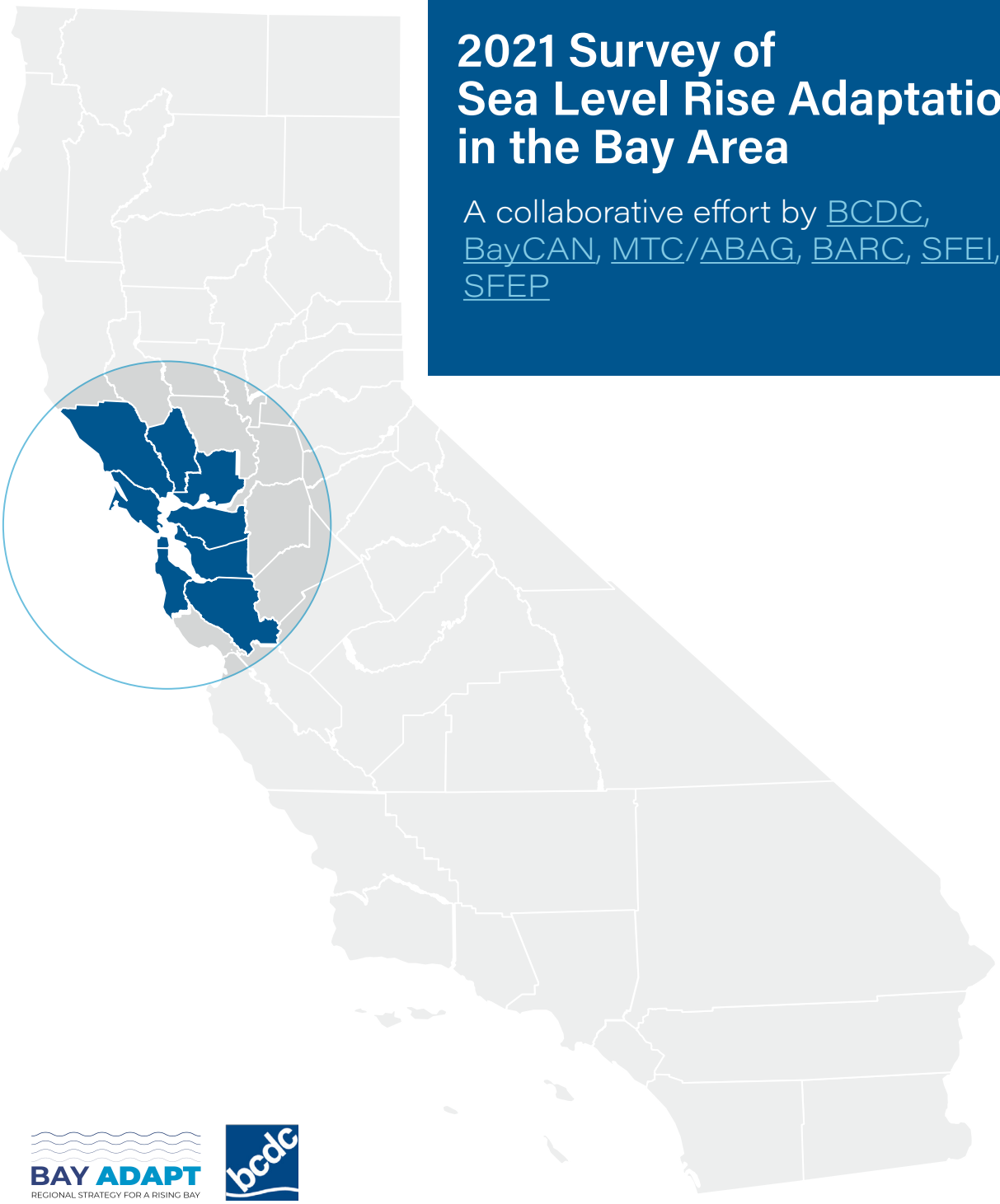
Sea Level Rise Adaptation Progress, Gaps & Needs Survey

2021 Survey of Sea Level Rise Adaptation in the Bay Area

A collaborative effort by BCDC, BayCAN, MTC/ABAG, BARC, SFEI, SFEP



BAY ADAPT
REGIONAL STRATEGY FOR A RISING BAY

2021 Progress, Gaps & Needs Survey

Sea Level Rise Adaptation in the Bay Area

A collaborative effort by BCDC, BayCAN, MTC/ABAG, BARC, SFEI, SFEP

Purpose

Provides a snapshot of adaptation planning progress around the Bay, with special focus on barriers to effective sea level rise planning and adaptation at local jurisdictions. Responses will inform Bay Adapt priorities and funding advocacy efforts.

Participants

Directors of Planning and Public Works at sixty-five jurisdictions (9 counties, 54 cities, and 2 special districts) were invited to participate in spring 2021.

Response

Response rate varied by topic - a breakdown of respondents is provided above each question (usually ranging from 17 to 27 respondents). Questions with fewer than 10 responses are summarized in the Appendices.

Introduction

Sea Level Rise Adaptation in the Bay Area

The Bay Area is often touted as a leader in sustainability and climate change, but how much has local, countywide, and regional sea level rise adaptation planning done so far actually moved the needle on coastal resilience throughout the Bay?

How far along are we, and how do we help the region move forward? This survey aims to shed some light on the current state of adaptation planning and set a baseline for moving forward towards more widespread and consistent sea level rise planning.

The goal of this survey was to assess how much sea level rise adaptation planning has occurred in the region, the challenges that people are facing, and how the region can help support ongoing, coordinated, and interconnected planning that leads to real, on-the-ground adaptation.

The survey achieves this through asking the following questions:

- Which cities have done a vulnerability assessment or are covered by one done by their county? What is in assessed in it? How much consistency is there in assessments around the region?
- Which cities have done some sort of adaptation planning? What is addressed in it?
- What is holding people back from doing more adaptation planning?
- How are people engaging with adaptation work? Are they spending money, hiring staff, and collaborating with other departments and neighbors?
- What is the state of technical knowledge? Where can the region help fill technical gaps?
- Lastly, is any of this actually leading to projects?

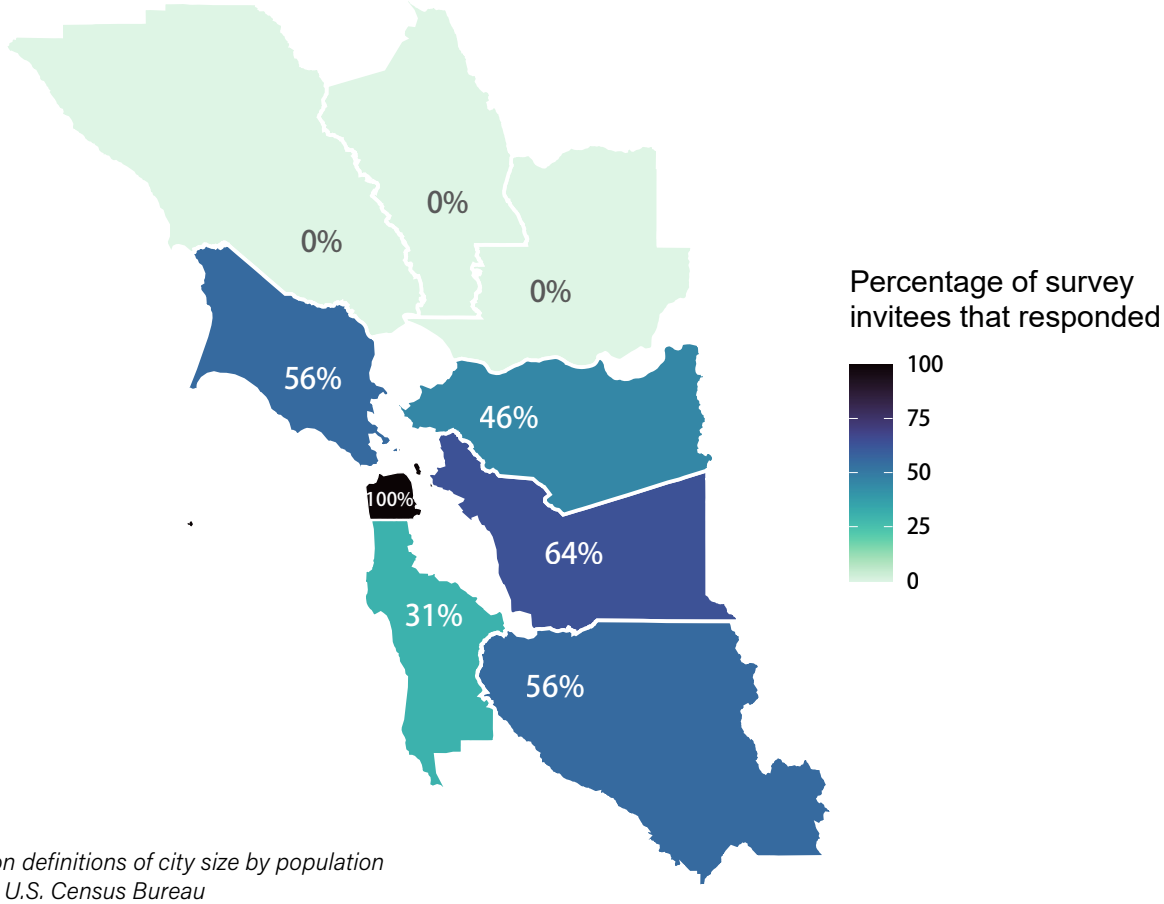
The results of this initial survey set the baseline and it is intended to be repeated on a regular cycle to track progress on adaptation plans, needs, and priorities in the region. Over time, it is envisioned to adapt and expand to comprehensively track successes, gaps, and needs. This can help ensure that any technical assistance or funding provided by regional agencies, such as that outlined in Bay Adapt, meets the true needs of users to accelerate consistent, high-quality plans that lead to adaptation projects.

Introduction

Sea Level Rise Adaptation in the Bay Area

This survey was done in partnership with many partners, including Bay Adapt partners such as BayCAN, MTC/ABAG, BARC, SFEI, and SFEP. It was created in partnership with the Governor's Office of Planning and Research to complement, but not replace, their Annual Planning Survey.

As this survey sets the baseline to track progress on adaptation plans, needs, and priorities in the region, we hope that participation will increase in future iterations. The results presented in this report represent responses from 42% of the 65 Bay shoreline jurisdictions invited to participate, so it does not yet represent a comprehensive picture of adaptation in the region. Of the 20 cities that participated, 14 were small cities or towns (*population less than 100,000*) and 6 were medium to large cities (*population more than 100,000*)[1]. The graphic below shows the distribution of those responses throughout the nine Bay Area counties. These responses therefore represent some counties' progress on sea level rise adaptation more than others.



[1] *based on definitions of city size by population from the U.S. Census Bureau*

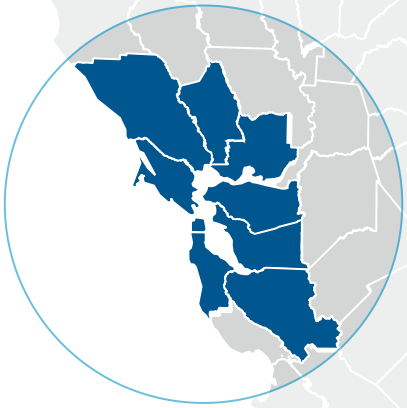
2021 Progress, Gaps & Needs Survey

for Sea Level Rise Adaptation in the Bay Area

A collaborative effort by BCDC, BayCAN, MTC/ABAG, BARC, SFEI, SFEP

A **snapshot of progress** around the Bay, with special focus on barriers to effective sea level rise (SLR) planning and adaptation at local jurisdictions.

Directors of Planning and Public Works at 9 counties, 54 cities, and 2 special districts were invited to participate in spring 2021.



92%
Indicate they have insufficient **staff & funds** to adequately plan & prepare for SLR

55%
Have unmet **staffing needs for SLR planning**, of those 2/3 don't have plans to hire

over 65%
Report **hiring personnel** to work on SLR-related tasks, but most them work on SLR less than 1/4 of the time

over 50%
Of the vulnerability assessments that have been done identify risks to **disadvantaged & socially vulnerable** groups

45%
Do not have an **adaptation plan** at all

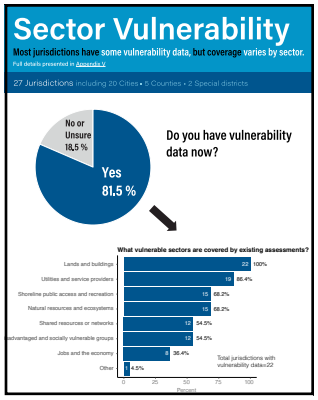
55%
Want training on **adaptive management**

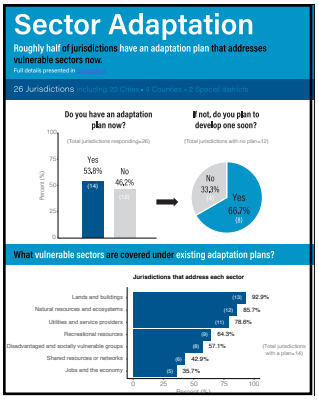
almost 2/3rds
Indicate a lack of **state legislation to provide direction** is a key barrier

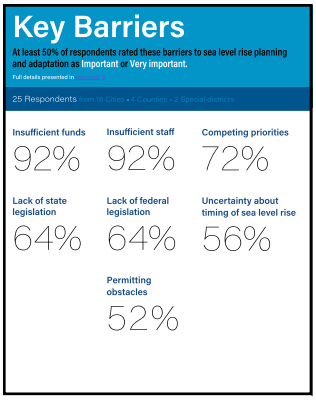
under 42%
Currently use **technical tools & resources** that may be necessary for effective SLR planning

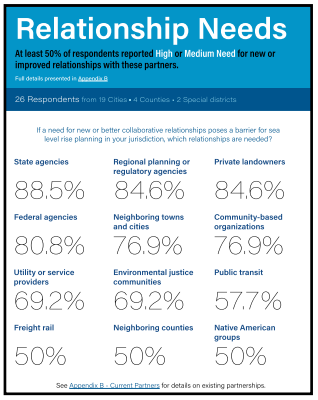
Responses varied by topic, so data summarized above are the results from 17 to 27 Respondents from 5 Counties ▪ 20 Cities ▪ 2 Special districts

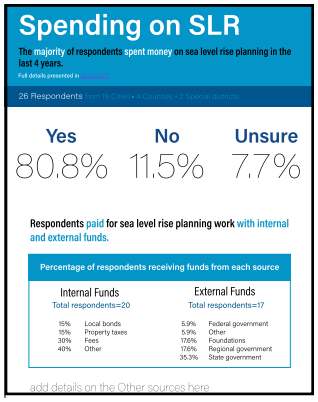
Click on a thumbnail to see the summary for each topic covered

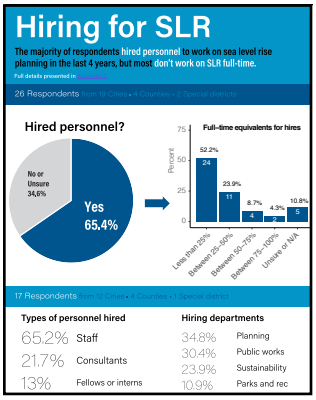


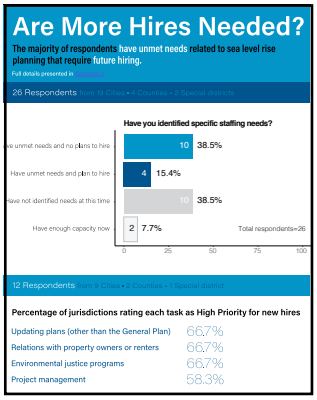


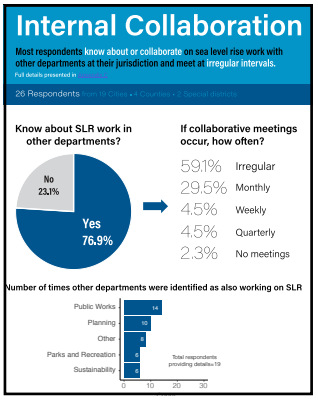


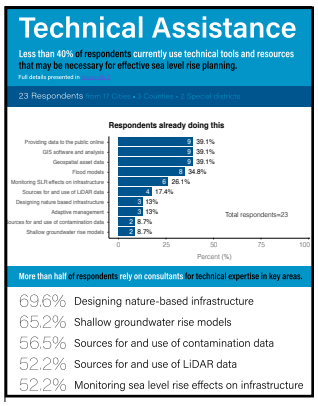


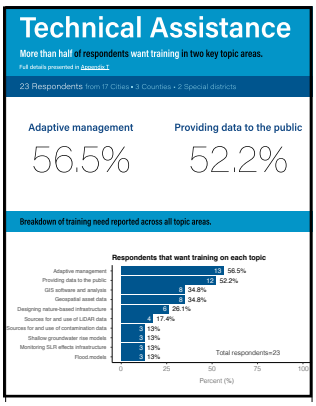


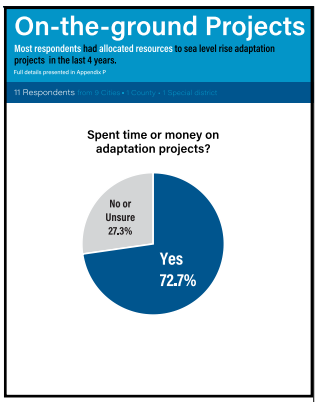


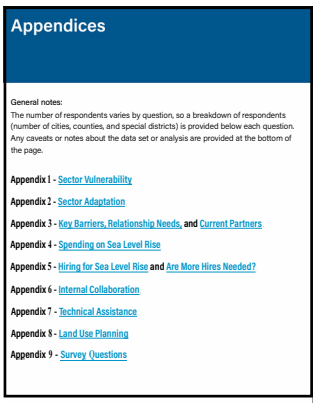












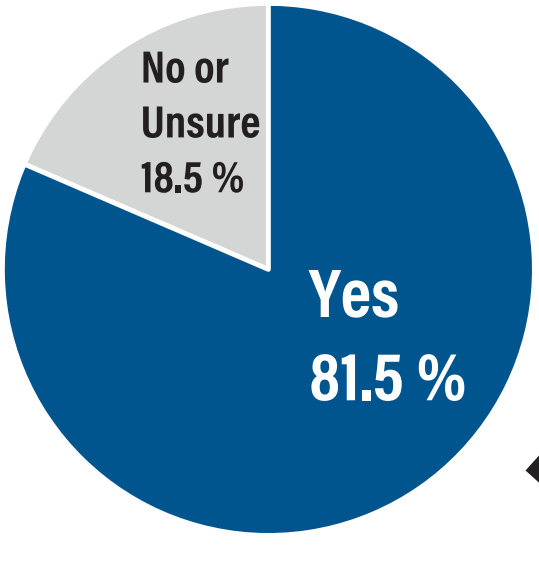
View the Appendices to see survey questions and full response details

Sector Vulnerability

Most jurisdictions have some vulnerability data, but coverage varies by sector.

Full details presented in Appendix 1

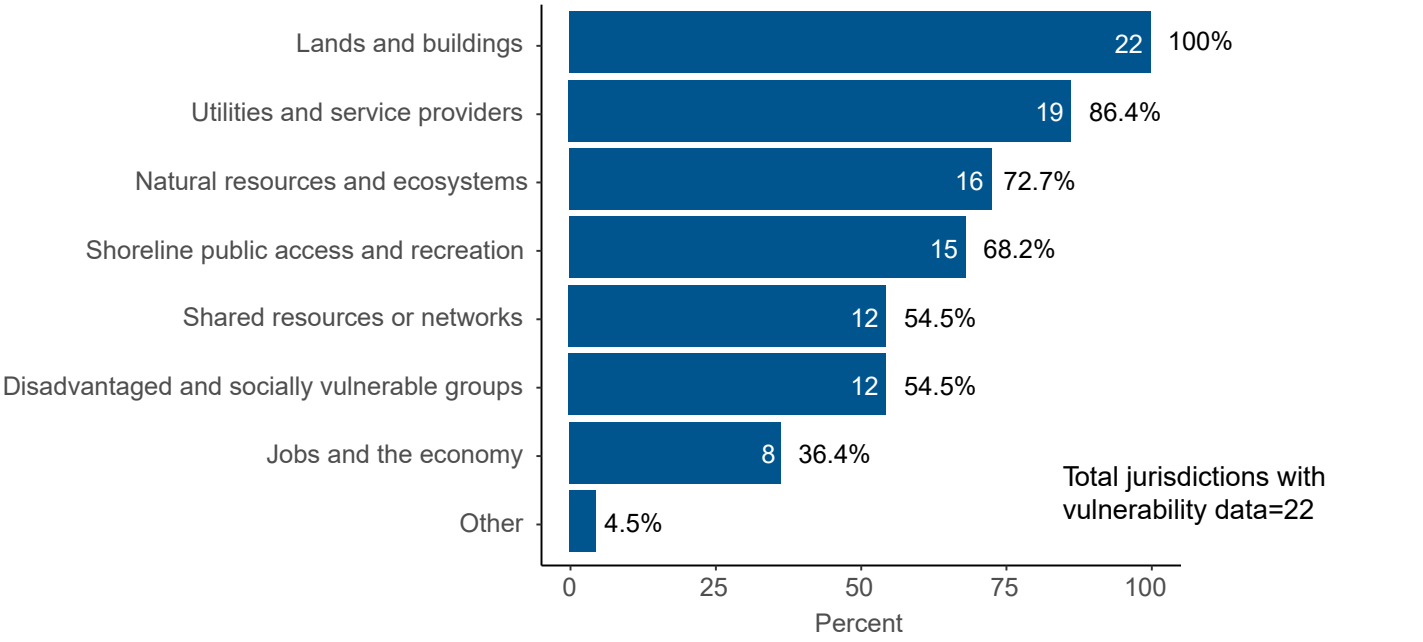
27 Respondents including 20 Cities ▪ 5 Counties ▪ 2 Special districts



Do you have any data for your jurisdiction on the vulnerability of any sectors to sea level rise?

Vulnerability data can come from either a local or countywide vulnerability assessment, including as part of a local hazard mitigation plan or climate action plan.

What vulnerable sectors are covered by existing assessments?

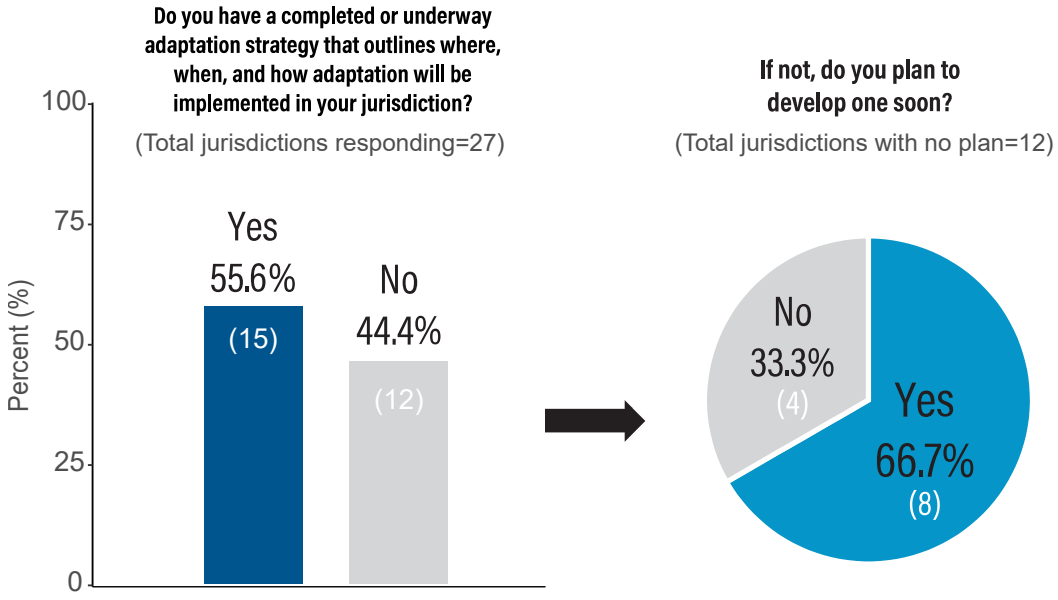


Adaptation Plans

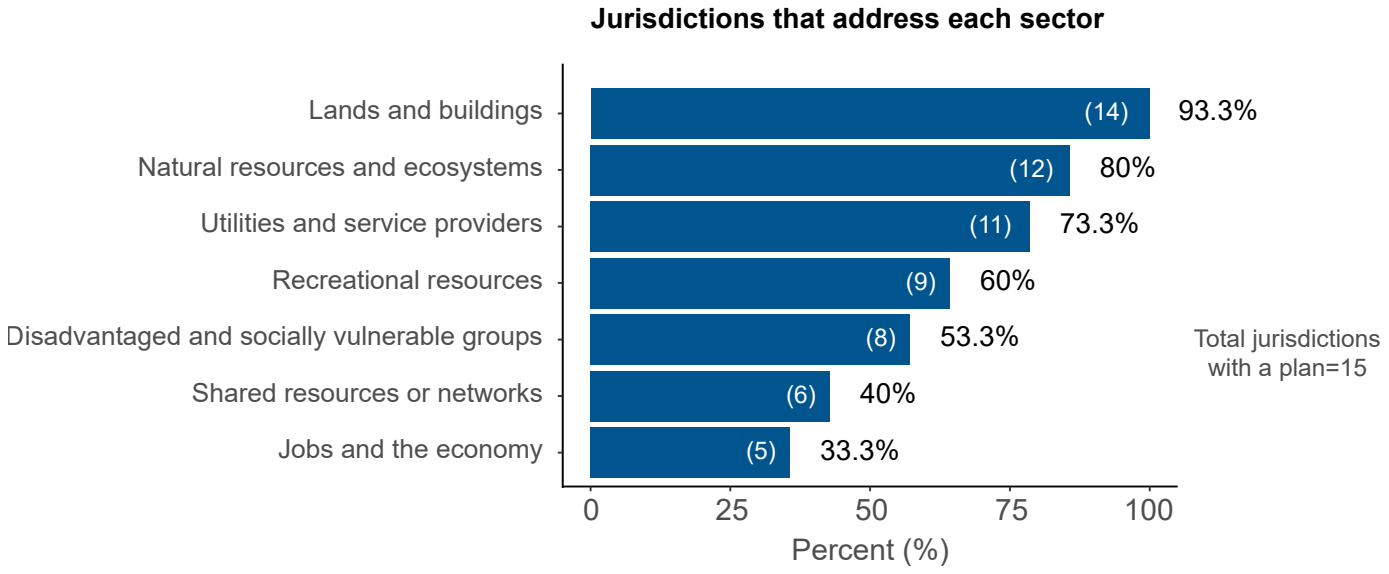
Roughly half of respondents have an adaptation plan that addresses vulnerable sectors now.

Full details presented in Appendix 2

27 Respondents including 20 Cities ▪ 5 Counties ▪ 2 Special districts



What vulnerable sectors does your adaptation strategy address?



Key Barriers

At least 50% of respondents rated these barriers to sea level rise planning and adaptation as Important or Very important.

Full details presented in Appendix 3

26 Respondents from 18 Cities ▪ 5 Counties ▪ 2 Special districts

Insufficient funds

92.3%

Insufficient staff

92.3%

Competing priorities

73.1%

Lack of federal legislation

65.4%

Lack of state legislation

61.5%

Uncertainty about timing of sea level rise

53.8%

Permitting obstacles

50%

Other barriers that were rated as less important (primarily rated as "somewhat important" or "not important") include lack of technical expertise, lack of political leadership by elected officials, distrust among stakeholders, lack of political support for policies addressing sea level rise, lack of coordination across internal departments, lack of local policies, and uncertainty about the extent of sea level rise.

Relationship Needs

The only relationship that the majority of respondents rated as primarily Low or Medium Need was with other internal departments.

Full details presented in Appendix 3

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts

If a need for new or better collaborative relationships poses a barrier for sea level rise planning in your jurisdiction, which relationships are needed?

State agencies

85.2%

Regional planning or regulatory agencies

85.2%

Private landowners

85.2%

Federal agencies

77.8%

Neighboring towns and cities

77.8%

Community-based organizations

77.8%

Environmental justice communities

70.4%

Utility or service providers

66.7%

Public transit

59.3%

Neighboring counties

51.9%

Native American groups

51.9%

See Appendix 3 - Current Partners for details on existing partnerships.

Spending on SLR

The majority of respondents spent money on sea level rise planning in the last 4 years.

Full details presented in Appendix 4

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts

Have you spent money on sea level rise planning or related activities?

Yes	No	Unsure
81.5%	11.5%	7.4%

Respondents paid for sea level rise planning work with internal and external funds.

Percentage of respondents receiving funds from each source

Internal Funds

Total respondents=21

42.9%	Other (*primarily general funds*)
28.6%	Fees
19%	Local bonds
14.3%	Property taxes

External Funds

Total respondents=18

38.9%	State government
16.7%	Foundations
16.7%	Regional government
11.1%	Federal government
5.9%	Other

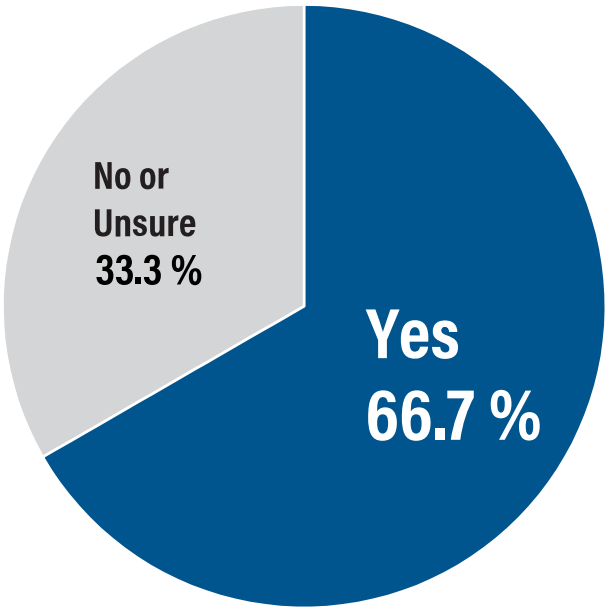
Hiring for SLR

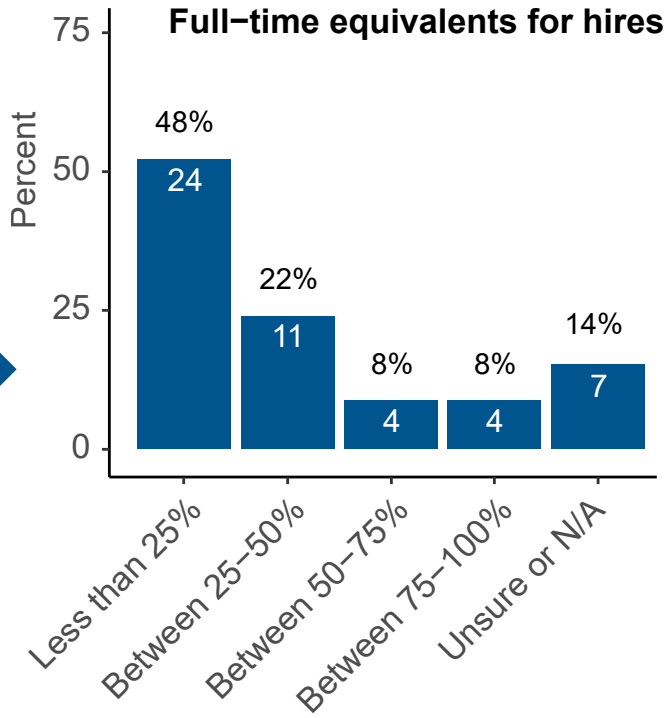
The majority of respondents hired personnel to work on sea level rise planning in the last 4 years, but most don't work on SLR full-time.

Full details presented in Appendix 5

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts

Hired personnel?





18 Respondents from 12 Cities ▪ 5 Counties ▪ 1 Special district

Types of personnel hired (out of 50 hires)

64%	Staff
24%	Consultants
12%	Fellows or interns

Hiring departments (across 50 hires)

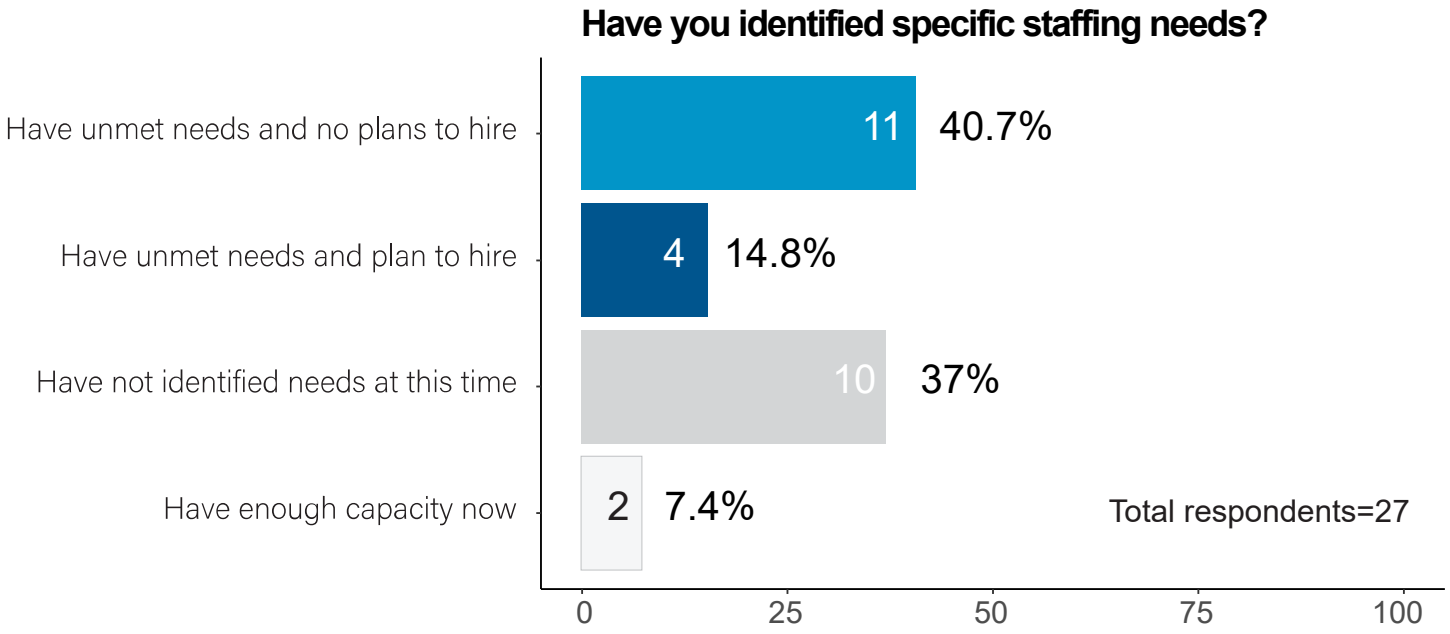
36%	Planning
28%	Public works
22%	Sustainability
10%	Parks and rec
4%	Other

Are More Hires Needed?

The majority of respondents have unmet needs related to sea level rise planning that require future hiring.

Full details presented in Appendix 5

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts



13 Respondents from 9 Cities ▪ 3 Counties ▪ 1 Special district

Percentage of jurisdictions rating each task as High Priority for new hires

Environmental justice programs	69.2%
Updating plans (other than the General Plan)	61.5%
Relations with property owners or renters	61.5%
Project management	58.8%

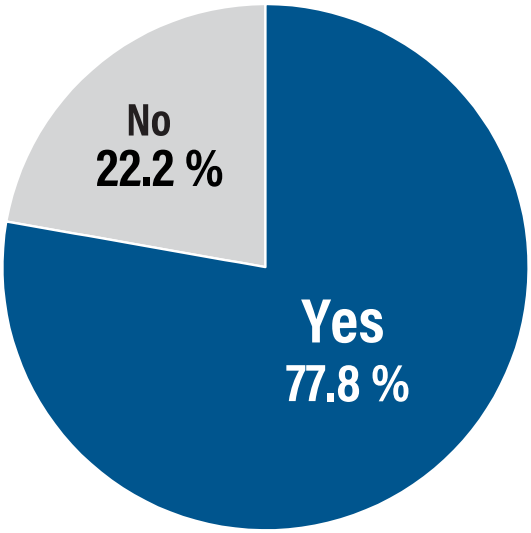
Internal Collaboration

Most respondents know about or collaborate on sea level rise work with other departments at their jurisdiction and meet at irregular intervals.

Full details presented in Appendix 6

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts

Are other departments besides your own working on sea level rise?



How frequently does your department collaborate with other departments working on sea level rise?

56.5%	Irregularly
28.3%	Monthly
8.7%	Weekly
4.3%	Quarterly
2.2%	No collaboration

For jurisdictions where internal collaboration was a challenge, reasons cited included competing priorities and challenges aligning organizational procedures and communication

Departments that were identified as working on SLR

Public Works

Planning

Parks and Recreation

Sustainability

Other

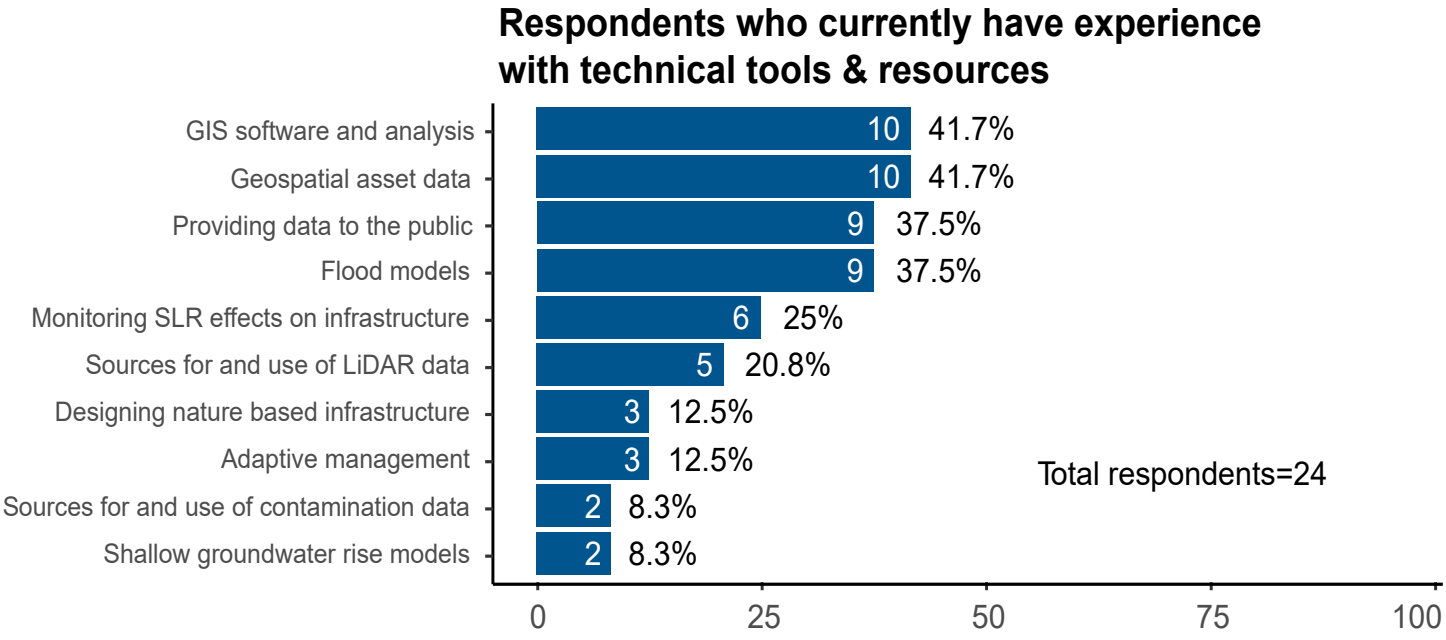
Total respondents providing details=20

Technical Skills/Needs

42% or fewer of respondents currently have experience with technical tools and resources for effective sea level rise planning.

Full details presented in Appendix 7

24 Respondents from 17 Cities ▪ 4 Counties ▪ 2 Special districts



More than half of respondents rely on consultants for technical expertise in key areas.

70.8% Designing nature-based infrastructure

66.7% Shallow groundwater rise models

58.3% Sources for and use of contamination data

50% Sources for and use of LiDAR data

50% Monitoring sea level rise effects on infrastructure

Technical Assistance

More than half of respondents want training in two key topic areas.

Full details presented in Appendix 7

24 Respondents from 17 Cities ▪ 5 Counties ▪ 2 Special districts

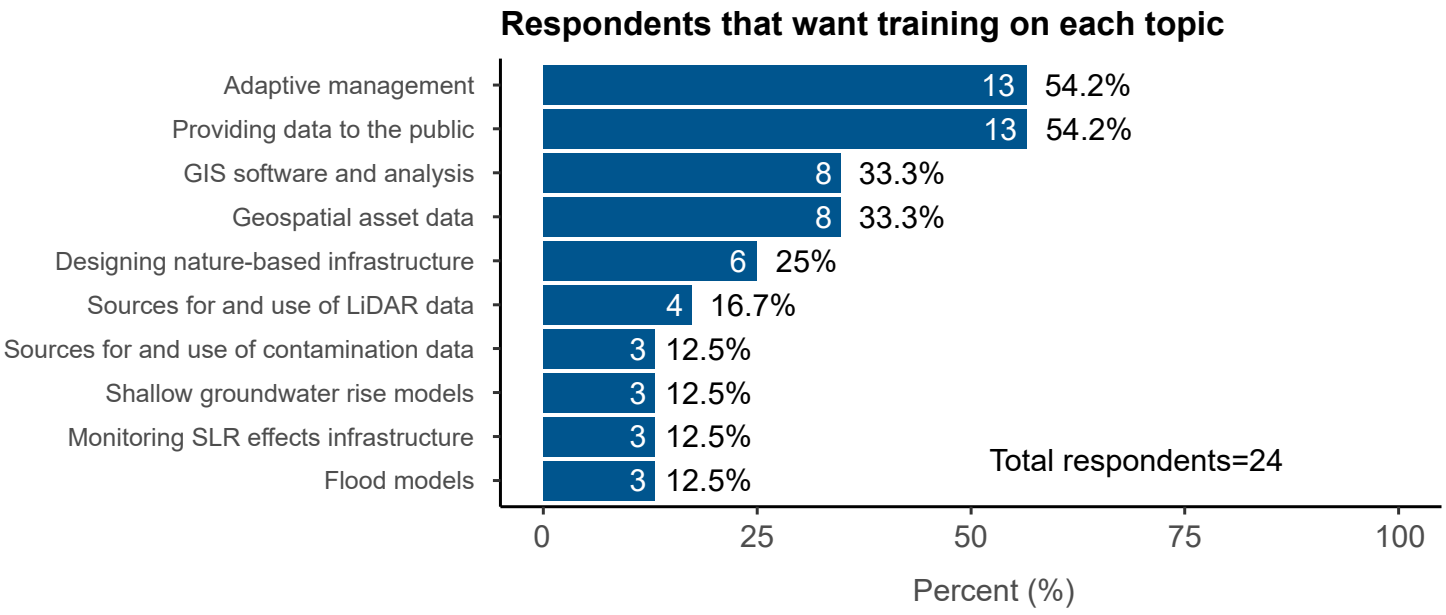
Adaptive management

54.2%

Providing data to the public

54.2%

Every respondent indicated a desire for training in at least one area.

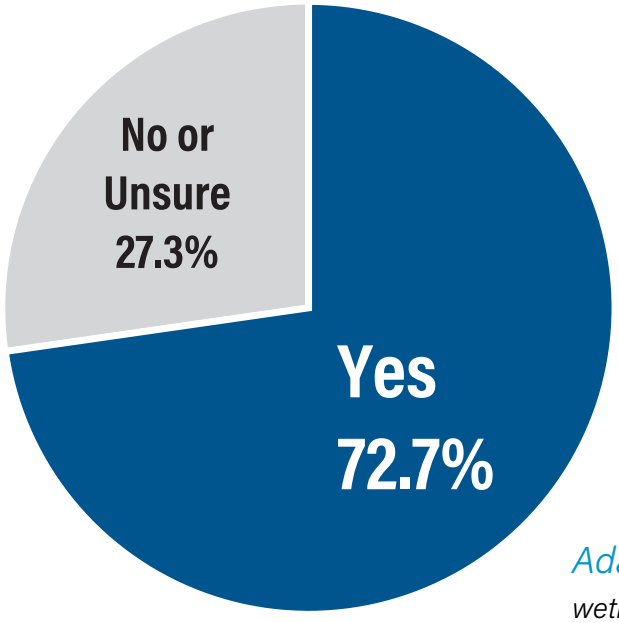


On-the-ground Projects

Most respondents had allocated resources to sea level rise adaptation projects in the last 4 years.

12 Respondents from 9 Cities ▪ 2 Counties ▪ 1 Special district

Have you spent time or money on adaptation projects?



Adaptation projects include stormwater upgrades, wetland restoration, building levees, etc., as well as any planning activities required to implement such projects (for example feasibility or engineering studies).

Example adaptation projects respondents have allocated resources to:

Wastewater Treatment Plant Upgrade and Expansion

Lagoon Outfall Adaptation

Shoreline Adaptation

Flood Improvement

Appendices

General notes:
The number of respondents varies by question, so a breakdown of respondents (number of cities, counties, and special districts) is provided for each question. Any caveats or notes about the data set or analysis are provided at the bottom of the page.

Appendix 1 - Sector Vulnerability

Appendix 2 - Sector Adaptation

Appendix 3 - Key Barriers, Relationship Needs, and Current Partners

Appendix 4 - Spending on Sea Level Rise

Appendix 5 - Hiring for Sea Level Rise and Are More Hires Needed?

Appendix 6 - Internal Collaboration

Appendix 7 - Technical Assistance

Appendix 8 - Land Use Planning

Appendix 9 - Full Survey Questions and Response Options

Appendix 1 - Sector Vulnerability

Question: Please indicate what sea level rise vulnerability data are available for your jurisdiction. **See the main text for this visualization.**

Additional findings: One jurisdiction chose "Other" and indicated they also have data on Agricultural and Cultural resources.

"Our city needs to better understand the vulnerability of utility systems owned by other jurisdictions within the city, including PG&E natural gas, EBMUD wastewater and drinking water and private communications system, Caltrans roads, AC Transit and WETA." ferry terminals."

"It would be helpful to have more information about impacts to low income people and the tools used to identify vulnerable populations."

"Better regional planning is needed."

- Survey respondents

Background information provided in the survey:
"Vulnerability assessments usually involve a mapping effort for a set of sea level rise scenarios and present data on lands, physical assets, communities, resources, and networks that would be affected by those scenarios. Documented vulnerabilities may be summarized in a report or plan, or they may reside in a GIS database or other resource."

Caveats and notes on analysis:
When more than one department from a given jurisdiction responded to this question, we consolidated these responses and assume that vulnerability data exists if at least one department reports it (this situation only occurred with one jurisdiction).

Appendix 2 - Sector Adaptation

Question: If you have an adaptation strategy (either complete or under development) that outlines where, when, and how sea level rise adaptation efforts will be implemented in your jurisdiction, what vulnerabilities does it address? (**See the main text for this visualization.)**

"We just launched a countywide resilience strategy, working with all cities, and some special districts to guide collaborative resilience efforts, and inform updates to local general plan safety elements."

"We have not established community consensus on adaptation strategies or the SLR model to use."

"The strategy in our city is found in several documents, including the Resilient Playbook, Equitable Climate Action Plan, and Local Hazard Mitigation Plan."

"The sea level rise strategy is currently fairly general and does not dive specifically into adaptation project level planning."

"We have developed a vulnerability assessment as part of our ongoing updates to our General Plan and Climate Action Plan. In the context of the updates, adaptation strategies will be developed. We don't know yet how detailed the strategy will be. "

- Survey respondents

Background information provided in the survey:
"Sea level rise adaptation plans mitigate impacts identified in a vulnerability assessment. Adaptation strategies may involve avoidance (for example, prohibiting development in low-lying areas), protection (building living shorelines or seawalls), or retreat (relocating vulnerable assets outside of threatened areas). Adaptation strategies may focus on impacts to lands, physical assets, communities, resources, and networks within a jurisdiction's boundaries, but ideally also consider resources and networks that span multiple jurisdictions (for example, a shared electricity grid or transit systems)."

Caveats and notes on analysis:
When more than one department from a given jurisdiction responded to this question, we consolidated responses and assume that a vulnerability is addressed by an adaptation plan if at least one department reports that information (this situation only occurred with one jurisdiction).

Appendix 2 - Sector Adaptation (cont.)

Question: If you have an adaptation strategy please provide details.

12 Respondents from 8 Cities ▪ 2 Counties ▪ 2 Special districts provided the name of their adaptation strategy document.

Respondents use a variety of SLR scenarios, projections, and mapping tools for their adaptation strategy

Highest flood level protected against

Total respondents=9

Highest flood levels protected against ranged from 8 to 108 inches above MHHW. Each respondent indicated unique flood levels and time horizons in their response. Some also specified that their adaptation strategy included storm surge and fluvial flooding.

Source of SLR projection

Total respondents=9

55.6%	OPC 2018 Guidance
22.2%	ART
11.1%	NRC 2012
11.1%	Unsure

Mapping tools used

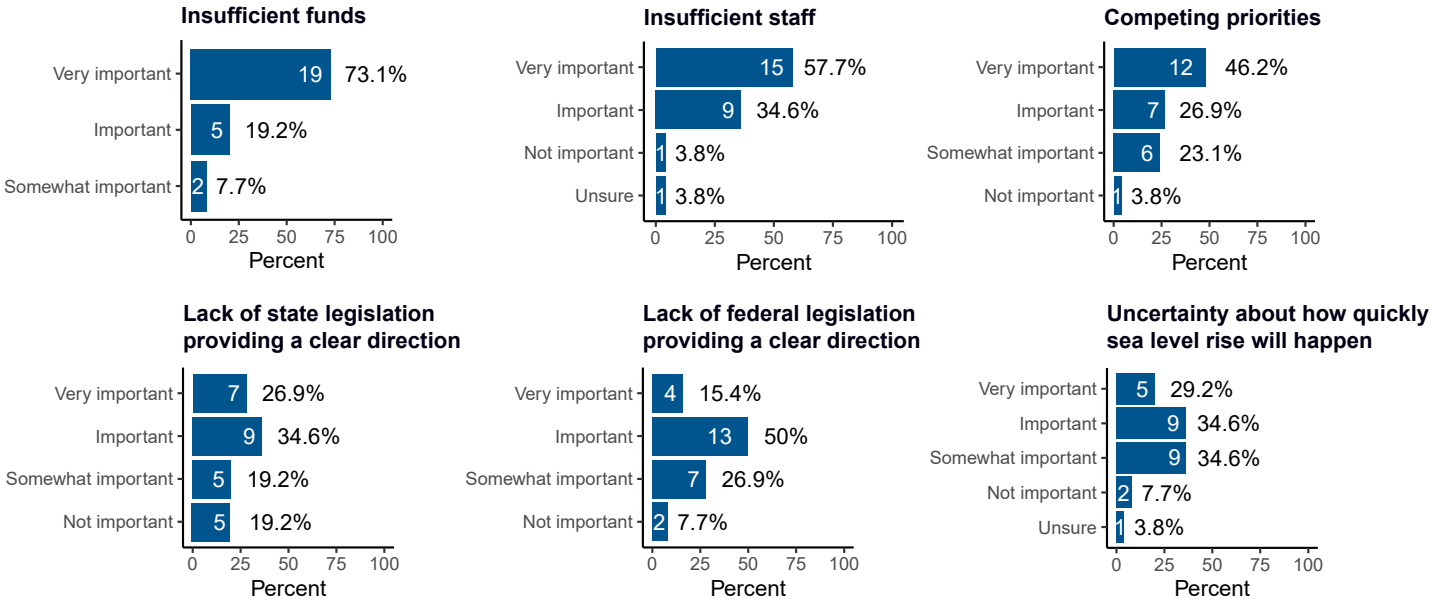
Total respondents=8

62.5%	Own GIS/consultant
25%	ART Flood Explorer
12.5%	Unsure

Appendix 3 - Key Barriers

Question: Please rate the following barriers as Very important, Important, Somewhat important, or Not important in terms of their impact on your ability to carry out effective sea level rise planning and adaptation in your jurisdiction.

26 Respondents from 18 Cities ▪ 5 Counties ▪ 2 Special districts



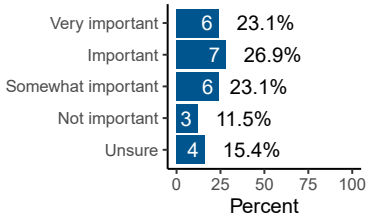
Background information provided for this section of the survey:
"For the purpose of some questions in this section, we define community-based organizations (CBO's) as groups based in local communities, which may (or may not) be disadvantaged. Environmental justice communities (sometimes called frontline communities) are disadvantaged communities that experience disproportionate impacts from sea level rise, which can result from proximity to sources of contamination, lack of local funding for sea level rise adaptation measures, etc."

Caveats and notes on analysis:
Respondents are departments at a given jurisdiction; barplots summarize responses from a single department at 17 cities, plus responses from two different departments at an 18th city. Respondents were offered the same set of ratings for each question, but only those chosen by at least one respondent are shown.

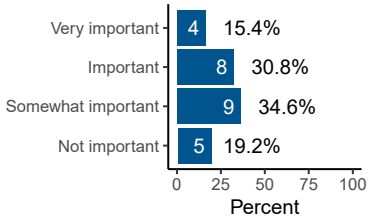
Appendix 3 - Key Barriers (cont.)

26 Respondents from 18 Cities ▪ 5 Counties ▪ 2 Special districts

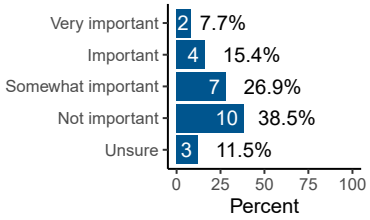
Permitting obstacles



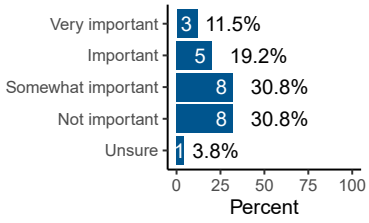
Lack of local policies or legislation providing a clear direction



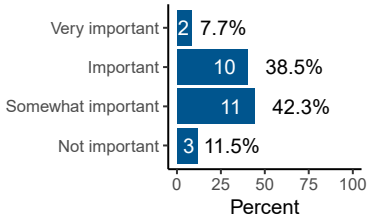
Lack of political leadership by elected officials



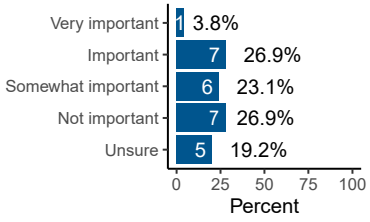
Lack of adequate scientific information



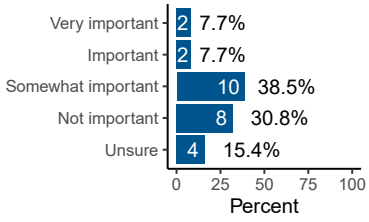
Lack of technical expertise



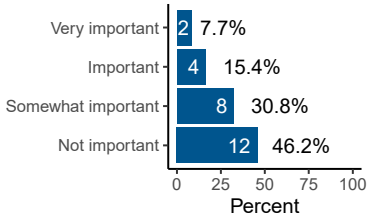
Lack of public support for policies addressing sea level rise



Distrust among stakeholders



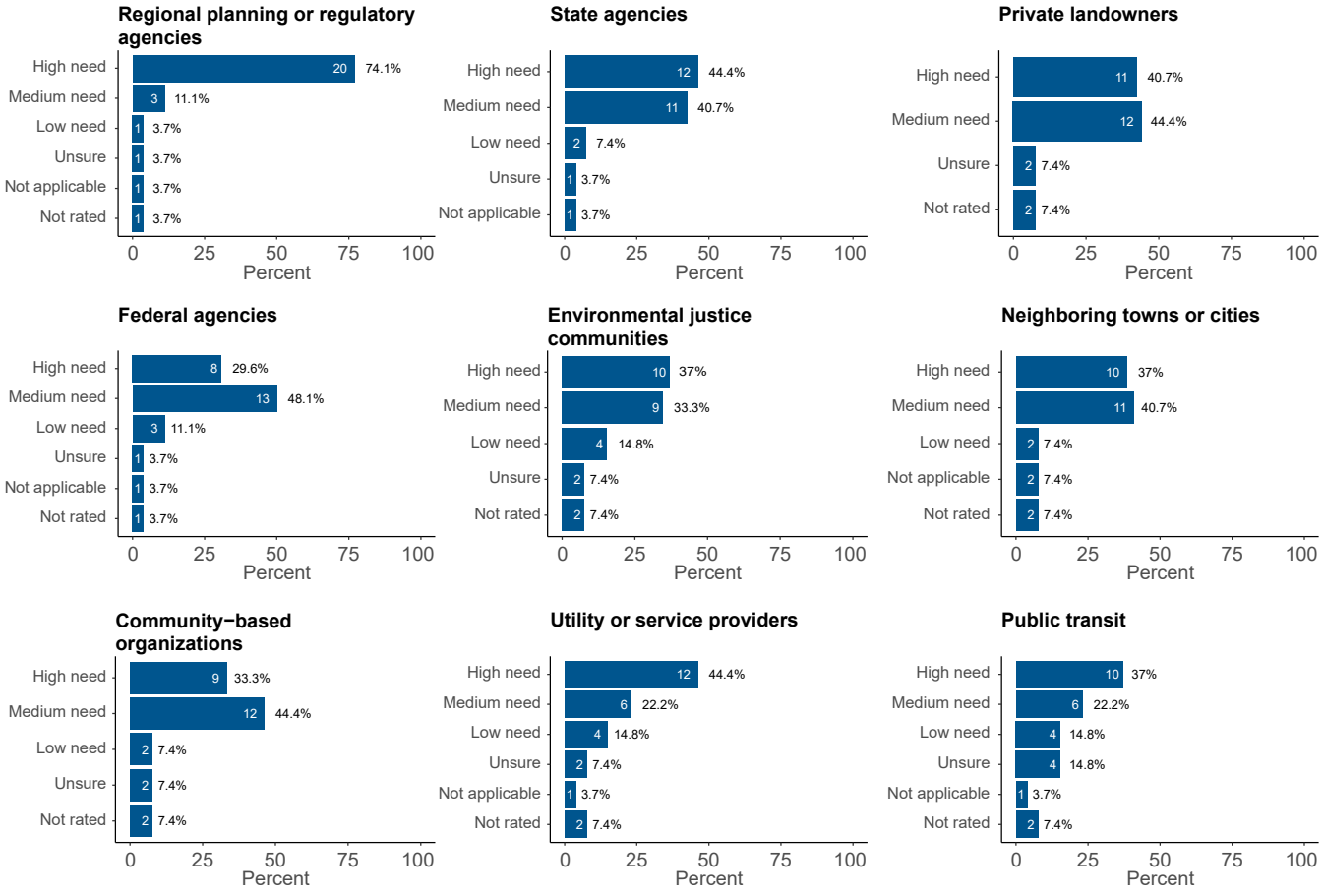
Lack of coordination across internal departments



Appendix 3 - Relationship Needs

Question: If a need for new or better collaborative relationships poses a barrier for sea level rise planning in your jurisdiction, which relationships are needed? Please indicate needs below, and use the text box to describe factors that impeded building, maintaining, or advancing these relationships.

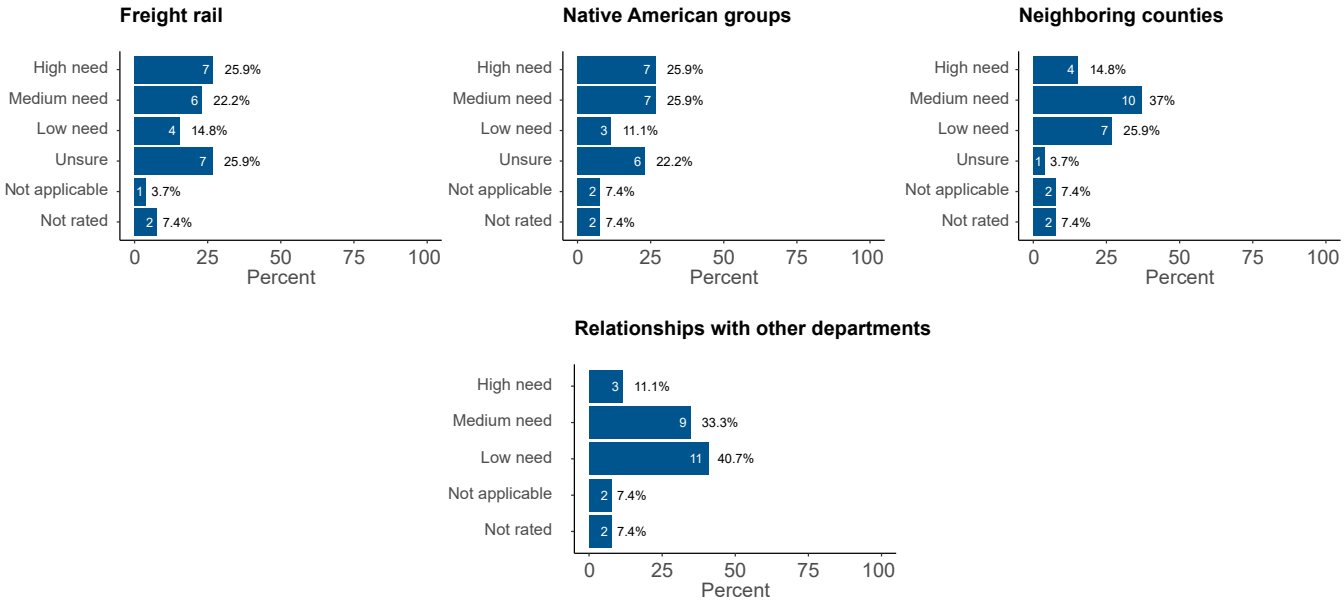
27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts



Caveats and notes:
Respondents are departments at a given jurisdiction; barplots summarize responses from a single department at 18 cities, plus responses from two different departments at a 19th city. Respondents were offered the same set of ratings for each question, but only those chosen by at least one respondent are shown.

Appendix 3 - Relationship Needs (cont.)

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts



"The State needs to take the lead on this, as aggressively as they have on the Housing Element. Cities cannot be expected to individually plan for a regional, and indeed, world-wide, issue like sea level rise."

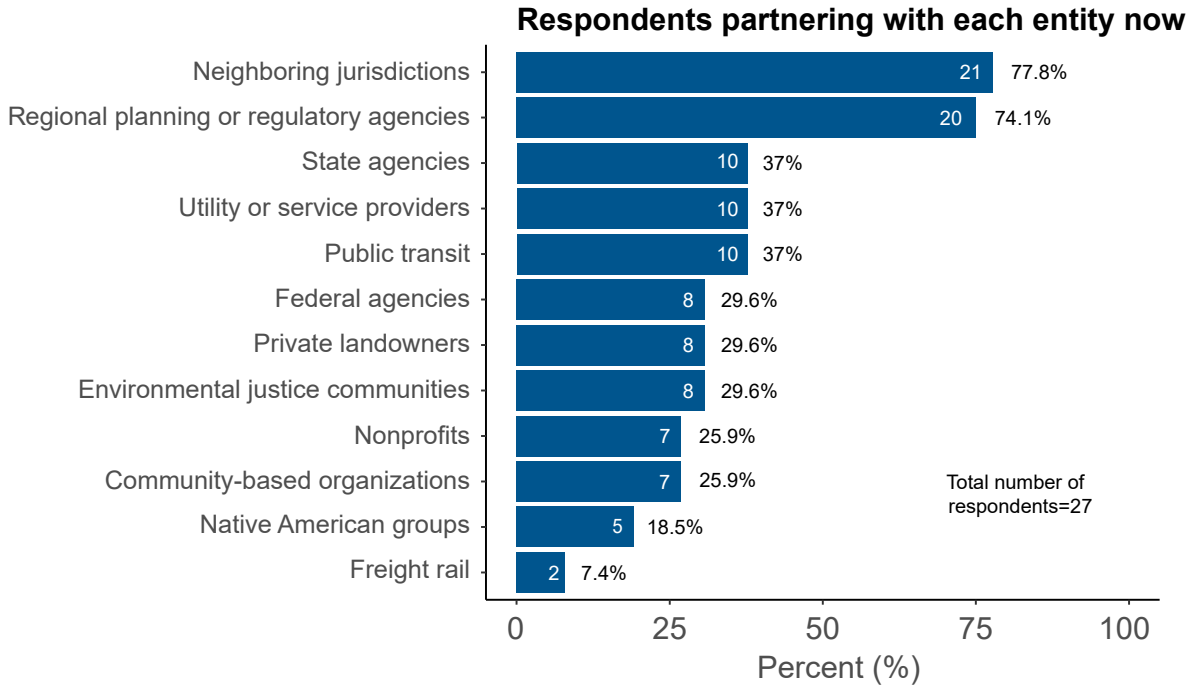
"The relationships are there, but having a convener for the agencies/ utilities would be helpful."

- Survey respondents

Appendix 3 - Current Partners

Question: Who does your jurisdiction collaborate with now on sea level rise issues? Please identify any partners below.

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts



A high percentage of respondents report partnerships with regulatory agencies, neighboring jurisdictions, and utility or service providers - a surprising finding, given that the same pool of respondents reported High or Medium Need for these relationships on Question B2 (see previous pages). This may reflect a desire to improve existing relationships; or it may reflect the relatively large pool of regulatory agencies, utility and service providers, and neighboring jurisdictions that each respondent could engage as a partner.

Caveats and notes:
Respondents are departments at a given jurisdiction; barplots here summarize responses from a single department at 18 cities, plus responses from two different departments at a 19th city.

Appendix 3 - Current Partners (cont.)

Current Partners Identified by Respondents

Community-based organizations
San Leandro 2050 ▪ Groundwork Richmond ▪ Greenbelt Alliance ▪ Marin Audubon ▪ Marin Conservation League ▪ League of Women Voters ▪ Environmental Forum of Marin ▪ Canal Alliance ▪ Multicultural Center of Marin ▪ Redwood Shores Homeowners Association ▪ Acterra ▪ Grassroots Ecology ▪ California Environment Indian Alliance ▪ Save the Bay ▪ Nuestra Casa ▪ American Indian Cultural District (SF)

Environmental justice communities or groups
SLHS Social Justice Academy ▪ Unity in the Community ▪ Chinese monolingual communities ▪ Communities for a Better Environment ▪ Shore Up Marin City ▪ Harbor Village ▪ Lemar and RC Mobile Home Parks ▪ Move Mountain View ▪ Climate Resilient Communities ▪ Youth United for Community Action, Boys and Girls Club of the Peninsula

Private landowners and renters
Homeowners associations ▪ Marina developer ▪ Marin Audubon ▪ Commercial property owners ▪ East San Rafael Working Group ▪ Brisbane Baylands ▪ Cargill

Freight rail
Union Pacific ▪ BNSF ▪ SMART

Public transit
BART ▪ ACTransit ▪ Transit Authority of Marin ▪ Golden Gate Bridge, Highway and Transportation District ▪ SMART ▪ SamTrans ▪ Caltrans ▪ Caltrain ▪ Vally Transportation Authority ▪ Transbay Joint Powers Authority ▪ San Francisco Municipal Transportation Agency ▪ Water Emergency Transportation Authority

Caveats and notes:
Partner names and category are as-reported by survey respondents.

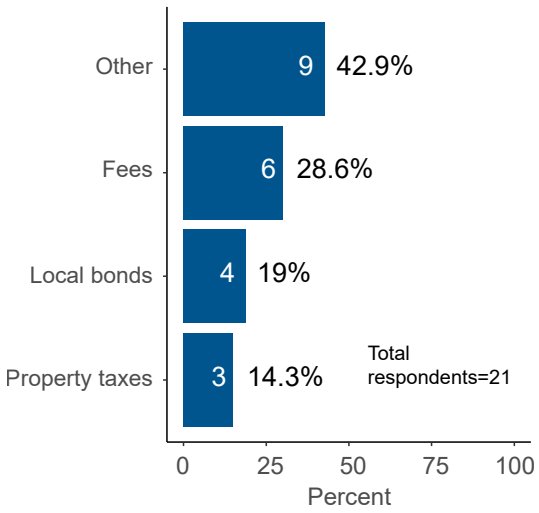
Appendix 4 - Spending on SLR

Question: Since January 2017, has your jurisdiction spent money on sea level rise planning or related activities, including SB 379 compliance? Please consider staff and contracting costs when providing your response **(see the main text for this visualization).**

Question: Since January 2017, have you used money that was raised locally within your jurisdiction to fund sea level rise planning or related activities? If yes, please indicate the source and a dollar amount (if known).

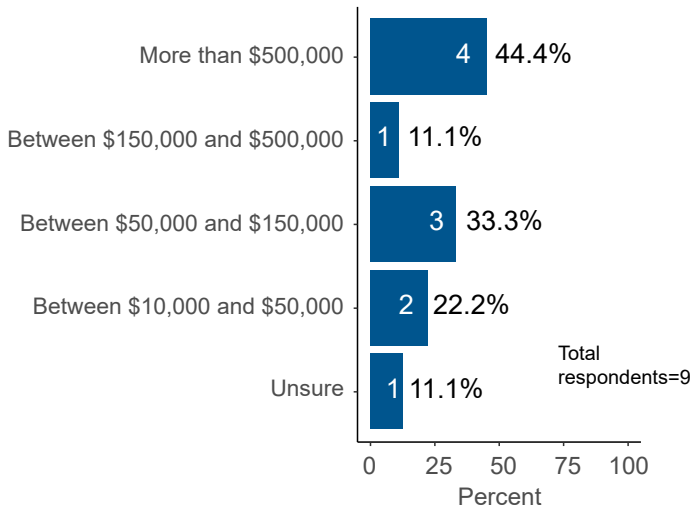
21 Respondents from 15 Cities ▪ 5 Counties ▪ 1 Special district

Receiving funds from each internal source



9 Respondents from 5 Cities ▪ 4 Counties ▪ 0 Special districts

Receiving funds in each amount category



Internal funding source write-ins:
General Fund ▪ General Plan Maintenance Fees ▪ Measure F Sales Tax ▪ Measure M ▪ Shoreline Regional Community Fund ▪ Stormwater Management Fees

Background information provided for this section of the survey:
"For the purposes of this survey, sea level rise planning and related activities could include conducting a vulnerability assessment, updating a plan, developing a community education program on sea level rise, partnering with community-based organizations, etc. Please restrict answers here to these or similar activities - the final section of the survey will focus on adaptation projects (such as stormwater upgrades, wetland restoration, levees, etc), including their cost."

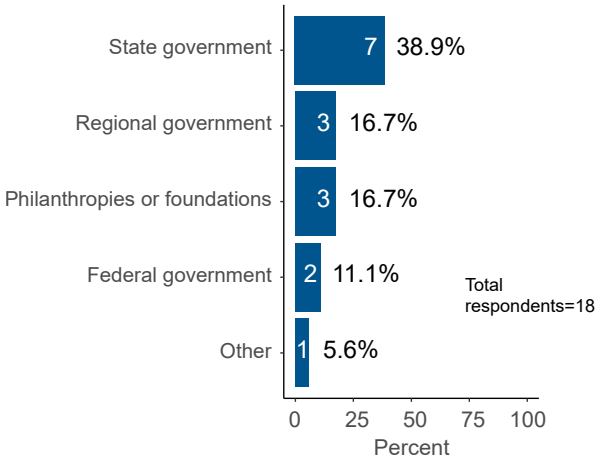
Caveats and notes on analysis:
Respondents are departments at a given city, county, or special district; each department may have received internal funds from multiple sources.

Appendix 4 - Spending on SLR (cont.)

Question: Since January 2017, have you received money from external sources to fund sea level rise planning or related activities in your jurisdiction? If yes, please indicate the source and a dollar amount (if known).

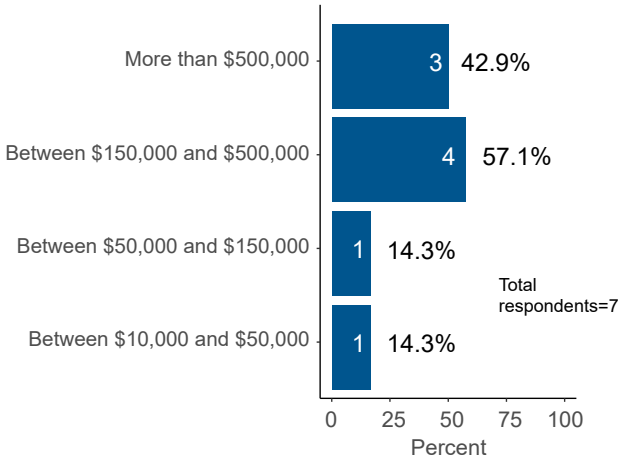
18 Respondents from 12 Cities ▪ 5 Counties ▪ 1 Special district

Receiving funds from each external source



7 Respondents from 4 Cities ▪ 3 Counties ▪ 0 Special districts

Receiving funds in each amount category



External funding source write-ins

Bay Area Air Quality Management District ▪ California Coastal Conservancy ▪ Caltrans Transportation Planning Grant ▪ Caltrans SB 1 Adaptation Planning Grant ▪ Marin Community Foundation ▪ Measure AA ▪ National Fish and Wildlife Foundation ▪ North Bay Watershed Association ▪ San Francisco Bay Conservation and Development Commission ART Program ▪ U.S Army Corps of Engineers

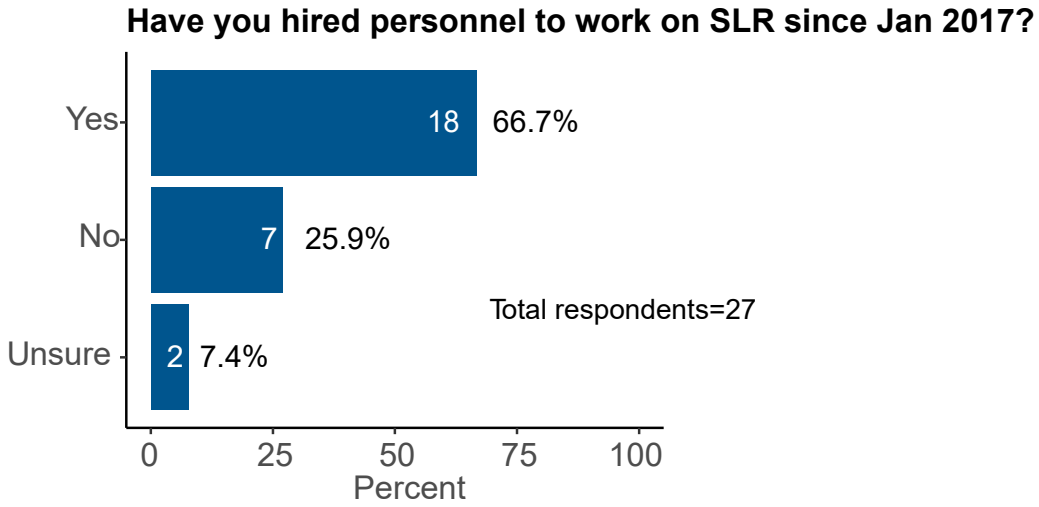
Caveats and notes on analysis:

Respondents are departments at a given city, county, or special district; each department may have received external funds from multiple sources.

Appendix 5 - Hiring for SLR

Question: Since January 2017, has your jurisdiction hired or reallocated personnel (staff, fellows, interns, or consultants) to work on sea level rise planning and related activities, including SB 379 compliance?

27 Respondents from 19 Cities ▪ 5 Counties ▪ 2 Special districts



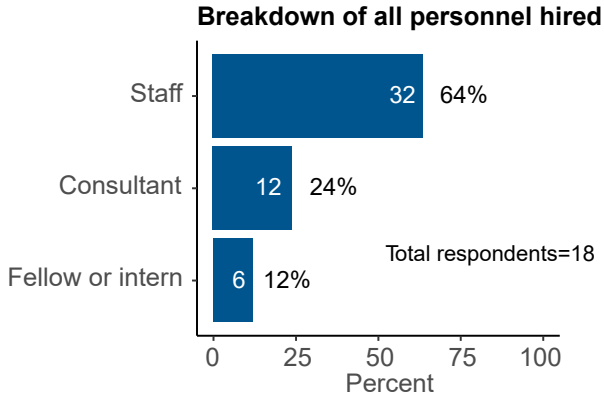
Background information provided for this section of the survey:
"For staffing questions, sea level rise planning and related activities could include conducting sea level rise-focused plan updates, project management, developing sea level rise education programs, building partnerships with neighboring jurisdictions or community-based organizations*, conducting research or monitoring, seeking funding, etc. *We define community-based organizations (CBO's) as groups based in local communities, which may (or may not) be disadvantaged."

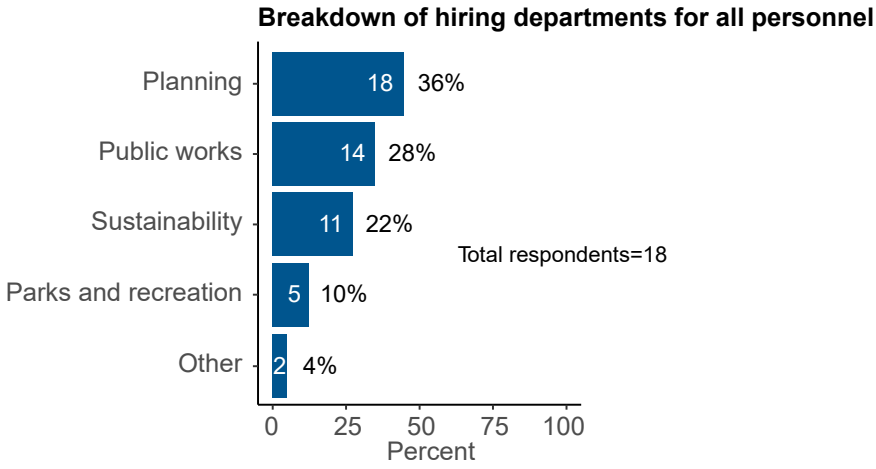
Caveats and notes on analysis:
Respondents are departments at a given city, county, or special district; each department may have hired multiple personnel, and some respondents provided information on hires in other departments at their jurisdiction.

Appendix 5 - Hiring for SLR

Question: What additional personnel have you hired or reallocated to work on sea level rise since January 2017?

18 Respondents from 12 Cities ▪ 5 Counties ▪ 1 Special district





Background information provided for this section of the survey:
"For staffing questions, sea level rise planning and related activities could include conducting sea level rise-focused plan updates, project management, developing sea level rise education programs, building partnerships with neighboring jurisdictions or community-based organizations*, conducting research or monitoring, seeking funding, etc. *We define community-based organizations (CBO's) as groups based in local communities, which may (or may not) be disadvantaged."

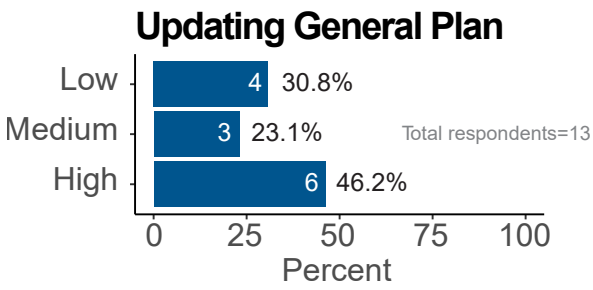
Caveats and notes on analysis:
Respondents are departments at a given city, county, or special district; each department may have hired multiple personnel, and some respondents provided information on hires in other departments at their jurisdiction.

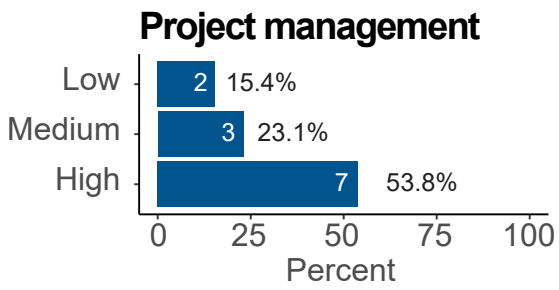
Appendix 5 - Are More Hires Needed?

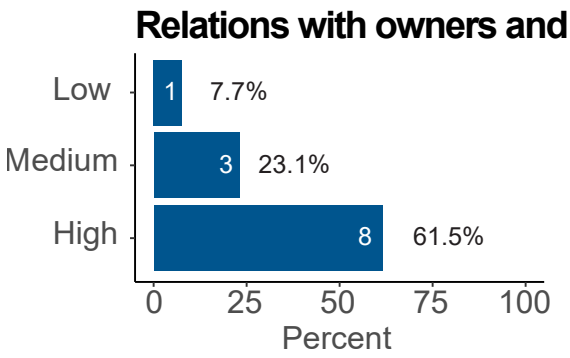
Question: If your department has identified needs related to sea level rise that are going unmet due to lack of capacity, do you have plans to hire staff, consultants, fellows, or interns to support these needs?
(See the main text for this visualization).

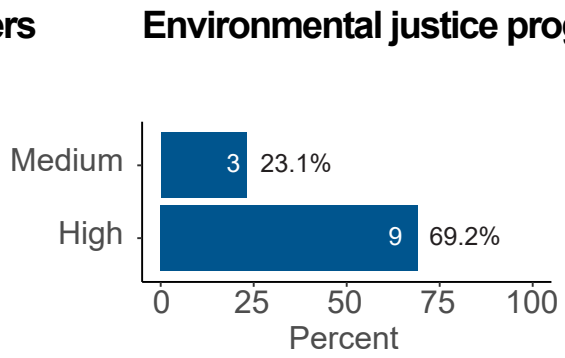
Question: What sea level rise-related tasks do you hope to accomplish using new hires or consulting contracts? Please designate relevant tasks as High, Medium, or Low priority.

13 Respondents from 9 Cities ▪ 3 Counties ▪ 1 Special district







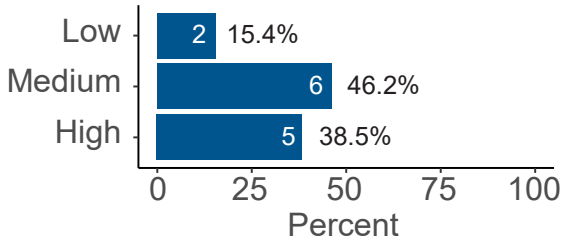


Background information provided for this section of the survey:
"For the purposes of this question, we define community-based organizations (CBO's) as groups based in local communities, which may (or may not) be disadvantaged. Environmental justice communities are groups based in disadvantaged communities that experience disproportionate impacts from sea level rise, which can result from proximity to sources of contamination, lack of local funding for sea level rise adaptation measures, etc."

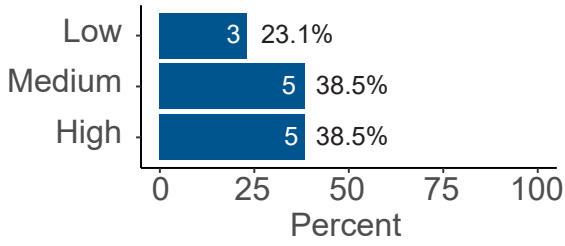
Appendix 5 - Are More Hires Needed? (cont.)

13 Respondents from 9 Cities ▪ 3 Counties ▪ 1 Special district

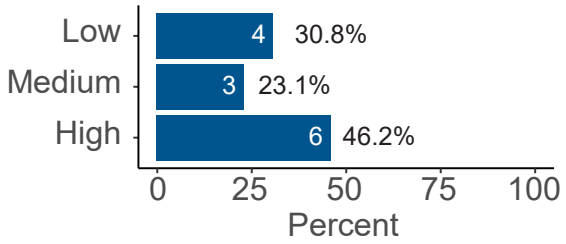
Collaboration with neighbors



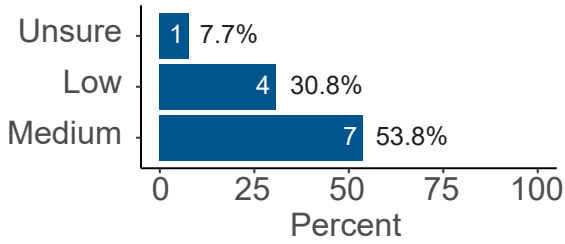
Regional collaboration



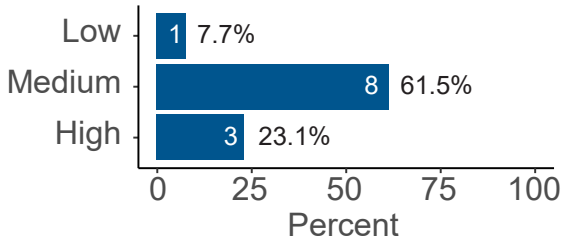
Updating General Plan



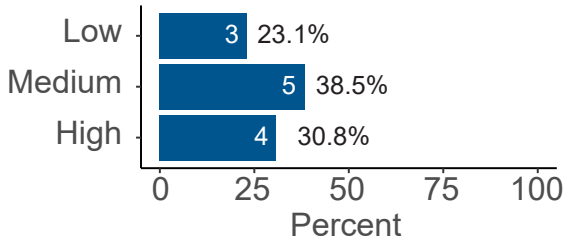
Research or monitoring



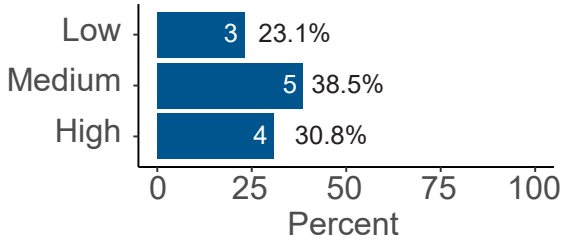
Education and outreach



Technical support



Fundraising

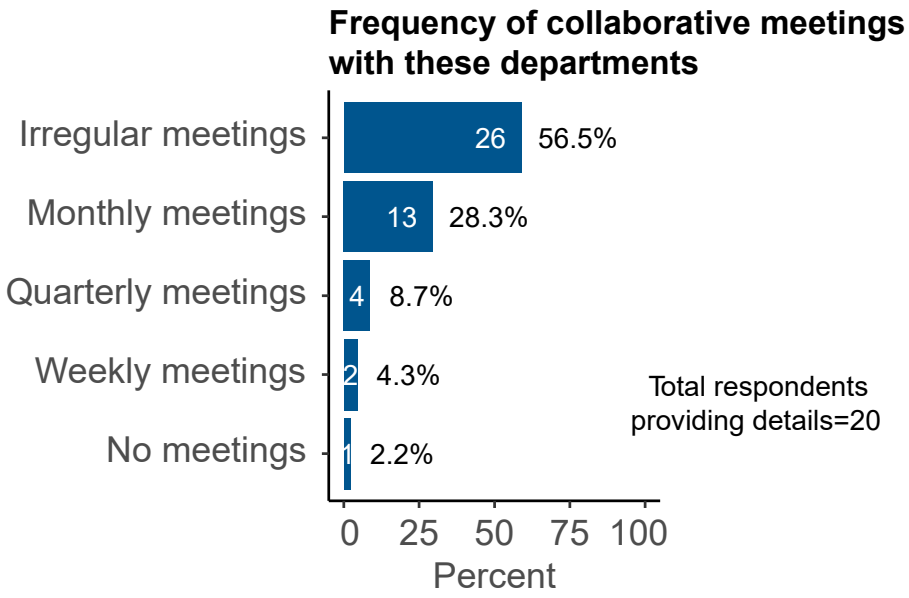


Appendix 6 - Internal Collaboration

Question: Are you aware of work being done in other departments at your jurisdiction that could affect sea level rise resilience? For example, consideration of sea level rise in emergency planning, infrastructure upgrades, etc. **(See main text for visualization).**

Question: What other departments are involved in work on sea level rise resilience? Please identify the departments, and choose the statement that best describes how often your departments collaborate on sea level rise resilience. **(See main text for the visualization of departments identified).**

20 Respondents from 15 Cities ▪ 5 Counties ▪ 0 Special districts



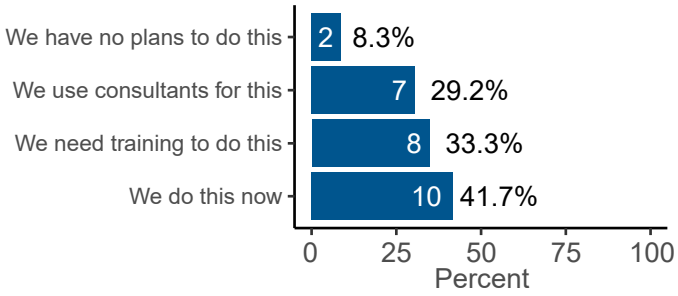
Caveats and notes on analysis:
Each respondent could provide details for up to 7 other departments that also work on sea level rise resilience, either independently or in collaboration with the respondent. The he barplot shows the breakdown of meeting frequency for respondents that reported meeting with one or more departments to work on sea level rise.

Appendix 7 - Technical Assistance

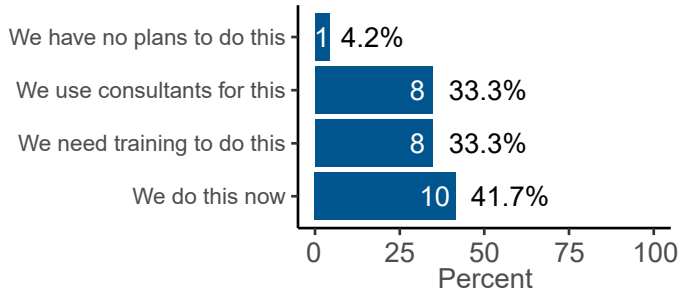
Question: What level of exposure/experience do staff in your department have using the following for sea level rise planning?

24 Respondents from 17 Cities ▪ 4 counties ▪ 2 Special districts

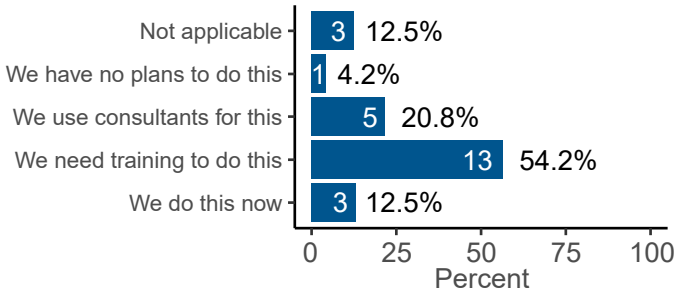
Using geospatial data



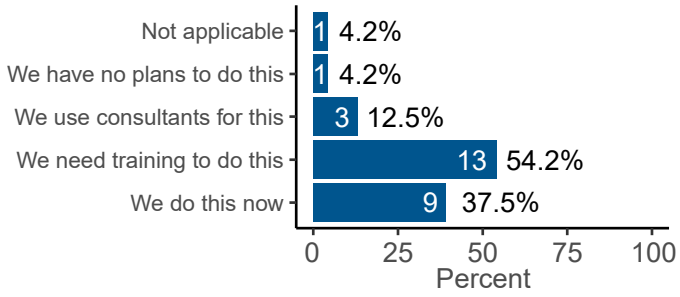
Applying GIS software and analysis



Adaptive management



Providing data to the public



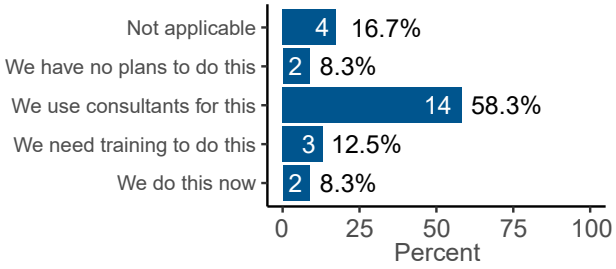
Caveats and notes on analysis:
Respondents are departments at a given jurisdiction; barplots here summarize responses from a single department at 17 cities, plus responses from two different departments at an 18th city. Respondents were offered the same set of ratings for each question, but only those chosen by at least one respondent are shown. Responses could mark more than one checkbox for a given topic - so it was possible to choose both "We need training to do this" and "We use consultants for this."

Appendix 7 - Technical Assistance (cont.)

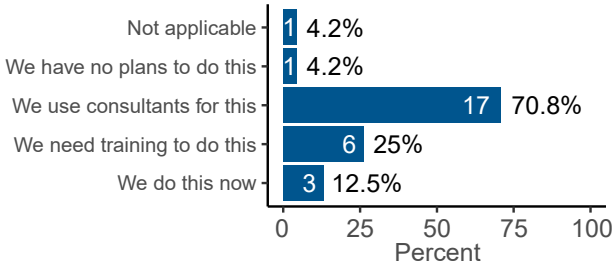
Question (part II): What level of exposure/experience do staff in your department have using the following for sea level rise planning?

24 Respondents from 17 Cities ▪ 4 Counties ▪ 2 Special districts

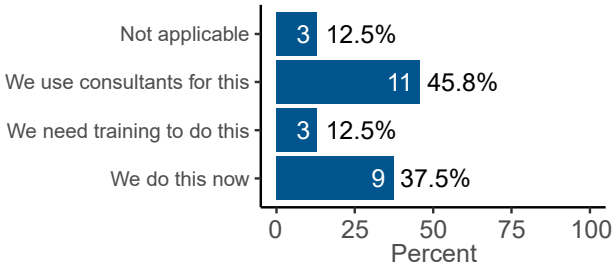
Using contamination data



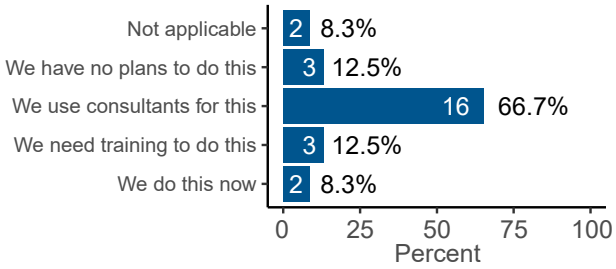
Designing nature based projects



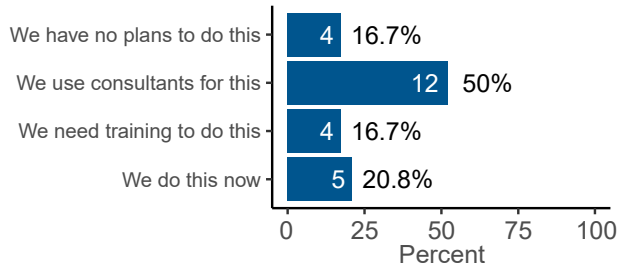
Using flood models



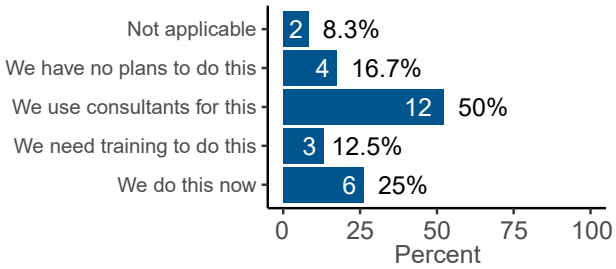
Using groundwater rise models



Using LiDAR data



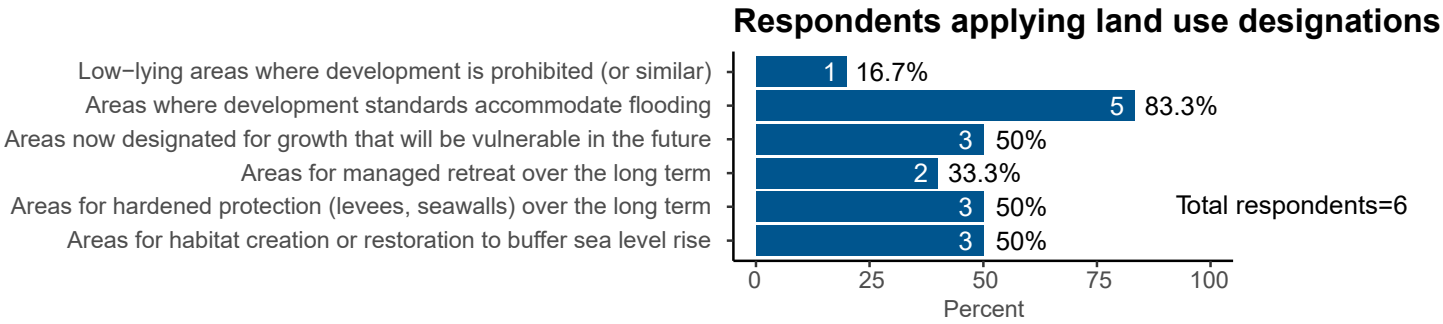
Monitoring & researching SLR impacts



Appendix 8 - Land Use Planning

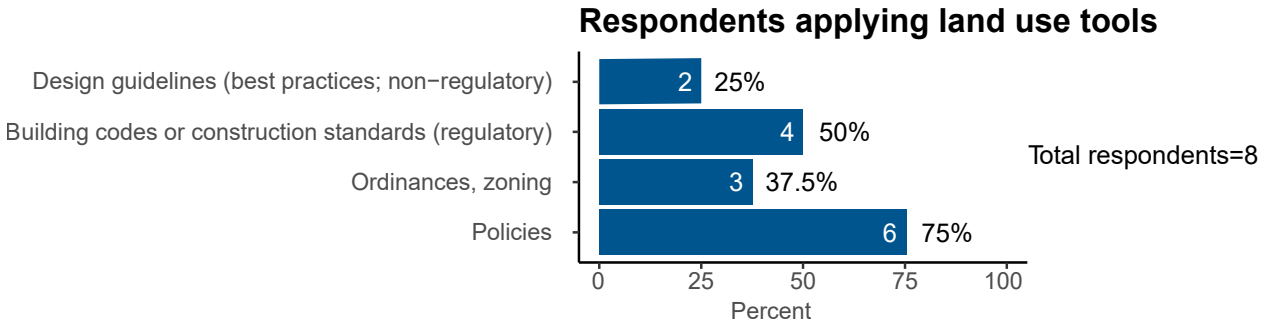
Question: Have you applied any of the following land use planning designations (or similar tools) in sea level rise adaptation planning? Please select all that apply.

6 Respondents from 5 Cities ▪ 1 Counties ▪ 0 Special districts



Question: Has your jurisdiction developed or applied any of the following to address sea level rise?

8 Respondents from 6 Cities ▪ 1 County ▪ 1 Special district



Caveats and notes on analysis:
Land use planning questions were optional, and each respondent could choose more than one tool or land use designation.

Appendix 9 - Full Survey Questions and Response Options

The subsequent pages show the full survey questions and response options provided to the respondents.

2021 Survey: Progress, Gaps, & Needs: Sea Level Rise Adaptation in the Bay Area

Housekeeping

1. Please provide your contact information and details for your jurisdiction and department below.
    - Text entry fields include:
        - Your name
        - Email
        - Phone
        - Jurisdiction
        - Department
        - Total staff in your department (full-time equivalents; estimates are fine)

Vulnerability

Vulnerability assessments usually involve a mapping effort for a set of sea level rise scenarios and present data on lands, physical assets, communities, resources, and networks that would be affected by those scenarios. Documented vulnerabilities may be summarized in a report or plan, or they may reside in a GIS database or other resource.

1. Where can the most up-to-date and comprehensive sea level rise vulnerability information for your jurisdiction be found? If in a report or plan, please provide the name of the document and a URL if possible. If your jurisdiction is not covered by a vulnerability assessment, please write in "None."
    - Text entry fields include:
        - Resource name
        - URL
        - Alternative contact, if we should follow up with someone else in your jurisdiction

2. Please indicate what sea level rise vulnerability data are available for your jurisdiction - choose all statements that apply.
    - Checkboxes include:
        - Vulnerability of lands and buildings
        - Vulnerability of natural resources and ecosystems
        - Vulnerability of disadvantaged communities and socially vulnerable groups
        - Vulnerability of jobs and the economy
        - Vulnerability of utilities and/or service providers
        - Vulnerability of shoreline public access and recreation
        - Vulnerability of resources or networks that are shared with neighboring jurisdictions (for example a shared electric grid or transit network)
        - We aren’t sure what the vulnerability data covers
        - We don’t have vulnerability information for our jurisdiction
    - A text entry field is also included:
        - Other (please specify):

3. If you are aware of any shortcomings in the available sea level rise vulnerability data, please describe below.

Adaptation Planning

Sea level rise adaptation plans mitigate impacts identified in a vulnerability assessment. Adaptation strategies may involve avoidance (for example, prohibiting development in low-lying areas), protection (building living shorelines or seawalls), or retreat (relocating vulnerable assets outside of threatened areas). Adaptation strategies may focus on impacts to lands, physical

assets, communities, resources, and networks within a jurisdiction's boundaries, but ideally also consider resources and networks that span multiple jurisdictions (for example, a shared electricity grid or transit systems).

1. If you have an adaptation strategy (either complete or under development) that outlines where, when, and how sea level rise adaptation efforts will be implemented in your jurisdiction, what vulnerabilities does it address? Please choose all that apply.
    - Multiple choice options include:
        - Vulnerable lands and buildings
        - Vulnerable natural resources and ecosystems
        - Socially vulnerable and disadvantaged communities
        - Vulnerable jobs and the economy
        - Vulnerable utilities and/or service providers
        - Vulnerable recreational resources
        - Vulnerable resources or networks that are shared with neighboring jurisdictions (for example a shared electric grid or transit networks)
        - We don't have an adaptation strategy, but we plan to develop one soon
        - We don't have an adaptation strategy and we have no plans to develop one
    - A text entry field is also included:
        - Other (please specify), or use this space to provide an alternative contact if we should follow up with someone else in your jurisdiction:

2. Please provide details about your adaptation strategy below - it's fine to leave sections blank if you don't know the answer.
    - Text entry fields include:
        - Document name
        - URL
        - Highest flood level protected against (specify whether values represent sea level rise, storm surge, or both)
        - Flood model used during planning (CoSMoS, etc.)
        - Source of sea level rise projections used (California State Guidance 2018, etc.)
        - Mapping tool used (ART Flood Explorer, Our Coast, Our Future, etc.)
        - Alternative contact, if we should follow up with someone else in your jurisdiction

3. If you have identified any shortcomings in the existing adaptation strategy, please describe below.

Barriers and collaboration

For the purpose of some questions in this section, we define community-based organizations (CBO's) as groups based in local communities, which may (or may not) be disadvantaged. Environmental justice communities (sometimes called frontline communities) are disadvantaged communities that experience disproportionate impacts from sea level rise, which can result from proximity to sources of contamination, lack of local funding for sea level rise adaptation measures, etc.

1. Please rate the following barriers as Very important, Important, Somewhat important, Not important, or Not applicable in terms of their impact on your ability to carry out effective sea level rise planning and adaptation in your jurisdiction.
    - Line items include:
        - Insufficient funds
        - Insufficient staff resources
        - Permitting obstacles

        - Lack of technical expertise
        - Lack of political leadership by elected officials
        - Competing priorities (for example COVID-19 or housing)
        - Distrust among stakeholders
        - Lack of public support for policies addressing sea level rise
        - Lack of coordination across internal departments
        - Lack of local policies or legislation providing a clear direction
        - Lack of state legislation providing a clear direction
        - Lack of federal legislation providing a clear direction
        - Lack of adequate scientific information
        - Uncertainty about the future extent of sea level rise
        - Uncertainty about how quickly sea level rise will happen
    - Next to each line item listed above, a "Rate" popup shows the following options:
        - Very important
        - Important
        - Somewhat important
        - Not important
        - Not applicable
    - A text entry field is also included:
        - Other (please describe):

2. If a need for new or better collaborative relationships poses a barrier for sea level rise planning in your jurisdiction, which relationships are needed? Please indicate needs below, and use the text box to describe factors that impede building, maintaining, or advancing these relationships.
    - Line items include:
        - Neighboring towns, cities or counties
        - Community-based organizations (CBO's)
        - Environmental justice communities
        - Private landowners
        - Freight rail
        - Public transit
        - Special districts, utility or service providers
        - Regional planning or regulatory agencies
        - State agencies
        - Federal agencies
        - Native American groups
        - Other
    - Next to each line item listed above, a "Need level" popup shows the following options:
        - High need
        - Medium need
        - Low need
        - Unsure
        - Not applicable
    - A text entry box is also included:
        - If Other please specify, and describe any factors that impede the relationships identified (for example, lack of funding, staffing, or suitable contacts; lack of consensus; etc.)

3. Who does your jurisdiction collaborate with now on sea level rise issues? Please identify any partners below.
    - Text entry boxes include:
        - Neighboring towns, cities or counties
        - Community-based organizations (CBOs)
        - Environmental justice communities

- Private landowners
- Freight rail
- Public transit
- Special districuts, utility or service providers
- Regional planning or regulatory agencies
- State agencies
- Federal agencies
- Native American groups
- Other

Funding for sea level rise planning and related activities

For the purposes of this survey, sea level rise planning and related activities could include conducting a vulnerability assessment, updating a plan, developing a community education program on sea level rise, partnering with community-based organizations, etc. Please restrict answers here to these or similar activities - the final section of the survey will focus on adaptation projects (such as stormwater upgrades, wetland restoration, levees, etc.), including their cost.

1. Since January 2017, has your jurisdiction spent money on sea level rise planning or related activities, including SB 379 compliance? Please consider staff and contracting costs when providing your response.
    - Multiple choice responses include:
        - Yes
        - No
        - Unsure
    - Alternative contact, if we should follow up with someone else in your jurisdiction

2. Since January 2017, have you used money that was raised locally within your jurisdiction to fund sea level rise planning or related activities? If yes, please indicate the source and a dollar amount (if known).
    - Line items include:
        - Local bonds
        - Local sea level rise tax
        - Local resiliency tax
        - Property taxes
        - Fees
        - Other
    - Next to each line item listed above, a “Response” popup shows the following options:
        - Yes
        - No
        - Unsure
    - Next to each line item listed above, a “Estimated dollar amount – if known” popup shows the following options:
        - Less than $5,000
        - Between $5,000 and $10,000
        - Between $10,000 and $50,000
        - Between $50,000 and $150,000
        - Between $150,000 and $500,000
        - More than $500,000
        - Unsure
    - A text entry field is also included:
        - Please name the funding source(s) if possible:

3. Since January 2017, have you received money from external sources to fund sea level rise planning or related activities in your jurisdiction? If yes, please indicate the source and a dollar amount (if known).
    - Line items include:
        - Regional government
        - State government
        - Federal government
        - Philanthropies or foundations
        - Corporate funding
    - Next to each line item listed above, a "Response" popup shows the following options:
        - Yes
        - No
        - Unsure
    - Next to each line item listed above, a "Estimated dollar amount – if known" popup shows the following options:
        - Less than $5,000
        - Between $5,000 and $10,000
        - Between $10,000 and $50,000
        - Between $50,000 and $150,000
        - Between $150,000 and $500,000
        - More than $500,000
        - Unsure
    - A text entry field is also included:
        - Please name the funding source(s) if possible:

Staffing for sea level rise efforts

For staffing questions, sea level rise planning and related activities could include conducting sea level rise-focused plan updates, project management, developing sea level rise education programs, building partnerships with neighboring jurisdictions or community-based organizations*, conducting research or monitoring, seeking funding, etc.
*We define community-based organizations (CBO's) as groups based in local communities, which may (or may not) be disadvantaged.

1. Since January 2017, has your city hired or reallocated personnel (staff, fellows, interns, or consultants) to work on sea level rise planning and related activities, including SB 379 compliance?
    - Multiple choice responses include:
        - Yes
        - No
        - Unsure
    - Text entry field
        - If we should follow up with someone else in your jurisdiction, please identify them here:

2. What additional personnel have you hired or reallocated to work on sea level rise since January 2017? For the Full-time equivalents popup, please respond based on time spent on sea level rise tasks (estimates are fine). Space is provided for up to 7 personnel - if more are involved, please describe in the text box below.
    - Line items include:
        - Personnel 1
        - Personnel 2
        - Personnel 3
        - Personnel 4
        - Personnel 5

        - Personnel 6
        - Personnel 7
    - Next to each line item listed above, a “Type” popup shows the following options:
        - Staff
        - Fellow or intern
        - Consultant
        - Other
        - Unsure
        - Next to each line item listed above, a “Department” popup shows the following options:
        - Planning
        - Public works
        - Parks and recreation
        - Sustainability
        - Other
    - Next to each line item listed above, a “Full-time equivalents – estimates are fine” popup shows the following options:
        - Less than 25%
        - Between 25-50%
        - Between 50-75%
        - Between 75-100%
        - Unsure
        - Not applicable
    - A text entry field is also included:
        - Additional details: Please specify Other departments, or write in contract amount If Consultant was selected above (estimates are fine).

3. If your department has identified needs related to sea level rise that are going unmet due to lack of capacity, do you have plans to hire staff, consultants, fellows, or interns to support these needs?
    - Multiple choice options include:
        - We have identified needs, and anticipate hiring before January 2022
        - We have identified needs, and anticipate hiring after January 2022
        - We have identified needs, but no forecast for hiring to meet those needs
        - We have not identified specific needs at this time
        - We have sufficient capacity now to meet our needs
    - A text entry field is also included:
        - Comments:

4. What sea level rise-related tasks do you hope to accomplish using new hires or consulting contracts? Please designate relevant tasks as High, Medium, or Low priority. For the purposes of this question, we define community-based organizations (CBO's) as groups based in local communities, which may (or may not) be disadvantaged. Environmental justice communities are groups based in disadvantaged communities that experience disproportionate impacts from sea level rise, which can result from proximity to sources of contamination, lack of local funding for sea level rise adaptation measures, etc.
    - Line items include:
        - Education and outreach on sea level rise
        - Forming partnerships with community-based organizations (CBO's) or community members
        - Efforts or programs to address disproportionate sea level rise impacts on environmental justice communities
        - Engagement with property owners and renters in high risk areas
        - Updating policies and implementation programs in the General Plan

        - Updating other planning documents (climate adaptation plans, vulnerability assessments, etc.)
        - More engagement with regional collaborations that focus on sea level rise (for example, BayCAN, Bay Adapt)
        - More engagement/collaboration with neighboring jurisdictions on sea level rise issues
        - Project management
        - Conducting research or monitoring
        - Fundraising
        - Providing technical support (engineering, architecture, GIS, hydrology, etc.)
        - Other
    - Next to each line item listed above, a "Priority" popup shows the following options:
        - High
        - Medium
        - Low
        - Unsure

Interdepartmental coordination

1. Are you aware of work being done in other departments at your jurisdiction that could affect sea level rise resilience? For example, consideration of sea level rise in emergency planning, infrastructure upgrades, etc.
    - Multiple choice options include:
        - Yes
        - No

2. What other departments are involved in work on sea level rise resilience? Please identify the departments, and choose the statement that best describes how often your departments collaborate on sea level rise resilience.
    - A "Department" popup shows the following options:
        - Planning
        - Public Works
        - Parks and Recreation
        - Sustainability
        - Other
    - A "Frequency" popup shows the following options:
        - No collaborative meetings
        - Irregular collaborative meetings
        - Quarterly collaborative meetings
        - Monthly collaborative meetings
        - Weekly collaborative meetings
    - A text entry field is also included:
        - If Other was chosen for Department please specify:

3. Please describe any perceived barriers to interdepartmental coordination in your jurisdiction.

Technical expertise

1. What level of exposure/experience do staff in your department have using the following for sea level rise planning?
    - Line items include:
        - GIS software and analysis
        - Geospatial data on community or municipal assets
        - Flood models (Our Coast, Our Future; ART)

        - Shallow groundwater rise models
        - Sources for and use of shoreline contamination data
        - Sources for and use of LiDAR data in analyses
        - Monitoring sea level rise effects on existing infrastructure
        - Designing/engineering nature-based infrastructure
        - Providing data to the public via an online portal or other resources
        - Adaptive management
    - Next to each line item listed above, five checkboxes are shown:
        - We know how to use this for sea level rise planning
        - We are interested in this but need training or assistance
        - We typically hire consultants for this
        - We have no plans to use or do this
        - Not applicable
    - A text entry field is also included:
        - If there are other tools or resources that your jurisdiction needs assistance to apply in sea level rise planning, please specify:

Optional questions on solutions

The final section of this survey includes two questions on land use planning and a set of questions focused on adaptation projects details. These details will be integrated into the Shoreline Adaptation Project Mapping effort, an extension of EcoAtlas to map gray infrastructure and hybrid projects alongside habitat restoration. This effort draws on work carried out by CHARG and BayCAN to track and classify shoreline projects, and will ultimately allow tracking of progress at both regional and local scales around the Bay shoreline. Bay Adapt and other regional planning groups will be able to use this resource to prioritize funding for adaptation projects around the region.

1. Are you willing to answer some additional questions?
    - Multiple choice options include:
        - Yes
        - No thank you, I would like to end the survey now

Land use

1. Have you applied any of the following land use planning designations (or similar tools) in sea level rise adaptation planning? Please select all that apply.
    - Checkboxes include
        - Areas for habitat creation or restoration to buffer sea level rise
        - Areas for hardened protection (levees, seawalls) over the long term
        - Areas for managed retreat over the long term
        - Areas now designated for growth that will be vulnerable to sea level rise in the future
        - Areas where development standards have been adjusted to accommodate flooding
        - Low-lying areas where development is prohibited (or similar)
    - A text entry field is also included:
        - Please write in other designations that your jurisdiction has applied:

2. Has your jurisdiction developed or applied any of the following to address sea level rise?
    - Checkboxes include
        - Policies
        - Ordinances, zoning
        - Building codes or construction standards (regulatory)
        - Design guidelines (best practices; non-regulatory)
        - Districts and assessment areas (for example special financing districts)

        - Land swap/transfer of development rights
    - A text entry field is also included:
        - Please specify any other land-use related tools or actions used to address sea level rise in your jurisdiction:

Projects

1. Since January 2017, has your jurisdiction spent staff time or money on sea level rise adaptation projects? Adaptation projects could include stormwater upgrades, wetland restoration, building levees, etc., as well as any planning activities required to implement such projects (for example feasibility or engineering studies).
    - Multiple choice options include:
        - Yes
        - No
        - Unsure
    - A text entry field is also included:
        - Comments:

2. Would you be willing to answer some additional questions about your project(s)? Project information will be entered into the Shoreline Adaptation Project Mapping effort, an extension of the EcoAtlas platform that will accommodate gray infrastructure and hybrid projects as well as habitat projects (partners on this effort include BayCAN, BCDC, CHARG, MTC/ABAG, SFBJV, SFEP, and SFEI). We estimate it may take ~5-10 minutes to provide details for each project (you will be given an opportunity to enter details for up to three projects).
    - Multiple choice options include:
        - Yes, I want to enter my project details
        - Maybe later
        - No thank you, I'd like to end the survey now
    - A text entry field is also included:
        - If a different person or department should provide these details, please provide contact(s) here:

3. Please name or describe the first project.

4. Please provide requested details for the project below.
    - Text entry fields include:
        - Total project cost (rough estimates are fine)
        - Highest flood level protected against (specify whether values represent sea level rise, storm surge, or both)
        - Flood model used during planning (CoSMoS, etc.)
        - Source of sea level rise projections used (NRC 2012, OPR California State Guidance 2018, etc.)
        - Mapping tool used (ART Flood Explorer, NOAA Sea Level Rise Viewer; Our Coast, Our Future, etc.)

5. Please enter details for the project by choosing the best response from menus below.
    - A "Project Type" popup shows the following options:
        - Land acquisition
        - Grey infrastructure
        - Green/gray infrastructure (hybrid)
        - Habitat restoration/creation
        - Unsure
    - A "Project Status" popup shows the following options:
        - Construction completed

        - Construction in progress
        - Construction planned
        - Permitting
        - Planning
        - Proposed
        - Unsure
    - A “Pilot/Demonstration Project?” popup shows the following options:
        - Yes
        - No
        - Unsure

6. What functions and benefits is the project intended to provide? Check all that apply.
    - Checkboxes include
        - Flood or erosion control
        - Habitat restoration
        - Watershed protection
        - Water quality improvement
        - Transportation
        - Shoreline public access or recreation
        - Housing or jobs
        - Emergency preparedness
        - Remediation/cleanup
        - Protect environmental justice communities
        - Unsure
    - A text entry field is also included:
        - Other functions or benefits (please specify):

7. What project activities will provide these functions and benefits? Check all that apply.
    - Checkboxes include
        - Building upgrades
        - Elevate land
        - Flood walls and berms
        - Elevate or realign transportation
        - Seawalls
        - Bulkheads
        - Revetments and riprap
        - Levees and dikes
        - Tide gate
        - Storm drain
        - Detention basins
        - Channel/spillway/bypass channel
        - Polder management
        - Ecotone levees
        - Migration space preparation
        - Creek to baylands reconnection
        - Green stormwater
        - Infrastructure
        - Sediment removal
        - Estuarine wetland restoration/creation
        - Beach restoration/creation
        - Subtidal habitat restoration/creation
        - Nearshore reef restoration/creation
        - Unsure
    - A text entry field is also included:
        - Other activities (please specify):

8. How was the project funded? Please write in the name of the funding source, and the dollar amount or proportion of project cost covered (rough estimates are fine).
    - Text entry fields include:
        - Local bonds
        - Property taxes
        - Other local taxes
        - Regional funds or grants
        - State funds or grants
        - Federal funds or grants
        - Philanthropies or foundations
        - Corporate funding
        - Development agreements
        - Public/private partnerships
        - Private development
        - Other sources

9. Is your jurisdiction working on this project with staff in neighboring jurisdictions, or regional, state, or federal agencies? If yes, please specify.

10. Is your jurisdiction working with any community-based partners on this project? If yes, please specify.

11. Do you have an additional project to enter?
    - Multiple choice responses include:
        - Yes
        - No, I'd like to end the survey now
    - A text entry field is also included:
        - Comments: