NOAA CORAL REEF CONSERVATION PROGRAM

NCRMP Socioeconomic Monitoring For USVI





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

May 5, 2019

Outline

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

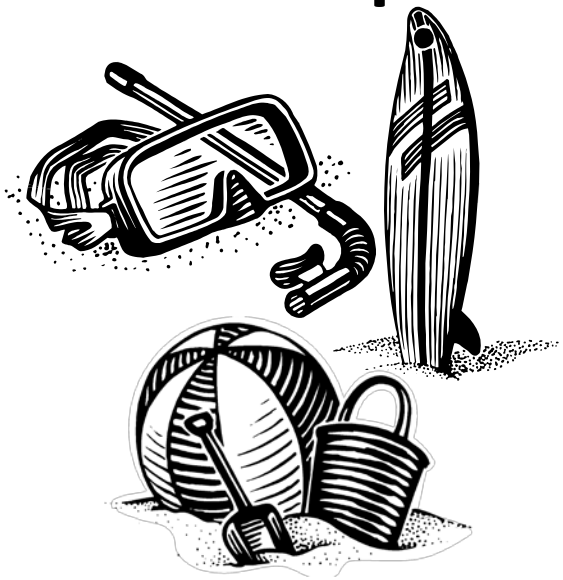
National Coral Reef Monitoring Program

Biological Indicators

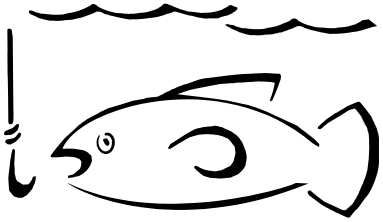
Climate Indicators

Socioeconomic Indicators

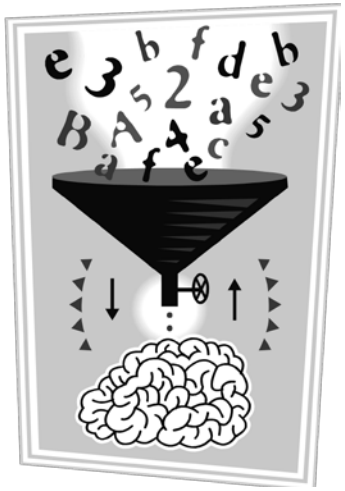
Socioeconomic Component: Examples of the types of data we collect



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

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

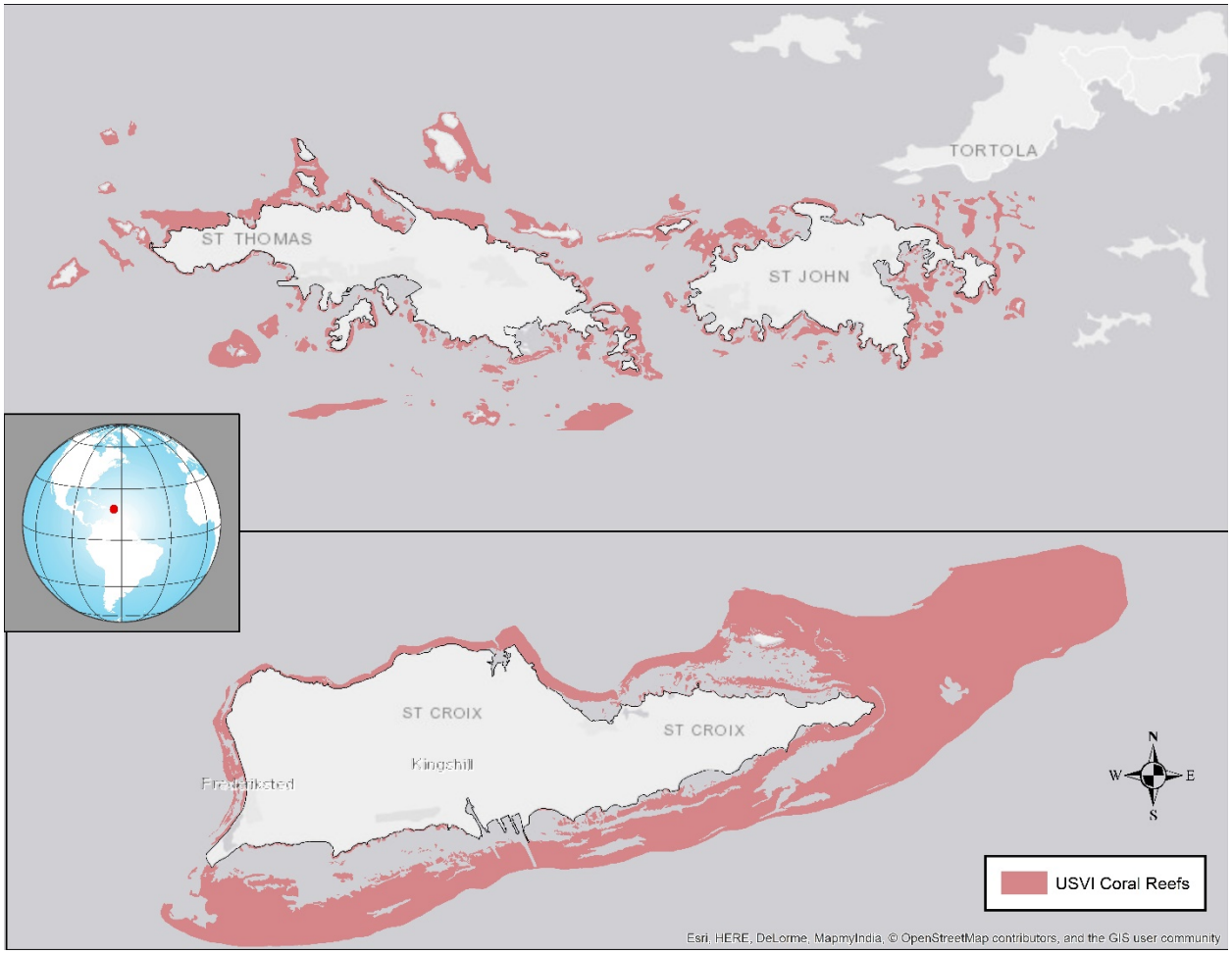
- Core module vs. jurisdiction specific module:
  - Asking some of the same questions in all areas allows comparisons across jurisdictions
  - Asking some specific questions for each area allows jurisdictional management and resource issues to be addressed
- Survey sample:
  - Random sample of adult 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
  - Dual survey mode for USVI in English and Spanish:
    - Phone (included cell and landline)
    - Face to face interview through intercepts
      - Intercept locations set to be geographically inclusive within and across islands

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

MONITORING RESULTS: Survey

Map of USVI With Proximity to Coral Cover

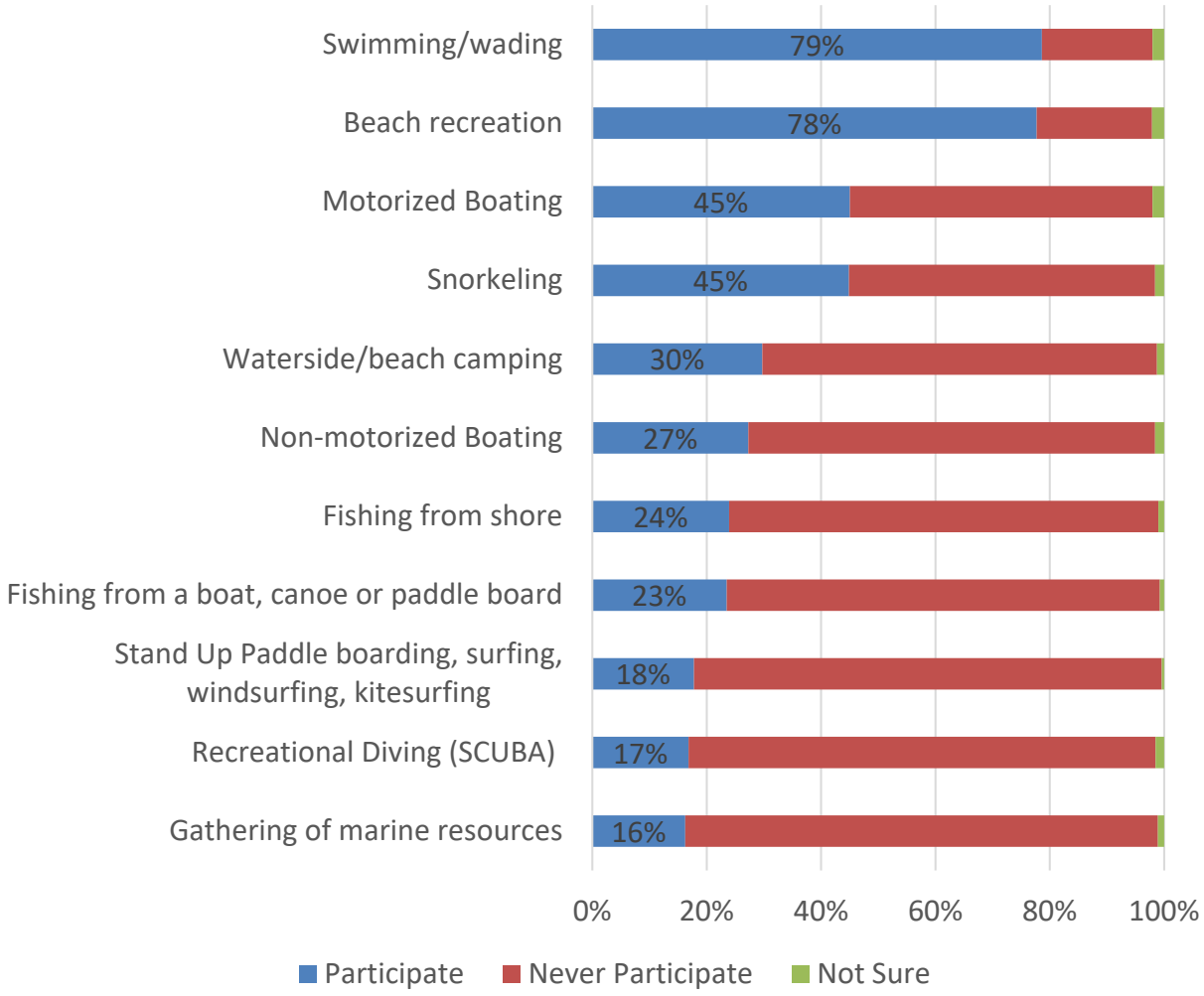


The Sample

Island	Sample Size
St. Thomas	436
St. John	362
St. Croix	390
Total	**1,188**

- Total of 1,188 with a margin of error of +/-5% and a 95% confidence interval
- Telephone response rate = 28%
- In person response rate = 15-20%
- Both cell and landline telephone sample frames were used

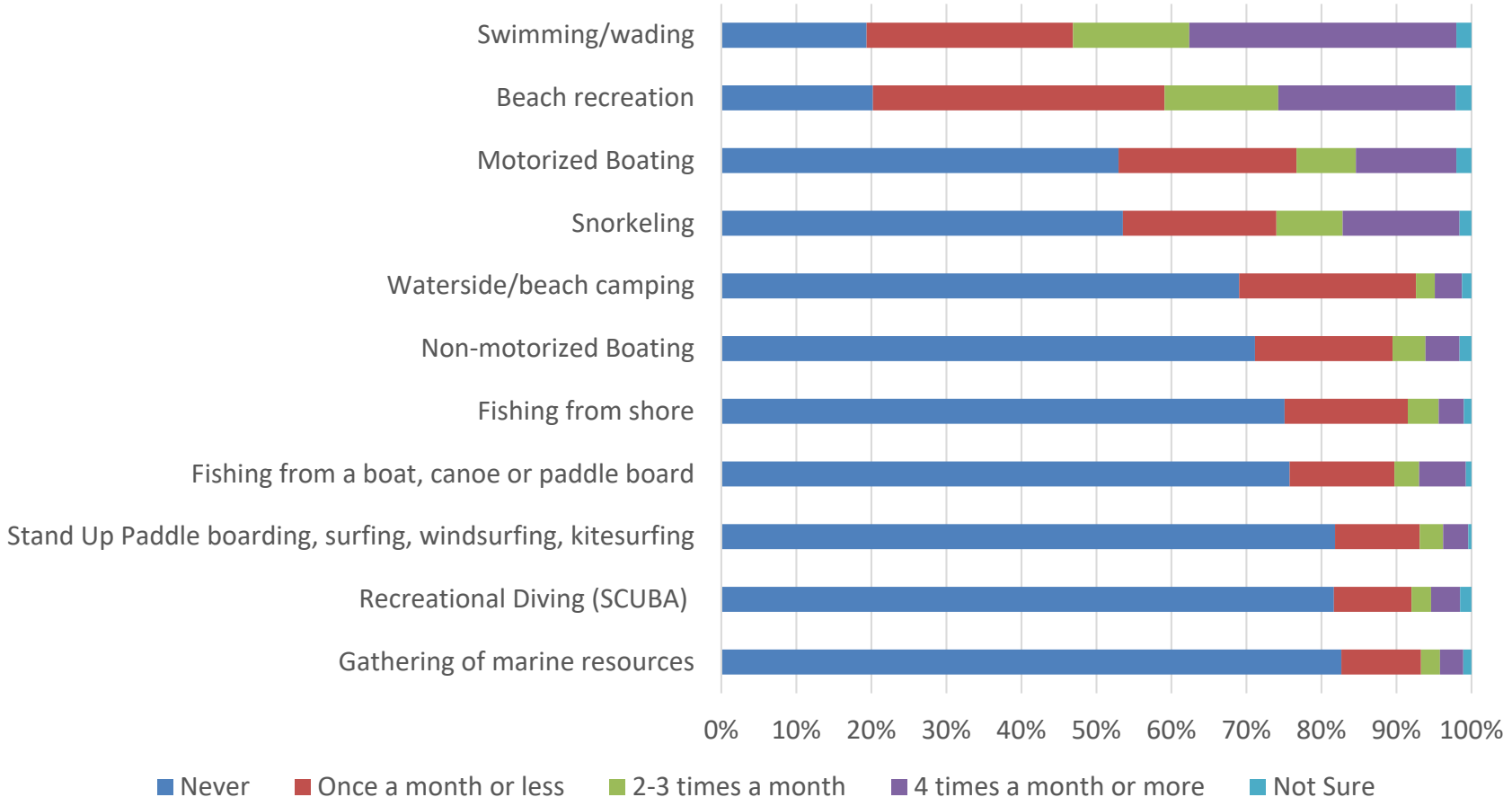
Participation in Coral Reef Activities (n = 1,188)



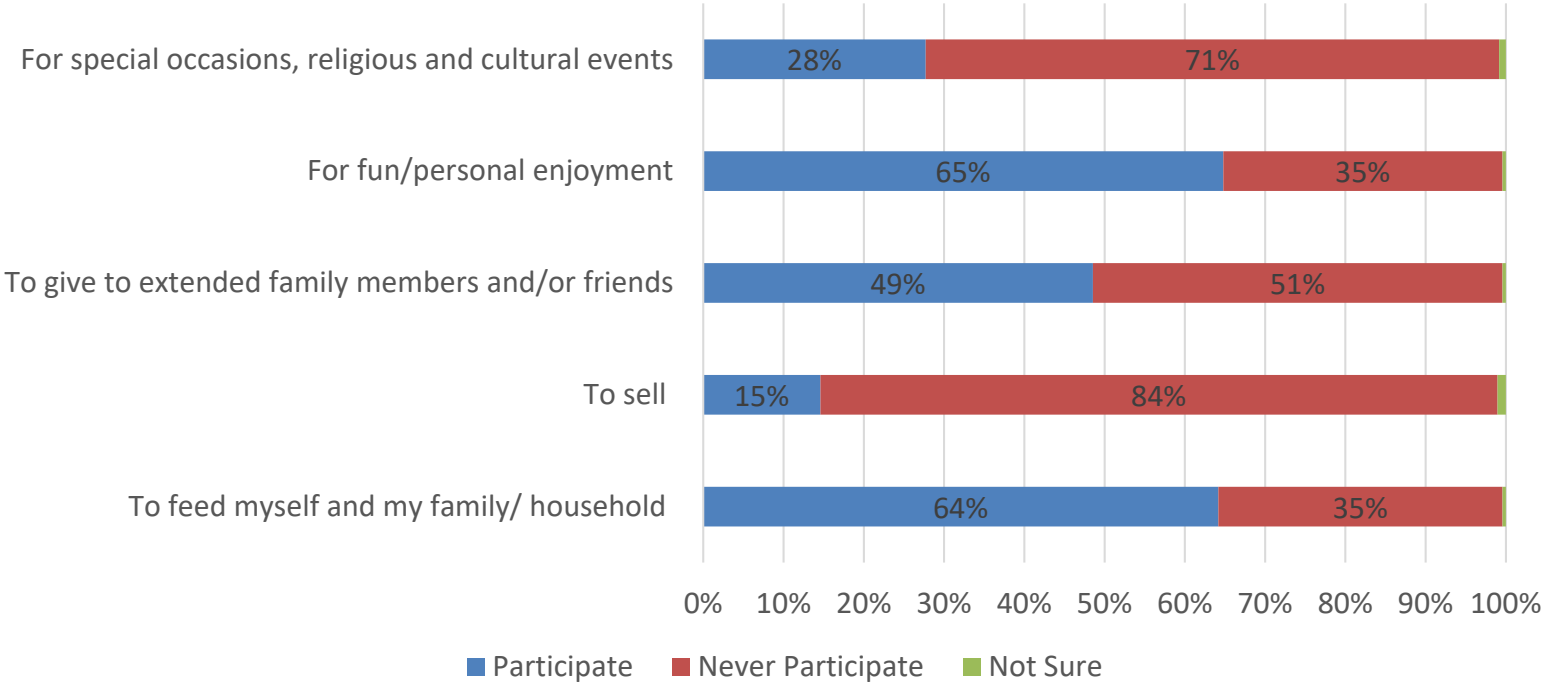
- The recreation activities with the highest level of participation were beach recreation (78%) and swimming/wading (79%).

- The recreation activities with the greatest proportion of respondents who never participate were gathering marine resources (83%) and diving (82%)

Participation in Coral Reef Activities (n = 1,188)



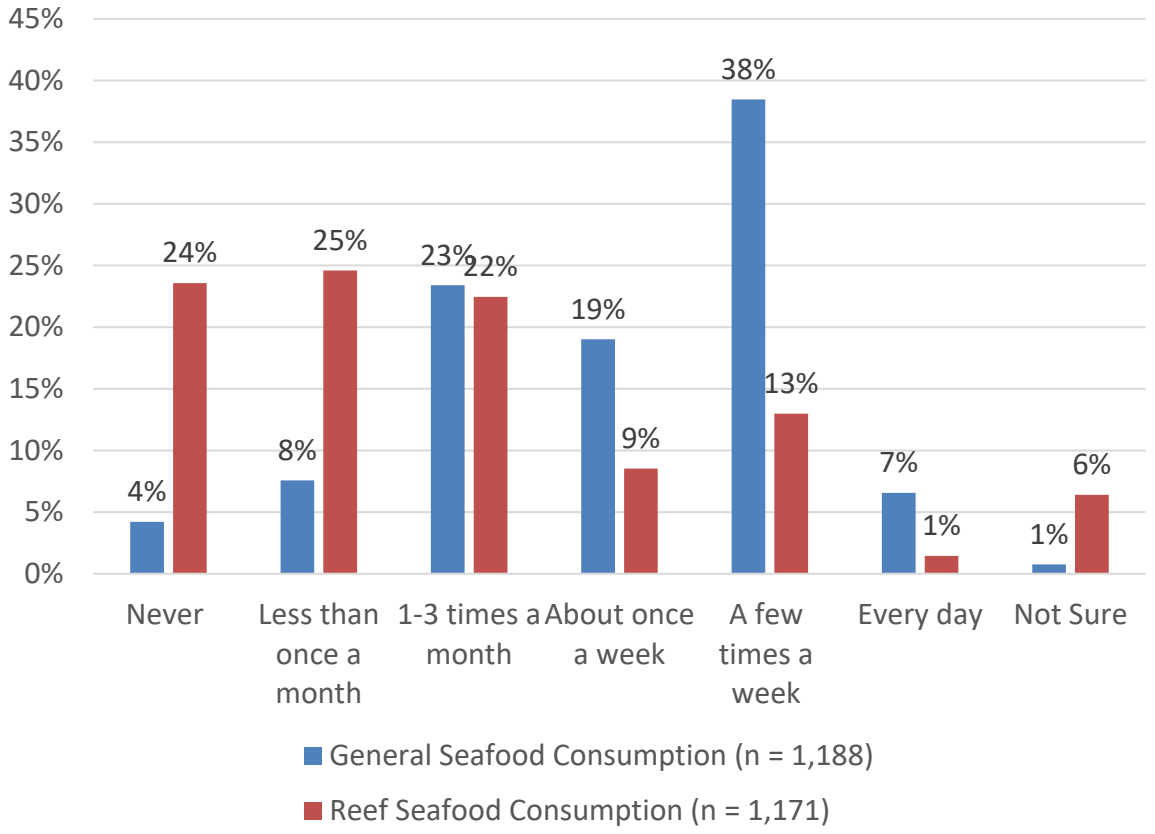
Reasons for participation in fishing or harvesting marine resources (n = 480)



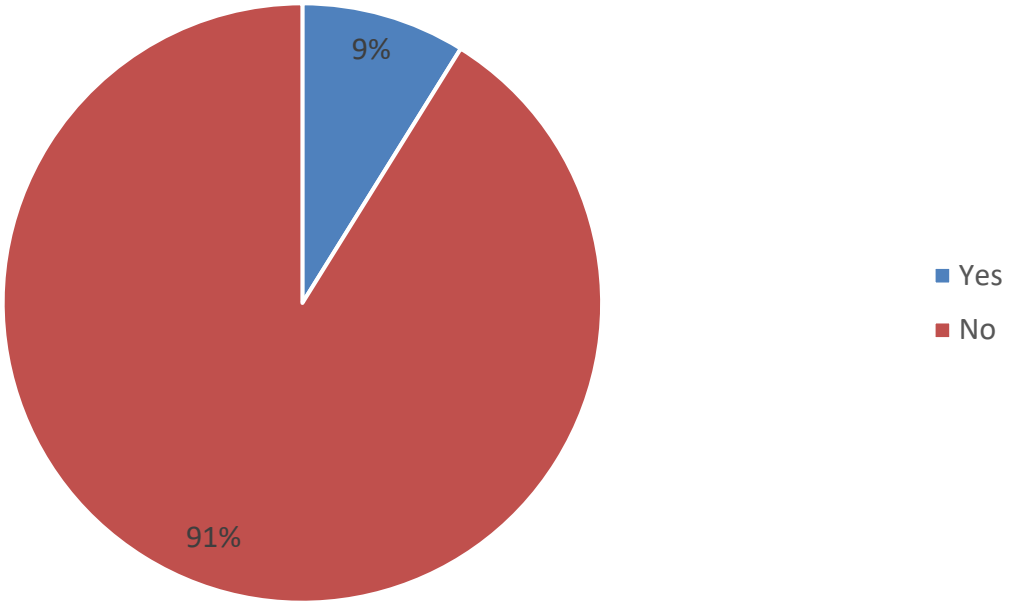
- The reason for fishing or harvesting marine resources with the highest level of participation was “for fun” (65%).
- The reason for fishing or harvesting marine resources with the lowest level of participation was “To sell” (84% Never participate).

Frequency of Fish/Seafood Consumption for Respondents and their Household

- The majority of respondents (64%) ate seafood at least once a week.
- 23% ate seafood harvested from coral reefs at least once a week.
- 95% consume seafood overall, and 70% consume reef seafood.

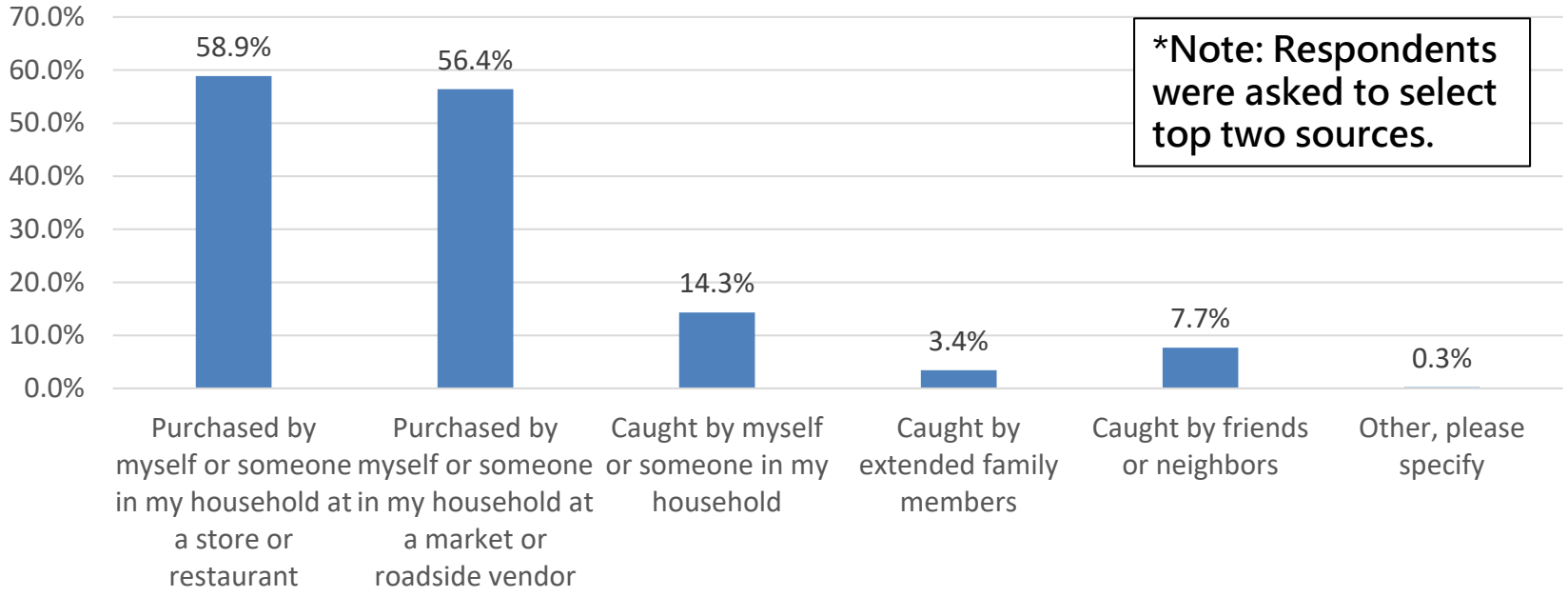


Do you or your family consume lionfish? (n = 1,162)



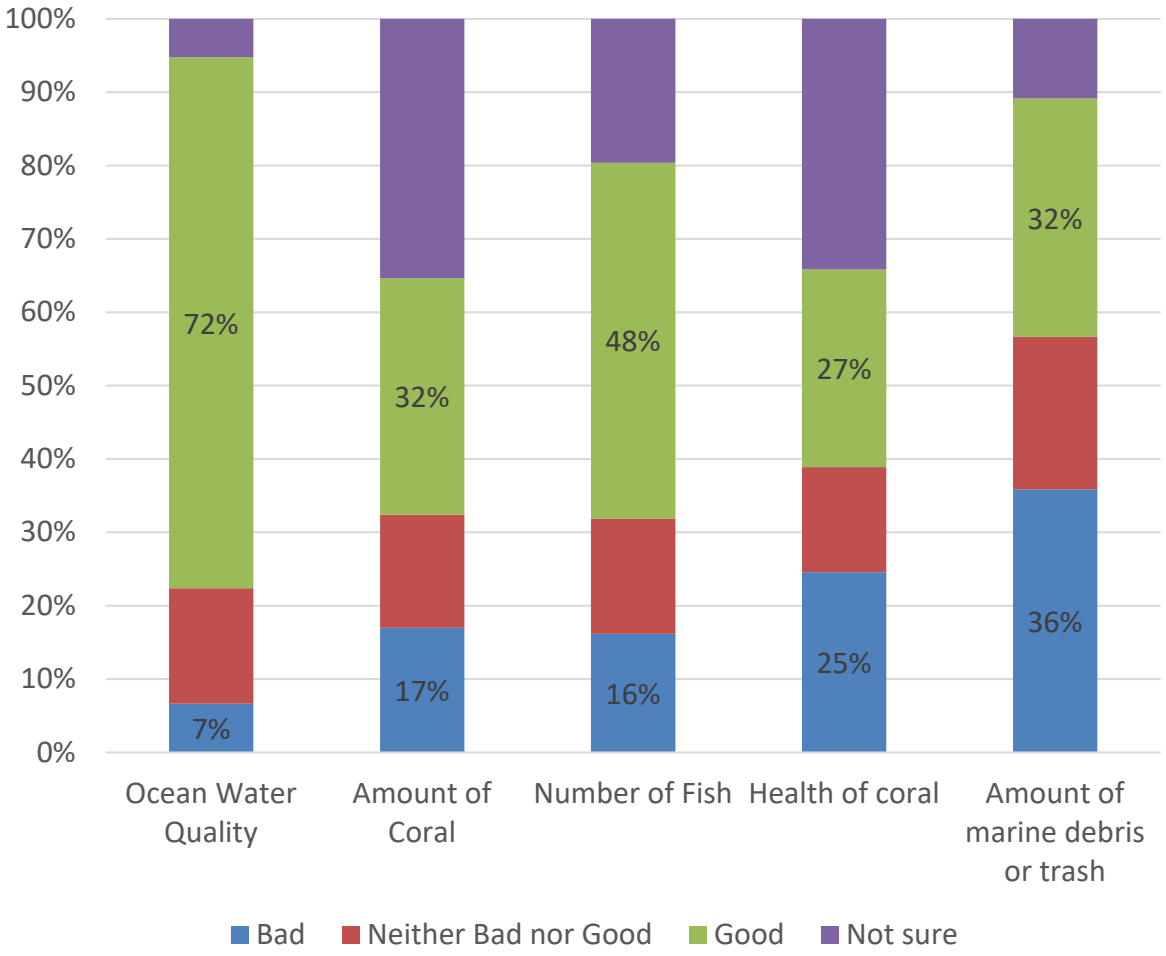
- 9% of respondents indicate that they or their family consumes lionfish

Main Source of Fish and Seafood for Personal and Household Consumption (n = 1,131)



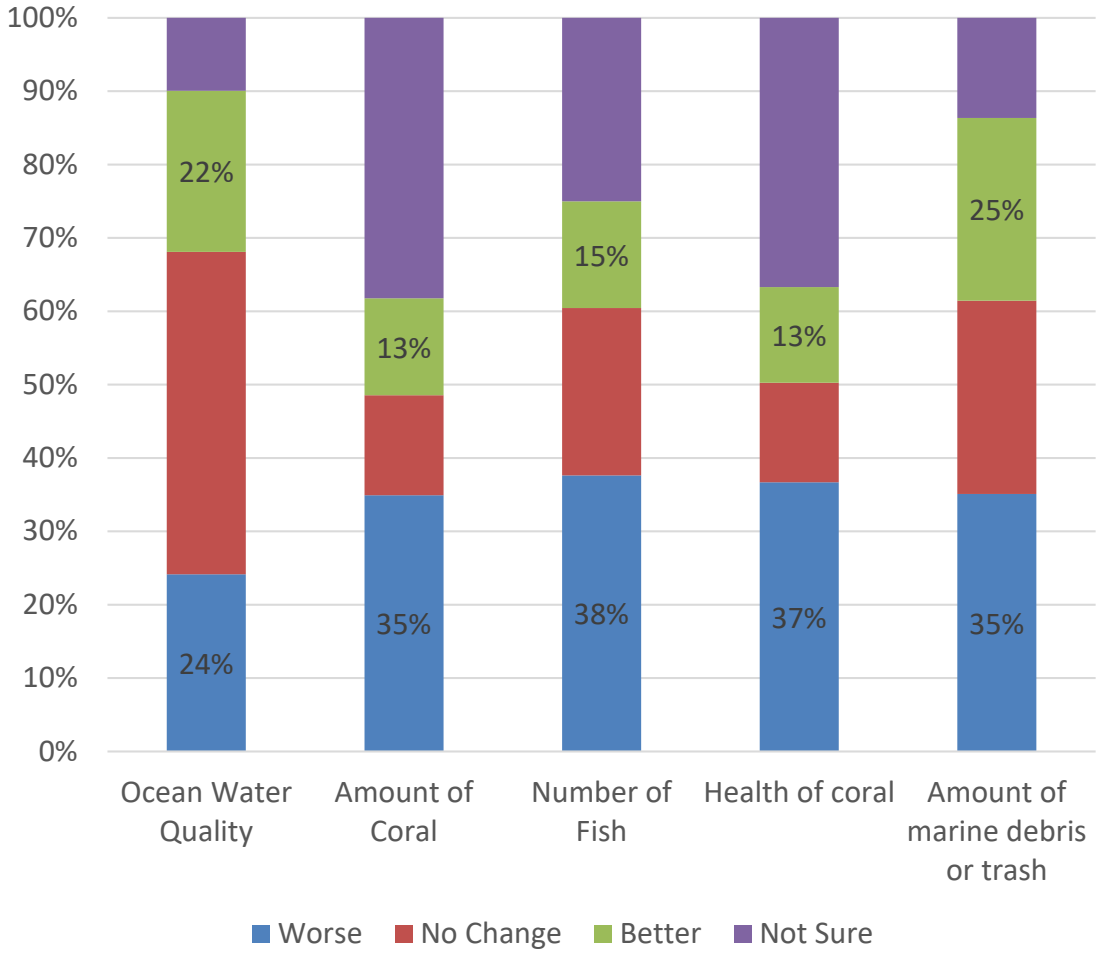
- The source chosen most as a main source of fish and seafood was “Purchased by myself or someone in my household at a store or restaurant” (59%) followed by “Purchased…at a market or roadside vendor” (56%).
- The source chosen least as a main source of fish and seafood was “Caught by extended family members” (3%).

Perceptions of Current Resource Conditions (n = 1,188)



- The resource considered to be in the best condition was ocean water quality (72%)
- The resource considered to be in the worst condition was amount of marine debris/trash (36%)
- The resource that respondents were the most unsure about was amount of coral (35%).

Perceptions of Change in Resource Conditions Over the Last 10 Years (n = 1,188)

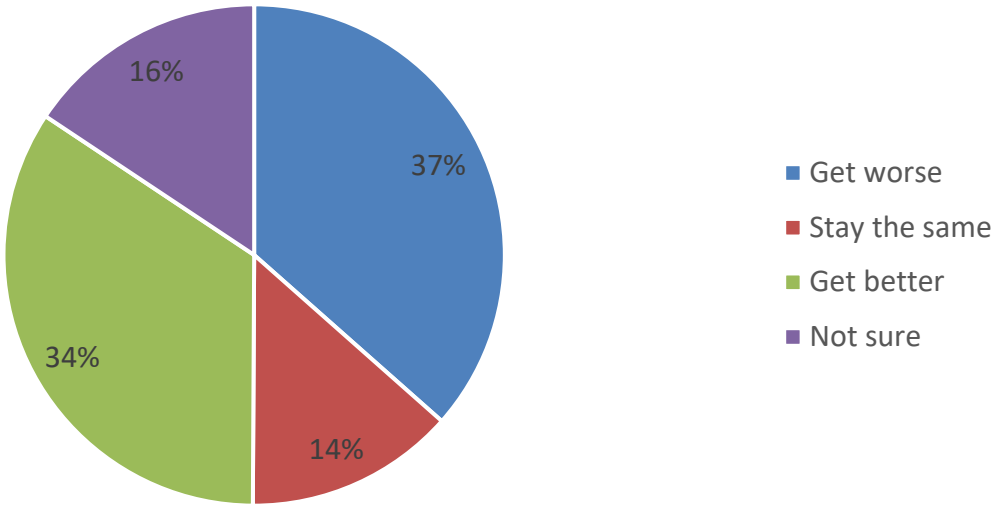


- Although the amount of marine debris/trash was considered to be in the worst condition currently, this was the item that respondents were the most positive toward in terms of the change in condition; 25% indicated the amount of marine debris/trash has gotten better.

- Number of fish (38%) was the resource perceived to have done the worst over the last 10 years.

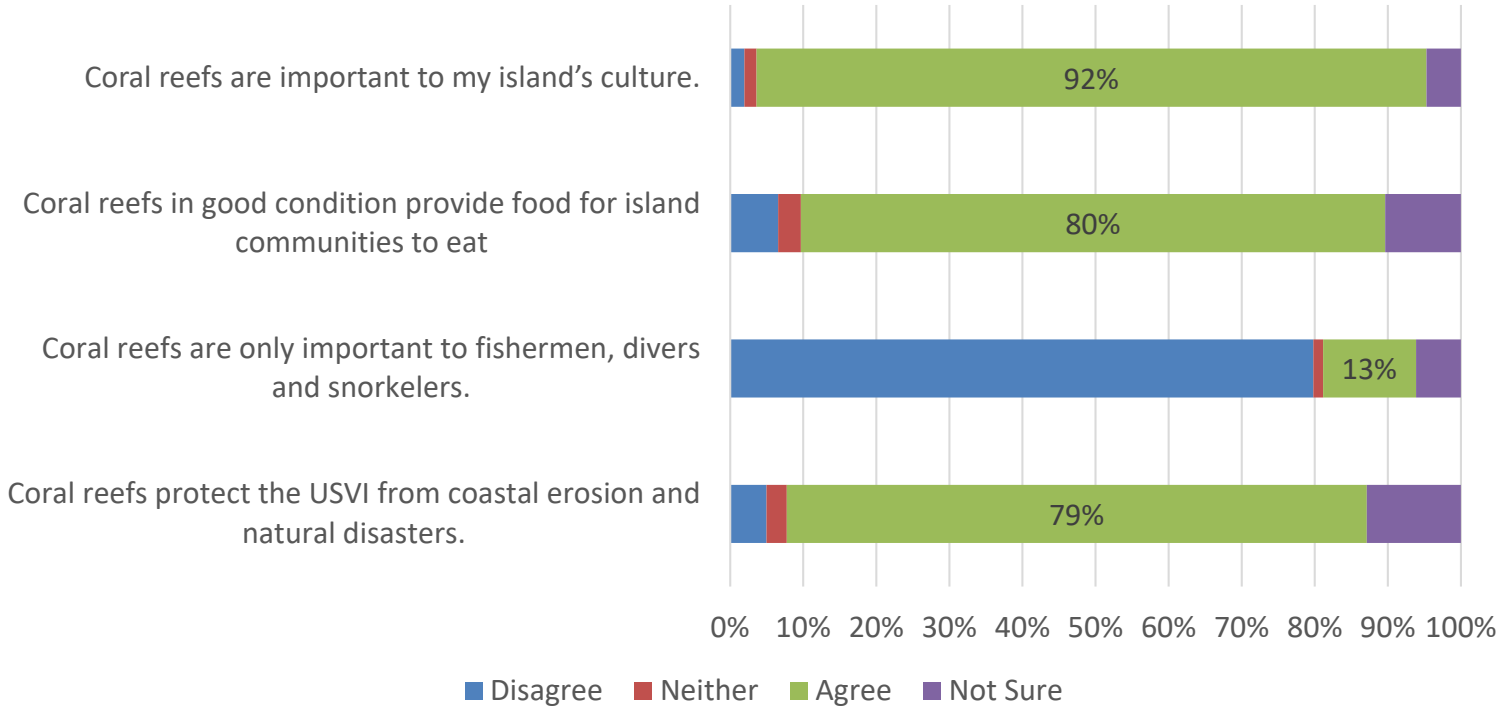
- Amount of coral was again the resource that respondents were the most unsure about (38%) in terms of its change in condition

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



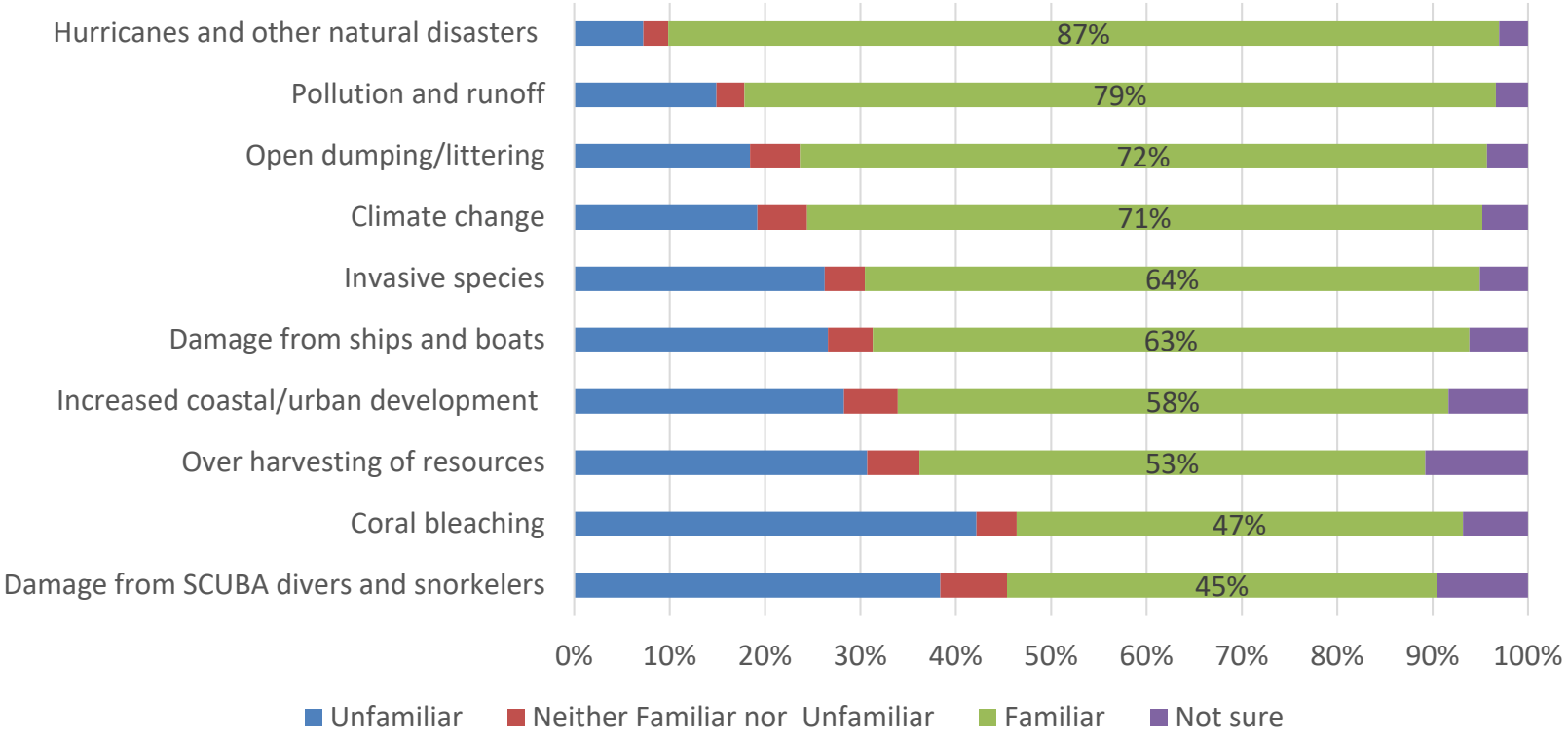
- 34% of respondents anticipated the overall resource condition will improve over the next 10 years.
- 37% of respondents anticipated the resource condition will get worse.
- 14% of respondents anticipated the resource condition will stay the same, while 16% were not sure.

Agreement with Statements of Coral Reef Value (n = 1,188)



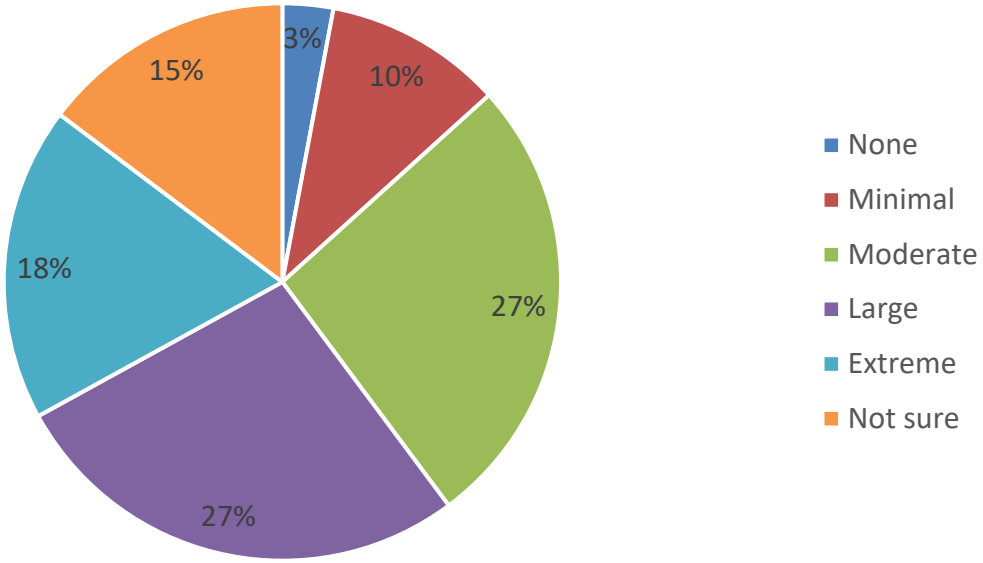
- The statement that respondents agreed the most with was "Coral reefs are important to my island's culture" (92%).
- The statement that respondents disagreed the most with was "Coral reefs are only important to fisherman, divers, and snorkelers" (80%).

Familiarity with Threats Facing Coral Reefs (n = 1,188)



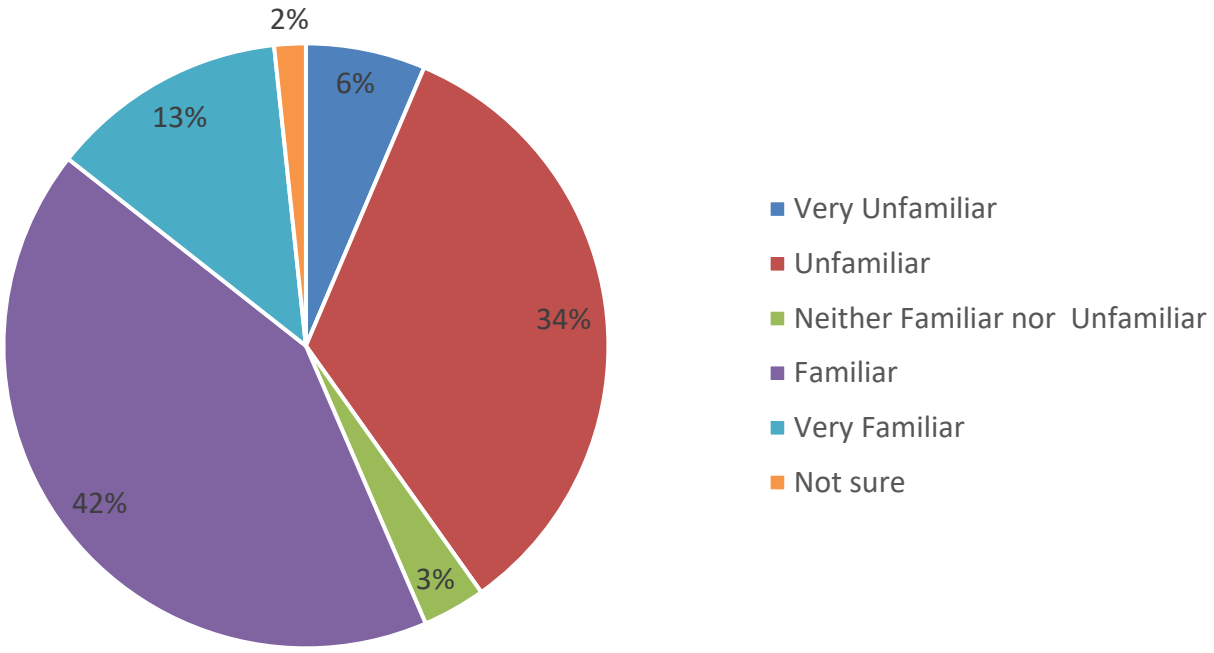
- The majority of respondents (>50%) were familiar with all threats except for coral bleaching and damage from divers/snorkelers
- Respondents were most familiar with hurricanes (87%) and pollution (79%)
- Respondents were the most unfamiliar with damage from divers and snorkelers (38%) and coral bleaching (42%)

Perceptions of the Level of Threat to Coral Reefs (n = 1,188)



- Almost half of respondents (45%) perceived the level of threat to coral reefs as Large or Extreme.
- 37% perceived the level of threat to coral reefs as Minimal or Moderate
- Only 3% believed there are no threats and 15% were not sure.

Familiarity with MPAs (n = 1,188)



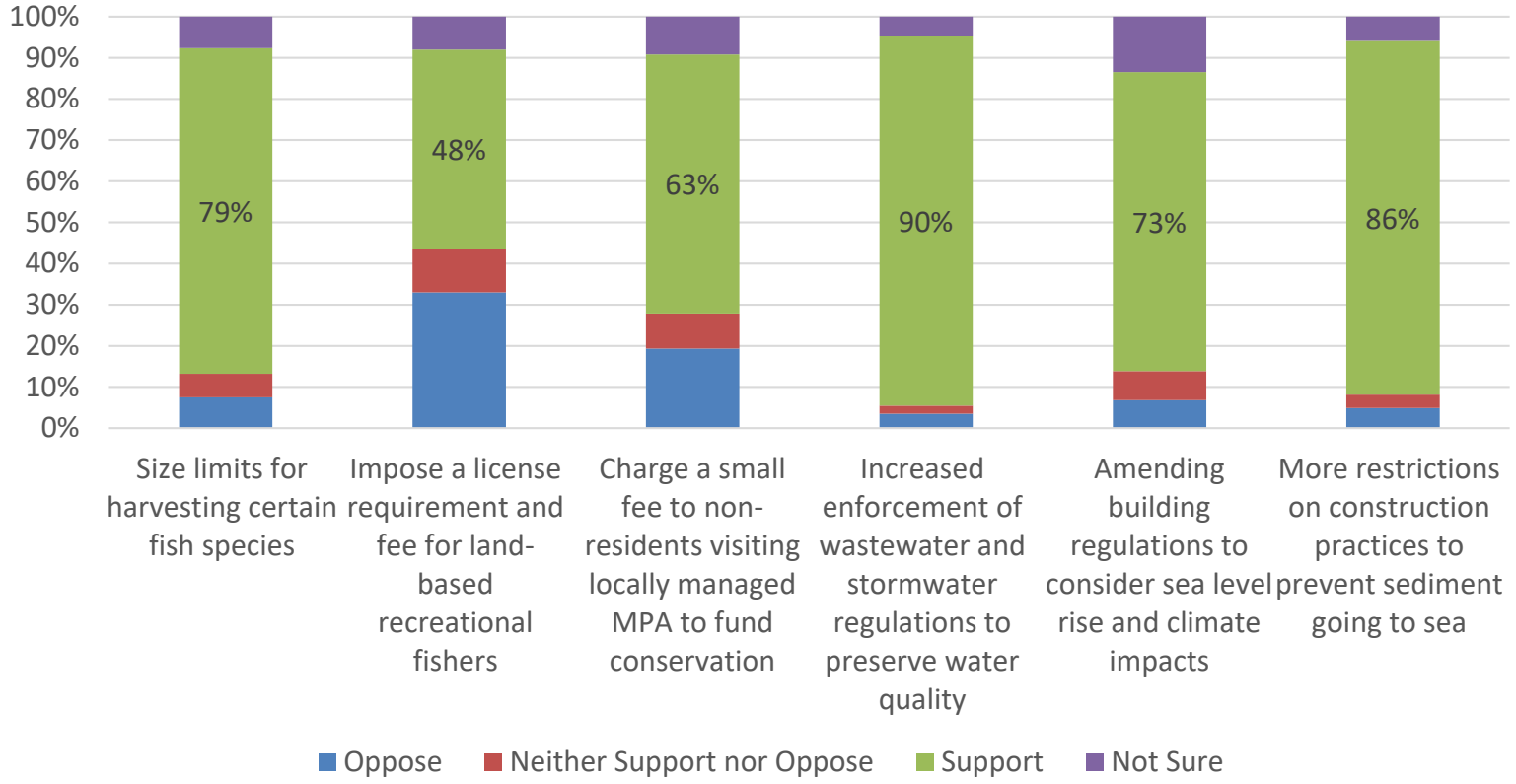
- Over half (55%) of respondents were familiar or very familiar with MPAs
- 40% were unfamiliar or very unfamiliar with MPAs

Perceptions of Marine Protected Areas (n = 705)

MPA Statement	Disagree	Neither Agree nor Disagree	Agree	Not Sure
MPAs protect coral reefs	3%	3%	88%	6%
MPAs increase the number of fish	4%	6%	79%	10%
There should be fewer locally-managed MPAs in the USVI	67%	9%	15%	9%
There should be more locally-managed MPAs in the USVI	14%	9%	67%	9%
There has been economic benefit to the USVI from the establishment of locally-managed MPAs	9%	7%	58%	25%
Fishermen's livelihoods have been negatively impacted from the establishment of locally-managed MPAs in the USVI	33%	13%	33%	20%
Locally managed MPAs help increase tourism in the USVI	10%	8%	67%	14%
The establishment of locally-managed MPAs increases the likelihood that people will vacation in the USVI	11%	12%	67%	9%
I would support adding new locally managed MPAs in the USVI if there is evidence that the ones we have are improving the USVI's marine resources	9%	5%	82%	4%
I generally support the establishment of locally-managed MPAs	6%	6%	84%	4%

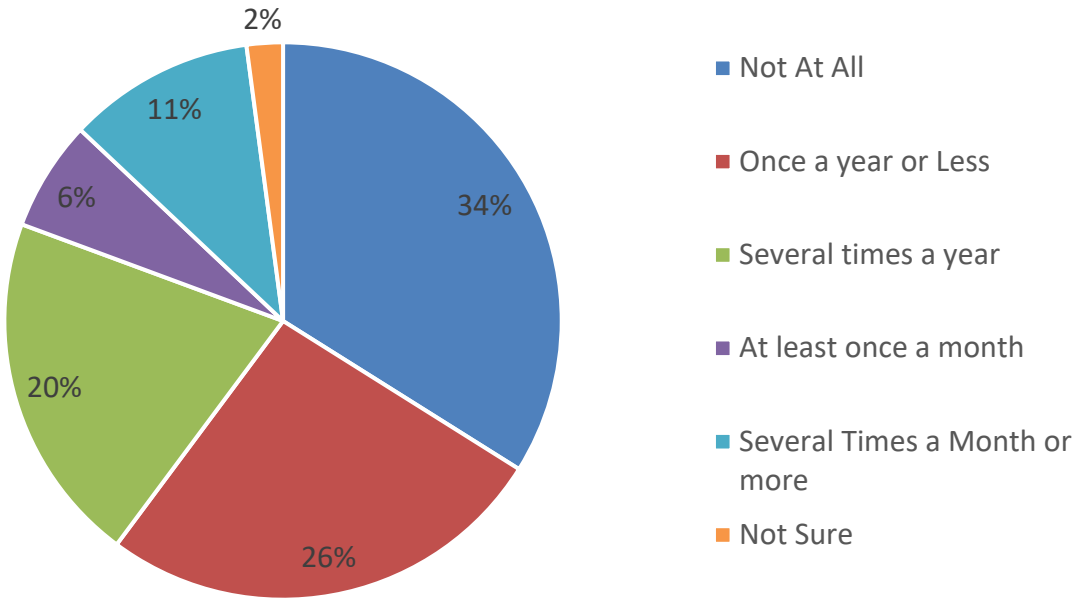
- 67% of respondents agreed that "there should be more locally managed MPAs in USVI" and 88% agreed that "MPAs protect coral reefs"
  - However, 33% agreed that "Fishermen's livelihoods have been negatively impacted from the establishment of locally managed MPAs in USVI"

Support for Management Strategies (n = 1,188)



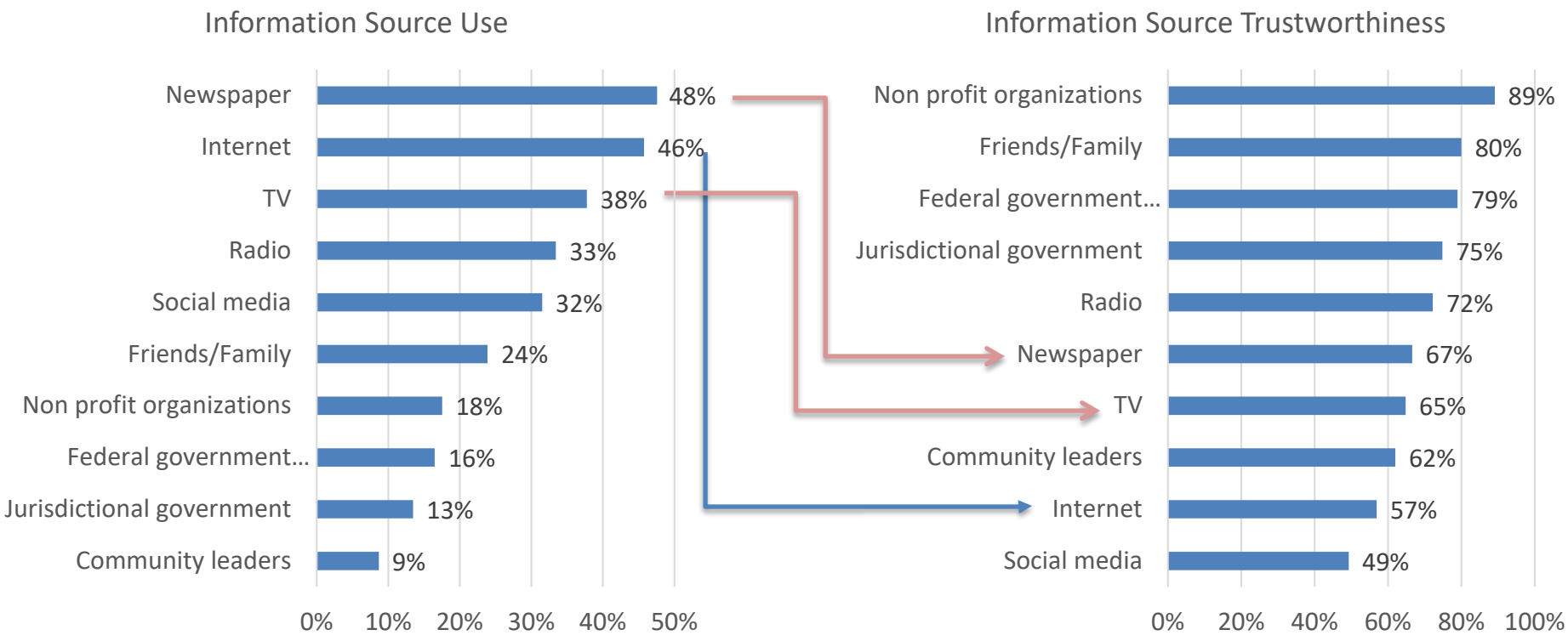
- At least 60% of respondents agreed with 5 out of 6 of the presented management strategies.
- Respondents agreed the most with “Increased enforcement of wastewater and stormwater regulations to preserve water quality” (90%).
- Respondents disagreed most with “Impose a license requirement and fee for land-based recreational fishers ” (33%).

Frequency of Participation in Any Activity to Protect the Environment (n = 1,188)



- Almost two thirds of respondents (64%) state that they participate in pro-environmental activities
- 38% participate at least several times a year

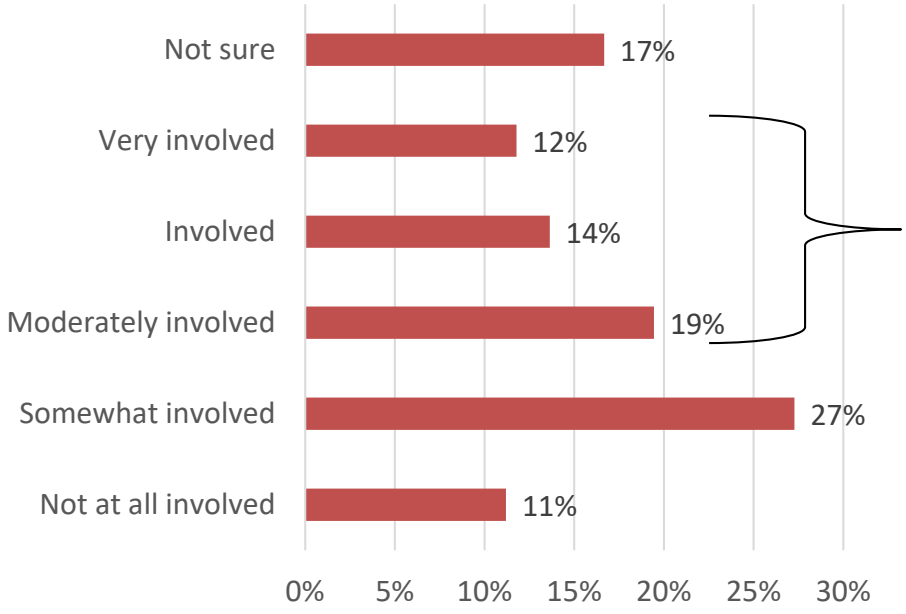
Respondents' Top Sources for Information about Coral Reefs and the Environment and Source Trust (n = 1,152)



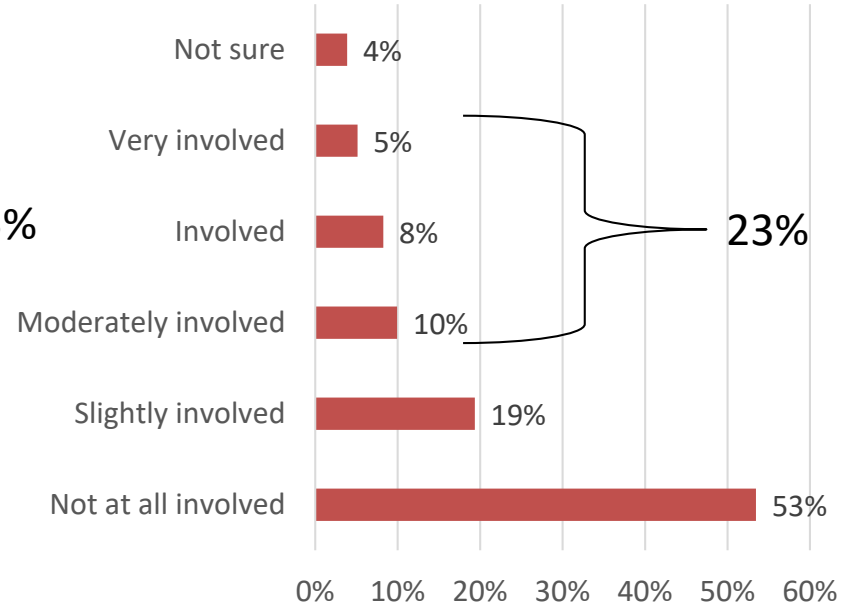
- Newspapers (48%), internet (46%), and TV (38%) are the top sources of information about coral reefs and the environment.
- However, these top sources are perceived to be less trustworthy than other sources chosen by respondents.

Perceptions of Individual and Community Involvement in Coral Reef Management & Decision Making (n = 1,188)

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?



- Only 11% perceive their local communities as not at all involved in protecting and managing coral reefs.
- Almost half (45%) indicate that their local communities are at least “moderately involved” in protecting and managing coral reefs
- 23% indicate that they themselves are at least moderately involved in protecting and managing coral reefs

Respondent Demographic Characteristics

Island	Percent of Sample	Percent of Sample (weighted)	Percent of Adult Population (2010 US Census)
St. Thomas	36.7%	49.7%	49.7%
St. John	30.5%	4.2%	4.2%
St. Croix	32.8%	46.1%	46.1%

*Respondents were weighted by island, age, and gender to be representative of USVI's population

*2010 US Census results on following slides refer to adult population of USVI

Respondent Demographic Characteristics

Gender	Sample	2010 US Census
Male	47%	47%
Female	53%	53%

Age	Sample	2010 US Census
18-24 year olds	10%	11%
25-34 year olds	14%	15%
35-44 year olds	13%	18%
45-64 year olds	35%	38%
65+ years old	16%	18%
No Response	9%	N/A

Education Level	Sample	2010 US Census
Less than high school	10%	31%
High School Graduate, GED	29%	31%
Some college, community college or AA	23%	20%
College Graduate	26%	11%
Graduate School, Law School, Medical School	7%	7%
Not Sure/No Response	4%	N/A

Respondent Demographic Characteristics

Annual Household Income	Sample	2010 US Census
Under $10,000	9%	14%
$10,000 to $19,999	8%	13%
$20,000 to $29,999	15%	14%
$30,000 to $39,999	13%	11%
$40,000 to $49,999	11%	9%
$50,000 to $59,999	10%	8%
$60,000 to $74,999	9%	9%
$75,000 to $99,999	10%	9%
$100,000+	15%	12%

Race	Sample	2010 US Census
Black/African American	50.54%	74.20%
White	17.06%	17.77%
American Indian/Alaskan Native	0.69%	0.42%
Asian	0.80%	1.41%
Native Hawaiian/Pacific Islander	0.38%	0.02%
Other race	24.20%	4.36%
2 or more races	1.50%	1.82%
No Response	4.60%	N/A

*Answers of “no response” left absent from analysis of household income due to high rate of occurrence (approx. 49%)

Respondent Demographic Characteristics

Employment Status	Sample
Unemployed	6%
Student	2%
Employed full-time	55%
Homemaker	1%
Employed part-time	7%
Retired	18%
Other	7%
No Response	3%

Year(s) of Residence	Sample
1 year or less	2%
2-5 years	8%
6-10 years	9%
More than 10 years (less than all my life)	68%
All my life	10%
No Response	3%

Languages Spoken	Sample
English	93%
Spanish	34%
French	7%
Dominica Creole	3%
St. Lucian Creole	3%
Haitian Creole	2%
Other	3%

MONITORING APPLICATIONS: Survey

Diving/Snorkeling and Marine Resource Condition Perceptions

USVI Resource	Respondent does NOT dive or snorkel		Respondent dives or snorkels		Statistical test for difference	
	weighted n	Mean	weighted n	Mean	t	p value
Current Conditions						
Ocean water quality	583	3.91	531	3.83	1.53	0.12
Amount of coral	312	3.34	419	3.07	3.38***	<0.01
Number of fish	444	3.63	479	3.35	4.32***	<0.01
Health of coral	314	3.22	434	2.80	5.25***	<0.01
Amount of marine debris or trash	540	2.88	521	2.74	2.07**	0.04
Change in conditions over last 10 years						
Ocean water quality	559	3.19	511	2.9	4.95***	<0.01
Amount of coral	291	2.81	409	2.45	4.57***	<0.01
Number of fish	441	2.87	437	2.50	5.44***	<0.01
Health of coral	299	2.83	427	2.38	5.64***	<0.01
Amount of marine debris or trash	523	2.98	499	2.66	4.51***	<0.01

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

- Higher mean values indicate a more positive perception
- Those who dive/snorkel have a more positive perception concerning marine resource condition

Tenure and MPA Perceptions

MPA Statement	Respondent has lived in USVI for 10 or less years		Respondent has lived in USVI over 10 years		Statistical test for difference	
	weighted n	Mean	weighted n	Mean	t	p value
MPAs protect coral reefs	136	4.24	485	4.11	2.25**	0.03
MPAs increase the number of fish	130	4.07	464	4.03	0.59	0.57
There should be fewer locally-managed MPAs in the USVI	133	2.03	468	2.33	-3.77***	<0.01
There should be more locally-managed MPAs in the USVI	130	3.97	465	3.77	2.36**	0.02
There has been economic benefit to the USVI from the establishment of locally-managed MPAs	111	3.94	390	3.72	2.66***	<0.01
Fishermen's livelihoods have been negatively impacted from the establishment of locally-managed MPAs in the USVI	105	2.63	410	3.05	-3.62***	<0.01
Locally managed MPAs help increase tourism in the USVI	128	3.91	440	3.79	1.37	0.17
The establishment of locally-managed MPAs increases the likelihood that people will vacation in the USVI	135	3.81	459	3.77	0.55	0.58
I would support adding new locally managed MPAs in the USVI if there is evidence that the ones we have are improving the USVI's marine resources	142	4.26	489	3.99	3.70***	<0.01
I generally support the establishment of locally-managed MPAs	141	4.15	495	3.97	2.87***	<0.01

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

- Higher mean values indicate more agreement with the statement
- Longer tenured residents have a more negative perception of MPAs

Participation in Pro-Environmental Behavior and Threat Familiarity

Threats to Coral Reefs in USVI	Respondent DOES NOT participate in pro-environmental behavior		Respondent participates in pro-environmental behavior		Statistical test for difference	
	weighted n	Mean	weighted n	Mean	t	p value
Climate change	365	3.45	735	3.86	-5.91***	<0.01
Coral bleaching	344	2.61	735	3.31	-9.12***	<0.01
Hurricanes and other natural disasters	368	4.11	755	4.28	-3.26***	<0.01
Pollution and runoff (stormwater, wastewater outfall, sediment, and marine debris)	371	3.73	755	4.05	-5.10***	<0.01
Increased coastal/urban development	333	3.07	731	3.56	-6.53***	<0.01
Invasive species (Example: Lionfish)	358	3.13	741	3.78	-9.05***	<0.01
Over harvesting of resources	325	3.00	718	3.62	-8.16***	<0.01
Damage from ships and boats (groundings or anchoring)	353	3.14	737	3.65	-6.98***	<0.01
Damage from SCUBA divers and snorkelers while in the water	339	2.69	717	3.30	-8.40***	<0.01
Open dumping/littering	369	3.57	744	3.86	-4.38***	<0.01

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

- Higher mean values indicate more familiarity with the threat
- Those who participate in pro-enviro behavior are more familiar with threats

Age and Condition Perception

- Spearman Correlation Analysis Results
  - Being older in age is positively correlated with having a more positive perception of current ocean water quality (p=0.03)
  - Being older in age is positively correlated with having a more negative perception about the change in condition of marine debris/trash over the last 10 years (p=0.08)

Age and Certainty of Condition Perpcetion

USVI Resource	Age ≥ 48		Age < 48		Statistical test for difference	
	weighted n	Mean	weighted n	Mean	t	p value
Current Conditions						
Ocean water quality	551	6%	531	5%	0.56	0.58
Amount of coral	551	40%	531	33%	2.14**	0.03
Number of fish	551	21%	531	22%	-0.35	0.73
Health of coral	551	37%	531	33%	1.39	0.17
Amount of marine debris or trash	551	10%	531	8%	0.92	0.36
Change in conditions over last 10 years						
Ocean water quality	551	9%	531	8%	0.56	0.58
Amount of coral	551	41%	531	37%	1.17	0.24
Number of fish	551	22%	531	27%	-1.94*	0.05
Health of coral	551	38%	531	35%	1.13	0.26
Amount of marine debris or trash	551	11%	531	14%	-1.58	0.12

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

- Higher mean values indicate higher proportions of “not sure” responses for the particular item
- 48 is chosen as the cut-point for age as it is the median of the sample
- Older residents answered “not sure” more frequently for the current amount of coral and less frequently for the change in number of fish when compared to younger residents, on average

Divers vs. Boaters Condition Perception

USVI Resource	Respondent participates in motorized boating (1)		Respondent participates in diving (2)		Respondent participates in motorized boating AND diving (3)		Respondent participates in NEITHER motorized boating nor diving (4)		Statistical test for difference (Tukey post hoc)	
	weighted n	Mean	weighted n	Mean	weighted n	Mean	weighted n	Mean	Result	p value
Current Conditions										
Ocean water quality	330	3.85	51	3.84	134	3.70	598	3.92	4>3	0.05
Amount of coral	224	3.01	43	3.43	121	3.01	341	3.34	4>1 , 4>3 , 2>1	<0.01 , <0.01 , 0.08
Number of fish	276	3.35	44	3.72	129	3.11	475	3.64	4>1, 4>3, 2>1, 2>3	<0.01 , <0.01 , 0.09, <0.01
Health of coral	238	2.79	39	3.41	125	2.70	345	3.15	4>1, 4>3, 2>1, 2>3	<0.01 , <0.01 , <0.01, <0.01
Amount of marine debris or trash	323	2.85	48	2.64	136	2.64	554	2.84	not sig	not sig
Change in conditions over last 10 years										
Ocean water quality	323	3.01	49	2.91	131	2.74	566	3.16	4>1, 4>3, 1>3	0.08 , <0.01, 0.03
Amount of coral	215	2.52	38	2.42	121	2.30	324	2.78	4>1, 4>3	0.02 , <0.01
Number of fish	253	2.58	45	2.42	122	2.39	458	2.85	4>1, 4>2, 4>3	<0.01 , 0.03 , <0.01
Health of coral	222	2.52	41	2.30	120	2.27	343	2.73	4>1, 4>2, 4>3	0.08 , 0.06 , <0.01
Amount of marine debris or trash	314	2.87	44	2.41	133	2.43	530	2.93	4>2 , 4>3 , 1>2 , 1>3	0.02 , <0.01 , 0.05, <0.01

- Higher mean values indicate a more positive perception
- Those who neither boat nor swim had the most positive perception, on average
- Those that only dive tend to have a more positive perception of current condition when compared to those that only boat
- Those that only dive tend to have a more negative perception of the change in condition when compared to those that only boat
- Those that both boat and dive tend to have the most negative perception, on average

Fisher/gatherers and MPA Perceptions

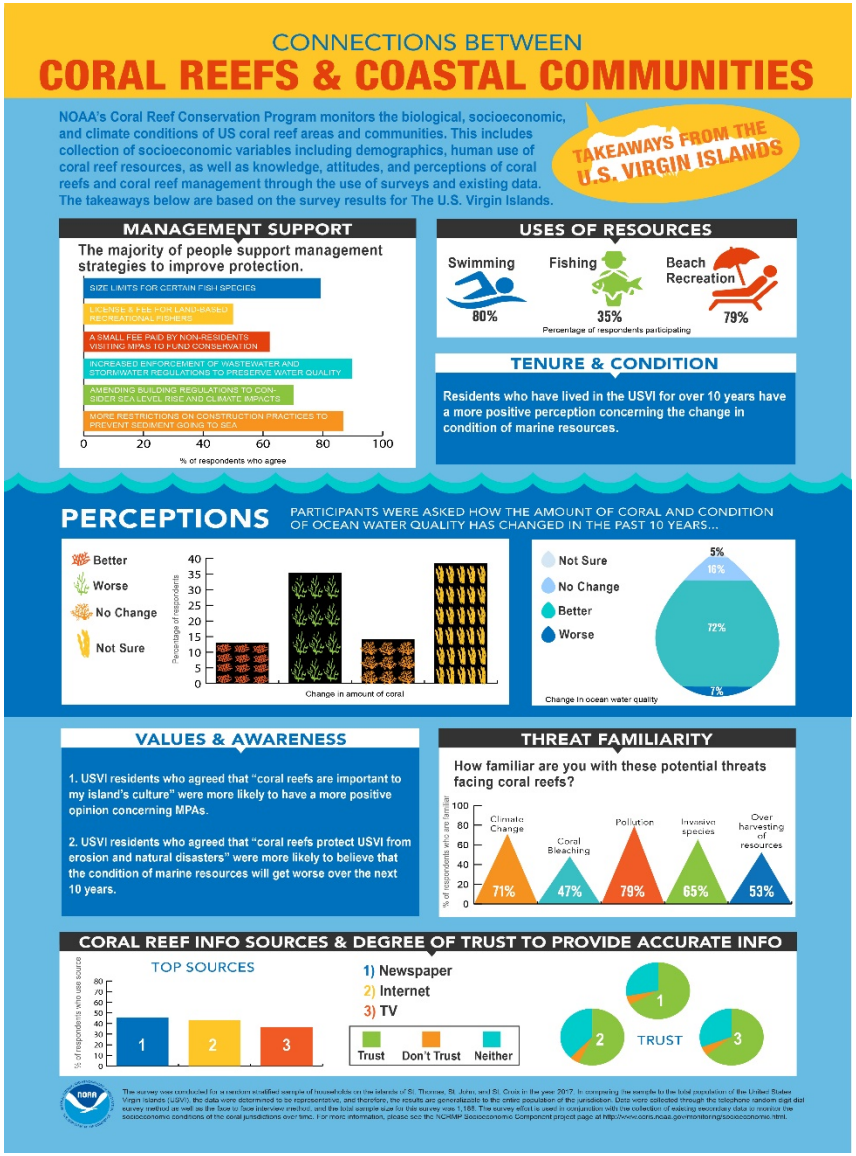
MPA Statement	Does NOT fish or gather marine reosurces		Fishes or gathers for marine reosurces		Statistical test for difference	
	weighted n	Mean	weighted n	Mean	t	p value
MPAs protect coral reefs	297	4.22	334	4.07	3.25***	<0.01
MPAs increase the number of fish	282	4.10	324	3.98	2.34**	0.02
There should be fewer locally-managed MPAs in the USVI	279	2.22	335	2.29	-1.07	0.28
There should be more locally-managed MPAs in the USVI	277	3.91	330	3.75	2.28**	0.02
There has been economic benefit to the USVI from the establishment of locally-managed MPAs	223	3.87	288	3.70	2.41**	0.02
Fishermen's livelihoods have been negatively impacted from the establishment of locally-managed MPAs in the USVI	240	2.97	286	2.96	0.16	0.87
Locally managed MPAs help increase tourism in the USVI	260	3.84	317	3.81	0.52	0.61
The establishment of locally-managed MPAs increases the likelihood that people will vacation in the USVI	273	3.79	332	3.76	0.48	0.63
I would support adding new locally managed MPAs in the USVI if there is evidence that the ones we have are improving the USVI's marine resources	303	4.09	341	4.00	1.47	0.14
I generally support the establishment of locally-managed MPAs	299	4.03	349	4.00	0.43	0.67

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

- Higher mean values indicate more agreement with the statement
- Those that fish/gather agreed less, on average, with statements about how MPAs protect reefs, increase fish, provide economic benefit, and that there should be more of them, when compared to those who not fish/gather

Who Is Your Audience?

	Newspaper	Radio	Television	Internet	Social Media	Friends and Family	Community Leaders	Jurisdictional Government	Federal Government	Non Profit Organizations
Older age	✓	✓	✓						✓	
Younger age				✓	✓	✓	✓			
Male		✓						✓		
Female										✓
More income				✓	✓					✓
Less income		✓	✓							
Completed high school				✓	✓			✓		✓
Did not complete high school		✓	✓							
Completed college				✓				✓	✓	✓
Did not complete college		✓	✓							
Has lived in USVI for over 10 years	✓	✓	✓					✓		
Has lived in USVI for 10 years or less				✓	✓	✓				✓
Speaks English					✓					✓
Speaks Spanish			✓						✓	
White				✓	✓	✓			✓	✓
Black	✓	✓	✓							
Hispanic			✓	✓		✓				
St. Thomas	✓	✓	✓							
St. John		✓	✓						✓	✓
St. Croix				✓				✓	✓	



Products

- Infographic highlighting findings for USVI
- 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?**
  - CRCP: Peter Edwards peter.edwards@noaa.gov or Arielle Levine arielle.levine@noaa.gov
  - NCCOS: Matt Gorstein matt.gorstein@noaa.gov or Chloe Fleming chloe.fleming@noaa.gov
  - Visit http://www.coris.noaa.gov/monitoring/socioeconomic.html