



NOAA  
**CORAL REEF**  
CONSERVATION PROGRAM



# NCRMP Socioeconomic Monitoring For Puerto Rico



Presented By: NCRMP Socioeconomic Team

**NOAA Coral Reef Conservation Program  
& National Centers for Coastal Ocean Science**

for more information, visit the web-portal at:

<http://www.coris.noaa.gov/monitoring/socioeconomic.html>

November 7, 2016

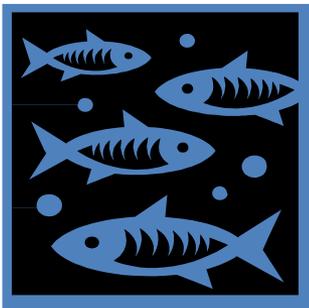


# Outline

- Background on the National Coral Reef Monitoring Program's Socioeconomic Component
- Social survey for Puerto Rico
  - Methods
  - Results
  - Applications of the data
- Questions and opportunities for input



# National Coral Reef Monitoring Plan



Biological  
Indicators

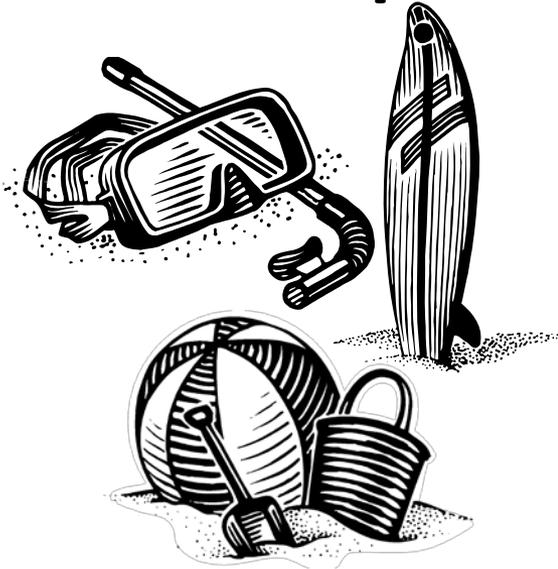
Climate  
Indicators



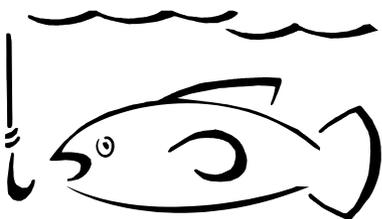
Socioeconomic  
Indicators



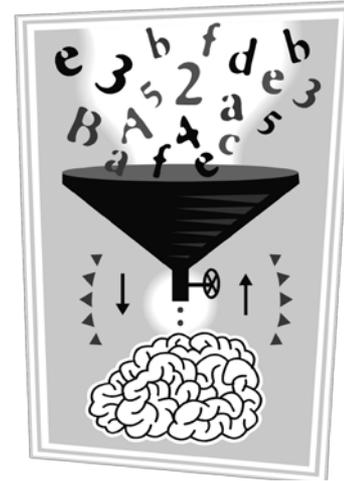
## Socioeconomic Component: Examples of the types of data we collect



Use of coral reef resources



Population change



Knowledge, attitudes, &  
perceptions of coral reefs  
and coral reef management



## **Socioeconomic Monitoring Approach**

- ❖ Data collection occurs through
  - ❖ Surveys of residents in coral reef jurisdictions
  - ❖ Synthesis of existing socioeconomic data
- ❖ Resulting data will feed into several products
  - ❖ Social science database
  - ❖ Data products such as infographics, posters, presentations, and publications
  - ❖ NCRMP report cards



## Project Team

- ❖ Peter Edwards
- ❖ Arielle Levine
- ❖ Jarrod Loerzel
- ❖ Matt Gorstein
- ❖ NCCOS social science team
- ❖ Jurisdictional management agencies
- ❖ Key jurisdictional stakeholders
- ❖ CRCP and NMFS management liaisons





# NOAA CORAL REEF CONSERVATION PROGRAM



## MONITORING METHODS: Survey



# Indicators for NCRMP Social Monitoring

- \* Participation in reef activities
- \* Perceived resource condition
- \* Attitudes towards coral reef management strategies and enforcement
- \* Awareness and knowledge of coral reefs
- Human population changes near coral reefs
- Economic impact of coral reef fishing to jurisdiction
- Economic impact of dive/snorkel tourism to jurisdiction
- Community well-being
- \* Cultural importance of reefs
- \* Participation in behaviors that may improve coral reef health
- Physical infrastructure
- \* Awareness of coral reef rules and regulations
- Governance



# Survey Methodology

- ❖ Core module vs. jurisdiction specific module:
  - ❖ Asking some of the same questions in all areas allows comparisons across jurisdictions
  - ❖ Asking some specific questions for each area allows jurisdictional management and resource issues to be addressed
- ❖ Survey sample:
  - ❖ Random sample of adult residents in the jurisdiction
  - ❖ Representative of population demographics (age, race, sex, income)
- ❖ Survey implementation:
  - ❖ By a contracted entity with experience conducting surveys in the jurisdiction
  - ❖ Survey mode for PR was phone (included cell and landline) in English and Spanish



## Social Monitoring by Geography and Year

Jurisdiction	Geographic scope	Year
American Samoa	Island of Tutuila	2013-14
Florida	Martin, Palm Beach, Broward, Miami-Dade, Monroe Co.	2013-14
Hawai'i	Islands of Kauai, Maui, Moloka'i, O'ahu, Hawai'i, Lana'i	2014-15
Puerto Rico	Islands of Puerto Rico, Vieques, Culebra	2014-15
Guam	Entire island of Guam	2015-16
CNMI	Islands of Saipan, Tinian, Rota	2015-16
USVI	Islands of St. Croix, St. Thomas, St. John	2016-17



# NOAA CORAL REEF CONSERVATION PROGRAM



## MONITORING RESULTS: Survey





# Municipios and Regions





# Municipios and Regions



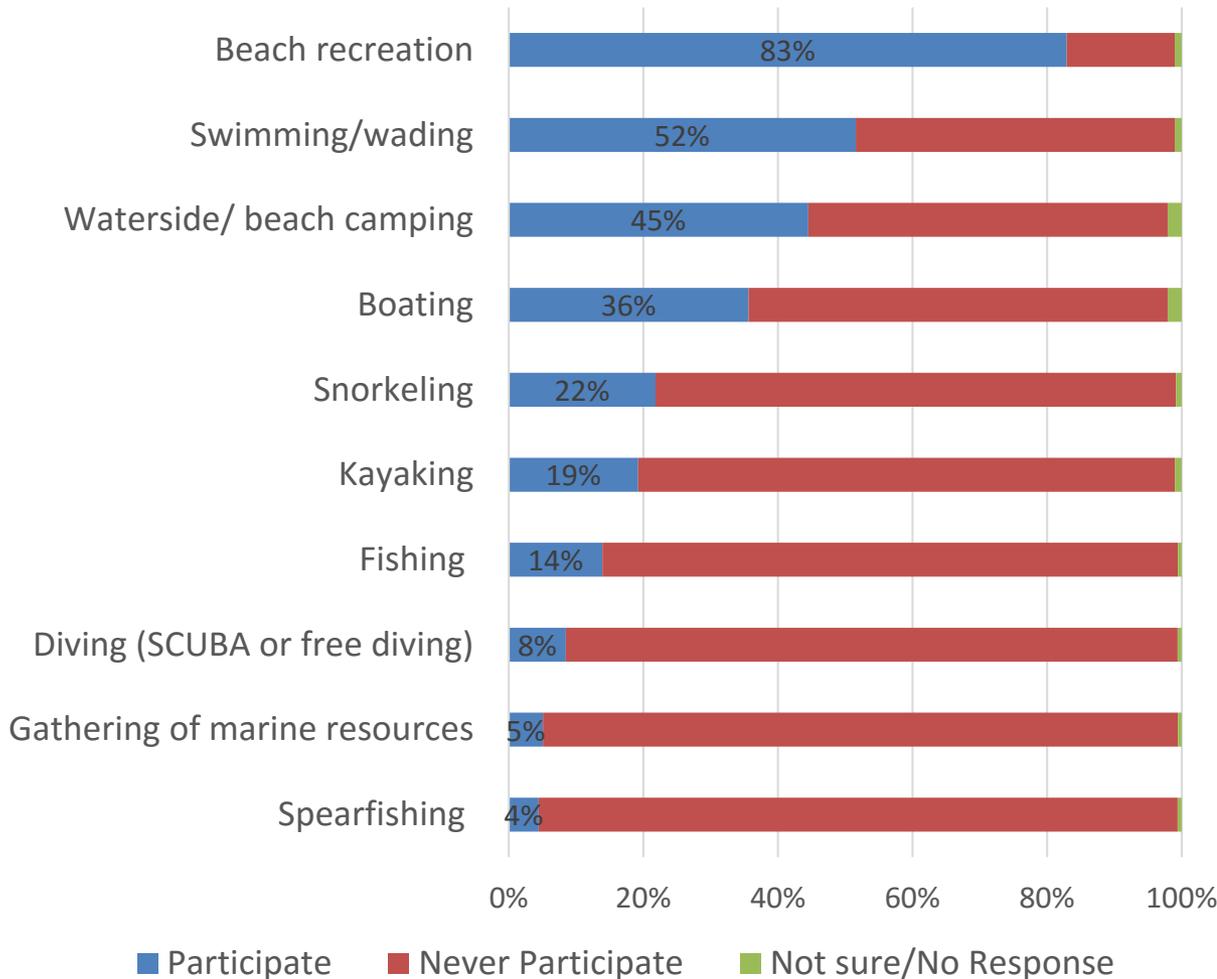


## The Sample

Region	Sample Size	Percent of Sample
Aguadilla	283	11.3%
Arecibo	189	7.6%
Bayamon	455	18.2%
Caguas	276	11.0%
Carolina	187	7.5%
Humacao	346	13.8%
Mayaguez	304	12.1%
Ponce	313	12.5%
San Juan	150	6.0%
Total	2503	100%

- Total of 2,503 with a margin of error of +/-2% and a 95% confidence interval.
- An overall response rate of 2.05%.
- Both cell and landline telephone sample frames were used

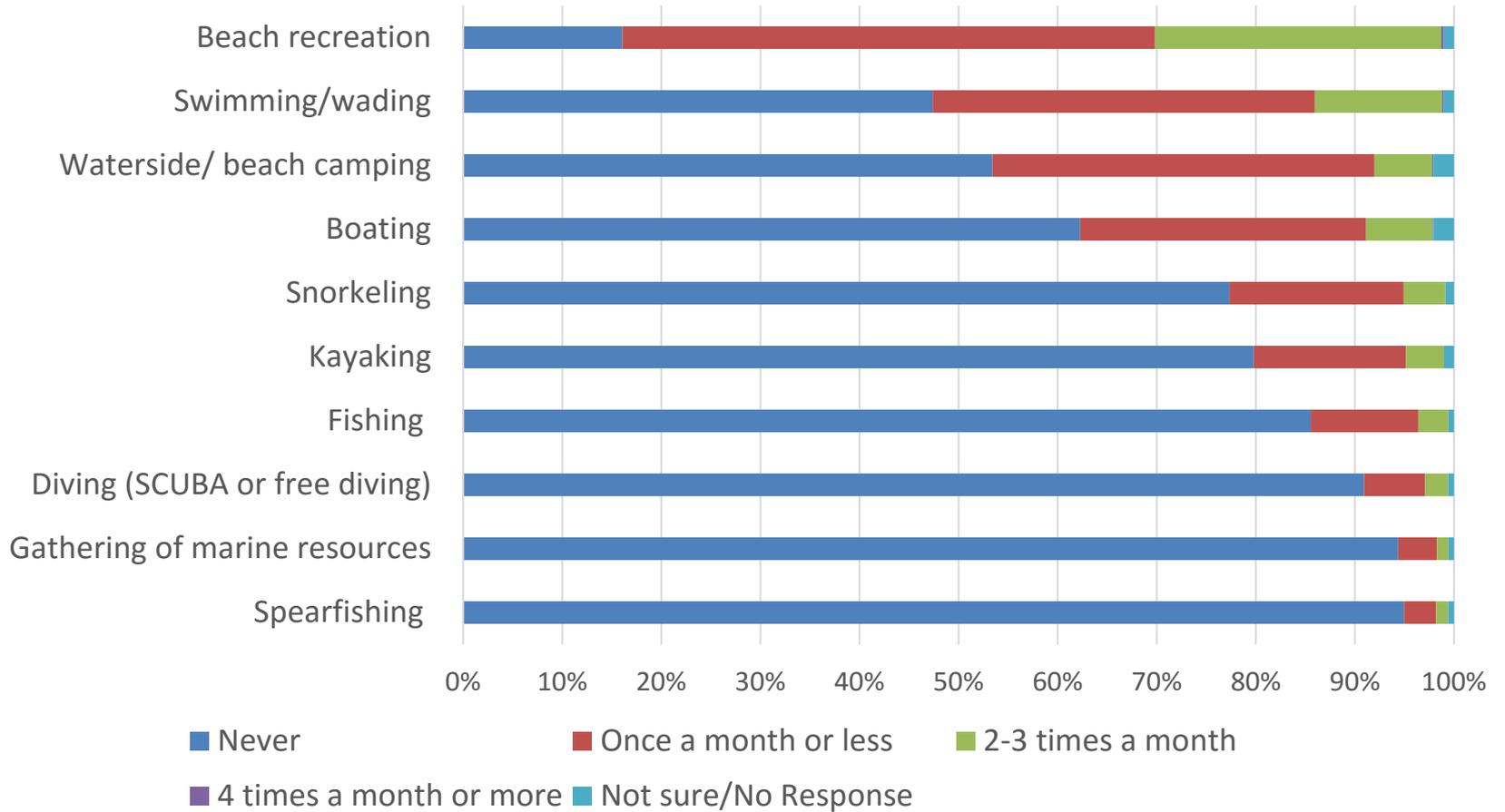
# Participation in Coral Reef Activities



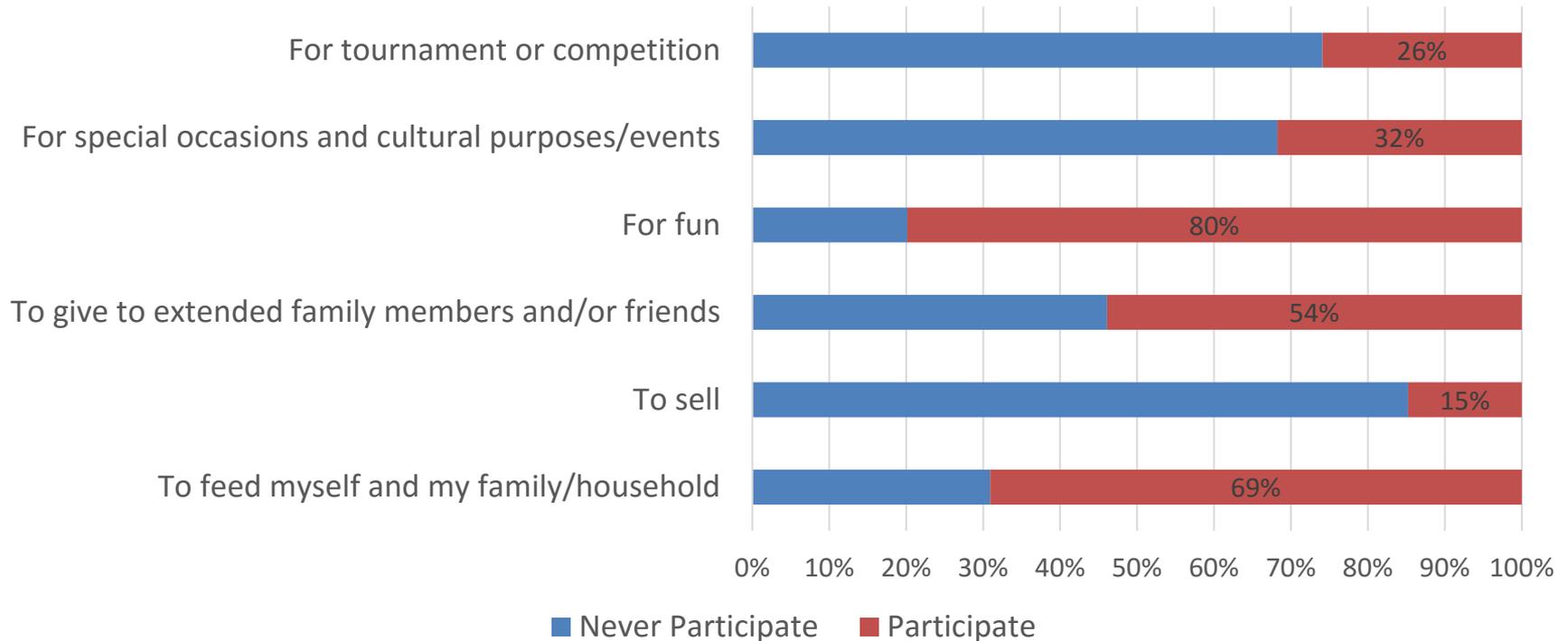
➤ The recreation activities with the highest level of participation were beach recreation (83%) and swimming/wading (52%).

➤ The recreation activities with the greatest proportion of respondents who never participate were spearfishing (96%) and gathering of marine resources (95%)

# Participation in Coral Reef Activities



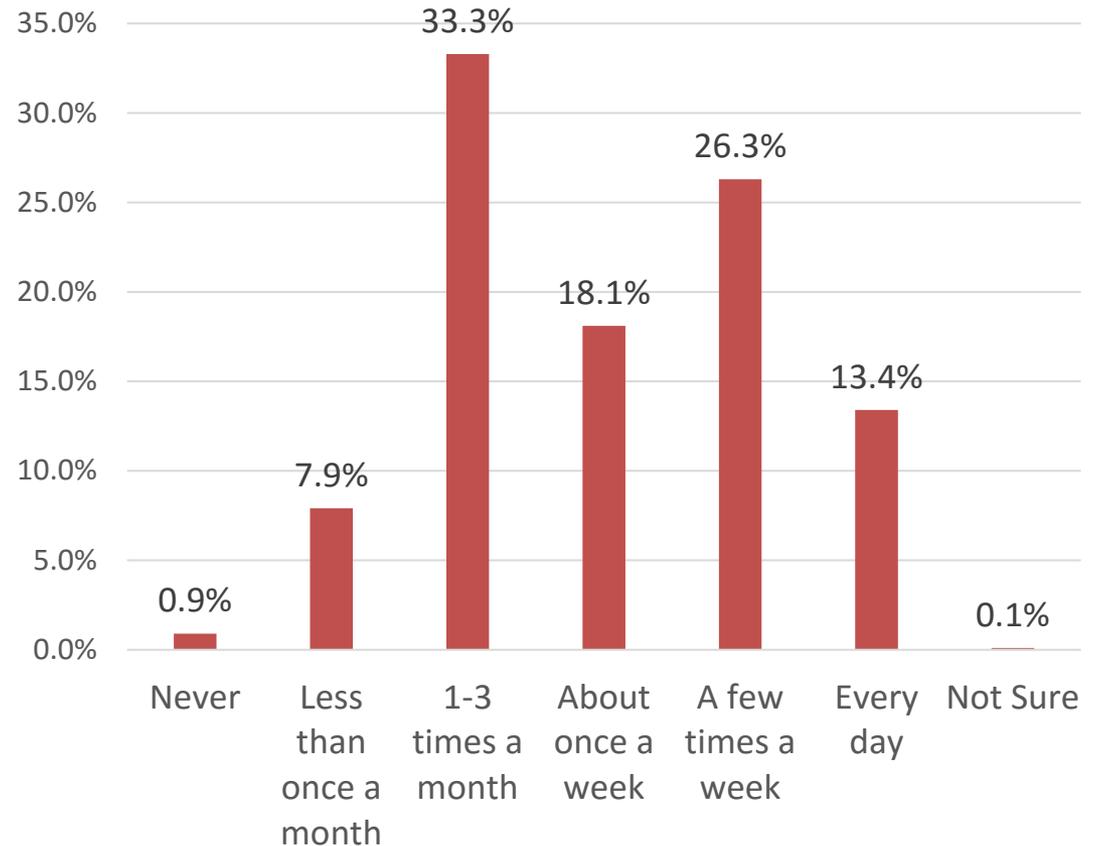
# Reasons for participation in fishing or harvesting marine resources



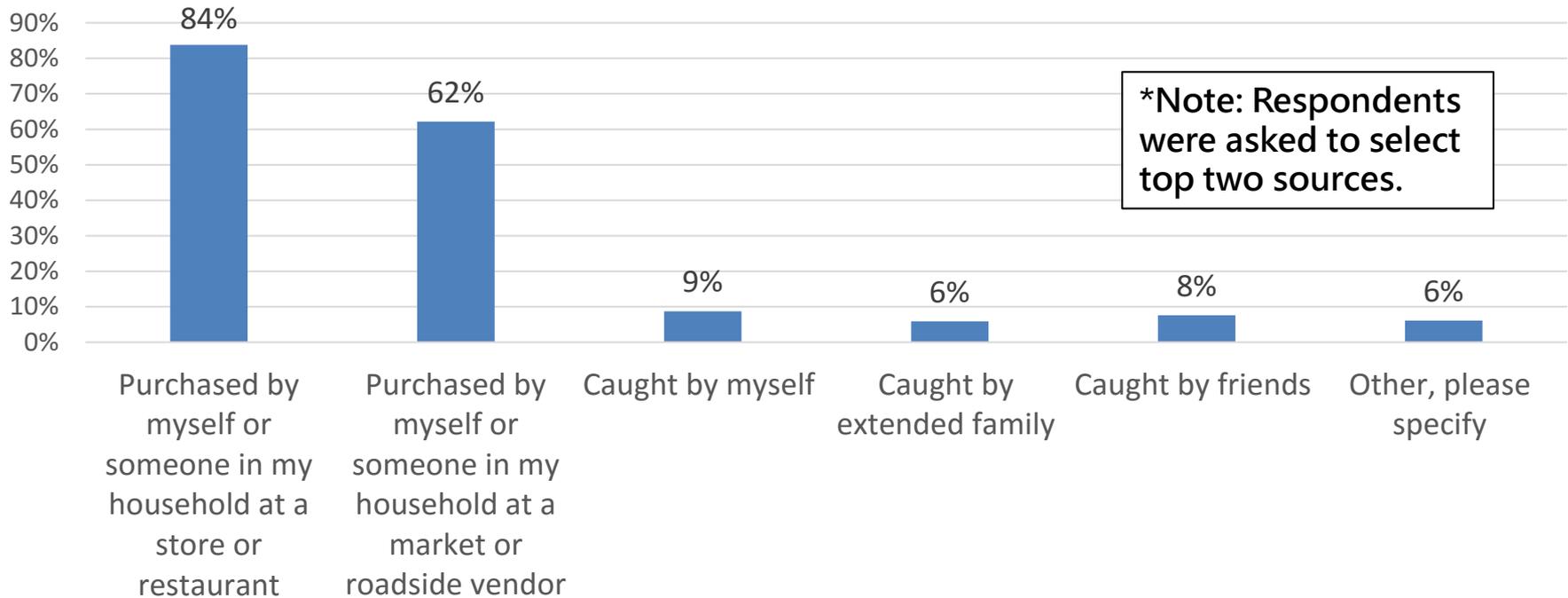
- The reason for fishing or harvesting marine resources with the highest level of participation was “for fun” (80%).
- The reason for fishing or harvesting marine resources with the lowest level of participation was “To sell” (85% Never participate).

# Frequency of Fish/Seafood Consumption for Respondents and their Household

- The majority of respondents (57.8%) ate seafood at least once a week.
- A very large proportion of respondents (91.1%) ate seafood at least once a month.

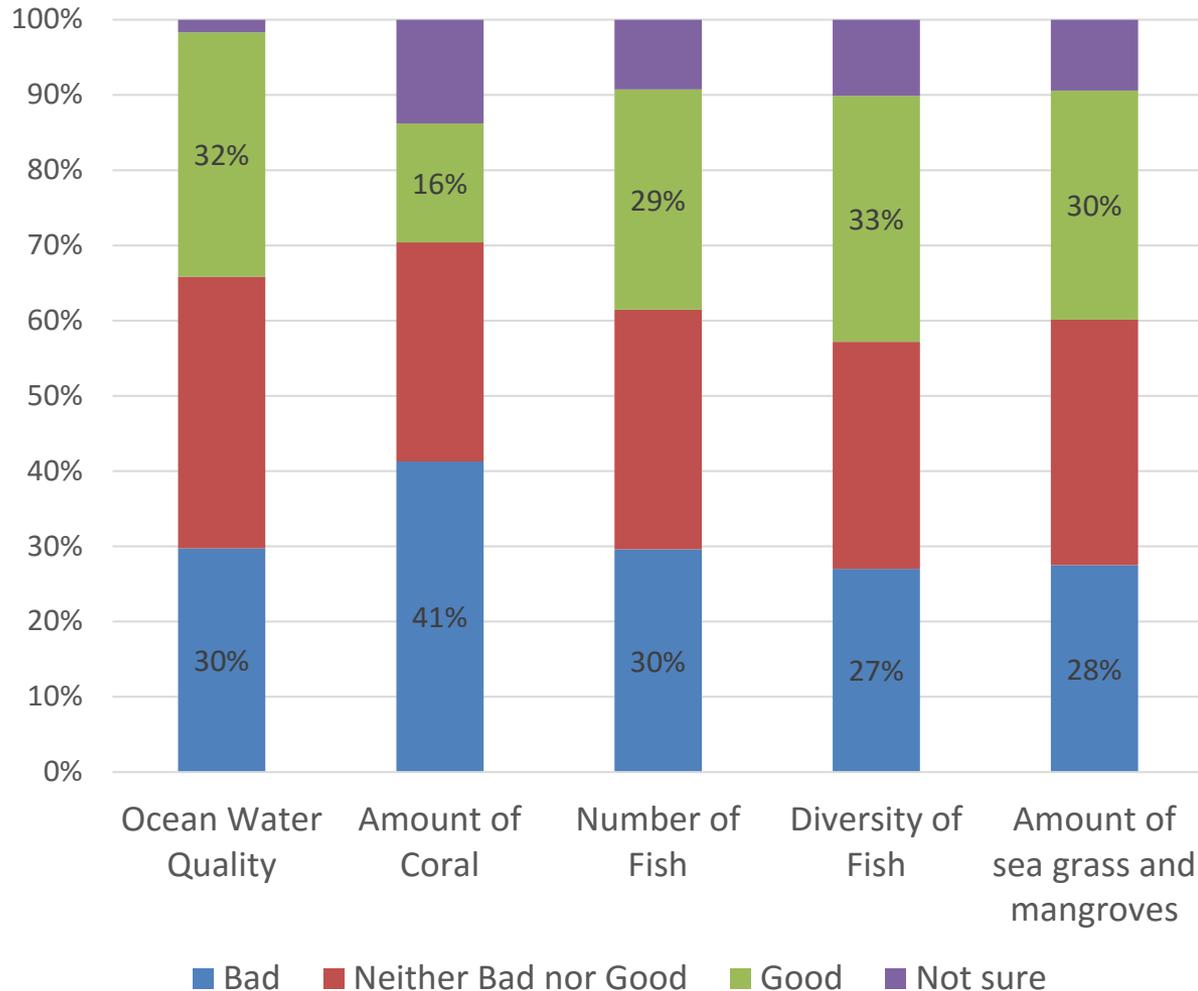


# Main Source of Fish and Seafood for Personal and Household Consumption



- The source chosen most as a main source of fish and seafood was “Purchased by myself or someone in my household at a store or restaurant” (84%) followed by “Purchased...at a market or roadside vendor” (62%).
- The source chosen least as a main source of fish and seafood was “Caught by extended family members” (6%).

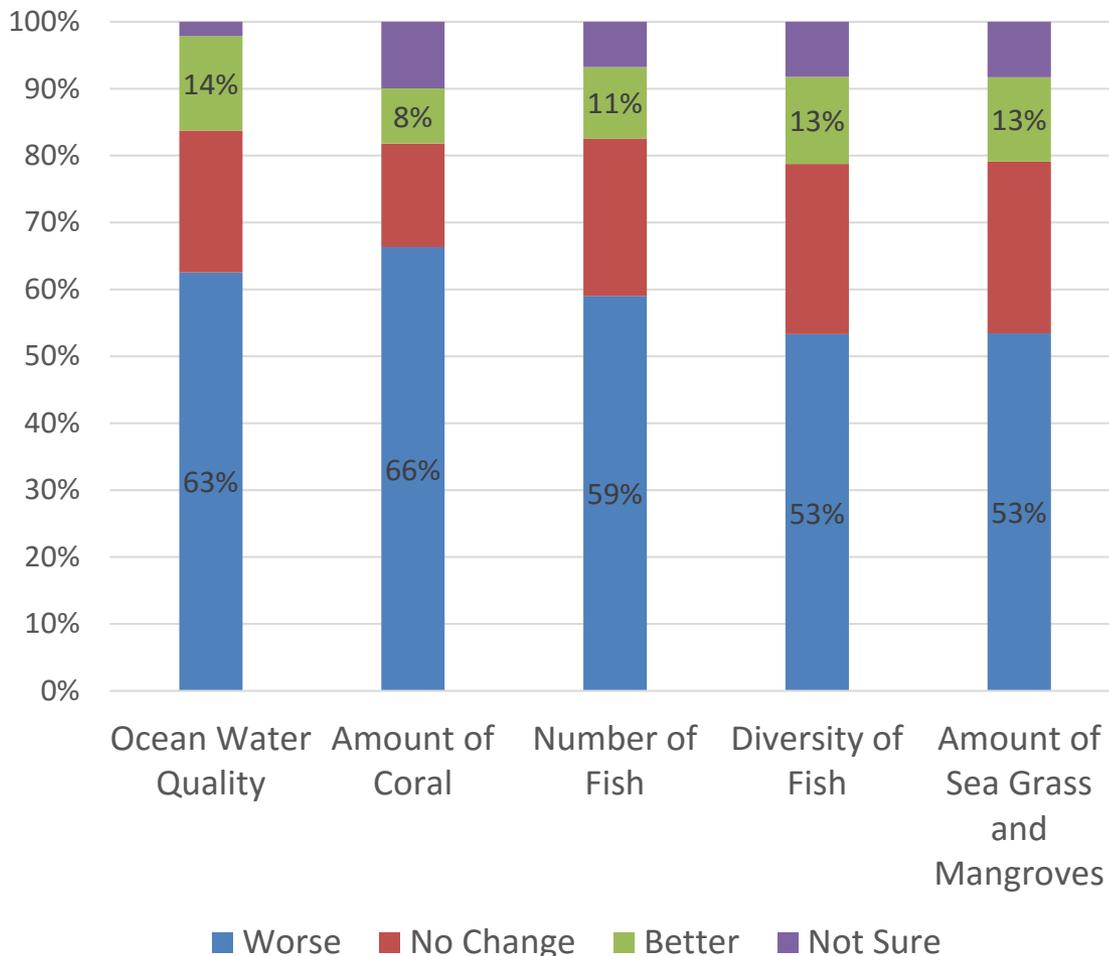
# Perceptions of Current Resource Conditions



➤ The resources considered to be in the best condition were Diversity of Fish (33%) and Ocean Water Quality (32%)

➤ The resource considered to be in the worst condition was Amount of Coral (41%), although this is the resource that respondents were the most unsure about as well (14%).

# Perceptions of Change in Resource Conditions Over the Last 10 Years

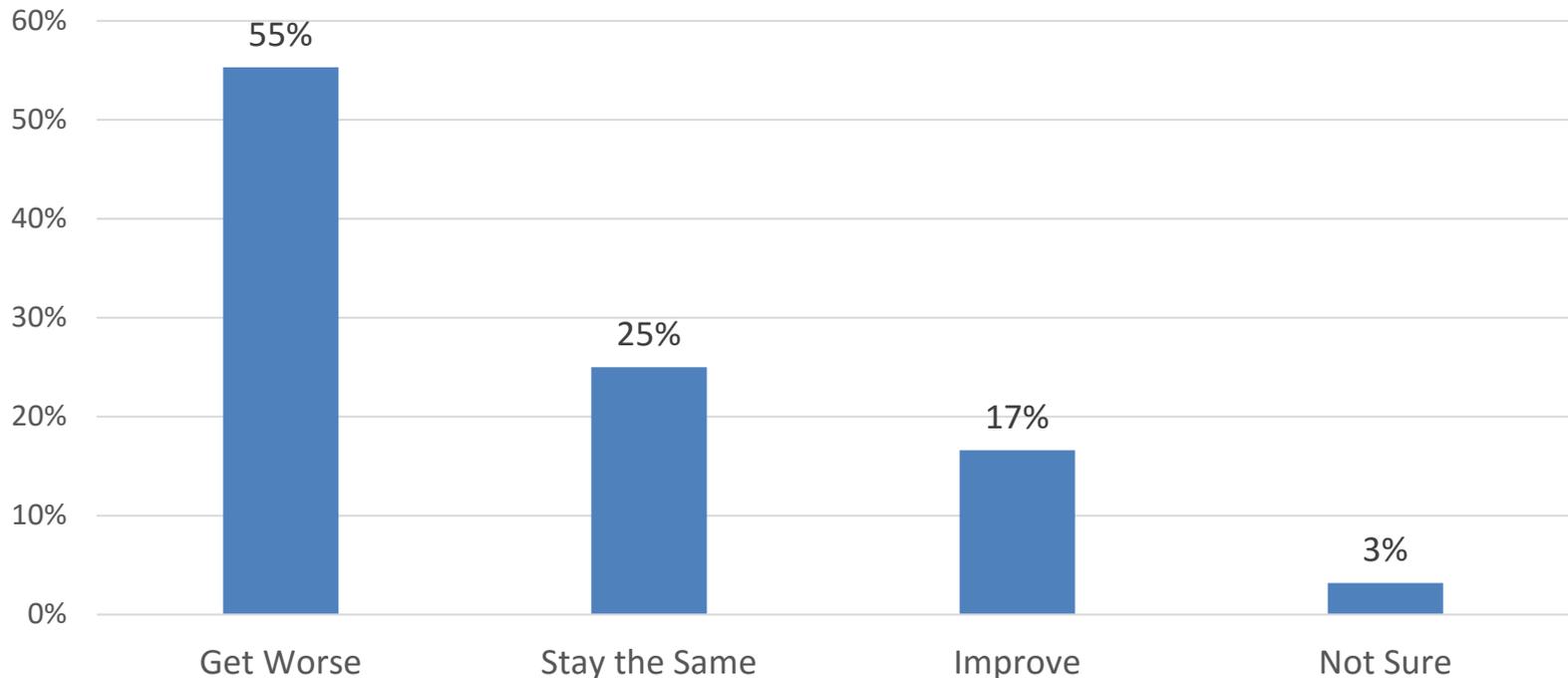


➤ Over half of the respondents indicated that they felt the condition of every marine resource has gotten worse over the last 10 years

➤ Amount of Coral (66%) and Ocean Water Quality (63%) were perceived to have deteriorated the most over the last 10 years.

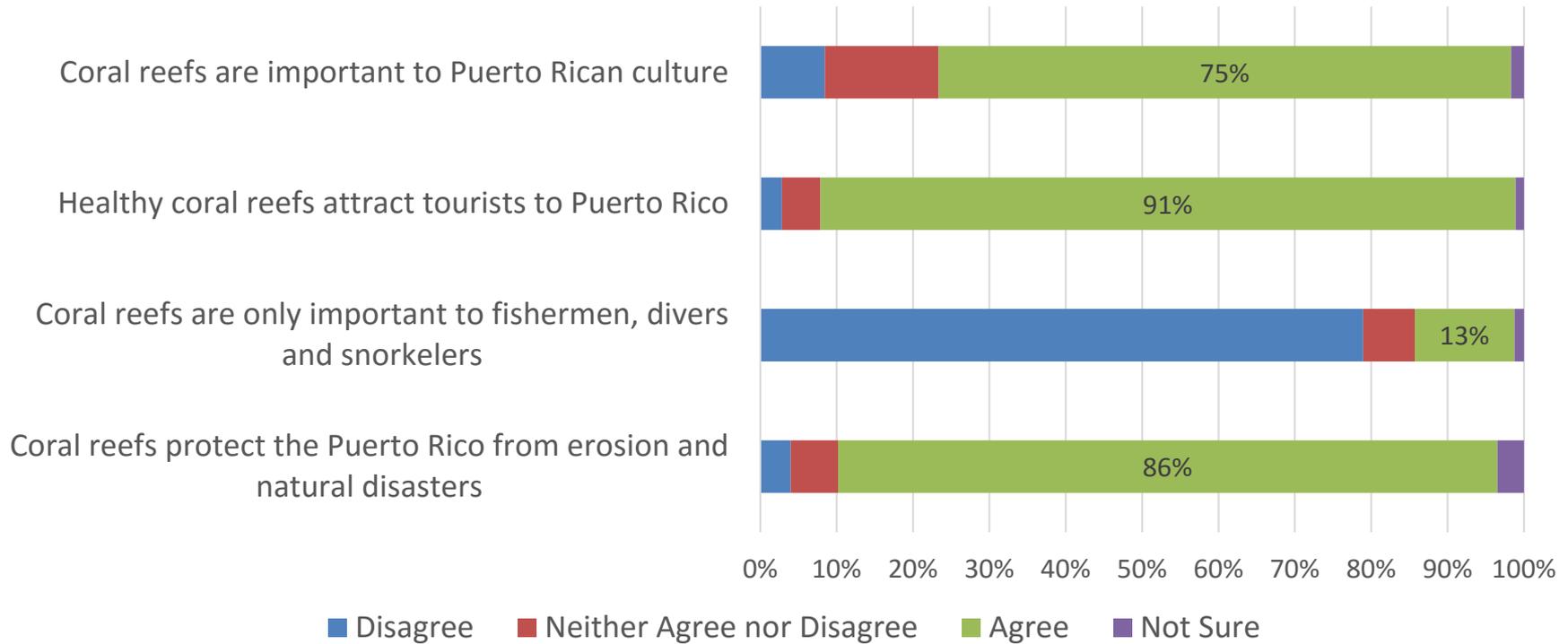
➤ Amount of Coral was again the resource that respondents were the most unsure about (10%) in terms of its change in condition

# Perceptions of Anticipated Change in Resource Conditions Over the Next 10 Years



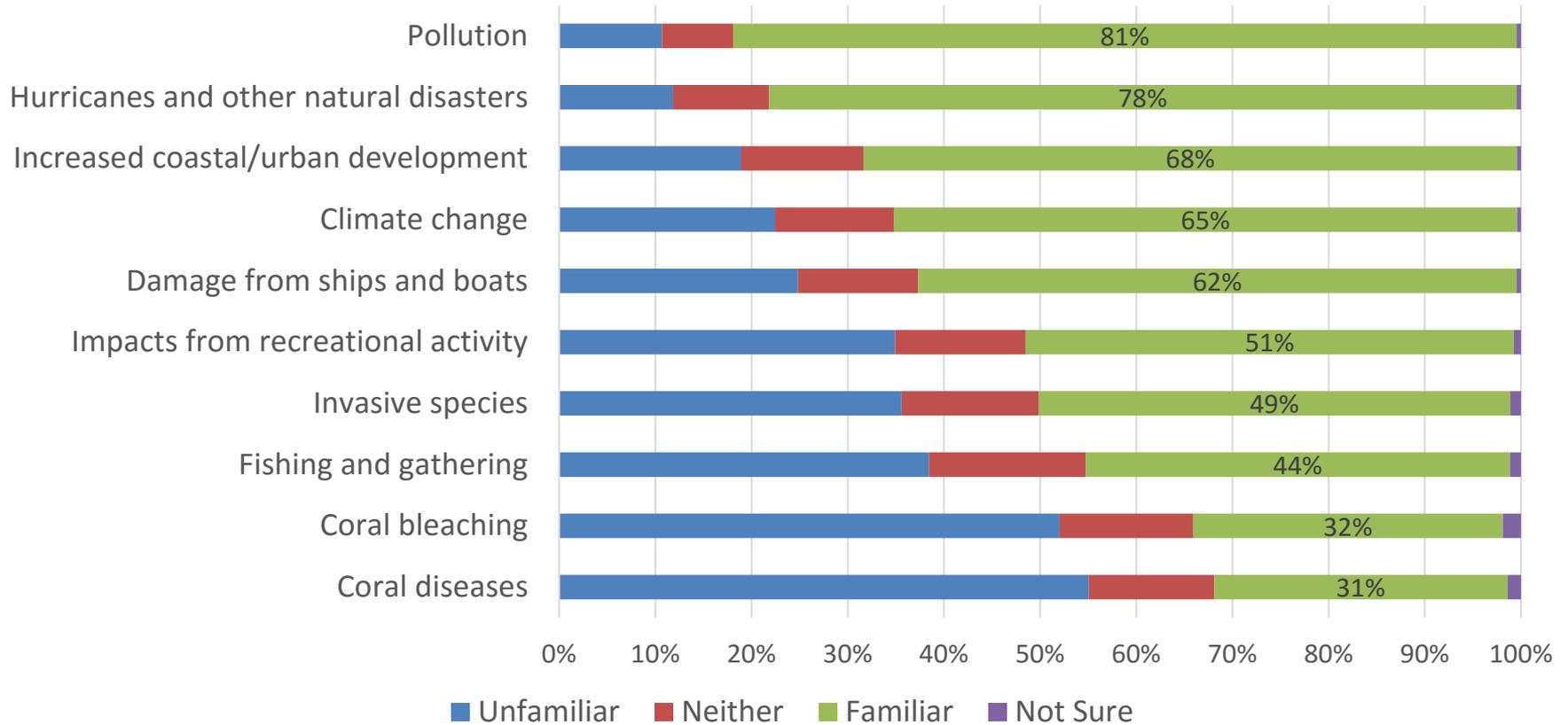
- The majority of respondents (55%) anticipated the overall resource condition will get worse over the next 10 years.
- 17% of respondents anticipated the resource condition will improve.
- 25% of respondents anticipated the resource condition will stay the same , while 3% were not sure.

# Agreement with Statements of Coral Reef Value



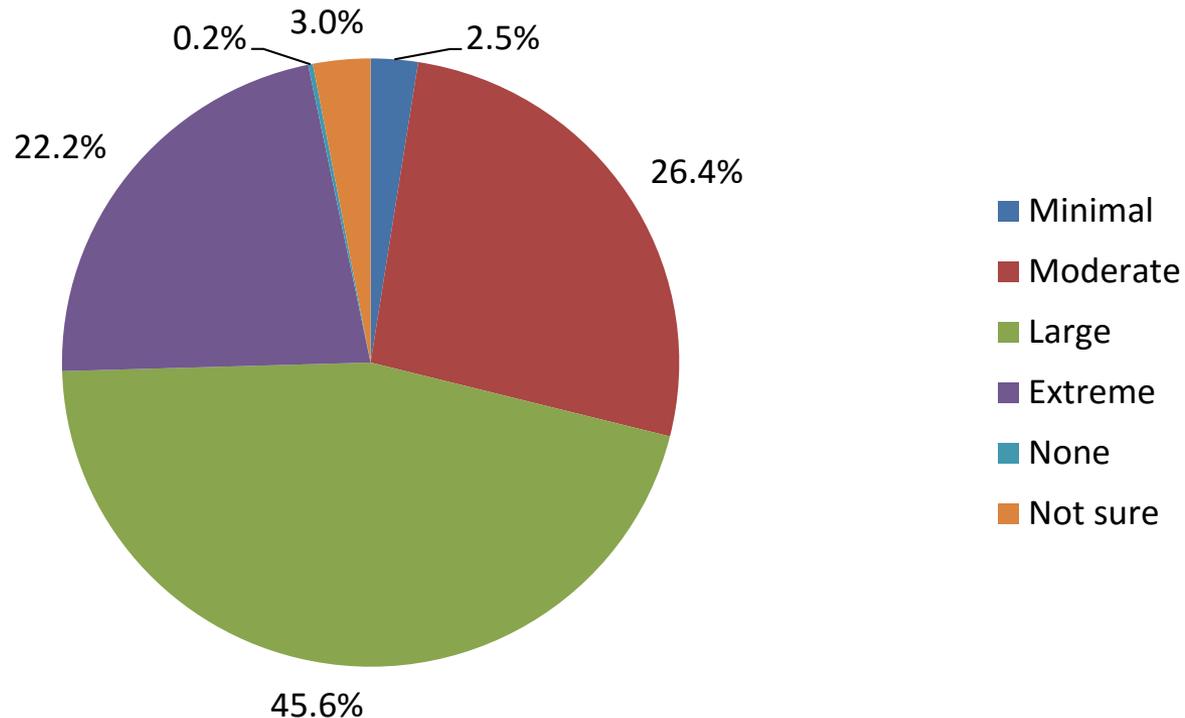
- The statement that respondents agreed the most with was “Healthy coral reefs attract tourists to Puerto Rico” (91%).
- The statement that respondents disagreed the most with was “Coral reefs are only important to fisherman, divers, and snorkelers” (79%).

# Familiarity with Threats Facing Coral Reefs



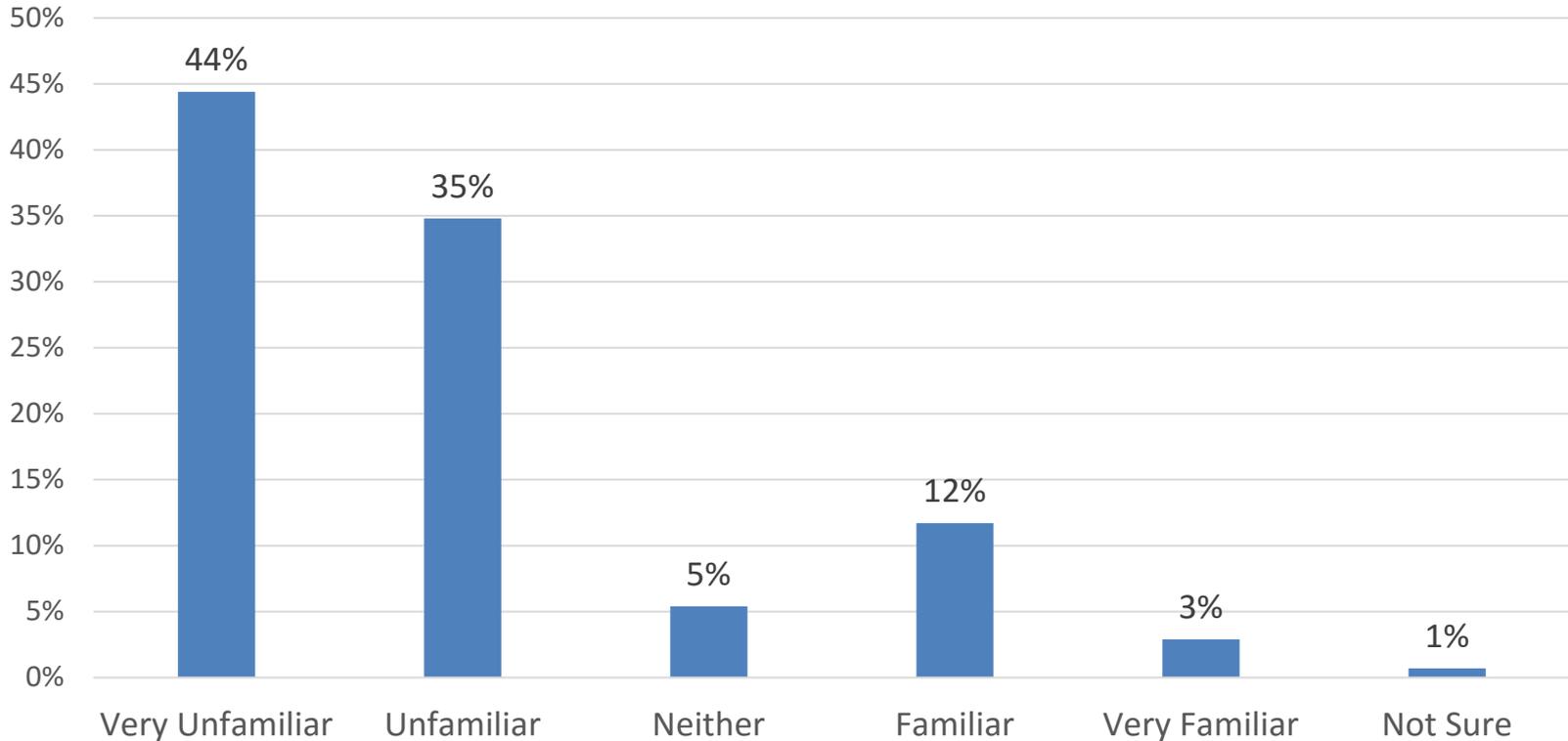
- The majority of respondents (>50%) were familiar with pollution, hurricanes, increased coastal/urban development, climate change, damage from ships/boats, and impacts from recreational activity
- Respondents were most familiar with Pollution (81%) and Hurricanes and other natural disasters (78%)
- Respondents were the most unfamiliar with coral diseases (55%) and coral bleaching (52%)

# Perceptions of the Level of Threat to Coral Reefs



- Over two thirds of respondents (68%) perceived the level of threat to coral reefs as Large or Extreme.
- Slightly over one quarter of respondents (29%) perceived the level of threat to coral reefs as Minimal or Moderate
- Only 0.2% believed there are no threats and 3% were not sure.

# Familiarity with MPAs



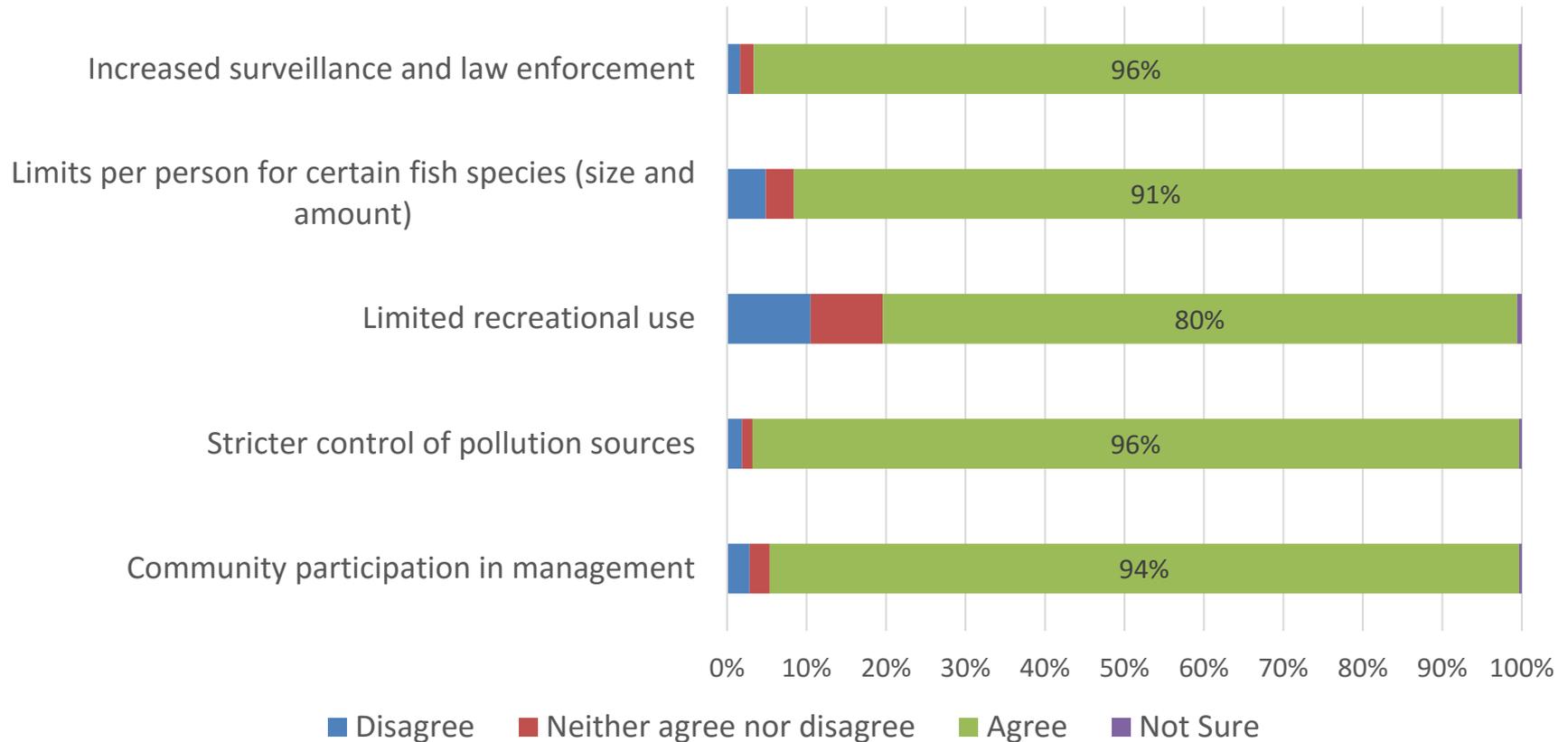
- Just over three quarters (79%) of respondents were unfamiliar or very unfamiliar with MPAs
- 15% were familiar or very familiar with MPAs

# Perceptions of Marine Protected Areas

MPA Statement	Disagree	Neither Agree nor Disagree	Agree	Not Sure
MPAs protect coral reefs	4%	6%	89%	1%
MPAs increase the number of fish	4%	5%	90%	2%
There should be fewer MPAs in Puerto Rico	87%	5%	8%	1%
There should be more MPAs in Puerto Rico	3%	5%	92%	1%
There has been economic benefit to Puerto Rico from the establishment of MPAs	14%	26%	55%	6%
Fishermen's livelihoods have been negatively impacted from the establishment of MPAs in Puerto Rico	34%	27%	34%	5%
MPAs help increase tourism in Puerto Rico	8%	18%	71%	2%
The establishment of MPAs increases the likelihood that people will vacation in Puerto Rico	12%	19%	67%	2%
I would support adding new MPAs in Puerto Rico if there is evidence that the ones we have are improving Puerto Rico's marine resources	2%	5%	92%	1%
I generally support the establishment of MPAs	3%	5%	91%	1%

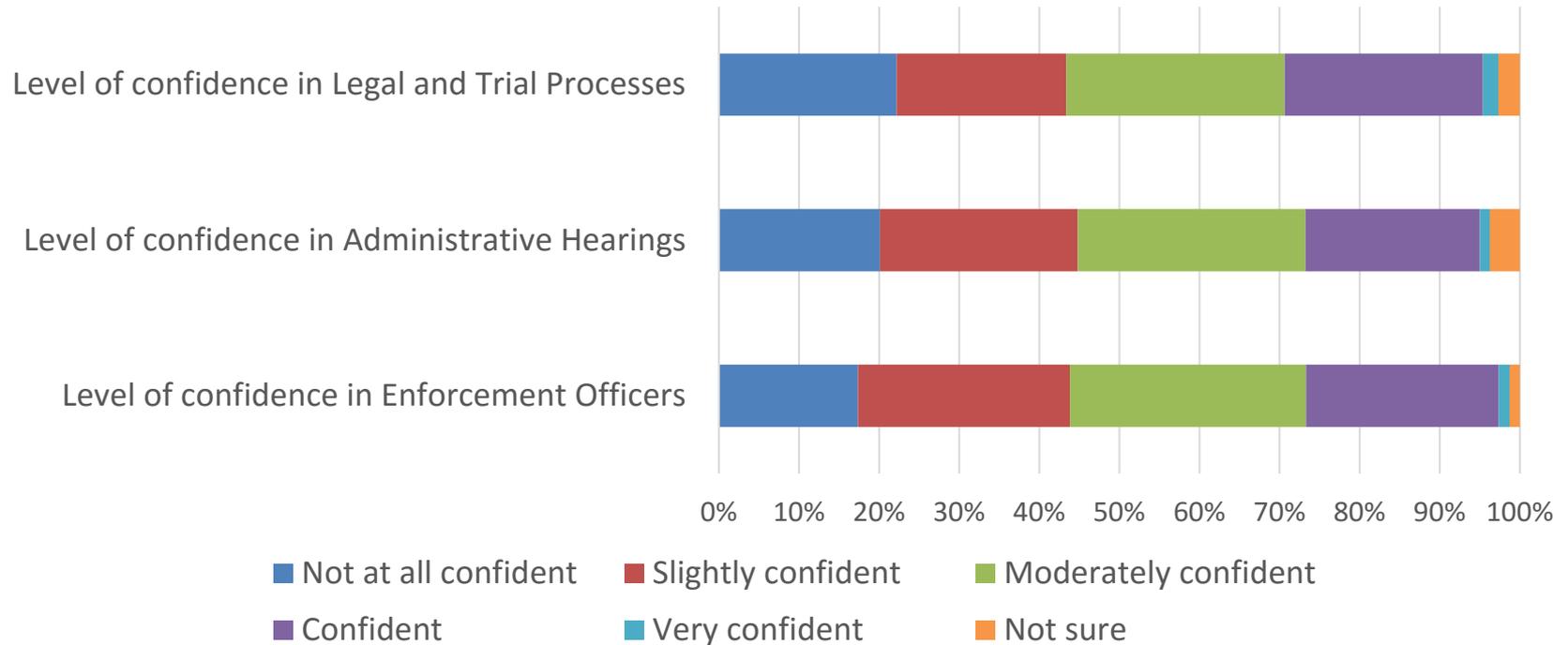
- 92% of respondents agreed that “there should be more MPAs in Puerto Rico” and that they “would support adding new MPAs in Puerto Rico if there is evidence that the ones we have are improving Puerto Rico’s marine resources”
  - However, over a third indicated that they believe “Fishermen’s livelihoods have been negatively impacted from the establishment of MPAs in Puerto Rico”

# Support for Management Strategies



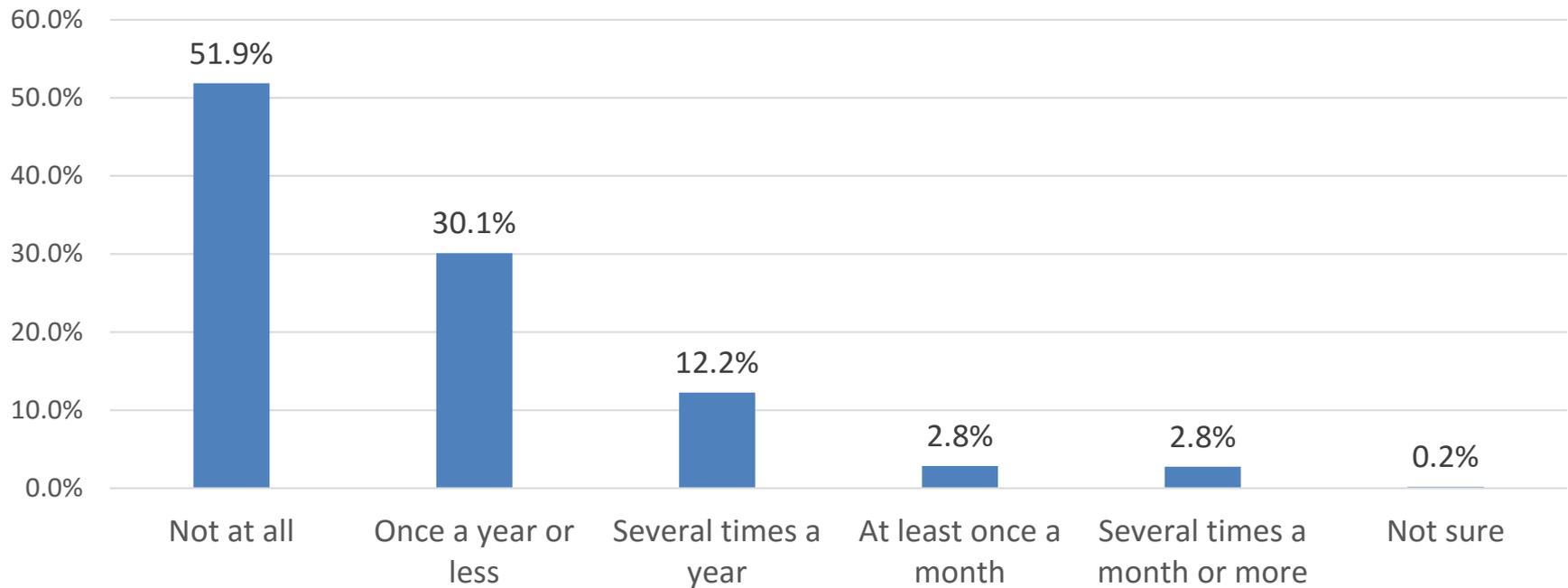
- At least 80% of respondents agreed with all the presented management strategies.
- Respondents agreed the most with “Stricter control of pollution sources” (96%).
- Respondents disagreed most with “Limited recreational use” (10%).

# Confidence in Enforcement



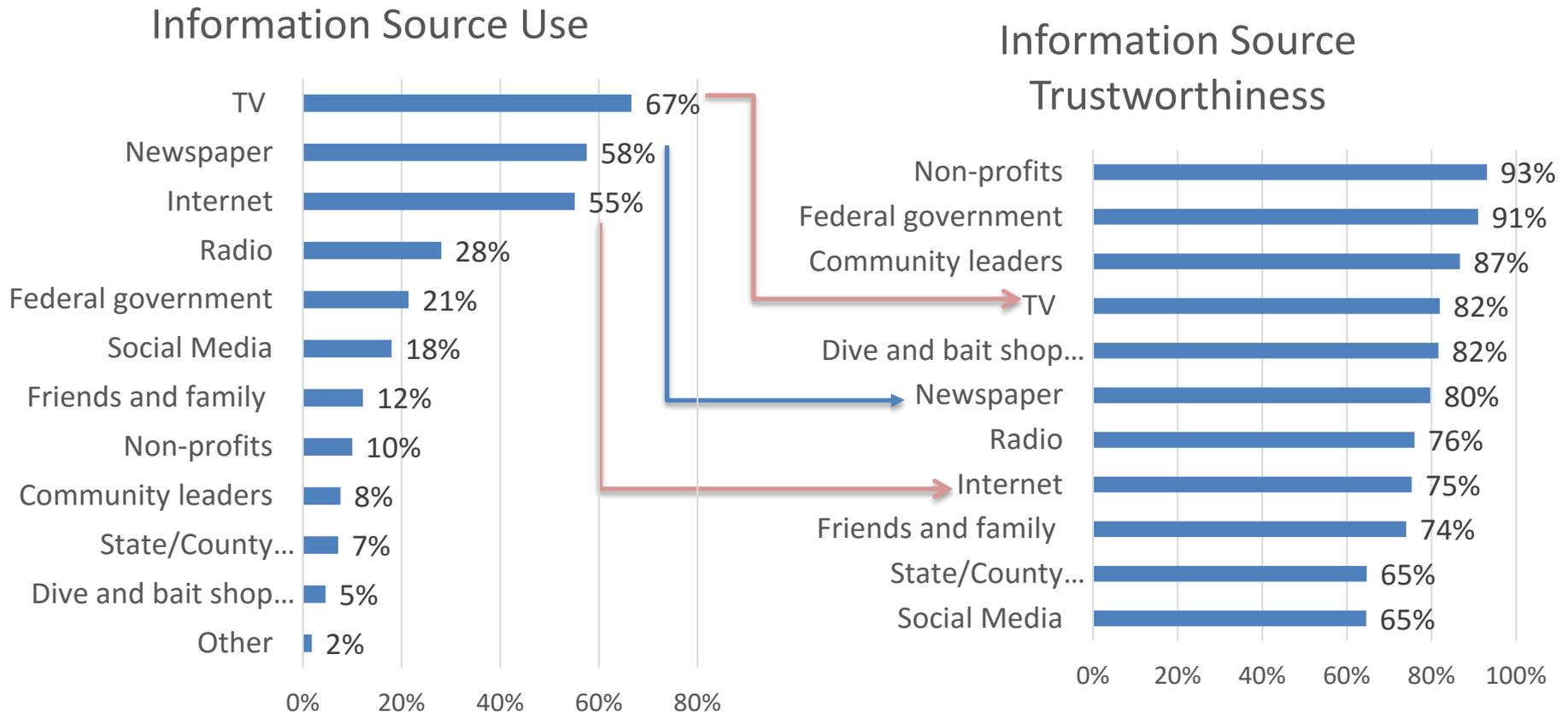
- Over half of the respondents were at least “moderately confident” in all three areas of enforcement.
  - However, less than 2% of respondents were “very confident” for each facet of enforcement
- The largest number of respondents that were “not at all confident” (22%) was for legal and trial processes

# Frequency of Participation in Any Activity to Protect the Environment



- Over half of respondents (52%) state that they never participate in pro-environmental activities
- 18% participate at least several times a year

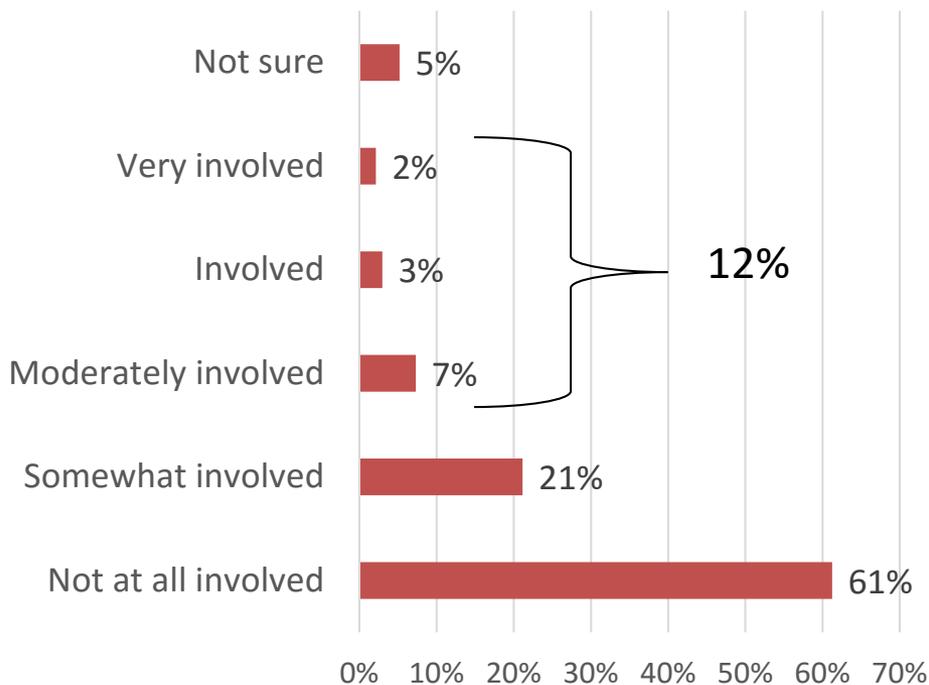
# Respondents' Top Sources for Information about Coral Reefs and the Environment and Source Trust



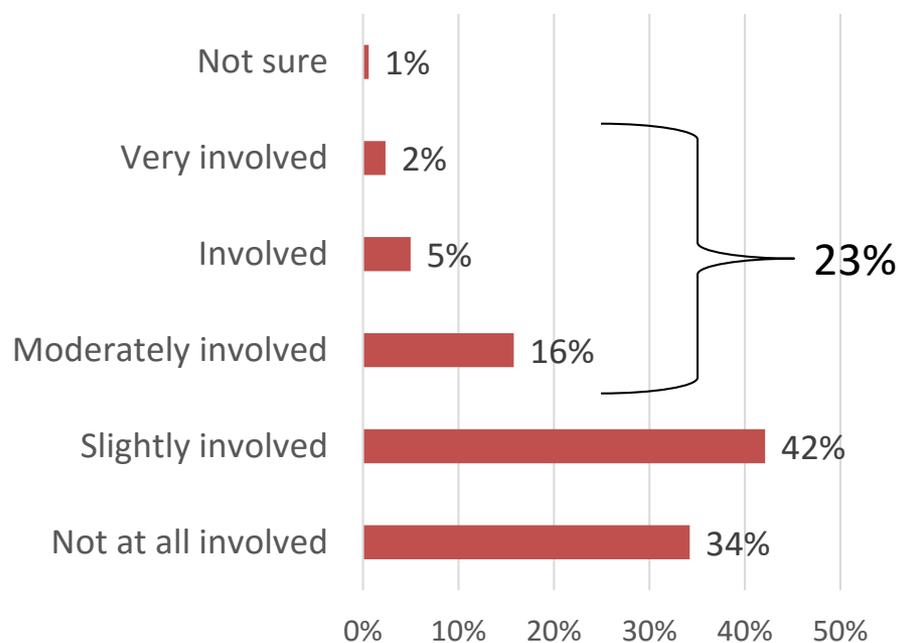
- TV (67%), Print publications (58%), and the Internet (55%) are the top sources of information about coral reefs and the environment.
- However, these top sources are perceived to be less trustworthy than other sources chosen by respondents.

# Perceptions of Individual and Community Involvement in Coral Reef Management & Decision Making

How involved is your local community in protecting and managing coral reefs?



How involved are YOU in making decisions related to the management of coral reefs in Puerto Rico?



- Over 60% perceive their local communities as not at all involved in protecting and managing coral reefs.
- Although 12% indicate that their local communities are at least “moderately involved” in protecting and managing coral reefs, 23% indicated that they themselves are at least moderately involved in protecting and managing coral reefs

# Respondent Demographic Characteristics

Gender	Sample	2010 US Census
Male	49%	48%
Female	46%	52%
No Response	6%	N/A

Age	Sample	2010 US Census
18-24 year olds	7%	10%
25-44 year olds	33%	26%
45-64 year olds	33%	25%
65-84 year olds	18%	13%
85+ years old	1%	2%
No Response	8%	N/A

Education Level	Sample	2010 US Census
Less than high school	2%	31%
High School Graduate, GED	21%	27%
Some college, community college or AA	21%	15%
College Graduate	39%	17%
Graduate School, Law School, Medical School	9%	6%
No Response	7%	N/A

# Respondent Demographic Characteristics

Annual Household Income	Sample	2010 US Census
Under \$10,000	9%	30%
\$10,000 to \$19,999	17%	20%
\$20,000 to \$29,999	13%	13%
\$30,000 to \$39,999	9%	12%
\$40,000 to \$49,999	6%	8%
\$50,000 to \$59,999	3%	6%
\$60,000 to \$74,999	3%	4%
\$75,000 to \$99,999	1%	3%
\$100,000 to \$149,999	1%	2%
\$150,000 or More	<1%	1%
No Response/Not Sure	38%	N/A

# Respondent Demographic Characteristics

Languages Spoken	Sample
Spanish	74%
English	60%
French	2%
Italian	1%
Other	2%

Year(s) of Residence	Sample
1 year or less	<1%
2-5 years	1%
6-10 years	1%
More than 10 years (less than all my life)	14%
All my life	78%
No Response	7%

Race/Ethnicity	Sample
Puerto Rican	69%
Hispanic/Latino	12%
White	9%
Black	2%
Other	1%
No Response	6%

Employment Status	Sample
Unemployed	6%
Student	4%
Employed full-time	42%
Homemaker	10%
Employed part-time	6%
Retired	21%
No Response	11%



# NOAA CORAL REEF CONSERVATION PROGRAM



## MONITORING APPLICATIONS: Survey



# Perception of Resource Condition & Human Use

Resource	Respondent DOES NOT Fish or Gather		Respondent Fishes or Gathers		Statistical test for difference	
	n	Mean	n	Mean	t	p value
<b><i>Current Conditions</i></b>						
Ocean water quality	2052	2.97	364	3.12	-2.77***	<0.01
Amount of coral	1772	2.63	334	2.78	-2.74***	<0.01
Number of fish	1863	2.96	355	3.07	-1.97**	0.05
Diversity of fish	1840	3.03	351	3.18	-2.60***	0.01
Amount of sea grass and mangroves	1861	3.00	351	3.18	-2.43**	0.02
<b><i>Change in conditions over last 10 years</i></b>						
Ocean water quality	2039	2.38	363	2.50	-2.08**	0.04
Amount of coral	1851	2.19	345	2.35	-3.04***	<0.01
Number of fish	1925	2.38	352	2.50	-2.37**	0.02
Diversity of fish	1890	2.46	348	2.62	-3.13***	<0.01
Amount of sea grass and mangroves	1892	2.45	346	2.60	-2.77***	<0.01

\* = significant at the 10% level, \*\* = significant at the 5% level, \*\*\* = significant at the 1% level

- Higher mean values indicate a more positive perception.
- Respondents who fish or gather for marine resources had an overall more positive perception as it pertains to the current condition of marine resources as well the change in condition over the last ten years when compared to respondents who do not fish or gather for marine resources

# Who is your audience?

## Information Source & Demographics

	Demographics													
Coral Reef Information Source	Male	Female	Older Age	Younger Age	Has not Lived in Puerto Rico for their whole life	Lived in Puerto Rico for their whole life	Completed College	Did Not Complete College	More Annual Income	Less Annual Income	White	African American	Puerto Rican	Hispanic
Newspaper/Print			✓				✓				✓	✓		
Radio		✓	✓			✓		✓		✓				
TV			✓					✓		✓			✓	
Internet				✓			✓		✓				✓	
Social media				✓									✓	
Friends and family	✓				✓			✓					✓	
Community leaders				✓							✓			✓
Dive and bait shop owners/employees				✓	✓									✓
Jurisdiction governments	✓			✓	✓							✓		✓
Federal government agencies (NOAA, EPA)				✓	✓		✓		✓			✓		✓
Non-Profit Organizations				✓			✓							✓

# Confidence in Enforcement

- An index of “confidence in enforcement” was calculated by summing the values for each of the three questions in this section for each respondent
  - This additive index was then normalized to a 0-100 scale
  - Mean of the sample = 40.4

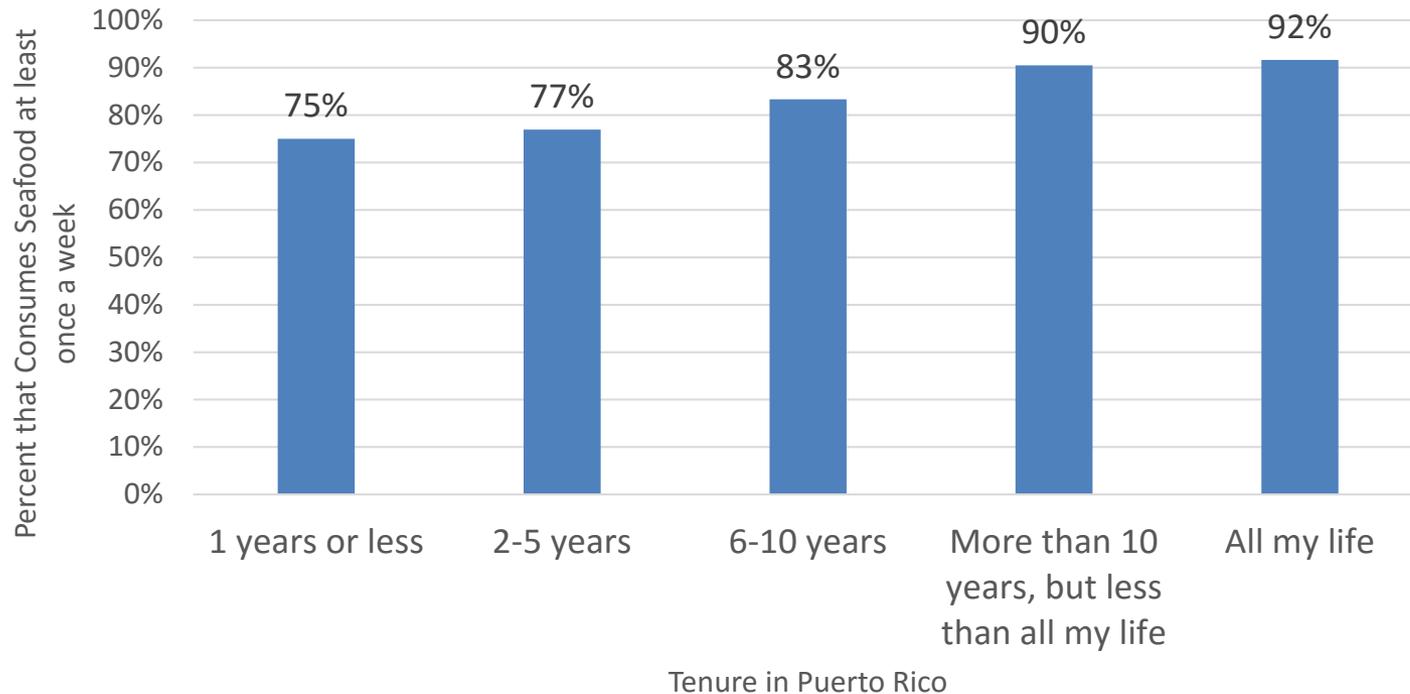
# Confidence in Enforcement

Type of Enforcement	Respondent DOES NOT Fish or Gather		Respondent Fishes or Gathers		Statistical test for difference	
	n	Mean	n	Mean	t	p value
Enforcement officers	2015	2.66	357	2.59	1.10	0.27
Administrative hearings	1956	2.60	351	2.44	2.65***	<0.01
Legal and trial processes	1978	2.64	355	2.52	1.73*	0.08
Confidence in Enforcement Index	1934	40.86	350	38.12	1.87*	0.06

\* = significant at the 10% level, \*\* = significant at the 5% level, \*\*\* = significant at the 1% level

- Higher mean values indicate more confidence
- Respondents who fish/gather for marine resources tend to have less confidence in enforcement

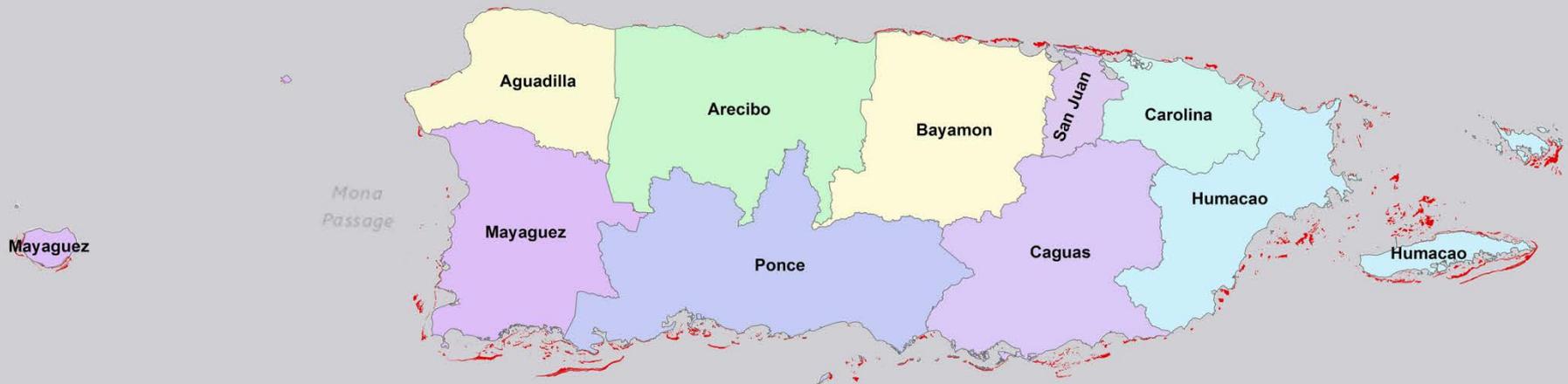
# Seafood Consumption and Tenure



- As the amount of time one has lived in Puerto Rico increases, so too does the likelihood of consuming seafood at least once a week



# Regions and Proximity to Reefs





# Regions and Proximity to Reefs

Region	Proportion Participating in Environmental Behavior	Proportion Familiar with MPAs	Percent of Total Reef Cover
Aguadilla	50.96%	18.66%	1.68%
Arecibo	44.75%	11.60%	1.19%
Bayamon	47.10%	12.95%	6.78%
Caguas	48.33%	15.81%	7.60%
Carolina	42.86%	16.30%	4.60%
Humacao	53.03%	20.24%	43.94%
Mayaguez	47.39%	14.48%	14.40%
Ponce	49.00%	15.03%	16.99%
San Juan	43.54%	10.07%	2.82%
Total	48.03%	15.33%	100%

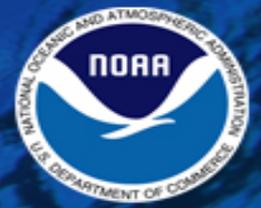


# Regions and Proximity to Reefs

Region	Proportion Participating in Environmental Behavior	Proportion Familiar with MPAs	Percent of Total Reef Cover
Aguadilla	50.96%	18.66%	1.68%
Arecibo	44.75%	11.60%	1.19%
Bayamon	47.10%	12.95%	6.78%
Caguas	48.33%	15.81%	7.60%
Carolina	42.86%	16.30%	4.60%
<b>Humacao</b>	<b>53.03%</b>	<b>20.24%</b>	<b>43.94%</b>
Mayaguez	47.39%	14.48%	14.40%
Ponce	49.00%	15.03%	16.99%
San Juan	43.54%	10.07%	2.82%
Total	48.03%	15.33%	100%



# NOAA CORAL REEF CONSERVATION PROGRAM



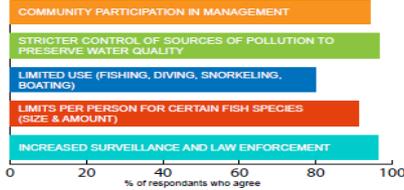
## CONNECTIONS BETWEEN CORAL REEFS & COASTAL COMMUNITIES

NOAA's Coral Reef Conservation Program monitors the biological, socioeconomic, and climate conditions of US coral reef areas and communities. This includes collection of socioeconomic variables including demographics, human use of coral reef resources, as well as knowledge, attitudes, and perceptions of coral reefs and coral reef management through the use of surveys and existing data. The takeaways below are based on the survey results for Puerto Rico.

### TAKEAWAYS FROM PUERTO RICO

#### MANAGEMENT SUPPORT

The majority of people support management strategies to improve protection.



#### USES OF RESOURCES

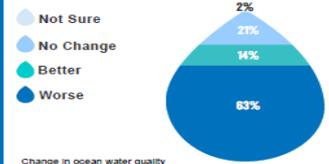
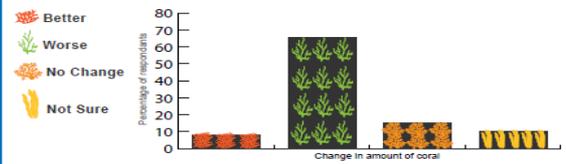


#### TENURE & CONDITION

Years of residence impacts perceptions of marine resource conditions. Lifelong residents of Puerto Rico are more likely to have a more negative opinion concerning the change in the condition of marine resources over the last 10 years.

### PERCEPTIONS

PARTICIPANTS WERE ASKED HOW THE AMOUNT OF CORAL AND CONDITION OF OCEAN WATER QUALITY HAS CHANGED IN THE PAST 10 YEARS...

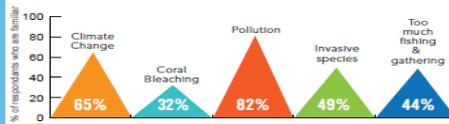


### VALUES & AWARENESS

1. Puerto Rican residents who agreed that "coral reefs are important to Puerto Rico's cultures" were more likely to participate in more marine activities and participate in pro-environmental behavior.
2. Puerto Rican residents who agreed that "coral reefs protect Puerto Rico from erosion and natural disasters" were more likely to respond more favorably to management options and be more familiar with the various threats faced by coral reefs.

### THREAT FAMILIARITY

How familiar are you with these potential threats facing coral reefs?



### CORAL REEF INFO SOURCES & DEGREE OF TRUST TO PROVIDE ACCURATE INFO



The survey was conducted for a random stratified sample of households in the Ponce, Aguadilla, Caguas, Mayaguez, Pabro, Guayama, Arecibo, Bayamon, and San Juan regions of Puerto Rico in the year 2015. In comparing the sample to the total population of Puerto Rico, the data were determined to be representative and therefore the results are generalizable to the entire population of the jurisdiction. Data were collected through the telephone random digit dial survey method, and the total sample size for this survey was 2,553. The survey effort is used in conjunction with the collection of existing secondary data to monitor the socioeconomic conditions of the coral jurisdictions over time. For more information, please see the NORMAP Socioeconomic Component project page at <http://www.noaa.gov/monitoringsocioeconomic.html>.

## Products

- Infographic highlighting findings for Puerto Rico
- Technical report for Puerto Rico is coming soon



## ❖ **Additional products**

- ❖ Posters, Infographics, Technical Report in development

## ❖ **Analyses are ongoing**

- ❖ Linkages between biological, climate, and socio data will be explored

## ❖ **Input needed**

- ❖ Are there results you would like to see further examined?
- ❖ Are there information products that would be especially useful?

## ❖ **Need more information?**

- ❖ CRCP: Peter Edwards [peter.edwards@noaa.gov](mailto:peter.edwards@noaa.gov) or Arielle Levine [arielle.levine@noaa.gov](mailto:arielle.levine@noaa.gov)
- ❖ NCCOS: Jarrod Loerzel [jarrod.loerzel@noaa.gov](mailto:jarrod.loerzel@noaa.gov) or Matt Gorstein [matt.gorstein@noaa.gov](mailto:matt.gorstein@noaa.gov)
- ❖ Visit <http://www.coris.noaa.gov/monitoring/socioeconomic.html>



NOAA  
**CORAL REEF**  
CONSERVATION PROGRAM



## Additional Slides



# Perceptions of Resource Condition & Education

Puerto Rican Resource	Did not complete college		Completed college		Statistical test for difference	
	n	Mean	n	Mean	t	p value
<i>Current Conditions</i>						
Ocean water quality	1116	3.00	1167	2.99	0.36	0.72
Amount of coral	967	2.64	1024	2.68	-1.03	0.30
Number of fish	1023	3.03	1082	2.93	2.61***	<0.01
Diversity of fish	1016	3.08	1062	3.04	0.93	0.35
Amount of sea grass and mangroves	1019	3.06	1072	2.96	2.33**	0.02
<i>Change in conditions over last 10 years</i>						
Ocean water quality	1108	2.42	1163	2.38	1.23	0.22
Amount of coral	1009	2.24	1074	2.20	1.35	0.18
Number of fish	1052	2.44	1107	2.36	2.18**	0.03
Diversity of fish	1040	2.52	1080	2.45	1.87*	0.06
Amount of sea grass and mangroves	1037	2.50	1088	2.43	1.74*	0.08

\* = significant at the 10% level, \*\* = significant at the 5% level, \*\*\* = significant at the 1% level

- Higher mean values indicate a more positive perception.
- More education is associated with more pessimistic perceptions of conditions of marine resources, as well as the change over the last 10 years.
- This relationship was also found in American Samoa, Florida, and Hawaii.

# Threat Familiarity & Management Support

Threat to Coral Reefs	Management Index $\geq 21$		Management Index $< 21$		Statistical test for difference	
	n	Mean	n	Mean	t	p value
Climate Change	1108	3.69	1267	3.37	7.22***	<0.01
Coral Bleaching	1106	2.71	1243	2.60	2.03**	0.04
Hurricanes and other natural disasters	1107	3.97	1268	3.66	8.43***	<0.01
Pollution (stormwater, wastewater, chemical runoff, trash/littering, fuel spills)	1107	4.02	1269	3.80	6.17***	<0.01
Increased Coastal/Urban Development (includes construction)	1106	3.74	1268	3.50	5.56***	<0.01
Invasive Species	1105	3.32	1252	2.98	6.98***	<0.01
Fishing and Gathering	1105	3.14	1253	2.89	5.00***	<0.01
Damage from Ships and Boats	1108	3.58	1266	3.31	5.96***	<0.01
Impacts from Recreational Activities (damage caused by inexperienced divers)	1105	3.33	1261	3.00	6.71***	<0.01
Coral Diseases	1102	2.58	1250	2.50	1.35	0.18

\* = significant at the 10% level, \*\* = significant at the 5% level, \*\*\* = significant at the 1% level

# MPA Perceptions and Tenure

Puerto Rican Marine Protected Area (MPA) Preferences	Has not lived in Puerto Rico their whole life		Has lived in Puerto Rico their whole life		Statistical test for difference	
	n	Mean	n	Mean	t	p value
MPAs protect coral reefs	112	4.14	354	4.38	-2.84***	<0.01
MPAs increase the number of fish	112	4.15	351	4.38	-2.71***	<0.01
There should be fewer MPAs in Puerto Rico	113	1.90	354	1.69	2.22**	0.03
There should be more MPAs in Puerto Rico	111	4.34	353	4.50	-2.02**	0.05
There has been economic benefit to Puerto Rico from the establishment of MPAs	104	3.52	337	3.63	-0.94	0.35
Fishermen's livelihoods have been negatively impacted from the establishment of MPAs in Puerto Rico	108	2.95	337	3.07	-0.97	0.33
MPAs help increase tourism in Puerto Rico	110	3.95	344	3.91	0.33	0.75
The establishment of MPAs increases the likelihood that people will vacation in Puerto Rico	109	3.86	346	3.81	0.51	0.61
I would support adding new MPAs in Puerto Rico if there is evidence that the ones we have are improving Puerto Rico's marine resources	113	4.32	354	4.49	-1.85*	0.07
I generally support the establishment of MPAs	112	4.25	351	4.46	-2.29**	0.02

\* = significant at the 10% level, \*\* = significant at the 5% level, \*\*\* = significant at the 1% level

# Condition Perceptions and Type of Information Source

Resource	Respondent DOES NOT use the Puerto Rican Government as an Info Source		Respondent uses the Puerto Rican Government as an Info Source		Statistical test for difference	
	n	Mean	n	Mean	t	p value
<i>Current Conditions</i>						
Ocean water quality	2246	2.98	175	3.25	-3.73***	<0.01
Amount of coral	1961	2.64	149	2.87	-3.01***	<0.01
Number of fish	2058	2.96	164	3.24	-3.75***	<0.01
Diversity of fish	2031	3.04	164	3.21	-2.17**	0.03
Amount of sea grass and mangroves	2055	3.01	161	3.13	-1.52	0.13
<i>Change in conditions over last 10 years</i>						
Ocean water quality	2236	2.39	173	2.46	-0.87	0.38
Amount of coral	2041	2.21	160	2.25	-0.57	0.57
Number of fish	2125	2.39	157	2.45	-0.77	0.44
Diversity of fish	2087	2.48	156	2.49	-0.09	0.93
Amount of sea grass and mangroves	2082	2.47	161	2.44	0.41	0.68

\* = significant at the 10% level, \*\* = significant at the 5% level, \*\*\* = significant at the 1% level