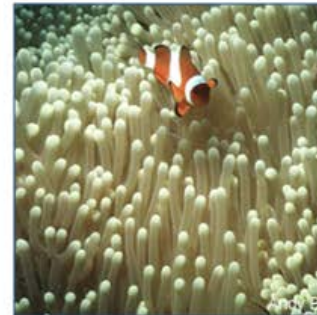




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NCRMP Socioeconomic Monitoring For CNMI



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>



Outline

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



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National Coral Reef Monitoring Program



Biological
Indicators

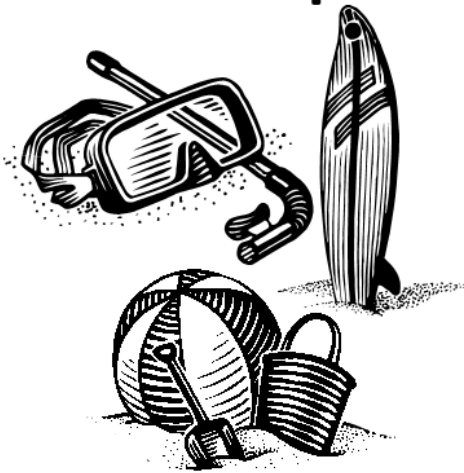
Climate
Indicators



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



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Project Team

- ❖ Peter Edwards
- ❖ Matt Gorstein
- ❖ Jurisdictional management agencies
- ❖ Arielle Levine
- ❖ Chloe Fleming
- ❖ Key jurisdictional stakeholders
- ❖ CRCP and NMFS management liaisons



NCCOS

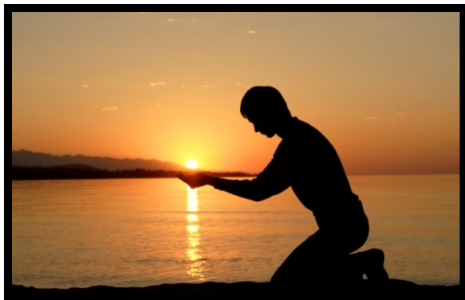




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MONITORING METHODS: Survey



NATIONAL OCEAN SERVICE

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
- ❖ Dual survey mode for CNMI in English, Chamorro, Carolinian, and Tagalog:
 - ❖ Phone (included cell and landline)
 - ❖ Face to face interview by household



Social Monitoring by Geography and Year

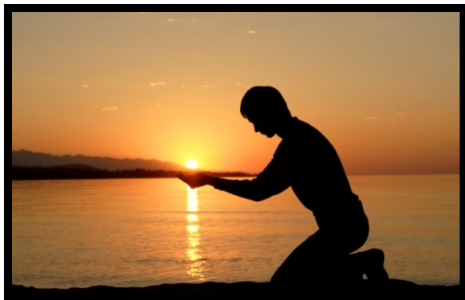
Jurisdiction	Geographic scope	Year
American Samoa	Island of Tutuila	2013-14
Florida	Martin, Palm Beach, Broward, Miami-Dade, Monroe Co.	2013-14
Hawai'i	Islands of Kauai, Maui, Moloka'i, O'ahu, Hawai'i, Lana'i	2014-15
Puerto Rico	Islands of Puerto Rico, Vieques, Culebra	2014-15
Guam	Entire island of Guam	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

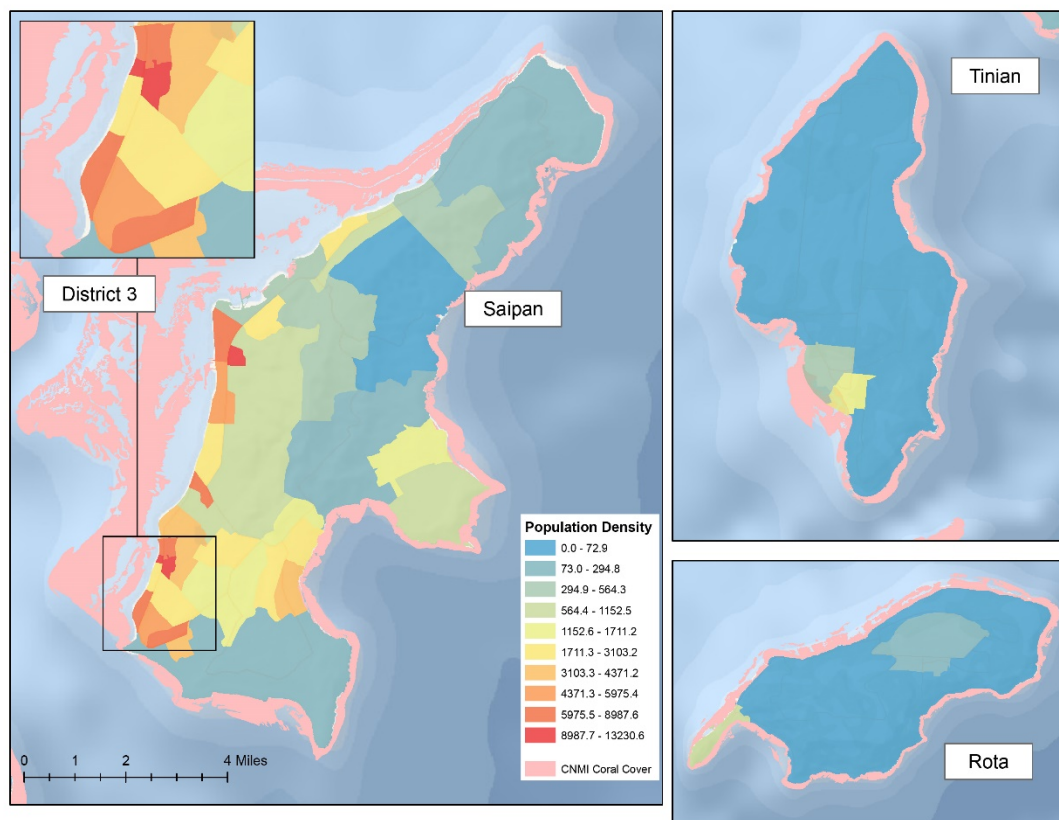


MONITORING RESULTS: Survey





Map of CNMI With Proximity to Coral Cover



2010 US Census Population Density – Block Groups



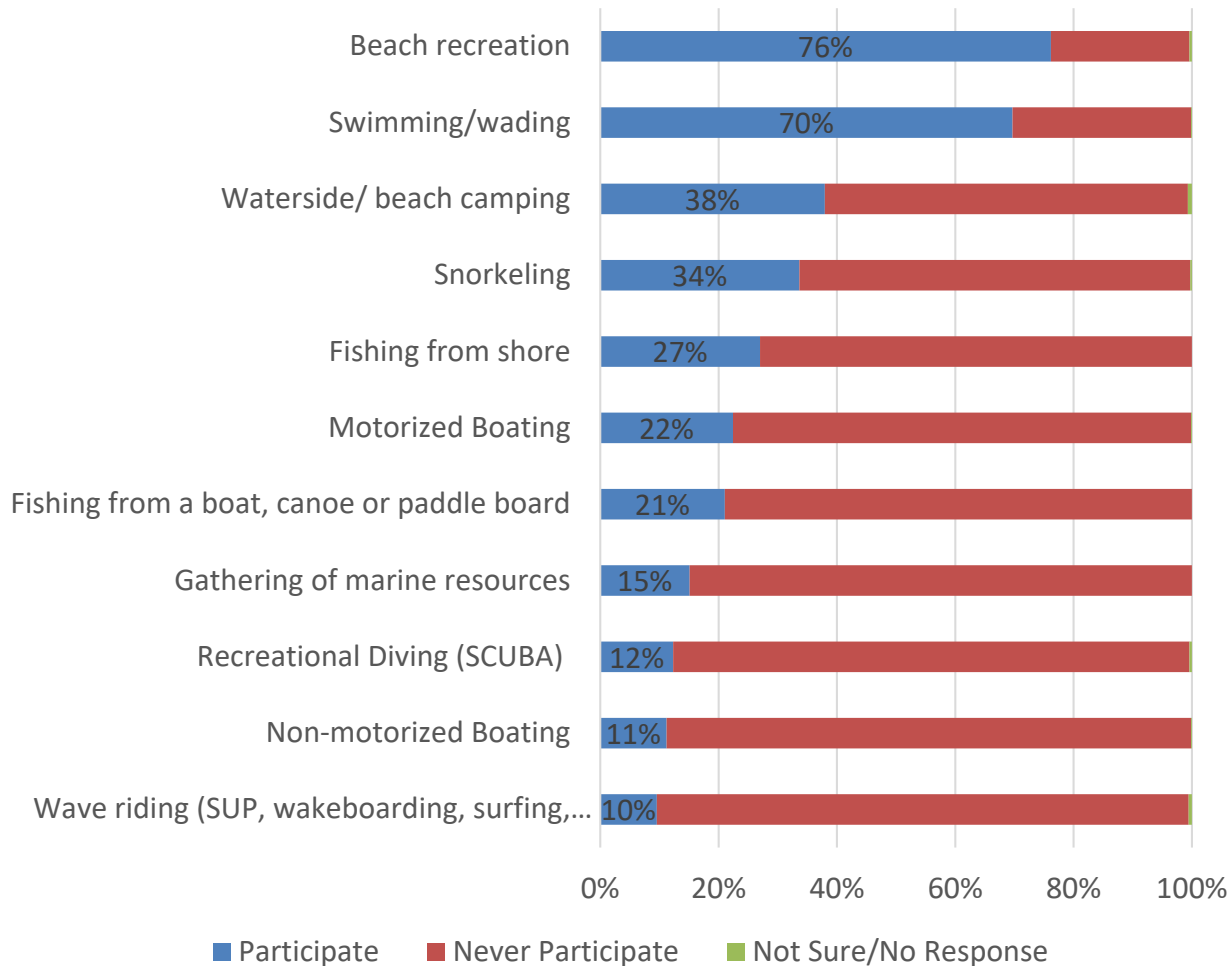
The Sample

Island	Sample Size
Saipan	644
Tinian	42
Rota	36
Total	722

- Total of 722 with a margin of error of +/-5% and a 95% confidence interval
- **An overall response rate of 51%.**
- Both cell and landline telephone sample frames were used

Participation in Coral Reef Activities

(n = 722)

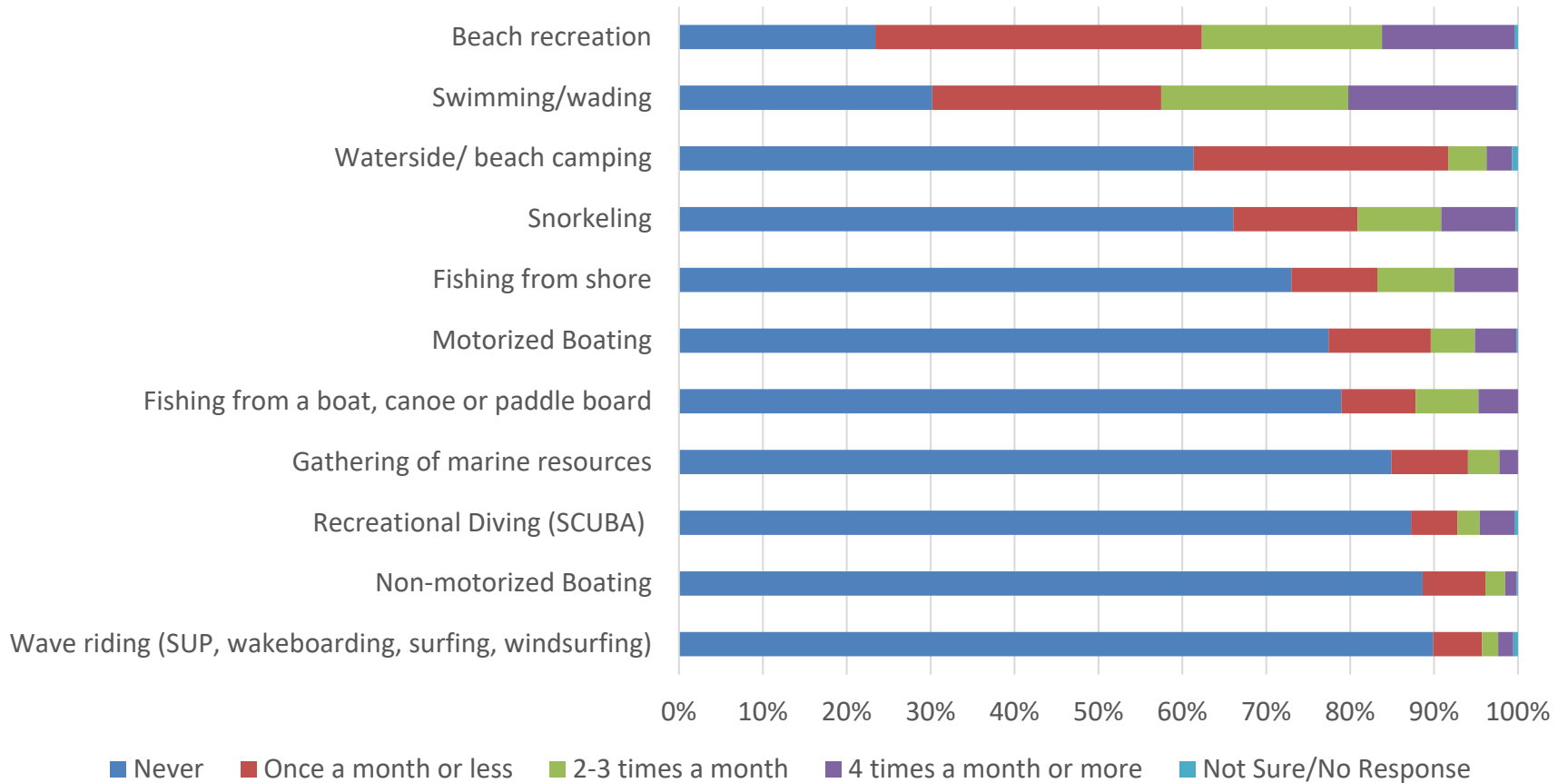


➤ The recreation activities with the highest level of participation were beach recreation (76%) and swimming/wading (70%).

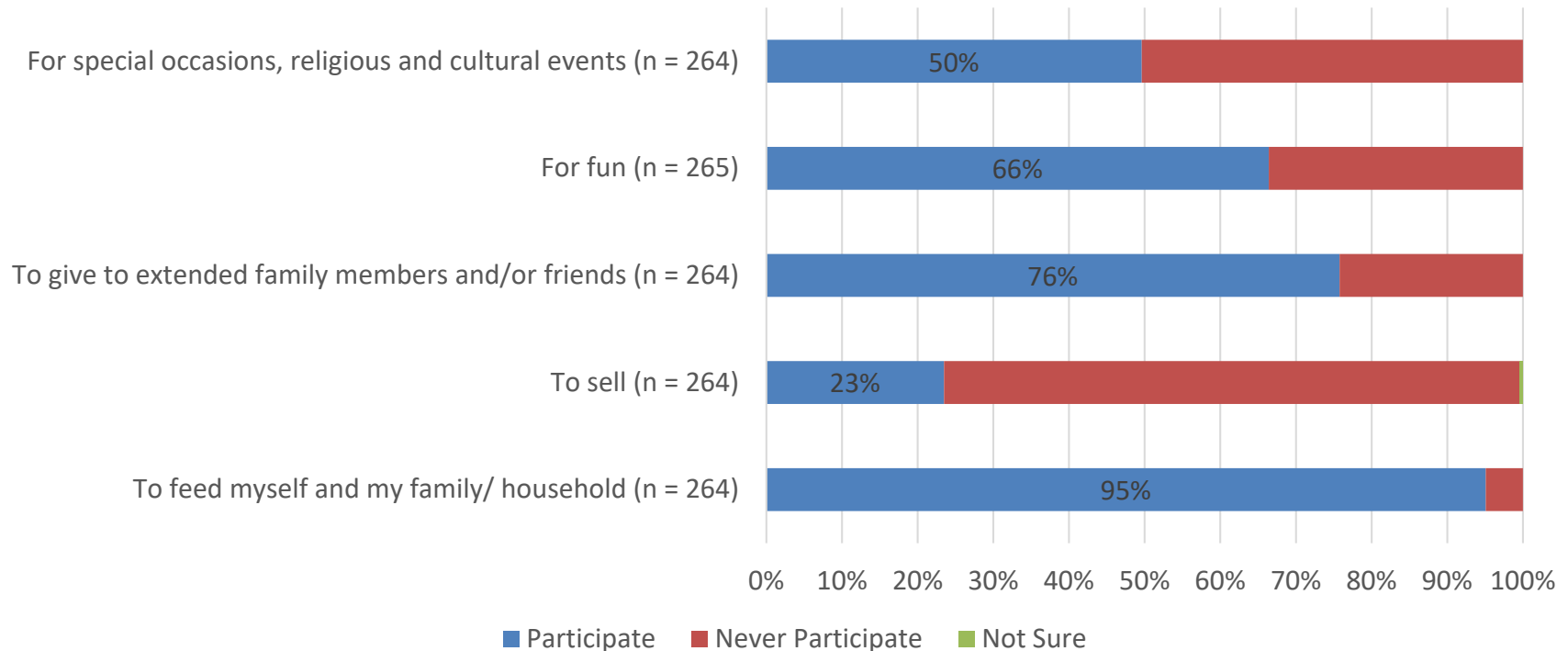
➤ The recreation activities with the greatest proportion of respondents who never participate were wave riding (90%) and non motorized boating (89%)

Participation in Coral Reef Activities

(n = 722)



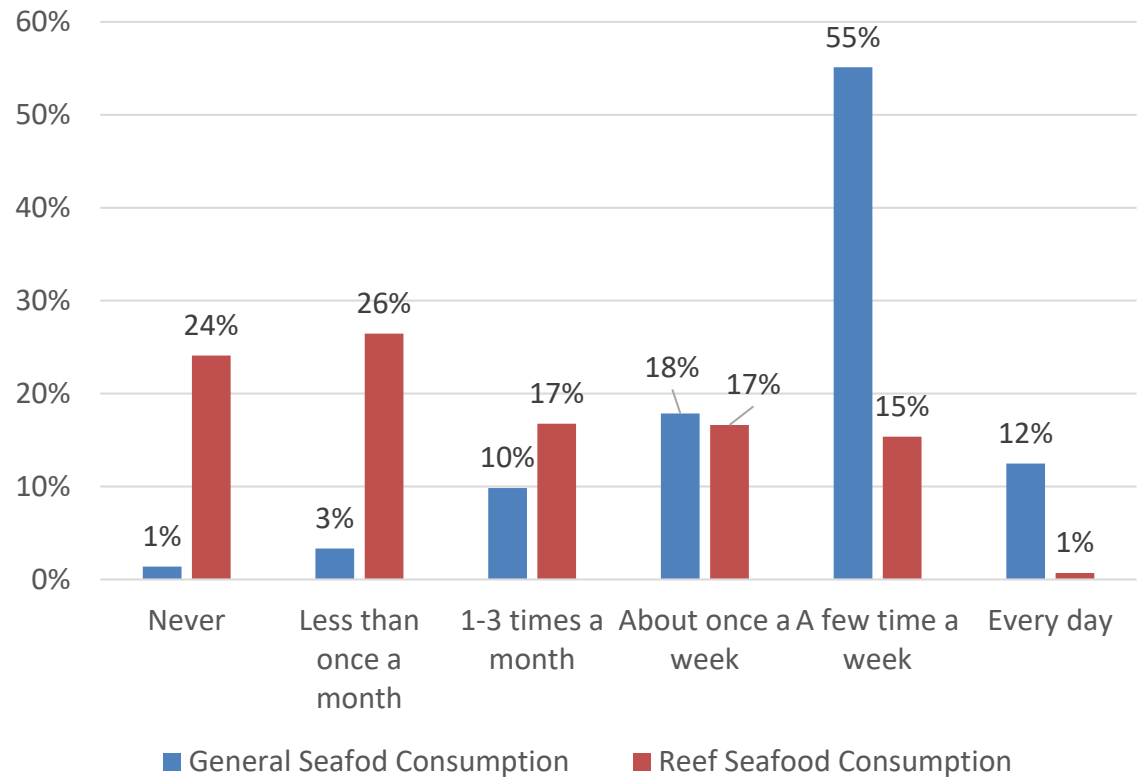
Reasons for participation in fishing or harvesting marine resources



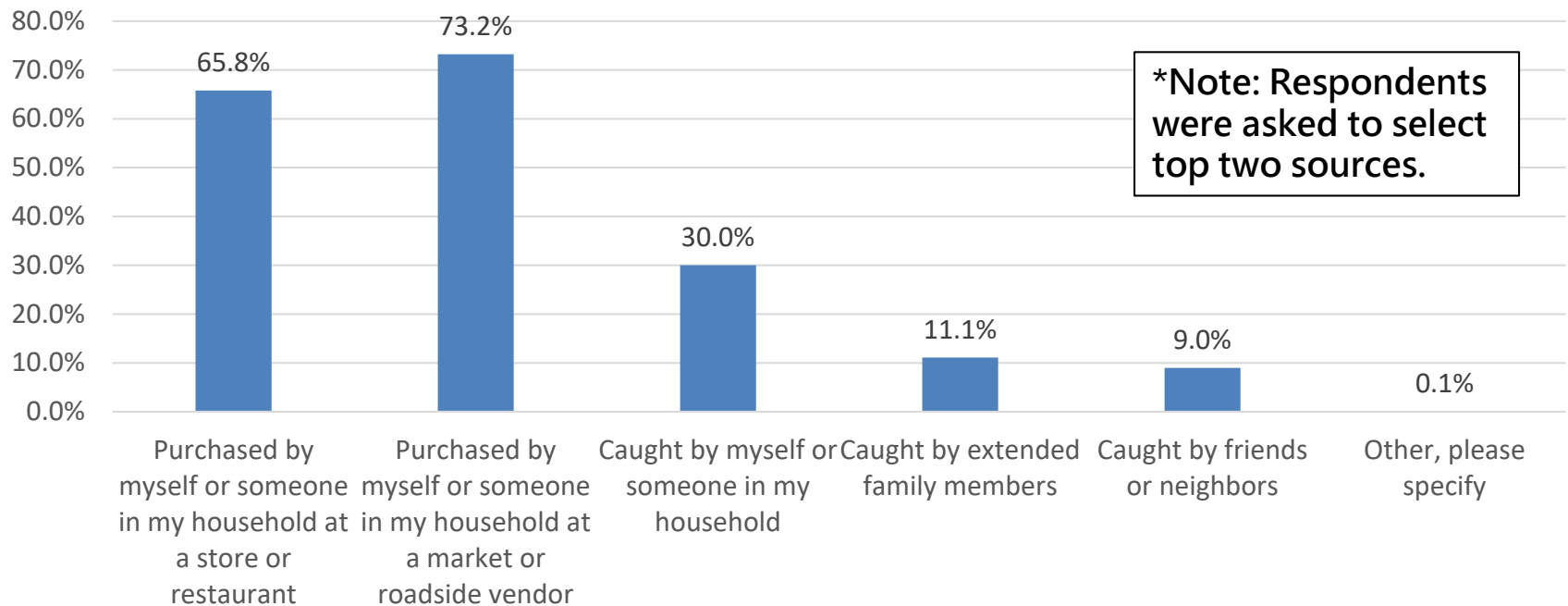
- The reason for fishing or harvesting marine resources with the highest level of participation was “To feed myself and my family/ household” (95%).
- The reason for fishing or harvesting marine resources with the lowest level of participation was “To sell” (76% Never participate).

Frequency of Fish/Seafood Consumption for Respondents and their Household (n = 722)

- The vast majority of respondents (85%) ate seafood at least once a week.
- 33% ate seafood harvested from coral reefs at least once a week.
- 99% consume seafood overall, and 76% consume reef seafood.

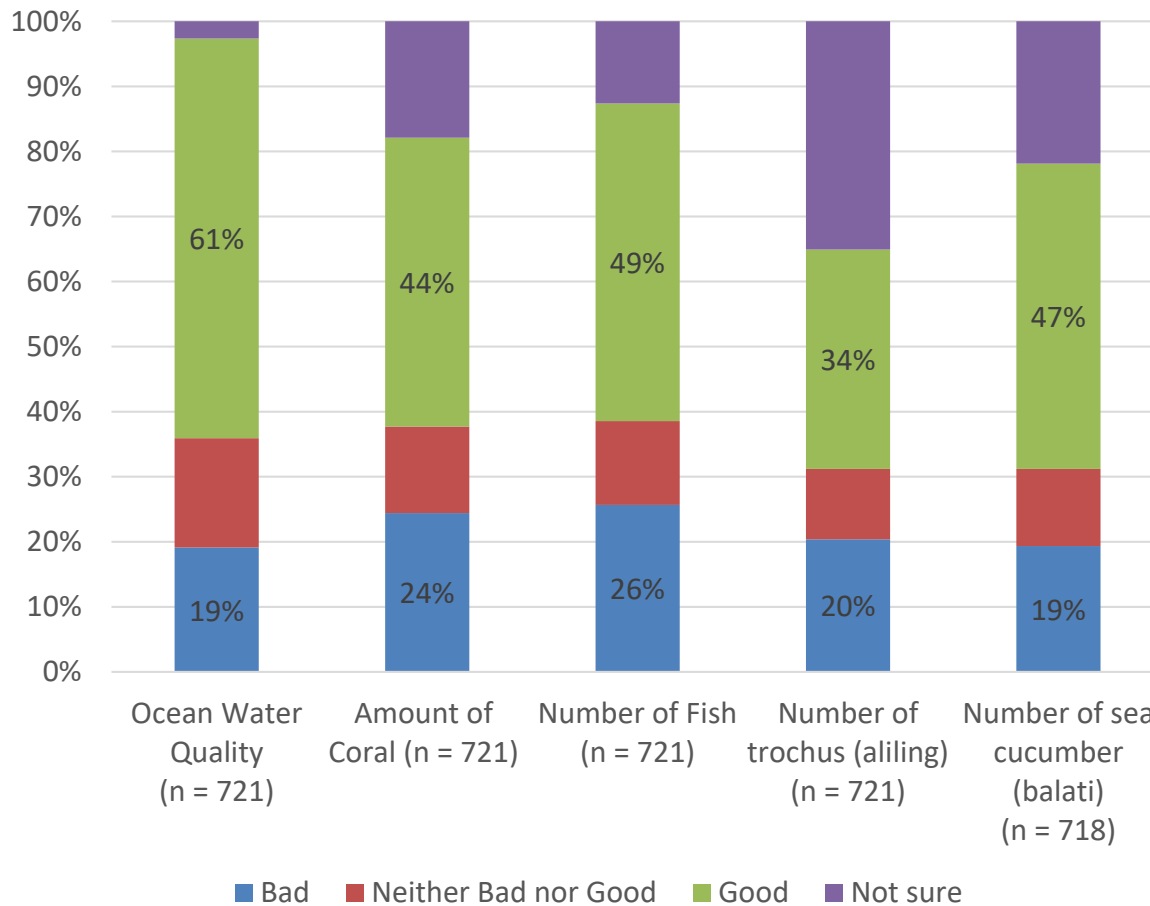


Main Source of Fish and Seafood for Personal and Household Consumption (n = 713)



- The source chosen most as a main source of fish and seafood was “Purchased by myself or someone in my household at a market or roadside vendor” (73%) followed by “Purchased...at a store or restaurant” (66%).
- The source chosen least as a main source of fish and seafood was “Caught by friends or neighbors” (9%).

Perceptions of Current Resource Conditions

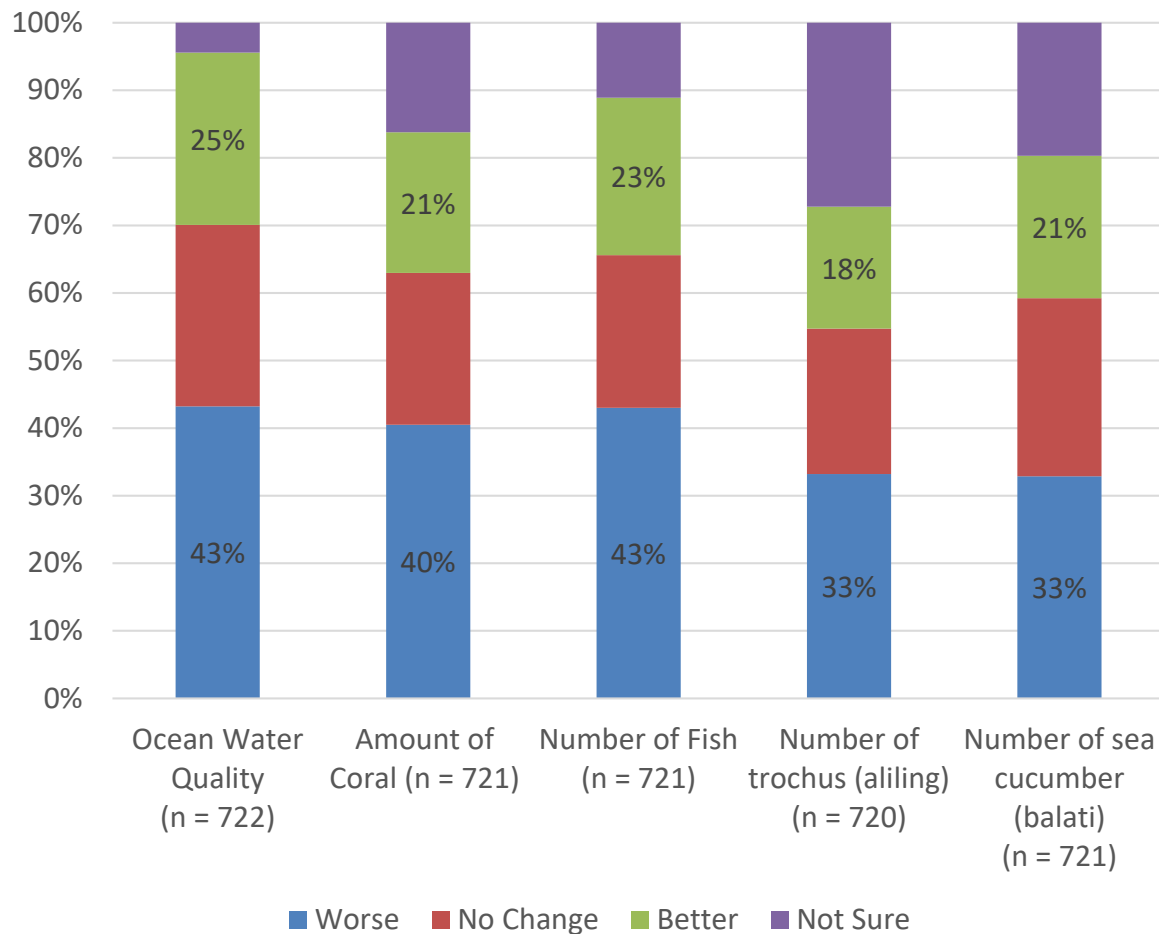


➤ The resource considered to be in the best condition was ocean water quality (61%)

➤ The resource considered to be in the worst condition was number of fish (26%)

➤ The resource that respondents were the most unsure about was number of trochus (35%).

Perceptions of Change in Resource Conditions Over the Last 10 Years

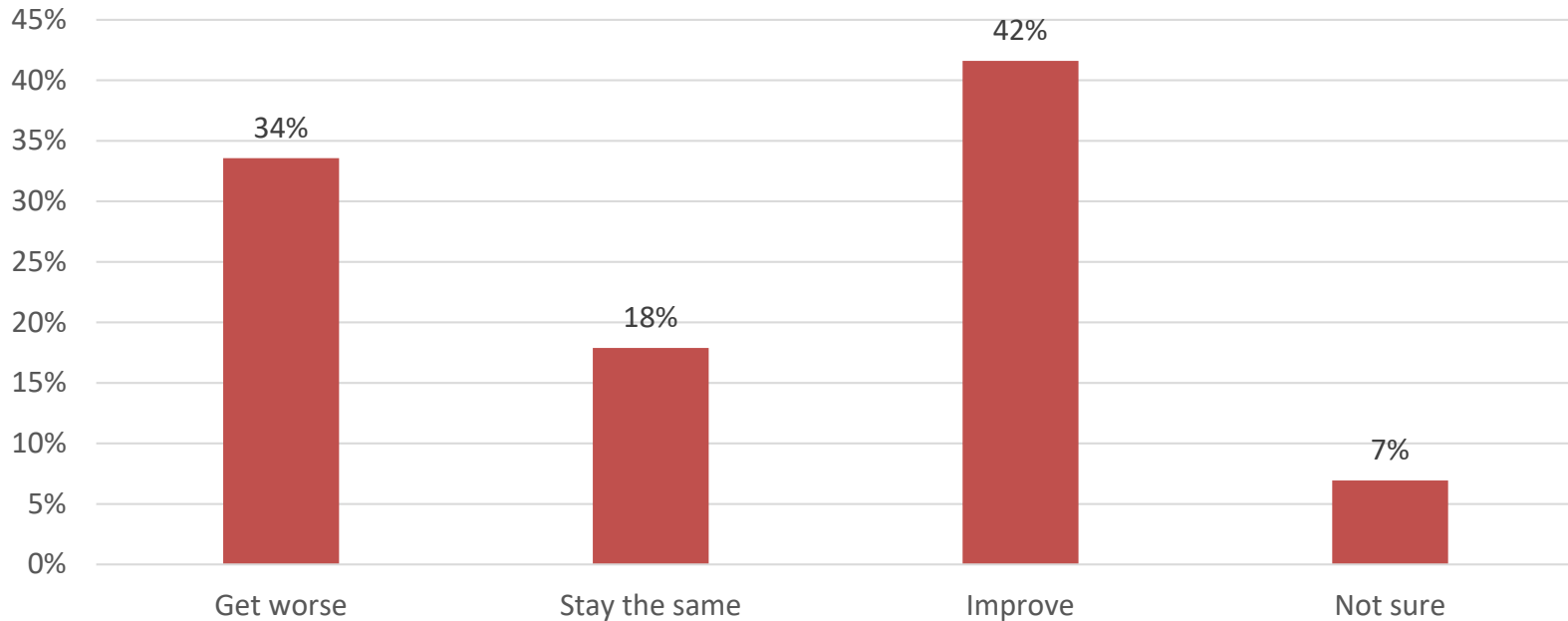


➤ At least one third of respondents indicated that the condition of all these resources has deteriorated over the last 10 years

➤ Ocean water quality (25%) was the resources perceived to have done the best (25%), but also the worst (43%) over the last 10 years.

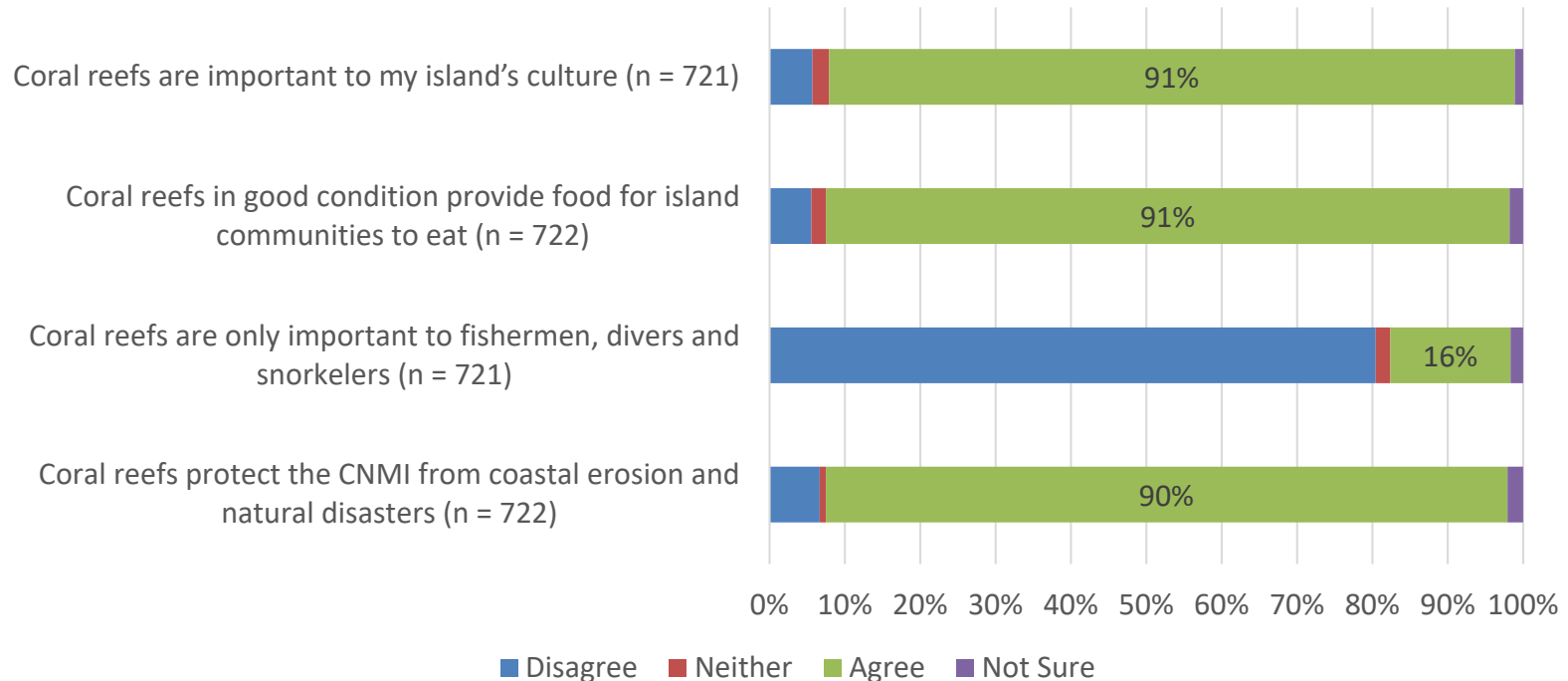
➤ Number of trochus was again the resource that respondents were the most unsure about (27%) in terms of its change in condition

Perceptions of Anticipated Change in Resource Conditions Over the Next 10 Years (n = 721)



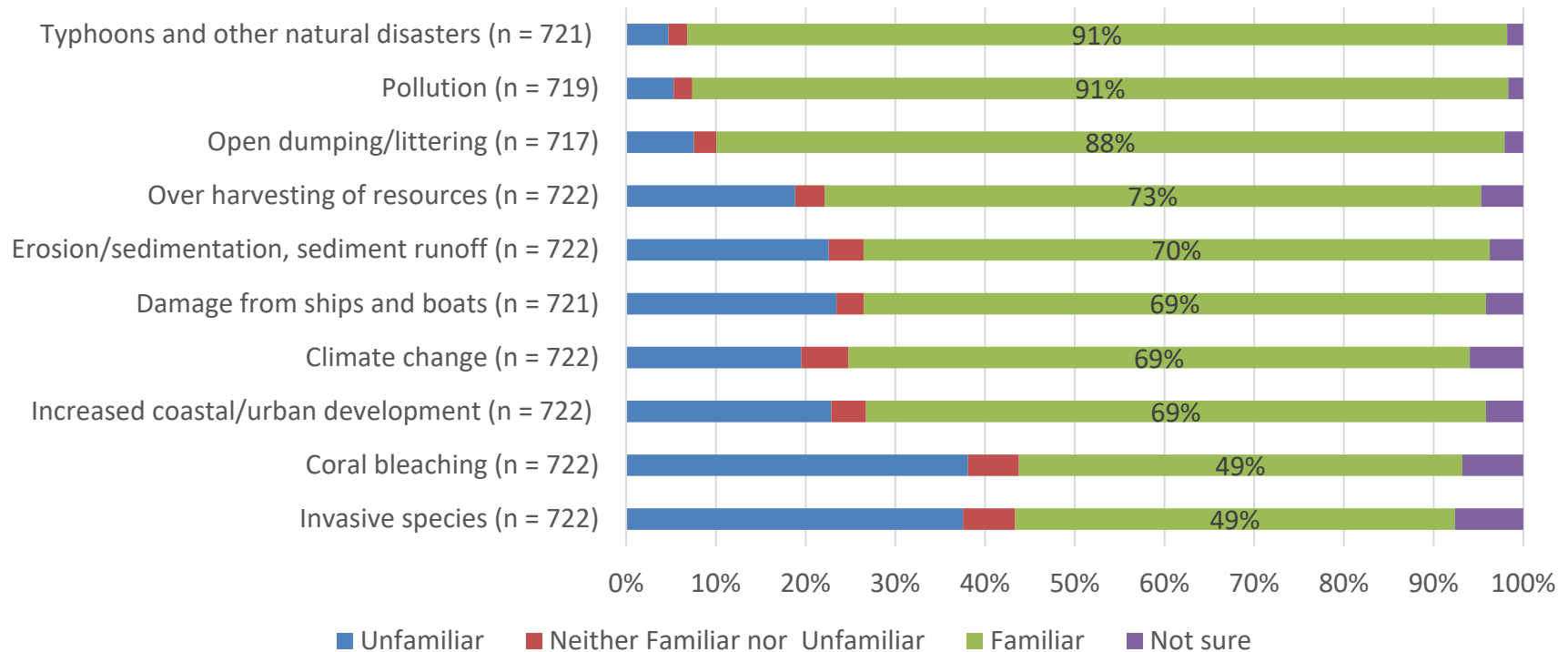
- Almost half of the respondents (42%) anticipated the overall resource condition will improve over the next 10 years.
- 34% of respondents anticipated the resource condition will get worse.
- 18% of respondents anticipated the resource condition will stay the same, while 7% were not sure.

Agreement with Statements of Coral Reef Value



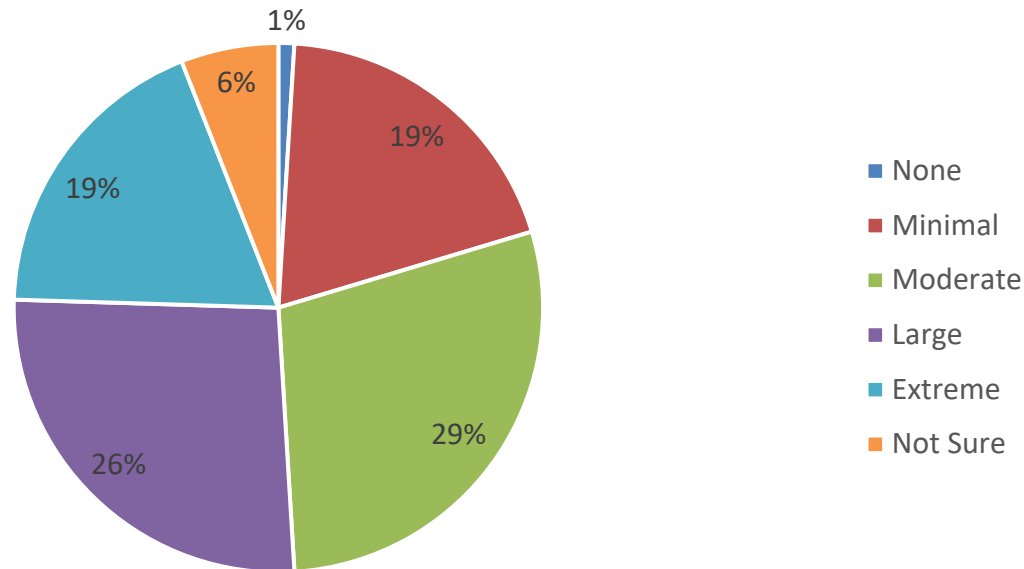
- The statement that respondents agreed the most with was “Coral reefs are important to CNMI’s culture” (91%).
- The statement that respondents disagreed the most with was “Coral reefs are only important to fisherman, divers, and snorkelers” (80%).

Familiarity with Threats Facing Coral Reefs



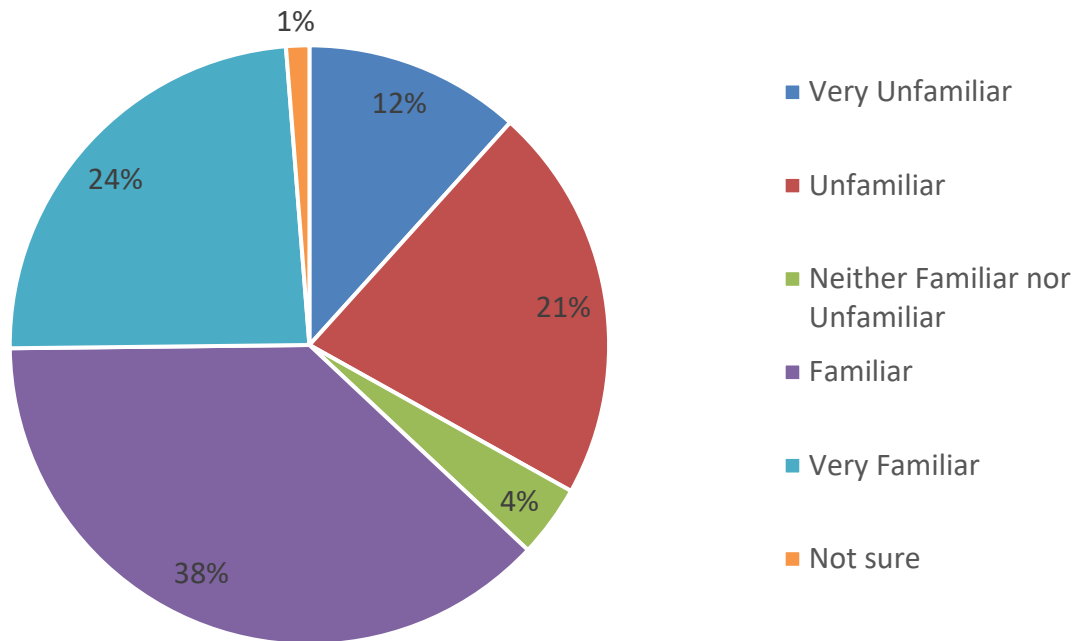
- The majority of respondents (>50%) were familiar with all threats except for coral bleaching and invasive species
- Respondents were most familiar with typhoons (91%) and pollution (91%)
- Respondents were the most unfamiliar with invasive species (38%) and coral bleaching (38%)

Perceptions of the Level of Threat to Coral Reefs (n = 722)



- Almost half of respondents (45%) perceived the level of threat to coral reefs as Large or Extreme.
- 48% perceived the level of threat to coral reefs as Minimal or Moderate
- Only 1% believed there are no threats and 6% were not sure.

Familiarity with MPAs (n = 719)



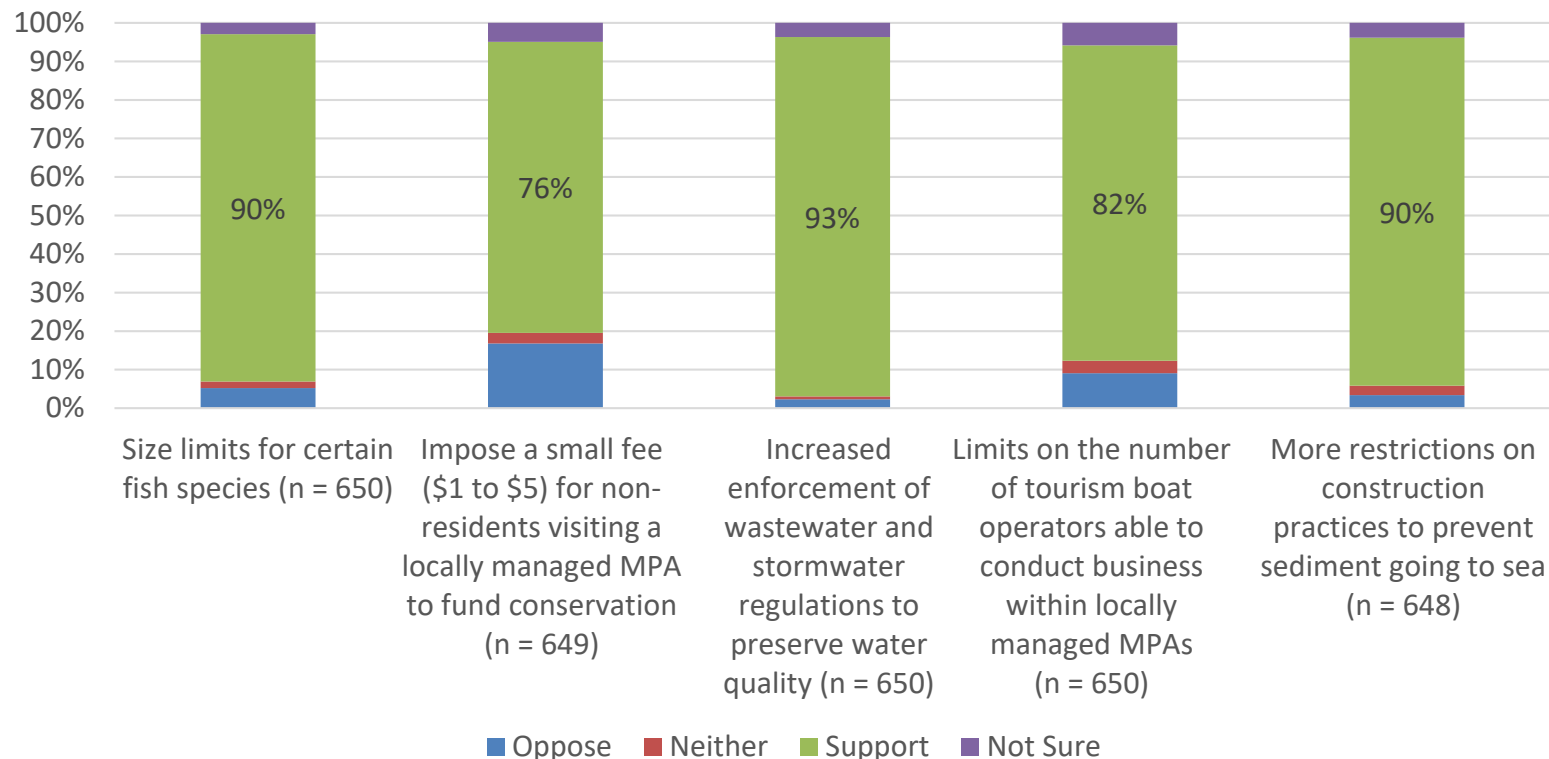
- Almost two thirds (62%) of respondents were familiar or very familiar with MPAs
- 33% were unfamiliar or very unfamiliar with MPAs

Perceptions of Marine Protected Areas

MPA Statement	Sample Size	Disagree	Neither Agree nor Disagree	Agree	Not Sure
MPAs protect coral reefs	477	1%	1%	96%	2%
MPAs increase the number of fish	477	4%	2%	90%	4%
There should be fewer locally-managed MPAs in CNMI	477	68%	11%	15%	6%
There should be more locally-managed MPAs in CNMI	478	12%	12%	71%	6%
There has been economic benefit to CNMI from the establishment of locally-managed MPAs	479	10%	5%	74%	11%
Fishermen's livelihoods have been negatively impacted from the establishment of locally-managed MPAs in CNMI	479	44%	10%	34%	12%
Locally managed MPAs help increase tourism in CNMI	477	9%	4%	81%	6%
The establishment of locally-managed MPAs increases the likelihood that people will vacation in CNMI	476	7%	5%	82%	6%
I would support adding new locally managed MPAs in CNMI if there is evidence that the ones we have are improving CNMI's marine resources	479	5%	5%	86%	4%
I generally support the establishment of locally-managed MPAs	477	4%	4%	90%	3%
I generally support the establishment of the federally managed Marina Trench Marine National Monument	476	6%	5%	81%	8%

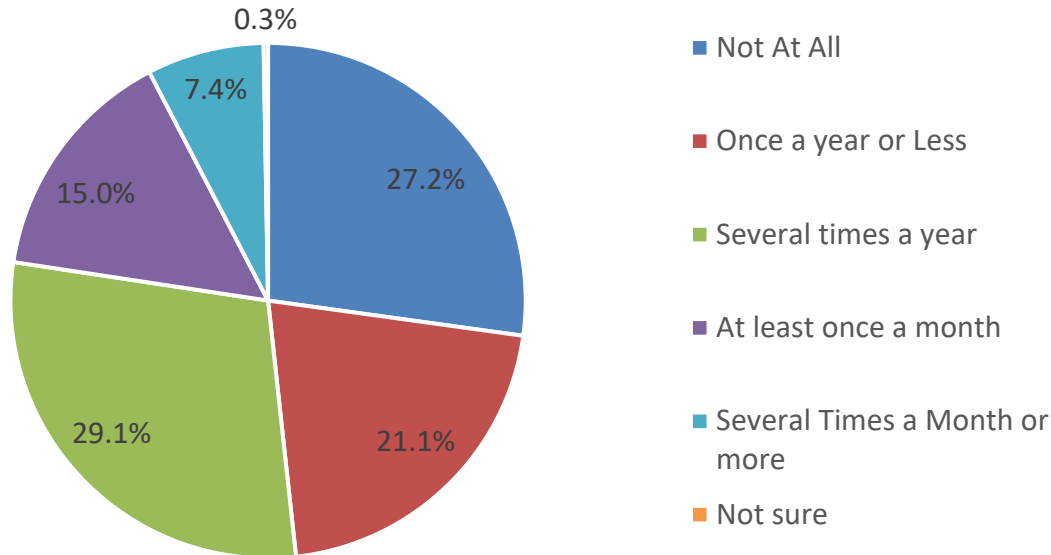
- 71% of respondents agreed that “there should be more locally managed MPAs in CNMI” and 96% agreed that “MPAs protect coral reefs”
 - However, 34% agreed that “Fishermen’s livelihoods have been negatively impacted from the establishment of locally managed MPAs in CNMI”

Support for Management Strategies



- At least 80% of respondents agreed with all the presented management strategies.
- Respondents agreed the most with “Increased enforcement of wastewater and stormwater regulations to preserve water quality” (93%).
- Respondents disagreed most with “Impose a small fee (\$1 to \$5) for non-residents visiting a locally managed MPA to fund conservation” (17%).

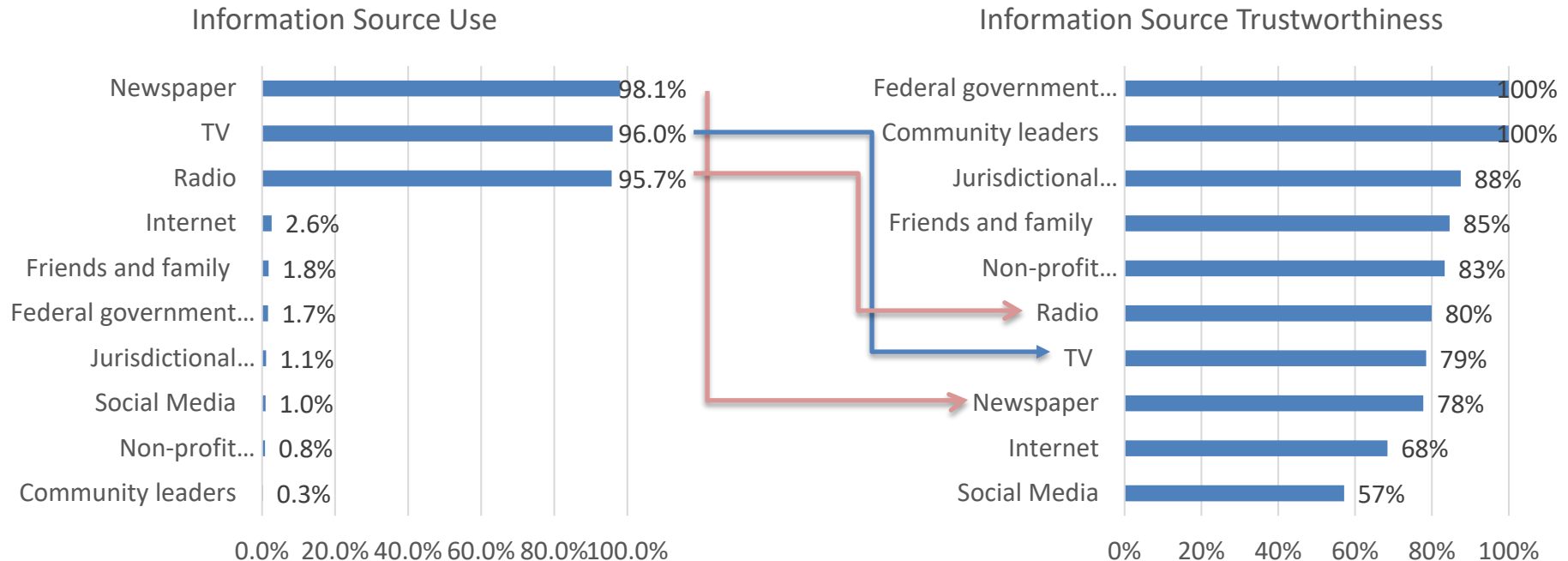
Frequency of Participation in Any Activity to Protect the Environment (n = 721)



- Almost three fourths of respondents (72.5%) state that they participate in pro-environmental activities
- Over half (51.5%) participate at least several times a year

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

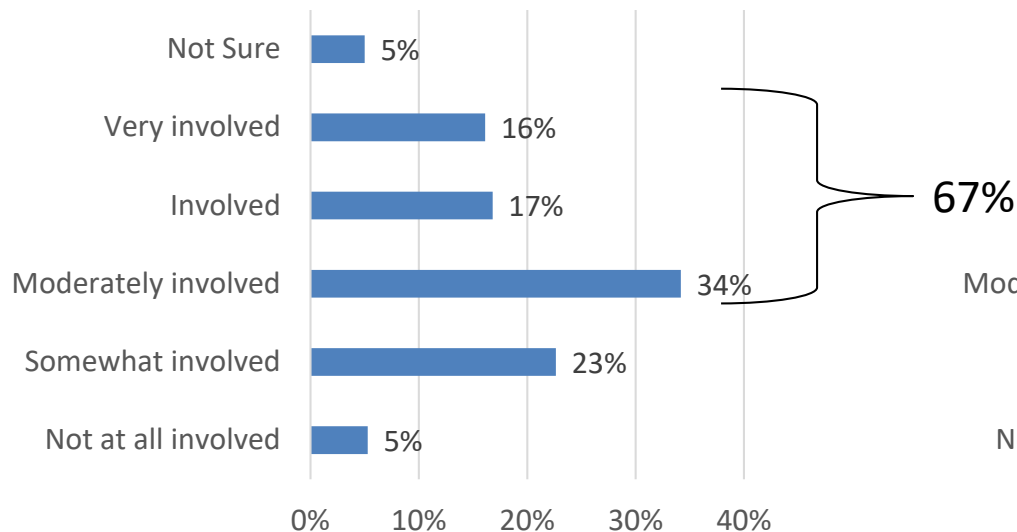
(n = 722)



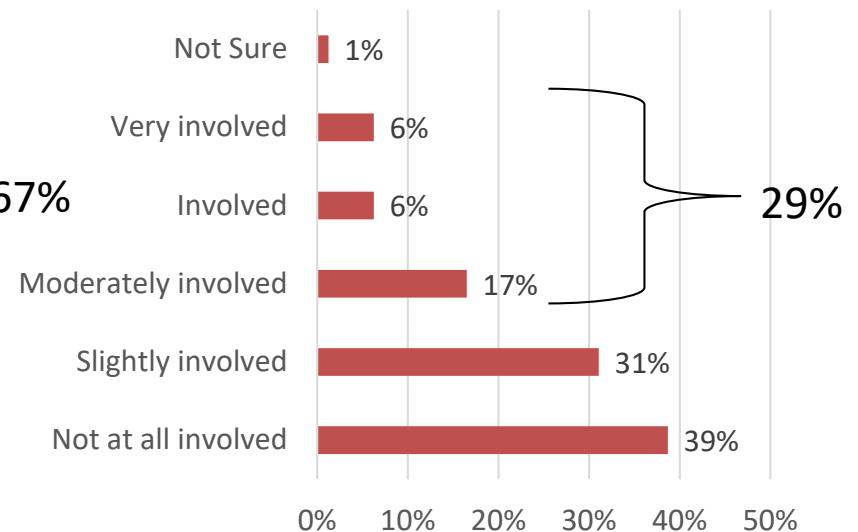
- Newspapers (98%), TV (96%), and the radio (96%) are far and away the top sources of information about coral reefs and the environment.
- However, these top sources are perceived to be less trustworthy than other sources chosen by respondents.

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

How involved is your local community in protecting and managing coral reefs? (n = 720)



How involved are YOU in making decisions related to the management of coral reefs? (n = 721)



- Only 5% perceive their local communities as not at all involved in protecting and managing coral reefs.
- Over two thirds (67%) indicate that their local communities are at least “moderately involved” in protecting and managing coral reefs
- 29% indicate that they themselves are at least moderately involved in protecting and managing coral reefs

Respondent Demographic Characteristics

Island	Percent of Sample	Percent of Population (2010 US Census)
Saipan	89%	89%
Tinian	6%	6%
Rota	5%	5%

*2010 US Census results on this and the following slides refer to adult population of CNMI

Respondent Demographic Characteristics

Gender	Sample	2010 US Census
Male	46%	51%
Female	54%	49%
No Response	0.1%	N/A

Age	Sample	2010 US Census
18-24 year olds	14%	11%
25-34 year olds	14%	19%
35-44 year olds	19%	29%
45-64 year olds	42%	36%
65+ years old	9%	4%
No Response	2%	N/A

Education Level	Sample	2010 US Census
Less than high school	5%	19%
High School Graduate, GED	35%	37%
Some college, community college or AA	31%	26%
College Graduate	24%	15%
Graduate School, Law School, Medical School	5%	3%
No Response	0%	N/A

Respondent Demographic Characteristics

Annual Household Income	Sample	2010 US Census
Under \$10,000	8%	25%
\$10,000 to \$19,999	21%	25%
\$20,000 to \$29,999	26%	15%
\$30,000 to \$39,999	15%	10%
\$40,000 to \$49,999	10%	7%
\$50,000 to \$59,999	7%	5%
\$60,000 to \$74,999	5%	5%
\$75,000 to \$99,999	5%	4%
\$100,000+	3%	5%

*Answers of “no response” left absent from analysis of household income due to high rate of occurrence (approx. 19%)

Respondent Demographic Characteristics

Race	Sample	2010 Census
Asian	42.1%	56.7%
Chinese	1.4%	8.5%
Filipino	34.6%	39.5%
Japanese	1.1%	1.8%
Korean	1.3%	4.0%
Other Asian	3.8%	2.9%
Black/African American	0.3%	0.1%
Native Hawaiian/Other Pacific Islander	48.4%	33.1%
Carolinian	6.8%	4.5%
Chamorro	34.3%	22.4%
Chuukese	1.3%	2.1%
Kosraean	0.0%	0.1%
Marshallese	0.1%	0.1%
Palauan	1.3%	2.2%
Pohnpeian	0.4%	0.8%
Yapese	0.7%	0.4%
Other Native Hawaiian/Pacific Islander	3.5%	0.5%
White	6.0%	2.7%
Hispanic	0.4%	0.1%
Other race	2.6%	0.3%
2 or more races	N/A	7.0%

Respondent Demographic Characteristics

Year(s) of Residence	Sample
1 year or less	1.7%
2-5 years	4.2%
6-10 years	5.5%
More than 10 years (less than all my life)	51.4%
All my life	36.8%
No Response	0.4%

Languages Spoken	Sample
English	98.9%
Chamorro	42.8%
Tagalog	37.6%
Carolinian	11.9%
Other	7.4%
Japanese	7.1%
Chinese	2.6%
Korean	2.5%
Spanish	2.4%
German	0.7%
French	0.4%
Hindi	0.4%
Arabic	0.4%
Hawaiian Pidgin	0.4%
Italian	0.3%
Hawaiian	0.3%
Portugues	0.1%
Samoan	0.1%

Respondent Demographic Characteristics

Employment Status	Sample
Unemployed	11.6%
Student	5.7%
Employed full-time	53.3%
Homemaker	7.1%
Employed part-time	6.9%
Retired	13.9%
Other	0.1%
No Response	1.4%

Occupation	Sample
Government of CNMI	11.2%
Federal Government	3.9%
US Military	0.3%
Private Company	40.7%
Self Employed	4.0%
Retired	12.7%
Unemployed, but looking for a job	7.9%
Unemployed, but not looking for a job	6.8%
Student (High school or post secondary)	5.3%
Other	1.5%
No Response	5.7%



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MONITORING APPLICATIONS: Survey



Perception of Resource Condition & Tenure

CNMI Resource	Respondent has NOT lived in CNMI their whole life		Respondent has lived in CNMI their whole life		Statistical test for difference	
	n	Mean	n	Mean	t	p value
<i>Current Conditions</i>						
Ocean water quality	441	3.68	258	3.32	4.55***	<0.01
Amount of coral	375	3.38	214	3.14	2.89***	<0.01
Number of fish	398	3.42	229	3.15	3.30***	<0.01
Number of trochus (aliling)	291	3.34	176	3.06	2.91***	<0.01
Number of sea cucumber (balati)	345	3.49	214	3.41	0.89	0.37
<i>Change in conditions over last 10 years</i>						
Ocean water quality	432	2.87	255	2.67	2.66***	<0.01
Amount of coral	382	2.81	219	2.64	2.17**	0.03
Number of fish	405	2.82	233	2.65	2.23**	0.03
Number of trochus (aliling)	324	2.85	199	2.64	2.47**	0.01
Number of sea cucumber (balati)	352	2.88	226	2.77	1.39	0.17

* = 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 have lived in CNMI their entire life had an overall more negative 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 have not lived in CNMI their entire life.

Perceptions of MPAs

- An index of “positive MPA sentiment” was calculated by summing the values for selected MPA questions for each respondent
 - MPAs protect coral reefs
 - MPAs increase the number of fish
 - There should be more locally-managed MPAs in CNMI
 - There has been economic benefit to CNMI from the establishment of locally-managed MPAs
 - I would support adding new locally managed MPAs in CNMI if there is evidence that the ones we have are improving CNMI’s marine resources
 - I generally support the establishment of locally-managed MPAs
 - I generally support the establishment of the federally managed Mariana Trench Marine National Monument
- This additive index was then normalized to a 0-100 scale
 - Mean of the sample = 75.5

Perceptions of MPAs

- Considering that the sample mean = 75.5, and that the midpoint of the index (50) would indicate an “average” opinion of neither positive nor negative....
 - This indicates that, on average, there is an overall positive sentiment toward MPAs and their functions

Threat Familiarity and Human Use

Threats to Coral Reefs in CNMI	Does NOT fish or gather marine resources		Fishes or gathers for marine resources		Statistical test for difference	
	n	Mean	n	Mean	t	p value
Climate change	419	3.67	260	3.62	0.56	0.58
Coral bleaching	415	3.09	258	3.27	-1.97**	0.05
Typhoons and other natural disasters	436	4.14	272	4.16	-0.38	0.70
Pollution (stormwater, wastewater outfall, terrestrial runoff and trash/littering)	434	4.03	273	4.20	-3.37***	<0.01
Increased coastal/urban development	421	3.54	271	3.67	-1.57	0.12
Invasive species	403	3.03	264	3.31	-3.13***	<0.01
Over harvesting of resources	419	3.56	269	3.86	-3.92***	<0.01
Damage from ships and boats (groundings or anchoring)	419	3.45	272	3.67	-2.84***	<0.01
Erosion/sedimentation, sediment runoff	420	3.57	275	3.65	-1.01	0.31
Open dumping/littering	431	3.97	271	4.09	-2.14**	0.03

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

- Higher mean values indicate more familiarity
- Respondents who fish/gather for marine resources tend to be more familiar with the various threats faced by coral reefs

Participation in Diving and Marine Preserve Perceptions

CNMI Management Option	Respondent DOES NOT participate in pro-environmental behavior		Respondent participates in pro-environmental behavior		Statistical test for difference	
	n	Mean	n	Mean	t	p value
Size limits for certain fish species	150	4.04	479	4.08	-0.67	0.50
Impose a small fee (\$1 to \$5) for non-residents visiting a locally managed MPA to fund conservation	148	3.64	467	3.81	-1.88*	0.06
Increased enforcement of wastewater and stormwater regulations to preserve water quality	150	4.15	474	4.24	-1.71*	0.09
Limits on the number of tourism boat operators able to conduct business within locally managed MPAs	148	3.86	462	3.97	-1.42	0.16
More restrictions on construction practices to prevent sediment going to sea	151	4.07	472	4.18	-2.00**	0.05

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

- Higher mean values indicate more agreement with the option.
- Those who participate in pro-environmental behavior agree more with imposing small fees, increasing enforcement of wastewater and stormwater regulations, and more restrictions on construction when compared to those who do not participate in pro-environmental behavior.



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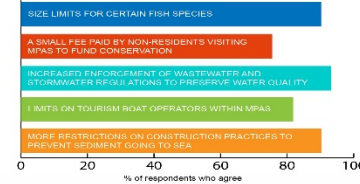
CONNECTIONS BETWEEN CORAL REEFS & COASTAL COMMUNITIES

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 The Commonwealth of Northern Mariana Islands.

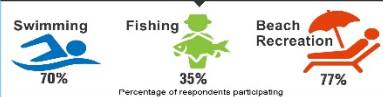
**TAKEAWAYS FROM
THE COMMONWEALTH OF
NORTHERN MARIANA ISLANDS**

MANAGEMENT SUPPORT

The majority of people support management strategies to improve protection.



USES OF RESOURCES

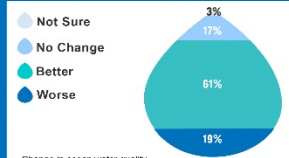
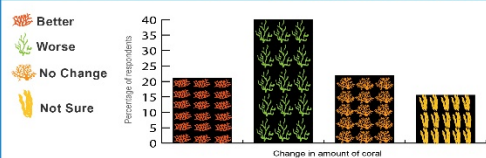


TENURE & CONDITION

Residents who have lived in the CNMI their entire lives have a more negative perception concerning the condition of marine resources.

PERCEPTIONS

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

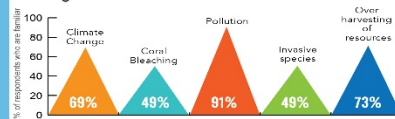


VALUES & AWARENESS

1. CNMI residents who agreed that "coral reefs are important to my island's culture" were more likely to fish/gather for marine resources more frequently.
2. CNMI residents who agreed that "coral reefs protect CNMI from erosion and natural disasters" were more likely to agree with various proposed coral reef management options.

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 on the islands of Saipan, Tinian, and Rota, in the years 2015-2017. In comparing the sample to the total population of the Commonwealth of Northern Mariana Islands (CNMI), 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 as well as the face-to-face interview method, and the total sample size for this survey was 722. The survey effort is used in conjunction with the collection of existing secondary data to monitor the socioeconomic conditions of the coral jurisdiction over time. For more information, please see the NOAA's Business and Community Project page at <http://www.noaa.gov/businessandcommunity>.

Products

- Infographic highlighting findings for CNMI
- Technical report



❖ **Additional products**

- ❖ Report Cards, NCRMP Annual Report, Infographics, Technical Report

❖ **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?**

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