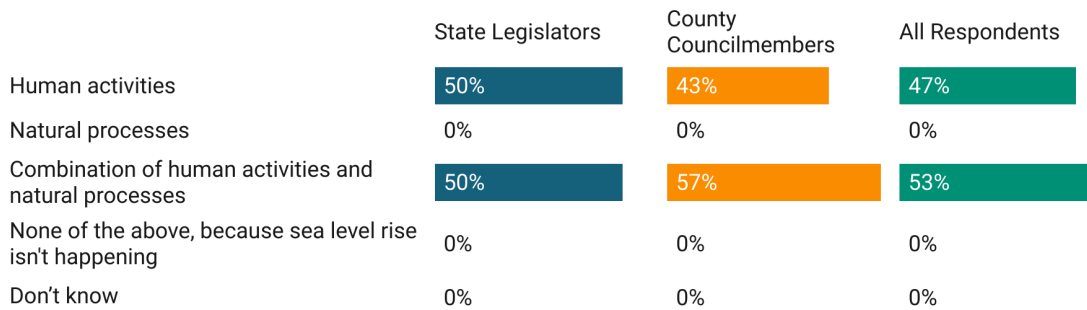


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According to Figure 2, 53% believe that SLR is a result of a combination of human activities and natural processes, while 47% said that SLR is the specific result of human activities. No respondents indicated that SLR is entirely the result of natural processes.

**Figure 2**

What is the cause of sea level rise?



*Throughout this report, “All Respondents” refers to the answers given by all County Councilmembers and State Legislators who responded to the survey.*

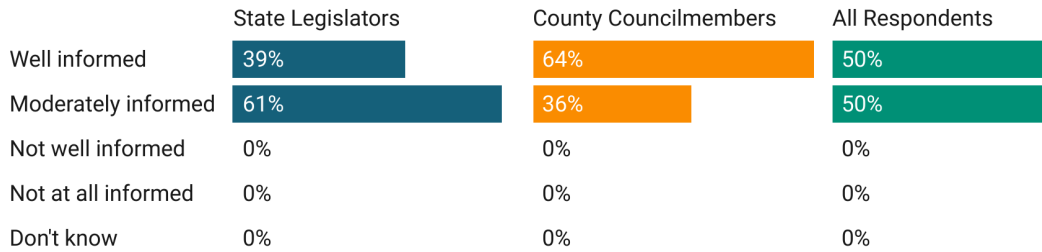
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Figure 3 shows that 50% of all respondents feel that they are “Well Informed” about SLR and 50% indicate they are “Moderately Informed.” Overall, County Councilmembers report feeling better informed than their counterparts at the

State Legislature. These findings suggest a command of basic knowledge about the causes of SLR among Hawai'i's elected officials and may provide a strong foundation for policy action.

### Figure 3

How well informed do you feel about sea level rise?



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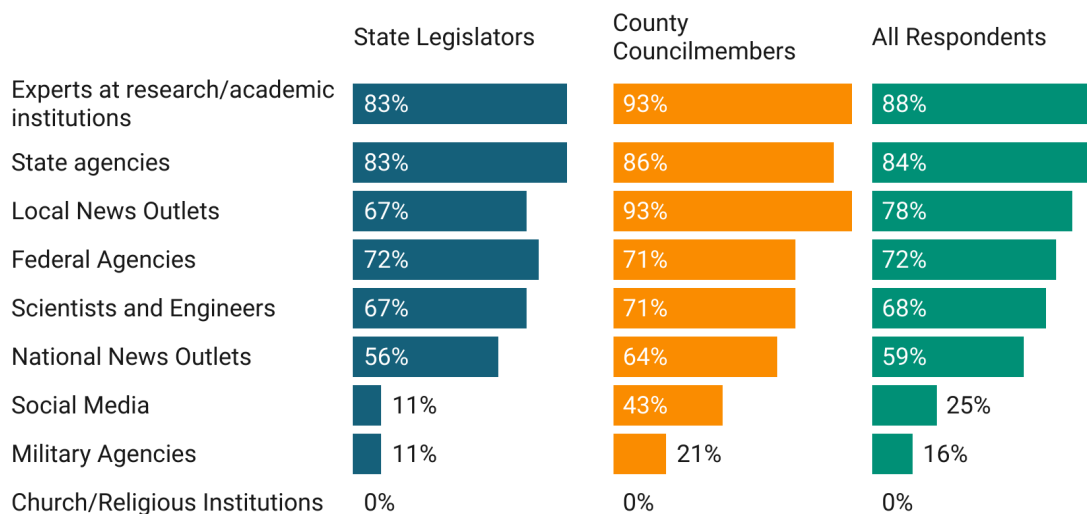
### 3.2 INFORMATION SOURCES AND FREQUENCY OF ENGAGEMENT

Which sources of information do elected officials use to educate themselves about SLR? The following survey questions assess where Hawai'i's policymakers are getting their information, and how often they hear about SLR.

Figure 4 shows that the response to this question yielded a wide range of sources from which Hawai'i's elected officials gather information about SLR. The top sources were experts at research/academic institutions (88%), State agencies (84%), and local news outlets (78%). These sources were followed by federal agencies (72%), scientists and engineers (68%), and national news media (59%).

### Figure 4

Where do you get your information on sea level rise? (mark all that apply)



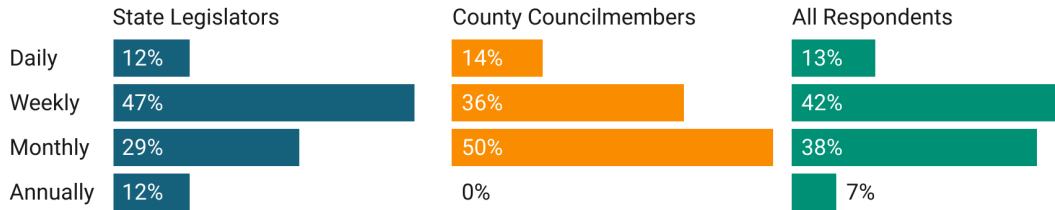
Please note that not all options presented in the survey are reported in Figure 4. Please Appendix A for a link to the full survey instrument.

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Since the frequency with which a given topic comes up may impact risk perception, we next asked policymakers how often they hear about SLR.

### Figure 5

How often do you hear about sea level rise in the media?

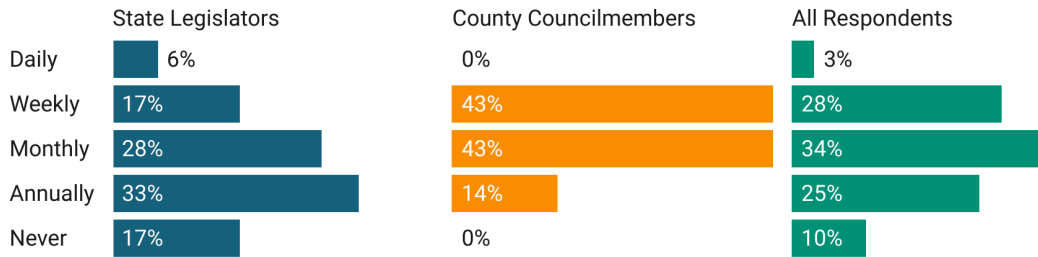


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As Figure 5 shows, 42% of Hawai'i's policymakers say they hear about SLR on a weekly basis, while 38% hear about it monthly. Only 13% of respondents indicate they hear about SLR in the media daily. No respondents told us they *never* hear about SLR in the news.

### Figure 6

How often does sea level rise/coastal flooding come up in discussions with your constituents?



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In general, according to Figure 6, respondents report they do not discuss SLR with their constituents very frequently. Only 34% of respondents discuss SLR with constituents monthly, 28% weekly, 25% annually, and 3% daily. Notably, County Councilmembers discuss SLR with their constituents almost twice as frequently as do State Legislators.

Overall, the findings in this section indicate that research institutions, State agencies, and local news sources play an especially important role in educating and informing policymakers. These results suggest that universities in particular are well positioned to increase the frequency of their engagement with Hawai'i policymakers on this topic. The survey also finds a clear opportunity for voters, non-profits, and other constituents to increase their communication with elected officials about this topic.

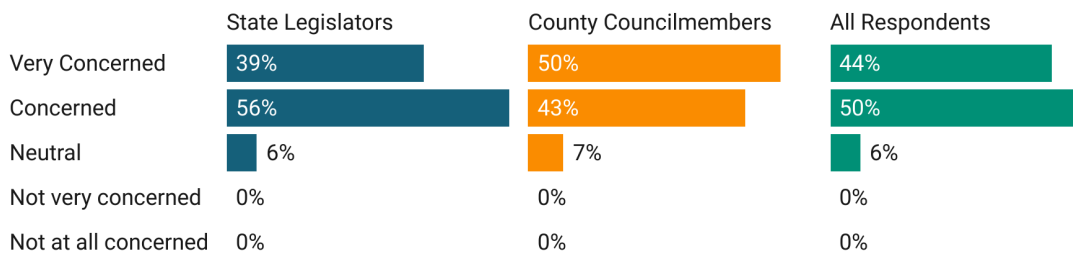
## 4. HOW DO LAWMAKERS ASSESS THE RISK OF SEA LEVEL RISE?

### 4.1 LEVEL OF CONCERN

We next probed how lawmakers view the risks associated with SLR. The following set of questions assess their level of concern, the potential timing and risk of impacts from SLR, anticipated consequences, and perceived preparedness at the State and county levels.

### Figure 7

What is your personal level of concern about sea level rise?

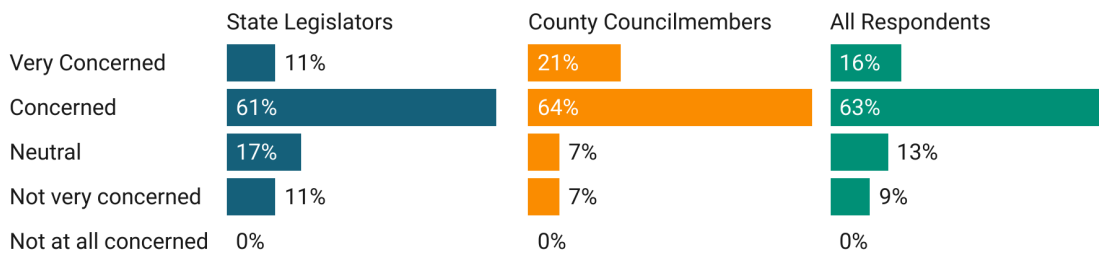


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As Figure 7 shows, the vast majority (94%) of Hawai'i's elected officials are concerned (50%) or very concerned (44%) about SLR, while only 6% remain neutral and no respondents indicate that they are unconcerned. While Hawai'i policymakers are closely aligned in terms of concern, County Councilmembers are more concerned about SLR than their State counterparts (50% indicate "very concerned" versus 39% of State respondents).

### Figure 8

How concerned do you think other elected officials in Hawai'i are about sea level rise?



Created with Datawrapper

When asked how concerned they think their peer elected officials are about SLR, Figure 8 shows the majority (79%) believe their peers are also "concerned" (63%) or "very concerned" (16%).<sup>4</sup> Only 13% of respondents believe their peers are "neutral" on the topic, while 9% think their peers are "not very concerned." No respondents indicate that their peers are "not at all concerned."

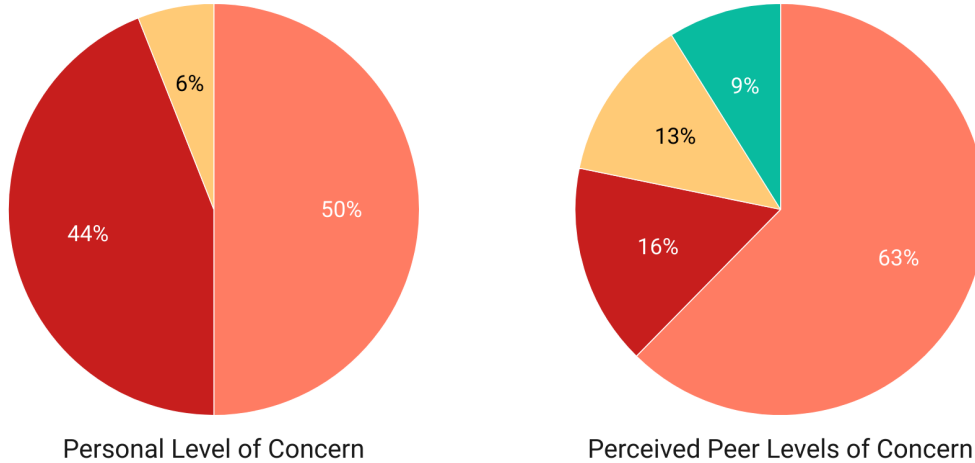
The results presented in Figure 9 may indicate that respondents who chose to participate in our survey are more likely to be concerned about SLR than the average elected official in Hawai'i. Although the question about perceived level of peer concern is speculative, it may provide a reasonable assessment of the views of a larger group of lawmakers, including those who chose not to respond to our survey. Most politicians possess a sophisticated and nuanced understanding of how their peers prioritize significant policy issues that they develop through debates, private conversations, and staff communications.

4 This question was drawn from a recent NSF project funded through the Climate Change Education Partnership program, titled *San Diego, 2050 Is Calling. How Will We Answer?* which engaged policy leaders in California. In that survey, 90% of leaders said they were personally very concerned about climate change but felt that only 10% of other leaders were concerned.

**Figure 9**

All Respondents

Concerned Very Concerned Neutral Not Very Concerned



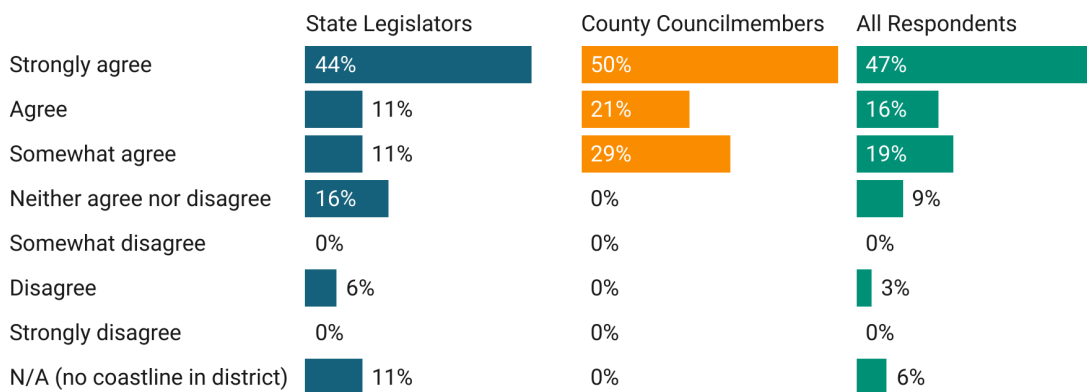
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**4.2 TIMING AND SERIOUSNESS OF IMPACTS**

Three questions drill down on risk perceptions by focusing on the perceived timing of impacts: when, if ever, SLR will begin to impact their districts; when SLR will begin to harm people in their districts; and how serious they expect these impacts to be.

**Figure 10**

"Sea level rise is already impacting coastlines in my district." How strongly do you agree or disagree with this statement?

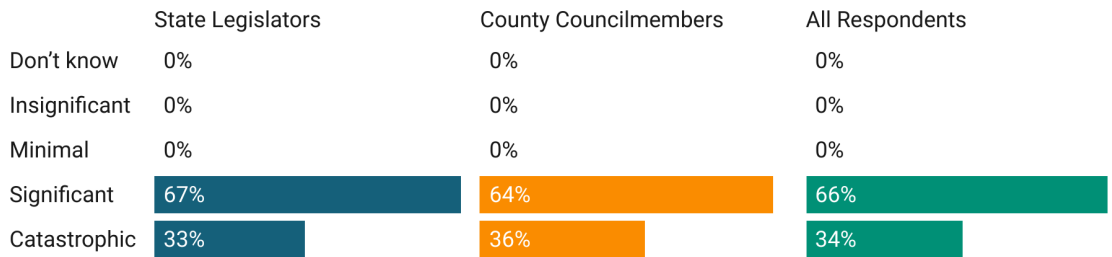


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According to Figure 10, 82% of responding lawmakers indicate SLR is already impacting coastlines in their districts. Nearly half of all respondents (47%) strongly agree SLR is already impacting coastlines in their districts, while another 16% agree and 19% somewhat agree.

### Figure 11

Over the next 50 years, how serious do you think the impacts of sea level rise will be on Hawai'i's residents?

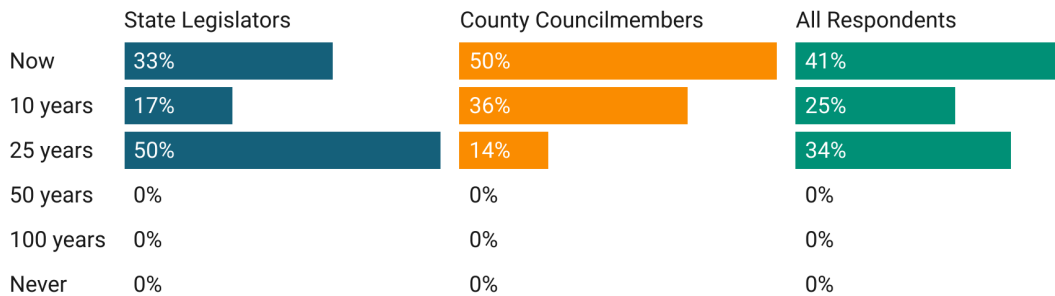


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Looking over a 50-year timeline, Figure 11 shows that all respondents believe SLR will have serious impacts on Hawai'i's residents, with 34% of respondents reporting that it will be catastrophic and 66% that it will be significant.

### Figure 12

When do you think sea level rise will start to harm people in your district?



Created with Datawrapper

All elected officials believe SLR will begin to harm people in their districts within the next 25 years, but County Councilmembers and State Legislators have different perceptions of when the harm will begin. As Figure 12 shows, a much higher percentage of county officials believe the harmful impacts have already begun (50%) or will be happening in the next decade (36%).

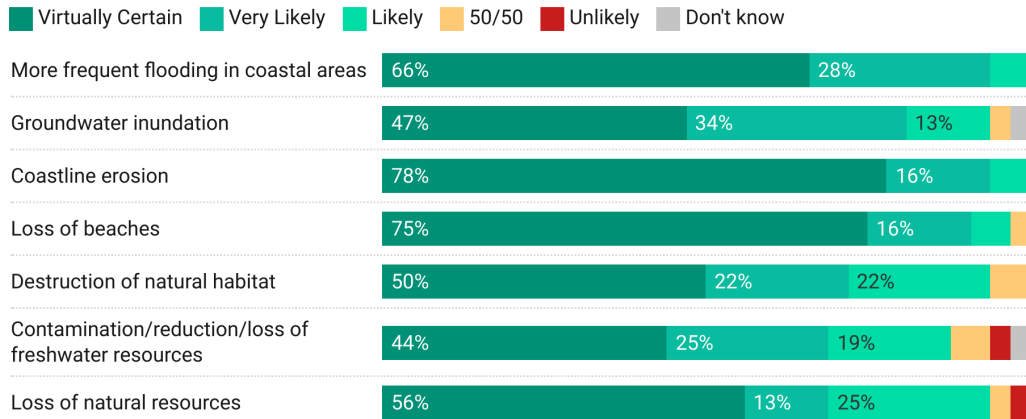
#### 4.3 EXPECTED CONSEQUENCES OF SEA LEVEL RISE

This section discusses the potential consequences of SLR expected by all responding lawmakers over the next 50 years. These questions are grouped by natural/geological consequences (Figure 13), socioeconomic consequences (Figure 14), and impacts on infrastructure (Figure 15).

Figure 13 indicates that policymakers believe maintaining the status quo response to SLR is likely to have serious negative consequences over the next 50 years. Increased coastal flooding is viewed as a virtually certain or very likely consequence by 94% of responding lawmakers, while similar numbers report that coastline erosion and the loss of beaches is very likely to occur. Although policymakers are somewhat less sure that groundwater inundation (47%) or the loss of freshwater resources (44%) will occur, the vast majority still believe it is likely or very likely to happen. There is relatively little variation in their answers, and lawmakers view all these consequences as highly likely if no action is taken to mitigate SLR.

### Figure 13

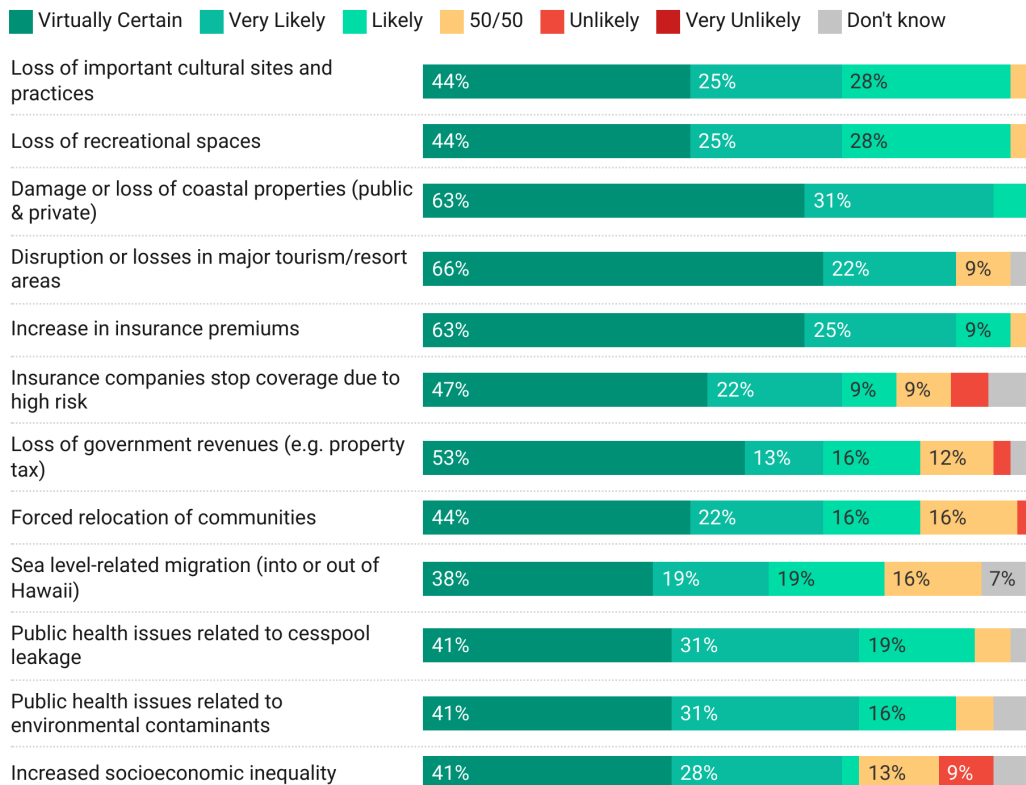
The following is a list of possible consequences of sea level rise. Please indicate how likely you think each is to occur in Hawai'i in the next 50 years if no action is taken to mitigate sea level rise.



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### Figure 14

The following is a list of possible socioeconomic consequences of sea level rise. Please indicate how likely each is to occur in Hawai'i in the next 50 years if no action is taken to mitigate sea level rise.



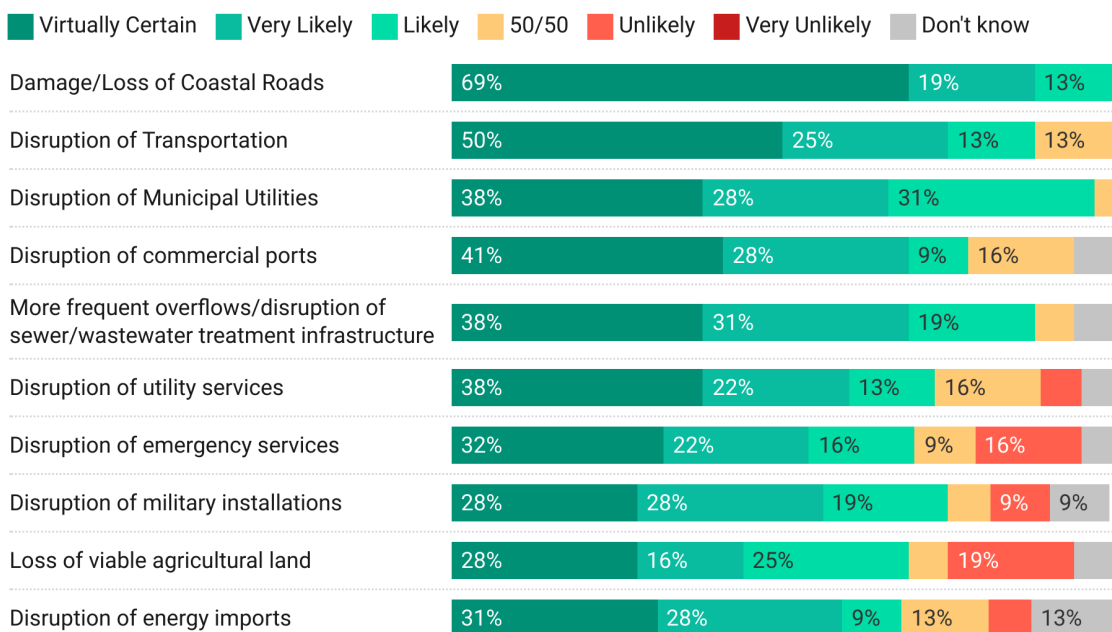
Percentages may not total 100 due to rounding

Created with Datawrapper

Lawmakers show similarly elevated expectations about the potential socioeconomic consequences of SLR over the next 50 years if effective mitigation measures are not taken. According to Figure 14, policymakers expect widespread socioeconomic impacts related to SLR. All respondents expect SLR will cause damage or loss of both public and private coastal properties and will cause disruption or loss in major tourism/resort areas. Nearly all think there will likely be increases in insurance premiums, and 69% of respondents think it is virtually certain or very likely that insurance companies will stop coverage due to high risks. The vast majority of respondents predict a higher than 50% chance that communities will be forced to relocate due to SLR. In addition, 97% believe the State will experience a loss of important cultural sites and practices, and 97% think the loss of recreational sites is likely. Finally, nearly 90% of respondents believe there will be public health issues related to environmental contaminants such as cesspool leakage.

### Figure 15

The following is a list of possible consequences sea level rise will have for infrastructure. Please indicate how likely each is to occur in Hawai'i in the next 50 years if no action is taken to mitigate sea level rise.



Percentages may not total 100 due to rounding  
Created with Datawrapper

Figure 15 shows that lawmakers believe SLR will have serious negative consequences for infrastructure in Hawai'i over the next five decades in the absence of mitigation efforts. The damage or loss of coastal roads is seen as almost inevitable, with an overwhelming 88% of respondents characterizing it as either virtually certain or very likely. Similarly, the disruption of municipal utilities is a significant concern, with all respondents reporting it as likely or very likely.

Some consequences are viewed as less certain but still cause for substantial concern, such as the disruption of transportation and commercial ports. Even for consequences that lawmakers are not certain will occur, the overwhelming majority find them probable. The disruption of military installations, for instance, is a concern for 82% of respondents, with 56% considering it virtually certain or very likely, while 44% believe the loss of viable agricultural land to be virtually certain or very likely.

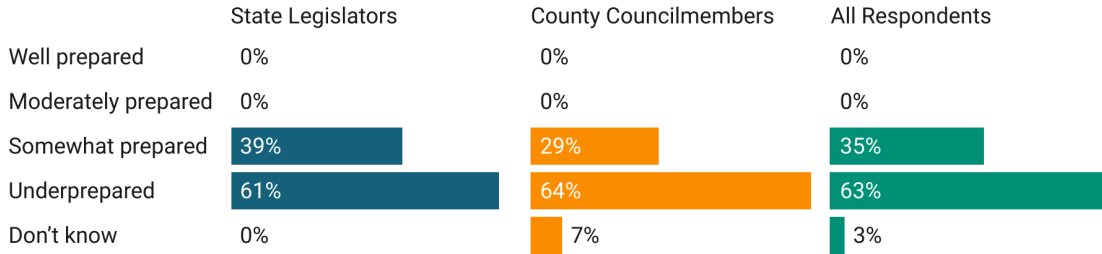


### 4.4 PERCEIVED PREPAREDNESS

Two questions focus on how well-prepared respondents think the State and individual counties are at this time.

### Figure 16

Overall, how well do you think the State of Hawai'i is prepared for the impacts of sea level rise?



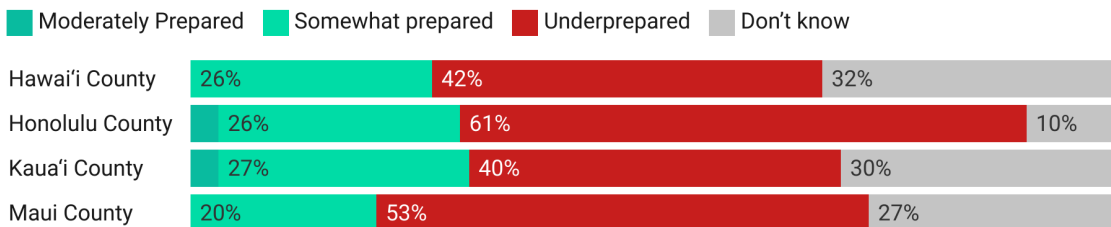
Created with Datawrapper

Notably, no respondents think that the State of Hawai'i is well prepared or even moderately prepared for the impacts of SLR. Figure 16 indicates that most lawmakers (63%) believe Hawai'i is underprepared, while 35% think Hawai'i is only somewhat prepared.

When asked how well they think the various counties of Hawai'i are prepared for SLR, no elected officials who responded to our survey think the counties are well prepared. As Figure 17 shows, lawmakers believe there is considerable work that still must be done to prepare the counties for the effects of SLR.

### Figure 17

Overall, how well do you think the counties are prepared for the impacts of SLR?



Note: No respondents selected "Well Prepared."

Created with Datawrapper

The results of the risk perception questions indicate a very high level of concern about the short- and mid-term impacts of sea level rise; furthermore, they indicate a strong alignment around risk perceptions between elected officials at both State and county levels. This elevated sense of risk and strong alignment may lead Hawai'i's policymakers to support policies that hasten adaptation measures.

## 5. POLICY PREFERENCES

This section asked respondents to assess complex policy responses to SLR that are possible options for Hawai'i. These questions are divided into three sets, according to standard categorization of coastal adaptation approaches: 1) adapt/accommodate, 2) protect, and 3) managed retreat.

- **Adapt/accommodate strategies** increase resilience to the impacts of SLR by modifying existing development or designing new development to decrease hazard risks. These strategies include actions such as elevating structures,

performing retrofits, using materials to increase the strength of development to handle additional wave impacts, building structures that can easily be removed during storms, or using additional setback distances to account for acceleration of erosion.

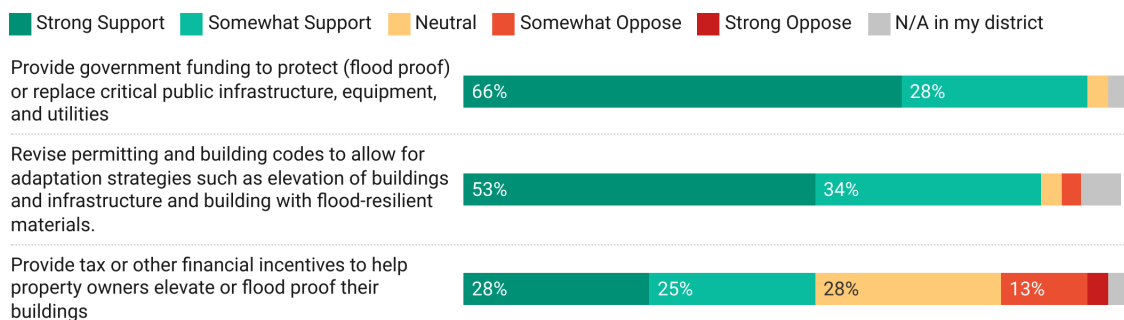
- **Protect strategies** employ engineered structures or other measures to defend development (or other resources) in its current location without changes to the development itself. These strategies include “hard” measures such as seawalls, revetments, offshore breakwaters, groins, or harbor jetties, and “soft” measures such as beach nourishment.
- **Managed retreat strategies** focus on relocating or removing existing development out of hazard areas and limiting the construction of new development in vulnerable areas. These approaches include disincentivizing development (e.g., through zoning, permitting, prohibiting coastal armoring) in affected coastal areas and incentivizing inland development (e.g., through public land buyouts and Transfer of Development Rights).

### 5.1 SUPPORT FOR SPECIFIC POLICIES

Among all respondents, the first policy approach—to protect or replace critical public infrastructure, equipment, and utilities—receives strong support. As Figure 18 indicates, a significant majority (66%) strongly favor this policy, while an additional 28% are more cautiously supportive.

**Figure 18**

To what degree do you support or oppose the following “adapt/accommodate”-type policy approaches in your district?



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The second policy approach, which involves revising permitting and building codes to allow for adaptation strategies like elevating buildings and using flood-resilient materials, receives relatively strong support. A majority of respondents (53%) express strong support with an additional 34% indicating more moderate support.

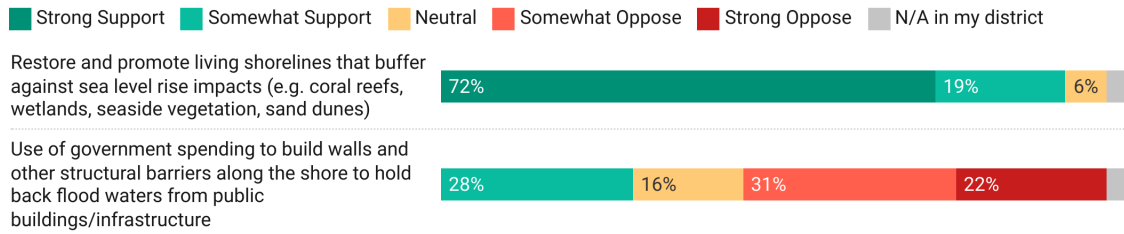
The final policy approach, which would provide tax or financial incentives to property owners for elevating or flood-proofing their buildings, receives more mixed responses. While 28% strongly support such a policy, a similar percentage (28%) are neutral.

As Figure 19 shows, policy approaches focused on restoring and promoting living shorelines, such as coral reefs, wetlands, vegetation, and sand dunes, to mitigate the impacts of sea level rise, receive strong support from the vast majority of respondents. A substantial 72% express strong support, while an additional 19% indicate more moderate support. Notably, no respondents strongly oppose this approach.

In contrast, support for using public funds to construct walls and structural barriers along the shore is limited. Only 28% favor this approach, while 53% of respondents indicate some or strong opposition to this policy approach (31% indicate that they are somewhat opposed to these policies and 22% strongly oppose this approach).

### Figure 19

To what degree do you support or oppose the following “protect”-type policy approaches in your district?



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Figure 20 shows the degree of support from lawmakers for various “managed retreat” policy approaches in their districts. Their responses to these specific policies are described below.

### Figure 20

To what degree do you support or oppose the following “managed retreat”-type policy approaches in your district?



Percentages may not total 100 due to rounding

Created with Datawrapper

**Encouraging inland development:** There is near unanimous agreement that policies should encourage inland development, with a significant majority (59%) expressing “Strong Support” for such policies while 31% are somewhat supportive.

**Enforcing Act 16:** The vast majority of lawmakers favor (59% strongly support, 31% somewhat support) the enforcement of Act 16, which prohibits private property owners from building or reinforcing hardening structures in beach areas unless it is in the interest of the general public.

**Changing regulations to discourage building in vulnerable areas:** Similarly, a majority (63%) strongly support changes to regulations such as zoning laws and increased “setback” or “buffer” distances to discourage building in areas likely to be affected by sea level rise. An additional 28% of respondents are somewhat supportive, and only 3% feel neutral toward this policy.

**Removing seawalls in eroded areas:** Support for the policy mandating the removal of seawalls in areas with no beach left after erosion is also quite strong, with 34% in “Strong Support” and 31% somewhat supportive. A notable 19% are neutral, while 6% are opposed.

**Relocating critical infrastructure:** Support is unanimous for providing government funding to relocate critical infrastructure, equipment, and utilities, although a small number of lawmakers note that this is not applicable in their districts.

**Permitting conditions for vulnerable structures:** Support is very strong for creating permitting conditions that require owners to remove or relocate vulnerable or damaged structures upon a triggering event, such as a changing tidal line. More than 40% of lawmakers strongly favor this policy, while an additional 31% somewhat support it.

**Government spending for socioeconomically vulnerable property owners:** Respondents largely support using public funds to assist vulnerable property owners with a slim majority (53%) who favor this SLR adaptation policy.

**Transfer of development rights (TDR):** A 60% majority favor TDR policies, but there is more opposition to this policy, with nearly 20% of responding lawmakers opposed.

**Government purchase of coastal lands:** There is strong but somewhat less support (66% strongly or somewhat support) for government purchase of coastal lands to maintain and restore natural areas as buffers against SLR and storms.

**Incentivizing private purchase of coastal lands:** The vast majority of respondents favor providing incentives for the private purchase of coastal lands for restoration (81% strongly or somewhat support). This is among the most popular options for “managed retreat” policy responses to SLR.

All three sets of questions related to SLR preferences show strong or moderate approval of most strategies presented here. Although this indicates that many elected officials support a variety of adaptation policies, it is likely that lawmakers who favor action are somewhat overrepresented in our sample. It is also important to note that policymakers have little information about costs, public support, logistics, and other key factors that inform their decision making at this time. Indeed, the responses might better be seen as preferences for certain policy approaches. The opinions of elected officials may change as more detailed information regarding the cost and difficulty of specific approaches is provided by researchers.

Within the “adapt/accommodate” set of policy solutions, there is a clear consensus among lawmakers to provide government investment to safeguard critical public infrastructure from flooding. Revising permitting and building codes to allow for adaptation strategies like elevating buildings and using flood-resilient materials also received relatively strong support, while providing tax or financial incentives to property owners for elevating or flood-proofing their buildings receive more mixed responses. These results suggest that financial incentives have far less support than direct government investment or revising building codes to support adaptation strategies.

Within the “protect” set of policies, the construction of seawalls and other “hard” barriers to SLR incursion is not a popular policy choice, while policies aimed at living shorelines (e.g. beach and sand dune restoration, wetland restoration, and coral reefs restoration), receive strong support. This indicates that Hawai‘i policymakers have a clear preference for restoring and enhancing living shorelines over traditional engineering approaches as a preferred solution to SLR.

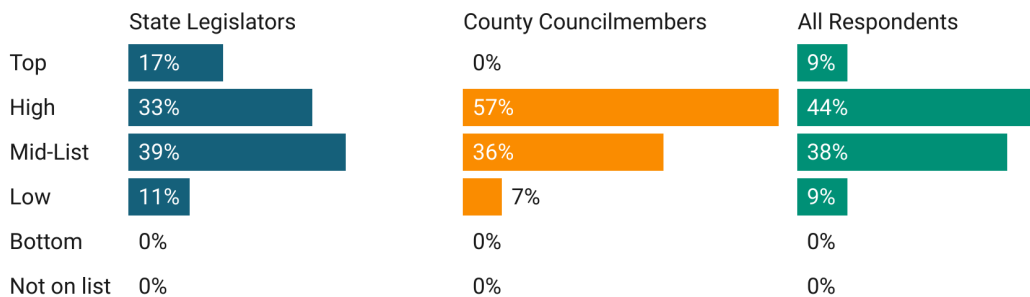
Finally, our results show these lawmakers largely favor a variety of managed retreat responses. Using government funding to relocate critical government infrastructure, equipment, and utilities received the most support. Respondents are also in favor of changing zoning laws to incentivize increased setbacks and buffer distances. By far the least popular managed retreat strategies are those that require utilizing government funds to buy out property owners, particularly approaches that do not take property owner wealth into account.

### 5.2 PRIORITIZATION OF SLR VERSUS OTHER ISSUE AREAS

Most respondents rank SLR adaptation as a major legislative priority, with 9% placing SLR at the top of their list, 44% percent placing it high on their list, and 35% placing it mid-list. There is also some variation between lawmakers at the State and county level, with State Legislators ranking SLR higher on their list of priorities than Councilmembers. As Figure 21 shows, 17% of State policymakers consider SLR adaptation a top priority, while 33% see it as a high priority. Nevertheless, a substantial number (39%) see it only as a moderate priority, and a small minority (11%) rank it as a low priority.

**Figure 21**

Considering all the items on your list of legislative priorities, where does sea level rise adaptation fall?



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County Councilmembers have somewhat different priorities. Although no county respondents list SLR adaptation as a top priority, 57% regard it as a high priority. Similar to State Legislators, 36% place it in the mid-list category, and 7% consider it a low priority.

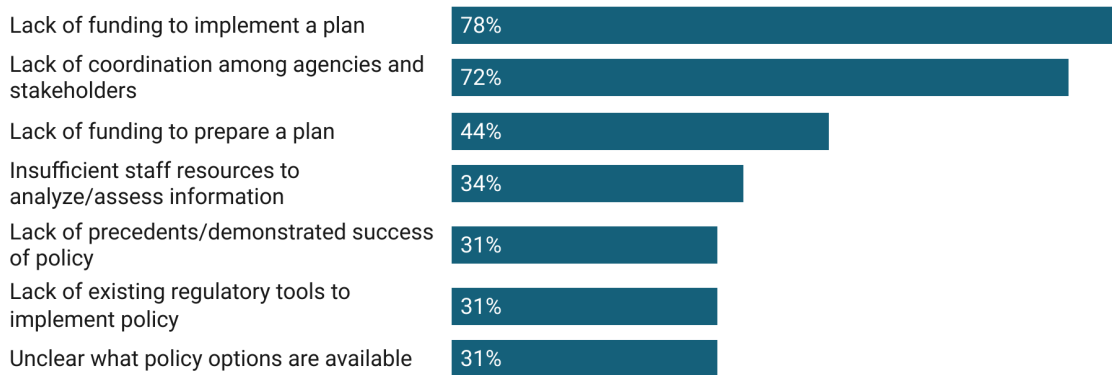
Given the severity of perceived risks recorded in previous sections, it is surprising that the issue is not higher on their policy priority lists, especially because our sample likely includes policymakers who are particularly concerned about SLR. Even though Councilmembers indicate a greater level of alarm about SLR (see Figure 10), none of them place it at the top of their list. Conversely, State Legislators who mostly indicate they are “concerned,” but not “highly concerned” about SLR, rank it as a higher priority than their county-level peers. This may be a function of the different roles that State- and county-level actors play in the political system. County-level officials may have a shorter timeline for prioritization as they deal more closely with the day-to-day of running counties where immediate problems such as homelessness command more attention than a slow-moving crisis like SLR.

### 5.3 OBSTACLES

As reported in Figure 22, for a substantial majority (78%) of respondents, the most significant obstacle to SLR is the lack of funding to implement a plan. This suggests that securing the financial resources necessary to carry out sea level rise mitigation and adaptation measures remains a significant barrier to taking legislative action. Lawmakers also identify related resource issues, such as insufficient staff resources and a lack of funding to prepare an adaptation plan.

**Figure 22**

What obstacles prevent you from passing sea level rise-related policy? Please indicate your top 5 obstacles.



*Results report the percent of respondents who selected the obstacle as among their top five.*

Created with Datawrapper

The second most cited obstacle is the lack of coordination among agencies and stakeholders, which is noted by 72% of respondents. Finally, a significant number of lawmakers reported being uncertain about available policy options (31%) and unclear about what policies have been successful in other jurisdictions (31%).

In general, these findings indicate that policymakers view SLR as a multifaceted problem that requires not only financial resources, but also new governance systems and creative policy responses. The responses underscore the need for improved collaboration and communication among federal, State, and county agencies, as well as nonprofit groups and community stakeholders involved in sea level rise policy responses. Unlike the lack of funding, this problem can be solved at the State level without significant federal support. Similarly, about a third of policymakers identified the lack of regulatory tools to implement policy, a problem that is clearly within their power to solve.

Finally, our findings indicate a clear opportunity for fostering deeper collaborations between academic experts and policymakers. Although basic data and policy responses to SLR are still being developed, there exists a significant body of national and international policy research, as well as examples of successful adaptation responses in other communities. Academics can play a pivotal role in tailoring these insights for Hawai'i's adaptation needs.

### 5.4 WHO SHOULD LEAD?

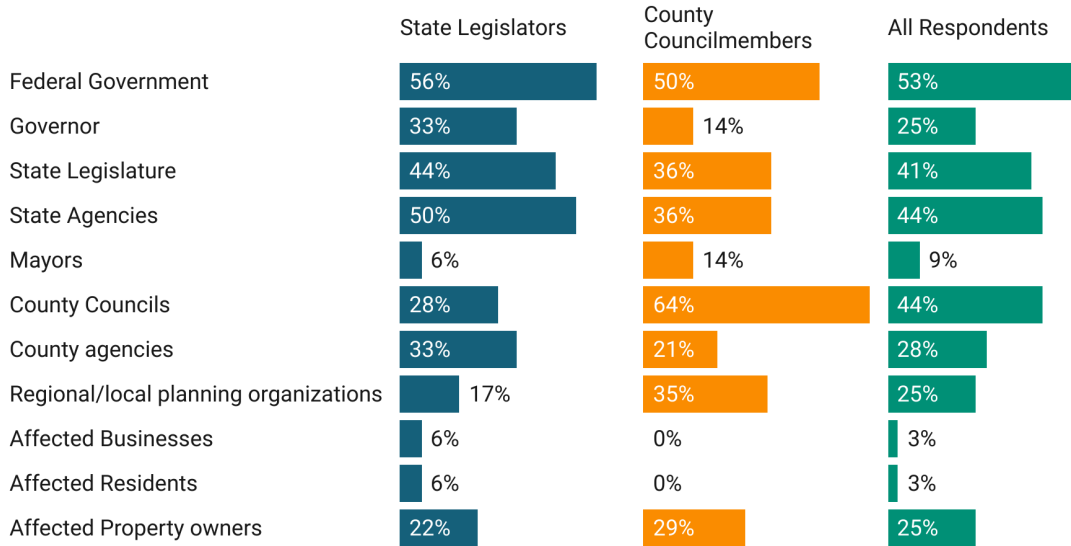
For this question, respondents were asked to select the top three entities they believe should take the lead in addressing the risks posed by flooding due to sea level rise in Hawai'i. Across both groups (Figure 23), the federal government emerged as a top choice, with 56% percent of State Legislators and 50% percent of County Councilmembers selecting it as one of the three entities that should take the lead.

The second most commonly chosen entity varied between the groups. Half of State Legislators select State agencies, while 64% of County Councilmembers select county councils as an important leader in addressing sea level rise risks.

Perhaps unsurprisingly, the State Legislature was the third most popular option (44%) among State Legislators, while 36% of County Councilmembers choose State agencies and the State Legislature.

### Figure 23

Who do you think should take the lead to address the risks posed by flooding due to sea level rise in Hawai'i? Please select your top three.



*This question included several other groups who might take the lead, but none of these were selected. Please see the link to the full survey instrument provided in Appendix A.*

Created with Datawrapper

These results reflect a broad consensus among respondents that addressing the risks of SLR in Hawai'i requires a collaborative effort involving both federal and State-level entities, with Councilmembers more likely to prioritize county-level leadership. Notably, very few respondents believe affected residents or businesses should play a major role.

## 6. NORMATIVE BELIEFS

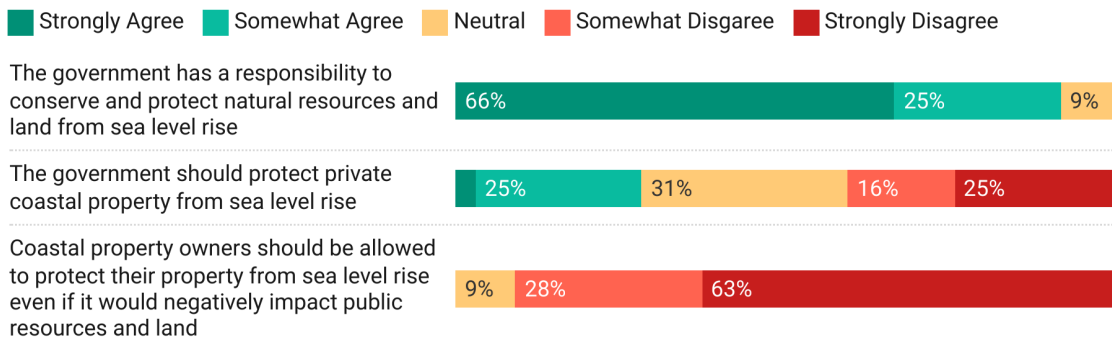
Hawai'i's lawmakers have clear preferences about who should take responsibility for mitigating the effects of SLR. First, as Figure 24 shows, a significant majority of respondents (66% strongly agree and 25% somewhat agree) believe the government has a responsibility to conserve and protect natural resources and land from SLR. This suggests broad legislative support for government intervention and conservation efforts to mitigate the impacts of rising sea levels.

Second, when it comes to the government's role in protecting private property from SLR, the responses are more varied. While some respondents (3% strongly agree and 25% somewhat agree) believe in government intervention to protect private property, a larger group have serious reservations about using government resources to protect private coastal property.

In contrast to their support for government intervention, the vast majority of lawmakers are opposed to allowing owners to protect their private property if it negatively impacts public resources and land. The vast majority (63% strongly disagree, 28% somewhat disagree) oppose such actions, and see the preservation of public resources and land as more important than private property rights. Only 9% are neutral, and not a single lawmaker supports this position.

## Figure 24

Do you agree or disagree with the following statements?



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Overall, these results underscore the tension between individual property rights and collective solutions when it comes to addressing SLR, with a clear majority favoring government responsibility for conserving natural resources and mixed views on whether the government should protect private property in coastal areas. Lawmakers are almost unanimously opposed to allowing coastal property owners to protect their land if it will negatively affect public resources.

## 7. DISCUSSION AND RECOMMENDATIONS

This survey reveals a significant disconnect between belief and behavior: on the one hand, Hawai'i's policymakers perceive an extremely high level of risk concerning sea level rise; on the other hand, they do not rank it as a top policy priority. A summary of points that indicate a high level of perceived risk include:

- Nearly all responding elected officials (94%) who responded to this survey are concerned (50%) or very concerned (44%) about SLR.
- A large majority of 82% of respondents indicate that SLR is already impacting coastlines in their districts.
- All respondents believe SLR will begin to harm people in their districts within the next 25 years.
- All policymakers who responded worry that SLR will have serious impacts on Hawai'i's residents within the next 50 years: 34% of respondents indicate that they believe the impacts on Hawai'i residents will be catastrophic, and the remaining 66% think the impacts will be significant.
- The vast majority of respondents believe that SLR is likely, very likely, or virtually certain to have deleterious effects to Hawai'i's natural environment, infrastructure, and socioeconomic systems within the next 50 years.
- No respondents think that the State of Hawai'i is well prepared or even moderately prepared for the impacts of SLR.
- No respondents believe that any of the counties are well prepared for SLR.

Despite these beliefs, only 9% of total respondents place SLR at the top of their policy priority list, while 44% percent place it high on their list, and 35% place it mid-list. Surprisingly, although a greater percentage of County Councilmembers indicate an even more elevated level of concern than do State respondents (believing SLR will have catastrophic results), not one places SLR on the top of their priority list.

This is *not* to say that no progress is being made. The State of Hawai'i has a strong scaffolding of legal frameworks, regulations, and plans that can facilitate the passage of policies related to SLR adaptation. We provide an overview of these



structures in Appendix B. It is also important to note that the State and each of the four counties are at various stages of creating or implementing adaptation plans that will outline future strategies, actions, and policy needs for protecting Hawai'i's communities from the worst impacts of SLR.

### Policymakers are deeply concerned about the impact of SLR

The survey revealed that policymakers in Hawai'i are deeply concerned about the impacts of SLR on natural systems, infrastructure and the built environment, society, and public health in the next 50 years. This elevated concern provides an opportunity for State and county leaders to engage in more research, planning, and policy action.

We recommend that policymakers discuss these concerns with their peers, who may also be more worried than they are aware. The survey found that 94% of respondents are personally concerned (50%) or very concerned (44%) about SLR, but they think their peers are less concerned than they are. We also recommend that policymakers talk with their constituents about these threats with greater regularity. The survey revealed that Hawai'i's elected officials do not discuss SLR very frequently with their constituents (68% of respondents reported talking about SLR on a monthly or even less frequent basis).

### Elected officials support a range of SLR adaptation policies

Survey respondents favor a wide range of policy options, including adapt/accommodate-approaches, protect-approaches, and managed retreat-approaches. The most popular policy responses to SLR among elected officials who responded to the survey include the following:

- **Restore and promote living shorelines.** All policymakers strongly support or somewhat support restoring and promoting living shorelines to buffer against SLR impacts.
- **Protect critical public infrastructure.** The vast majority (94%) of respondents strongly support or somewhat support providing government funding to protect or replace critical public infrastructure, equipment and utilities.
- **Implement regulatory tools such as zoning and setback laws in affected coastal areas.** Nearly all (91%) lawmakers support changes to regulations such as zoning laws and increased "setback" or "buffer" distances to discourage building, improvements, and rebuilding in SLR-affected areas.
- **Enforce Act 16.** A strong majority (90%) of respondents support enforcement of Act 16, which prohibits property owners from building or enforcing hardening structures in areas with beaches unless in the interest of the general public.
- **Encourage inland development over coastal development.** Nearly all (90%) respondents support creating policies that encourage inland development.

Slightly less popular, but still receiving significant support were the following policies:

- **Use permitting tools to incentivize removal or relocation of damaged structures.** 75% of respondents support creating permitting conditions that require owners to remove or relocate vulnerable or damaged structures upon a triggering event; e.g., change in shoreline or seasonal waves flooding a dwelling.
- **Mandate removal of seawalls where no beach is left.** 65% of respondents support creating policy to create these mandates.
- **Transfer of Development Rights (TDR).** 60% of respondents support using a TDR approach to enable relocation for coastal owners.

The least popular policy responses to SLR among elected officials who responded to the survey include the following:

- **Provide public funds to construct walls and structural barriers along the shore.** Only 28% expressed some support for this approach, while 53% of respondents indicated some or strong opposition to this policy approach (31% indicated that they were somewhat opposed to these policies and 22% strongly opposed this approach.) 16% remained neutral.
- **Use government funds to vacate homes.** Respondents were largely unresponsive of using public funds to help property owners, regardless of socioeconomic level, to vacate their homes. While 22% support this policy, 25% are somewhat opposed and 22% strongly oppose this policy. By far and away, responding lawmakers judged this to be the least attractive policy solution among “managed retreat” SLR adaptation policies.

It is important to note that there is insufficient data and evidence for many of these approaches. At this point, modeling of coastal impacts is still undergoing improvements, and researchers are only now beginning to calculate the potential costs of implementing various responses.

There is also limited information about community preferences. Much of this information is being collected now, and these results may impact the policy preferences of elected officials. In addition, high profile adaptation cases such as the battle over sea walls on O’ahu’s North Shore, the Army Corps of Engineers’ contentious Ala Wai canal flood control plan, and the Lahaina wildfire response will affect the politics of adaptation.

### Hawai’i’s policymakers value the public interest

Respondents value the overall impact on the community over a strict interpretation of private property rights. When asked whether the government has a responsibility to conserve and protect natural resources and land from SLR, 66% indicated that they strongly agree and 25% that they somewhat agree. By contrast, when asked whether the government should protect private coastal property from SLR, 25% strongly disagreed, 16% somewhat disagreed, and 31% remained neutral while 35% somewhat agreed. These findings align with the policies section findings, which also indicated that using government funds for buyouts of private property, especially without consideration for socioeconomic status, was largely unpopular.

These results are not entirely surprising given Hawai’i’s history, political composition, and guidance under the Public Trust Doctrine. However, they are important given the political battles ahead which will require making difficult decisions around individual ownership, community needs, and our natural resources and ecosystems. These findings support the notion that Hawai’i is among the “most likely” cases for advancement of SLR-related policies that protect the public interest.

### State and county policymakers share many of the same beliefs about SLR

While the survey was designed to compare risk perceptions and policy preferences across different levels of elected officials (State and county), we ultimately found a great deal of alignment between these two groups, which may indicate an opportunity to engage in comprehensive, multi-level planning and policymaking. For example, both groups of respondents agree that the State and counties are underprepared for SLR impacts. In addition, survey findings indicate significant gaps in knowledge among State and county respondents. For both groups, 20–30% of respondents were unable to evaluate the level of preparedness of specific counties.

For most questions, the findings were so close between the groups that we did not find a need to report their individual group findings. Nevertheless, some exceptions are worth noting:

### Information sources

- County level officials receive more frequent exposure to the topic of SLR in the media and in conversations with their constituents than State officials.

## Risk perceptions

- More County Councilmembers indicate that SLR is already impacting their districts (71% agree or strongly agree and 29% somewhat agree compared to 55% of State Legislators who agree or strongly agree and 11% who somewhat agree).
- County Councilmembers also believe the timeline at which SLR will begin to harm people is much sooner than State Legislators (50% of Councilmembers think people are being harmed right now).

## Policy priorities

- While only 17% of State officials place SLR at the top of their policy priority list, no County Councilmembers do. But more county lawmakers place SLR High on their list (57%) than do State Legislators (33%).
- When asked who should take the lead in addressing the risks posed by flooding due to SLR, county level respondents overwhelmingly pointed to themselves (64%), followed by the federal government (50%) and (tied at 36%) the State Legislature and State agencies. By contrast, 55% of State level respondents pointed to the federal government, followed by State agencies (50%) and the State Legislature (44%).
- Among adapt/accommodate-type policy approaches, State officials expressed stronger support (by degree) for the following: 89% of State officials indicate “strong support” for providing government funding to protect/replace critical public infrastructure (only 35% of county officials indicated strong support) and 61% indicate “strong support for revising permitting and building codes to allow for adaptation strategies (compared to 43% of county respondents). While 44% of State respondents “strongly support” and 28% “somewhat support” providing tax or other financial incentives to help property owners elevate or flood proof their properties, county level respondents are far less keen on this measure (7% “strongly support” and 21% “somewhat support”).
- Notably, among the two groups’ responses to the managed retreat-type approaches, county respondents are far more enthusiastic about making changes to regulations to discourage building, improvements, and rebuilding in areas likely to be affected by sea level rise (79% strongly support this as opposed to 44% of State level respondents). Meanwhile 61% of State respondents strongly support providing government funding to relocate critical infrastructure, equipment, and utilities, compared to 43% of county respondents.

## 7.1. RECOMMENDATIONS

**Focus on policies that lawmakers already support.** The survey reveals strong alignment and broad policy support among elected officials at both the State and county levels of government, signaling opportunity for action related to SLR. Policymakers may want to capitalize on this alignment by considering the following strategies:

- **Concentrate on implementing and enforcing existing policies and regulations that already have strong support, such as Acts 16 (2020) and 178 (2021).**<sup>5</sup> This will require building funding and personnel capacity for the better implementation and enforcement of such measures.
- **Amend existing zoning laws, building codes, and regulations to better account for sea level rise over time.** SLR projections and real-time data could be incorporated into these regulatory frameworks and by adopting standards that flex and change over time as SLR unfolds. New and updated infrastructure could take into account a longer time frame as SLR develops over time. Policymakers could also consider ways to build a regulatory scaffolding that will support a range of strategies that conform to federal guidelines (e.g. FEMA) so Hawai’i could eventually utilize a federal buyout program.
- **Invest in research and development to better inform emerging plans and strategies related to SLR.** While Hawai’i’s policymakers appear to support a wide variety of strategies for responding to SLR, more data is needed

<sup>5</sup> For a description of these acts, please see Appendix B.

on a range of issues from coastal SLR and flooding impacts, to understanding the costs of various adapt/protect/and managed retreat responses, to gathering public input about values and preferences that should guide decisions about responses to SLR. This will require substantial funding and enhanced staffing.

**Enhance policy coordination.** The survey points to a perceived lack of coordination by elected officials about agencies and stakeholders. Policymakers could consider governance strategies to address SLR that include federal, State, and county agencies, as well as non-profit organizations, corporations, and community stakeholders. The Hawai'i State Office of Planning and Sustainability Development, Coastal Zone Management Program, Office of Conservation and Coastal Lands, and their county counterparts are good examples of these coordinating structures. In addition, the State could explore adding a full-time position dedicated to coordinating the agency response to SLR.

**Address knowledge gaps and lack of analytical capacity.** The report identifies a lack of clarity among some policymakers regarding available policy options and successful responses in other jurisdictions. Experts and researchers should consider how they can better communicate with policymakers about effective SLR policies and how they can be adapted to the needs of Hawai'i. The survey also identified a lack of staff to help elected officials make sense of the data and policy options for SLR adaptation. This lack of capacity could be addressed by enhancing staffing at key agencies, particularly the State's Office of Planning and Sustainable Development and the Office of Conservation and Coastal Lands, and building out consultative structures with academic, corporate, and non-profit stakeholders. This may require lawmakers to increase wages and improve the recruitment process so State and county agencies can hire and retain essential staff.

**Prioritize funding for SLR adaptation planning and implementation.** Hawai'i's leaders cite a lack of funding for planning and implementation as a significant obstacle. Although national political dynamics largely determine federal funding, Hawai'i should be prepared to capitalize on significant federal investments, such as the 2022 Inflation Reduction Act. This requires the State to develop shovel-ready projects that can qualify for funding and begin quickly. Policymakers should also work to increase federal funding for existing plans as they respond to sea level rise. For instance, the Office of Planning and Sustainable Development uses federal funding to catalyze sea level rise adaptation projects through the State Ocean Resources Management Plan; however, continued coordination and resources will be necessary to address the scale of adaptation planning. Hawai'i's leaders should consider seeking out new revenue streams for funding large- and small-scale adaptation work, such as creating green banks and new bonds to pay for infrastructure projects. Policymakers could also consider ways to make State and county procurement systems more efficient. Additionally, the State and counties could increase wages and improve the staffing recruitment process to fill vacant positions. Finally, they should continue to explore public-private partnerships with corporations and nonprofits to ensure access to the best technology and community engagement practices.

**Begin addressing SLR through pilot projects.** The State and counties have started releasing plans that recommend specific policy responses. Some of these actions will require more research and development, while others can be piloted immediately. Because much of the technology and strategy related to adaptation is emergent, we recommend that the State and counties approach these projects in the spirit of innovation, recognizing that some projects will succeed, while some will fail. Enhanced public communication and engagement around the experimental nature of adaptation pilot projects will be important to ensure public support for these initiatives.

**Enhance long-term planning.** Both State and county lawmakers are often pressured to work on issues of more immediate consequence, such as the wildfire response, or housing and economic inequality. Sea level rise, on the other hand, is a slow-moving hazard that will be unfolding over the next century and will require extensive and comprehensive long-term planning, massive investments into adapting our built and natural environments, and policy and regulatory structures that are flexible enough to accommodate this long-term transformation. All elected officials who completed this survey indicated that SLR impacts will be felt within the next 25 years if they are not already being felt.

**Provide policymakers with the information they want.** A final question in our survey asked respondents what additional information they would like to receive about SLR. Elected officials are interested in learning more about several

coastal adaptation approaches, including managed retreat (73%); adaptation/accommodation responses, such as raising buildings (80%); and nature-based responses, including wetland preservation and coral reef restoration (83%). As one might expect, they are particularly keen to learn more about cost estimates of these various responses to SLR (83%). These results clearly indicate that lawmakers are hungry for more information. Scientists and experts at the University of Hawai'i and in the broader community should respond to this opportunity by providing elected officials with accessible research about the best and most efficient ways to engage in SLR adaptation in Hawai'i.

## 7.2 CONCLUSION

The gap between perception and policy action regarding sea level rise in Hawai'i is both pronounced and perplexing. Despite the overwhelming consensus among Hawai'i's policymakers about the imminent threats posed by SLR, it is not considered an urgent policy priority. This result is less surprising than it may seem. Lawmakers prioritize issues that are most frequently mentioned by their constituents or influential members of the community. These tend to be issues of immediate concern, which may affect their chances of reelection, rather than a slow-moving crisis like SLR.

Future research should address this gap between concern and priority more directly. Nevertheless, it remains concerning that SLR adaptation policy is not yet a top priority of most lawmakers. Given that Hawai'i is already facing the effects of SLR and that our respondents are likely more worried about SLR than the median elected official, these results are particularly troubling.

Although Hawai'i has made noteworthy strides in establishing foundational legal frameworks and planning tools for SLR, policymakers now have an opportunity to bridge the divide between awareness and action. Emphasizing policies already favored by lawmakers, fostering greater inter-agency coordination, bridging knowledge gaps, and prioritizing robust planning mechanisms are required to ensure that we not only recognize the menace of SLR but also act decisively to safeguard our future. The stakes are undeniably high, but lawmakers can still meet this challenge through coordinated and rapid action.

## APPENDIX A: SURVEY METHODOLOGY

The research team identified a list of all currently elected State of Hawai'i Legislators (Senators and Representatives) and City/County Councilmembers from all four of Hawai'i's Counties via the State and county websites. The survey was sent to all currently elected State Senators (n=25) and Representatives (n=51), as well as to all current County Councilmembers (n=34) in the four Counties (Honolulu, Hawai'i, Maui, Kaua'i). A total of 110 individuals received the survey via Survey Monkey.

Names, addresses, demographic, and contact information were not collected in the survey. Only generic professional titles, e.g., "State Senator," "State Representative" or "County Council Member" were gathered.

After receiving IRB approval, the survey was conducted between June 26 and September 7, 2023 via the Survey Monkey online platform. The research team sent the first email invitation and link to the survey on June 26, and then sent weekly reminder emails through July 10. Due to a low response rate in the initial round, the team then sent a round of personalized emails to all State and county elected officials on July 11, followed by calls and follow-up emails during the first week of August. The team then visited the offices of State Legislators in person during the first week of September.

The sample size was the universe of Hawai'i State Legislators (Senate n=25; House n=51) and County Councilmembers from all four of Hawai'i's counties (n=34). The survey consisted of 27 questions. The majority of the questions were close-ended multiple choice questions, with a few allowing additional 'other' responses. The order of answer choices was not randomized. On average, it took respondents 11 minutes to complete.

### Party Affiliation

While the survey was anonymous (and, due to the small n, did not collect biographical or other identifying information), we did ask respondents to provide their party affiliation. This only applies to State Legislators because all county council positions in Hawai'i are nonpartisan. The Hawai'i State Senate has two Republicans, and the State House has six Republicans (or 11% of the total). In total, 88% of our respondents self-identified as Democrats, while 6% declined to answer and another 6% selected N/A.

### Wildfires on Maui

On August 8-11, 2023, a devastating series of wildfires broke out on Maui, destroying the coastal town of Lahaina and killing at least 100 people. Because the wildfire occurred during the final weeks of this survey, it is possible that this event impacted the survey findings. In total, 11 survey responses or 39% of the total sample, were received after the wildfire event. The crisis may have increased concerns about sea level rise as community members and the media were quick to draw connections between the fires and the State's vulnerability to climate change.

### Survey Instrument

The full survey instrument may be viewed online through the following link: <https://manoa.hawaii.edu/isr/research-projects/>

## APPENDIX B: SEA LEVEL RISE POLICY AND GOVERNANCE IN HAWAII

### How does the State of Hawai'i line up against other coastal states with respect to SLR planning?

The State of Hawai'i received a B in the 2021 Surfrider Foundation State of the Beach Report Card,<sup>6</sup> which evaluates the performance of all thirty-one US coastal States based on a set of twelve criteria measuring good coastal management practices (in accordance with the US Coastal Zone Enhancement Program through the federal Coastal Zone Management Act). In particular, the report cited the State's heavy reliance on sand replenishment as a means of erosion control and its "lackadaisical" enforcement of coastal armoring regulations. The report urges Hawai'i to adopt "codified regulations or ordinances that protect lands and provide space for rising tides and landward creep of the ocean." While Hawai'i does not rank as poorly as states bordering the Great Lakes or the Gulf Coast, the State lags behind several states in the Northeast, although no state received an A in this study.

### Overview of Policy Progress on SLR in Hawai'i

Although substantial progress has been made, more work remains to be done across the state and counties in the near- and medium-term. The existing policy framework still mostly remains at the high-level research and planning phase with large gaps in data and, as the survey respondents largely agree, lacking in cross-jurisdiction coordination.

The following is a summary overview of existing structures and policies related to SLR in the State of Hawai'i and Hawai'i's four Counties. For a more detailed account, please see the 2023 [Regional Shoreline Management Scoping Study for the State of Hawai'i](#).

### State Policy Related to Sea Level Rise

- The State has a strong [Public Trust Doctrine](#), enshrined in the State Constitution since 1978, which requires the State and political subdivisions to protect the beach for the benefit of the public, and which incorporates Native Hawaiian traditional and customary law.
- The Coastal Zone Management Act (CZMA), created at the federal 1975 and codified as Hawai'i Revised Statutes (HRS) [Chapter 205A](#) in 1977, protects the shoreline and State waters by managing coastal development and growth up to the identified shoreline across the State. Its objectives are implemented through State administrative rules and county ordinances, including shoreline certification and shoreline setbacks (HRS Ch. 205A, Part III; Hawai'i Administrative Rules (HAR) §13-222; Revised Ordinances of Honolulu (ROH), Ch. 23 and 25).
- Hawai'i has officially recognized the threat of climate change. The State has passed several acts and resolutions recognizing the threat of climate change ([Act 234 of 2007](#) and [State Concurrent Resolution 44 of 2001](#), which made it the first state in the nation to declare an official climate emergency).
- Hawai'i has issued directives for integrating climate change and SLR impact considerations into State-level planning; in 2012 the State Legislature passed [Act 286](#), mandating the creation of climate change adaptation priority guidelines for integrating climate adaptation considerations into Statewide planning processes.
- The State has established coordinative entities tasked to address climate change adaptation. Two of the chief coordinating agencies include CZM (discussed above) and the Office of Conservation and Coastal Lands (OCCL), which is responsible for overseeing beach and marine lands out to the seaward extent of the State's jurisdiction. In addition to these two agencies, in 2014, [Act 83](#) established an Interagency Climate Adaptation Committee (renamed the [Hawai'i Climate Change Mitigation and Adaptation Commission](#) in 2017), which is actively working to create reports and plans aimed at tackling these issues for the state.

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<sup>6</sup> This is an improvement from the 2018 ranking, in which Hawai'i received a C+. As of the 2021 report, Hawai'i lags behind California, Maine, and Maryland, but is tied with Massachusetts, New Hampshire, Rhode Island, and Delaware, which also received "B" grades. [https://ee5-files.s3-us-west-2.amazonaws.com/publications/SOTB\\_2021.pdf](https://ee5-files.s3-us-west-2.amazonaws.com/publications/SOTB_2021.pdf)

- Hawai'i has created several reports, tools, guidance documents, and plans to facilitate and coordinate adaptation planning strategies around SLR and coastal management:
  - ◇ [The Hawai'i Ocean Resources Management Plan](#) (created in 2013 and updated in 2020) includes management priorities for addressing coastal hazards that will be exacerbated by climate change and sea level rise and flags State support for county level laws that result in risks of climate change and coastal hazards.
  - ◇ [The Hawai'i Sea Level Rise Vulnerability and Adaptation Report](#) (created in 2017; updated in 2022)
  - ◇ [The Hawai'i Sea Level Rise Viewer \(SLR-XA\)](#): allows downscaled mapping of anticipated SLR impacts on Hawai'i's coastlines over the next century.
  - ◇ A State commission also created several Guidance Documents to assist in policy making related to SLR:
    - [Guidance for Addressing Sea Level Rise in Community Planning in Hawai'i](#);
    - [Integrating Coastal Hazards and Sea-Level Rise Resilience in Community Planning](#);
    - [Guidance for Disaster Recovery Preparedness in Hawai'i](#);
    - [Final Statement on Decision Making and Investment Guidance to Address the Climate Emergency in Hawai'i](#).
- Hawai'i has created *some* funding streams to support SLR planning and implementation: In 2010, [Act 73](#) established a "barrel tax" on petroleum products to provide resources for addressing clean energy, agriculture, and adaptation initiatives in Hawai'i. The environmental response tax generated \$25.9 million in FY 2022. In 2015, the State passed an [Act Relating to Beach Protection](#), a special fund of \$300,000 per year through a tax on hotel revenues that is to be used for supporting development and implementation of plans related to SLR and coastal management.
- Finally, in 2021, several important pieces of State legislation passed, including
  - ◇ [Act 178](#) which 1) directs the state's agencies to collaborate toward identifying state facilities that are vulnerable to sea-level rise, flooding, and natural hazards, and 2) requires agencies to assess options to mitigate the impacts of sea-level rise to these facilities.
  - ◇ [Act 179](#), which requires real estate purchase disclosures about sea level rise and legislation that requires interagency cooperation to protect coastal resources in light of climate change, ensuring the protection of 'landward areas' to better accommodate future sea level rise.

## County Policy Related to Sea Level Rise

Hawai'i's four counties (Honolulu County, Hawai'i County, Kaua'i County, and Maui County) also have their own plans and policies in place and seek to coordinate their planning via a regularly convened network call.

**Honolulu County**, the Office of Climate Change, Sustainability and Resilience (CCSR), along with a Climate Change Commission jointly research, coordinate and provide guidance to the various county agencies about sea level rise and coastal adaptation. Honolulu has in place a [Resilience Strategy](#) and [Multi-Hazard Pre-Disaster Mitigation Plan](#) (both ratified by county council in 2019) and is in the process of finalizing a [Climate Adaptation Plan](#). The county's Climate Change Commission has provided several guidance documents on managing for sea level rise, including considerations to make when planning, financial risk guidance, and social equity considerations. The county has also passed several recent laws to update shoreline setback and special management area (SMA) rules, and which amend special district regulations to control building in flood zones.

**Maui County's** coordinating body is the Office of Climate Change, Resilience and Sustainability (CCRS), in partnership with the Planning Department and other county agencies. Maui has in place a [Multi-Hazard Mitigation Plan](#) (2005, 2015,



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2020); a [Beach Management Plan](#) (1997, 2008); and the county is currently in the process of creating a [Climate Change Action and Resilience Plan](#). In 2023 Maui passed some important updates to its legal codes related to SMA rules (Chapter 12 subtitle 2-202) and Shoreline Rules (Chapter 12, subtitle 203).

**Kaua'i County's** adaptation work is mostly spearheaded by the county Planning Department. Kaua'i updated its [Multi-Hazard Mitigation Plan](#) in 2020 and has been putting in place various assessments and tools to inform a county-wide [Adaptation Plan](#) (in progress). In 2022 Kaua'i passed an ordinance updating the comprehensive zoning ordinance with firmer building codes in new construction areas identified as vulnerable to SLR; and in 2023 the county passed one of the nation's most aggressive setback laws, which take into account scientific projections about passive flooding and high wave run-up.

**Hawai'i County's** coordination around SLR is managed by the Department of Research and Development, the county's Civil Defense Agency, and the Windward and Leeward Planning Commissions (who have the authority to grant shoreline setback variances and to grant or deny SMA use permits). The county updated its [Multi-Hazard Mitigation plan](#) in 2020 and is gathering data and making assessments to inform its [Integrated Climate Action Plan](#) (ICAP) (in progress).

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