
Rising to the Challenge

Results of the 2011 California Coastal
Adaptation Needs Assessment

Bay Area/Delta Region

Compiled by Marika Schulhof

University of Southern California Sea Grant

ACKNOWLEDGEMENTS

We would like to thank, first and foremost, the 594 individuals who responded to this survey. The survey was initiated and developed in collaboration with 15 organizations based in California, who share an interest in the sustainable management and stewardship of the state's coastal and marine resources. We thank them for their participation, collaborative spirit, and for useful feedback on earlier drafts of the survey instrument and this analysis. We thank the six individuals who tested the 2011 survey instrument and provided critical feedback.

REGIONAL SUB-REPORTS

The data collected in the California Coastal Adaptation Needs Assessment were analyzed separately in regional sub-reports for the four coastal California regions surveyed: Northern, Bay Area/Delta, Central, and Southern. In the four regional sub-reports, graphs and charts were generated combining data for all respondent types in each region (city and county; state, federal and regional; elected officials; NGO; and private industry and environmental consultants). The regional analyses also include text responses, which were not included in the full report. The regional sub-reports can be accessed at: <http://www.usc.edu/org/seagrant/research/survey.html>

REPORT CITATION

Bay Area/Delta Region Results:

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Statewide Report:

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The National Sea Grant College Program is a national network of 32 programs dedicated to serving citizens in coastal communities throughout the Nation. Administered through the National Oceanic and Atmospheric Administration (NOAA), Sea Grant is the Agency's primary university-based program dedicated to helping citizens utilize scientific information to support a vibrant economy while ensuring ecological sustainability.

The Center for Ocean Solutions (COS) is a collaboration among Stanford's Woods Institute for the Environment and Hopkins Marine Station, the Monterey Bay Aquarium and the Monterey Bay Aquarium Research Institute. Across these institutions, COS draws from about 80 scholars, researchers and educators who work on coastal and ocean ecosystems in the natural, physical and social sciences. COS also works with experienced conservation practitioners and policy experts. Located at Stanford and in Monterey, California, COS is uniquely positioned to leverage expertise and develop practical solutions to the most urgent and important ocean conservation problems.

SURVEY COLLABORATIVE

California Coastal Commission

California Nevada Applications Program at the Scripps Institution of Oceanography, University of California, San Diego through the NOAA Regional Integrated Sciences and Assessment Program

California Ocean Protection Council

California Ocean Science Trust

California Sea Grant College Program

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Coastal Services Center, National Oceanic and Atmospheric Administration

Gulf of Farallones National Marine Sanctuary

San Francisco Bay Conservation and Development Commission

San Francisco Bay National Estuarine Research Reserve

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INTRODUCTION

With more than 1,100 miles of open ocean coastline and another 1,000 miles of shoreline along San Francisco Bay, and hundreds more miles of embayments, the range of coastal management challenges, as well as approaches to managing coastal climate change risks, is diverse. It was thus important to determine whether the survey respondents adequately represented California’s southern, central, northern and bay regions and the different types of coasts found in the state. Forty-three percent of respondents are from southern California, including Santa Barbara, Ventura, Los Angeles, Orange and San Diego counties. Thirty-seven percent of respondents work in the Bay/Delta Region, which includes the 12 counties of Sonoma, Napa, Solano, Sacramento, Marin, San Francisco, Contra Costa, Alameda, San Joaquin, Santa Clara, San Mateo, Santa Cruz.⁸ The remaining respondents are equally divided between counties in central California (12%, Monterey and San Luis Obispo) and northern California (12%, Del Norte, Humboldt, Mendocino, Sonoma). Notably, each coastal county is represented in the survey by at least one respondent (Map 1).

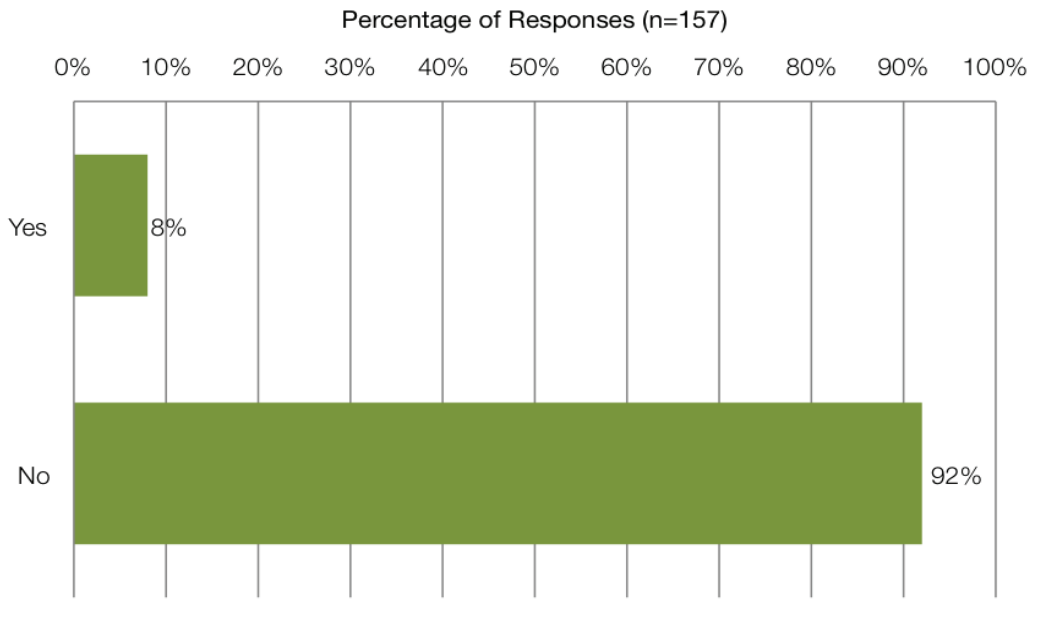
The survey population captured in our survey is thus representative of all California’s major coastal regions with the most populated coastal regions of the state (southern California and the San Francisco Bay region) most strongly represented by survey respondents. In terms of respondents’ job responsibilities, nearly three-quarters of participants are planners, environmental specialists, or wildlife/natural resource managers, while engineers, water resource managers, emergency or flood district managers and others make up the remaining portion. While obviously an uneven distribution, those most directly involved in long-term planning (such as for climate change) are well represented here. Moreover, this survey – contrary to its 2005/2006 predecessor – includes individuals from all levels of government, reflecting the complex nature of coastal management and adaptation planning. The only group clearly missing is Tribal communities, and more efforts need to be made in the future to reach that particular population. Based on this review, we conclude that survey responses are adequately representative of the state of affairs in California.



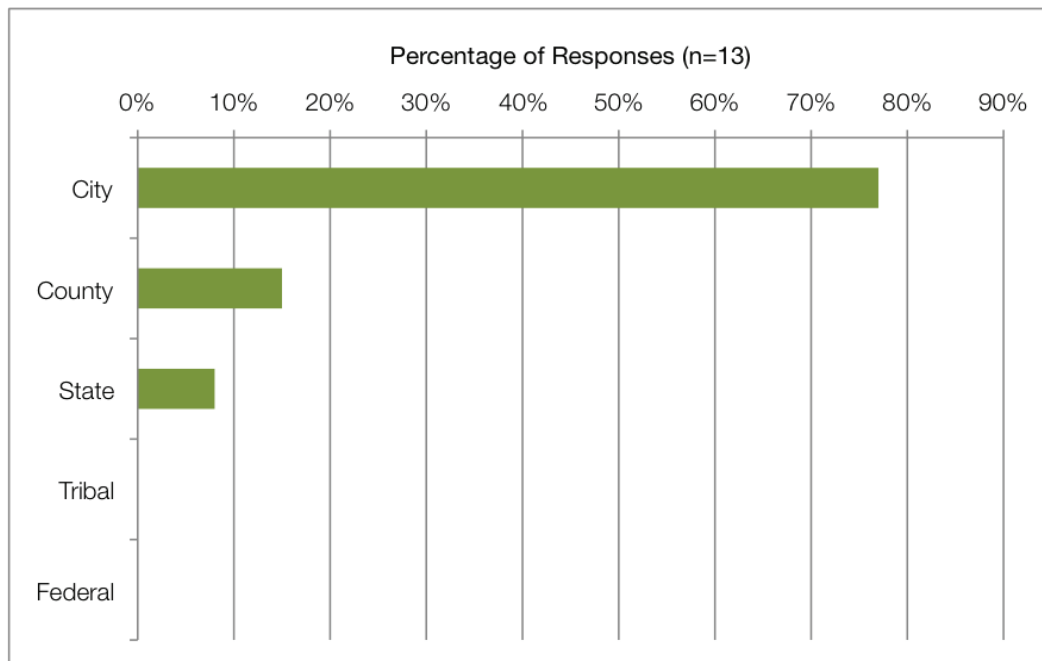
Map 1. Locations of respondents. The identity of survey respondents was kept anonymous unless they chose to provide their contact information. This map was developed using this contact information and is therefore not reflective of the respondent population as a whole. Rather, the map provides a glimpse of the geographic distribution of some of the survey respondents (n=59 of 594 survey respondents).

PART I: SURVEY POPULATION

1. Please indicate if you are an elected official.



2. If you responded that you are an elected official, please indicate the governmental/organizational sector in which you work.

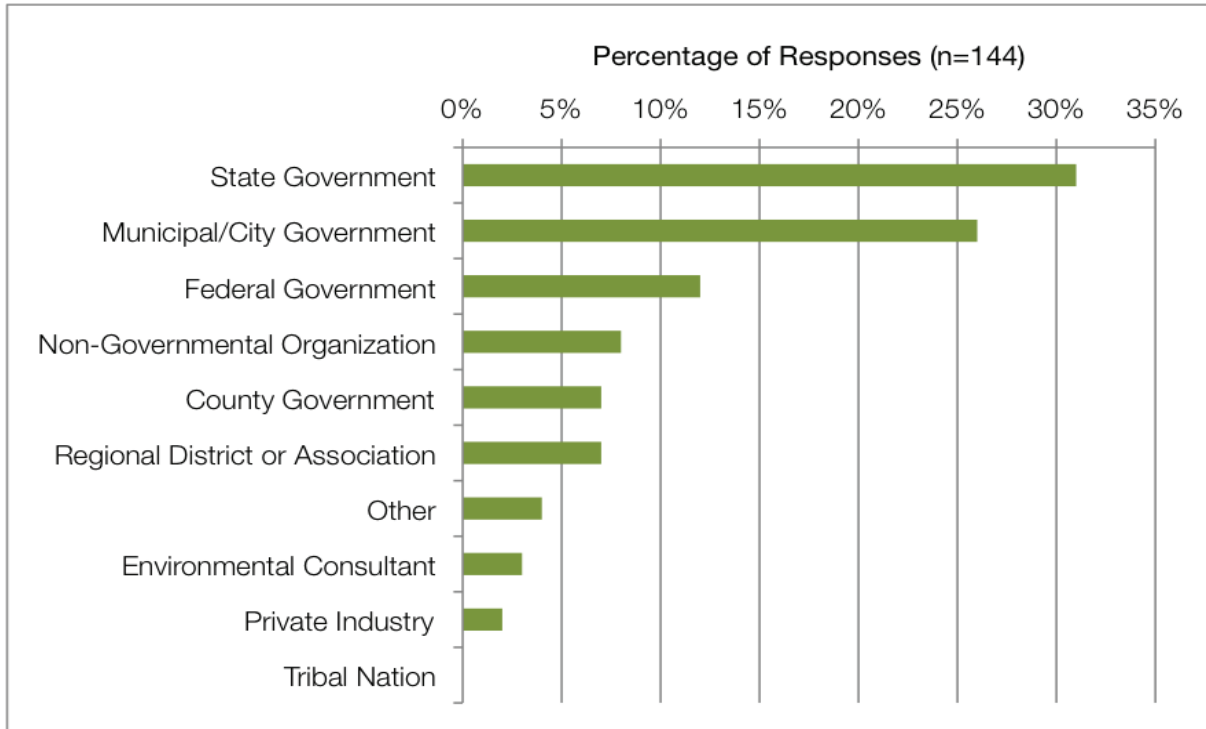


3. Please indicate in which elected office you serve.

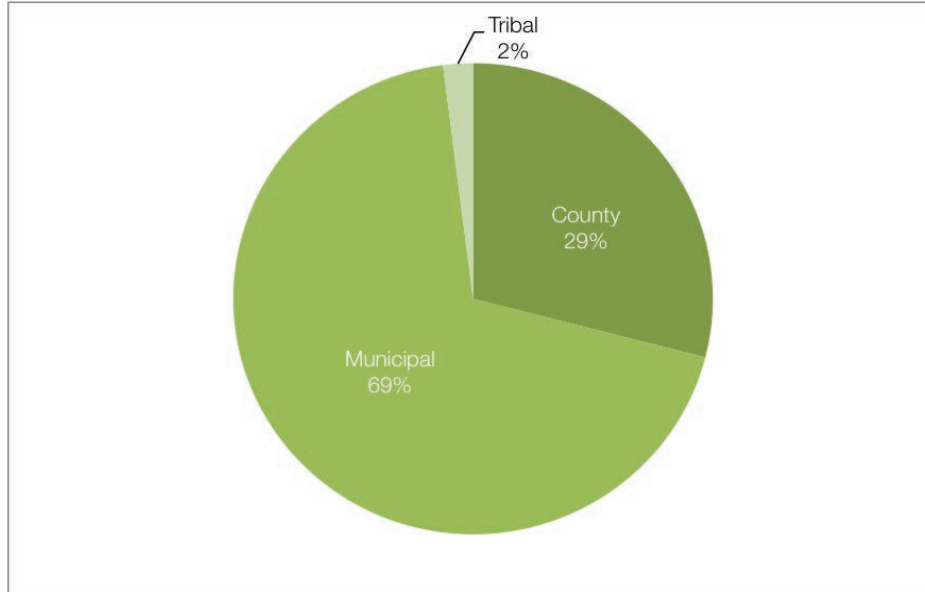
Elected Official Respondents

Supervisor
City Council (3)
Town Council
County Board of Supervisors
Mayor (2)
Councilmember

4. If a non-official, please indicate the governmental/organizational sector in which you work.

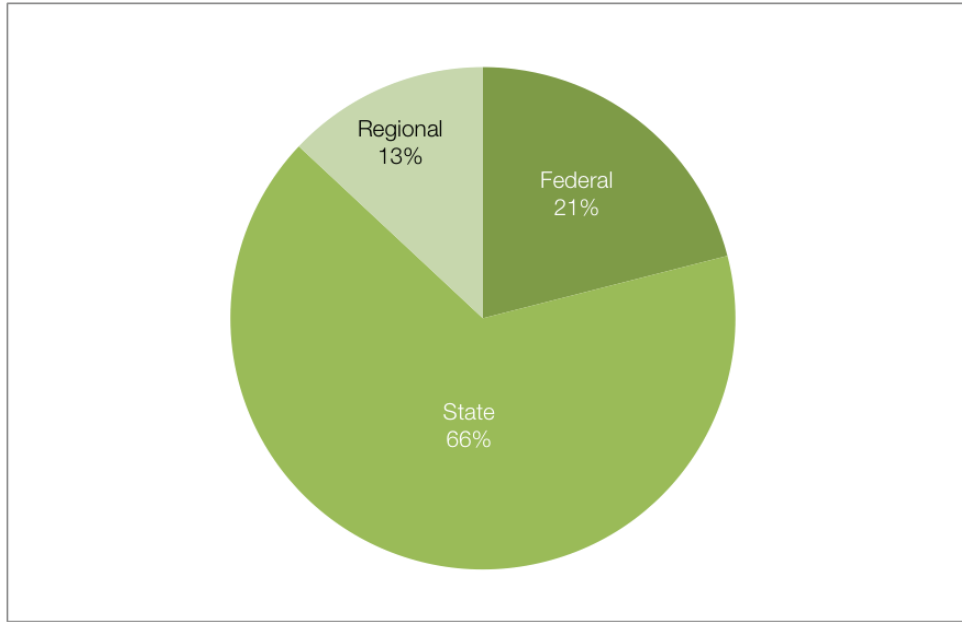


5. Please select your jurisdiction.

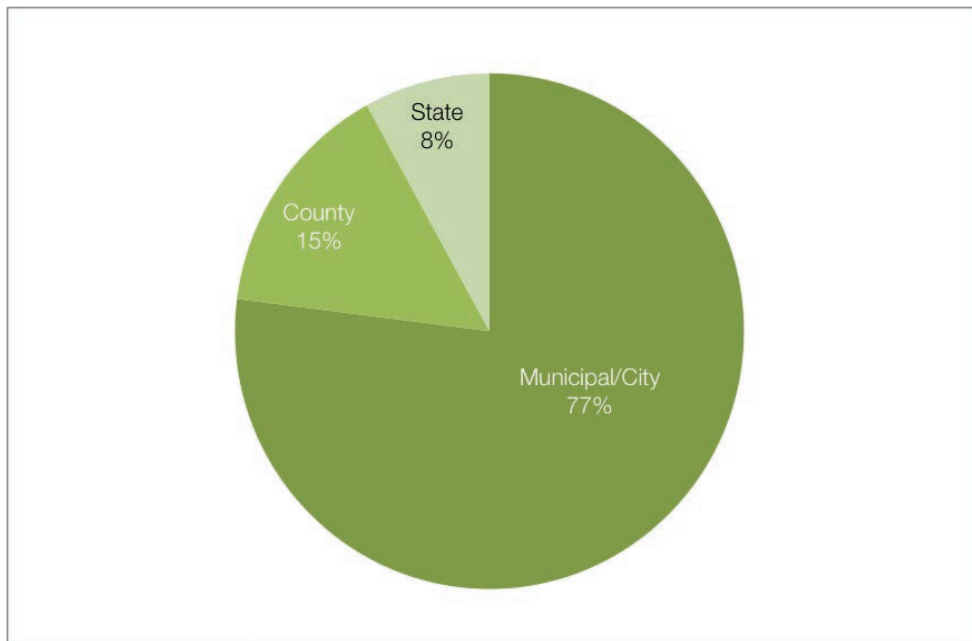


City/County Respondents
(n=51)

5. Please select your jurisdiction. (cont'd)

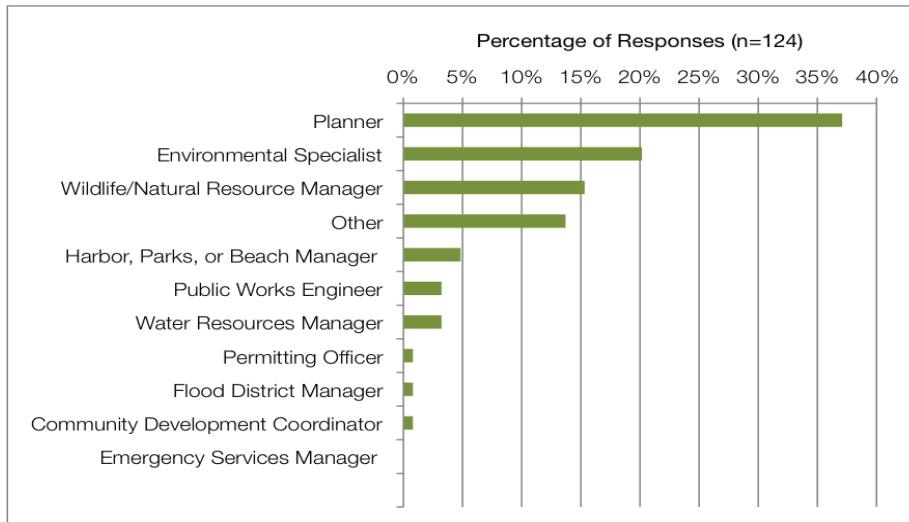


State, Federal & Regional Respondents
(n=67)

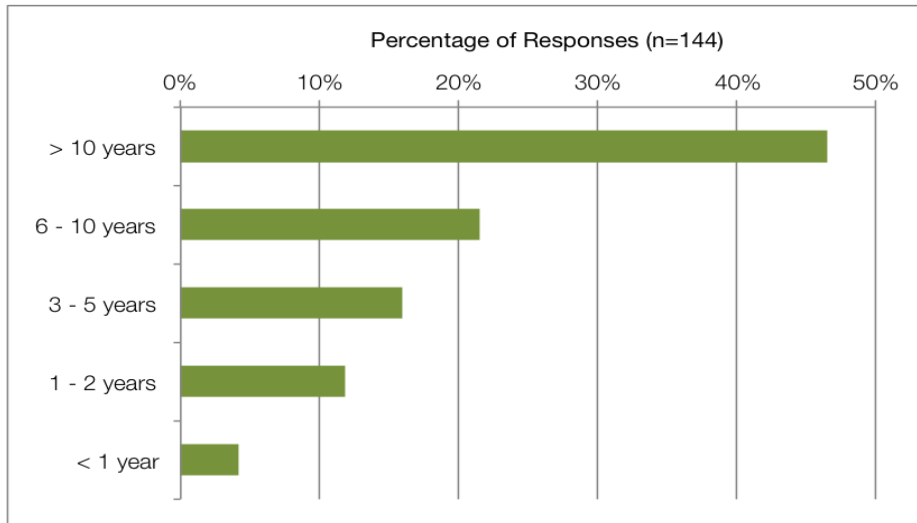


Elected Officials
(n=13)

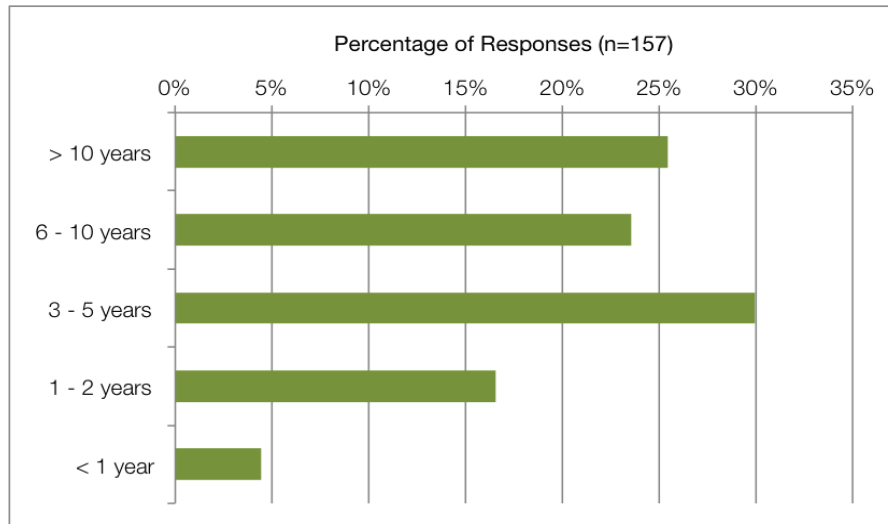
6. Please indicate what type of position you hold in your organization.



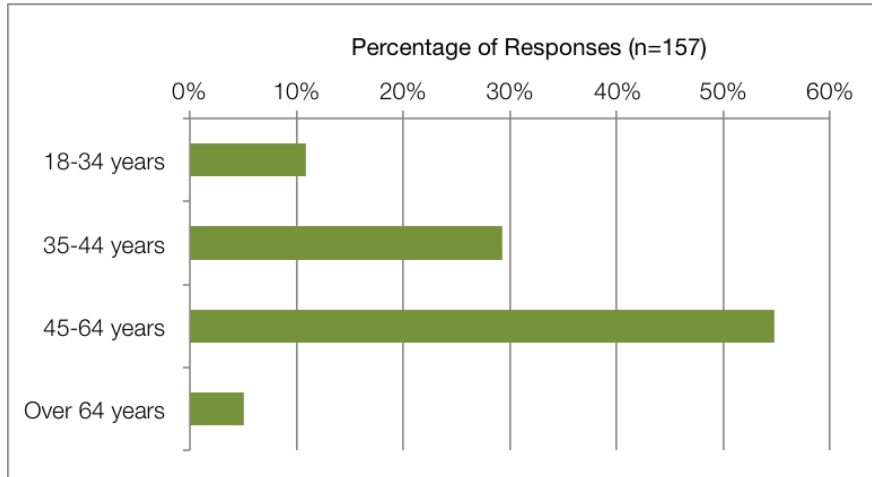
7a. How many years have you been employed by your organization?



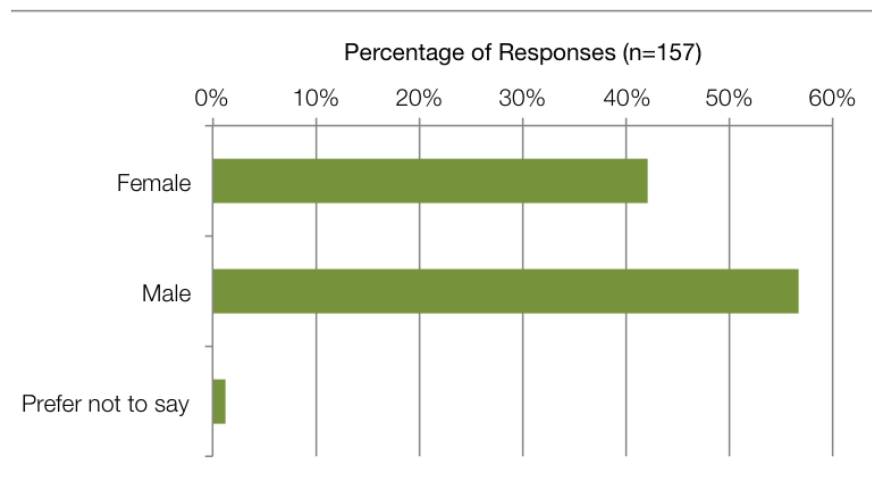
7b. How many years have you held your current position?



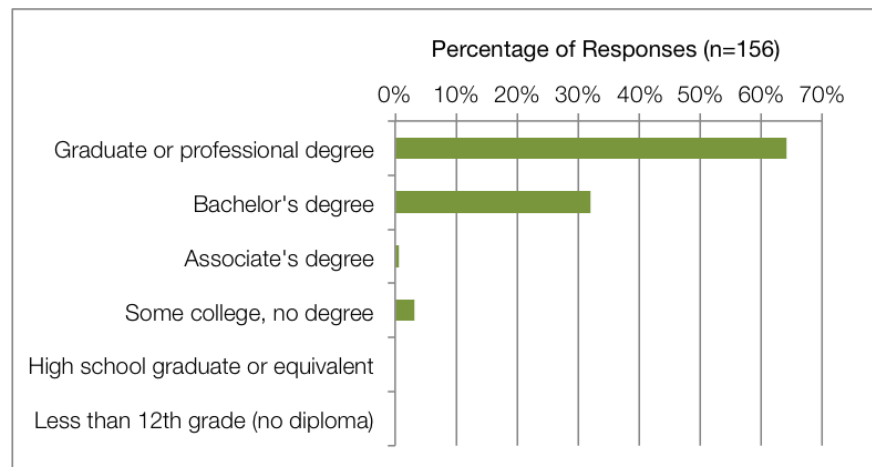
8. What is your age?



9. What is your gender?



10. What is the highest level of education you have completed?

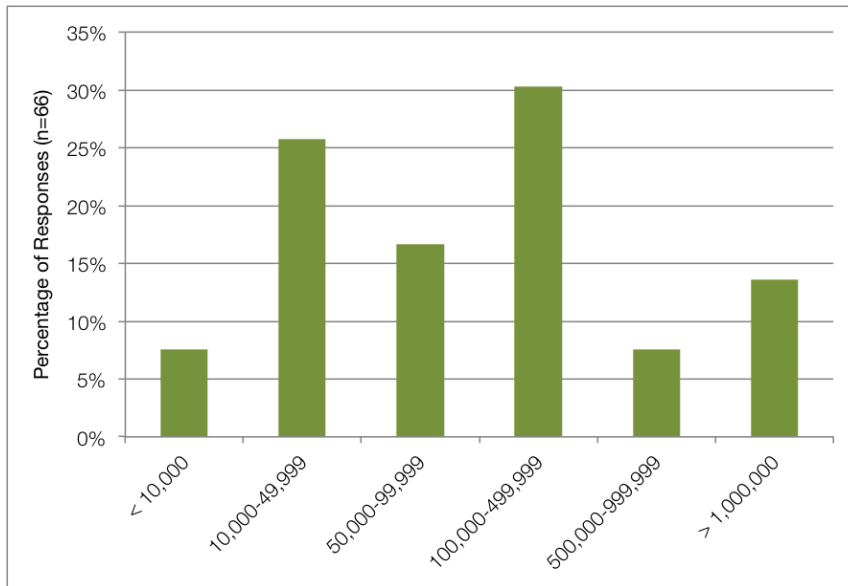


PART: CURRENT COASTAL MANAGEMENT CHALLENGES IN CALIFORNIA

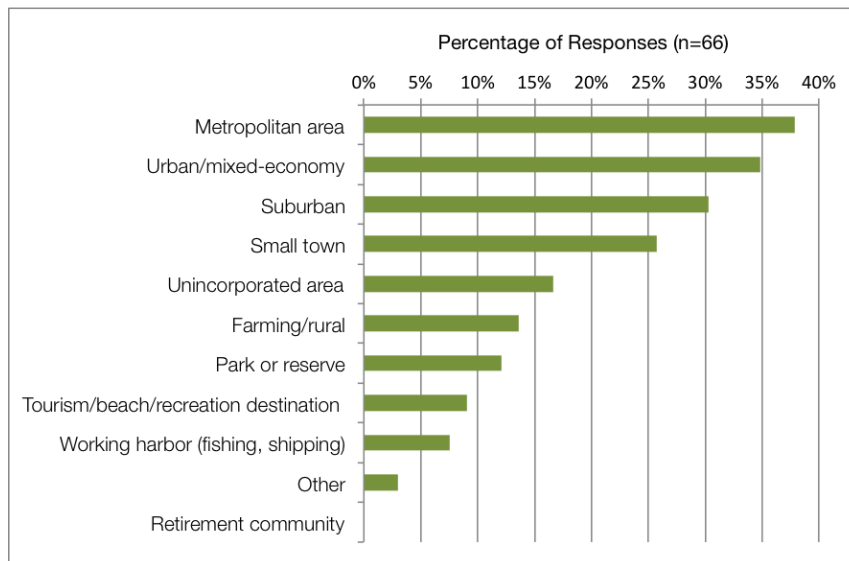
11. What is the approximate length (miles) of the shoreline that you manage or are concerned about in your work (ie., entire length of coastal waterfront, including ocean, bay, lagoon, and estuarine shorelines, within your jurisdictional limits)?

Respondent Category	Mean (\pm Standard Deviation)	Median	Mode	n
City/County	27 (54)	9	10	35
Regional/State/Federal	658 (607)	500	1100	50
Elected Officials	15 (30)	4	4	10

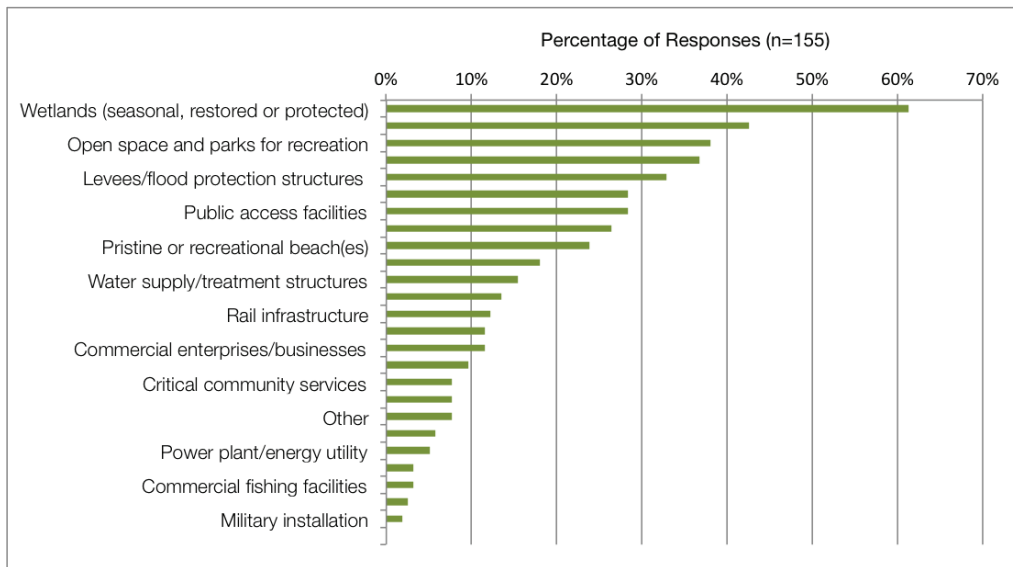
12. What is the approximate size of the population of the community in which you work?



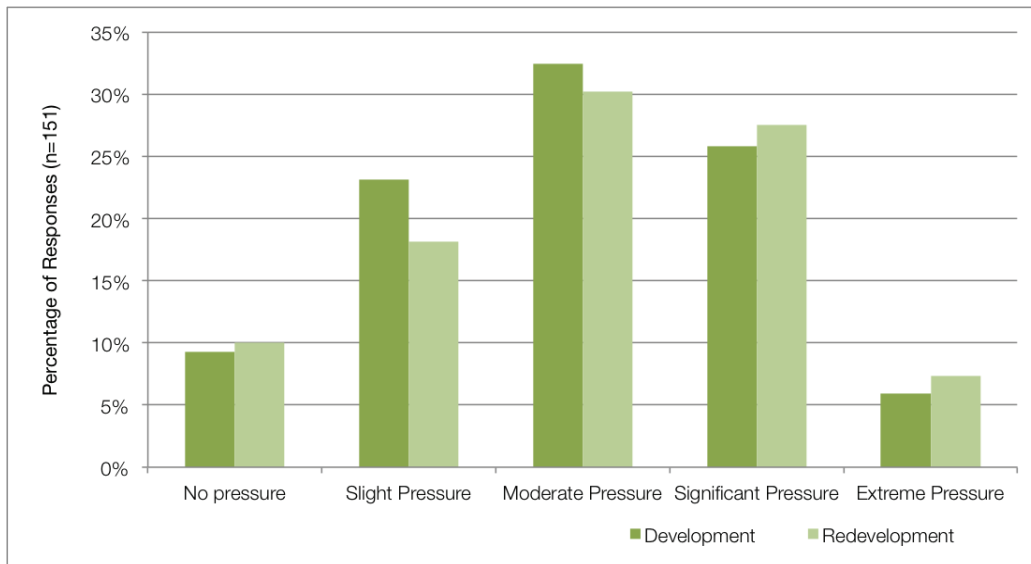
13. What characteristics best describe the community in which you work?



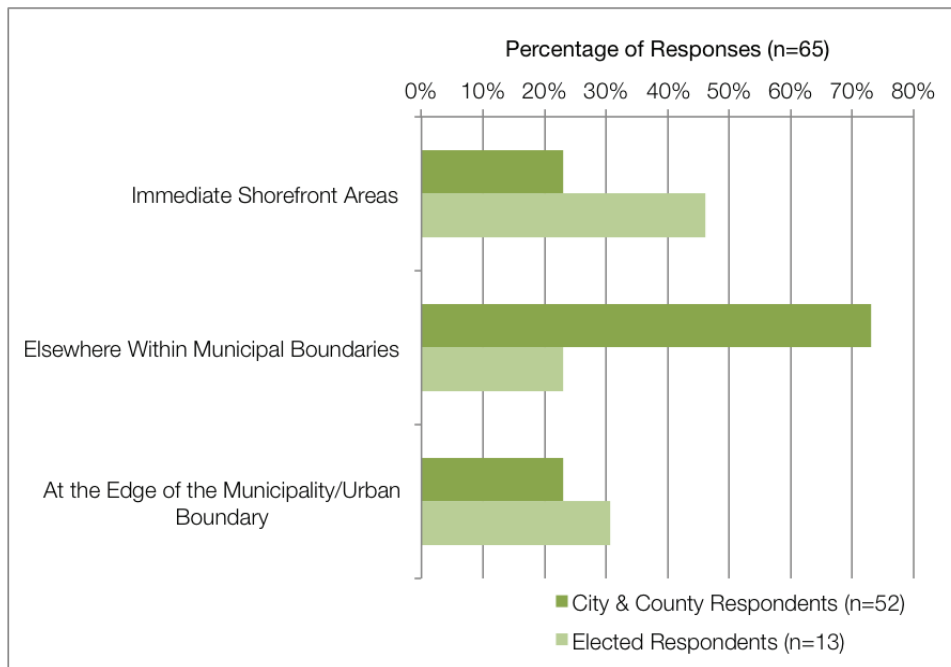
14. What are the predominant types of sensitive infrastructure, development, or habitats are located in the immediate shorefront areas (i.e., in the 100-year floodplain, along bluffs/cliffs) in the area that you manage? (Please select only the top 5)



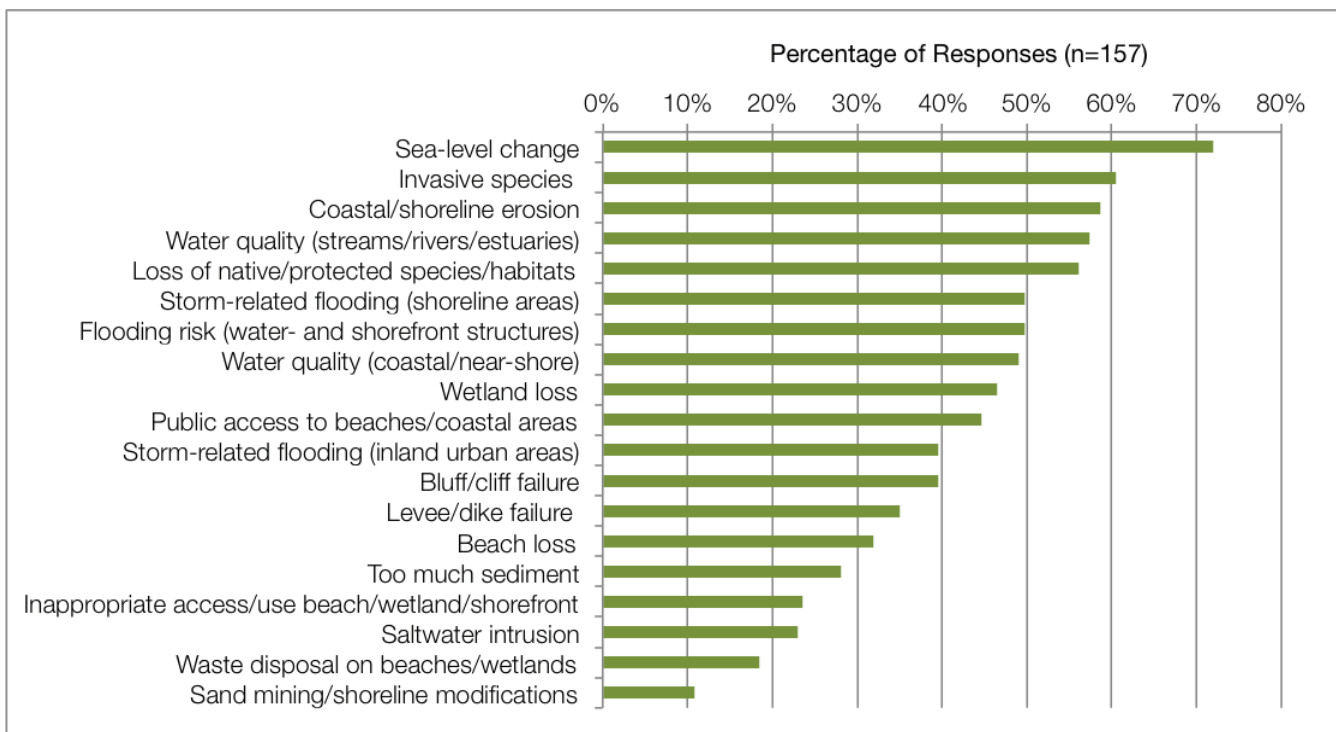
15. How would you describe the degree of development/redevelopment pressure occurring in your community or region?



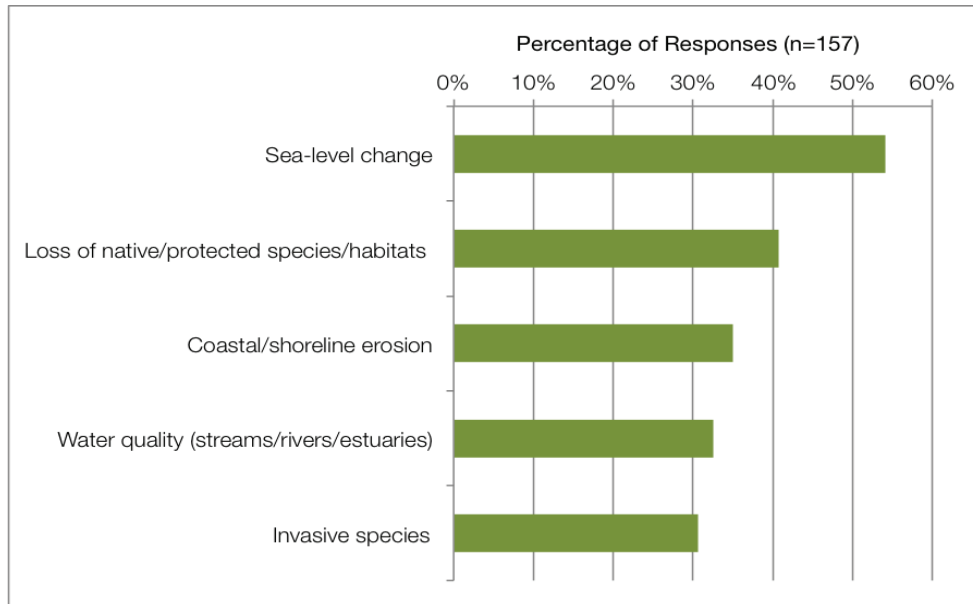
16. Where do you see the greatest development pressure at present?



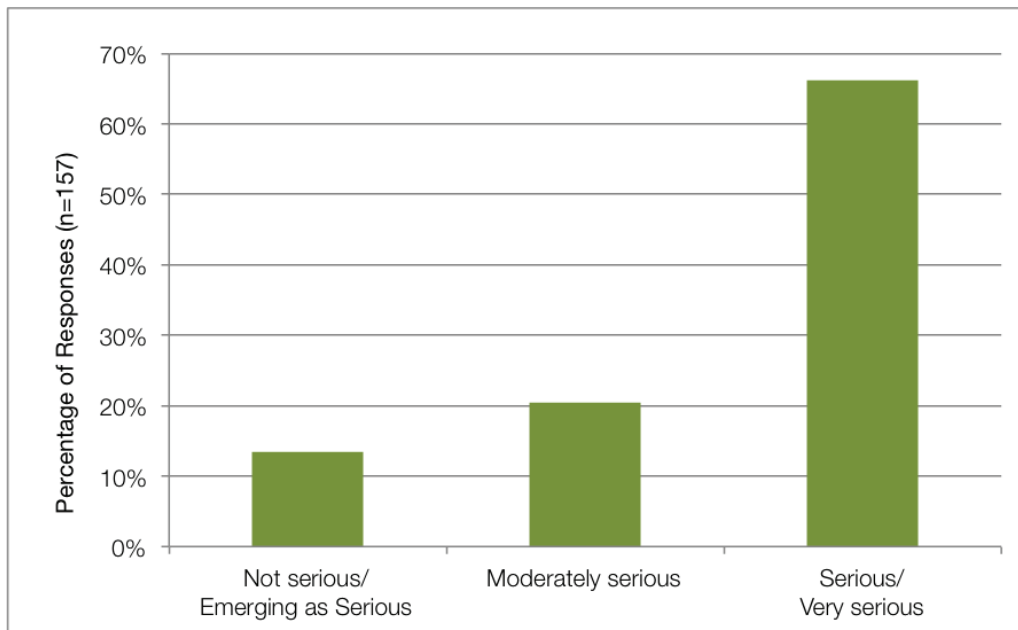
17. What type(s) of coastal management challenges does your community currently face?



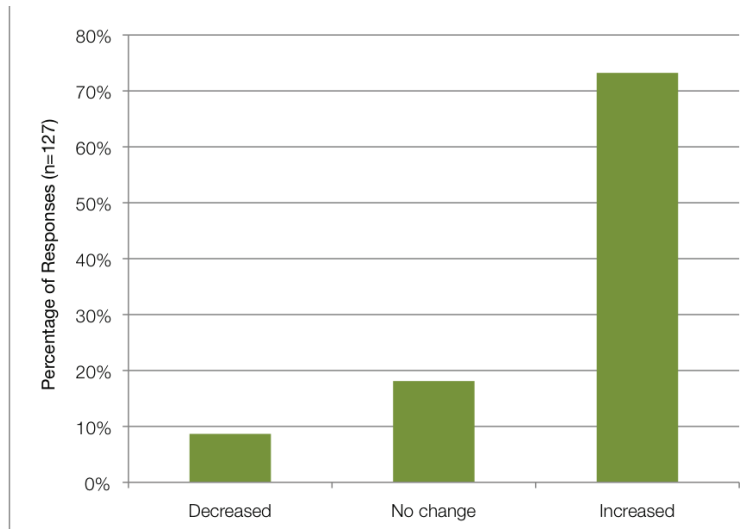
18. Of the challenges selected in Question 19, which do you consider the top five most challenging in your community at present?



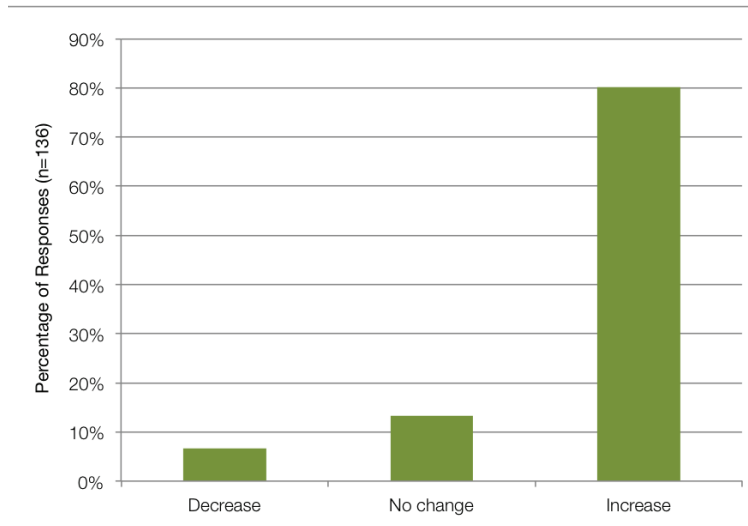
19. How serious would you consider this top coastal management challenge?



20a. How has the severity of this top management challenge changed in your community over the past 5 years?



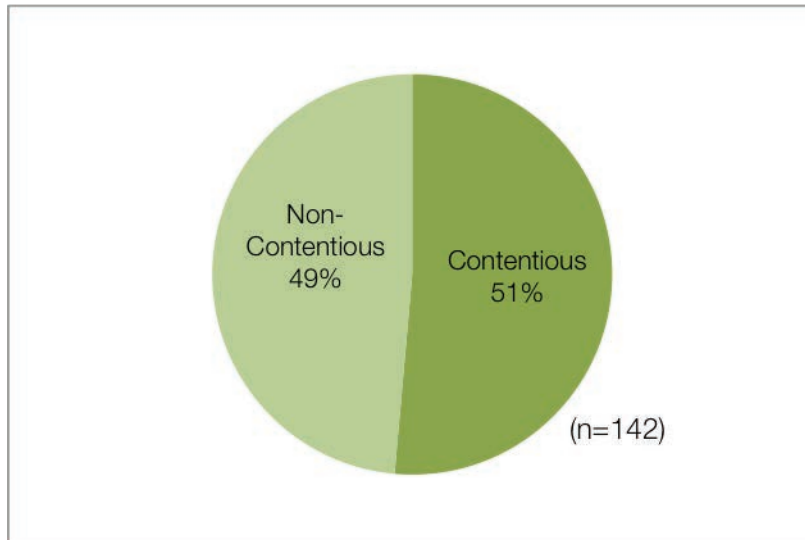
20b. How do you expect the severity of this top management challenge to have changed in your community in 5 years from now?



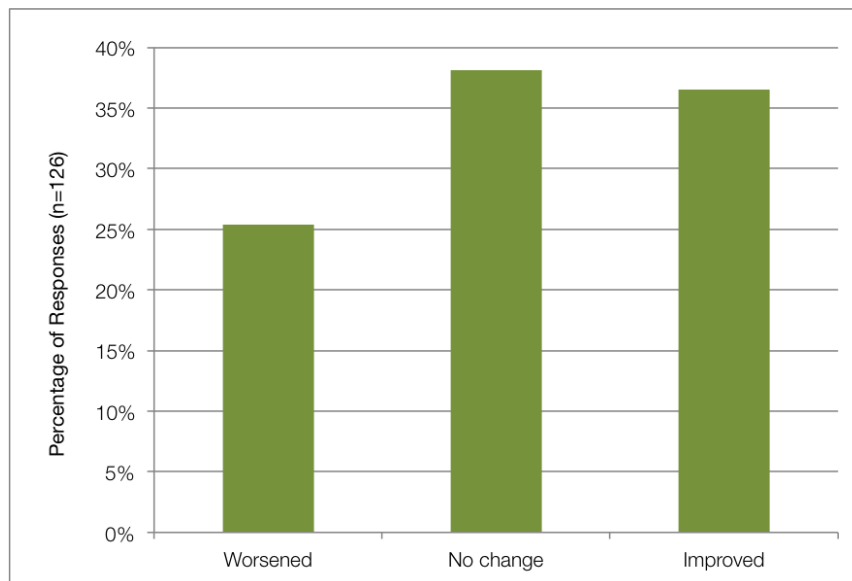
20c. Which are the top three groups of stakeholders involved in your top coastal management challenge?

Respondent Type	Top 3 Stakeholders
City/County	Local governments (n=31) State agencies/commissions (n=18) Environmental advocacy groups (n=18)
Regional/State/Federal	State agencies/commissions (n=50) Federal agencies/departments (n=35) Local governments (n=32)
Elected	State agencies (n=8) Commissions & Local Governments (n=8) Environmental advocacy groups (n=5)
NGO	Local governments (n=9) State agencies/commissions (n=8) Federal agencies/departments (n=6)

21a. How would you characterize the current political atmosphere around your top management challenge?

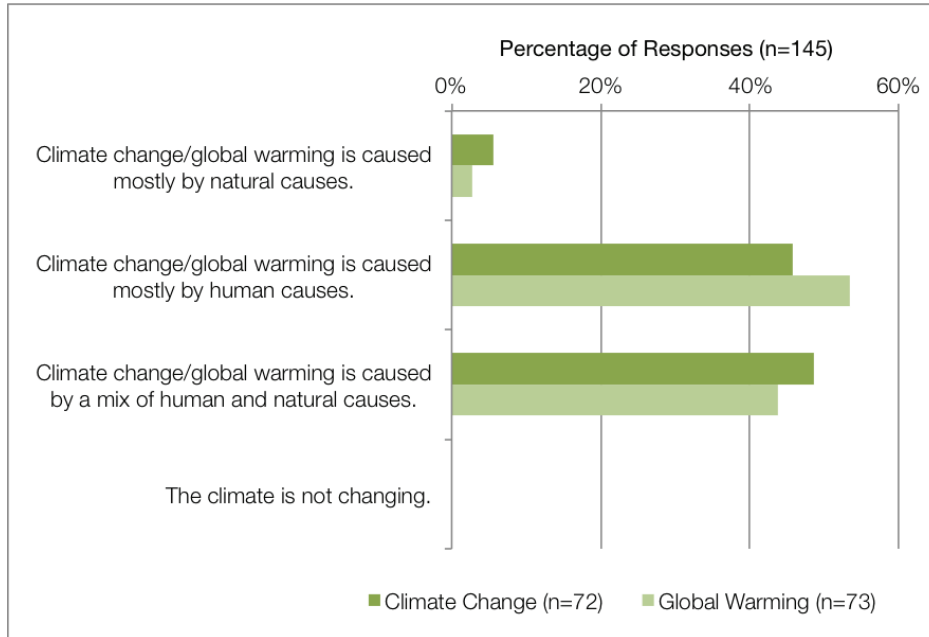


21b. How has the current political atmosphere around your top coastal management challenge changed over the past 5 years?

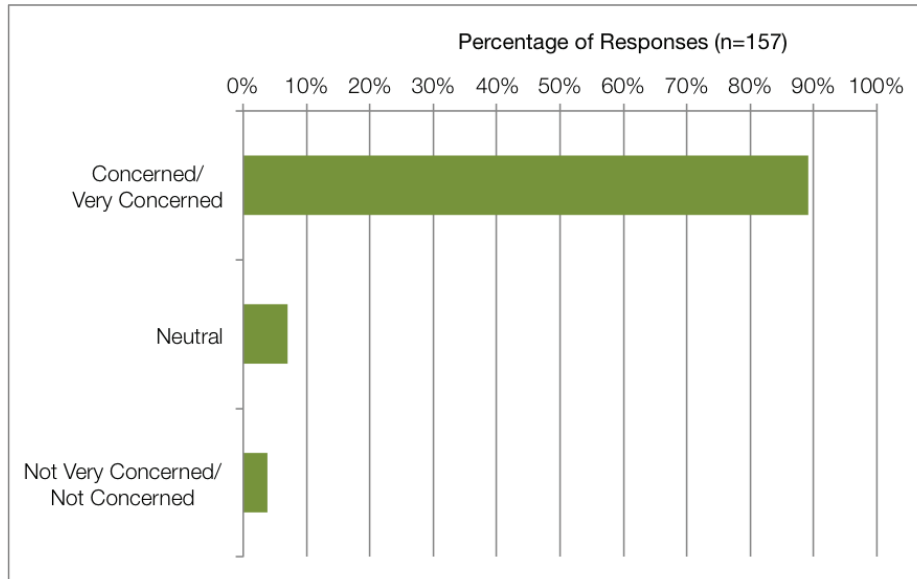


PART III: COASTAL ADAPTATION TO CLIMATE CHANGE

22. Please indicate which of the following statements comes closest to your opinion of climate change or global warming.

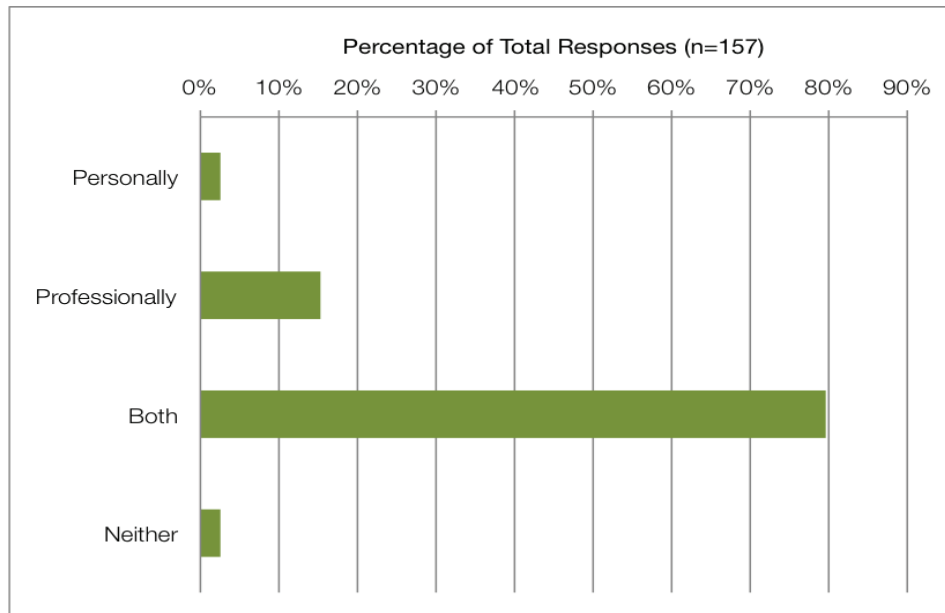


23. What is your personal level of concern about climate change/global warming?

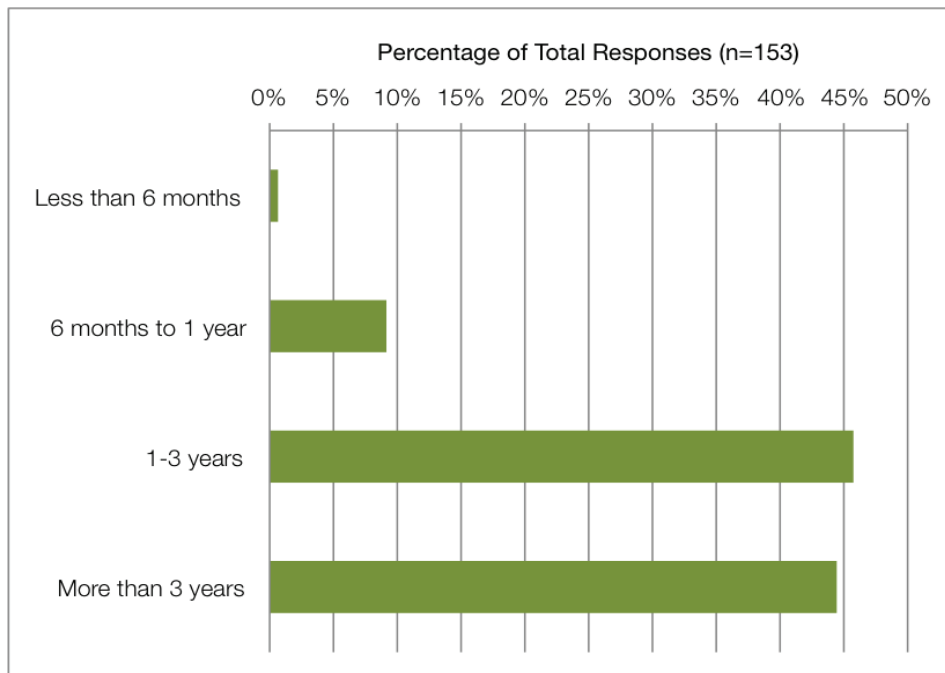


78 respondents received surveys using the term "climate change"
79 respondents received surveys using the term "global warming"

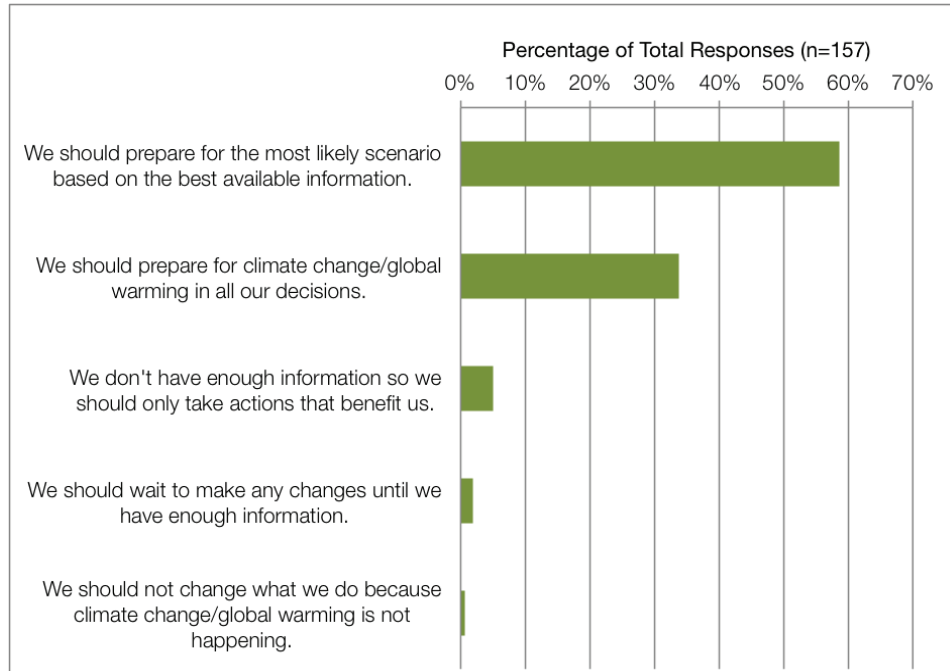
24a. Have you ever, personally or in your work, considered the potential impacts of climate change on your community or region?



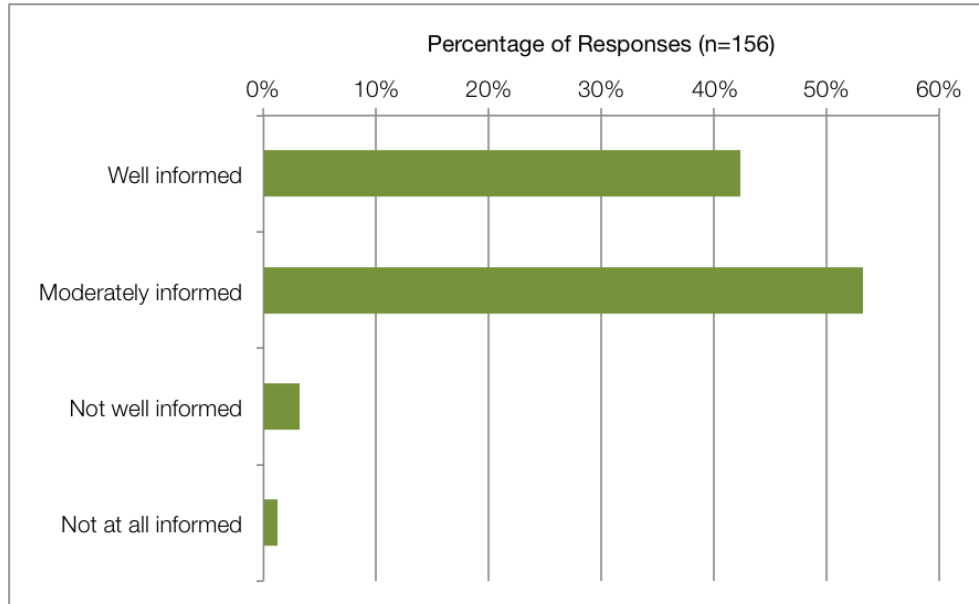
24b. If you have begun considering the impacts of climate change in your work, approximately how long have you done so?



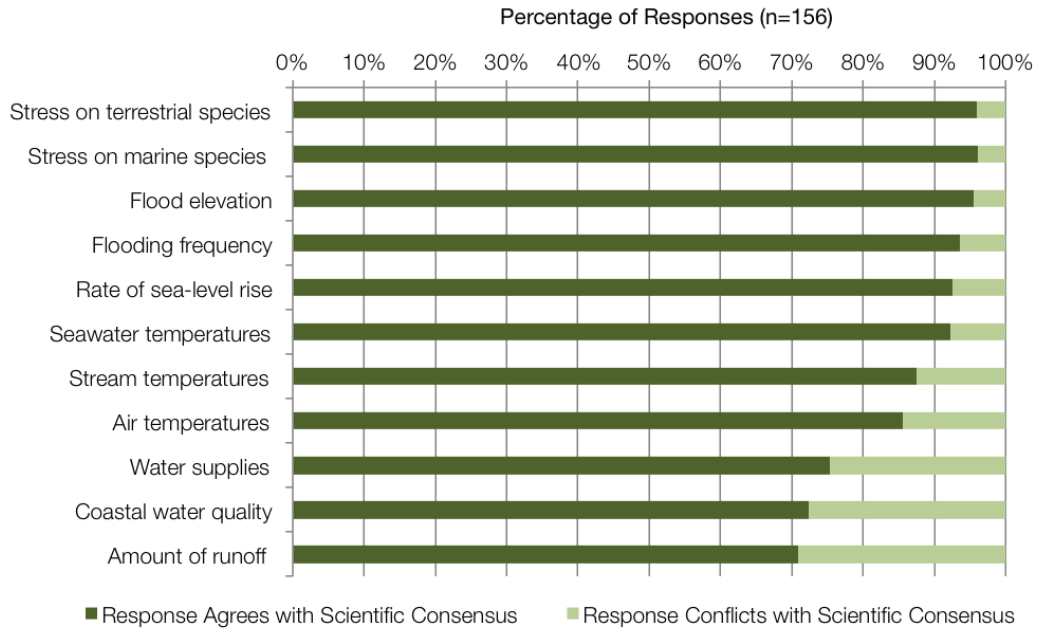
25. Which of the following statements best represents your attitude toward preparing for changes in coastal areas that might result from future climate change?



26. How well informed do you feel you are about climate change?



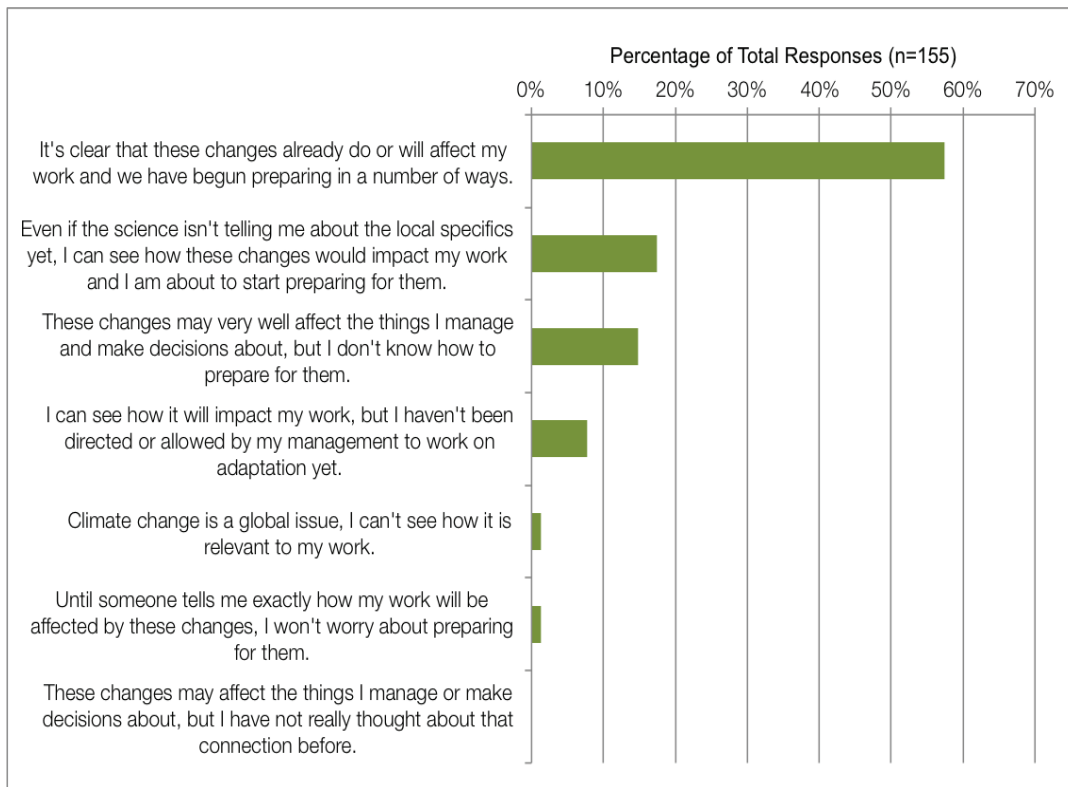
27. How do you think climate change may affect the local average conditions and natural environment in your region over the next 3 - 4 decades?



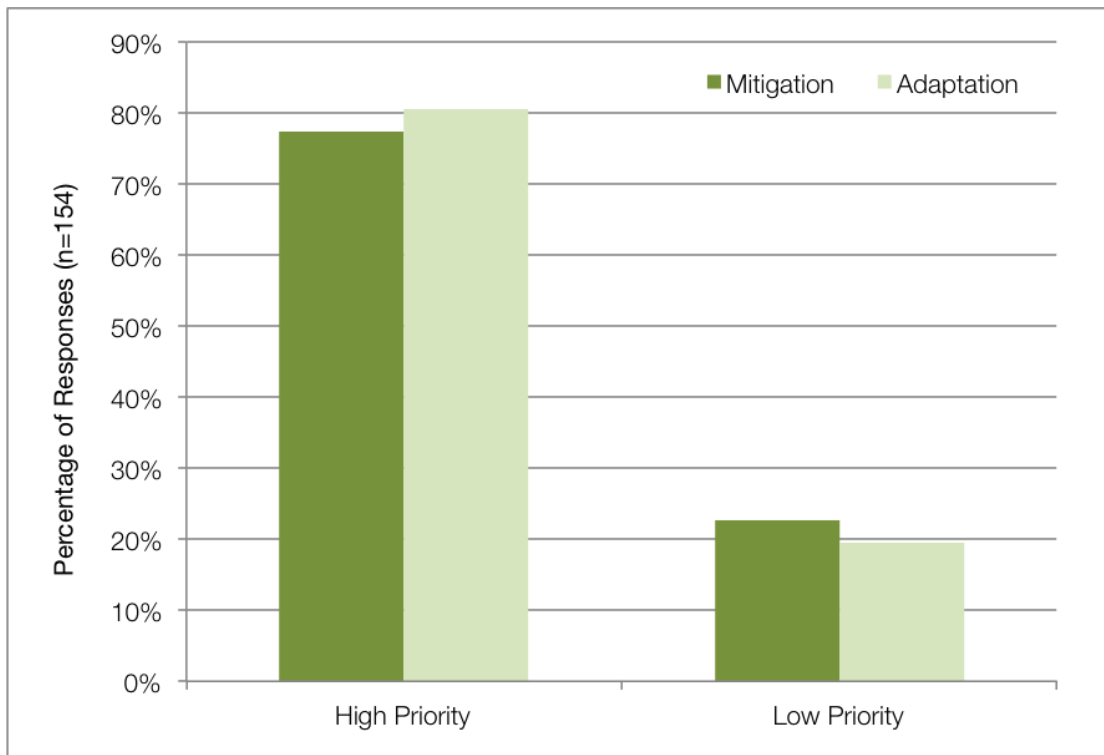
28. Table identifying scientific consensus for various climate change impacts based on analysis of Cayan et al. (2009).

Impact Area	Scientific Consensus
Air temperatures	Air temperatures will increase
Seawater temperatures	Seawater temperatures will increase
Stream temperatures	Stream temperatures will increase
Rain- and snowfall (precipitation)	Depends on region (question not included in analysis)
Water supplies	Water supplies will decrease
Amount of runoff	Amount of runoff will increase
Flooding frequency	Flooding frequency will increase
Flood elevation	Flood elevation will increase
Rate of sea level rise	Rate of sea-level rise will increase
Storm frequency	Still scientific debate (question not included in analysis)
Storm intensity	Still scientific debate (question not included in analysis)
Stress on terrestrial species	Stress will increase
Stress on marine species	Stress will increase
Occurrence of algae blooms	Still scientific debate (question not included in analysis)
Coastal water quality	Coastal water quality will decrease

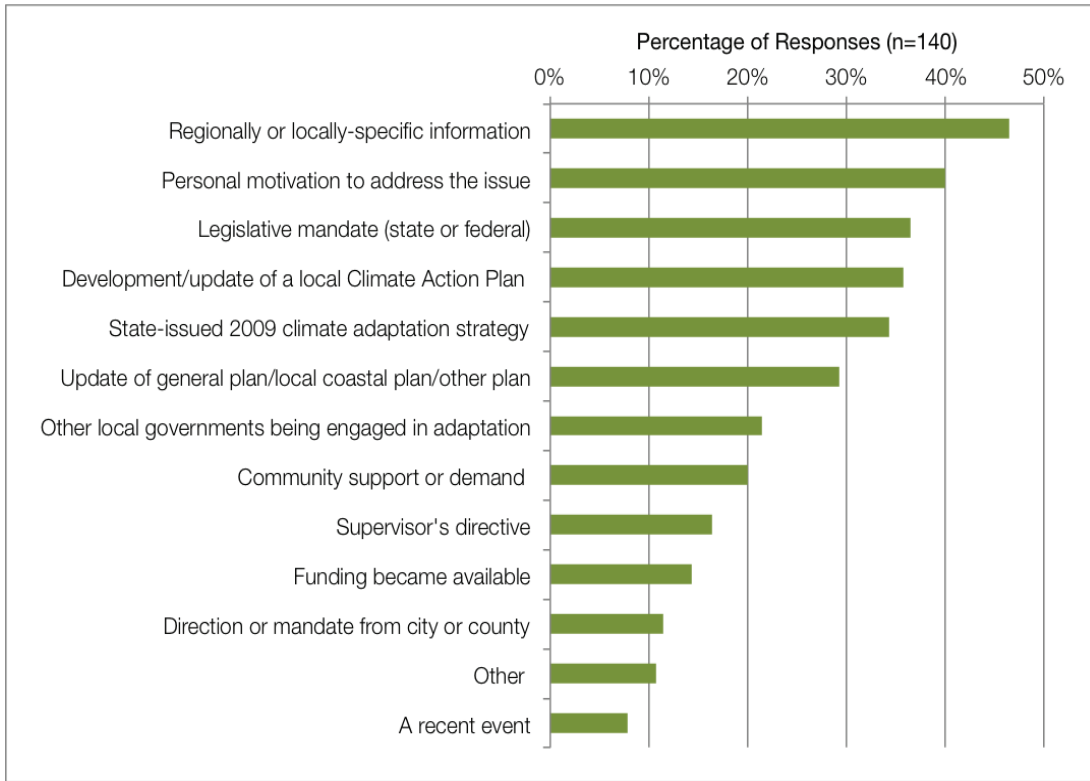
29. How do you think climate change could impact your work?



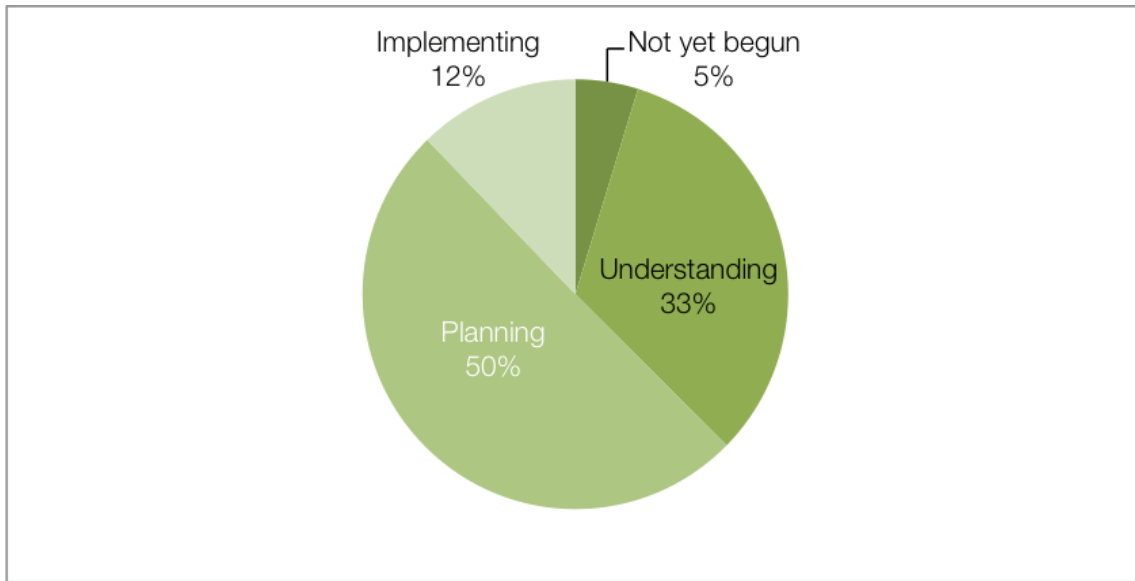
30. Please rate how important it is in your work to address climate change through (a) the reduction of greenhouse gas emissions from energy and land use (mitigation) and (b) efforts to plan and prepare for the projected impacts of climate change (adaptation).



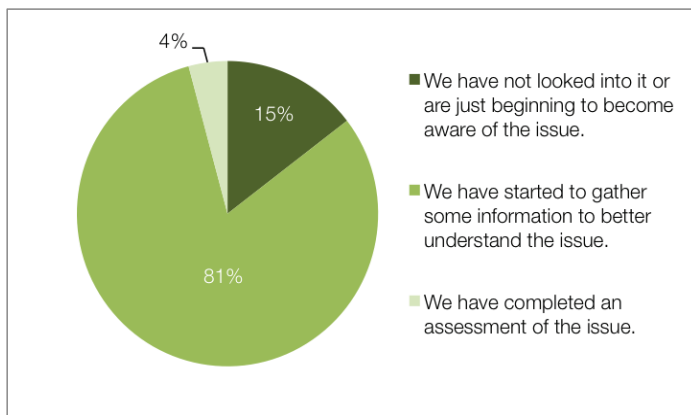
31. If you are engaged in, or contributing to, planning for climate change (adaptation) in your community or region at this time, what prompted your action?



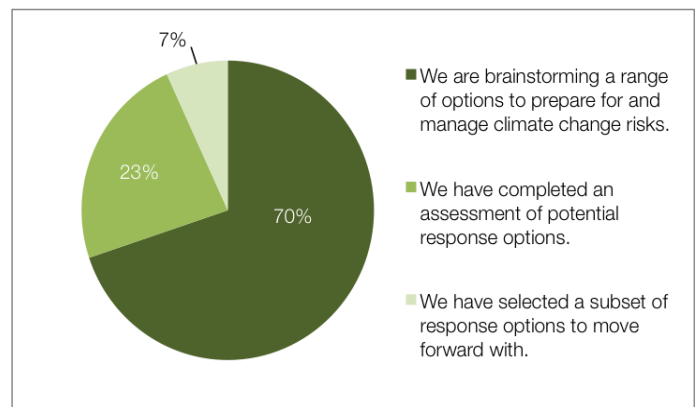
32a. Which phase best describes your current phase of climate change planning and implementation?



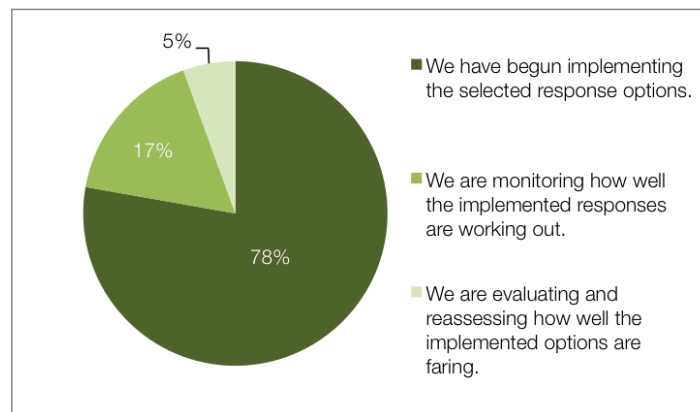
32b. Please provide more detail on your activities or contributions to this phase by selecting one of the statements below.



Understanding

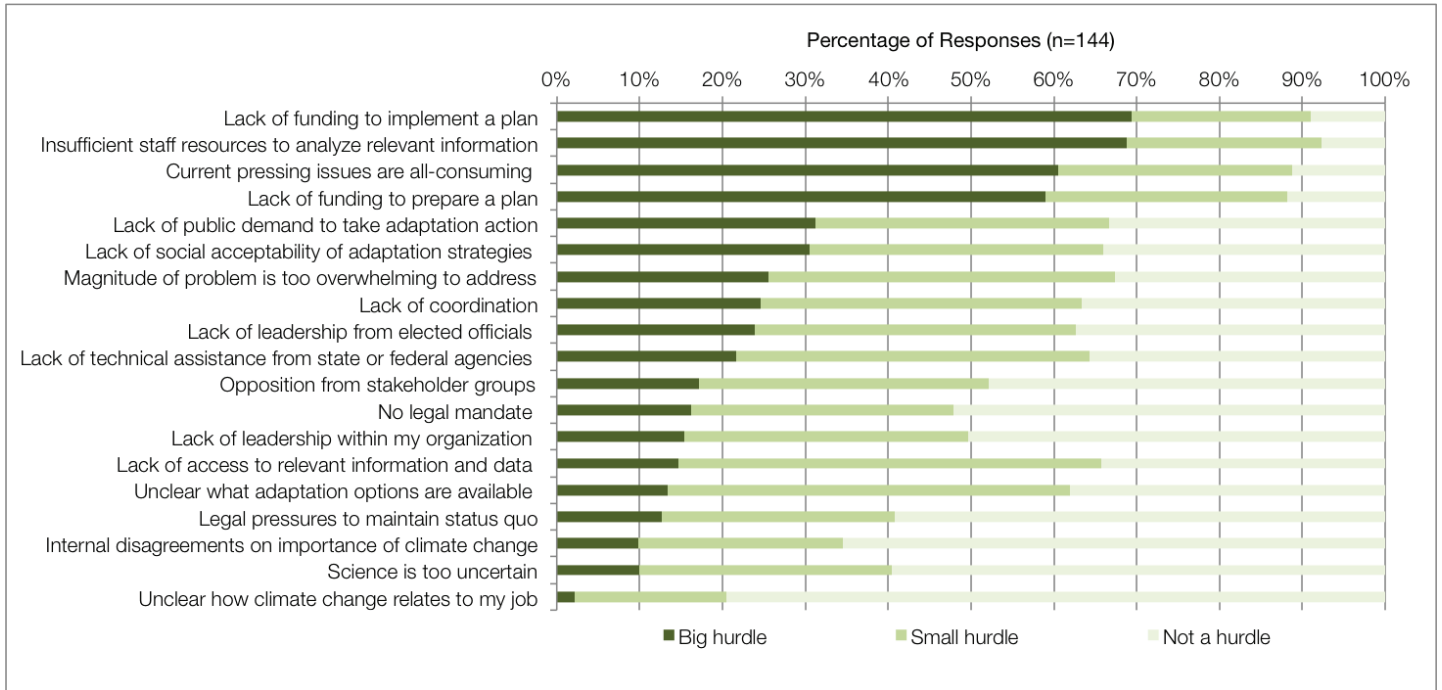


Planning

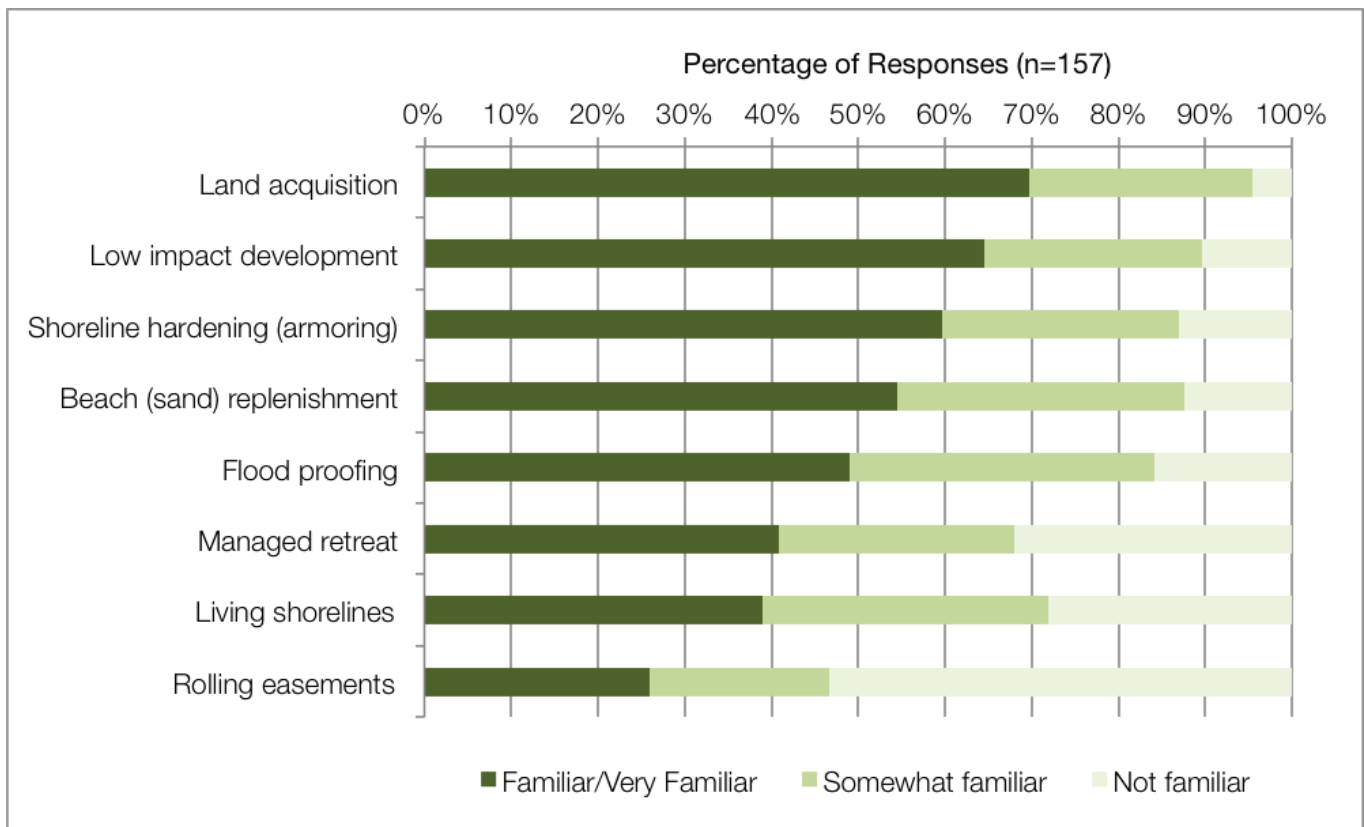


Implementing

33. Whether or not your organization has already taken action to prepare for the possible impacts of climate change, how much of a hurdle has each of the following issues been in your efforts to date?

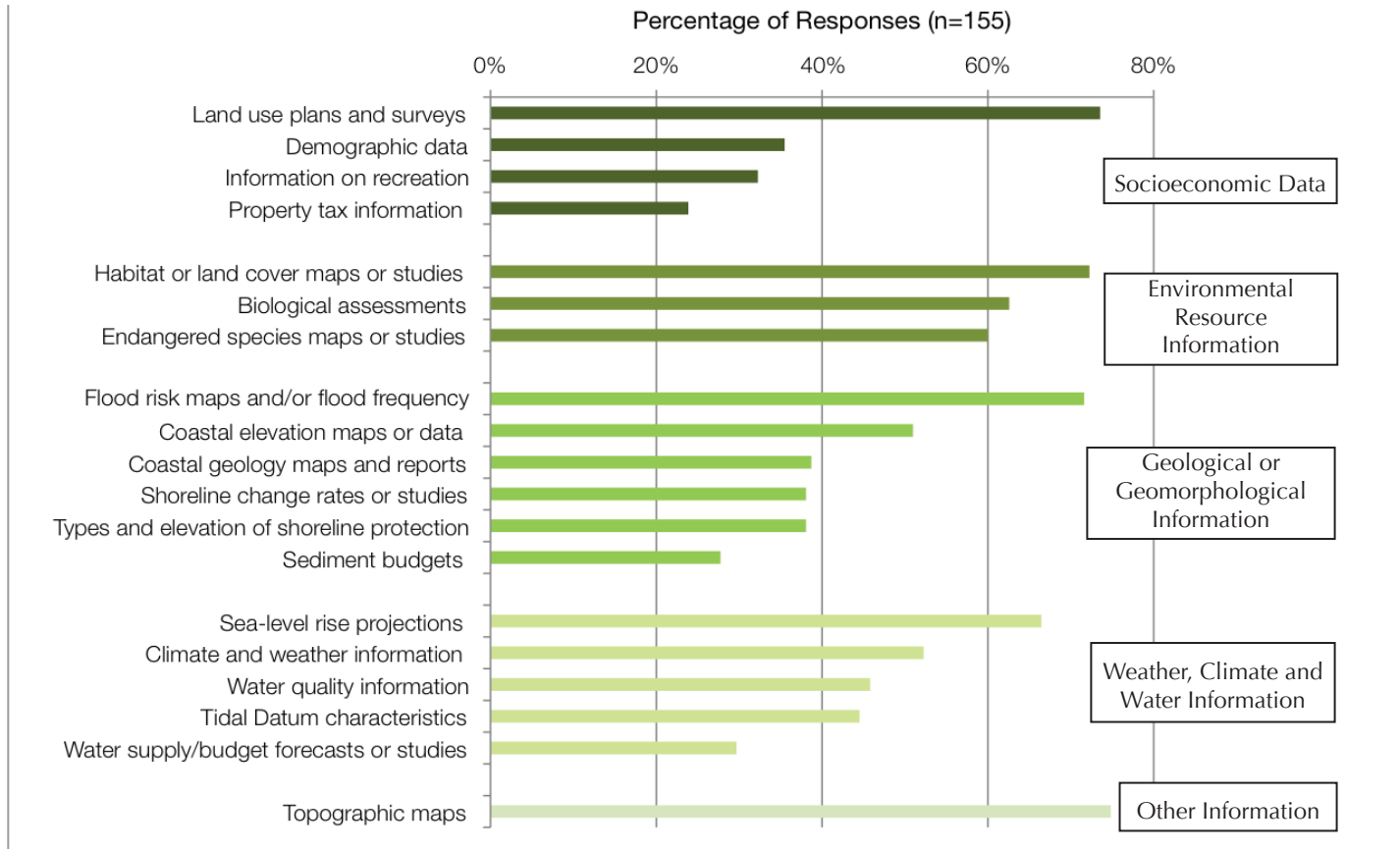


34. Please describe how familiar you are with each of the following coastal adaptation options.

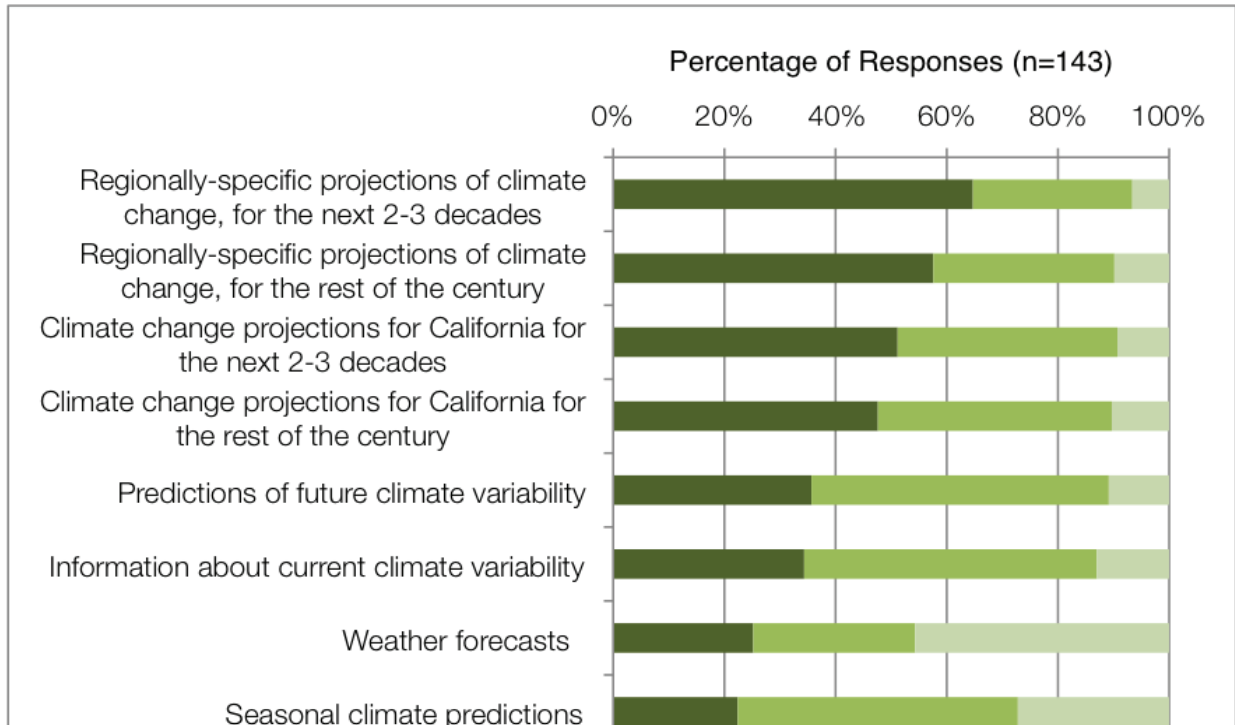


PART IV: DATA AND INFORMATION NEEDS

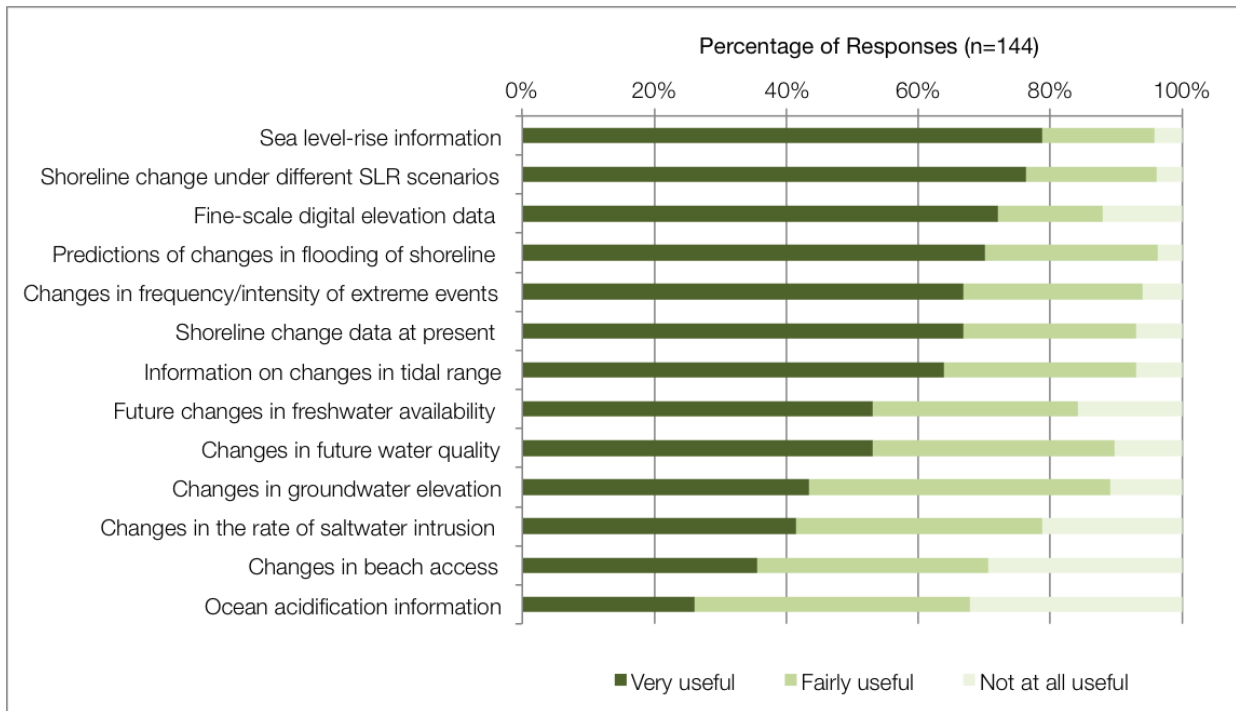
35. In order to carry out your daily job responsibilities, what data and information do you consult regularly?



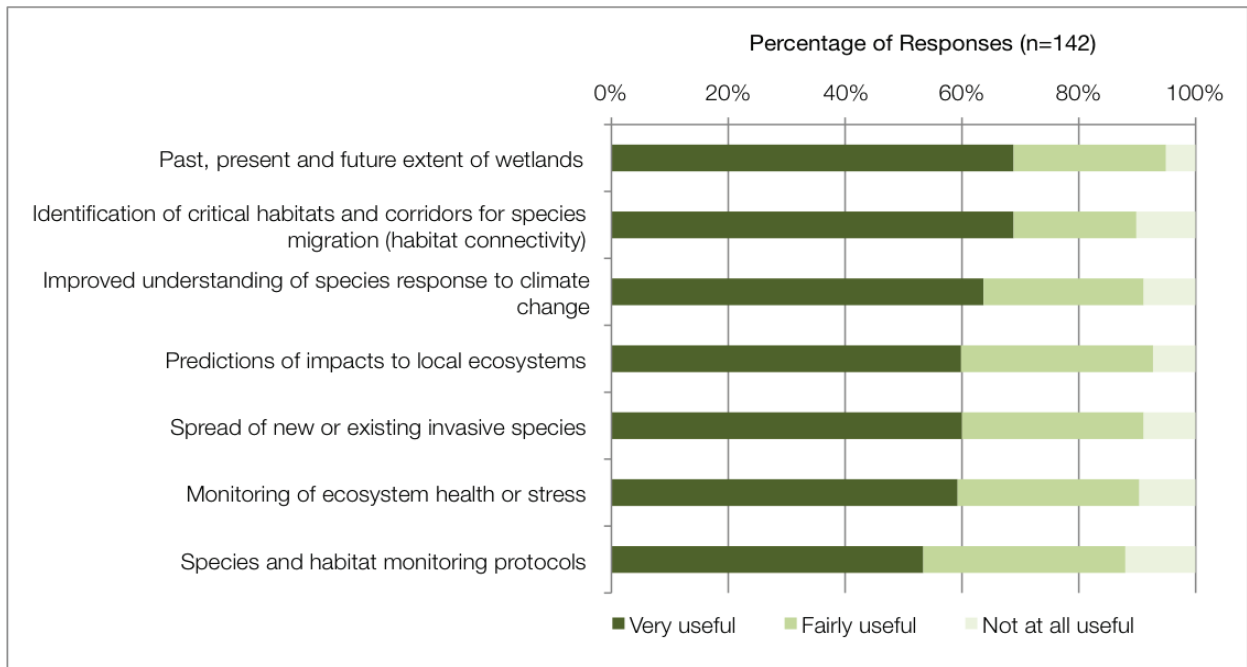
36a. In the work you do, please rate the usefulness of the following types of *weather and climate* information for assessing the risks from climate change to local coastal resources.



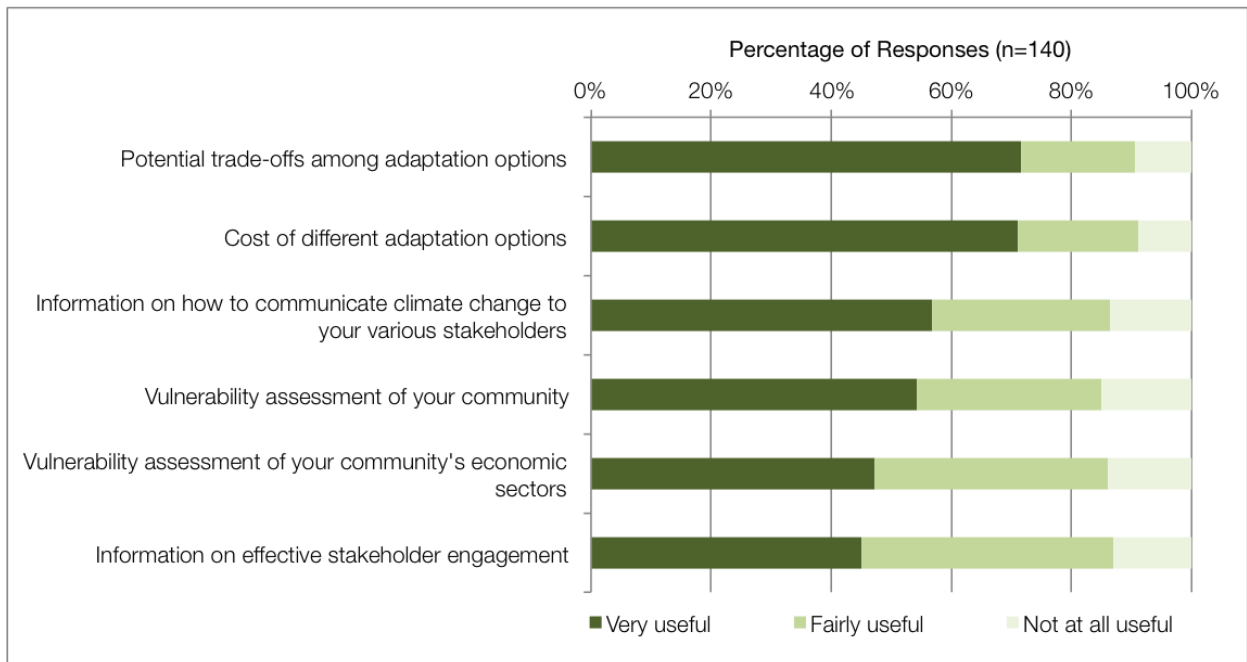
36b. In the work you do, please rate the usefulness of the following types of *physical information* for assessing the risks from climate change to local coastal resources.



36c. In the work you do, please rate the usefulness of the following types of *biological information* for assessing the risks from climate change to local coastal resources.



36d. In the work you do, please rate the usefulness of the following types of *socioeconomic information* for assessing the risks from climate change to local coastal resources.



37. Please identify three types of information for which you have the greatest need, but to which you currently do not have access.

City & County Respondents

Information Type #1	Information Type #2	Information Type #3
Clear understanding of storm regime changes at regional level	Likely rate of rise from 2100 to 2200	Better error bars (margin of error) for 2050 range estimates (might be low)
Changes to forest health due to climate change	Changes in bird migration	Changes in plant blooming periods
Storm event frequency and magnitude	Funding Sources	Harmful Algal Bloom drivers
Regional modeling	Rates of levee erosion	Adaptation costs
Engineering studies of flooding from sea level projections	[No response provided]	[No response provided]
Mitigation strategies for wide range of climate outcomes	interaction of mitigation strategies for various outcomes	Scenarios of outcomes of various mitigation strategies for Bay Area
Vulnerability assessment	Safe zones in the event of a seiche	[No response provided]
Accurate worst case sea level rise scenarios	Requirements for effective habitat/wildlife migration corridors	Cost benefit ratios of (and methods of implementing) building seawalls vs. abandonment/retreat in low lying areas
Funding options	Cooperative regional responses	
Reliable stormwater volume projections	Reliable sea-level rise projections	Reliable wave action modeling based on reliable sea-level rise and storm event projections
Risk assessment	Risk forecast	Adaptation options
Detailed maps of probable sea level rise over the next 3-4 decades	More information about implementation adaptation strategies	Tools to accurately evaluate development proposals' impact on climate change
Accurate sea level predictions	Effects of climate change on storm severity	Effect of climate change on sedimentation in sf bay
Projected tide elevation changes in rivers	Projected storm trends including rainfall and frequency	Groundwater basin studies
Stream channel condition	Continuous water quality	Continuous streamflow
Reliable historical wave data	Sediment transport data	Marine life migration & habitat patterns
Locally specific and detailed sea level rise projections	Local precipitation changes	[No response provided]
Sea level rise implications of existing improvements	Storm surge/sea level rise data for tidally influenced bodies	[No response provided]
Modeling of extreme events plus sea level rise at fine (parcel) scale	Historical precipitation data at a sub-county scale	Climate change related data down-scaled to county level
Scientific Journal	State Agencies	Consultants
Educating politicians	Educating the public	Educating developers
Vulnerability assessment scenarios for our community for each type of projected impact	Comparative analysis of adaptation options, including pros/cons and costs	Visually effective maps and illustrations of impacts, vulnerabilities, adaptation scenarios
Sea-Level Rise GIS Data	[No response provided]	[No response provided]
Coastal Bluff Retreat	Sand loss rates	Bathymetry

37. Please identify three types of information for which you have the greatest need, but to which you currently do not have access. (cont'd)

City/County Respondents (cont'd)

Information Type #1	Information Type #2	Information Type #3
Levee Conditions	Climate Model Predictions	Regional Reports on Climate Change
Coastal bluff erosion estimates	Bluff protection measures	Predicting storm events in winter
Updated S.F. Bay levels of SLR	Storm surge	Flooding from streams
Economic impact of sea level rise	Hard numbers for expected sea level rise	What other communities are going to do and if a regional approach is possible
1990 baseline air quality data	[No response provided]	[No response provided]
Future Inundation maps	Future storm changes	Future tide changes
Climate change effects on ground-water resources	Climate change benefits of various LID technologies	[No response provided]
Detailed local maps of various sea level rise scenarios	Vulnerability Assessment	Balance with housing needs
Mapping of future inundation	[No response provided]	[No response provided]
Range of peer-reviewed SLR projections	Groundwater levels - historic and projected	Species adaptation responses, where available
Health measurement tools	[No response provided]	[No response provided]

State, Federal & Regional Respondents

Information Type #1	Information Type #2	Information Type #3
Status and location of shoreline protection	Location and extent of wetlands vulnerable to SLR	Ability of wetlands to keep up with SLR through sediment deposition
Biological requirements of sensitive species	Climate changes already occurring locally	[No response provided]
Wetland retreat information (where the habitat will go as sea level rises)	Sedimentation ability to raise wetlands as sea level rises	[No response provided]
Sea level rise projections for the Sacramento-San Joaquin Delta	Changes in the hydrodynamics for the Sacramento-San Joaquin Delta	Anticipate shifts in habitat in the Sacramento-San Joaquin Delta
Spatial data/Geographic Projections for future extreme weather events	Species, habitat and ecosystem data on sensitivity & adaptive capacity to projected climate change	Cost/benefit of various adaptation strategies
Sea level rise impacts to the transportation system	Localized impacts of increased precipitation	Localized impacts of increased temperatures
High resolution digital elevation models of coast	Climate models downscaled to the county level	Sea level rise projections downscaled to the local level
Effects of ocean conditions on Pacific herring population health	Predator/prey relationships in bays and estuaries and nearshore waters	Extent of subaquatic vegetation in CA bays and estuaries
Species Distribution	Stream Gage Data	[No response provided]
Private land ownership maps	Database of all known occurring climate impacts to date	Species migration information
Order of magnitude costs for adaptation strategies	Magnitude of costs for non-adaptation	Vulnerability of infrastructure
Specific regional forecast for range of expected changes	Expected biological response to physical changes	Adaptation strategies for biological change

37. Please identify three types of information for which you have the greatest need, but to which you currently do not have access. (cont'd)

State, Federal & Regional Respondents (cont'd)

Information Type #1	Information Type #2	Information Type #3
Travel diaries	Small area demographic surveys	[No response provided]
Changes in biological populations on private lands	Changes in biological populations relative to ecological restoration	[No response provided]
Infrastructure adaptation options	Infrastructure adaptation costs	Infrastructure adaptation design alternatives
GIS data	Sea level rise predictions	Storm intensity
Projections of sea level rise for specific locations along the coast	Projections of regional impacts to endangered species	Projections of regional flooding impacts
Local climate change projections	Local tidal flooding projections, given existing levees of protection and SLR	Local information on impacts of climate change to habitats and wildlife
What to do exactly about sea level rise.	Money	Policy is not concrete
Multiscenario planning strategies	Climate change models	[No response provided]
funding	funding	funding
Changes in extreme event characteristics	Changes in wave heights/tidal range	Longer lead-time weather forecasts
Local scale modeling and maps of sea level rise, coastal erosion and retreat	Local to regional scale temperature and rainfall modeling	Adaptation strategies
Probability of sea level rise impacts over time	Impacts of ocean acidification on CA coast and bays	information on the cost of implementing adaptation now versus implementing later
Accepted estimates of coastal impacts of sea level rise, and coastal erosion in next 100 years	Impacts of CC & SLR on water: freshwater streams/wetlands; sourcewater supplies in coastal environs; impacts on water quality in coastal areas	Adaptation strategies for development that can be put into practice today; planning for future conditions
Fine resolution bathymetry/topography	Episodic shoreline retreat amounts	Recreational value of beach area
funding	commitment	action
Vested land ownership	Accurate SLR numbers/time	Effect of SLR on ecosystems/wetland distribution
LCP certified maps	Permit histories for property	Identification of publically held easements
Future bluff erosion rates	Tectonic uplift rates	Land subsidence data
Downscaled climate scenarios	Detailed sediment budgets	Coastal risk assessments
Regional predictions of change	Regional species response predictions	[No response provided]
Scientific journals	Climate change conferences	Specific local data
Need a cost benefit analysis that is regionally focused to help us understand the "winners and losers" adaptaton decisions	Geospatial understanding of potential local/regional impacts to wildlife, habitats and people	[No response provided]

37. Please identify three types of information for which you have the greatest need, but to which you currently do not have access. (cont'd)

State, Federal & Regional Respondents (cont'd)

Information Type #1	Information Type #2	Information Type #3
Future SLR rates	Future shoreline change rates	Future fluvial discharge rates
Sea level rise levels for area	Overlay maps of habitat and predicted sea level rise	Predicted changes in wildlife
Scientific publications	Fine scale species and habitat presence/absence data	Conferences
Sea-level rise predictions	Coastal erosion predictions	[No response provided]
Detailed habitat maps	High accuracy elevations	Marine habitat & substrate
Site specific sea level rise data	Site specific bluff erosion rates	Real examples of coastal managed retreat and how to accomplish that
Fine-scale mapping of coastal biological resources	Fine-scale information about rates of change for coastal resources	[No response provided]
Predicted sea level rise	Effectiveness of mitigation	Adaptation strategies
Shoreline Change Data	Fine scale digital elevation data	Digital tidal data
Climate & Weather Information	Information on recreation	Topographic maps
Changes identified via permit process	[No response provided]	[No response provided]
Ocean acidification economic effects	SLR economic effects	[No response provided]
Future projections of storm characteristics	Rate of change of extremes	Appropriate transformation of future projections of ARs to precipitation
How to incorporate local relative sea level trends into assessments of future SLR scenarios	Outputs from new global circulation models that reflect significant problems with current models (e.g. methane)	Worst case scenarios for 2100 and 2200
Site specific recommendations: information seems too broad to apply on site	[No response provided]	[No response provided]
SLR projections	Vulnerability assessment	Flooding hazards
Species adaptation information	Effects of sea level rise on freshwater systems	Effects of specific habitat modifications such as water temperature in streams
Benthic habitat data	Trends in species indicators in near-shore habitats	Trends in water quality and quantity nearshore
Future changes in regional estuarine freshwater and sediment budgets	Likely scenarios of regional habitat change (habitat type or guild scale)	Future change in lateral extent of shoreline habitats (based not just on SLR but wind and hydrodynamic effects)
Fine-scale predictions of local changes in precipitation and temperature patterns	Hydrologic response to predicted changes	[No response provided]
Changing distribution of marine animals	[No response provided]	[No response provided]

37. Please identify three types of information for which you have the greatest need, but to which you currently do not have access. (cont'd)

NGO, Private Industry & Environmental Consultant Respondents

Information Type #1	Information Type #2	Information Type #3
Specific impacts to the west coast, given the global variability in SLR	Appropriate Regional climate models	Information/road map for obtaining grants to address SLR and coastal flood related decisions
Cost of adaptation versus inaction	Engineered studies of future floods - FEMA maps	Habitat migration potential
Detailed Infrastructure information (Physical condition, remaining service life, importance...)	GIS-based data inventory for near-shore infrastructure (most information is "hidden" in reports)	[No response provided]
Effect of climate change on native plant and animal species distribution	Effects of climate change on riparian systems	Finer scale data - more specific and more detailed
Rare species' climate tolerance range	Carbon credit structure	Will coastal areas warm or cool?
Local government plans for climate change	Federal government plans for climate change	Individual corporate plans for mitigating climate change
Changes in coastal fog	Future sediment budget for tidal marsh restoration	Top climate adaptation priorities for biodiversity and agriculture
Funding opportunities specific to climate adaptation	Policy information that may affect adaptation efforts	[No response provided]
Future high water events considering sea level rise, tides, and storms.	Wildlife population vulnerability to sea level rise and increased storm intensity and frequency	Value of ecosystem services, particularly flood control, water quality, fish nurseries, carbon sequestration
Predictions of weather pattern changes	Changing coastline geography	Rate of sea level rise over time
Regional rainfall predictions	Regional tidal variation	Local flooding predictions
LIDAR information	Adaptation options for local scale	Climate projection data downscaled
Nearshore (surf zone) bed elevations	Effects of armoring on near shore	Quantified conceptual models of habitat response to coastal morphologic changes

38. Briefly describe what limits your access to this information:

City & County Respondents

Limitations to information
1. Downscaling GCM to regional 2. Glacial melt rate limits 3. Current science has been hesitant to "over predict"
I don't know who creates this kind of information. Also don't know if I can make changes or adapt to these kinds of changes.
Time available to dig into scientific reports and translate findings to local setting
No one is collecting data
Cost to prepare
Sophistication and usefulness of predictions
Funding is necessary for the City to conduct this type of research and to draft plans that decreases the potential to loss of life or property.
Don't know if it exists, or where to find it if it does
Not many programs seem to be available. Options seem locally based but issues are regional or statewide or beyond.
It does not exist? Mostly speculative unreliable information for investment decisions
Regional collaboration and funding to complete risk assessment and forecast; Staff resources to analyze and develop adaptation options
Time, money, political will, and lack of adaptation implementation experience to guide decision making.
Accurate predictions do not exist at the level of detail to make financial commitments to adaptation
No known sources
Money and technology
The available data is for a short time period; no significant/reliable historical information
Down-scaling of climate models to predict local impacts and accuracy of existing base maps to layer projected sea level rise
Does not exist to my knowledge
Limited access to my agency's GIS staff time; limited dynamic modeling capability; limited knowledge of sources and access to county-scale source data.
No capacity to work on issues. No readily available data that has been analyzed/ written up succinctly our behalf.
No clear source to get the most recent estimates of sea-level rise data in GIS formats from reputable source
Time and resources
Not sure where to find information or if it exists
We don't have a coordinated plan for protecting properties along the coastal bluffs. We collect information and do research on a project by project basis but the issue really is much larger than one project or one property owner. It is especially hard to coordinate permits and reviews if different properties in the same area are treated differently in terms of what type of bluff protection and when it is allowed occur.
Only use occasionally
Funding, cooperation, uncertainty
Since we are not a coastal city, we have interest in work being done regarding climate change and coastal regions, but we don't need specific resources in this area. We are only interested in information on how climate change may impact our city. There are climate change resources available, but they are non-specific or non-conclusive for our use.

39. Briefly describe what limits your access to this information (cont'd):

City & County Respondents (cont'd)

Limitations to information
This is just guess work to try and meet a specified target from a time that their was limited information
I don't think they exist.
Lack of time to research if it already exists in usable format. Lack of time to integrate new data into already initiated planning processes.
Funding and staff resources to engage in adequate analyses
Topographic data has not yet been compiled and released to local governments.
Time to research, conflicting projections, state adoption of 16"/50" (or similar) in 2050/2100 without context or likelihood.
Working in public health, these tools are just being developed.

State, Federal & Regional Respondents

Limitations to information
Data have not been collected.
Time to research information and lack of tools to obtain information
Don't know where to find it.
Relevant models are under creation and have not been finalized or model results are not available as of yet.
Despite a multitude of sea leve rise projections, there doesn't seem to be any official extreme weather event future projections despite the fact that they will most likely produce more damage (at least in short term) than sea level rise. Although NatureServe and now many other organizations have developed vulnerability assessments, and projection data exists to assess climate exposure, there is very little scientific data out there which examines exactly how sensitive specific species and habitats are to climate change.
We are not aware if the data exists on localized climate change impacts, specifically on the transportation system.
All three types of information listed would require extensive research to obtain. It would take bringing together many marine scientific disciplines and multiple independently conducted studies.
Not enough surveys conducted; Not enough gaged streams.
Either it is not put together yet, or I do not know where to find it.
Resources for myself to lead a serious effort to generate costs of adaptation/non-adaptation to allow for business decisions to proceed.
I assume that these big questions are still works in progress. I hope that you plan to make information more widely available to coastal managers.
I'm in the field of transportation planning. Our biggest hurdle to is always funding - low population areas are low priority for state and federal funding sources.
Failure on our part to collect the data even though we have the ability. Biologists I work with would rather implement a project for the sake of implementing it, but not monitor it to determine success or failure. Private property rights and the role we play in respecting those rights in order to do work on private land.
While there seems to be plenty of work going on to study transportation infrastructure risk and vulnerability to SLR impacts, there is no specific information available on alternative, adaptive infrastructure design and cost options.
Poor infrastructure within my organization
The department needs information related to impacts on existing hazardous waste facilities and site and the siting of future facilities in coastal and estuarian regions. The information would be used in planning remediation projects and in CEQA documentation.

39. Briefly describe what limits your access to this information (cont'd):

State, Federal & Regional Respondents (cont'd)

Limitations to information
Information being generated by various parties. Not all information has been developed. Continuously evolving field of study.
Most likely time and ineffective government policy.
1.) The existence of such strategies that are acceptable for my work 2.) The fact that my agency requires models to be certified for use and there is a huge backlog
How will the region pay for all this adaptation? What do we let go of and what do we keep and protect?
These are emerging areas of science research, not yet good agreement in science community. Need user-directed research in these areas, and active transition of research to operations.
The lack of local models
Lack of published research on these three issues
An authoritative source for accepted conditions to expect under CC/SLR, and guidance on hoe best to respond to it through our actions.
Bathymetry/topography is limited by cost; episodic erosion is limited by field measurements -- most erosion is averaged over long time periods or developed from endpoint conditions; recreational value of beach area is limited by the science or research into this area.
Funding is not available, and is being cut more by the federal government
Scientific limits and legal challanges
Current database systems need to be updated - maps not all easily available - easements not mapped statewide
Mostly it doesn't exist
The Delta lacks regional specific information about climate related change, some efforts are underway but not complete.
High cost for journal subscriptions, conferences, and lack of a partner agency or institute to research and provide site specific local data.
Science highly uncertain
The data is not available at this time. Working with USGS to acquire data and model sea level rise and extreme storm events.
Prohibitive cost of access to scientific journals; fine scale biological information often doesn't exist; lack of access and expense of conferences
Lack of consistent studies
Work has generally not been done or not processed
Lack of resources to investigate on a site specific level. how to accomplish retreat on a site specific level.
Most of the needed information is developed on a site-specific basis in response to a proposed project; however, it would be helpful to have the information available for areas before projects are proposed.
Time; information availability
Cost
Don't know where it's available
There needs to be a credible central clearing house for this information There need to be more professional conferences devoted to this subject
It doesn't exist yet
Does it exist? Seems like there is a lot of conjecture and conceptual understanding, but not a lot of site specific recommendations.

39. Briefly describe what limits your access to this information (cont'd):

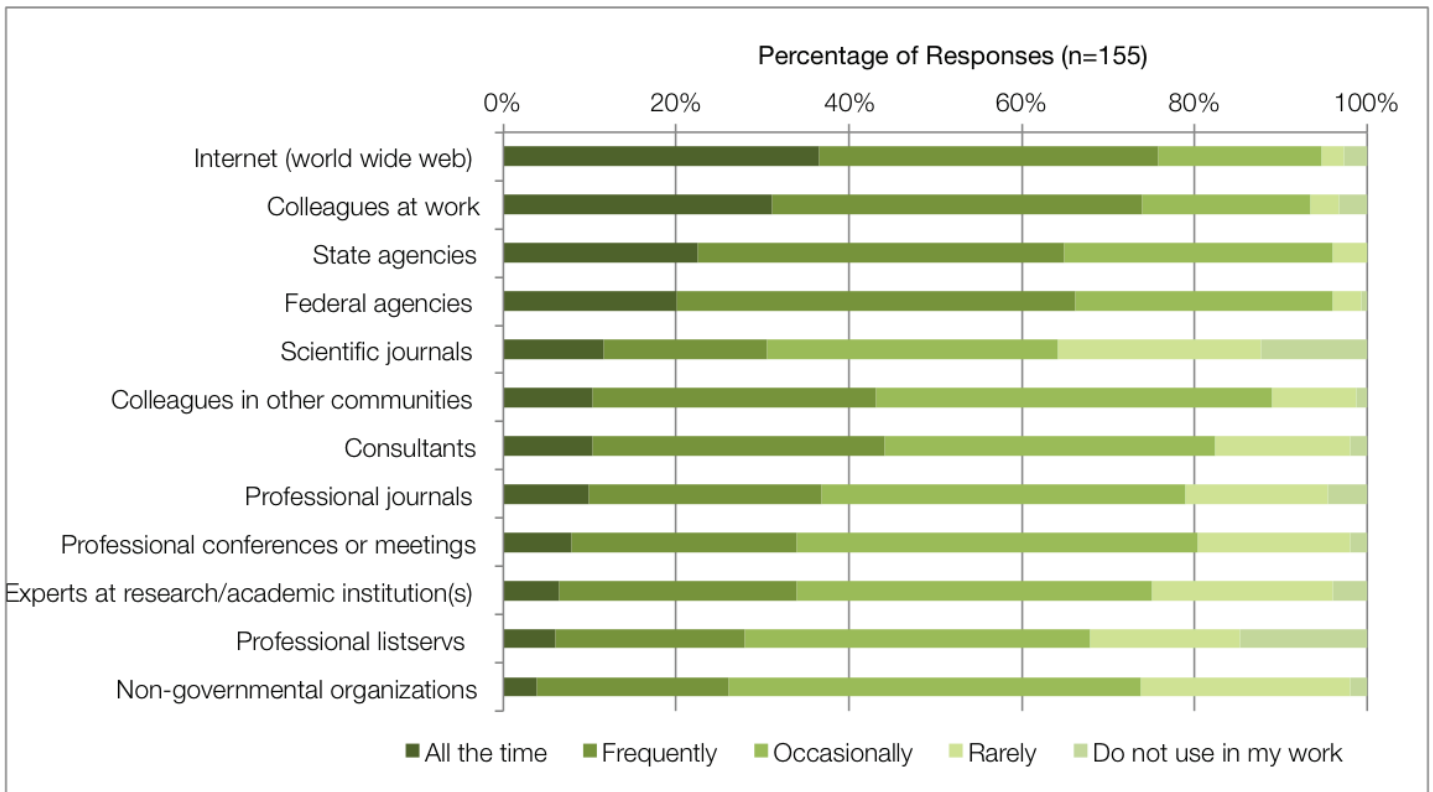
State, Federal & Regional Respondents (cont'd)

Limitations to information
Funding
Advancement of science.
Capability and funds
Lack of long term baseline data; uncertain future management situations; uncertainties in plant community response to multiple stressors, lack of fully developed/linked models for shoreline evolution.
Studies have not been done.
Not routinely collected

NGO, Private Industry & Environmental Consultant Respondents

Limitations to information
Technology (it's still emerging). Limitations on funding.
Most information for infrastructure and other assets is located in reports and not easily accessible on a regional scale. Would be nice to have as metadata for GIS-based inventory.
Seems to be too coarse or not yet developed
Limited time to research it online, would be helpful if it is consolidated in one place. A fact page for climate change issues.
Fog is an unknown. Sediment budget info for the Bay is uncertain even though there is a lot of speculation. But without a clearer picture we can't make good decisions on where to restore. Private agricultural and non-agricultural lands will be the most important pieces to sustain biodiversity. Need info on what is good for biodiversity but also benefits farmers.
Lack of comprehensive or available knowledge - either the data is scattered, or we do not know how to access it
Data may not exist yet, analyses probably have not been completed.
Ease of access given limited time and staff to FIND the research that has been done
Accessibility and availability of updated regional climate models
Lack of information, or uncertainty is too great for decision-making.
Funding for research and applications is limited. There needs to be leadership at a state and federal level to induce local and regional studies. Governance is not often adequate. The Coastal Act needs revision to require compensation for ecological degradation caused by armoring, and extension of the public trust to the limit of runup or other elevation higher than high tide.

40. What sources do you typically consult to obtain the data and information you need for your work?



41. If you have begun working on adaptation-related projects, please list the three organizations that you have consulted most for information, tools, or other technical assistance.

City & County Respondents

Organization #1	Organization #2	Organization #3
Scripps	NOAA	USGS
Army Corps	Santa Clara Valley Water District	BAAQMD
BCDC	[No response]	[No response]
USGS	UC system	Stanford
San Francisquito Creek Joint Powers Authority	Bay Conservation Development Commission	Academic institutions
PMC	ICLEI	[No response]
Consultants	UC Berkeley	Bay Conservation and Development Commission
UC Berkeley	UC Cooperative Extension	USDA NRCS
USGS	Natural Capital	DWR
Water Environment Research Foundation	Environmental Protection Agency	National Association of Clean Water Agencies
ICLEI	[No response]	[No response]
NOAA	BCDC	GFNMS
State Agency	Federal Agency	Non Profits
Bay Conservation and Development Commission	Pacific Institute	ICLEI
PWA in San Francisco	HASPA	NOAA
ART Project	[No response]	[No response]
BCDC	County of Marin	ABAG
California Air Resources Board	SF Bay Conservation and Development Commission	US EPA
CA State Public Health Department	NACCHO	[No response]

41. If you have begun working on adaptation-related projects, please list the three organizations that you have consulted most for information, tools, or other technical assistance. (cont'd)

State, Federal & Regional Respondents

Organization #1	Organization #2	Organization #3
NOAA	California Coastal Commission	USFWS
NOAA	USGS	DFG
CalAdapt, TNC ClimateWizard, Pacific Institute, USGS for spatial data	USFWS report for Vulnerability Assessment info	California Energy Commission for statewide vulnerability assessment
Federal Highway Administration	USGS	Pacific Institute
NOAA Coastal Services Organization	CA Energy Commission	DWR
San Francisco Bay Conservation and Development Commission	NOAA	State of California
Bay Conservation and Development Commission	US Army Corps	Metropolitan Transportation Commission
University of California	National Park Service	USGS
USGS	HASPA	PWA
S.F. Bay Conservation and Development Commission	USGS	Pacific Institute
Ocean Protection Council (sea level rise advisory)	CO-CAT (sea level rise guidance)	Pacific Institute
Pacific Institute	PRBO Conservation Science	USGS
BCDC	NOAA	[No response]
Bay Area Conservation and Development Commission	NOAA	Consultants
NOAA, including NWS	NOAA's RISA centers (multiple centers)	National Research Council
California Climate Action Team	USGS (sea level rise maps)	Pacific Institute
CEC PIER	Pacific Institute	NOAA
USGS	California Geographic Survey	NOAA
NOAA	USGS	USACE
USGS	NPS	DFG
NOAA	Local Research institutions (i.e.BML)	Sonoma, Marin and San Mateo Counties
USACE	NOAA	[No response]
USGS	PRBO Conservation Science	Bodega Marine Lab
NMFS	FWS	CDFG
California Coastal Commission	Various local governments	[No response]
National Weather Service	CA OSPR	CA State Lands Commission
USGS	[No response]	[No response]

41. If you have begun working on adaptation-related projects, please list the three organizations that you have consulted most for information, tools, or other technical assistance. (cont'd)

State, Federal & Regional Respondents (cont'd)

Organization #1	Organization #2	Organization #3
Scientific journals	Scientific conferences	
Scripps Institute of Oceanography CNAP RISA	Western Region Climate Center	MWH
NOAA Coastal Services Center	PRBO Conservation Science	USGS
ICLEI	NOAA	USGS
USDA Natural Resources Conservation Service	NOAA National Marine Fisheries Service	Consultants
ESA PWA	CA Coastal Sediment Management Workgroup	USGS
NPS Adaptation Planning Group	Our Coast Our Future - with NOAA	[No response]
climatechange.gov	ICLEI	NOAA CSC

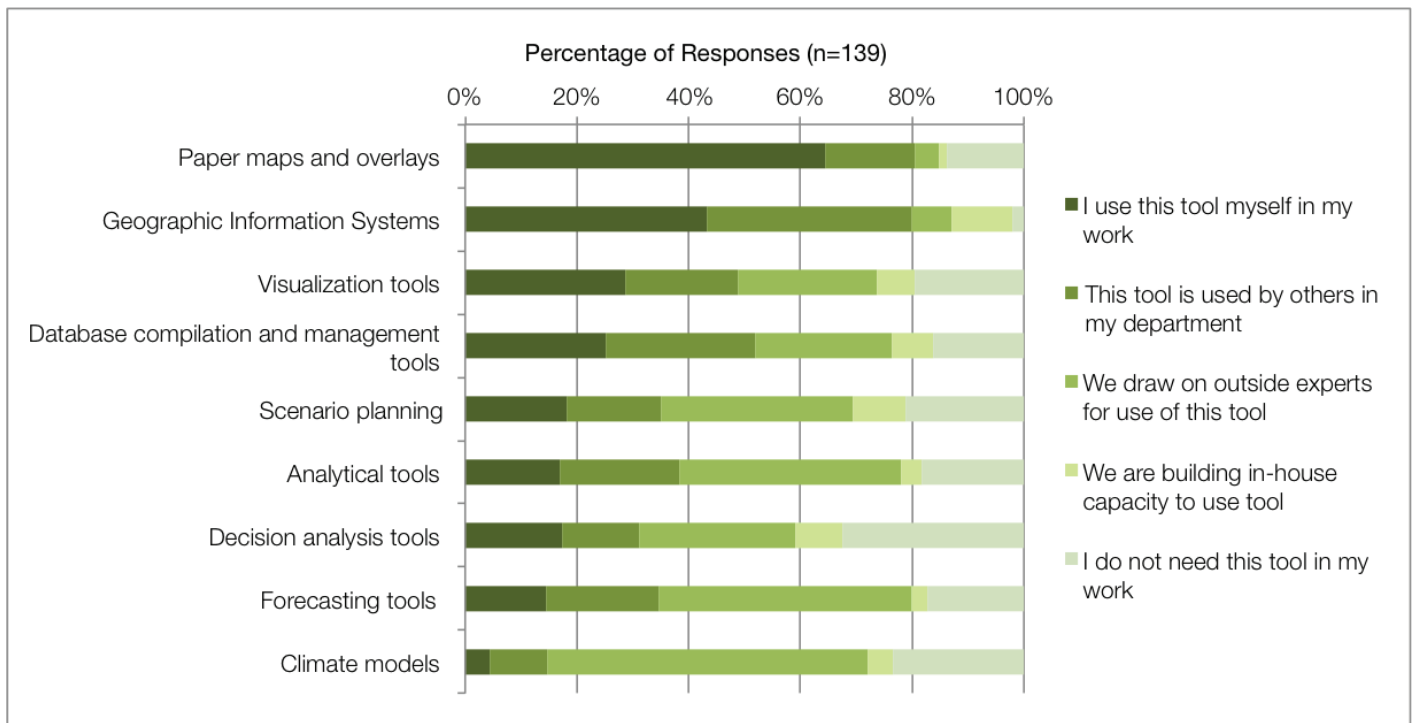
Elected Official Respondents

Organization #1	Organization #2	Organization #3
Bay Conservation and Development Commission	Gulf of the Farallones National Ma- rine Sanctuary	Federal Emergency Management Agency
Stopwaste	State agencies	Local staff

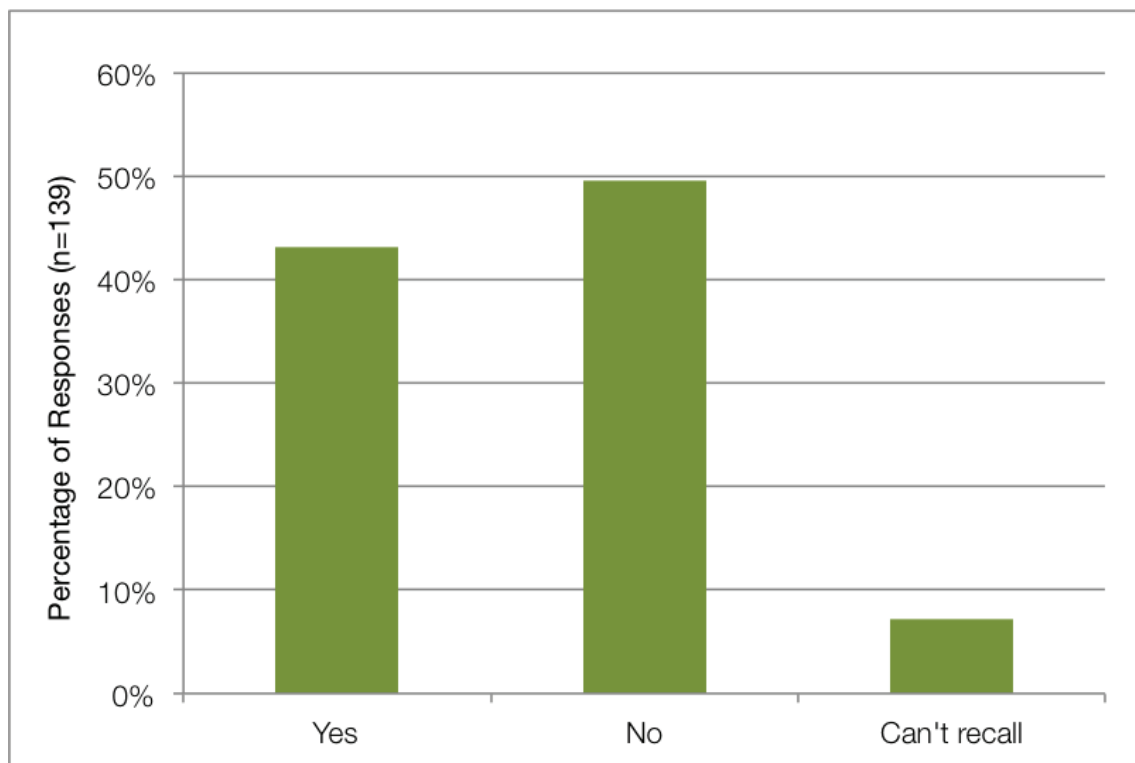
NGO, Private Industry & Environmental Consultant Respondents

Organization #1	Organization #2	Organization #3
NOAA	FEMA	BCDC
My own, ICLEI - Local Governments for Sustainability	NOAA	EPA
BCDC	Cal-Adapt	[No response]
Point Reyes Bird Observatory	North Bay Climate xx Initiative (NBCAI)	[No response]
Elkhorn Slough Foundation	UCSC research on hydrologic re- sponses to climate change	[No response]
USGS	CA Resources Agency	Local partners
Moffatt & Nichol	[No response]	[No response]
FEMA	US EPA	State Resources Agency
Philip Williams and Associates	County development agency	Local consultants
NOAA	US EPA/US DOT	State Resources (California)
NOAA / NWS for environmental data (waves, tides, winds)	Scripps / CDIP for global climate model output and nearshore wave modeling	USGS for coastal field data
San Francisco Bay Joint Venture	SF Estuary Partnership	California State Parks

42. Please rate the use of the following information processing tools in your work.



43. Have you already participated in any formal training(s) on planning for climate change?



44. If yes, please describe which training(s) you attended (if you have attended more than three, please list the most recent):

City & County Respondents

Title/Topic	Approximate date	Location	Organization offering training
CalFed Conference	2008	Sacramento, CA	CALFED
CA climate change predictions	2010 or 2011	USGS	USGS
Graduate School	2002 -2003	Cambridge	Harvard University
AEP CLimate Change Adaptation in SF Bay Area	7/19/2011	Redwood City, CA	Association of Environmental Professionals
Data and Tools for Incorporating Climate Change Impacts into Community Planning and Project Design	30-Mar-11	Oakland, CA	BCDC, NOAA
Planning for Sea Level Rise	2010	Oakland	NOAA?
TRB Meetings	Jan-10	Washington DC	TRB
IRWM and Climate Change	May-11	Sacramento	DWR
Climate Change Workshop	Oct. 2010	San Francisco	City of San Francisco
Climate change adaption	Spring 2011	Oakland	NOAA? BCDC
Adapting to Climate Change:	Feb-10	Marshall, CA	NOAA National Marine Sanctuary Program
Spring Seminar: Climate Change	30-Apr-11	Monterey Bay Aquarium	National Association for Interpretation
Scenario Planning--Futures of Wild marin	Feb-11	Marin County, CA	California Energy Commission & UC Santa Cruz
AMBAG	Jul-11	Marina, CA	
Roadmap for Adapting to Coastal Risk	13-May-11	Webex	NOAA-BCDC
Adaptation to Sea-Level Rise Works Shop	2009	Oakland	BCDC/ABAG
Roadmap for Adapting to Coastal Risk	13-May-11	Webinar	NOAA
ICLEI	2007	San Francisco , CA	BAAQMD
SF Bay Climate Response	Fall 2010	Sacramento, CA	CalFed Science Conference
Smart Growth Conference	2011	Charlotte, NC	Local Government Commision
Can't remember	2009?	Sunnyvale or San Jose	Bay Conservation and Development Commission (BCDC)
ACI Environmental committee Meetings	various	various	Airports Council International
Atmospheric Dynamics (?)	Aug. 2010	San Francisco	City of San Francisco

44. If yes, please describe which training(s) you attended (if you have attended more than three, please list the most recent): (cont'd)

City & County Respondents (cont'd)

Title/Topic	Approximate date	Location	Organization offering training
Futures of Wild Marin	Jan-11	Fort Cronkhite, Sausalito	UCSC
Webinar	Apr-11		
Adapting to Rising Tides project	2010	Oakland	BCDC/ABAG
Addressing Climate Change in General Plans	Sept. 13, 2010	Oakland, CA	BCDC & NOAA
CWCCG	2009	Oakland, CA	BACWA
SF Bay Climate Change	Spring 11	Bay Area	ART
Addressing Climate Change Impacts and Adaptation in Climate Action Plans and General Plan Updates	Sep-10	Oakland	SF Bay NERR
Sea Level Rise Strategies	2010	Oakland	Bay Coalition
World Ocean Conference	Sept. 7, 2010	San Francisco	

State, Federal & Regional Respondents

Title/Topic	Approximate date	Location	Organization offering training
Climate Change Adaptation Planning	Feb-10	Marshall, CA	NOAA CSC
Climate adaptation at Landscape Level	Jan-11	Los Angeles	California LCC
California/Oregon/Washington DOT Coordination	Jun-11	Oakland	FHWA
Adapting to Rising Tides	Jul-01	Oakland	BCDC
California Agriculture and Climate Change	4/1/2011	Davis, CA	California Climate & Agriculture Network
NMFS Climate Tools	2010	Marin County	NOAA
Adapting to Rising Tides	Spring 2011	Hayward	ABAG
SLR Storm Surge Modeling	5/4/2011	Webinar	BCDC
Extreme Precipitation Conferences	June 2010 and 2009	Davis	[No response]
Climate Change Adaptation Planning for Coastal Resource Managers	2010	Bolinas, CA	NOAA/ BCDC
in house training on GHG evaluation in grants	Mar-11	Oakland	in house staff
Futures of Wild Marin	Jan. 28, 2011	Headlands Institute	California Energy Commission

44. If yes, please describe which training(s) you attended (if you have attended more than three, please list the most recent): (cont'd)

State, Federal & Regional Respondents (cont'd)

Title/Topic	Approximate date	Location	Organization offering training
Data and Tools for Incorporating Climate Change Impacts into Community Planning and Project Design	3/30/2011	San Francisco	BCDC/NERR/EBM Tools Network
BCDC Sea Level Rise Training	2009	Tomales Bay	BCDC-NOAA
Adaptation Training for climate change	February 2010	Tomales Bay	NOAA, BCDC
Adaptation to coastal climate change	September 2010	San Francisco	
Climate Change Adaptation	2007	DWR Training Office	NOAA
Adapting to Climate Change: A Training for Coastal and Marine Resource Managers	February 22-26, 2010	Marshall, CA	ONMS/BCDC/Center for Ocean Solutions/ CA Coastal Commission
CA Climate Conference	Annual	Sacramento	PIER
Planning for Marin County	Spring 2011	Marin Headlands	UC Davis
Will They Sink or Swim	Sept	Oakland	Elkhorn Slough CTP
Pacific NW Climate conferences	2010	Portland	University of WA
State Climate Change DOT Meeting	August 2010	Washington DC	AASHTO
Adapting to Rising Tides	June 2011	Newark	BCDC
Adapting to Coastal Risk	5/13/2011	Webinar	BCDC
Sierran conferences	summer 2009	Tahoe	
Adaptation planning for local governments	2011	Oakland, CA	APA
PACLIM conference	spring 2011	Pacific Grove	USGS
Climate change	Fall 2010	Palo Alto	UC Berkeley
Our Coast Our Future	July	Petaluma	GOF NMS
Climate adaptation training	2008	Seattle	Univ of WA
Climate Change Conf.	Oct. 2010	Washington DC	Georgetown University
Adapting to Rising Tides	May-11	Hayward	BCDC
FHWA COAST Demo	5/23/2011	Webinar	FHWA
San Francisco Bay: Preparing for the Next Level	September 2009	San Francisco	BCDC et al
BCDC	2010	Oakland	BCDC
Our Coast our Future	Summer 2011	PRBO, Petaluma	BAECCC
Adapting to Rising Tides	Jan-Sept	East Bay Various	BCDC

44. If yes, please describe which training(s) you attended (if you have attended more than three, please list the most recent): (cont'd)

NGO, Private Industry & Environmental Consultant Respondents

Title/Topic	Approximate date	Location	Organization offering training
Vulnerability Assessments	2011	SF Bay Area	
Data and Tools for Incorporating Climate Change Impacts into Community Planning and Project Design	March 11	MTC Oakland	San Francisco Bay National Estuarine Research Reserve
Sea level rise study	Fall 2010	Elkhorn Slough Foundation	Elkhorn Slough Foundation
Planning for climate change	2009	Oakland	BCDC
Urban Climate Adaptation Graduate Course	Fall 2011	Cambridge, MA	Harvard University Graduate School of Design
Adapting to Climate Change	Feb, 2010	Marshall CA	Center for Ocean Solutions
Climate change seminar / retreat	2010	Tomales Bay	NOAA (was one of the lecturers on coastal processes and adaptation)
Tools and Data workshop	2011	SF Bay Area	
Redwood Forest and Climate Change	Fall 2010	Moore Foundation	Save the Redwoods League
Workshop	Aug 2011	San Francisco	NOAA OCOF Coastal Managers Workshop
Adaptation	2010	SF Bay Area	
Grazing for carbon sequestration	Spring 2010	Circle P Ranch	Central Coast Rangeland Coalition
Coastal zone management	Jun 2011	Anchorage AK	ASCE - at Solutions to Coastal Disasters Conference

45. If you have had the opportunity to implement any skills, or used information, you obtained in the training, please describe any challenges you encountered in doing so.

City & County Respondents

Challenges
Internal support and City wide leadership
Lack of interest from the Public Works Department
Adapting to Rising Tides - implementation of SF Bay Alameda project
When working with a joint powers authority representing many municipalities, there is the concern that the more fiscally-sound (historically affluent) partner cities will drive the process to the design and planning detriment of their less well-heeled neighbors.
None
Have utilized new climate change tool for CA developed by UC Berkeley
Access to base data, downscaled projections and software/tools for modelling
Background and Materials provided have been helpful in educating the City Council / Commissions and particularly helpful in ongoing discussion with Citizen's advisory committee for General Plan update and formulating Station Area Plan workprogram partially within flood areas.

State, Federal & Regional Respondents

Challenges
Stakeholders are concerned with vulnerability and risk assessment making their property less valuable.
I think the biggest challenge has been sorting through the multitude of useful (and some not useful) information out there relating to climate change and adaptation. It seems like every week another agency releases a 200-page report on adaptation.
The Adapting to Rising Tides process is collectively working on the types of tools regions and communities may undertake to address climate change impacts and/or adapt to climate change
Our work is driven by legislative mandates. Guidance is appreciated and high-quality information can be used to support decision-making. But legislated change is easier to implement.
The Corps of Engineers has planning mandates that require identification of a single most likely future scenario while new mandates require we analyze potential projects under multiple sea level change scenarios. How to reconcile this is a hurdle and even more of a challenge is how to make implementation decisions under multi-scenario planning.
Lack of quantifiable and significant mitigation for GHG emissions from projects. (in the context of evaluating grant applications for projects)
The training was too abstract. Need a workshop where you can work with a team to develop an adaptation plan that you will use.
None

45. If you have had the opportunity to implement any skills, or used information, you obtained in the training, please describe any challenges you encountered in doing so. (cont'd)

NGO, Private Industry & Environmental Consultant Respondents

Challenges
We addressed climate change in our Conservation Blueprint that was just completed this spring. Go to www.LandTrustSantaCruz.org to access the entire 200-page document or just the maps. I did not work on this project, but reference it for stewardship that I manage.
I have struggled to find the appropriate job outlet to use the extensive research and knowledge I have about climate adaptation
Most of our work is customized and detailed: Most "tools" are not technically substantive enough.

46. If you have one or more specific suggestions for climate change or adaptation-related research that would assist you in planning and preparing for climate change please list them here.

City & County Respondents

Suggestions
More clear discussion of storm regime in central calif.. current theory is more extreme annual cycle (drought/flood), not necessarily higher intensity storms over the long run (statistically) more discussions about what 2200 looks like
Any information or training you provide should be made available for different levels of education. A lot of staff don't have a college education and there are the ones who will be implementing any changes we make in technology - lower emission vehicles, use of leaf blowers, installation of solar panels, etc.
Provision of assistance to small cities who do not have staffing to address these issues.
Levee planning to protect against sea level rise.
Need to obtain funding for preparation of a subregional adaptation plan to respond to sea level rise.
Pilot projects are needed
See my 3 suggestions above.
Funding and implementation strategies; establishing regional or sub-regional responses
engage at a system level with risk managers, insurance, CFOs, engineers etc...needs to move out of the environmental field more aggressively to get the attention it needs.
Role of financial inducements for local government agencies in stimulating pro-active global warming adaptation. Effectiveness of current adaptation practices in mitigating likely global warming effects. International and national political and economic barriers to global warming adaptation in both the developed and developing world.
web-site with access to studies defined by region
Impact on growth and quality of coastal grazing lands (ability to support dairy cows, cattle) in response to projected climate changes (precipitation, temp., fog frequency). Rate of accretion of wetlands vs. rate of sea level rise. Most effective means of augmenting accretion of wetland to avoid drowning.
There needs to be region wide specific mitigation measures that cities can use in an "off the shelf" format for projects that will be impacted by global warming similar to the regulations the Santa Clara Valley Water District uses for creating buffers from rivers and creeks to development projects. If the guidelines are clear cut and easily enforceable across a region, you will get a higher level of compliance.
Better predictive models at the local and regional scale.

46. If you have one or more specific suggestions for climate change or adaptation-related research that would assist you in planning and preparing for climate change, please list them here. (cont'd)

City & County Respondents (cont'd)

Suggestions
Future inundation maps, changes in storms and tides
A consistent State Agency of federally mandated policy regarding likely scenarios and mitigation/adaptation strategies would be helpful.
Historic and projected climate vs. sea level vs groundwater measurements/projections. Juxtaposition to see the interrelationships would be very useful in understanding how and where to plan.

State, Federal & Regional Respondents

Suggestions
It would be helpful to have guidance/models on how to assess the ability of marshes to keep up with SLR based on their sediment supply.
I think more important than research would be in-person trainings showing managers how to use the tools available to them (i.e. ClimateWizard, Pacific Institute sea level rise maps, NOAA coastal services tools). This would be EXTREMELY useful, and especially if these training were developed in a way that allows attendees to work on their specific issues as a case study for the class (i.e. if you're training professionals how to use ClimateWizard or CalAdapt to find local climate projection data, then leave not only having seen it done but having produced maps and information for their locality).
We could use some assistance on assessing climate change impacts to the statewide transportation system. Climate change data would also be helpful to help use us formulate future policy directions.
Our biggest need are for tools and models that apply to the parcel level, i.e. at the scale of acres rather than the entire west coast of North America.
Workshops on possible scenarios looking at existing shoreline habitats.
The ART process is ambitious but seems to be a well paced way for a local to regional way to introduce the complex issues. The questions in the survey suggest that some process will be able to teach us the tools to just 'get ready' on our own but a little research when in reality, the measures nearly anyone will have to undertake will require in-depth engineering and probably consultants to actually pull off any real work since my resources at this point are just aimed at becoming ready to incorporate climate change in our organization. Early days now...
Regional planning for adaption to sea level rise impacts on estuaries and coastal wetlands
Research that would quantify adaptive and mitigative infrastructure design and cost opportunities.
CEQA guidance related to adaptation
cost benefit of protection from sea level rise.
1. Quantification of climate change impacts on winter storm events -- changes in amount/intensity of storm precip, and number of severe storms annually. 2. Improved winter storm predictive capability -- longer lead time forecasts and better quantitative precip estimates. 3. Useful seasonal to interannual climate forecasts (not current CPC outlooks). 4. Quantification of climate change impacts on wave heights and tidal range off Calif coast.
Trainings that focus on how to integrate planning across all levels of government would be great.
Most studies of the costs associated with inaction.
How to prepare a climate action plan and components of a climate action plan.

46. If you have one or more specific suggestions for climate change or adaptation-related research that would assist you in planning and preparing for climate change, please list them here. (cont'd)

State, Federal & Regional Respondents (cont'd)

Suggestions
The one main issue is making climate change relevant at a local level which means impacts today, not 100 years from now. The public opinion is that it's an issue for the next generation. The ability to downscale climate change to a local level is a real need. I recently read an article about disease, ocean acidification and oyster culture in the NW. It takes effective communication of the impacts to the general public to create the mind set that climate change is real and not some political football. Terrorism doesn't mean much unless it happens in your city. The public outreach on climate change needs to bring facts to the public and only then will elected officials listen.
Information on the change in the distribution of wildlife.
local predictions
"Future projections of atmospheric rivers and associated storm characteristics and their translation into precipitation patterns over the terrain of California Projections of rate of change expected in coming decade relative to background interdecadal variance"
Documenting coastal ecosystem response to physical changes in climate.
I have less knowledge and concerns regarding amount of rainfall, runoff, storm frequency, etc. I am more involved with issues pertaining to the changing seasonality of storm events, as this complicates restoration activities for endangered salmonids.
How does it affect mitigation decisions for natural resources today? What considerations should we be including in siting, maintenance, or restoration?
Better correlation between transportation choices and runoff, inclusion in evaluation tools
How will existing habitats for wildlife species shift/change/move and how can designs for habitat restoration be changed to be more adaptable to those changes?

Elected Official Respondents

Suggestions
I would like to see planning happen on a collective basis in a regional format. I would also like to have the research presented in a factual documented manner that deters argument and presents the details as we truthfully know them today
Techniques of planned retreat; Permit coordination and facilitation
Outreach to all that global is more natural and less a result of something manmade. If we could separate the differences and agree, we might be able to move forward at a more purposeful pace.

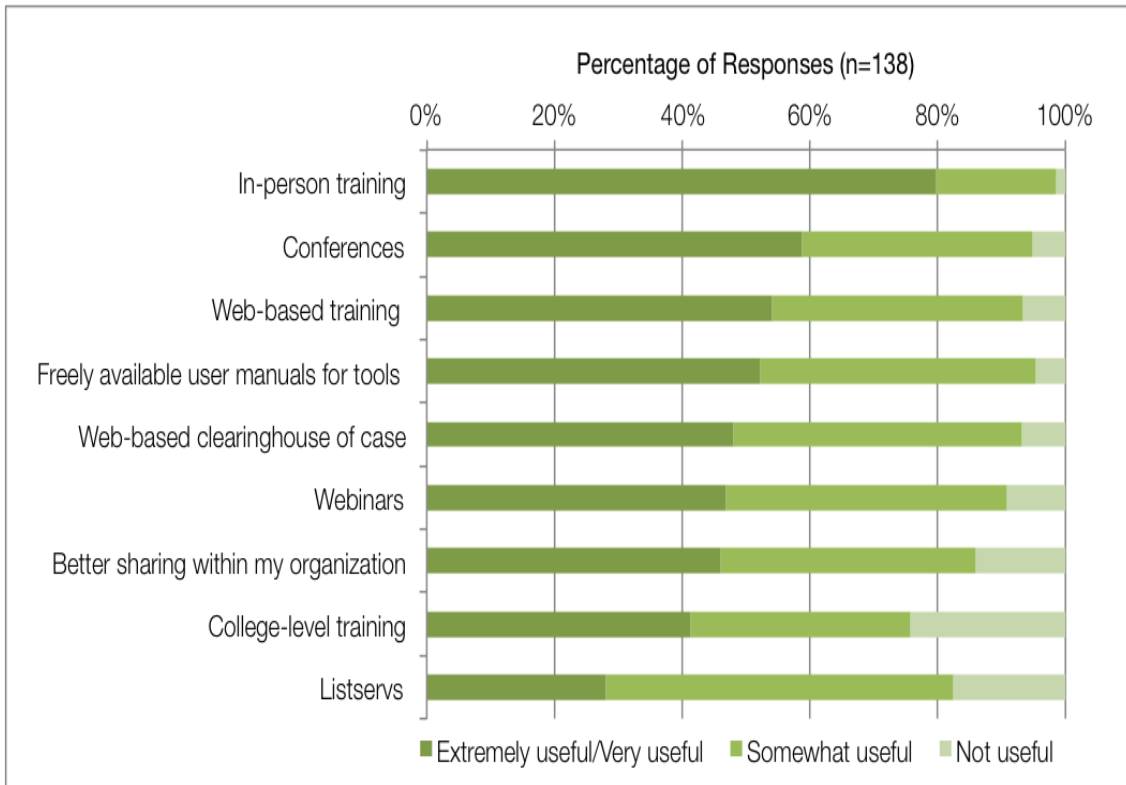
46. If you have one or more specific suggestions for climate change or adaptation-related research that would assist you in planning and preparing for climate change, please list them here. (cont'd)

NGO, Private Industry & Environmental Consultant Respondents

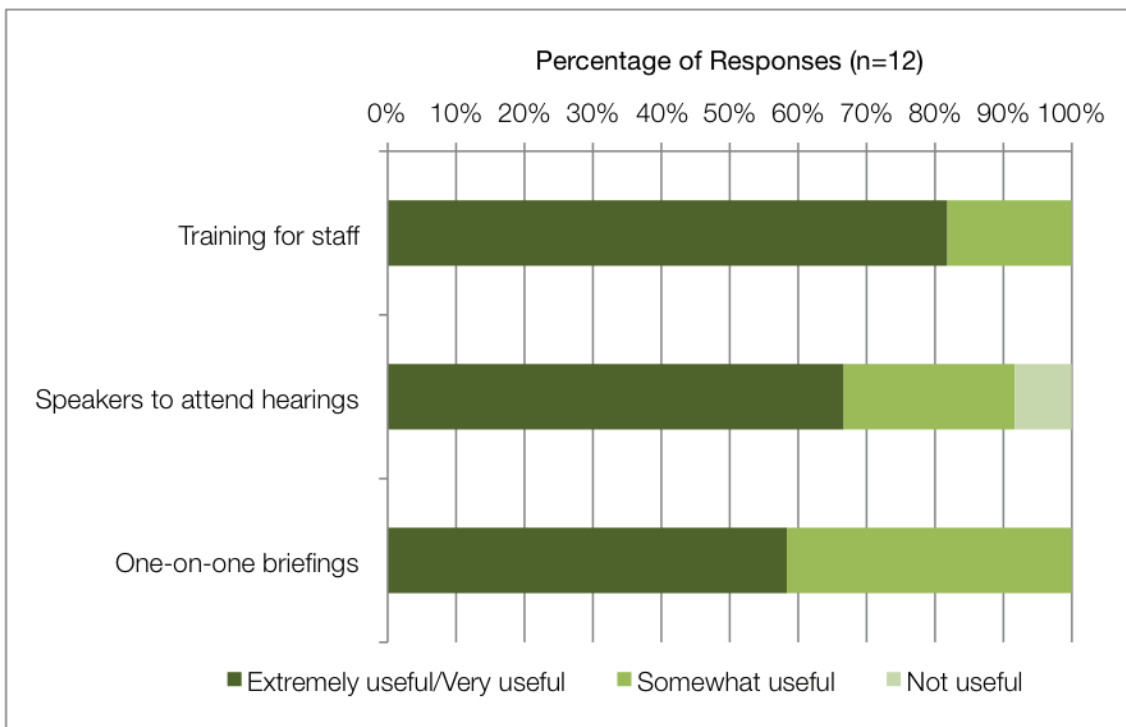
Suggestions
Clearinghouse of specific adaptation strategies for different sectors (infrastructure, residences, farms,...)
I would like to know where to find the climate change projection graphs. They are definitely out there, but I haven't found the place. I have also seen some great powerpoints that summarize the problem, but I can't find where I filed them. It would be great to have that as a refresher and as something to share with interns and newcomers to climate change.
Understanding how to effectively engage others. Understanding tools to slow water in restoration projects. Understanding how to predict where restoration priorities should be.
Assessing value of ecosystem services compared with other options for adaptation. Identify smart approaches to balancing these options from economic, human welfare, and sustainable ecosystems perspectives.
It is important for those of us planning for climate change to be able to relate and disseminate information to the general public; in other words there needs to be a "laymans" language developed to transmit the knowledge.
<ol style="list-style-type: none"> 1. Quantified conceptual models of ecological / habitat response to geomorphic changes (and climate changes) that are keyed to physical indexes that can be modeled based on physical processes (e.g. beach width). 2. Quantification and valuation of ecosystem services of natural shores and beaches, in particular the ecological-habitat values, so that these values can be internalized into benefit cost analyses of hazard mitigation actions 3. Evaluation of the effects of armoring and beach nourishment on the nearshore morphology and ecology 4. Nearshore data collection targeted to be useful to coastal analysis: "smart data" geomorphic indexes such as limits of shore face, bar and reef geometry, beach elevation and width, back beach elevation, backshore characterization (geology and development)

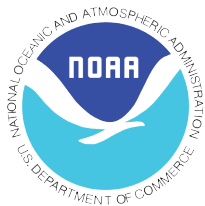
47. To make the most effective and efficient use of the available information and tools to support planning for climate change, please rate how useful each of the following opportunities to learn more about them would be to you.

All Respondents (Except Elected Officials)



Elected Officials





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