Rising to the Challenge

Results of the 2011 California Coastal Adaptation Needs Assessment

Northern 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

Northern Region Results:
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Statewide Report:
Finzi Hart, J. A., P. M. Grifman, S. C. Moser, A. Abeles, M. R. Myers, S. C. Schlosser, J. A. Ekstrom (2012) *Rising to the Challenge: Results of the 2011 Coastal California Adaptation Needs Assessment*. USCSG-TR-01-2012.

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J. A. Ekstrom - University of California, Berkeley | Natural Resources Defense Council

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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

Center for Ocean Solutions, Stanford University

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

Southern California Coastal Ocean Observing Systems

Susanne Moser Research & Consulting

Tijuana River National Estuarine Research Reserve

University of California, Berkeley

University of Southern California Sea Grant

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INTRODUCTION

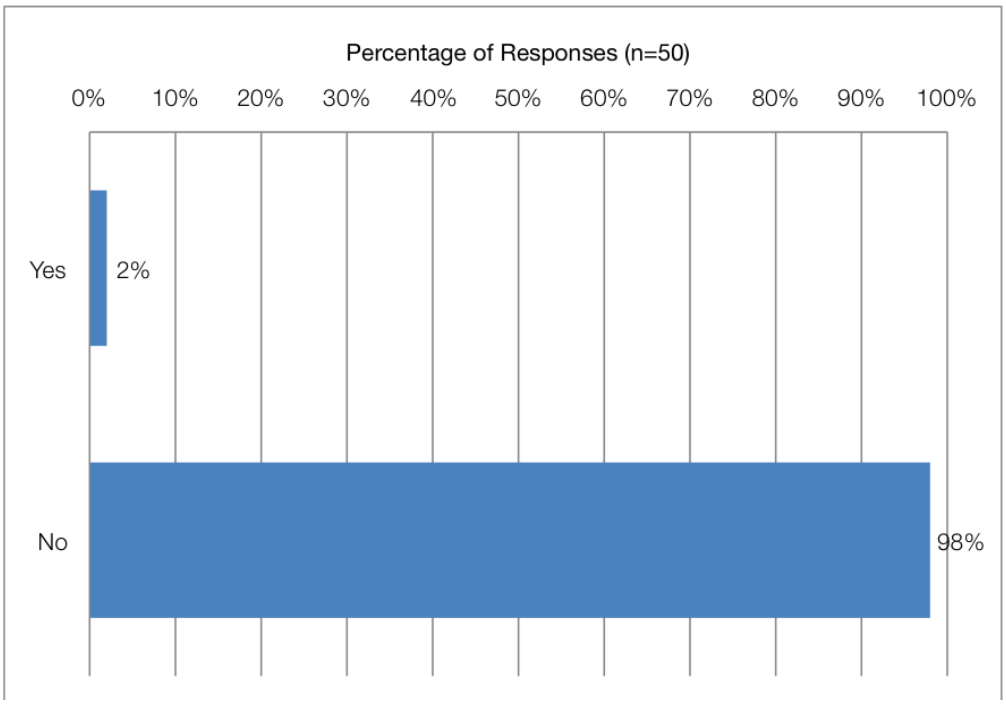
With more than 1,100 miles of open ocean coastline and another 1,000 miles of shoreline along San Francisco Bay, and hundreds more miles of embayments, the range of coastal management challenges, as well as approaches to managing coastal climate change risks, is diverse. It was thus important to determine 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).

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).

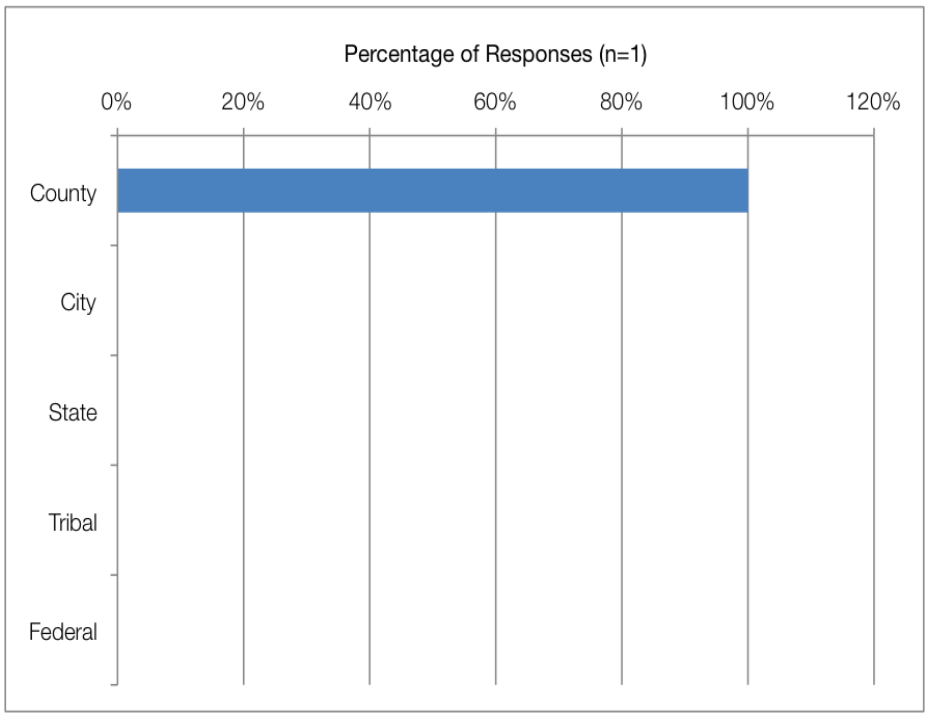
The survey population captured in our survey is thus representative of all California's major coastal regions with the most populated coastal regions of the state (southern California and the San Francisco Bay region) most strongly represented by survey respondents. In terms of respondents' job responsibilities, 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.

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 govenrmenta/organizational sector in which you work.

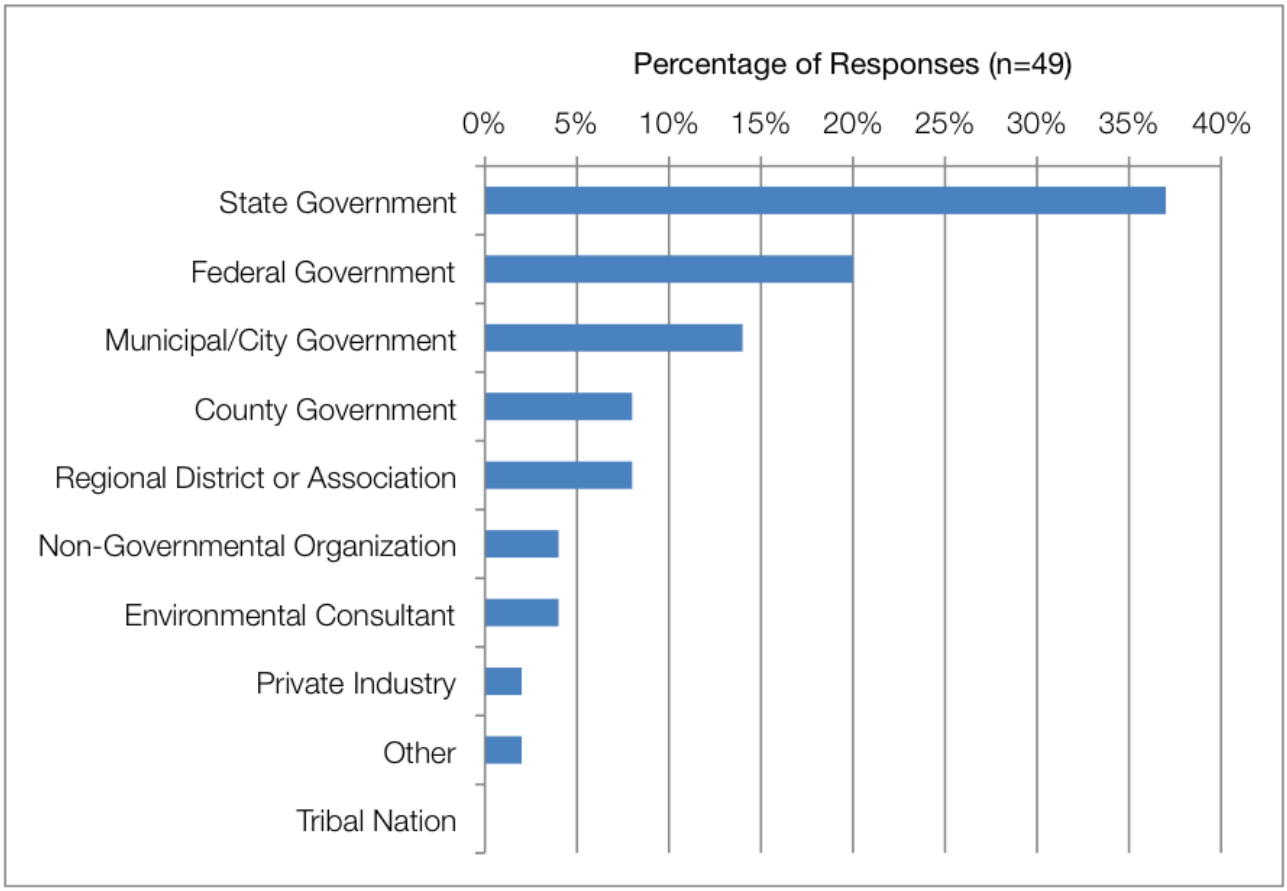


3. Please indicate in which elected office you serve.

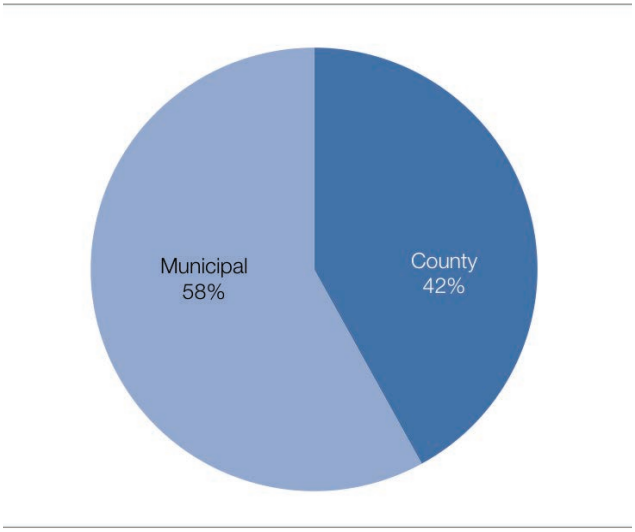
Elected Official Respondents

Supervisor
Humboldt Bay Municipal Water District

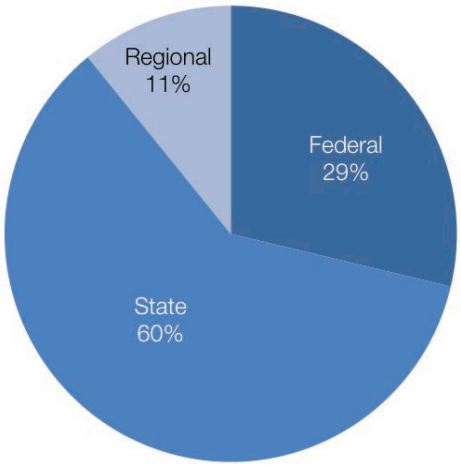
4. If you are not an elected official, please indicate the governmental/organizational sector in which you work.



5. Please select your jurisdiction.



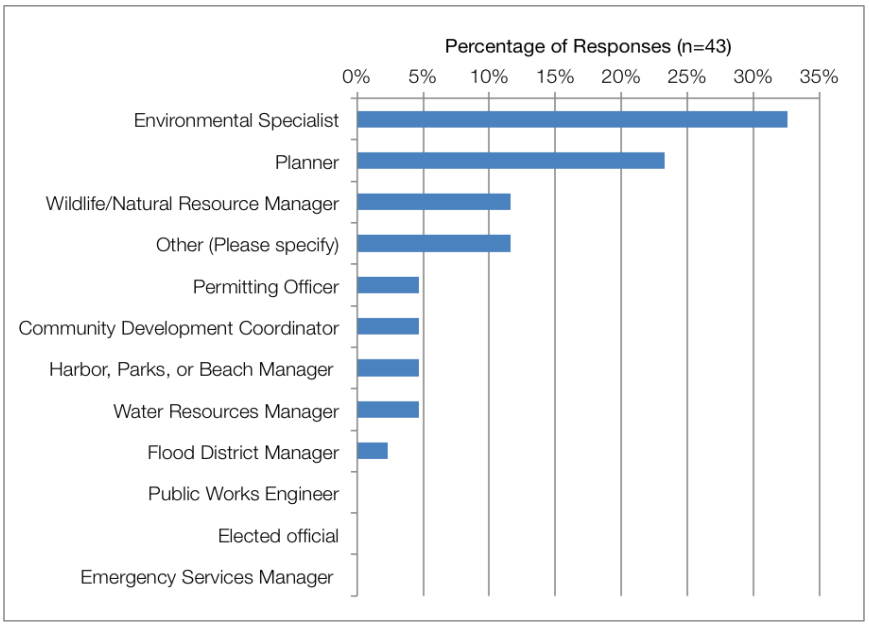
City/County Respondents (n=12)



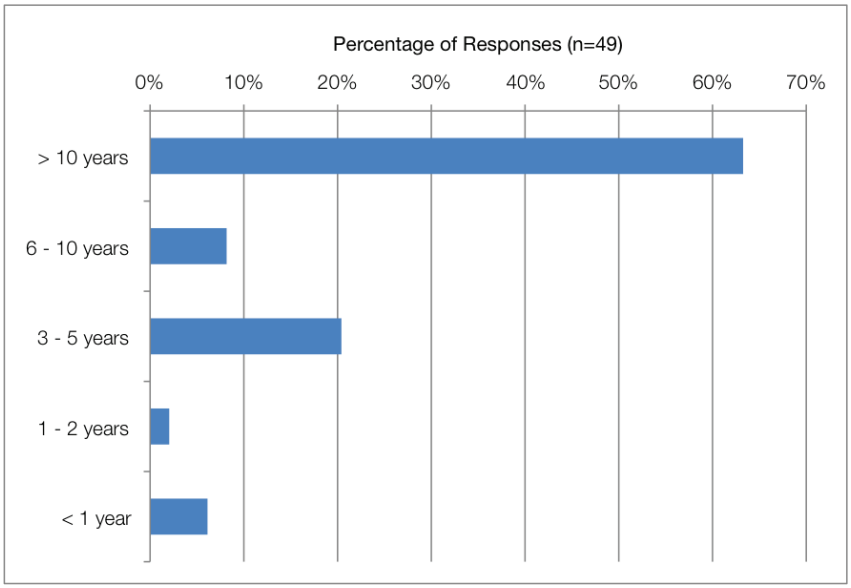
State/Regional/Federal Respondents (n=28)

Elected Official Respondents (n=1)

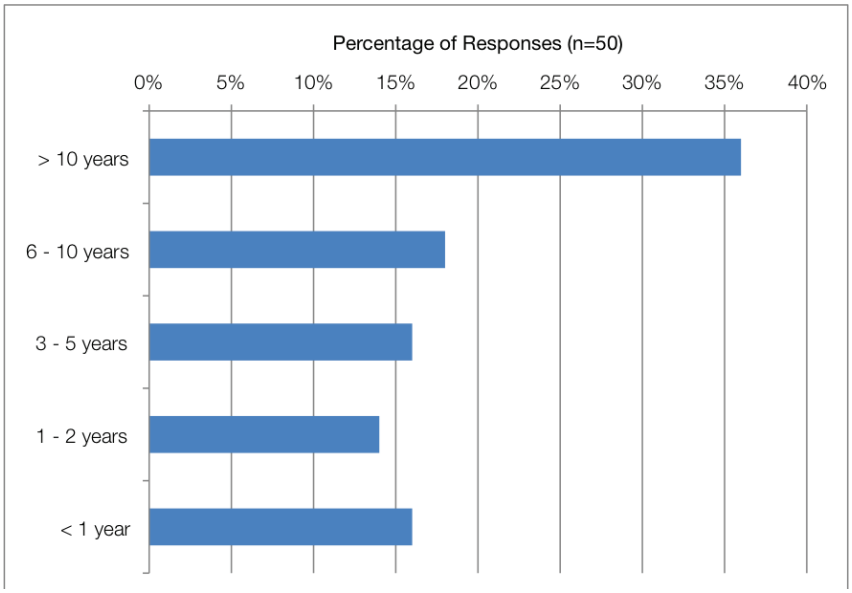
6. Please indicate what type of position you hold in your organization.



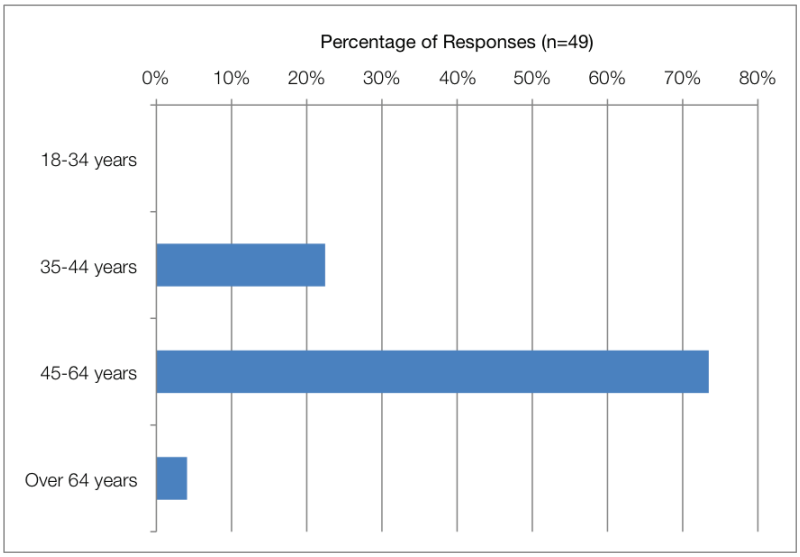
7a. How many years have you been employed by your organization?



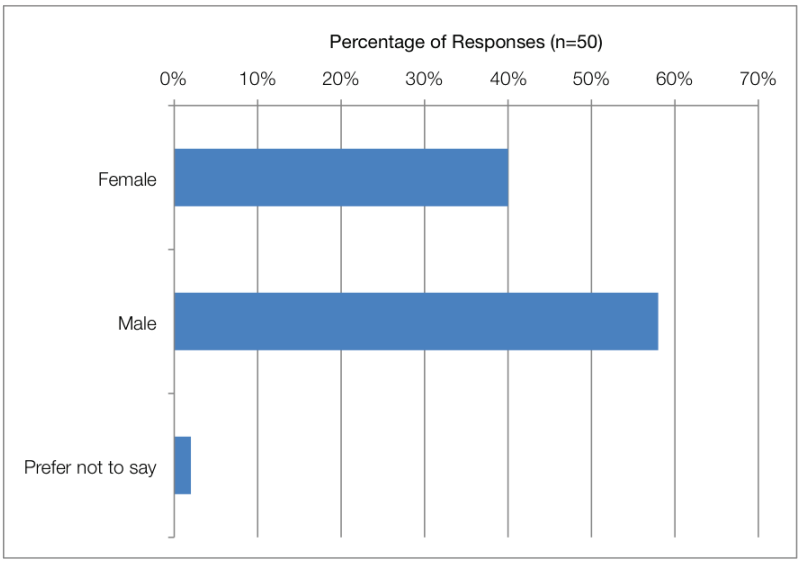
7b. How many years have you held your current position?



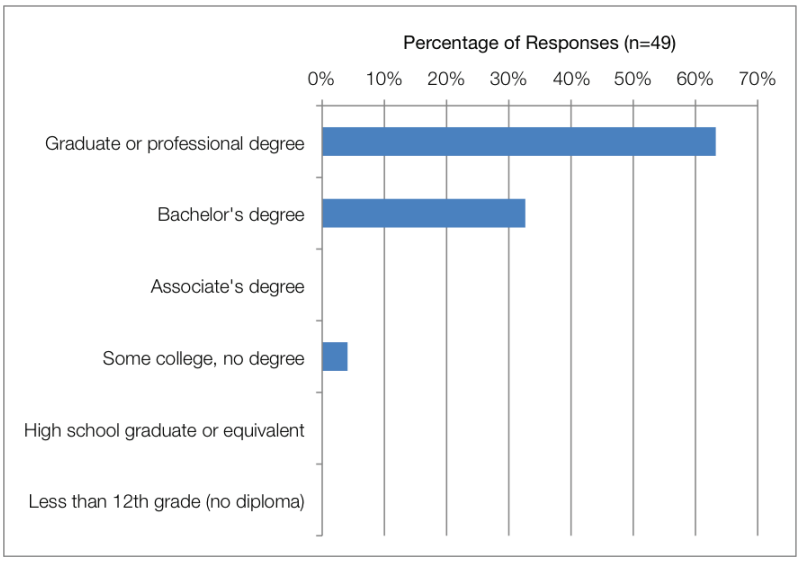
8. What is your age?



9. What is your gender?



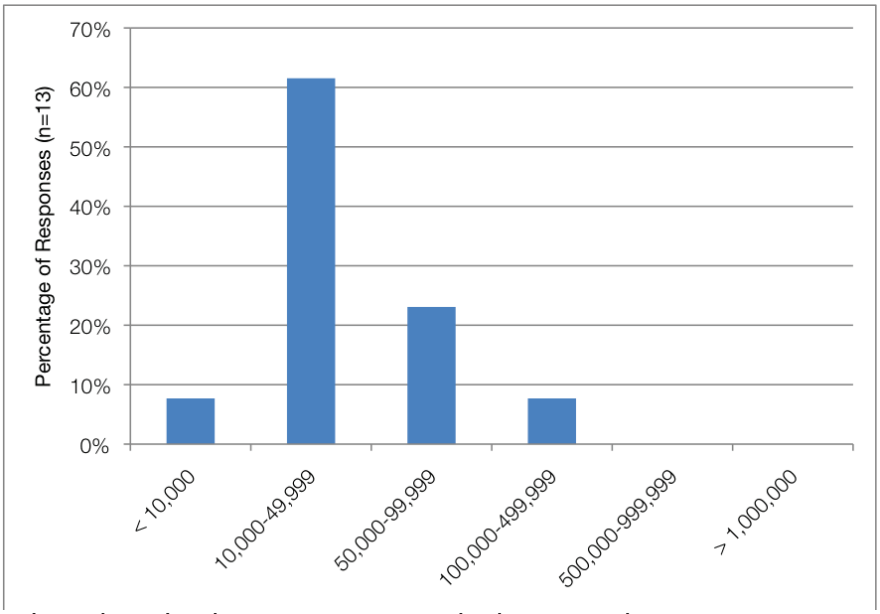
10. What is the highest level of education you have completed?



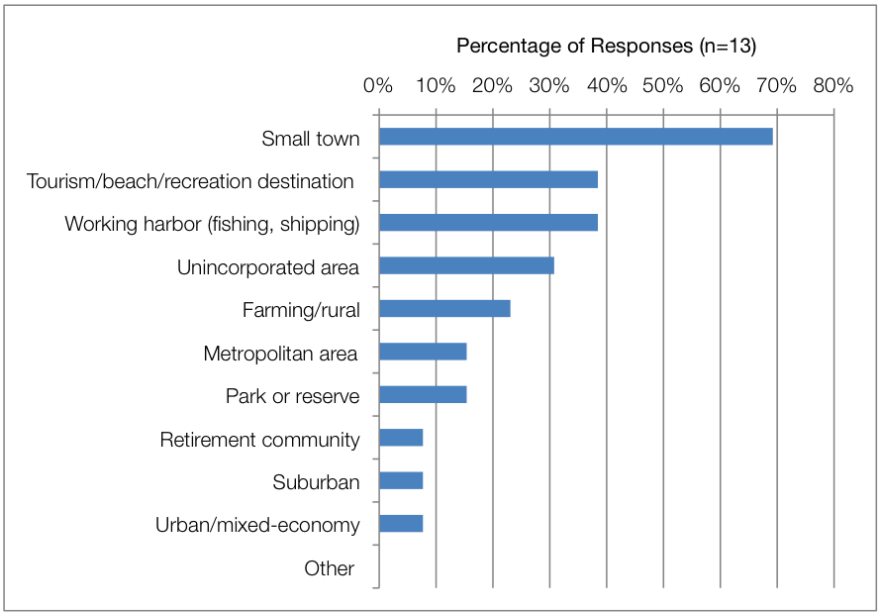
11. What is the approximate length (miles) of the shoreline that you manage or are concerned about in your work (ie., entire length of coastal waterfront, including ocean, bay, lagoon, and estuarine shorelines, within your jurisdictional limits)?

Respondent Category	Mean (± Standard Deviation)	Median	Mode	n
City/County	42 (50)	8	100	9
Regional/State/Federal	578 (651)	300	150	25
Elected Officials	90	90	n/a	1

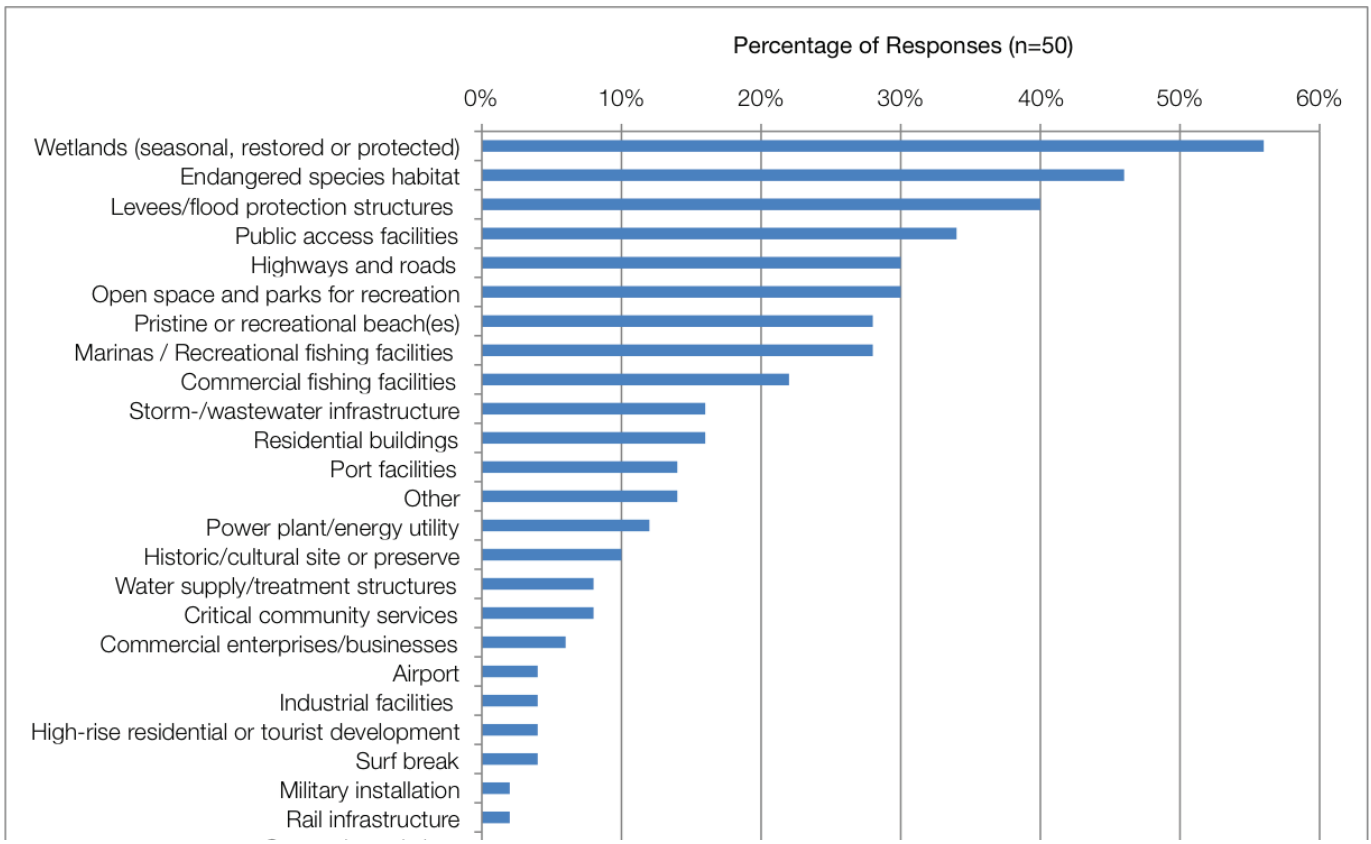
12. What is the approximate size of the population of the community in which you work?



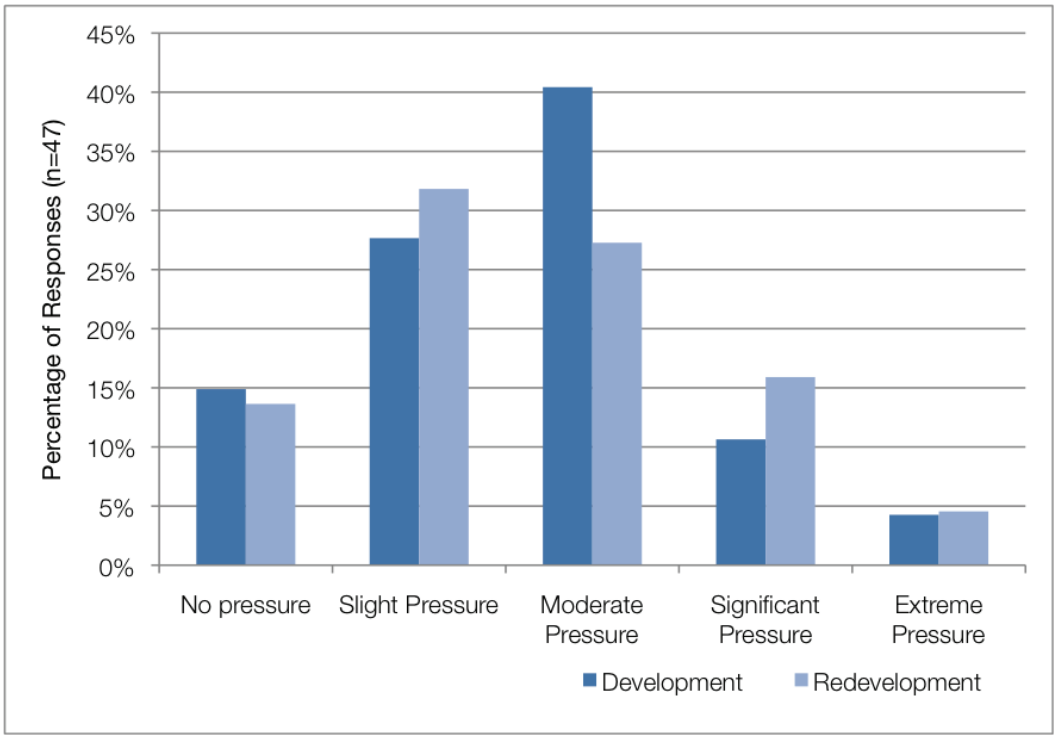
13. What characteristics best describe the community in which you work?



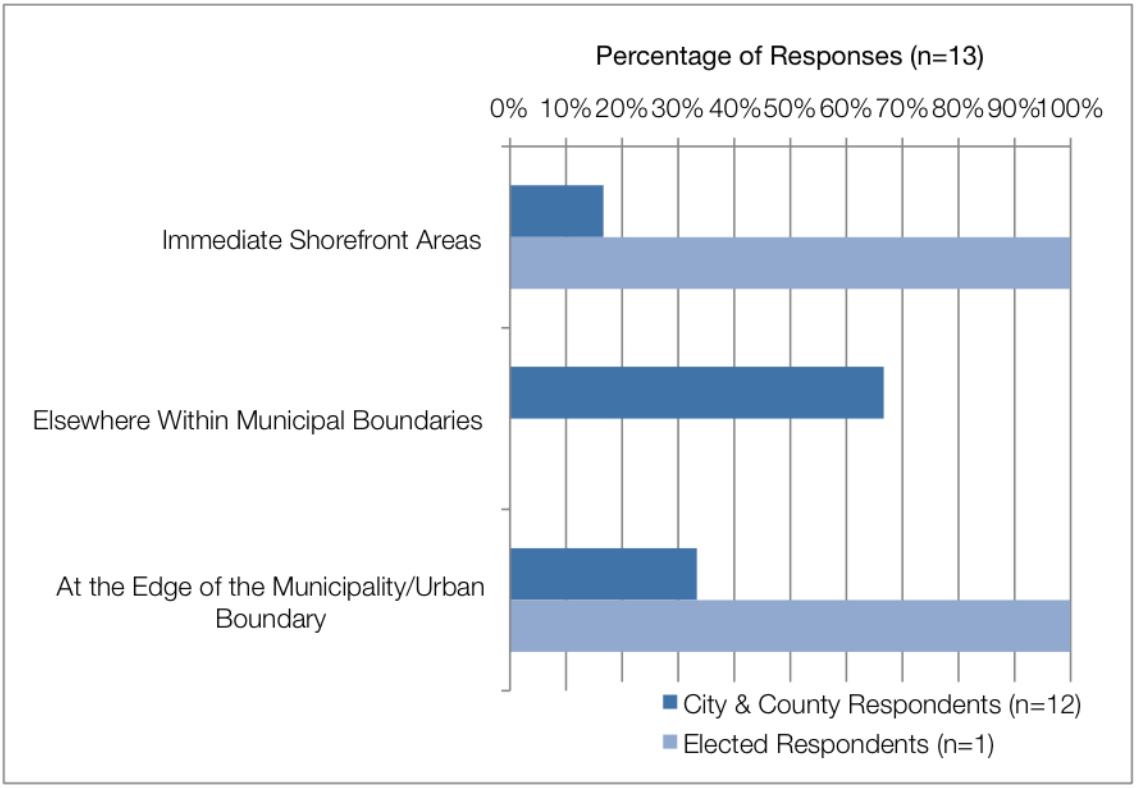
14. What are the predominant types of sensitive infrastructure, development, or habitats are located in the immediate shorefront areas (i.e., in the 100-year floodplain, along bluffs/cliffs) in the area that you manage? (Please select only the top 5)



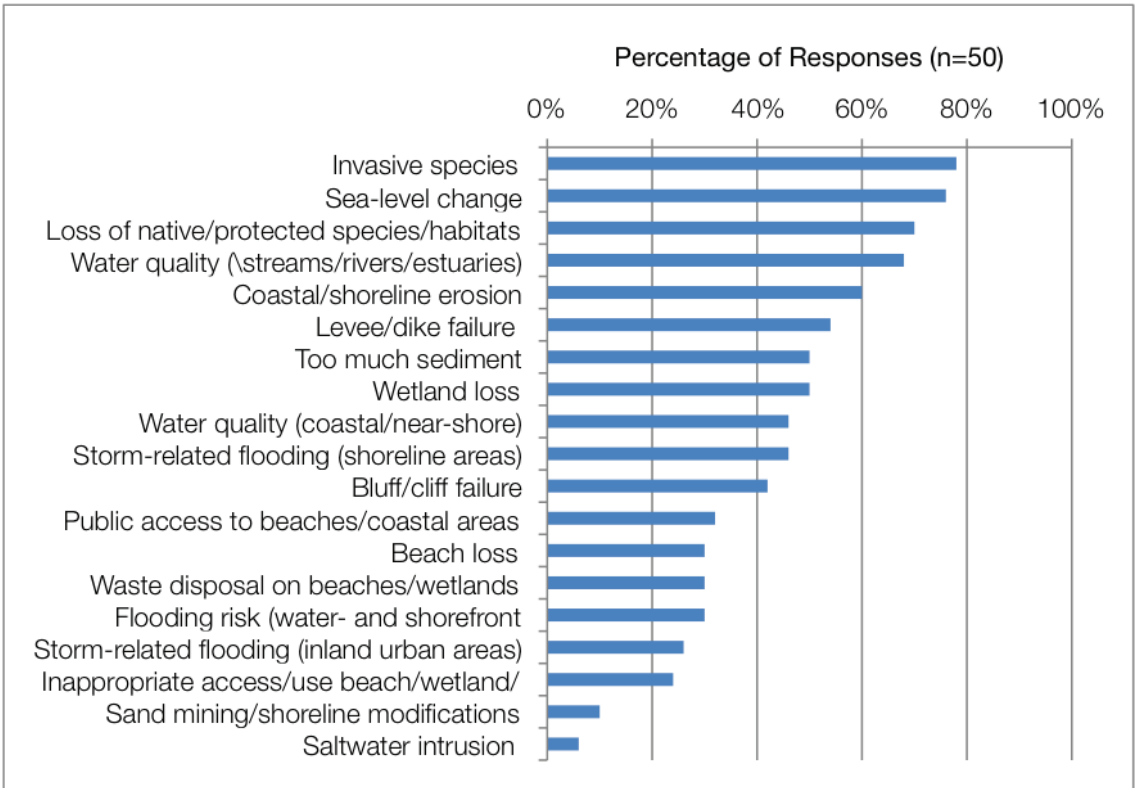
15. How would you describe the degree of development/redevelopment pressure occurring in your community or region?



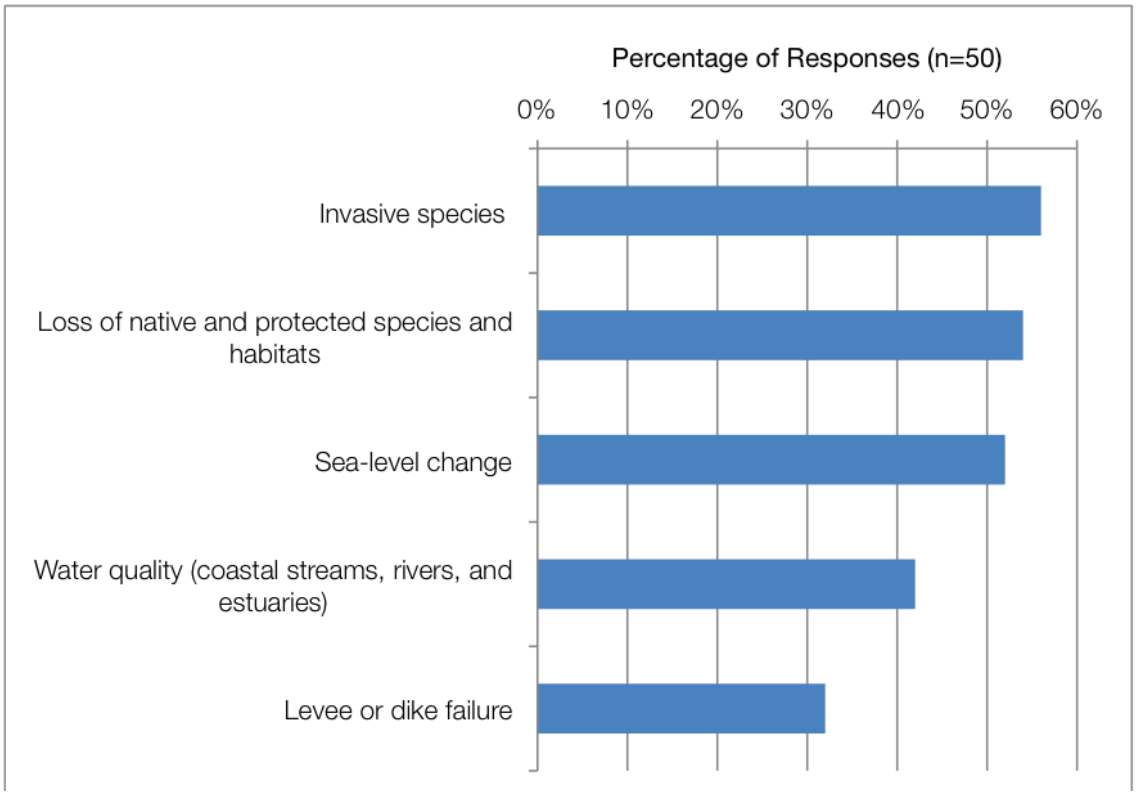
16. Where do you see the greatest development pressure at present?



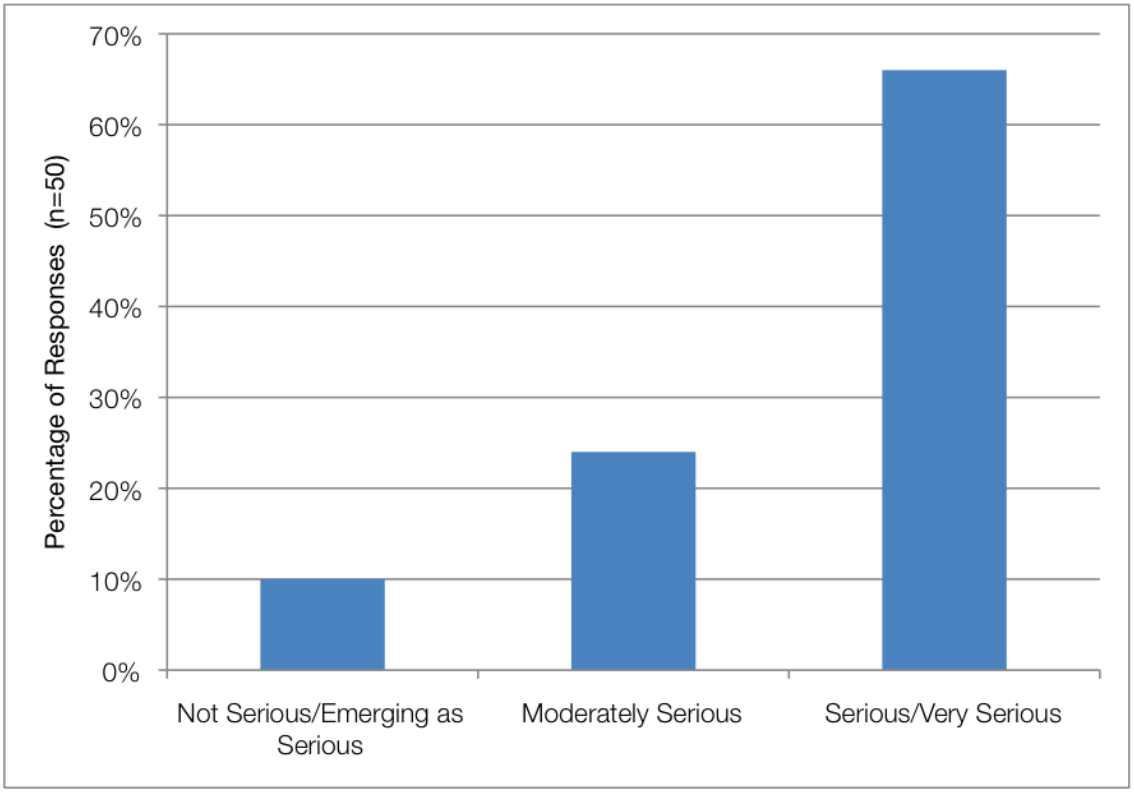
17. What type(s) of coastal management challenges does your community currently face?



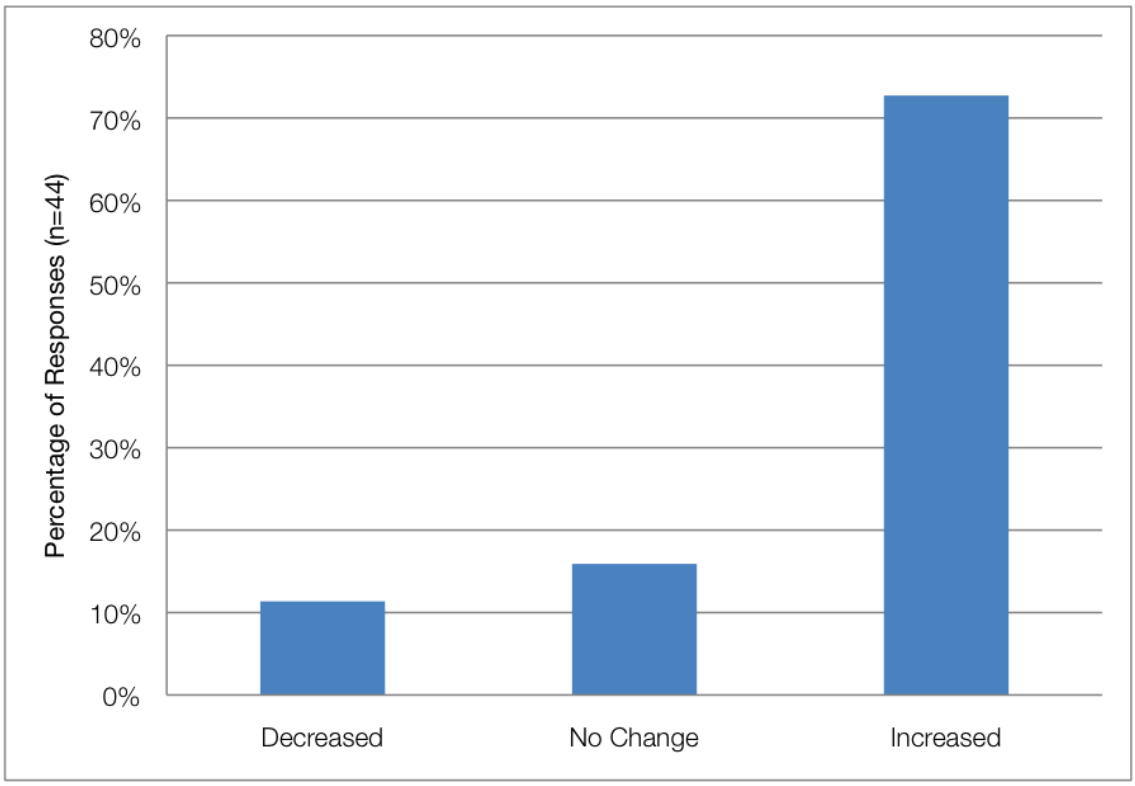
18. Of the challenges selected in Question 19, which do you consider the top five most challenging in your community at present?



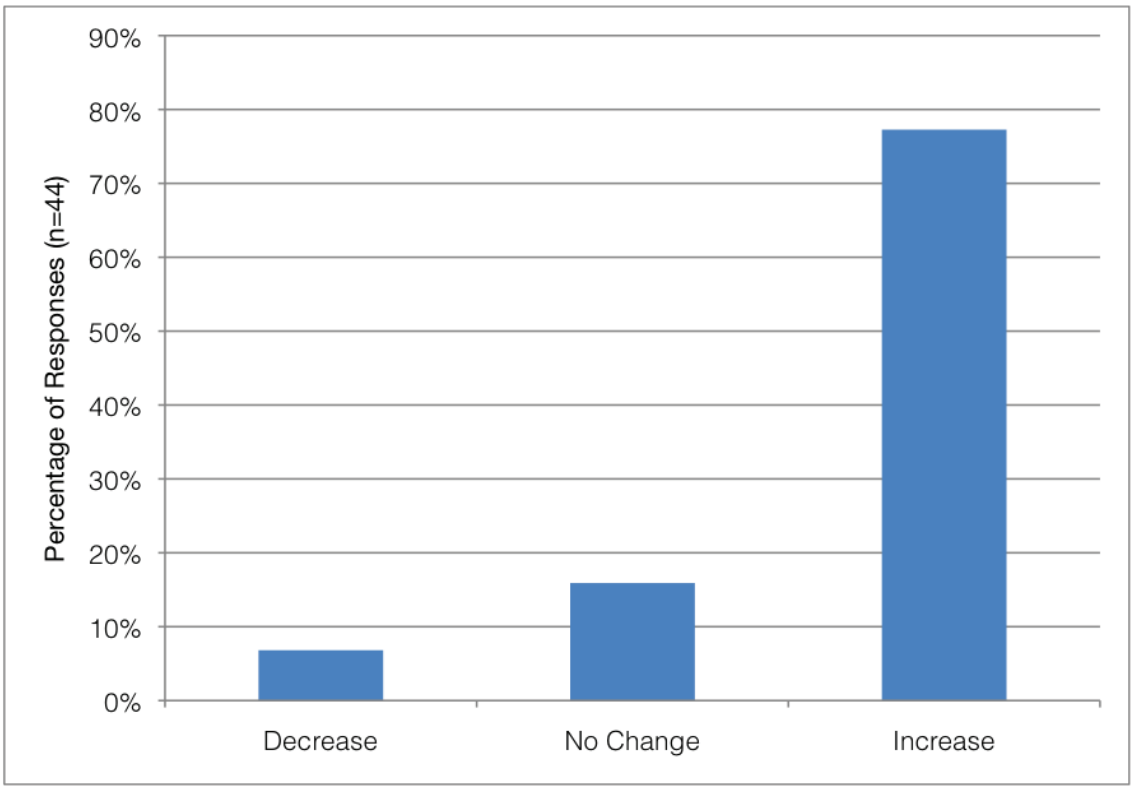
19. How serious would you consider this top coastal management challenge?



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



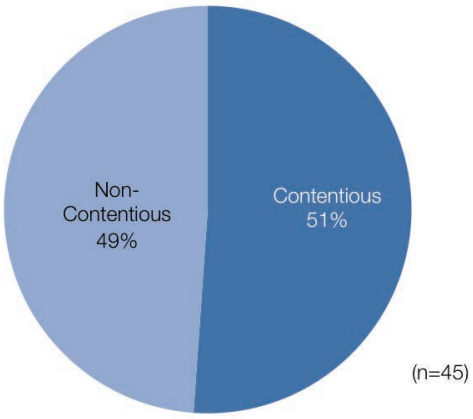
20b. How do you expect the severity of this top managment challenge to have changed in your community in 5 years from now?



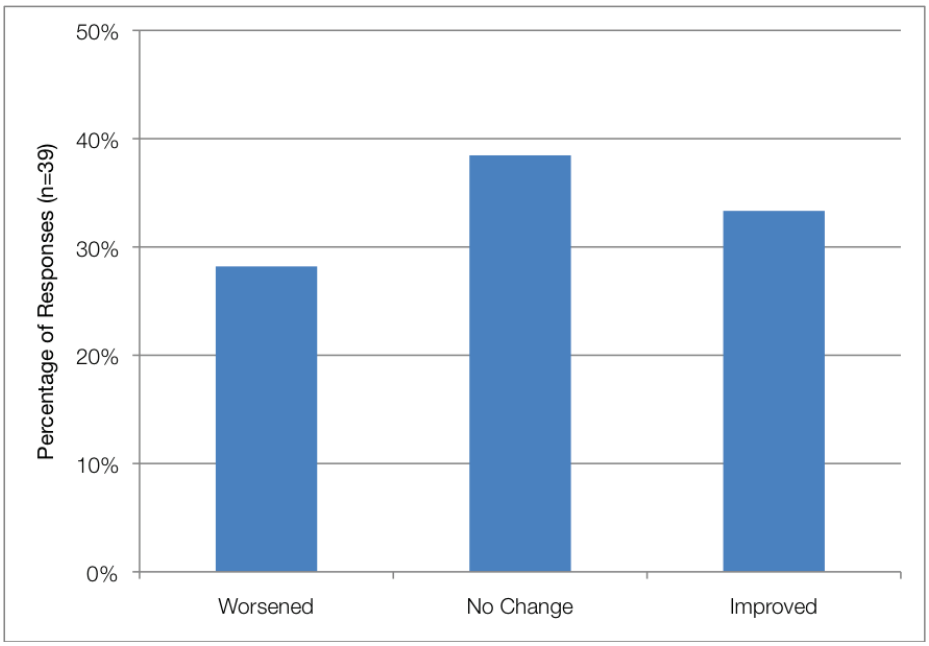
20c. Which are the top three groups of stakeholders involved in your top coastal management challenge?

Respondent Type	Top 3 Stakeholders
City/County	State agencies/commissions (n=7) Local governments (n=5) Tribes (n=4)
Regional/State/ Federal	State agencies/commissions (n=26) Federal agencies/departments (n=19) Local Governments (n=15)
Elected	Environmental advocacy groups (n=1) Scientists/engineers (n=1) State agencies/commissions (n=1)
NGO	Commercial resource users; State agencies/commissions; Local governments (n=3) Environmental advocacy groups; Federal agencies/departments (n=2) Port authority; Trade or professional organizations (n=1)

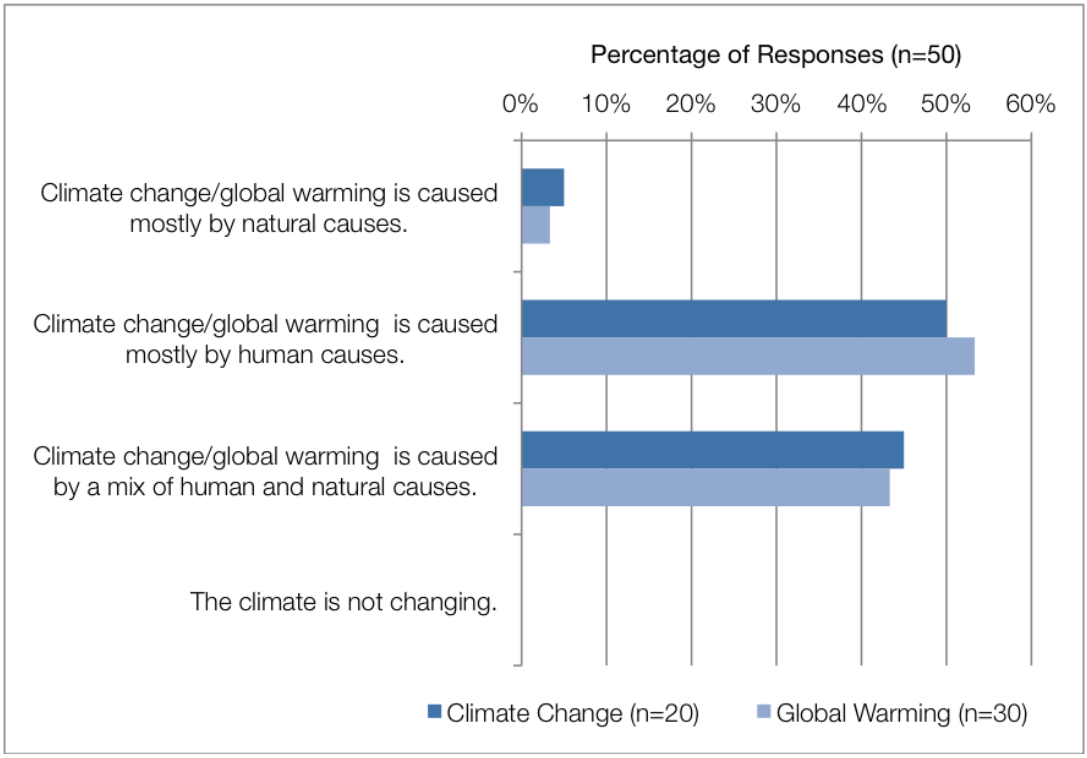
21a. How would you characterize the current political atmosphere around your top management challenge?



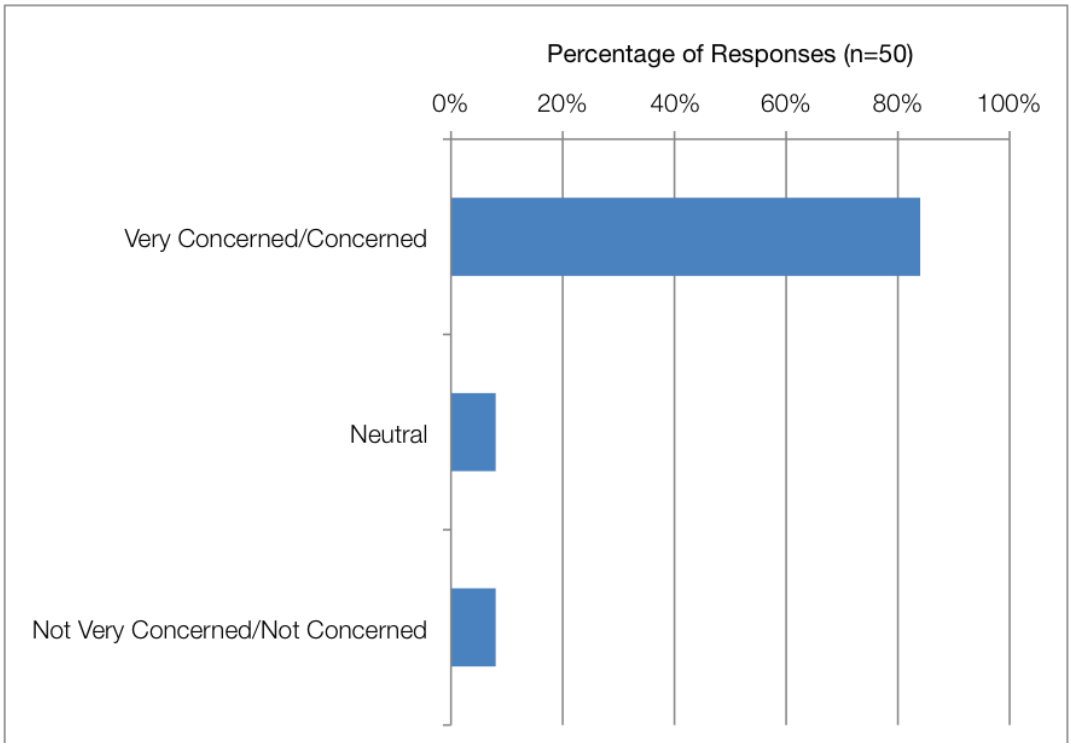
21b. How has the current political atmosphere around your top coastal management challenge changed over the past 5 years?



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

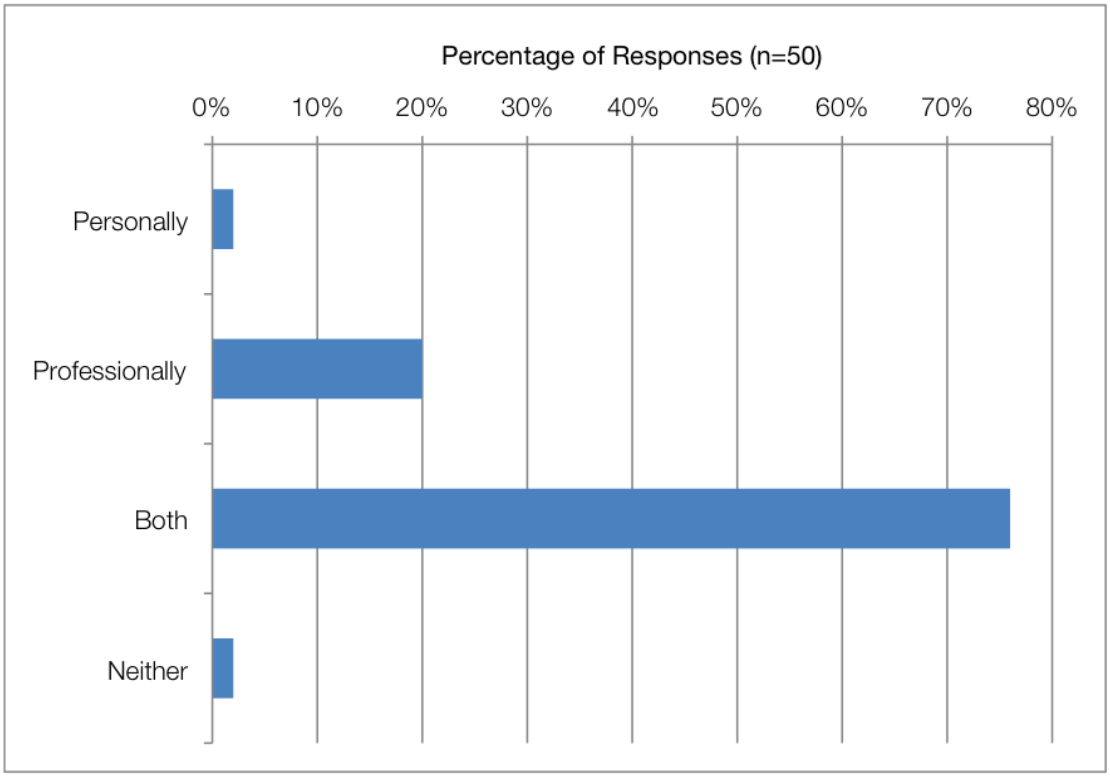


23. What is your personal level of concern about climate change/global warming?

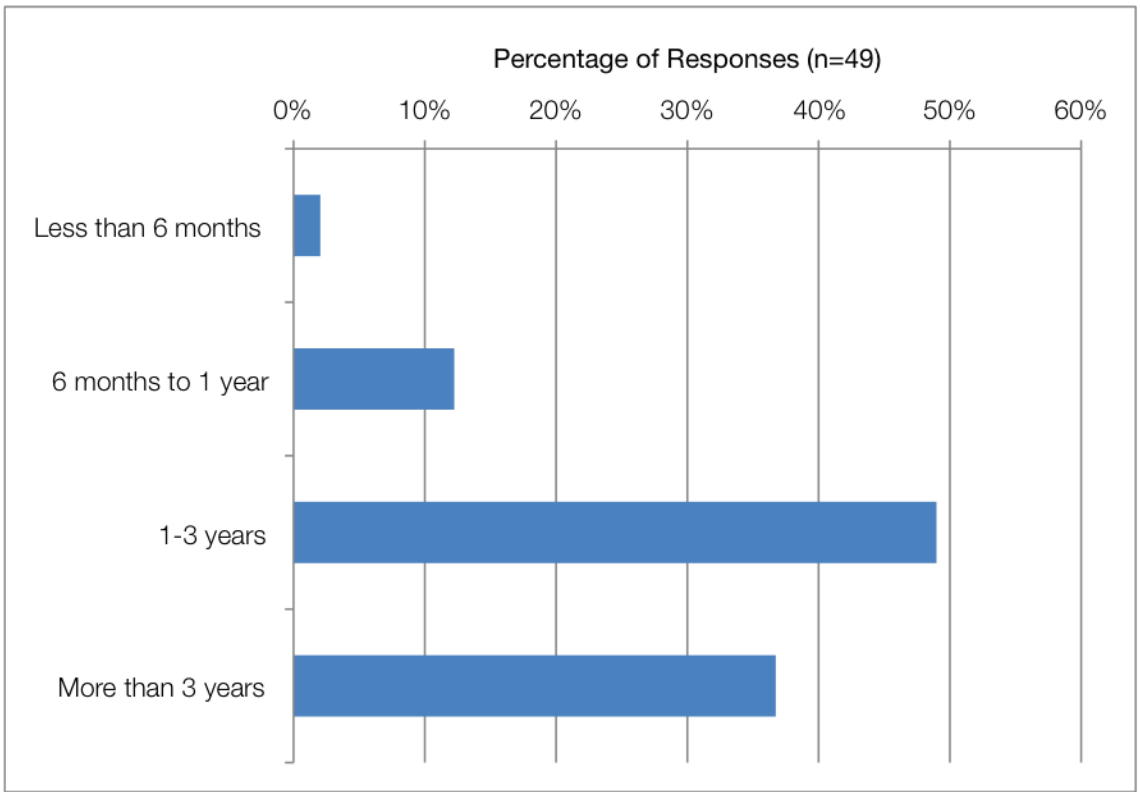


20 respondents received surveys using the term "climate change"
30 respondents received surveys using the term "global warming"

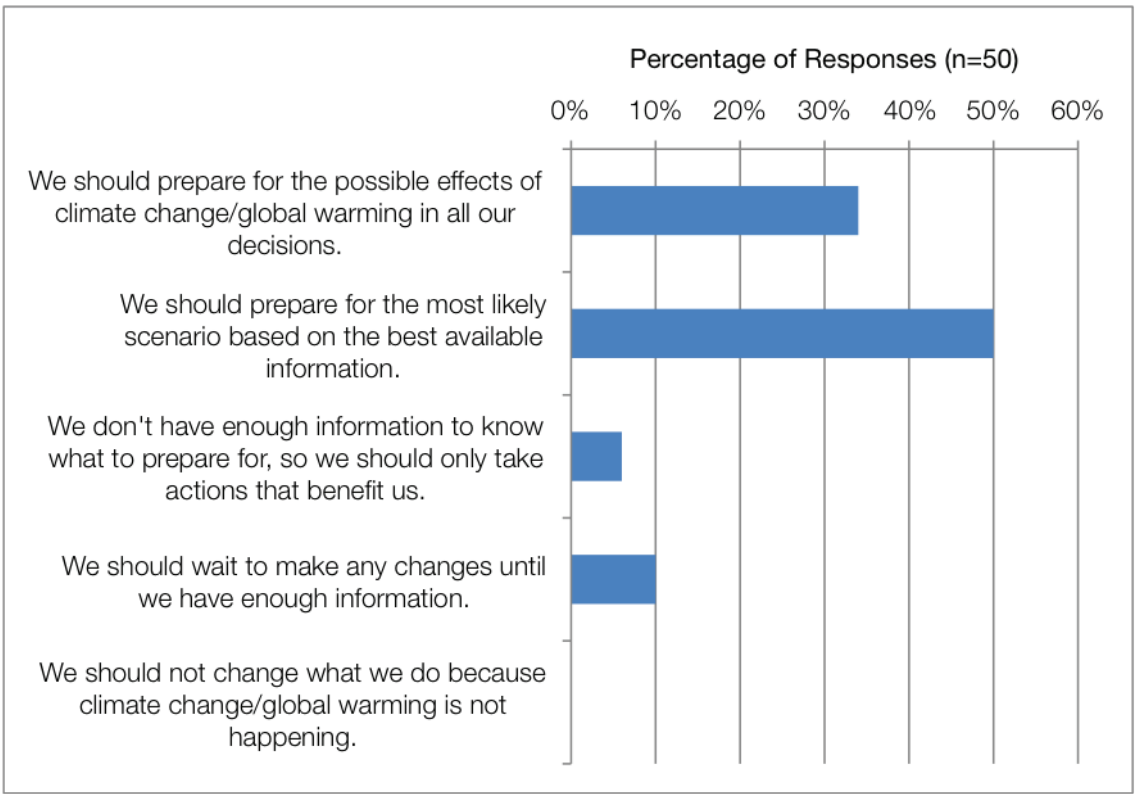
24a. Have you ever, personally or in your work, considered the potential impacts of climate change on your community or region?



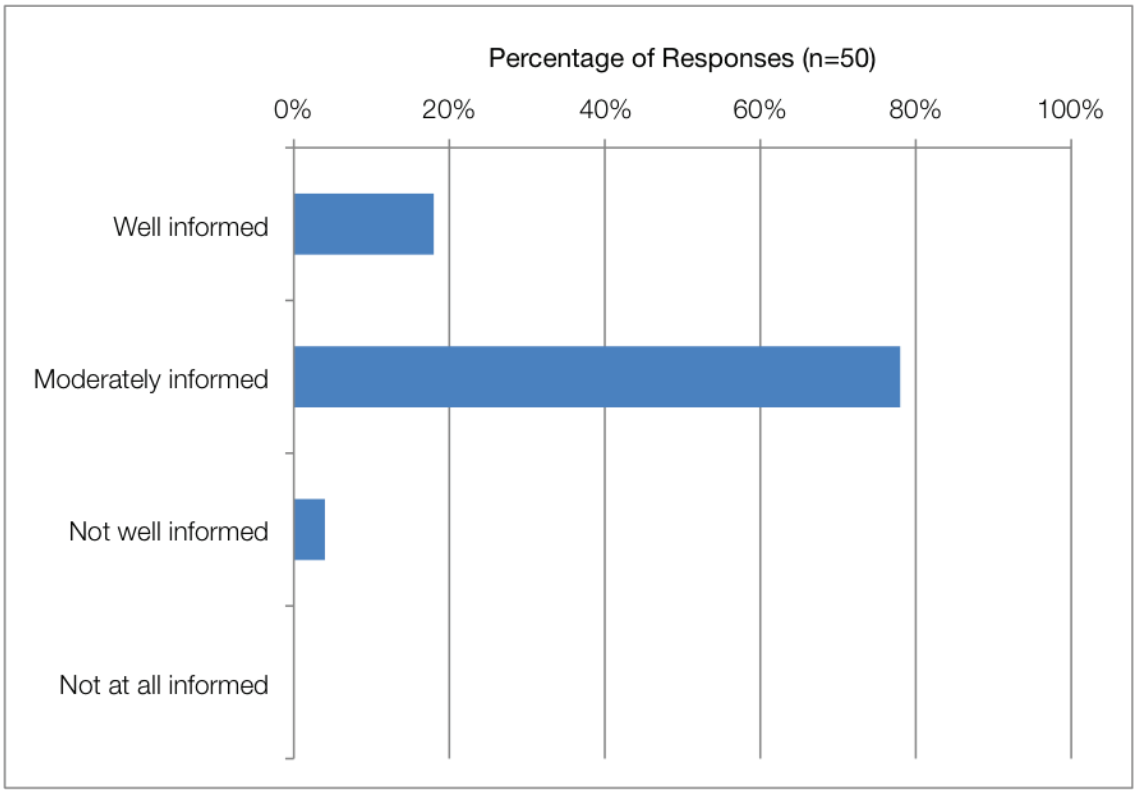
24b. If you have begun considering the impacts of climate change in your work, approximately how long have you done so?



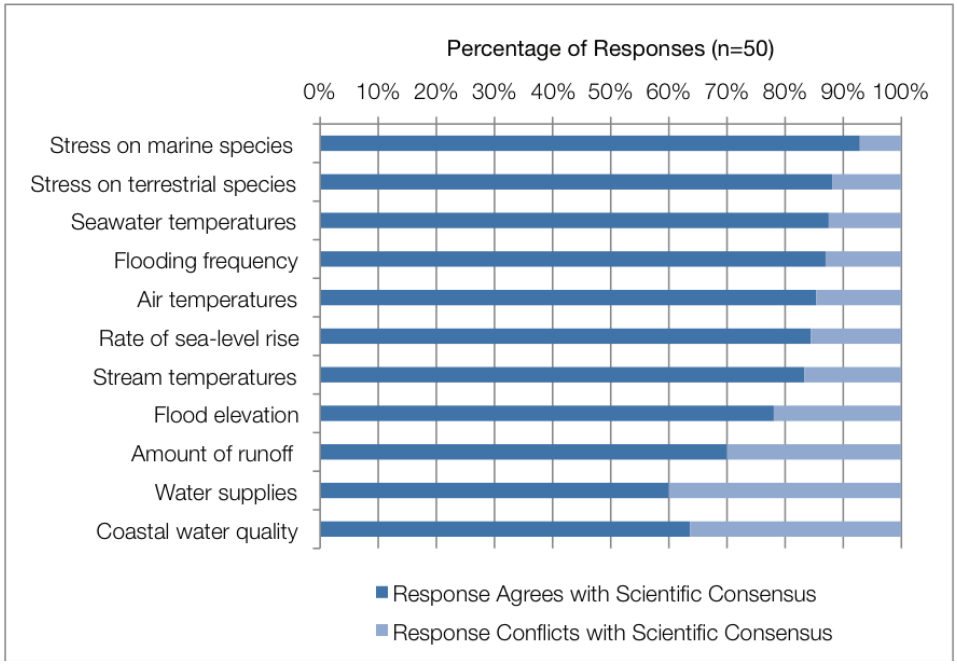
25. Which of the following statements best represents your attitude toward preparing for changes in coastal areas that might result from future climate change?



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



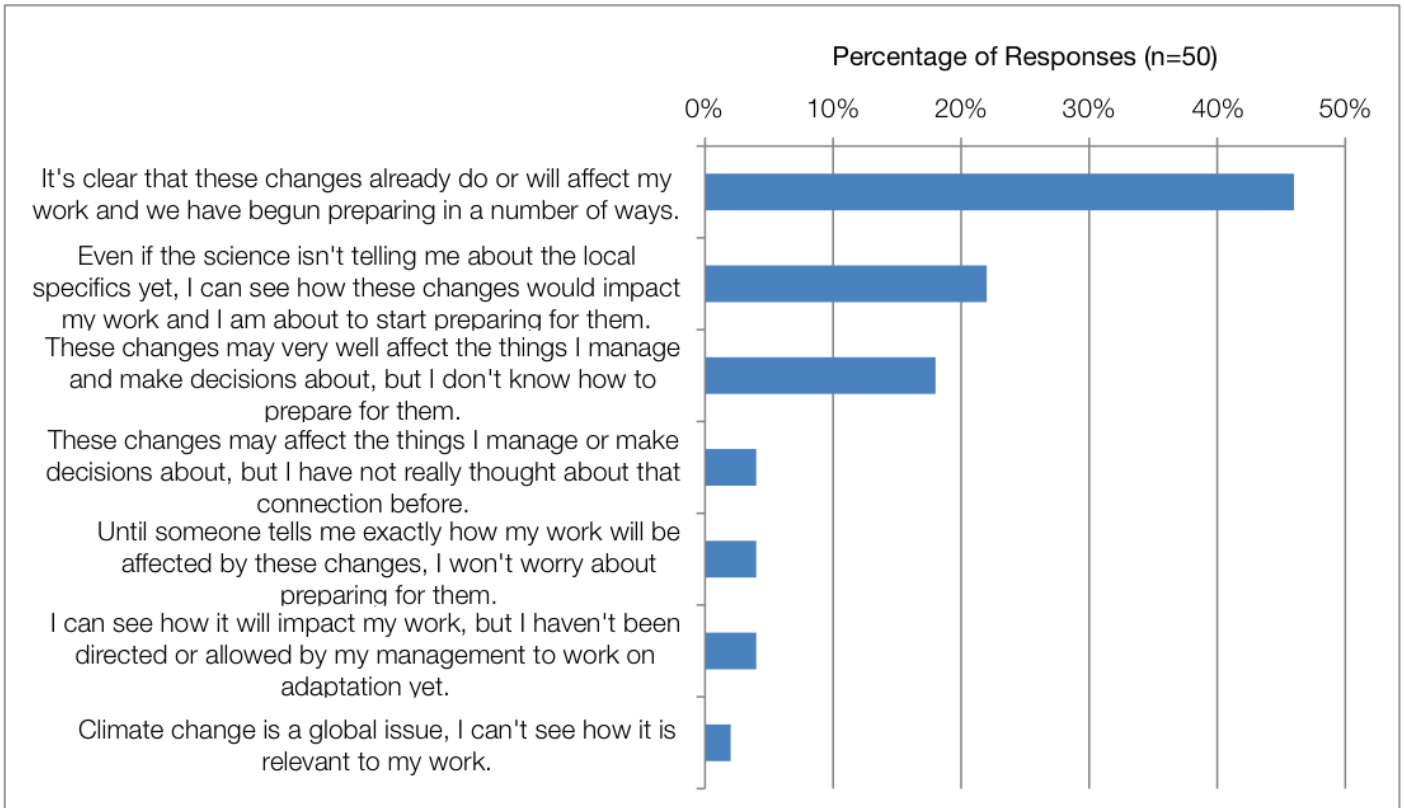
27. How do you think climate change may affect the local average conditions and natural environment in your region over the next 3 - 4 decades?



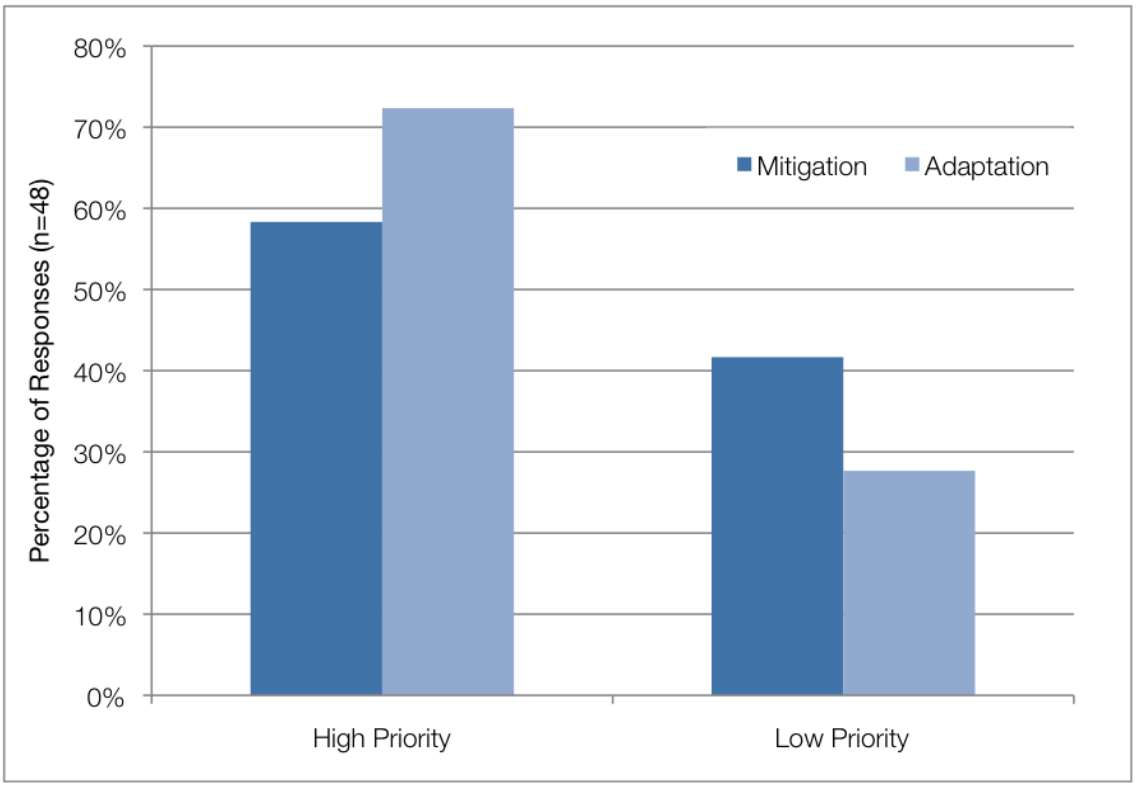
28. Table identifying scientific consensus for various climate change impacts based on analysis of Cayan et al. (2009).

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

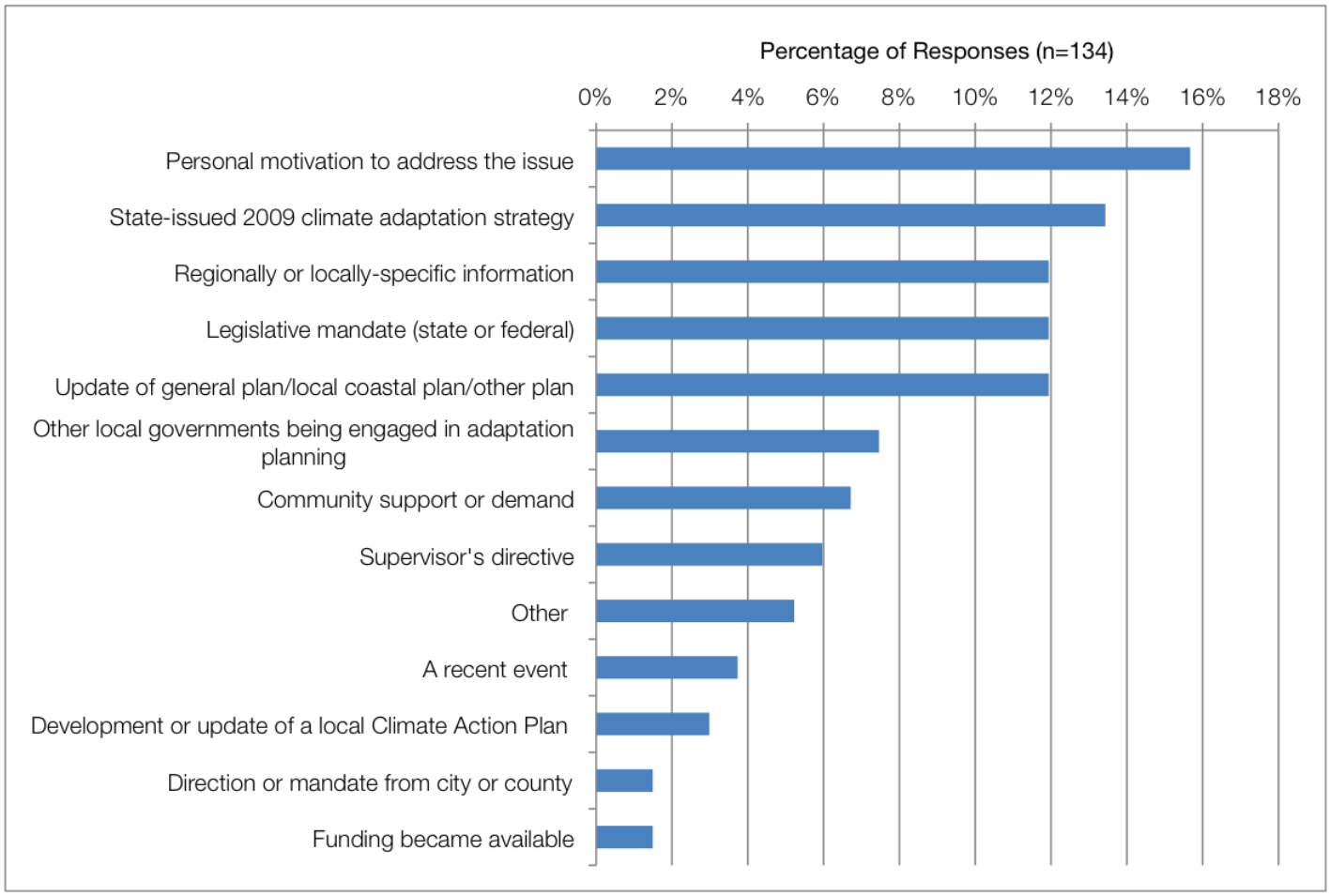
29. How do you think climate change could impact your work?



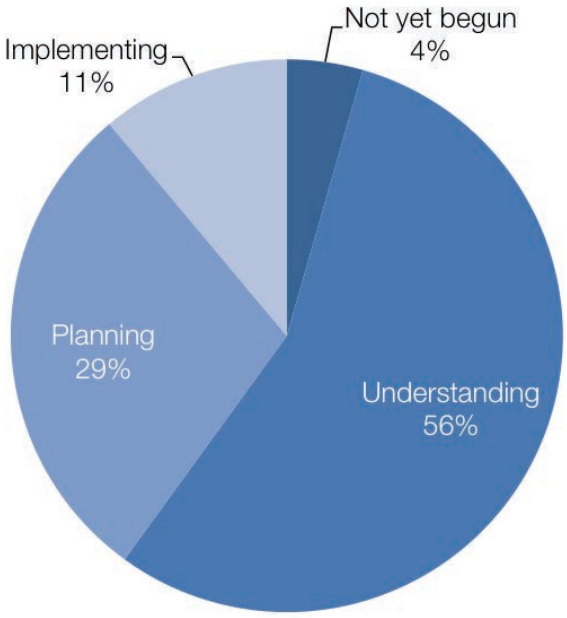
30. Please rate how important it is in your work to address climate change through (a) the reduction of greenhouse gas emissions from energy and land use (mitigation) and (b) efforts to plan and prepare for the projected impacts of climate change (adaptation).



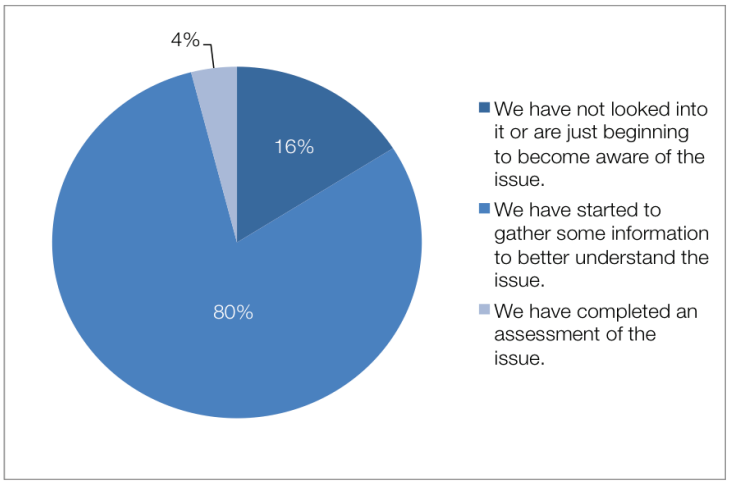
31. If you are engaged in, or contributing to, planning for climate change (adaptation) in your community or region at this time, what prompted your action?



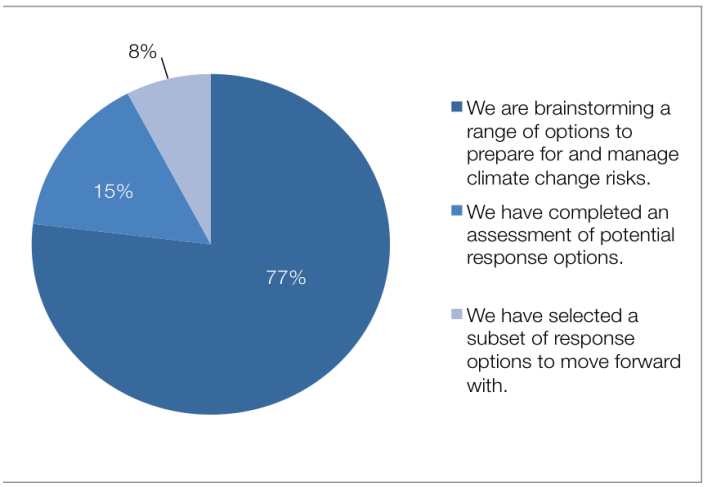
32a. Which phase best describes your current phase of climate change planning and implementation?



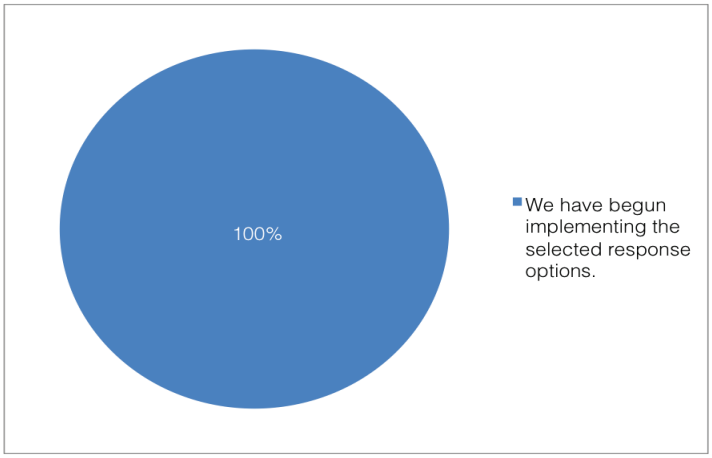
32b. Please provide more detail on your activities or contributions to this phase by selecting one of the statements below.



Understanding

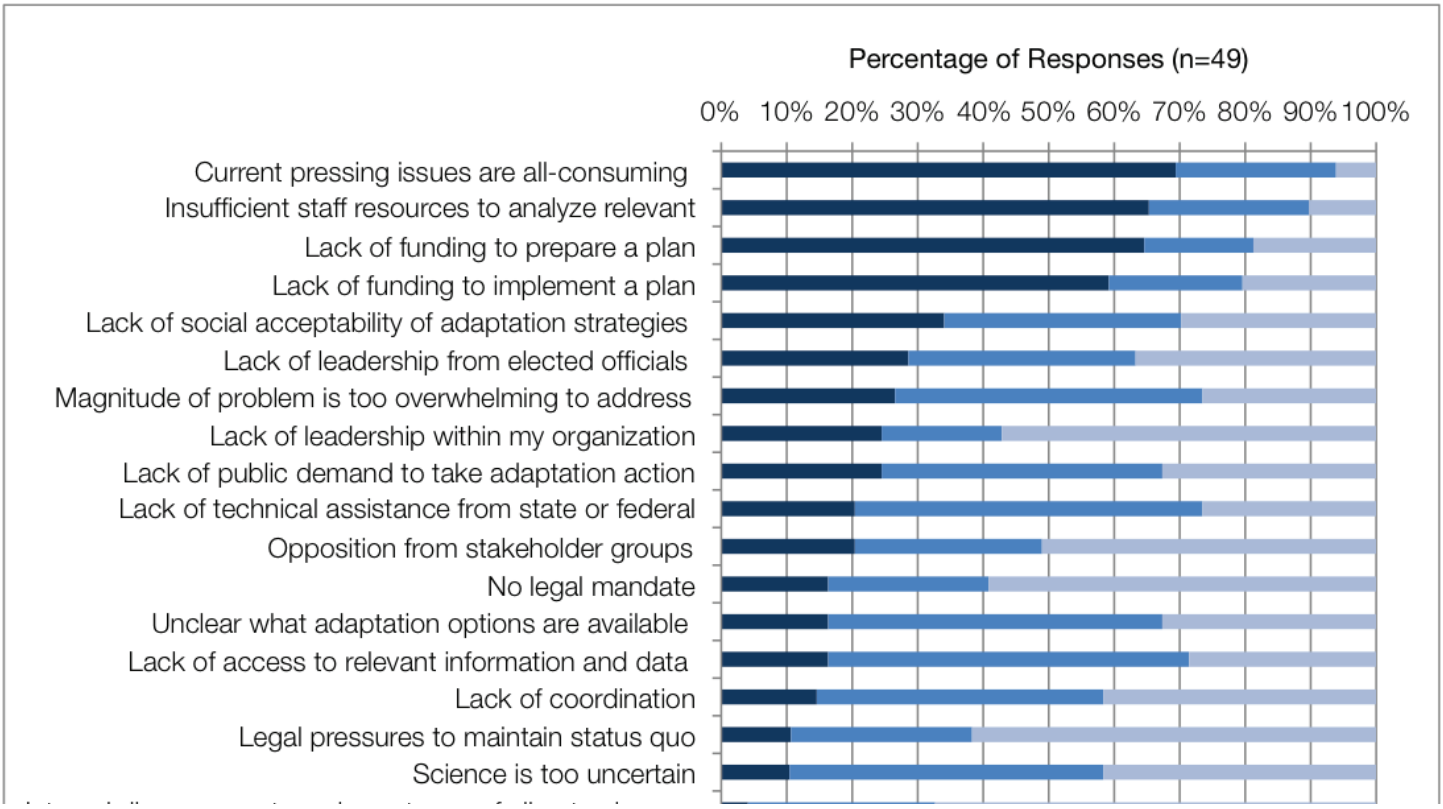


Planning

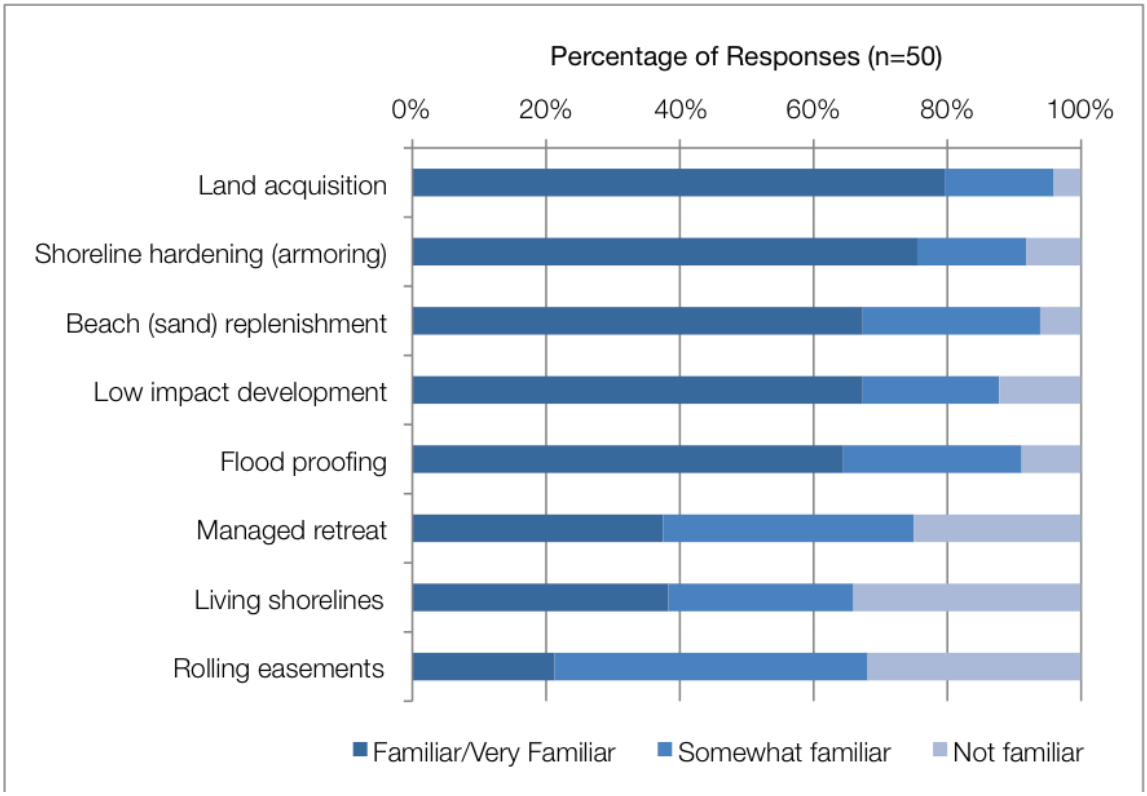


Implementing

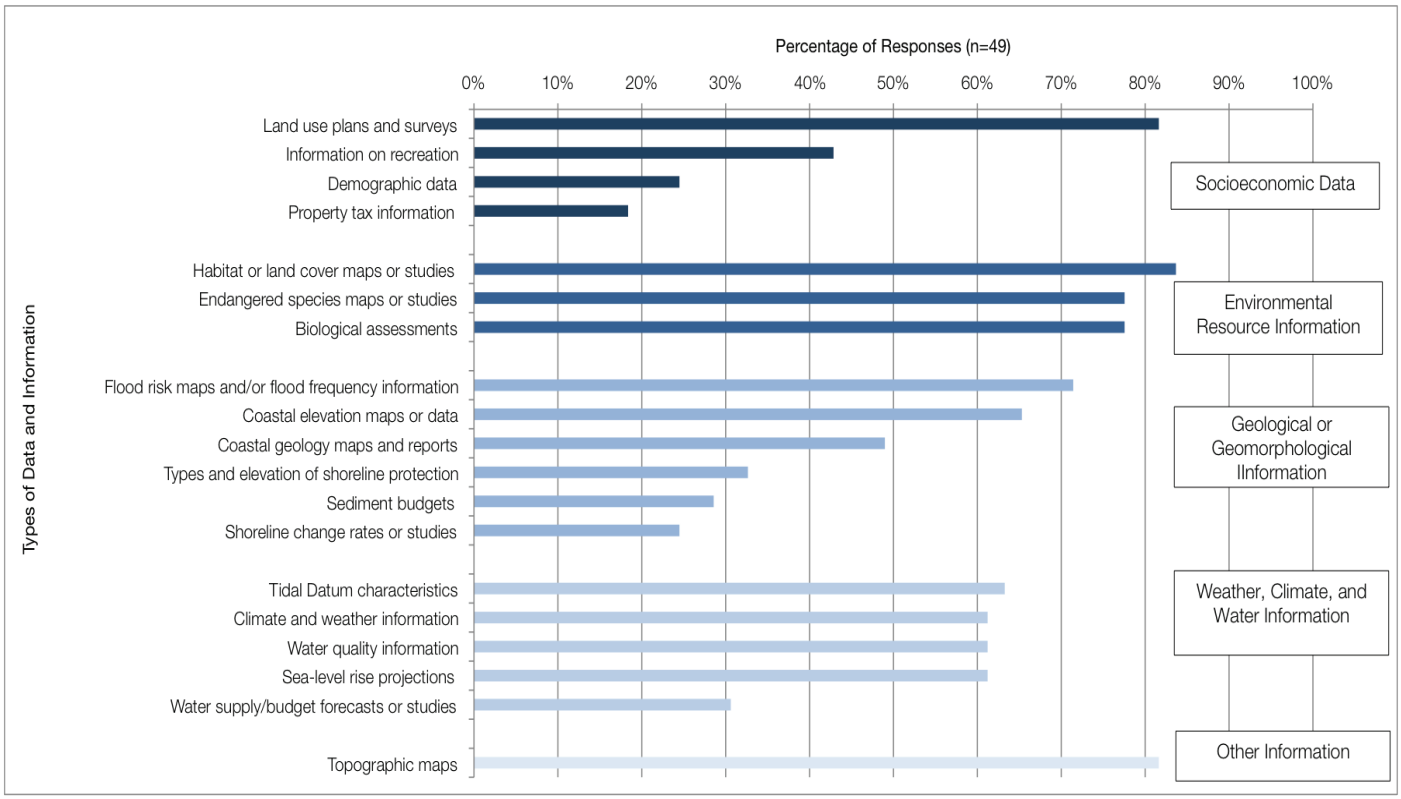
33. Whether or not your organization has already taken action to prepare for the possible impacts of climate change, how much of a hurdle has each of the following issues been in your efforts to date?



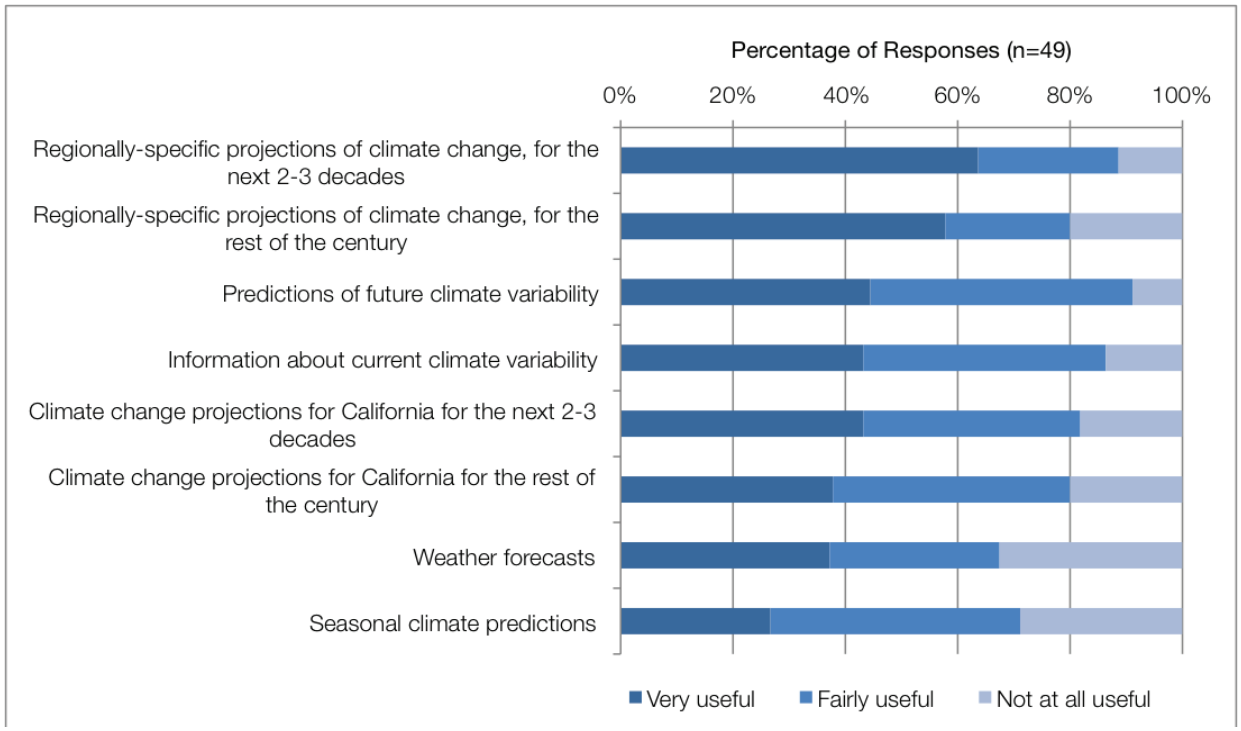
34. Please describe how familiar you are with each of the following coastal adaptation options.



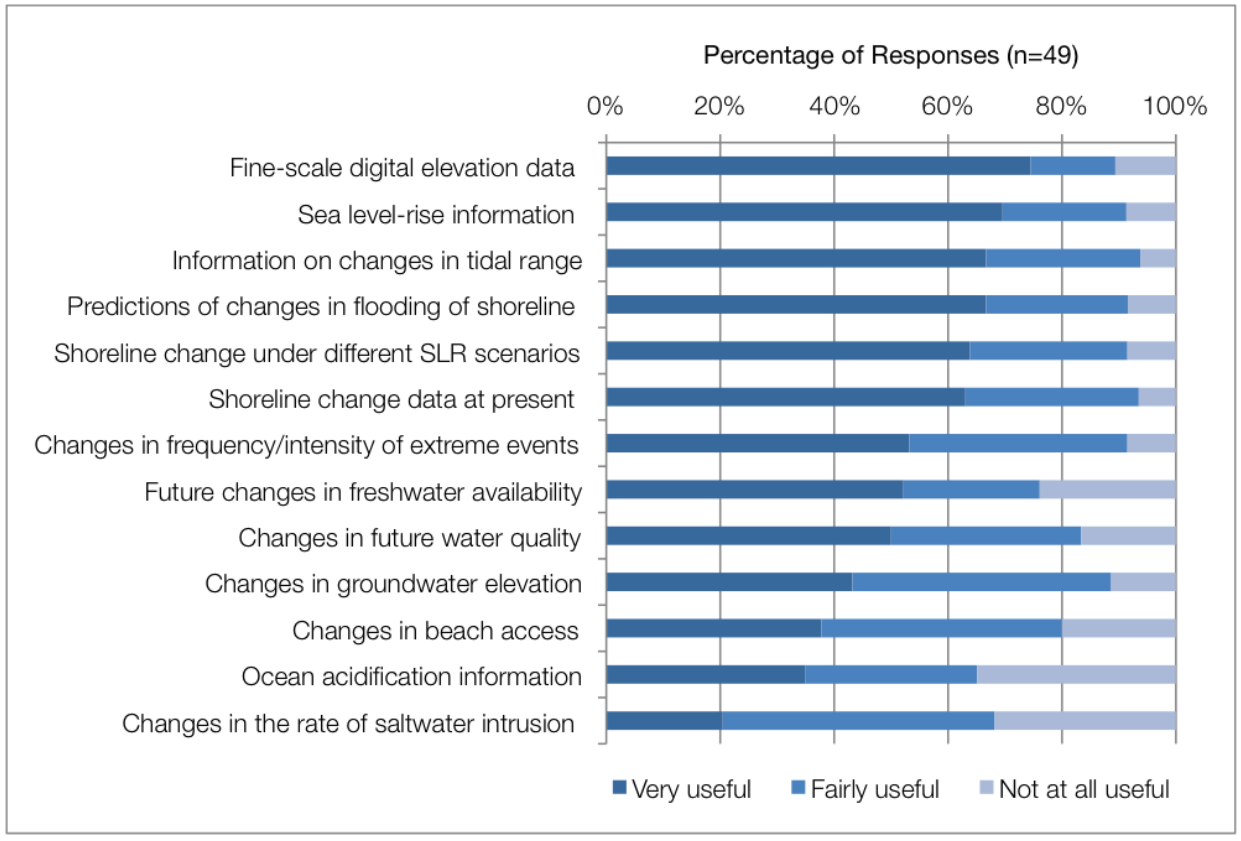
35. In order to carry out your daily job responsibilities, what data and information do you consult regularly?



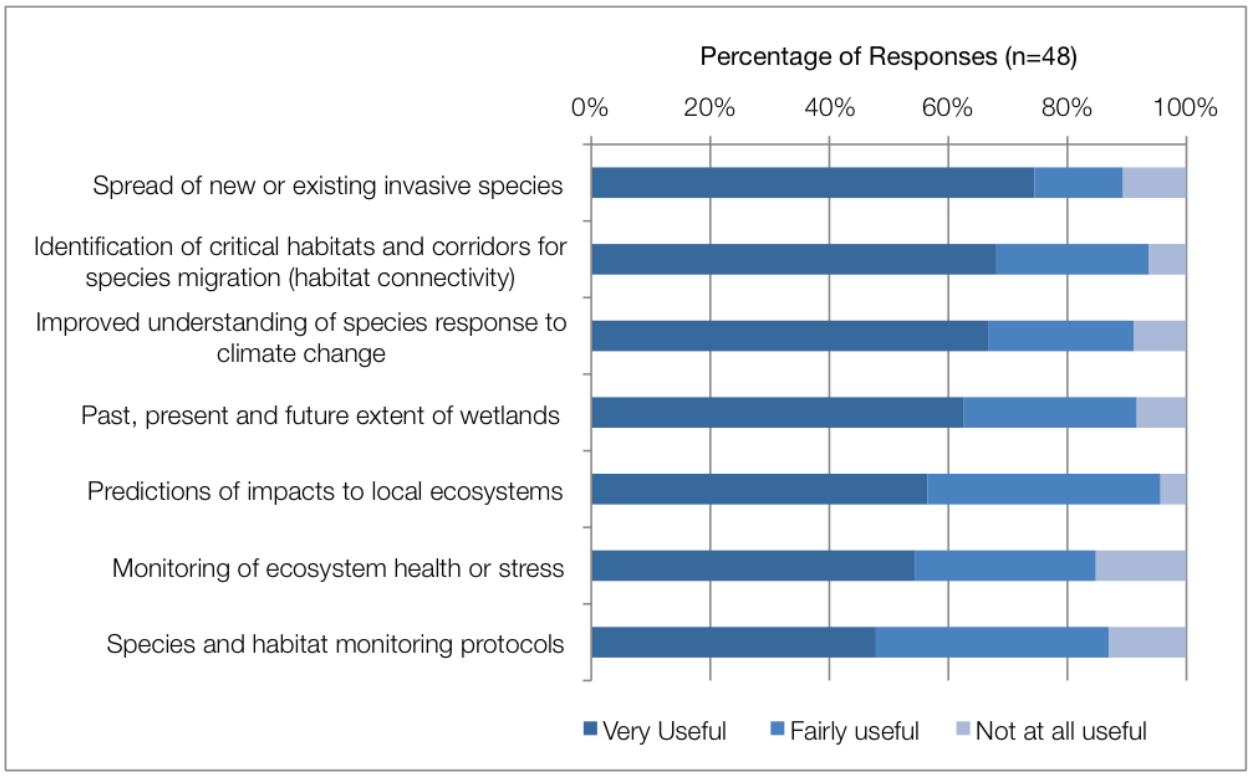
36a. In the work you do, please rate the usefulness of the following types of *weather and climate* information for assessing the risks from climate change to local coastal resources.



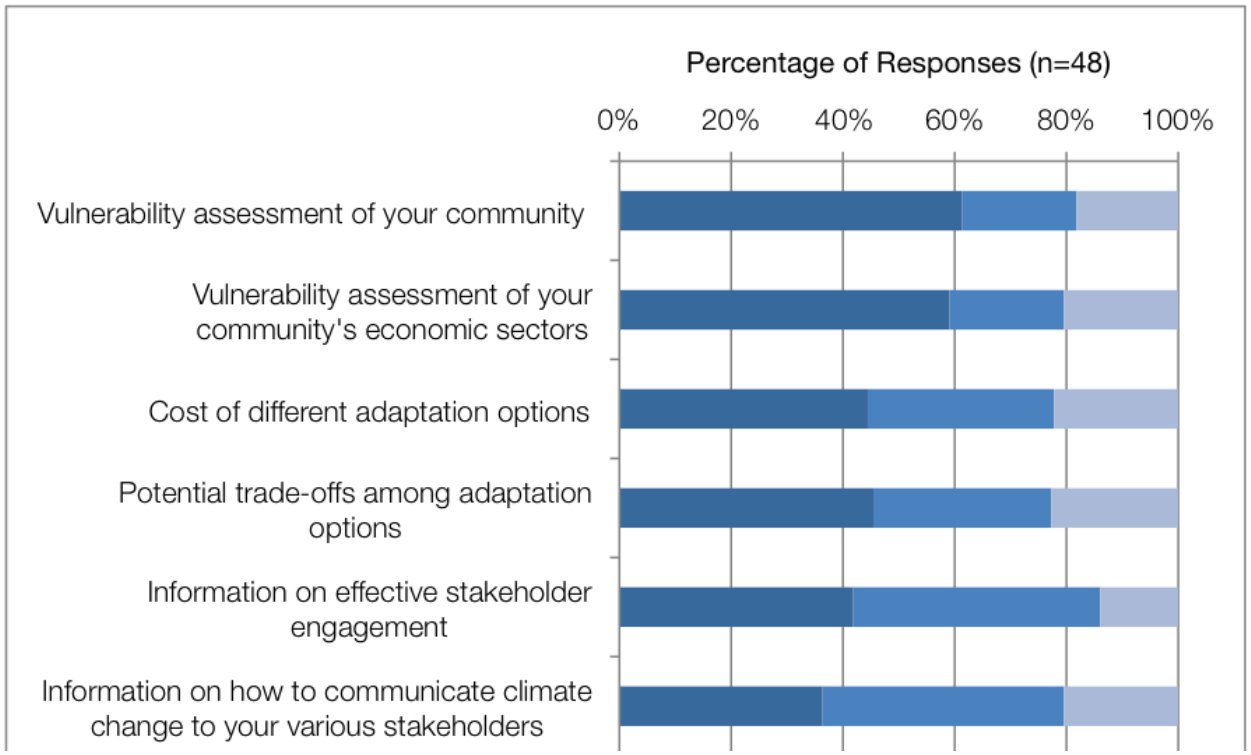
36b. In the work you do, please rate the usefulness of the following types of *physical information* for assessing the risks from climate change to local coastal resources.



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
Most recent predictions in an easy to find format	Most recent findings regarding spread of invasive species or other biological indicators	Most recent data from indices that show the effect; say deep sea temperatures, coral reef loss, sea level change
Funding sources to rural communities	Mapping of climate change impacts	Technical assistance to address adaptation
Coastal lidar	Uplift/subsidence elevation change	Tsunami probablistic risk assessment
Direct & indirect impacts of SLR to various coastal water beneficial uses	[No response]	[No response]
Site specific assessment	Site specific projections	[No response]
Sea level rise Mitigation projects	Cost estimates for mitigation projects	Land use policy examples to mitigate impacts of sea level rise
Detailed ground surveys	Levee infrastructure funding	Shoreline erosion hazard

State, Federal & Regional Respondents

Information Type #1	Information Type #2	Information Type #3
Updated tidal datums	Extent of eelgrass habitat	Extent of wetland loss
Wetland retreat information (where the habitat will go as sea level rises)	Sedimentation ability to raise wetlands as sea level rises	[No response]
Sediment budget in Humboldt Bay	[No response]	[No response]
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.
Private land ownership maps	Database of all known occuring climate impacts to date	Species migration information
Ocean acidication projections	Economic impacts to ag lands effected by SLR	Accurate projections of coastal salmon populations
Unequivocal examples of adverse impacts of climate change in my community	Overcoming the inherent laziness and greed in human beings	[No response]
identification of feasible adaptation stratagies and mitigations for sealevel rise and climate change	Clear understanding of response of critters and habitats to climate change	Detailed spatial understanding of which species and habitats are most vulnerable to climate change and sea level rise
GIS	[No response]	[No response]
Funding	Committment	Action
Predictions of changes in flooding of shoreline areas (e.g., frequency, storm surge height, extent of inundation)	Monitoring of ecosystem health or stress	Sediment budgets
Local sea-level rise model	Local precipiation change model	Condition of existing protection structures

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
Specific information on local sea level rise which includes the results of tetonic movement	Specifics on increased storminess for local area which includes details on wind, rainfall intensity and wave height/period	[No response]
High resolution elevation (LIDAR) data for mapping impacts of projected SLR	Clear and coordinated guidance from state and federal regulatory agencies re: permitting feasibility shoreline adaptation options	[No response]
Regional inundation, sea level change, & spring tide mapping & modelling info	[No response]	[No response]
Sea level rise predictions	Coastal erosion predictions	[No response]
Detailed habitat maps	High accuracy elevations	Marine habitat & substrate
Changes identified via permit process	[No response]	[No response]
Accretion data	Wetland migration	Species response to sea-level rise
What adaptations are being employed for other projects	[No response]	[No response]
Consensus on elevation for sea level rise	Federal funding	Relocation of infrastructure, abandon some coastal communities
Groundwater elevations	Saltwater intrusion	[No response]

NGO, Private Industry & Environmental Consultant Respondents

Information Type #1	Information Type #2	Information Type #3
Tidal and vertical data	Tide gates and levee elevations	Endangered species habitat
Specific regional projections of impacts	Specific regionally appropriate adaptation	[No response]
Bathymetery	Topography	Water velocity, stage, salinity, temperature
Public Prevention of Public Acquisition of Private Land	[No response]	[No response]

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

City & County Respondents

Limitations to information
No clearinghouse for latest and best information. All the information is mixed in with old info or only shows up for a day in the news.
Rural coastal communities are being ignored in entire state process. Money spent on addressing impacts to 1000 people not as effective as money spent addressing problem in largest cities. But we have problems too.
Coastal LIDAR is on its way. Funding and coordination with state and fedral agencies are impediments to #2 and #3.
Most of the information available is too coarse in scale to be useful for planning or for public education & outreach
No time, funds or expertise to develop
Experience, the right connections and time
Time and money

State, Federal & Regional Respondents

Limitations to information
Difficult to get real time information on the above.
Don't know where to find it.
the information needs to be devloped
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.
Either it is not put together yet, or I do not know where to find it.
Don't know
complexity and unavailablity
For #2 and #3, I am not sure the science is there yet for most habitats and specific species. For #1, the economic feasiblity and public policy complexities are daunting. For #1, do we really have mitigation stratagies say, for instance, ocean acidification? For coastal habitats such as wetlands and estuaries, mitigation measures and adaptation stratagies seem a little more redily avalible.
funding resources, staff resources, time
funding is not available, and is being cut more by the federal government
time to research it and potentially funding
Existing models are done at such a coarse level that they cannot be accurately ""stepped down"" to the community level. Funding is not available to assess condition of local protection structures (levees, dykes)"
State of the science
#1) I understand it is coming via OPC and other efforts #2) it doesn't exist - living shoreline, dike strengthening/raising, etc are a nightmare to permit becuase of wetland protection laws and Coastal Commission approach. "
lack of local data (Data focuses on east coast currently); GIS extension requirements & limited GIS availability
lack of consistent studies
work has generally not been done or not processed
Lack of existing data. Lack of funds to acquire the data.

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

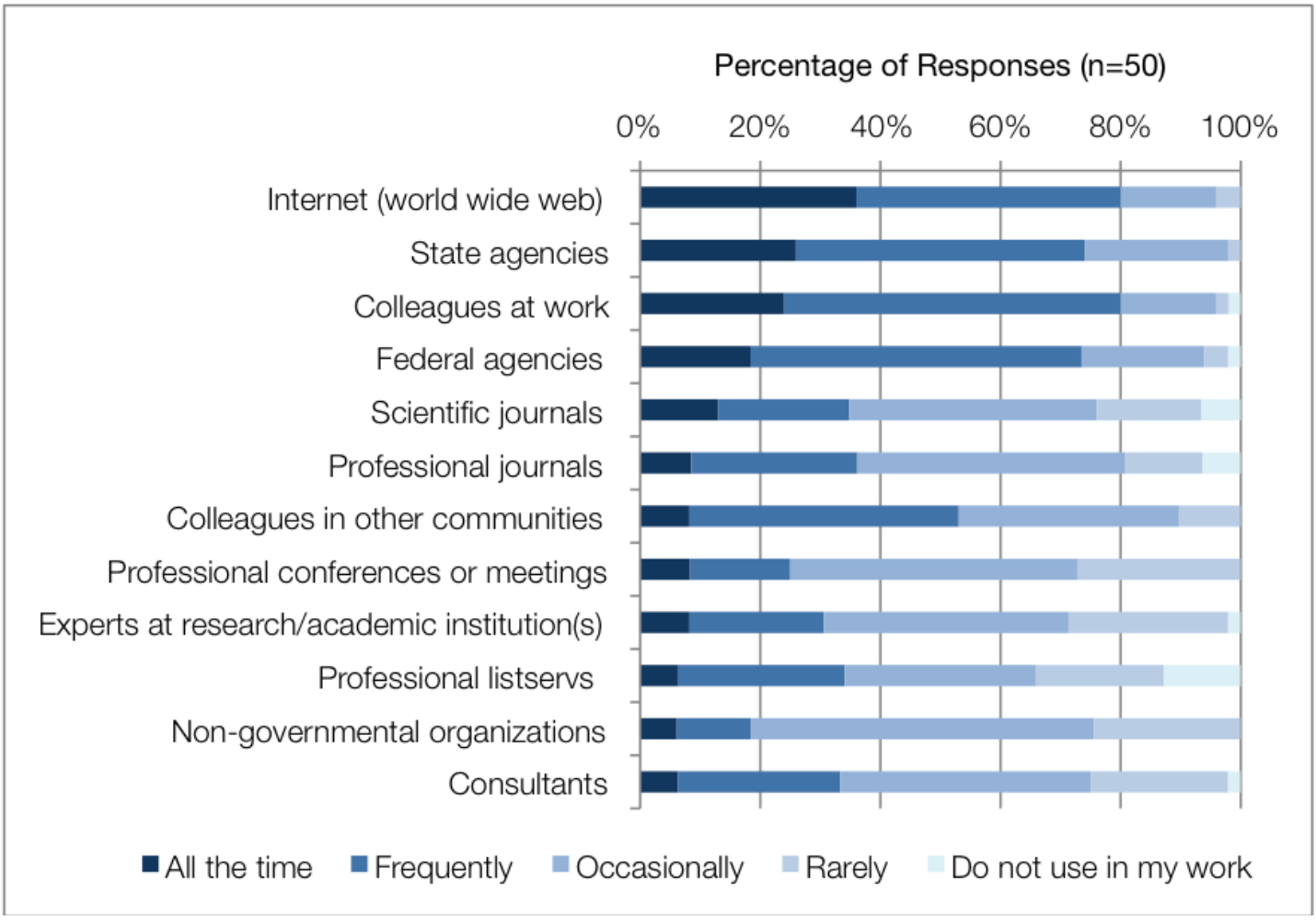
State, Federal & Regional Respondents (cont'd)

Limitations to information
A central storehouse for conservation professionals to house conservation practices related to global warming or climate change;
Public has not been shown or experienced actual sea level rise. We have only experienced severe weather which is normal for the north coast of California.
Not sure where to find it for a specific location

NGO, Private Industry & Environmental Consultant Respondents

Limitations to information
Studies currently being done, data not available yet
Little scientific study seems to be occuring in smaller, rural areas.
Funding. We have the technical capacity to collect the data/information. We just can't get the funding.
We need to prevent Public Acquisition from agencies that do not have management funds and retain land in private ownership for better management.

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



40. 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
California Association of Environmental Professionals	[No response]	[No response]
NOAA	International Council for Local Environmental Initiatives	California Ocean Protection Council
CA Sea Grant	NOAA Coastal Services Center	CA State Water Resources Control Board
Coastal Commission	FEMA	[No response]
Consultants	State climate change data	[No response]

State, Federal & Regional Respondents

Organization #1	Organization #2	Organization #3
NOAA	USGS	DFG
San FranciscoBay Conservation and Development Commission	NOAA	State of California
Army Corps	CA Coastal Commission	USFWS/NOAA
Scientific journals	State and Federal Reports	NGO reports
USGS	NPS	DFG
Local Engineering Consultants	Humboldt Bay Initiative	[No response]
NOAA NOS	State of CA	[No response]
OPC	NOAA (Digital Coast)	[No response]
NMFS	FWS	CDFG
National Weather Service	CA OSPR	CA State Lands Commission
U.C. Sea-Grant	Academic institutions	[No response]
Other resource conservation districts	State agencies	University extension services
Caltrans	USGS	NOAA Fisheries

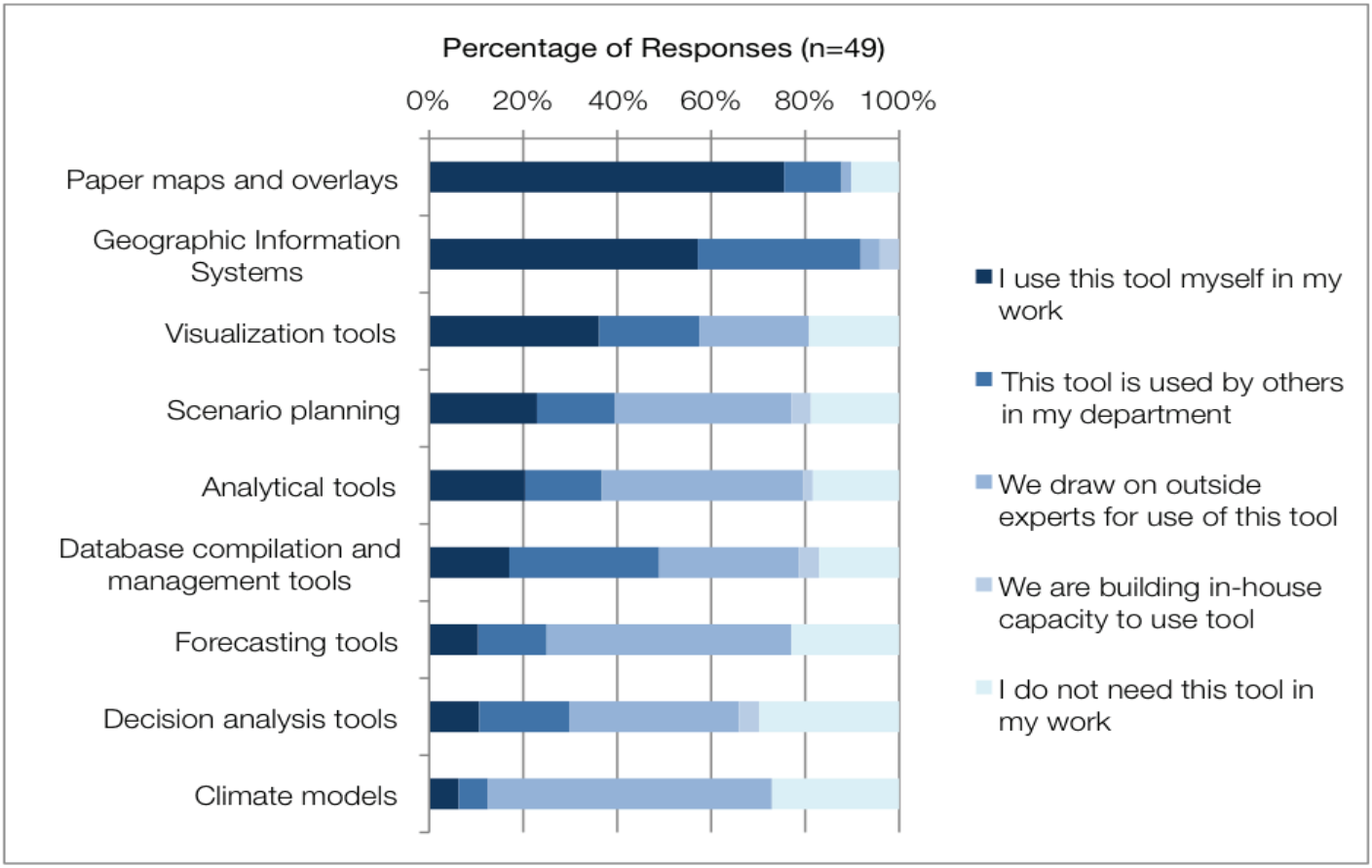
Elected Official Respondents

Organization #1	Organization #2	Organization #3
California Climate Change Portal	California Coastal Commission	Google

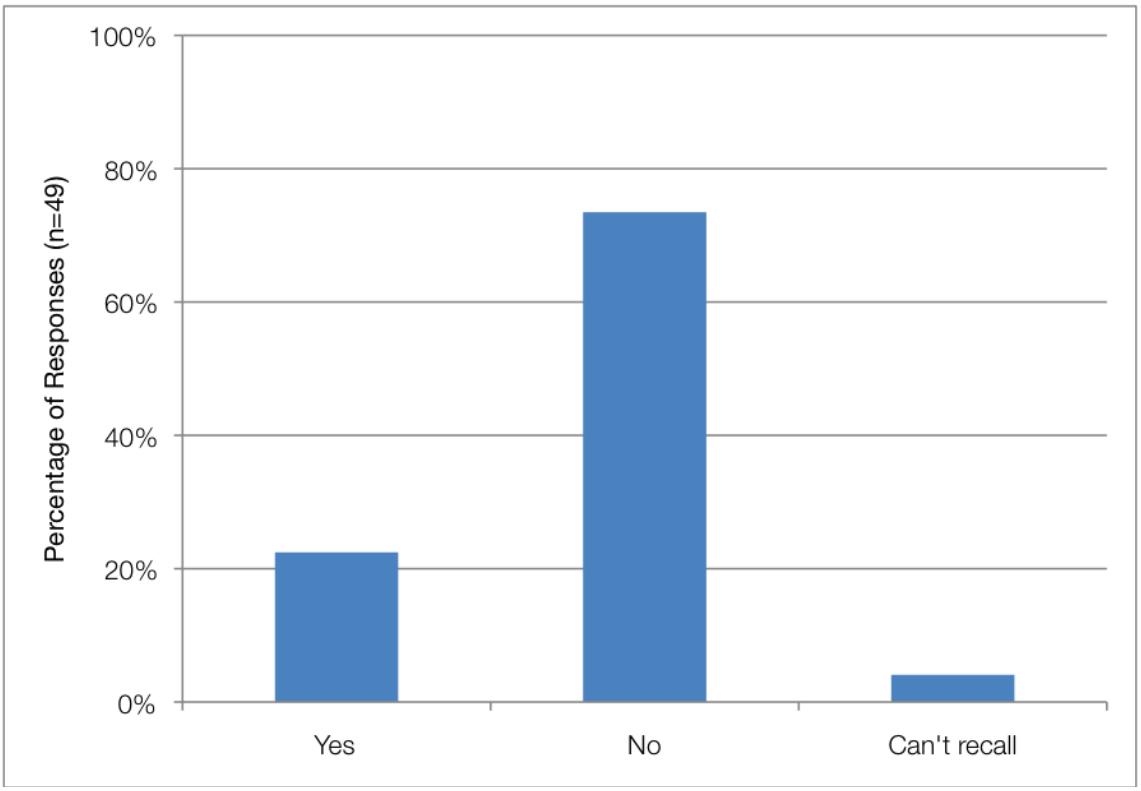
NGO, Private Industry & Environmental Consultant Respondents

Organization #1	Organization #2	Organization #3
The Farm Bureau	UC Extension	[No response]

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



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



43. 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
Annual Conference	Feb-11	Monterey	CA AEP
Sea level rise	Sep-10	Eureka	[No response]
Annual Conference	Oct-10	Carlsbad	CA APA
Sea level rise	Sep-11	Eureka	[No response]

State, Federal & Regional Respondents

Title/Topic	Approximate date	Location	Organization offering training
Adaptation Strategy	Early 2011	Oakland, CA	Own Agency
Coastal Inundation Mapping	Feb-10	Arcata, CA	NOAA Coastal Services Center
Adaptation to Coastal Climate Change	Sep-10	San Francisco	[No response]
Climate Action Plan	[No response]	Sacramento, CA	Caltrans
CEQA & Climate Change	Jan-09	Sacramento, CA	UC Davis Extension
Flood analysis		Sacramento, CA	FHWA
Climate Impacts and Risk Communication	18-Nov-10	Webinar	EPA's State and Local Climate and Energy Program
Hydrology	[No response]	Sacramento, CA	FHWA

NGO, Private Industry & Environmental Consultant Respondents

Title/Topic	Approximate date	Location	Organization offering training
Ocean Acidification	May-11	California	IOOS

44. 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
It takes time to research, develop strategy alternatives and develop policies. Implementation takes even longer. Global warming doesn't happen overnight, neither does implementation

State, Federal & Regional Respondents

Challenges
Reaching consensus with regulatory agencies on projected habitat values of particular elevations in a restored tidal marsh in the face of Sea Level Rise.
Inundation data not available for my region

47. 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
Easily adaptable education and outreach materials on various climate change topics (brochures, informational handouts, etc.) for various audiences (e.g. business owners, tourists/visitors, general public, municipal government elected officials and staff). There are lots of "50 things you can do to prevent Climate Change", but not as much for translating local gov't and agency climate change adaptation plans into informational and/or action items for different audiences.

State, Federal & Regional Respondents

Suggestions
Workshops on possible senarios looking at existing shoreline habitats
Area specific habitat projections for particular elevations in restored tidal marshes
What it takes for fellow Americans to commit to a more conservation-minded lifestyle that includes greater short-term expenses (e.g. buying green), less convenience (e.g., car pooling), and less energy consumption
On a regional scale, it would be good to know how a broad range of habitats (eg. montain coniferous forests, or lowland riparian habitat) will respond climate change and sea level rise, and what the mitigation options are, if any.
Given increasingly-tight budgets, tools should not utilize expensive programs or extensions (e.g., ArcGIS Spatial Analyst tool requirement for NOAA's Habitat Priority Planner tool), otherwise the skills learned won't be able to be applied. Policy directives from leadership in agencies would help encourage the use of climate change analysis applications in day-to-day work.
We funding to acquire the data needed to use predictive tools that develop scenarios we can then use for planning.

45. 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)

Elected Official Respondents

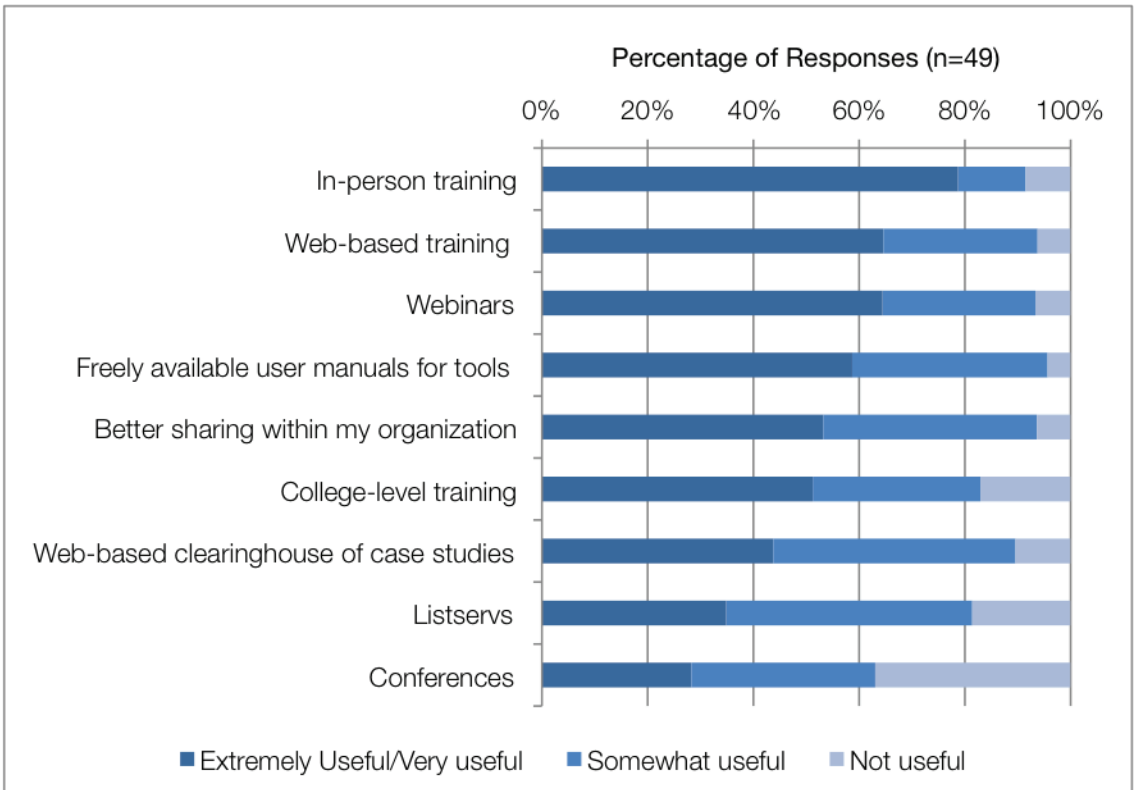
Suggestions
Need LIDAR for the coastal area of Humboldt Bay-lower Eel and Mad Rivers in Humboldt County. Need to know the rate and location of subsidence and uplift in the same area.

NGO, Private Industry & Environmental Consultant Respondents

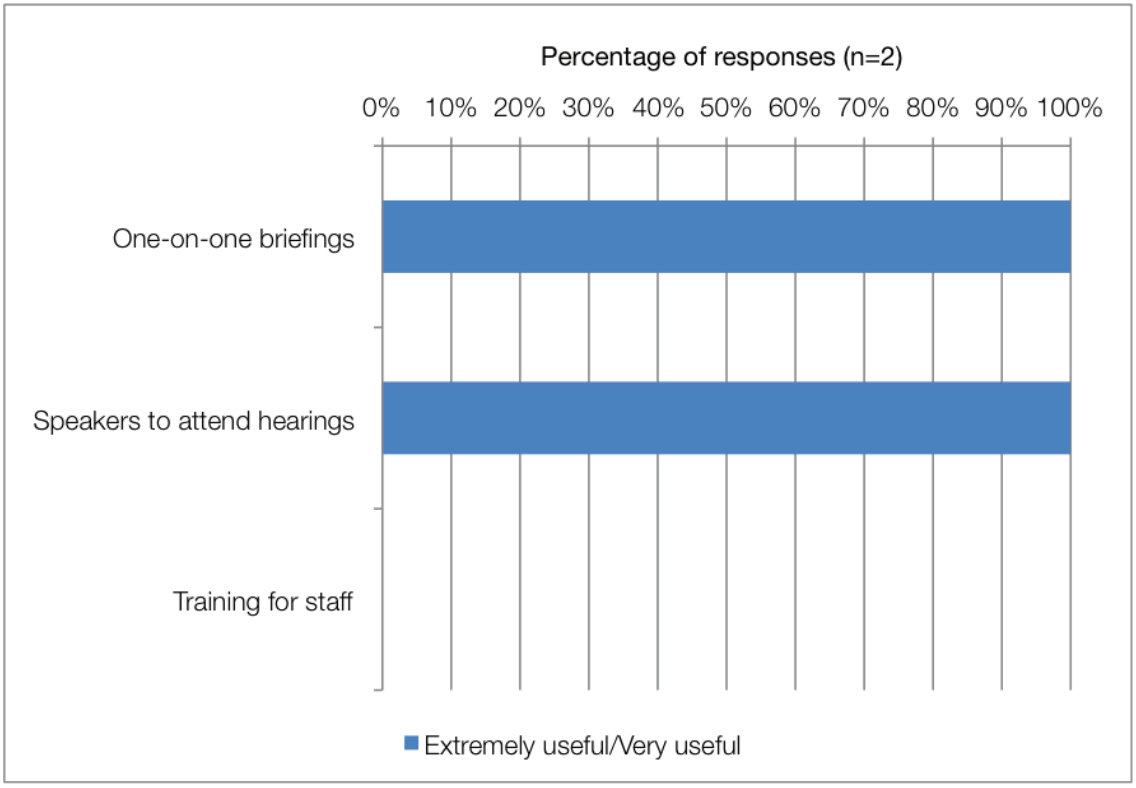
Suggestions
We need funding to support local technical capacity building, data collection, etc.

46. 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



Sea Grant
University of Southern California

University of Southern California Sea Grant
Technical Report USCSG-TR-04-2013