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NOAA Technical Memorandum CRCP 25

National Coral Reef Monitoring Program Socioeconomic Monitoring Component

Summary Findings for South Florida, 2014

NOAA Coral Reef Conservation Program

Silver Spring, MD

June 2016

United States Department of Commerce	National Oceanic and Atmospheric Administration	National Ocean Service
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About this document

The mission of the National Oceanic and Atmospheric Administration (NOAA) is to understand and predict changes in the Earth's environment and to conserve and manage coastal and oceanic marine resources and habitats to help meet our Nation's economic, social, and environmental needs. As a branch of NOAA, the National Ocean Service (NOS) conducts or sponsors research and monitoring programs to improve the scientific basis for conservation and management decisions. The NOS strives to make information about the purpose, methods, and results of its scientific studies widely available.

Coral Reef Conservation Program (CRCP) along with the National Centers for Coastal Ocean Science (NCCOS) uses the NOAA Technical Memorandum NOS series to achieve timely dissemination of scientific and technical information that is of high quality but inappropriate for publication in the formal peer-reviewed literature. The contents are of broad scope, including technical workshop proceedings, large data compilations, status reports and reviews, lengthy scientific or statistical monographs, and more. NOAA Technical Memoranda published by the CRCP, although informal, are subjected to extensive review and editing, and reflect sound professional work. Accordingly, they may be referenced in the formal scientific and technical literature.

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

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Executive Summary

The Socioeconomic Component of the National Coral Reef Monitoring Program (NCRMP) is currently in the process of monitoring socioeconomic indicators across all United States (US) coral reef territories and jurisdictions. These indicators fall under the following broader categories: the demographics of these areas, human use of coral reef resources, and knowledge, attitudes, and perceptions of coral reefs and coral reef management. The overall goal of this endeavor is to track relevant information regarding each jurisdiction's population, social and economic structure, society's interactions with coral reef resources, and the responses of local communities to coral management. From there, these baseline data are used to develop indicators that describe the state of each jurisdiction and provide researchers with the ability to compare jurisdictions to one another. The National Oceanic and Atmospheric Administration's (NOAA) Coral Reef Conservation Program (CRCP) will use the information for future research, to assess the socioeconomic outcomes of management activities, and to improve the results of programs designed to protect coral reef resources.

This report outlines human dimensions information relevant to coral reef resources in South Florida. The South Florida region is defined as the five counties adjacent to the Florida Coral Reef Tract: Martin, Palm Beach, Broward, Miami-Dade, and Monroe Counties. The findings here are derived from a combination of data gathered through household surveys conducted from January to July of 2014, and additional secondary sources of socioeconomic information for the region.

With respect to human participation in recreational coral reef-related activities, the surveys demonstrated that South Florida residents participate in swimming and beach recreation most frequently. Additionally, just over 30% of residents indicated that they participate in fishing or gathering of marine resources. Though the sample was not large enough to be representative of each county's population, differences in perceptions concerning marine resource condition were identified between respondents based on county of residence. If perceptions of coral reef health truly vary by location, this may correlate to differing resource quality in different regions, which could, in part, explain the lack of consensus across counties concerning the condition of marine resources. Surveys also revealed that South Floridians generally support a range of potential marine management policies and regulations, and are generally familiar with the various threats faced by coral reefs (such as hurricanes, pollution, and coastal development).

Unlike several US coral reef jurisdictions, the population of South Florida increased between 2000 and 2010. In addition to a rising population, the jurisdiction faces a number of other social challenges including a decline in real gross domestic product since 2007, a decline in real median household income from 2000 to 2010, and an increase in the poverty rate from 2000 to 2010. The actions of humans in coastal communities have been shown to affect coral reefs in several ways and an estimated 30% of global coral reefs could already be considered "severely damaged" due to human-induced impacts (Hughes 2008). Coupled with the increasing impact of

contaminant runoff, pressures from coastal development, and unsustainable levels of fishing in South Florida (FDEP 2011), there is little question about connection between communities and environment in this region. Conversely, it is also important to note that the communities of this region are positively connected to coral reef resources through the tourism industry, commercial fishing, and a range of recreational activities enjoyed by residents (NOAA CRCP 2015).

There were key lessons learned from this first NCRMP socioeconomic data collection in South Florida. For example, there is a need to fine-tune the survey question pertaining to fish consumption and fishing activity in order to make it more specific to coral reef related fish and invertebrate species, as well as a need to distinguish between locally caught and imported fish. Also, within the participation in coral reef related activities section, the team will add 'shelling' as an example under the 'beach recreation' category. And finally, Florida partners recommended that the scale for the familiarity with management agencies and processes question be simplified to assess the difference between respondents who are familiar, those who have heard of the agency or process, and those who are not familiar. As similar surveys are implemented across other US coral reef jurisdictions, the NCRMP team will be making adjustments to the data collection effort to improve on the type of information being generated. Thus, the findings contained within this report should be considered a starting point to the development of more detailed research questions for future work. Surveys are planned to be repeated in each US coral reef jurisdiction after the completion of a full monitoring cycle, approximately once every five to seven years.

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List of Acronyms

ACS	American Community Survey
AQI	Air Quality Index
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
CATI	Computer Assisted Telephone Interviewing
C-CAP	Coastal Change Analysis Program
CRCP	Coral Reef Conservation Program
DEMA	Diving and Equipment Marketing Association
ENOW	Economics National Ocean Watch
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FKNMS	Florida Keys National Marine Sanctuary
GDP	Gross Domestic Product
HHS	Department of Health and Human Services
MPA	Marine Protected Area
NCCOS	National Centers for Coastal Ocean Science
NCRMP	National Coral Reef Monitoring Program
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NWS	National Weather Service
OMB	Office of Management and Budget
OR&R	Office of Response and Restoration
SEFCRI	Southeast Florida Coral Reef Initiative
SCUBA	Self Contained Underwater Breathing Apparatus
UNEP	United Nations Environment Programme
US	United States
USGS	United States Geological Survey

Introduction

In 2007, the National Oceanic and Atmospheric Administration's (NOAA) Coral Reef Conservation Program (CRCP) underwent an external review by an expert panel to provide an independent assessment of the CRCP's effectiveness in meeting its mandates and to suggest recommendations for future improvement. Some major recommendations from the external review included increasing the CRCP's social science portfolio, strategically using social science to improve coral reef management by engaging local communities, and better assessing the social and economic consequences of management policies, interventions, and activities on local communities. In response, the *CRCP Social Science Strategy* (Loper *et al*. 2010) recommended three priority activities:

1. Developing of a set of national-level social science indicators
2. Collecting these indicators via regular and repeated jurisdictional surveys
3. Increasing social science capacity within the coral reef conservation program.

In 2010, the CRCP created the National Coral Reef Monitoring Program (NCRMP) which included, for the first time, a socioeconomic monitoring component that would improve the Program's ability to track social science information in coral reef jurisdictions. The socioeconomic component of the NCRMP addresses the first two priorities. Because the socioeconomic component of NCRMP is situated within a larger social science program dedicated to a range of social science activities in United States (US) and international coral reef jurisdictions, the results of this monitoring have a wide range of applications.

The inclusion of socioeconomic indicators in the NCRMP represents a strong step forward for the CRCP, which has recognized the need to integrate socioeconomic information with biophysical indictors relevant to the conservation of coral reef resources. The main purpose of the Socioeconomic Component of the NCRMP is to answer the following questions: What is the status of human knowledge, attitudes, and perceptions regarding coral reefs? And, how are human uses of, interactions with, and dependence on coral reefs changing over time? Integration of socioeconomic information will strengthen national coral reef monitoring and improve the Program's ability to explain how people interact with coral reef resources, as well has how coral reef ecosystems and coral reef management strategies are perceived by the public -- issues of utmost interest to our partners, resource managers, and policy makers.

The NCRMP is an integrated long-term program designed to monitor the condition of coral reefs and coral reef ecosystems. The program now conducts sustained observations of biological, climatic, and socioeconomic indicators in US states and territories where coral reefs are present. More information about all components of the monitoring program can be explored in "NOAA Coral Reef Conservation Program: National Coral Reef Monitoring Plan" (NOAA CRCP 2014) available at:

http://docs.lib.noaa.gov/noaa_documents/CoRIS/CRCP/noaa_crcp_national_coral_reef_monitoring_plan_2014.pdf.

Purpose of this Report

This technical memorandum presents the findings from the initial South Florida NCRMP socioeconomic data collection. The report presents preliminary social indicators and provides examples of how indicators can be used to analyze changes over time in a long term setting. The main objective is to lay the groundwork for combining and comparing socioeconomic variables with a goal of developing meaningful indicators that can be used to examine trends in human dimensions of coral reef resources and better understand human influences on effective coral reef conservation. It should be noted that this report presents information that, in many instances, is being collected for the first time. In all instances, the information represents baseline socioeconomic data for the NCRMP. Some of the variables presented in this report identify gaps in information, and we provide suggestions on how these gaps can be addressed in the future.

Overall Approach of the Socioeconomic Component of NCRMP

The socioeconomic component of NCRMP gathers and monitors a collection of socioeconomic variables, including demographics in coral reef areas, human use of and their interactions (over time) with coral reef resources, as well as knowledge, attitudes, and perceptions of coral reefs and coral reef management. The overall goal is to track relevant information regarding each jurisdiction's population, social and economic structure, society's interactions with coral reef resources, and the responses of local communities to coral management actions. The CRCP will use the information in future research, to assess and monitor socioeconomic status and change over time, to assess the socioeconomic outcomes of management activities, and to improve programs designed to protect coral reefs within each jurisdiction. Ultimately, in consultation with stakeholders, partners and other scientists, the information collected will inform the development of indicators. The development of composite indicators is a method that allows researchers to measure the complex two-way relationship between the environment and humans and track the various facets of this relationship over time by breaking down an intellectually complex and immeasurable concept into its various smaller and more measureable parts to improve communication and policy (Schirnding 2002).

Each indicator will be created using primary data from resident surveys in the US coral reef jurisdictions and from existing socioeconomic data collected from secondary sources such as the US Census Bureau and local government agencies. These indicators will include information about the population, the social and economic structure, the impacts of society on coral reefs, and the contributions of healthy corals to nearby residents. The indicators can also be used to track and assess the status of human knowledge, attitudes, and perceptions regarding coral reefs and

management activities related to coral reef resources. The indicators and the rationale for their selection are provided below in Table 1. The process of selecting and prioritizing these indicators can be explored further in the workshop report "Developing Social and Economic Indicators for Monitoring the US Coral Reef Jurisdictions" (Lovelace and Dillard 2012) available at: http://data.nodc.noaa.gov/coris/library/.

Indicator Development

The indicators identified in Table 1 will be developed at the conclusion of the first full monitoring cycle by combining data from **primary** and **secondary** sources. The assessment of all US coral reef jurisdictions will draw on indicators that may be composites of multiple distinct measures that address the same higher level concepts such as 'Attitudes towards coral reef management strategies.' For example, Dillard *et al.* (2013) established a methodology for creating composite indicators of well-being in coastal communities; and this work will be used as a guide for developing indicators for the well-being of populations living in US coral reef jurisdictions. Box 1 provides a description of the conceptual framework for developing the community well-being composite indicators, as an example of the way in which multiple measures can be used to assess a single composite indicator, such as Basic Needs or Economic Security, that ultimately capture aspects of a larger concept like well-being. It should be noted that the data presented in this report represent the current status of the collection, ultimately intended to contribute to the development of indicators. Once developed, these indicators will be used to assess all US coral reef jurisdictions at the conclusion of the first full monitoring cycle. Both the primary and secondary data presented in this report serve as a snapshot of the collection and analysis of the NCRMP socioeconomic monitoring component for South Florida in 2014.

Primary Data

Primary data for the socioeconomic component of NCRMP is collected via a survey administered to individuals reporting on behalf of their households. The survey instrument is composed of one set of questions that is the same for all US coral reef jurisdictions, as well as a sub-set of jurisdiction-specific questions relevant to local management needs. NCRMP socioeconomic data are collected using a variety of modes as appropriate to the context in each jurisdiction. For example, in South Florida, a random digit dial telephone survey method was employed. For all jurisdictions, the aim is a representative sample of the population that meets a 95% confidence level with a minimum of a +/-5% margin of error. The survey methodology generally follows Dillman's Tailored Design Method (Dillman *et al.* 2009). It should be noted that the survey was developed by utilizing questions from a "bank" of over 120 questions. These questions were approved for use by the Office of Management and Budget (OMB), which is responsible for administering the Paper Work Reduction Act (1995), the main purpose being to ensure that the public is not unduly burdened (in terms of time) and that confidentiality is

assured. Surveys are planned to be repeated in each US coral reef jurisdiction after the completion of a full monitoring cycle, approximately once every five to seven years.

Secondary Data

Not only is the use of secondary data ideal for the development of a sustainable, cost effective, and long term socioeconomic monitoring plan, but secondary data is also well suited for the development of indicators used to track population and environmental trends over time. Secondary data collection involves compiling data that was gathered by other organizations from multiple sources and across US coral reef jurisdictional geographies into a centralized database. The use of data sources that are collected in a standardized way over time (such as US Census Bureau data) can help facilitate the integration of social, economic, and biophysical data collected under NCRMP because integration is aided by broad spatial and temporal coverage of social, economic, and biophysical data. Many of the secondary datasets that provide social and economic data have this quality and allow for more robust analyses with biophysical data.

Original sources for much of the secondary data presented in the report can be found in the secondary data sources table (Appendix 3). Secondary data items included in this report, but not listed in Appendix 3, are not considered part of the formal NCRMP secondary data collection because they are unique to the jurisdiction or are not available in a standardized format over time. These items may be included in the formal NCRMP secondary data collection at a later time if availability across geographies increases.

Box 1: Composite Indicator – Community Well Being

Well-being is a concept used to assess the status of people, either individually or collectively, at different scales (e.g., individual, community and national; Costanza *et al*. 2007). Well-being assessments can be used to determine how people are doing in relation to an optimum standard of life experience (Doyal and Gough 1991) and are generally used by decision-makers to inform policies and programs focused on improving the societal conditions. It provides a means of tracking the relationship between communities and the environment, and a better means of understanding the ecosystem as a whole. When the environment is providing ecosystem services that communities need and desire, well-being has positive gains. Conversely, if there is decline or disruption in ecosystem services, we may expect a decline in well-being, particularly with increased dependence on these services (Butler and Oluoch-Kosura 2006; Costanza *et al*. 1997; MEA 2005). Being able to predict the consequence to humans, both positive and negative, associated with changes in ecosystem states is critical to informed management.

Composite indicators that can ultimately be tracked alongside coral reef ecosystem condition will be employed. The composite indicators are shown in the figure below and each composite indicator is conceptually complex. At the conclusion of the first monitoring cycle, the coral reef jurisdictions like South Florida will be scored on select indicators of well-being. These scores will be compared across US coral reef jurisdictions and will then be used in statistical analyses with indicators of environmental condition to analyze the dynamic relationship between the ecosystem services that people regularly enjoy and community well-being.

Figure 1: Framework of composite indicators for well-being and ecosystem condition, adapted from Dillard *et al.* 2013

Table 1: NCRMP Socioeconomic Indicators

	Indicators	Rationale
1	Participation in coral reef activities (including snorkeling, diving, fishing, harvesting)	Measuring participation in coral reef activities enhances understanding of the economic and recreational importance of coral reefs to local residents as well as the level of extractive and non-extractive pressures on reefs
2	Perceived resource condition	Assessment of perceived conditions is a complement to biophysical information and is key to evaluating differences in levels of support for various management strategies
3	Attitudes towards coral reef management strategies	Monitoring this information over time will be valuable to decision makers, as it will provide insight into possible changes in public perception concerning coral reef management strategies
4	Awareness and knowledge of coral reefs	Monitoring this information over time is key to tracking whether CRCP constituents understand threats to coral reefs and will help inform management strategies (and education/outreach efforts)
5	Human population trends (change) near coral reefs	Monitoring human population trends is important for understanding increasing pressure on coral reefs, as well as reef-adjacent populations
6	Economic impact of coral reef fishing to jurisdiction	Tracking the economic contributions of coral reefs can help justify funds allocated for coral reef protection
7	Economic impact of dive/snorkel tourism to jurisdiction	Tracking the economic contributions of coral reefs can help justify funds allocated for coral reef protection
8	Community well-being	Tracking changes in health, basic needs, and economic security enhances understanding of linkages between social conditions and coral reefs
9	Cultural importance of coral reefs	Measuring cultural importance improves understanding of traditional and cultural significance of coral reefs to jurisdictional residents, and whether this is changing over time
10	Participation in behaviors that may improve coral reef health (*e.g.*, beach cleanups, sustainable seafood choices)	Measuring participation improves understanding of positive impacts to coral reefs as well as negative impacts
11	Physical Infrastructure	Assessment of coastal development footprint, physical access to coastal resources, and waste management/water supply infrastructure provides general understanding of human impact on the coast
12	Knowledge of coral reef rules and regulations	Tracking this information over time at the jurisdictional/national level will inform investment in education and outreach
13	Governance	Measurement of governance provides information on the current status of local institutions involved in coral reef conservation, number of functioning management strategies, and percent area of coral reefs under protection

Geographic Scope

Overall, the NCRMP focuses on the CRCP's geographic priority areas; however, as some of those areas are uninhabited, the socioeconomic variables are being collected from only the inhabited areas. When feasible, indicators formulated at the sub-jurisdictional scale will be reported alongside biological indicators collected at the same scale. Efforts will be made to

ensure sufficiently robust sample size to allow for reporting of socioeconomic indicators at appropriate sub-jurisdictional scales.

Table 2: Geographic scope of current NCRMP Socioeconomic Monitoring

Location	Sampling Units
American Samoa	Island of Tutuila
Florida	Martin, Palm Beach, Broward, Miami-Dade, and Monroe Counties
Hawai'i	Islands of Hawaii, Maui, Oahu, Kauai, Molokai, and Lanai
Puerto Rico	Islands of Puerto Rico, Vieques, and Culebra
Commonwealth of the Northern Mariana Islands	Islands of Saipan, Tinian and Rota
Guam	Entire island of Guam
US Virgin Islands	Islands of St. Croix, St. Thomas, and St. John

Jurisdiction Description

The five South Florida Counties included in this study (Miami-Dade, Broward, Palm Beach, Martin, and Monroe) are among the southernmost counties in the contiguous United States, with portions of the Florida Keys (which are part of Monroe County) extending south of the 25th parallel north. The broad-shallow continental shelf off of the coast of these counties combined with water temperatures influenced by the Gulf Stream Current provide ample habitat for coral growth (Andrews *et al*. 2005), making this the only near-shore coral habitat in the contiguous United States (Figure 2). The area, also known as the Florida Coral Reef Tract, extends approximately 360 miles, from St. Lucie Inlet (Martin County) in the north to the Dry Tortugas National Park in the south (FDEP 2011b). From here forward, references to the jurisdiction of Florida are limited to these counties unless otherwise specified.

Of the sixty-seven counties in Florida, almost one third of the state's population resides in the five study area counties, with the top three most populous counties statewide consisting of Miami-Dade, Broward, and Palm Beach (US Census Bureau 2015). Many of the region's corals are within 1.5 km of the counties' urbanized shores (Collier *et al*. 2008), putting the residents in close proximity to these natural features.

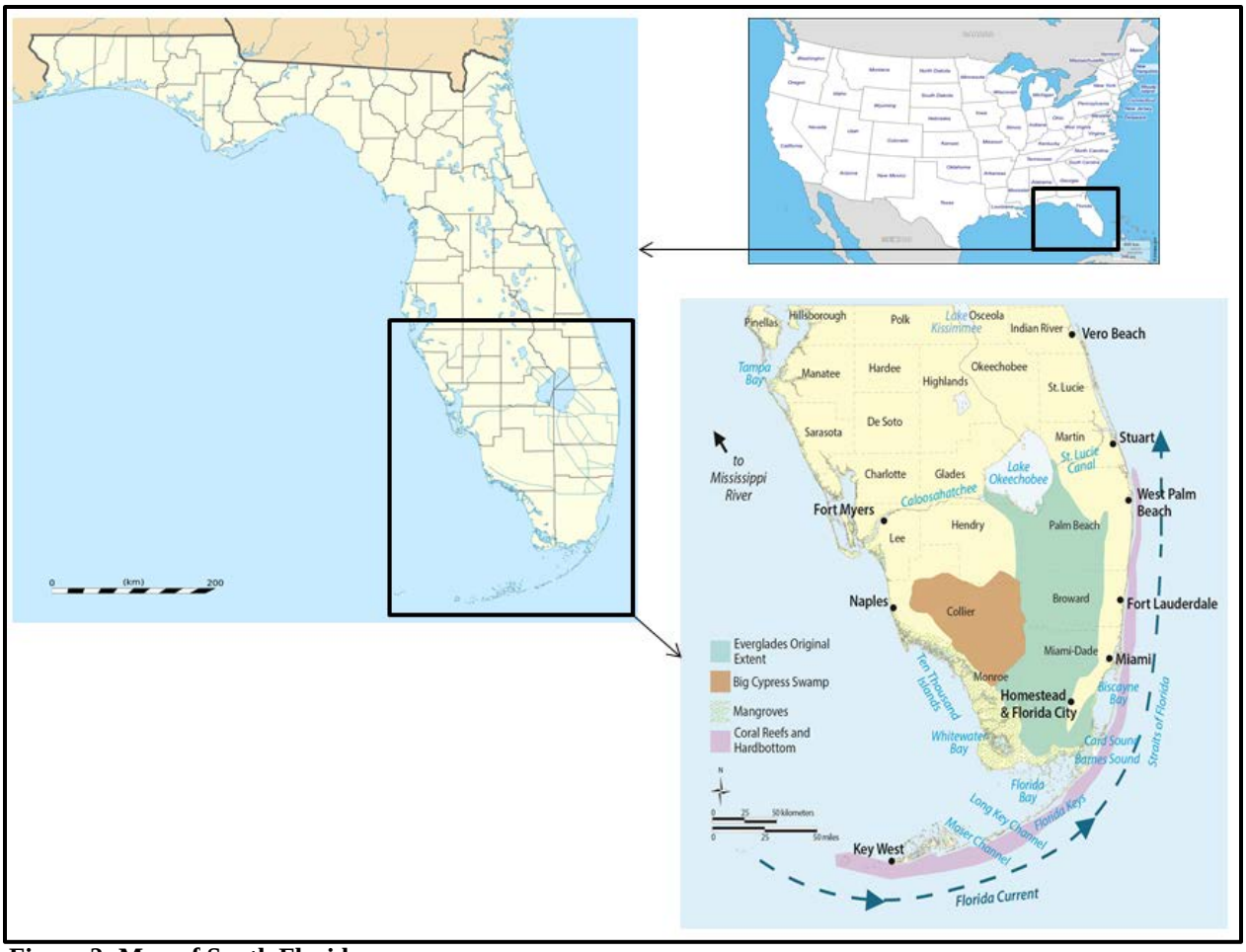

Figure 2: Map of South Florida

Source: NOAA, US Census Bureau, d-maps.com

South Florida's climate is classified as *tropical savanna* (Kottek *et al.* 2006). There is a defined rainy season from May through October, when air mass thundershowers that build in the heat of the day drop heavy but brief summer rainfall. Late summer and early fall bring decaying tropical lows (and occasionally land-falling tropical cyclones) that contribute to late summer and early fall rains. The Gulf Stream Current that brings warm water up Florida's East Coast keeps temperatures moderate a few miles inland and helps coral reefs thrive (University of Miami 2013).

South Florida has a diverse population, including many Hispanic immigrants. Due to Miami's close proximity to Cuba, the city has long been a haven for many Cuban immigrants. In fact, Miami-Dade County has the nation's largest populations of Cubans, Colombians, Hondurans, and Peruvians (US Census Bureau 2010; Pew Research Center 2012). While English is the predominant language, Spanish is used extensively in certain enclaves throughout South Florida, most notably in Miami-Dade County.

Tourism is an integral part of the South Florida economy, producing over $8 billion in gross domestic product (GDP) in 2013 (measured in year 2005 dollars). South Florida is the only US coral reef jurisdiction that the NCRMP monitors that also lies on the US mainland, and as such, South Florida is a frequently visited tourist destination for domestic and foreign travelers alike. These high rates of tourism, coupled with high population density near the coast, bring even more humans in contact with coral reef ecosystems in the region; thereby creating more opportunities for humans to derive ecosystem services from reefs, but also more opportunities for human-induced stressors to impact reefs.

Methodology

2014 NCRMP Survey

Resident surveys took place in South Florida in Miami-Dade, Broward, Palm Beach, Martin, and Monroe counties in 2014, and will be repeated approximately every five to seven years. The potential respondent universe for this study was adults, eighteen years or older, who live in one of the five above counties for at least 3 months out of the year. Due to the importance of understanding all potential users of the coral reefs who may be affected by activities related to NOAA's CRCP, the survey was not restricted to those who live directly on the coastline. Therefore, all adults in these counties were included in the potential respondent universe.

The South Florida survey data collection was focused on the following indicators:

- Participation in coral reef activities (including snorkeling, diving, fishing, harvesting)
- Perceived resource condition
- Attitudes towards coral reef management strategies and enforcement
- Awareness and knowledge of coral reefs
- Cultural importance of reefs
- Participation in behaviors that may improve coral reef health
- Awareness/knowledge of coral reef rules and regulations

More information on the general survey methods applied can be found here: http://www.coris.noaa.gov/monitoring/resources/FAQs_NCRMP_Social_Survey.pdf, while details for the South Florida effort are provided below.

Residents of the five aforementioned South Florida counties over the age of 18 were surveyed via telephone from January – March 2014, and again from May – July 2014. Phone number lists were purchased for the five counties containing both landline and cell phone numbers. Each number from the list was called up to five times, at which point the number was dropped from the calling process if it had not yet been answered. Contracted surveyors used Computer Assisted Telephone Interviewing (CATI) software and offered the survey in two languages: English and Spanish. A total of 10,080 unique phone numbers were called over the course of the survey, resulting in a total of 1,210 interviews (1,177 completed interviews and 33 partially completed

interviews) for a response rate of approximately 12%. No names or personally identifiable information were collected during surveying.

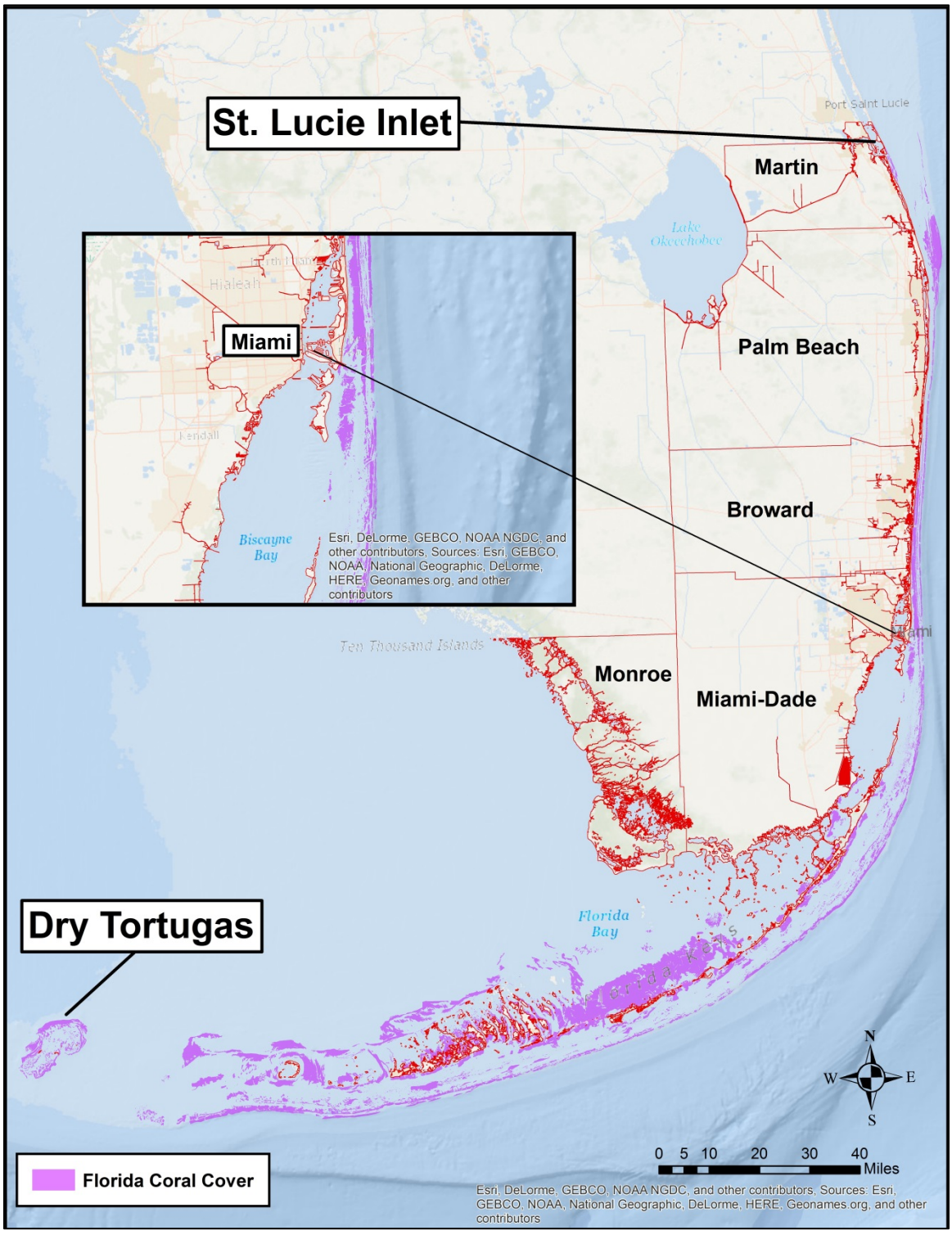

Figure 3: Location of sampled counties in Florida

This report presents a summary of select measures collected via the survey instrument and secondary data sources. A presentation on all survey data results for Florida is available at: http://www.coris.noaa.gov/monitoring/socioeconomic.html.

Secondary Data Collection

Socioeconomic data were compiled for South Florida from secondary data sources including the US Census Bureau, the US Bureau of Economic Analysis (BEA), the US Bureau of Labor Statistics (BLS), the Environmental Protection Agency (EPA), the US Department of Health and Human Services (HHS), the National Weather Service (NWS), and local government agencies. These data were collected and analyzed at the jurisdiction level, though smaller geographies may be included in future analyses. Secondary data collection included cleaning and transforming data prior to analyses, maintaining documentation from original sources, evaluating data for errors, and other data proofing procedures.

The secondary data collection for South Florida was focused on the following indicators:

- Human population change near coral reefs
- Community well-being
- Physical infrastructure
- Economic impact of coral reef fishing to jurisdiction
- Economic impact of dive/snorkel tourism to jurisdiction

Many of the secondary data presented in this report were taken from the NCRMP socioeconomic project collection as described above. More information about original sources for these data can be found in the data sources table (Appendix 3). Secondary data items included in this report, but not in Appendix 3, are not considered part of the formal NCRMP secondary data collection because they are unique to the jurisdiction or are not available in a standardized format over time.

As the data collection and final indicator development for South Florida is in progress, there are several indicators that will be more comprehensively addressed by combining the survey (primary) and secondary data. These include indicators which benefit from both existing data from management plans, as well as survey data on the involvement of local residents in resource management decisions (e.g., Governance). At the conclusion of the first full cycle of monitoring, the following indicators will be developed using a combination of data:

- Governance
- Community well-being
- Economic impact of coral reef fishing to jurisdiction
- Economic impact of dive/snorkel tourism to jurisdiction
- Awareness/knowledge of coral reef rules and regulations

Data analysis

Data analysis of both survey and secondary data included descriptive analyses (e.g., measures of central tendency, examination of distribution), as well as examinations of statistical relationships between variables (e.g., cross tabulations, correlation, regression analyses). Additionally, geospatial analyses were used to examine the extent of governance and specifically, the amount of coral reef area under protected status. Some of the key findings will be discussed in the following sections of this report.

As a result of the survey under-sampling some demographic groups in South Florida (most notably younger people and Hispanic people), post-stratification sampling weights were calculated to make the sample representative of South Florida's population. In order to compare the South Florida population to the sample, data on the populations for each sub-group were derived from the US Census Bureau American Community Survey (ACS), using the five year estimates from 2014. These post-stratification sampling weights were designed to fix the skewness of responses toward older people and non-Hispanic people, and were employed in all statistical analyses. Therefore, any conclusions that are stated concerning relationships between knowledge, attitudes, perceptions, and demographics based on NCRMP survey data have utilized these weights in their calculations. It also must be noted that the following frequency tables and graphs do not utilize these post-stratification weights, as no statistical conclusions are being drawn from them. Instead, they are merely illustrating the frequency distribution of responses to each survey question.

Figure 4: Coral reefs in South Florida (Photo Credit: NOAA)

Results: Section 1

Results are reported by indicator in order to demonstrate which individual measures will be used to assess the indicators presented in Table 1. The first section of indicators presented includes those measured through the use of primary survey data; the first of which is the frequency of participation in marine activities related to coral reefs, as displayed in Table 3.

Frequency of participation in recreational and extractive activities

Table 3: Frequency of participation in various extractive and non-extractive reef activities (n=1,210)

	Non-extractive activities								Extractive Activities	
Frequency	**Swimming**	**Snorkeling**	**Diving (SCUBA or free)**	**Waterside/ beach camping**	**Beach recreation**	**Boating**	**Watersports (surfing, kayaking, paddle-boarding, kite surfing)**	**Island/ sandbar recreation**	**Fishing**	**Gathering of marine resources**
Never	41.9%	72.5%	82.5%	81.9%	38.3%	61.3%	76.5%	75.5%	74.7%	84.7%
Once a month or less	27.4%	16.8%	11.0%	12.5%	31.0%	21.6%	12.5%	15.1%	12.5%	8.3%
2-3 times a month	13.0%	5.5%	3.5%	2.1%	13.7%	7.1%	5.5%	3.0%	5.4%	2.4%
4 times a month or more	17.2%	4.3%	2.2%	2.0%	15.6%	8.9%	4.5%	4.5%	6.3%	2.9%
Not sure, Refused, or No response	0.6%	1.0%	0.9%	1.5%	1.4%	1.1%	1.1%	1.9%	1.1%	1.7%

Table 3 outlines respondents' self-reported frequency of participation in coral reef related activities. It must be noted that these results reflect only residents of South Florida, and do not take tourist activity participation into account. Participation in non-extractive recreational reef activities varies in South Florida, with the two activities that residents participate in most frequently being swimming (58% participate) and beach recreation (60% participate).[1] Participation in fishing and gathering (extractive activities) of marine

[1] The most direct linkage between beaches and coral reefs is through the protection afforded to beaches by coral reefs which help protect beaches from erosion due to storm events. Additionally, reefs provide material for "natural beach replenishment" (NOAA CRCP 2015). As a result of these linkages, coral reefs are important to coastal residents' and visitors' use of the beach (Shivlani 2014).

resources is less common, with just under a quarter of respondents indicating that they fished, and just under 14% of respondents indicating that they gathered marine resources.

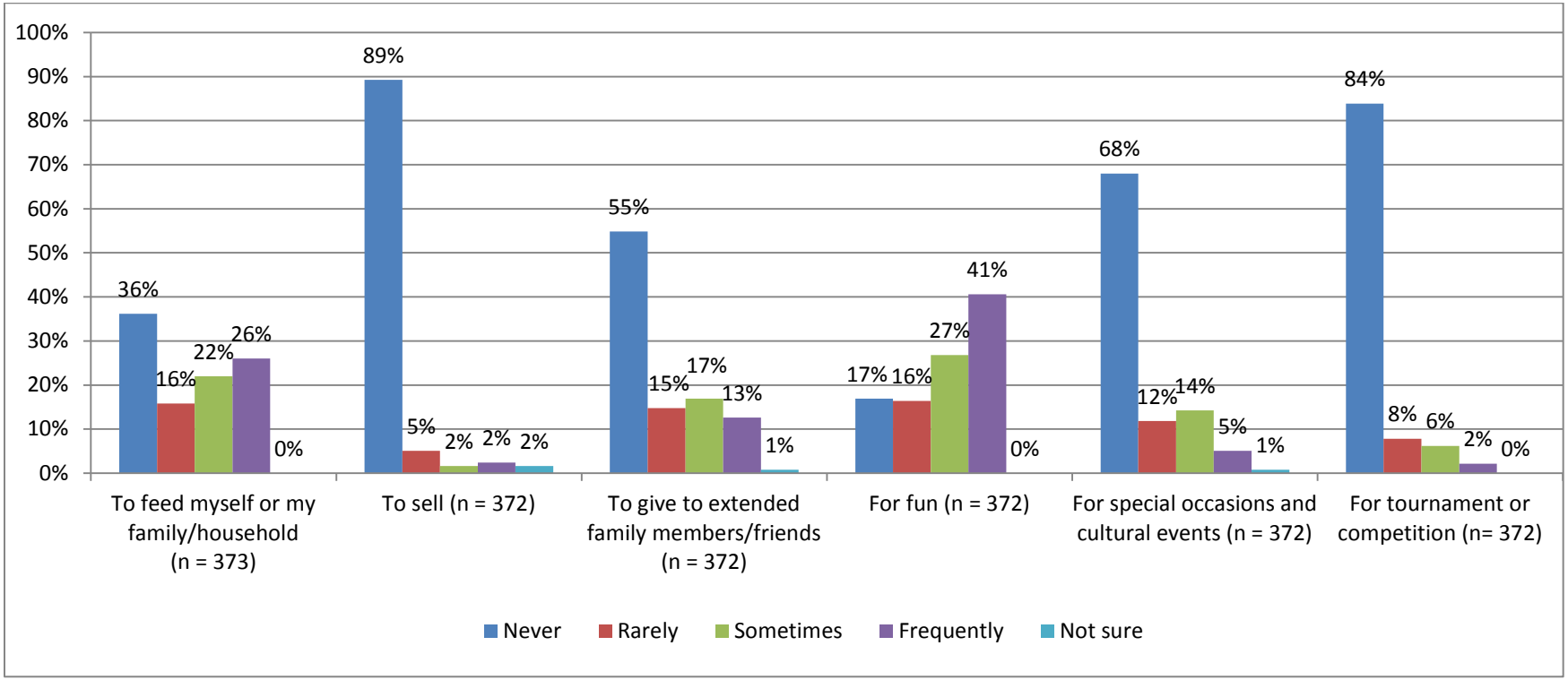

Figure 5: Frequency of fishing for various purposes in South Florida

Figure 5 displays respondents' self-reported reasons for fishing. These questions were only answered by respondents that indicated that they fish and/or gather in the "activity" question (Table 3). Therefore, the sample size for this question is relatively small when compared to other questions in the survey. The most common reason for fishing among South Florida respondents who fish is "for fun;" with 41% of respondents that fish indicating that they fish "for fun" frequently. Of respondents who fish, fishing "to sell" was the least chosen response; with 89% of respondents indicating that they never sell their catch. This finding suggests that approximately 33 people surveyed fish to sell their catch either rarely, sometimes, or frequently.

Frequency of seafood consumption

Of the 1,199 people that responded to the question "How often do you or your family eat fish/seafood?" over 95% indicated that they consume seafood, with over 65% indicating that they consume seafood at least once a week. When considering where respondents obtained their seafood from, "purchased by myself or someone in my household at a store or restaurant" was by far the most frequently encountered response, with over 78% of respondents indicating that they use this source as their first or second choice source for seafood. This choice was followed by "purchased by myself or someone in my household at a market or roadside vendor" (31%).

Participation in behaviors that improve coral reef health

Respondents were also asked about their environmental behavior practices. These behaviors consist of participating in beach clean-ups and volunteering for an environmental group, among other practices. It is believed that these types of behaviors would help sustain and/or improve coral reef health in the region. Of the 1,175 that responded, over half (58%) indicated that they never participate in environmental behavior and 23% of respondents indicated that they participate in environmental behavior at least "several times a year."

Figure 6: Beach Clean-ups in Palm Beach County (Photo Credit: Embry Riddle Aeronautical University)

Perceived resource condition

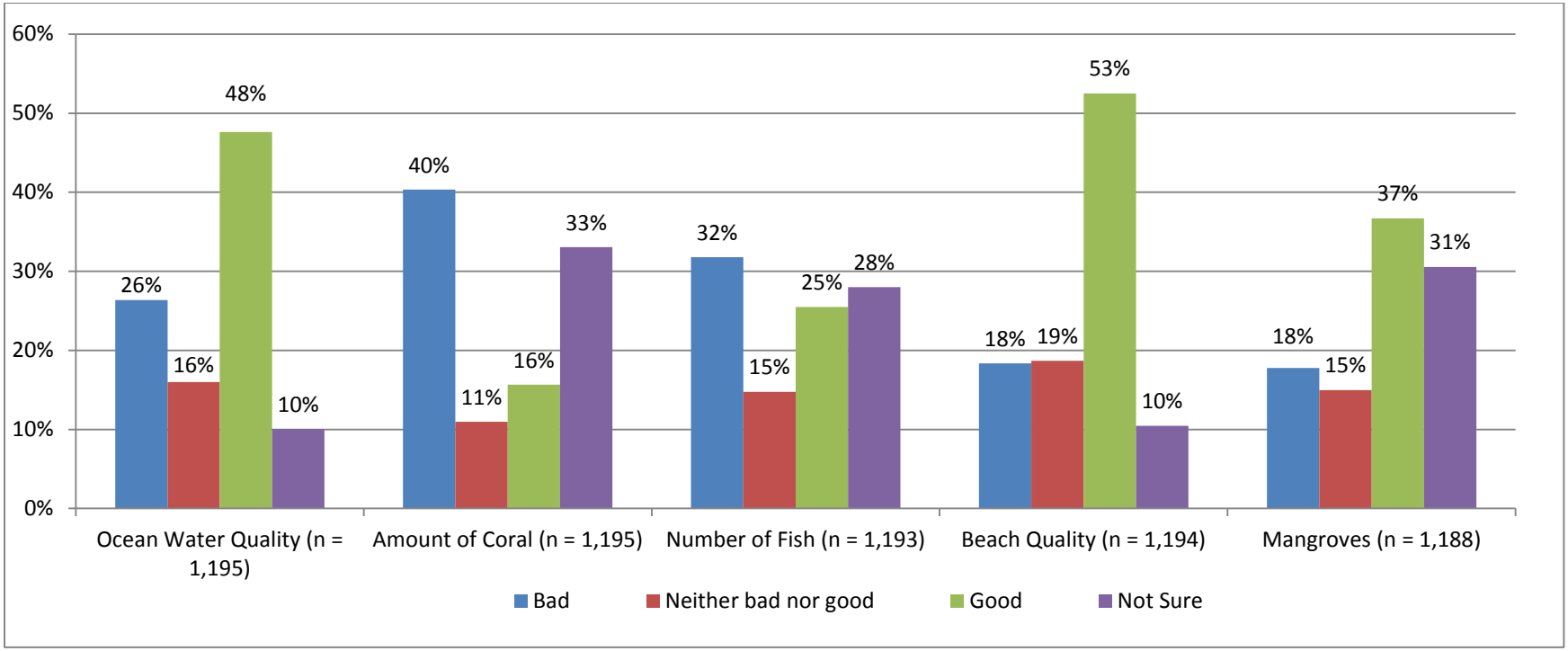

Figure 7: Resident opinions regarding current conditions of marine resources

Figure 7 illustrates respondents' perceptions of the current condition of marine resources in South Florida. Residents responded most favorably when asked about their perceived condition of beach quality, with over half of the respondents indicating that current beach quality condition was "good." Residents responded least favorably when asked about their perceived condition of the amount of coral, with 40% of respondents indicating that the current condition of the amount of coral was "bad;" however, amount of coral was also the resource that respondents were most unsure about, with one third of respondents indicating that they were "not sure" of the condition of the amount of coral.

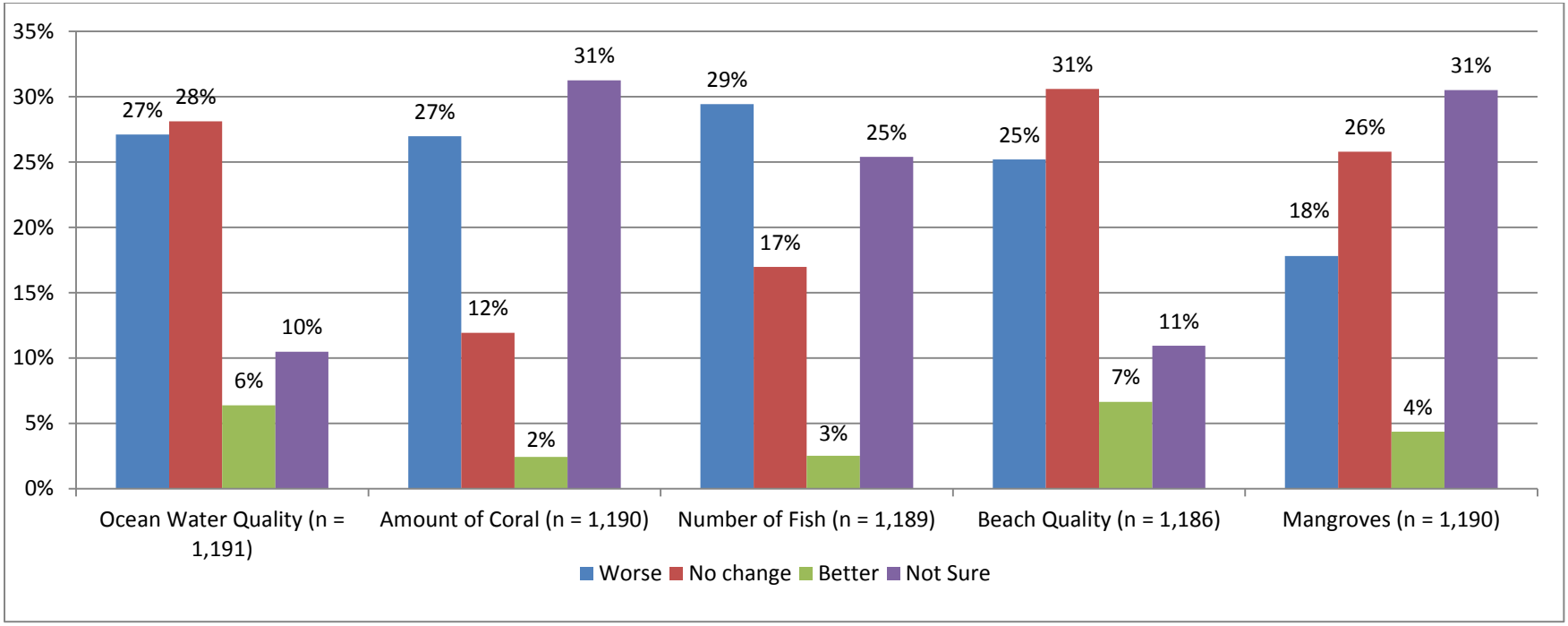

Figure 8: Resident opinions on change in condition of marine resources over past 10 years

Figure 8 illustrates respondents' perceptions concerning the change in the condition of marine resource over the last 10 years in South Florida. Overall, a very small proportion of respondents believed that the condition of these marine resources has gotten better over the last decade. "Number of fish" was the marine resource that the highest proportion of respondents felt had gotten worse over the last decade (29%). When asked about the change in condition over the last decade, the marine resources that respondents were most unsure about were amount of coral and amount of mangroves (31% for each).

Respondents were asked how they felt the condition of marine resources will change over the next 10 years as well. Of the 1,192 that responded, over half (52%) indicated that they thought that the condition of marine resources will "get worse" over the next decade, while 15% felt that the condition would "stay the same," and 23% believed that the condition will "get better."

Attitudes towards coral reef management strategies

Table 4: Resident opinions regarding potential management strategies for South Florida

Management Option	Disagree	Agree	Neither/ Unsure	Sample Size
Law enforcement of existing rules/regulations	6%	86%	9%	1,179
Community participation in management	7%	82%	11%	1,178
Seasonal openings/closures of fisheries	8%	74%	17%	1,174
Stricter control of sources of pollution to preserve water quality	4%	90%	6%	1,179
Restrictions on coastal development	8%	82%	10%	1,178
Marine zoning	7%	67%	26%	1,165
Designated marine protected area	4%	88%	7%	1,176
Limited recreational use	23%	62%	15%	1,177
Restricted access	19%	65%	16%	1,171
No-take zones	7%	71%	22%	1,168
More restrictions on construction practices to prevent sediment from going into the sea	8%	83%	9%	1,177
Limits per person for certain fish species (size and amount)	8%	84%	8%	1,178

Table 4 depicts respondents' attitudes toward various management options that were presented in the survey as common strategies used in the management of coral reef ecosystems. Overall, respondents were generally very supportive of all potential management strategies that could be used to improve the protection of coral reefs. The management option with the most support was "stricter control of sources of pollution to preserve water quality," with 90% of respondents agreeing with this strategy. While the majority of respondents agreed with all of the presented management options, the option with the least support was "limited recreational use," with 23% of respondents disagreeing with this strategy. The management options that respondents were the most unsure about were marine zoning and no-take zones (26% and 22%, respectively).

Knowledge of coral reef rules and regulations

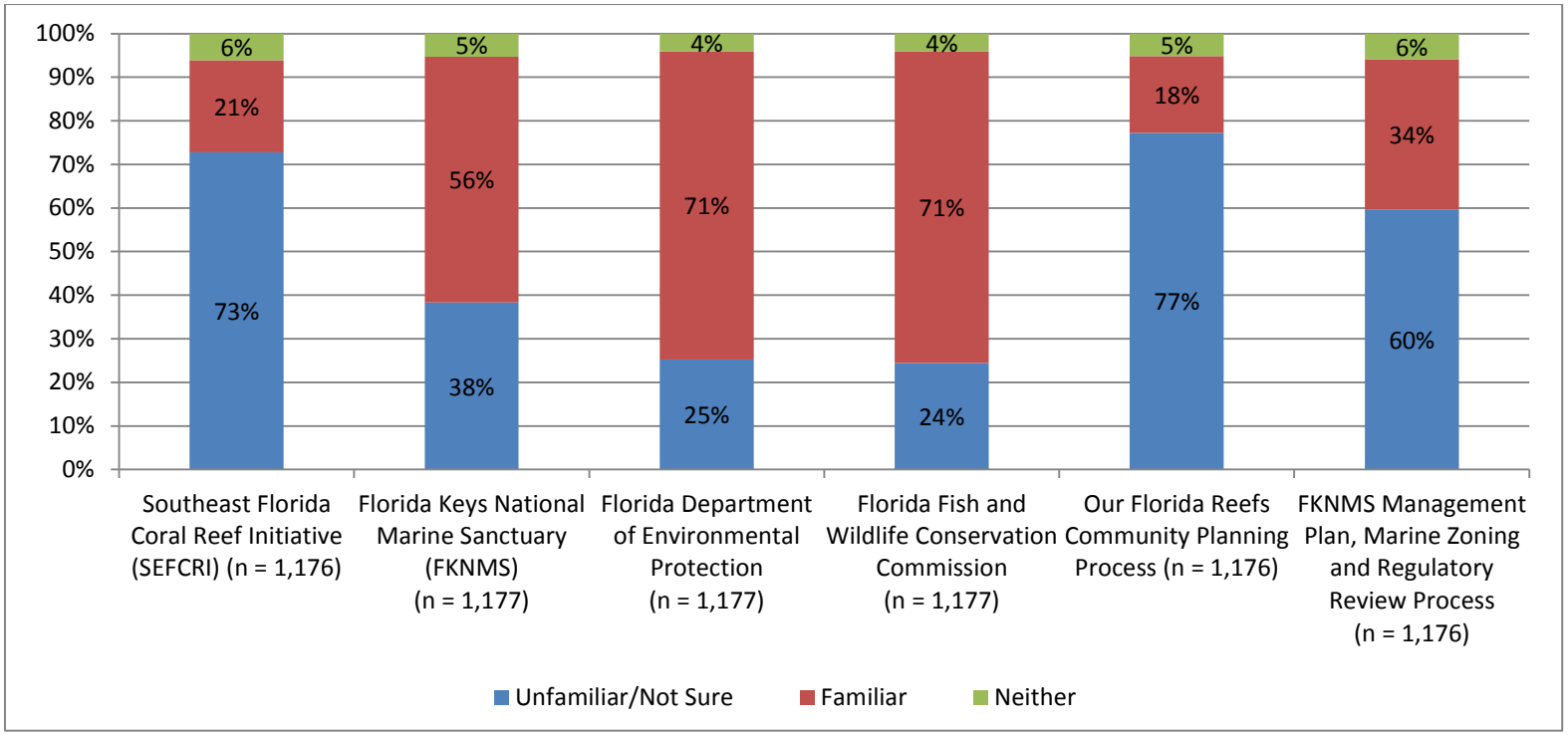

Figure 9: Residents' knowledge of coral reef management organizations in South Florida

In order to operationalize the indicator of "knowledge of coral reef rules and regulations," Figure 9 displays respondents' relative familiarity with various coral reef management organizations and planning processes throughout South Florida. Respondents were most familiar with the Florida Department of Environmental Protection and the Florida Fish and Wildlife Conservation Commission (71% familiar). Conversely, respondents were the least familiar with Our Florida Reefs Community Planning Process (77% unfamiliar), followed by the Southeast Florida Coral Reef Tract Initiative (73% unfamiliar). Given that the latter process and organization were relatively new in South Florida, these results were not surprising. In fact, major efforts to promote the Our Florida Reefs Community Planning Process were underway during this survey (see for example: http://ourfloridareefs.org/press-room/).

Figure 10: The Healthy Beaches Program management initiative (Photo credit: Lonnie Watts, WUSF)

Awareness and knowledge of coral reef functions and threats

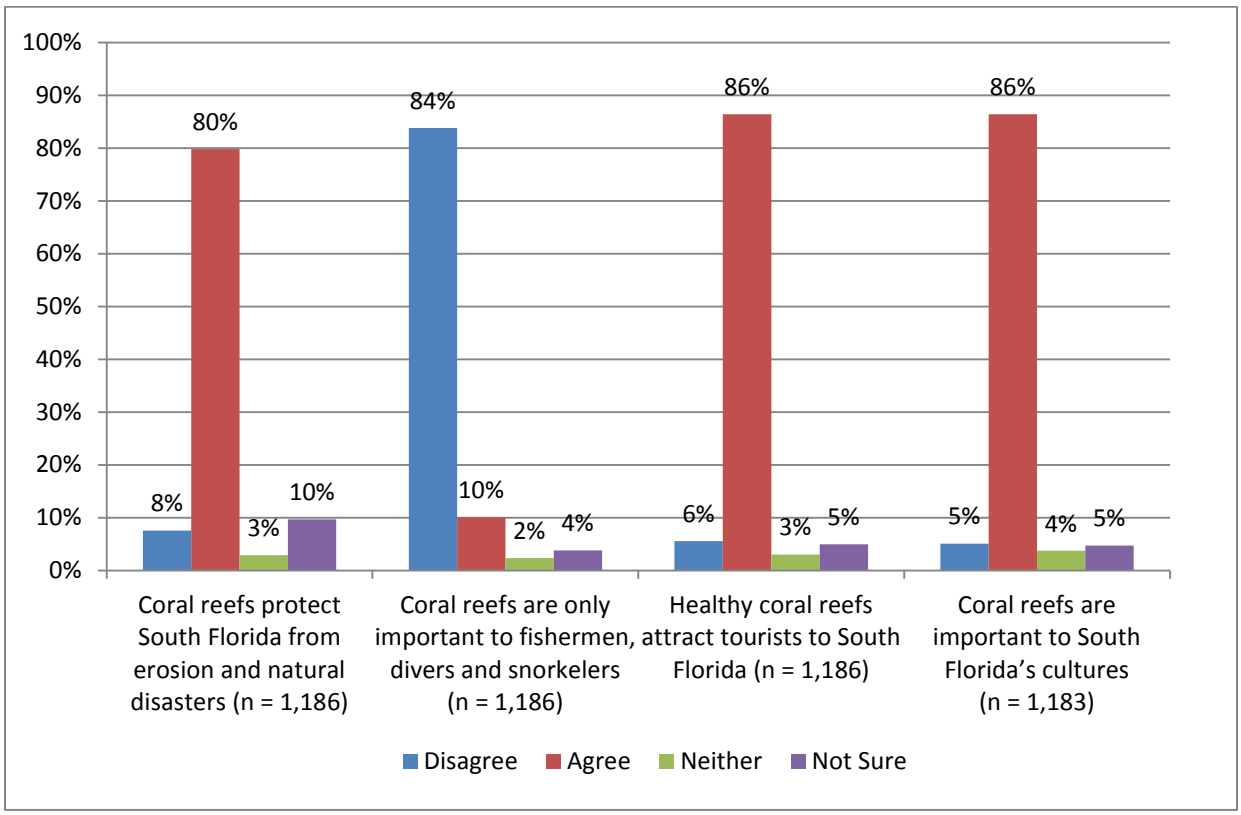

Figure 11: Resident perceptions regarding coral reef services

Figure 11 displays respondent attitudes pertaining to the services and byproducts of healthy coral reef ecosystems. The majority of respondents agreed with the above statements in the graph, except for one item: 84% of respondents disagree with the statement "coral reefs are only important to fishermen, divers and snorkelers." The statement that respondents were most unsure about was "coral reefs protect South Florida from erosion and natural disasters" (10%).

Familiarity with threats

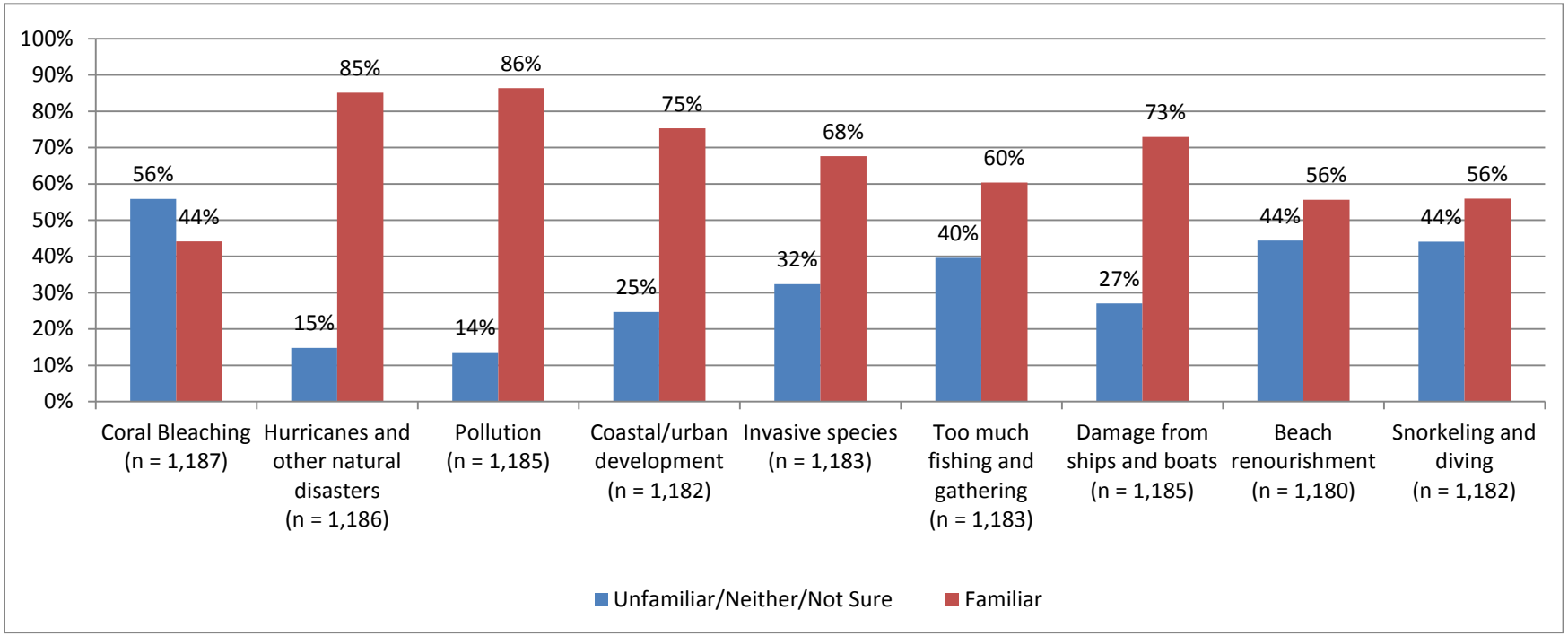

Figure 12: Residents' familiarity with threats to coral reefs

Respondents were also asked about their relative familiarity with various items that pose a threat to coral reef ecosystems. Residents were, overall, mostly familiar with the various threats faced by coral reefs. For all of the threats listed in the survey, respondents were more familiar than they were unfamiliar with one exception. Figure 12 shows that 56% of respondents were unfamiliar with coral bleaching. The threat to coral reefs that respondents were most familiar with was pollution (86%), followed by hurricanes and other natural disasters (85%).

Level of threats to coral reefs

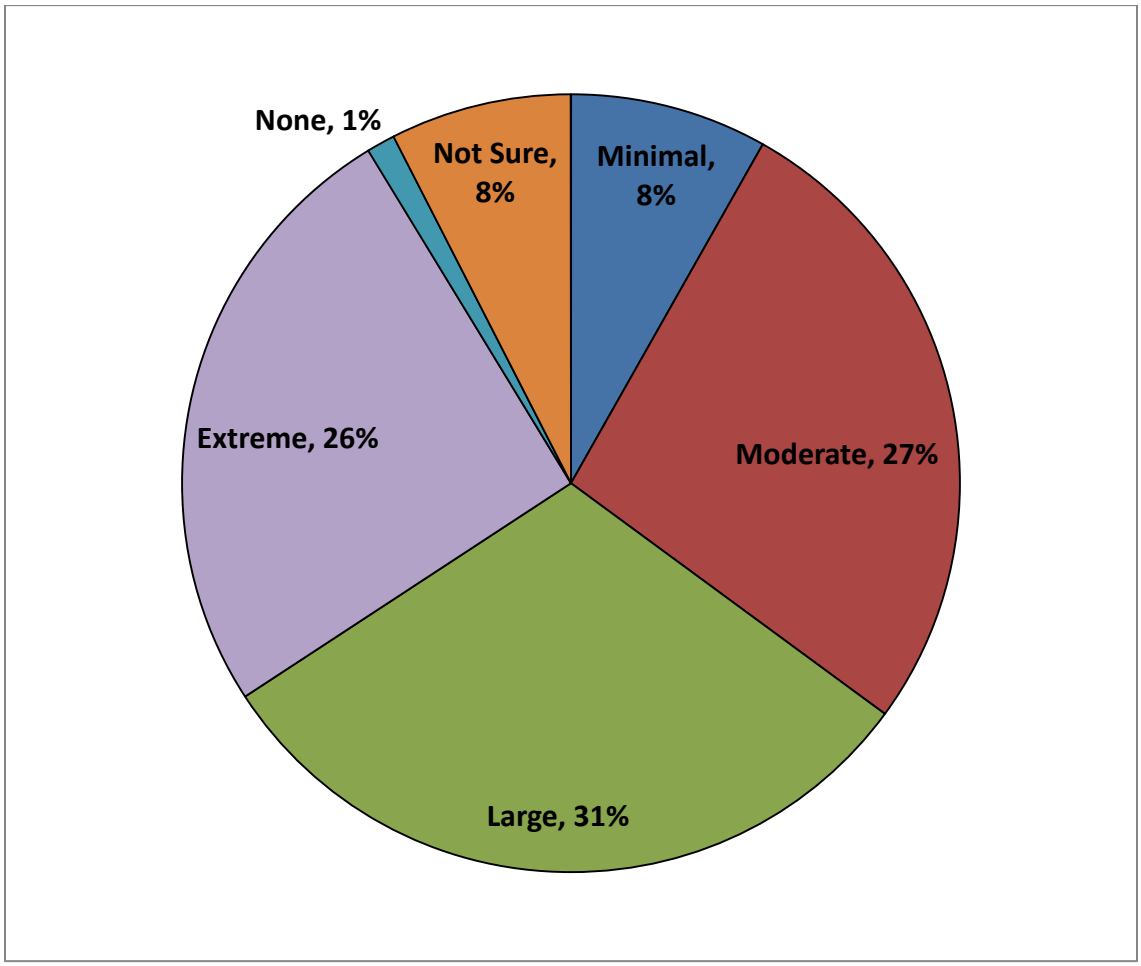

Figure 13: Residents' perceptions of the severity of threats to coral reefs (n = 1,183)

Figure 13 illustrates respondent perceptions concerning the level of threat severity facing coral reef ecosystems. Over half of the respondents (57%) believed that the threat severity to coral reefs is at least "large." Only 1% of respondents indicated that they believe coral reefs are facing no threats at all. Additionally, 8% of respondents indicated that they are not sure about overall coral reef threat severity.

Results: Section 2

In the following section, the measures presented for each indicator originate from various secondary data sources. These indicators may be ultimately measured through secondary data alone or through a combination of primary and secondary data.

Human population composition and trends (change) near coral reefs

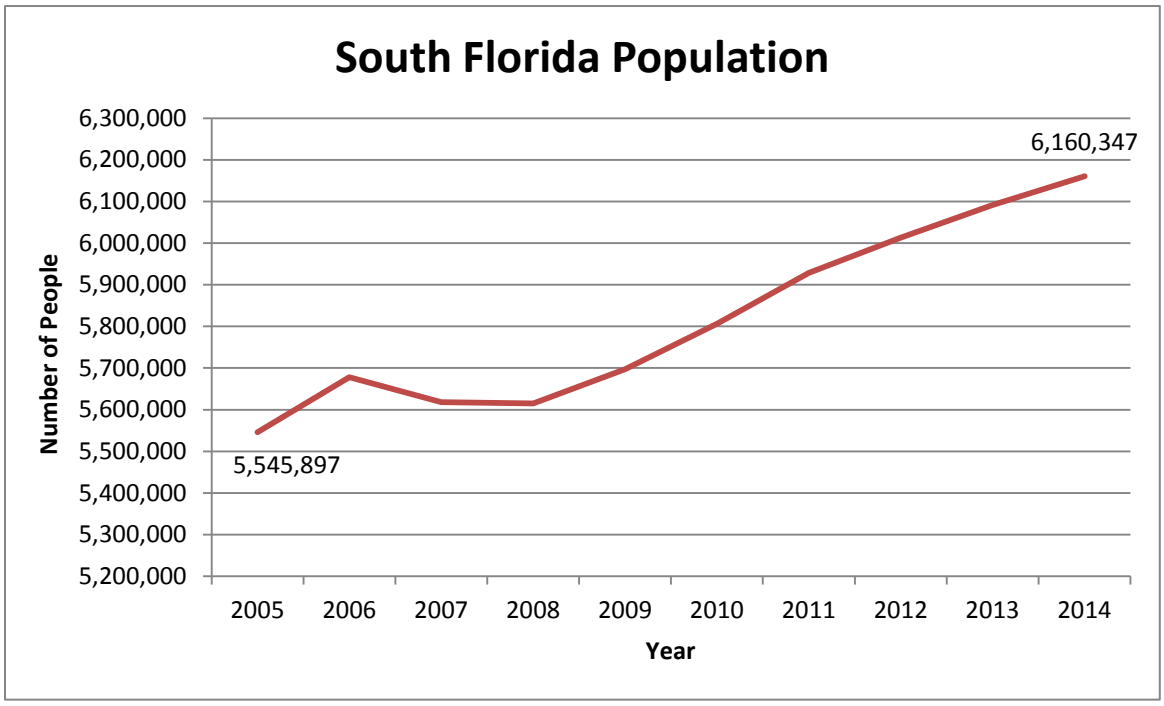

Figure 14: Combined population in South Florida Counties

Source: US Census Bureau, American Community Survey

Figure 14 illustrates the recent trend in population growth in South Florida (US Census, American Community Survey). The population of South Florida dipped slightly from 2006 to 2007, and remained steady until 2008, but has been steadily increasing since. The reported 2005 population of 5,545,897 people has increased by 14% to 6,160,347 people in 2014.

Table 5: Population change for each South Florida county, 2005-2014

County	Population Change	Percent Change
Broward	111,645	6%
Martin	17,254	13%
Miami-Dade	333,687	14%
Monroe	2,062	3%
Palm Beach	149,802	12%

Source: US Census Bureau, American Community Survey

Miami-Dade County exhibited the most population growth from 2005-2014 in absolute and percentage terms when compared to the other South Florida counties. Monroe County was on the other end of the spectrum, exhibiting the smallest population growth from 2005-2014 in absolute and percentage terms. The five counties of the South Florida region each exhibited a net population gain over this period (US Census, American Community Survey).

Table 6: Population density in South Florida counties, 2000-2010

County	Population Density, 2000 (persons per square mile of land area)	Population Density, 2010 (persons per square mile of land area)	Percent change in population density, 2000-2010
Broward	1346.5	1444.9	7%
Martin	228.1	269.2	18%
Miami-Dade	1157.9	1315.5	14%
Monroe	79.8	74.3	-7%
Palm Beach	573.0	670.2	17%
South Florida	**1050.7**	**1165.2**	**11%**

Source: US Census Bureau, Decennial Census of Population and Housing

From 2000 to 2010, population density increased for each South Florida county, with the exception of Monroe (US Census). Martin County exhibited the largest growth in population density (18%) over the course of the decade, and the overall population density of the five South Florida counties increased by 11% from 2000 to 2010.

Table 7: Migration Inflows and Outflows for South Florida counties, 2008-2012

County	In-Migration	Out-Migration	Net Migration
Broward	99,718	77,395	22,323
Martin	11,020	8,743	2,277
Miami-Dade	95,436	91,009	4,427
Monroe	6,201	6,599	-398
Palm Beach	71,926	54,627	17,299
South Florida	**284,301**	**238,373**	**45,928**

Source: US Census Bureau, 2008-2012 American Community Survey 5-yr estimates

The table above illustrates the migration inflows and outflows (annual averages from 2008-2012) for each of the five South Florida counties. Broward County exhibited the highest average annual net in-migration with a figure of 22,323 people, followed by Palm Beach County with an average annual net in-migration of 17,299 people. Both of these figures were much greater than the figures for the other three South Florida counties, with Monroe County actually exhibiting an average annual net out-migration of 398 people. Overall, South Florida experienced an average annual net in-migration of 45,928 people in the years 2008-2012.

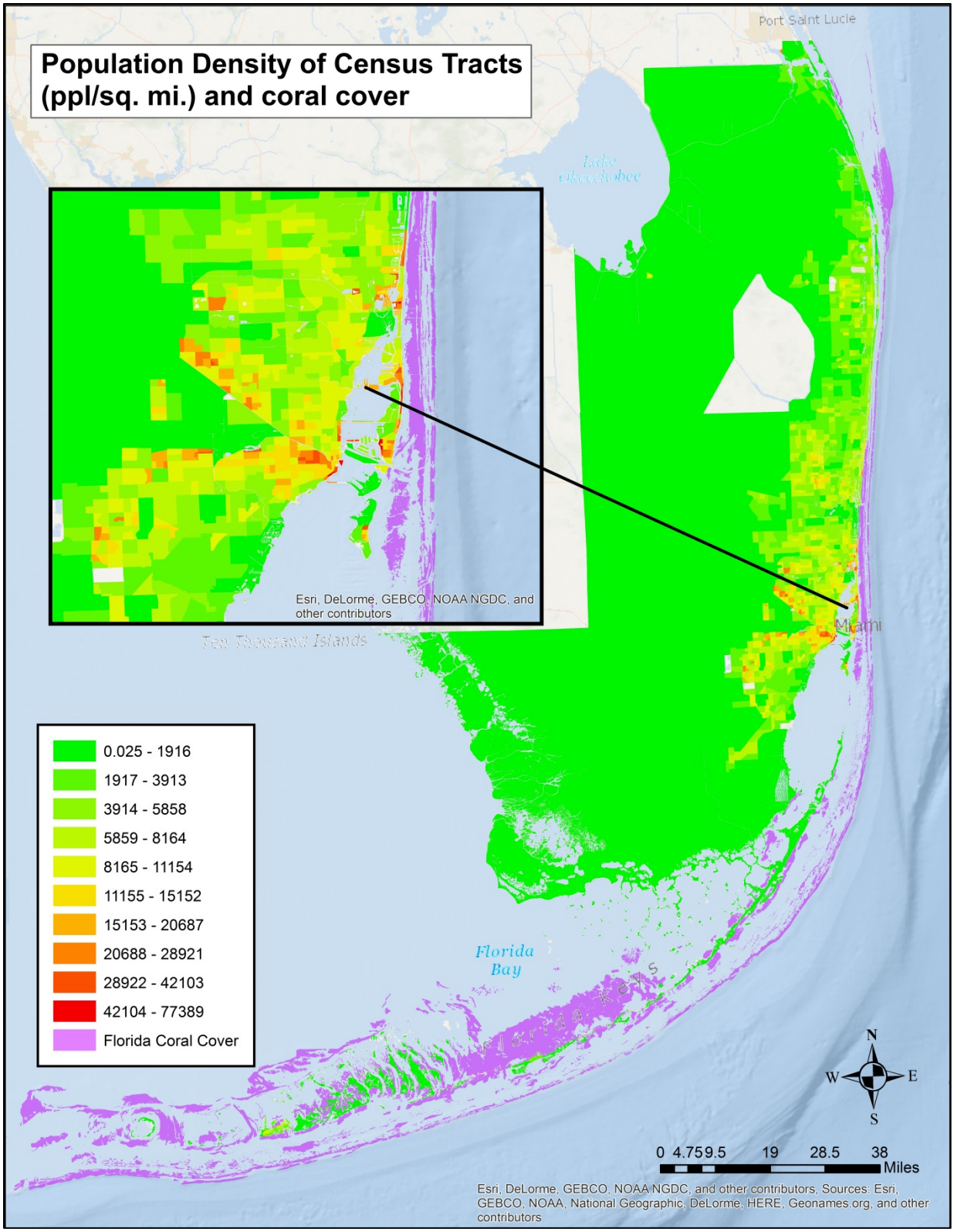

Figure 15: Population density (2010) in South Florida by US Census Tract and proximity to coral cover.

Figure 15 above depicts South Florida's population density at the Census tract level. It is widely understood that increased population density in proximity to coral reefs can lead to stress in the coral reef ecosystem (Brewer 2013). The inset map illustrates an area of high population density (the city of Miami) in relation to coral cover, and shows how South Florida contains several areas of high population density that may impact its coral reef ecosystem through stressors from development, recreation, and other types of anthropogenic effects.

Racial Composition and Age Structure of South Florida

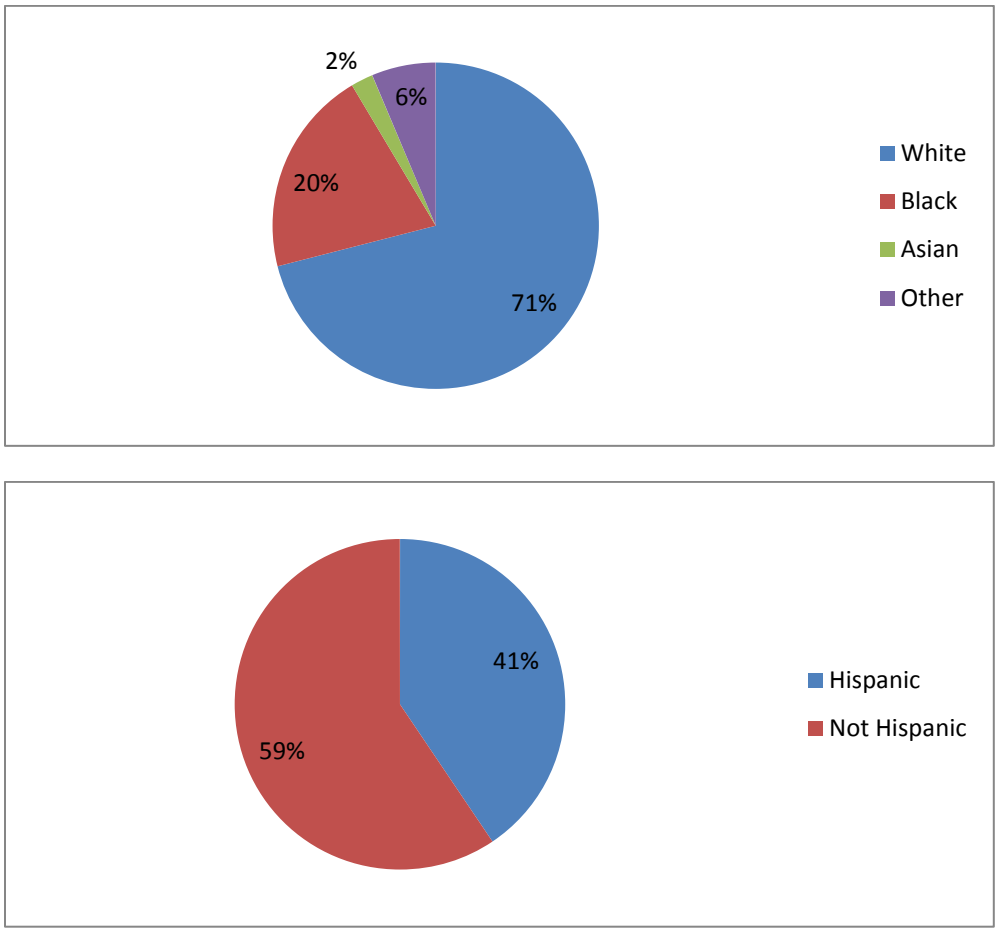

Figure 16: Racial and ethnic composition of South Florida

Source: US Census Bureau, Decennial Census of Population and Housing

As evidenced by the above figure, the racial composition of South Florida is predominantly white (71%), followed by black/African American (20%), and Asian (2%). South Florida is known to have a prominent Hispanic population as well, with 41% of the population identifying themselves as Hispanic in the 2010 US Census.

As for the age structure of the population of South Florida, the 2010 US Census Bureau reports that 21% of the population was under 18 years old (same as 2000 Census) and 16% of the population was 65 years or older (15% in 2000 Census). The 2010 US Census Bureau reports an overall median age of 40 years old for the South Florida population (38 years old in 2000 Census).

Community well-being

In addition to the basic demographics described above, composite indicators can be utilized to further explain social variance. Eight composite indicators were included in the original well-being framework; a sub-set of these will be tracked alongside coral reef ecosystem condition. The composite indicators being applied to the NCRMP socioeconomic component are: Economic Security, Health, Basic Needs, Access to Social Services, and Education.

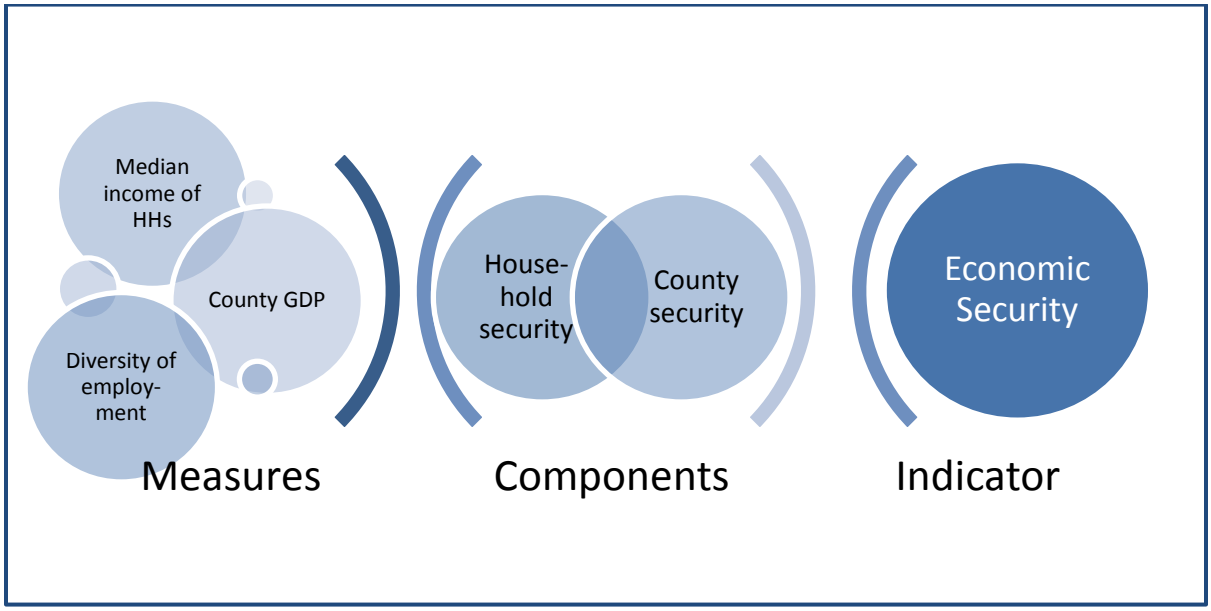

Figure 17: Economic Security presented as an example of operationalizing a composite indicator

Each composite indicator is conceptually complex. The indicators, demonstrated in Figure 17 with *Economic Security*, are made up of multiple of measures that, in turn, operationalized multiple dimensions of the composite indicator.

At the conclusion of the first monitoring cycle, the coral reef jurisdictions will be scored on select indicators of well-being. These scores will allow for comparisons across jurisdictions and will be used in statistical analyses with indicators of environmental condition to analyze the dynamic relationship between the ecosystem services that people regularly enjoy and community well-being. A selection of measures that will be used to operationalize the well-being indicators of Economic Security, Health, Basic Needs, Access to Social Services, and Education are presented and discussed below.

Economic Security

The measures used to operationalize economic security will include gross domestic product, median household income, the percent of the population in poverty, unemployment rate, and the amount of households receiving public assistance.

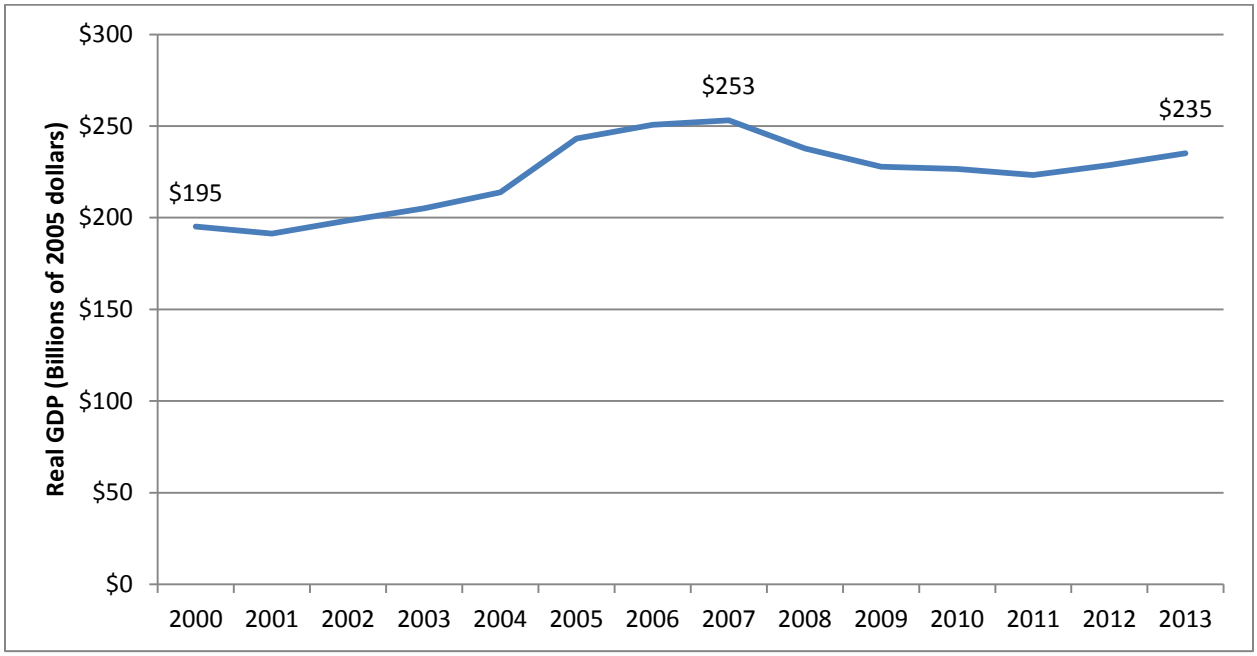

Figure 18: Combined real GDP of South Florida Counties

Source: NOAA Digital Coast, Total Economy of US Shoreline Counties

One of the most telling measures of economic well-being is real gross domestic product (GDP). Since 2000, the overall trend in real GDP (measured in billions of 2005 dollars through the consumer price index) was slightly upward (Figure 18). Real GDP in South Florida rose steadily throughout the 2000s until the Great Recession of 2007-2009, in which real GDP started to decline from its pre-recession high point. From 2000-2013, real GDP in South Florida has increased by 21%, although since 2007, real GDP has declined by 7% as of 2013. It also must be noted that real GDP reached its lowest point in 2011, and has increased by 5% from 2011-2013. The trend in real GDP in South Florida is similar to the statewide trend and slightly different from the national trend. From 2007 to 2013, the statewide Florida real GDP declined by 7%, and the US national real GDP actually increased by 5%; however, each have increased by 21% and 24%, respectively, since 2000 (US BEA). Additionally, the trend in real GDP growth for each of the individual South Florida counties closely mirrors the trend for the five counties combined. The data show that although South Florida is recovering from the Great Recession in terms of its real GDP, it has not recovered as quickly as has the nation as a whole.

According to the 2012 ACS five year estimates, 7.2% of the civilian population in Broward, Miami-Dade, Martin, Monroe, and Palm Beach counties age 16 years and older were unemployed. This is an increase of 3.3% from the figure of 3.9% reported in the 2000 US Census.

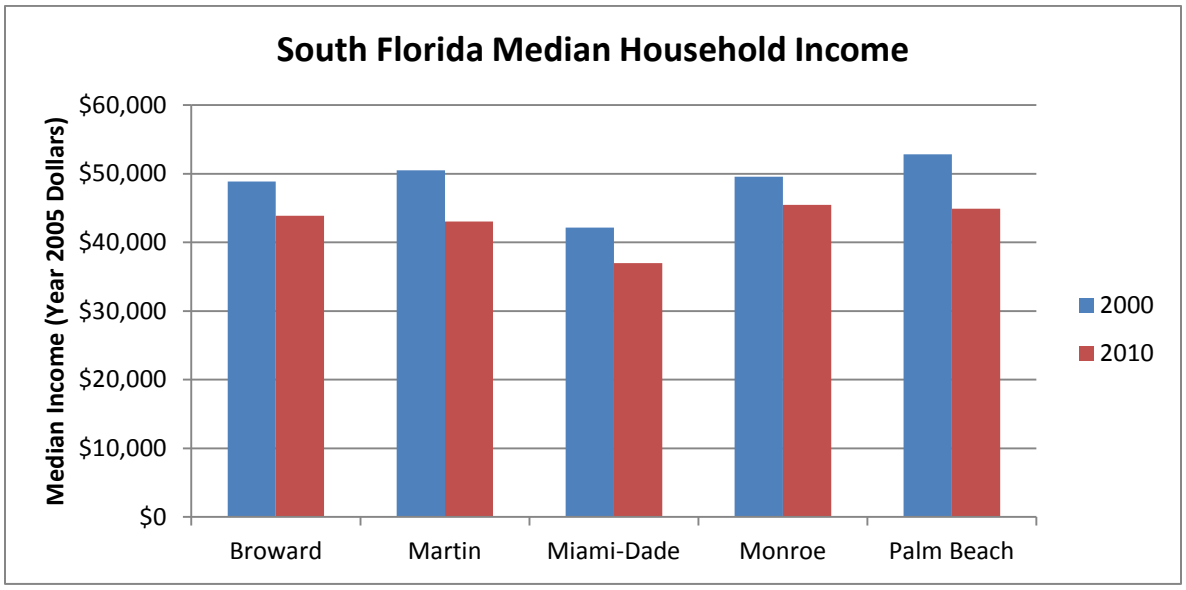

Figure 19: Median household income in South Florida (inflation adjusted to 2005 dollars)

Source: 2010 US Census Bureau, Decennial Census of Population and Housing

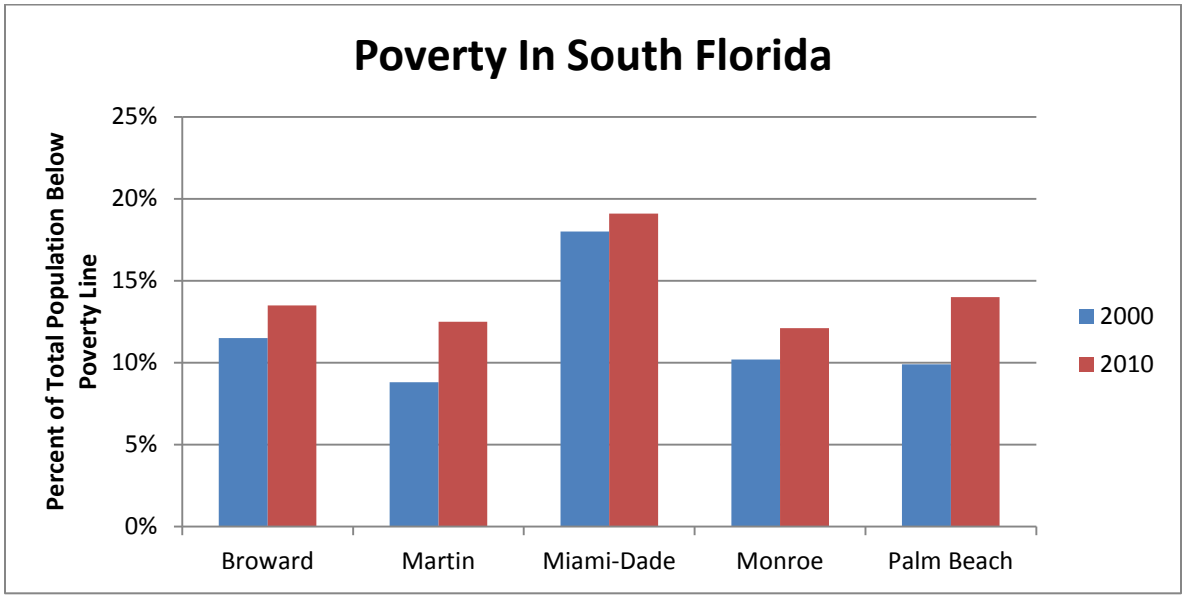

Figure 20: Level of poverty in South Florida

Source: 2010 US Census Bureau, Decennial Census of Population and Housing

Real median household income, measured in 2005 dollars using the consumer price index, declined in all South Florida counties from 2000 to 2010 (US Census). The largest decrease was observed in Palm Beach County where real median household income declined by 15% over the course of the decade. For the five counties as a whole, real median household income decreased by 12.4% from $47,257 in 2000, to $41,410 in 2010. Additionally, the percent of the population below the poverty line, determined to be $14,570 for a two-person family and $22,050 for a four-person family (US HHS 2010), increased in all South Florida counties from 2000 to 2010, with the largest increase observed in Palm Beach County (US Census). In Palm Beach County, the poverty rate increased from 9.9% in 2000, to 14.0% in 2010. For the five counties as a whole, the poverty rate increased by 2.1% from 13.9% in 2000, to 16.0% in 2010.

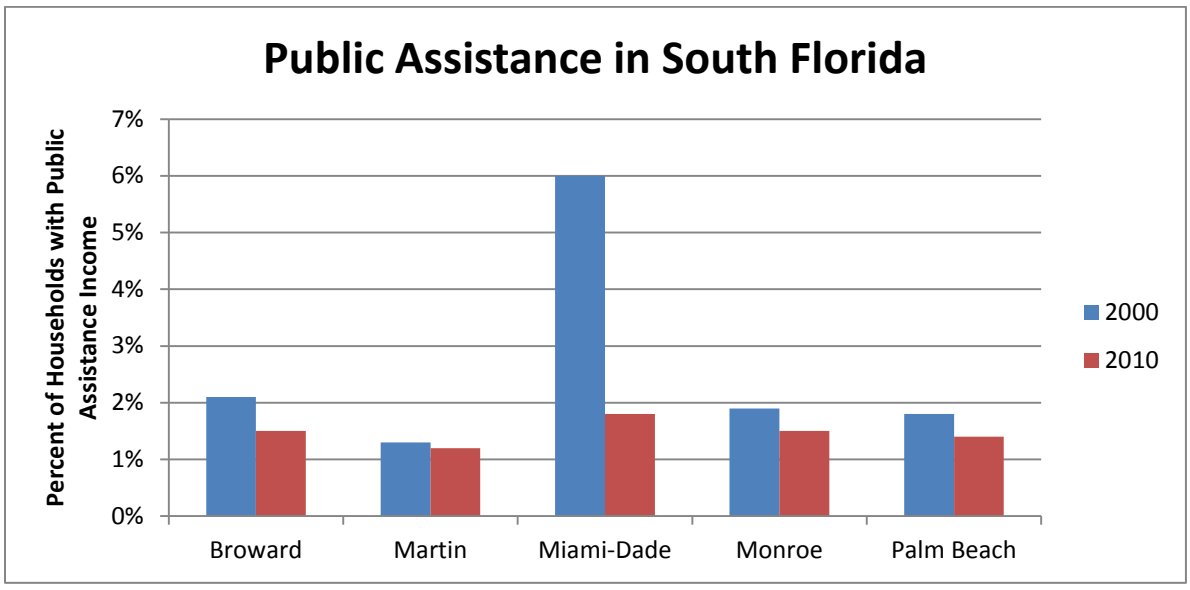

Figure 21: Public assistance in South Florida

Source: 2010 US Census Bureau, Decennial Census of Population and Housing

The percentage of households receiving public assistance income decreased in all five South Florida counties from 2000 to 2010 (US Census). The most drastic decrease is observed in Miami-Dade County; 6% of households in Miami-Dade were receiving public assistance income in 2000, compared to just 1.8% of households receiving public assistance income in 2010. For the five counties as a whole, the percentage of households receiving public assistance income decreased from 3.5% in 2000, to 1.6% in 2010. The complete well-being assessment will examine the percentage of the population in need that is not being served by public assistance in order to measure the efficacy of support services in reaching target populations. Such measures are important to understanding the overall vulnerability of the population independent of stressors such as resource decline, severe storm events, and climate change.

Health

Health, both physical and mental, contributes tremendously to individual and population well-being. Measures of life expectancy, mortality, and opportunity for a healthful lifestyle can be used to assess a population's health. Some of the measures that will be used as part of the indicator for health across all jurisdictions include leading cause of death, life expectancy, and three categories of age-adjusted death rates (from all cancers, from heart disease, and overall). The leading cause of death in South Florida (2010-2012) was cancer and malignant neoplasms. The average life expectancy (2012) was 79.74 years of age. In 2010, the age-adjusted death rate from all cancers was 165.6 per 100,000 people, the age-adjusted death rate from heart disease was 162.3 per 100,000 people, and the overall age-adjusted death rate was 677.1 per 100,000 people. It is important to track the overall health of the population in relation to the state of the environment, as the impact of environmental stressors on human health has been shown to have severe consequences. For example, a recent report finds that "the air we breathe, the food we eat, the water we drink, and the ecosystems which sustain us are estimated to be responsible for 23% of all deaths worldwide" (UNEP 2016).

Basic Needs, Access to Social Services, and Education

Basic needs, access to social services, and education are important social dimensions of well-being. The measures for basic needs include those related to the adequacy of housing, access to healthy food, and clean water. Basic needs are linked to the environment and its ability to provide the regulating and provisioning services that are necessary for water, food, and shelter. Of the 2010 US Census Bureau reported figure of 2,595,312 housing units in South Florida, 2,194,154 (85%) were occupied. Of the occupied housing units, 1,396,796 (64%) were owner-occupied and 797,358 (36%) were renter-occupied. In 2010, the median value of owner occupied housing units in South Florida was $215,443 and the median age of housing units was 31.9 years. Housing units in Miami-Dade, Broward, and Monroe counties had a median age that was 10 years older than the median age of housing units in Martin and Palm Beach counties. The average household size in 2010 was 2.72 persons per household. This is an increase of 6.1% from the figure of 2.57 persons per household reported in 2000. Similarly, the average family size in South Florida also increased by 8.6% from 3.13 persons per family in 2000 to 3.40 persons per family in 2010.

In 2010, 75% of the civilian non-institutionalized population in South Florida had health insurance coverage. Also, as of 2010, only 8.7% of occupied South Florida households lacked access to a vehicle and only 3.2% of occupied households lacked access to telephone service. Additionally, less than 1% of occupied South Florida households lacked access to complete plumbing, and similarly, less than 1% of occupied South Florida households lacked access to a complete kitchen (US Census). As of 2013, 83.7% of occupied households in South Florida had access to a computer or laptop at home; and of those, 88.6% had access to internet service (US Census, American Community Survey).

One of the key components of community well-being is education. K-12 enrollment, along with high school and college educational attainment will be combined to examine education. In 2010, 84% of South Floridians aged 25 and older had completed high school or higher, and 29% of South Floridians aged 25 and older had completed a bachelor's degree or higher. Both of these figures represented an increase in educational attainment since 2000, in which 77% of South Floridians aged 25 and older had completed high school or higher, and 24% of South Floridians aged 25 and older had completed a bachelor's degree or higher (US Census).

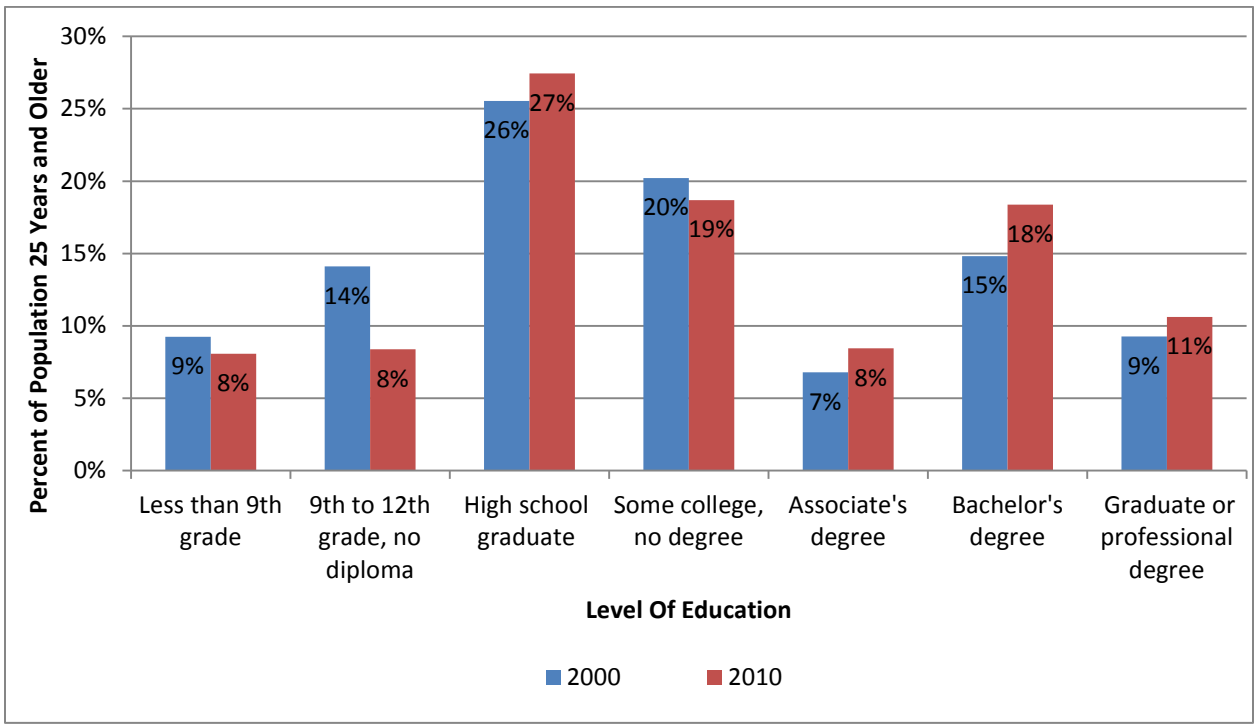

Figure 22: Levels of educational attainment in South Florida

Source: 2010 US Census Bureau, Decennial Census of Population and Housing

Physical Infrastructure

In addition to the five community well-being indicators, an indicator of physical infrastructure will be monitored in order to track coastal development, access to coastal resources, and waste management/water supply infrastructure. Indicators for physical infrastructure relate to both the human development footprint, as well as measures in place to mitigate human impacts to the marine environment (e.g., point and non-point sources of land-based pollution, as well as sewage treatment and abatement). Some key aspects of physical infrastructure in South Florida are outlined below.

Pollution

Fifty percent of all beaches in South Florida were monitored in 2012. Of these, 25% were impacted by a beach advisory action; however, only 1.4% of beach days were impacted (EPA). According to the 2011 EPA National Emissions Inventory, South Florida produced over 1,449,527 tons of emissions in the year 2011, 65.5% of which was carbon monoxide, and 10.6% of which was ammonia. Other emissions included in this figure include nitrogen oxide, particulate matter, sulfur dioxide, and other volatile organic compounds. The EPA tracks daily air quality through its Air Quality Index (AQI). Table 8 illustrates the number of days under each quality condition as defined by the EPA for all of the South Florida counties except Monroe (data were unavailable). In 2014, these four South Florida counties experienced a total of 3 days in which the air was "unhealthy for sensitive groups" and zero "unhealthy" and "very unhealthy" days. In 2015, there were zero days in which the air was "unhealthy for sensitive groups" and zero "unhealthy" and "very unhealthy" days as well. This indicates that the air quality situation in South Florida is not of dire concern.

Table 8: South Florida air quality days

	2015					2014				
County	Good days	Moderate days	Unhealthy for Sensitive Groups days	Unhealthy days	Very Unhealthy days	Good days	Moderate days	Unhealthy for Sensitive Groups days	Unhealthy days	Very Unhealthy days
Broward	321	44	0	0	0	331	33	1	0	0
Martin	333	32	0	0	0	339	25	0	0	0
Miami-Dade	293	72	0	0	0	285	79	1	0	0
Palm Beach	296	69	0	0	0	319	45	1	0	0

Source: US Environmental Protection Agency, Air Quality Index

Land cover

Impervious land cover is a good indicator of development and is also associated with land-based pollution that can damage coral reefs. All counties combined, South Florida had a total of ~1,191 square kilometers of impervious cover out of a total of ~17,317 square kilometers of land area in 2010; or, approximately 6.9% of South Florida is impervious cover (NOAA Digital Coast, C-CAP). Miami-Dade County has the most impervious land cover out of the five South Florida counties in absolute terms, while Broward County has the most impervious cover in percentage terms (Table 9).

Table 9: Impervious surfaces by county, 2010

County	Total Land Area (Sq. km)	Impervious Cover (Sq. km)	Percent of Impervious Cover
Broward	3,148.47	341.89	10.86%
Martin	1,438.75	60.94	4.23%
Miami-Dade	5,059.26	396.99	7.85%
Monroe	2,563.98	32.43	1.26%
Palm Beach	5,106.39	358.63	7.02%
South Florida Total	**17,316.85**	**1,190.86**	**6.87%**

Source: 2010 US Census Bureau, Decennial Census of Population and Housing and NOAA C-CAP

As of 2013, the development of man-made shorelines in South Florida reached a total of 976.2 km (606.6 miles), or about 12% of the recorded total (NOAA/OR&R 2013). For the purposes of this report, man-made shorelines include: sheltered solid man-made structures (wooden or concrete seawalls, boat docks, and the like that are not directly exposed to the ocean); riprap (large stones or other large rough cut solid materials placed on the shore to prevent or reduce erosion due to wave action); exposed, solid man-made structures (wooden or concrete seawalls, boat docks, and the like that are directly exposed to the ocean); and, sheltered riprap (large stones or other large rough cut solid materials placed on shore in an area not exposed to the ocean in order to prevent or reduce erosion due to wave action).

Most of the development in Martin, Palm Beach, Broward, and Miami-Dade counties lies within 32 km (20 miles) of the Atlantic coast. The large areas of the non-coastal, western parts of these counties consist mostly of rural towns, farmland, swamps, and preserves (such as the Everglades). As one ventures inland from the Atlantic coast in these four counties, development becomes progressively less dense. Monroe county consists of a large area of mostly undeveloped land at the very southwestern tip of the Florida peninsula as well as a series of islands south of the peninsula (the Florida Keys), with Key West being the mostly densely developed and populous key.

Waste Management and Water Supply

Of the 2,194,154 occupied housing units in 2010, 78,215 (3.6%) used septic tanks, cesspools or some other means of sewage treatment. Of these occupied households, 9,827 (<1%) had incomplete plumbing facilities (US Census, American Community Survey). As of 2015, there were 1,521 waste management facilities in South Florida (see Figure 23) (Florida Department of Environmental Protection, 2015).

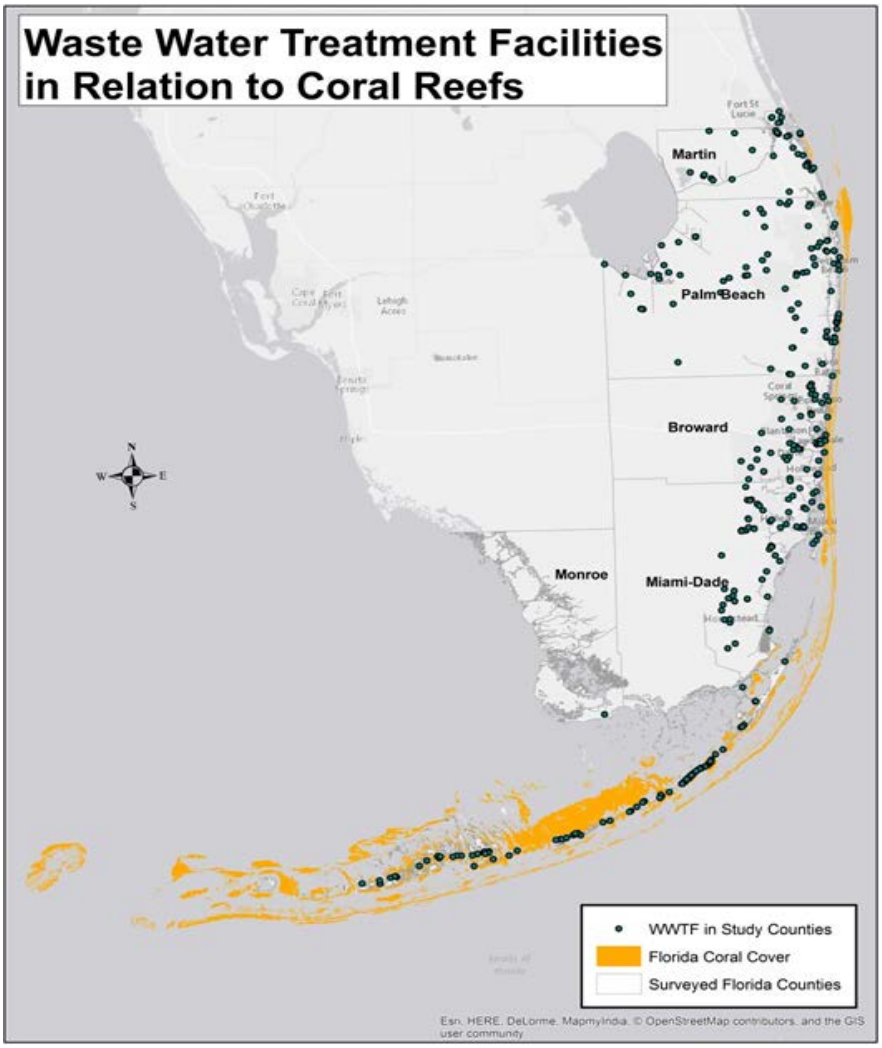

Figure 23: The proximity of wastewater treatment facilities to coral reef cover in South Florida

As of 2010, 5,456,482 people in South Florida were served by groundwater and 148,087 people were served by surface water. An additional 179,474 people were reported to be self-serviced (US Geological Survey 2010). A large share of the drinking water for South Florida residents is derived from the Floridian Aquifer. As of September 2015, there were 465 wastewater treatment facilities in South Florida, 239 of which were classified as domestic wastewater treatment

facilities, and 226 were classified as industrial (Florida Department of Environmental Protection 2015). Palm Beach County had the most wastewater treatment facilities, with a figure of 129.

Physical Access to Coastal Resources

South Florida has 137.5 miles of sandy beach coastline and 530 public beach access points. Additionally, there are 59 Great Florida Birding and Wildlife trails in South Florida as well (Florida Department of Environmental Protection 2015). Palm Beach County contains the most miles of sandy beach with 45.3 miles and Broward County contains the greatest amount of public beach access points with 179. Thus, beach accessibility is widespread and mostly consistent across South Florida.

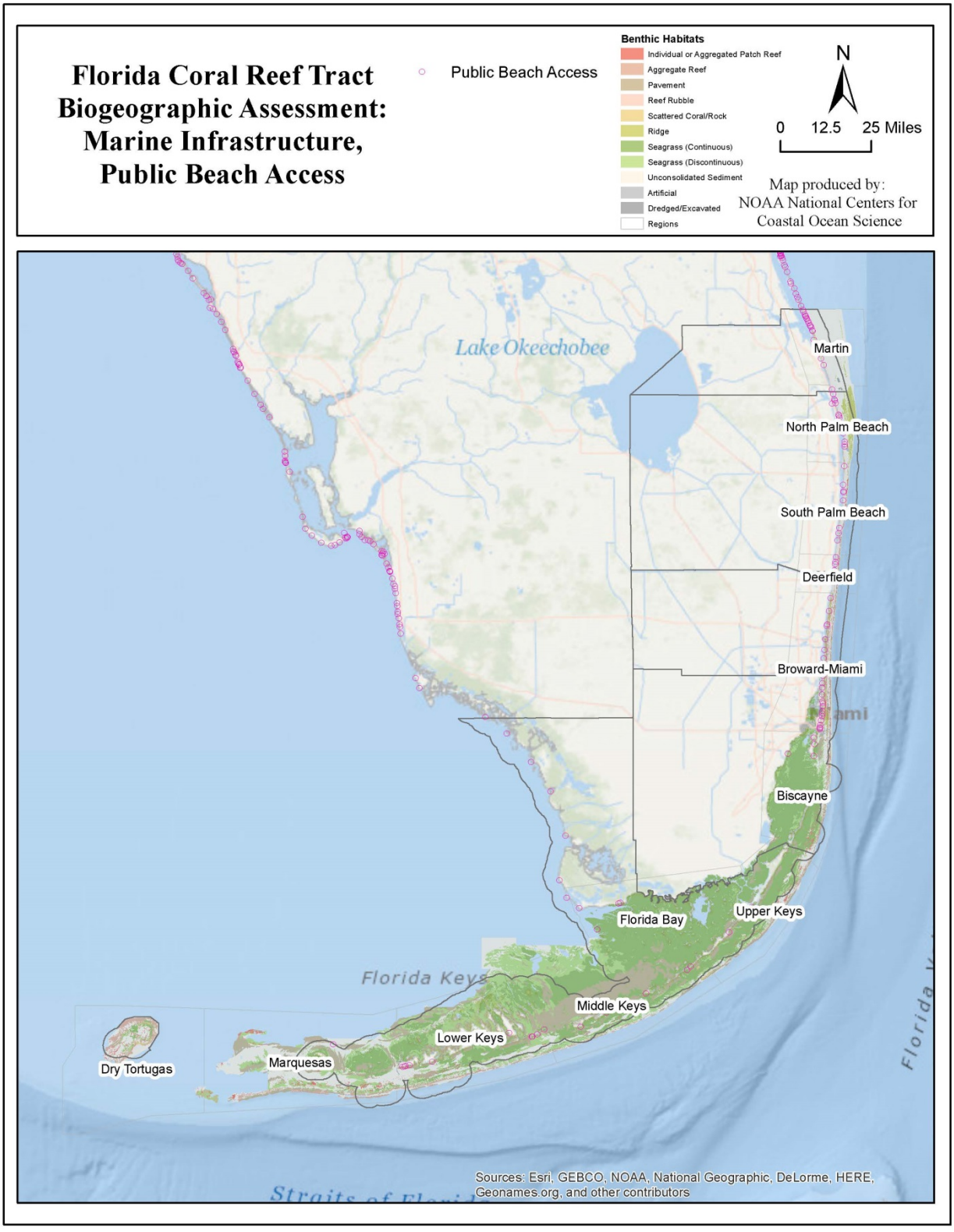

Figure 24: Beach Access in South Florida

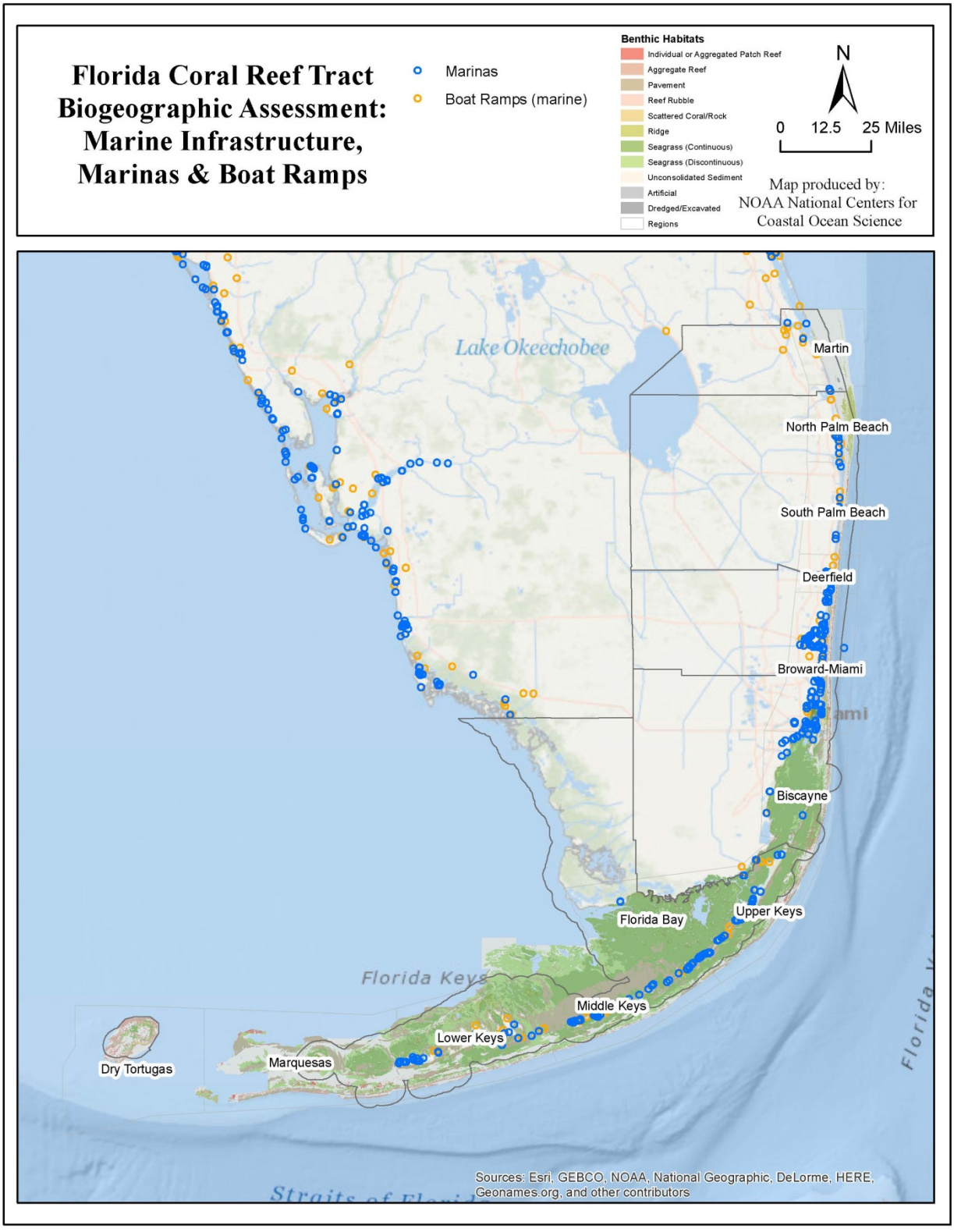

Figure 25: Marine facilities in South Florida

Economic activities related to reefs

Also relevant to the NCRMP socioeconomic monitoring component are the various economic activities taking place along the coast. These activities can have direct and indirect impacts on coral reefs, and are outlined below.

Ocean-Related Industry

Table 10: South Florida Ocean Sector Economy, 2013

County	Number of establishments	Number of employees	Wages (millions of dollars)	GDP (millions of dollars)	Percent of Total County GDP
Broward	2,323	37,506	1,065	$2,264.40	2.71%
Martin	484	6,609	142	$282.73	5.15%
Miami-Dade	3,118	75,900	2,573	$6,480.17	5.26%
Monroe	842	12,687	355	$852.91	24.28%
Palm Beach	1,766	33,923	908	$1,945.66	3.02%
South Florida	**8,533**	**166,625**	**5,044**	**$11,825.87**	**5.03%**

Source: NOAA Digital Coast, ENOW

Table 10 shows a snapshot of the ocean sector economy in South Florida for the year 2013. These numbers reflect the sum of all economic activities related to the following industries: marine construction, living resources, offshore mineral extraction, ship/boat building, tourism/recreation, and marine transportation[2]. These aforementioned industries contributed roughly $11.83 billion to the economy of South Florida in 2013 (a 4.1% increase from the previous year) and supported 166,625 employees at 8,533 establishments in the region as well. The ocean sector in Miami-Dade County alone produced almost $6.5 billion in GDP in 2013, and supported 75,900 employees at 3,118 establishments. Overall, ocean-related industry represents just over 5% of South Florida's total GDP and Monroe County is especially dependent on ocean-related industry, with almost one fourth of its total county GDP coming from ocean-related industry in 2013 (NOAA Digital Coast, ENOW).

[2] The tourism/recreation sector for the ocean economy takes into account boat dealers, full service restaurants, limited service eating places, cafeterias, snack and nonalcoholic beverage bars, hotels (non-casino) and motels, bed and breakfast inns, marinas, RV parks and recreational camps, scenic and sightseeing transportation (water), sporting and athletic good manufacturing, scenic and sightseeing transportation (other), sport and recreation institutions, recreation goods rentals, amusement and recreation services not elsewhere classified, zoo/botanical gardens, and nature parks/other similar institutions (NOAA Digital Coast 2015).

Fishing

In 2013, the South Florida region contained nearly 175,000 registered recreational boats and 42 registered charter fishing boat companies. There were 9,584 licensed commercial fishermen in the five southeastern counties. Across the entire state of Florida, there were 1,367,933 paid fishing license holders, providing $34,817,821 in costs to obtain the licenses.

Two studies commissioned by Hazen and Sawyer found that visitors and residents in South Florida spent a combined 14,559,129 person-days on recreational fishing in the coral reefs of Broward, Miami-Dade, Palm Beach, and Monroe counties (Johns *et al*. 2001) and 454,809 person-days on recreational fishing in the coral reefs of Martin County (Johns *et al.* 2004). Using the use value per person-day figures calculated in these reports, recreational fishing in South Florida's coral reefs produces an annual direct expenditure value of over $120 million in year 2000 dollars (almost $166 million in year 2015 dollars). This report included residents of and visitors to South Florida, and also included artificial and natural reefs in the calculations.

Snorkeling/Diving

Between 2005 and 2013, 128,633 individuals were newly certified for open water diving in the state of Florida (DEMA 2014). Johns *et al.* also found that visitors and residents spent a combined 13,250,829 person-days snorkeling and diving in the coral reefs of Broward, Miami-Dade, Palm Beach, and Monroe counties (Johns *et al*. 2001) and 74,735 person-days snorkeling and diving in the coral reefs of Martin County (Johns *et al.* 2004). Using the use value per person-day figures calculated in these reports, snorkeling and diving in South Florida's coral reefs produces an annual direct expenditure value of over $136 million (approximately $37 million attributed to snorkeling and $99 million attributed to diving) in year 2000 dollars (almost $188 million in year 2015 dollars).

Tourism

Tourism is a very important and integral aspect of the South Florida economy. An estimated 302,000 people visited a national wildlife refuge in South Florida in 2013, along with an estimated 1,698,069 visitors to national parks and 3,615,910 visitors to state parks. The tourism and recreation industry in South Florida produced a GDP of over $8 billion in 2013 (a 4.3% increase from the previous year) while supporting 140,929 employees at 7,152 establishments (NOAA Digital Coast, ENOW).

Figure 26: A cruise ship in Hollywood Beach, FL (Photo Credit: Peter Edwards)

Results: Section 3

The final section of results presents Governance as an example of an indicator that will be measured through a combination of NCRMP survey data as well as secondary data. Below, examples of both types of measures are featured. The measurements concerning the sources of coral reef-related information, the level of trust for each information source, and involvement in coral reef decision making come from NCRMP survey data, while all other facets of the governance indicator were derived from secondary data sources.

Governance

Governance measures such as public trust, percent areas of coral reefs under management or protection, level of community involvement in decision making/local reef governance, and the presence, longevity, and focus of MPAs and other marine managed areas were used to assess governance related to coral reefs and the marine environment for South Florida.

Sources of coral reef-related information and level of trust

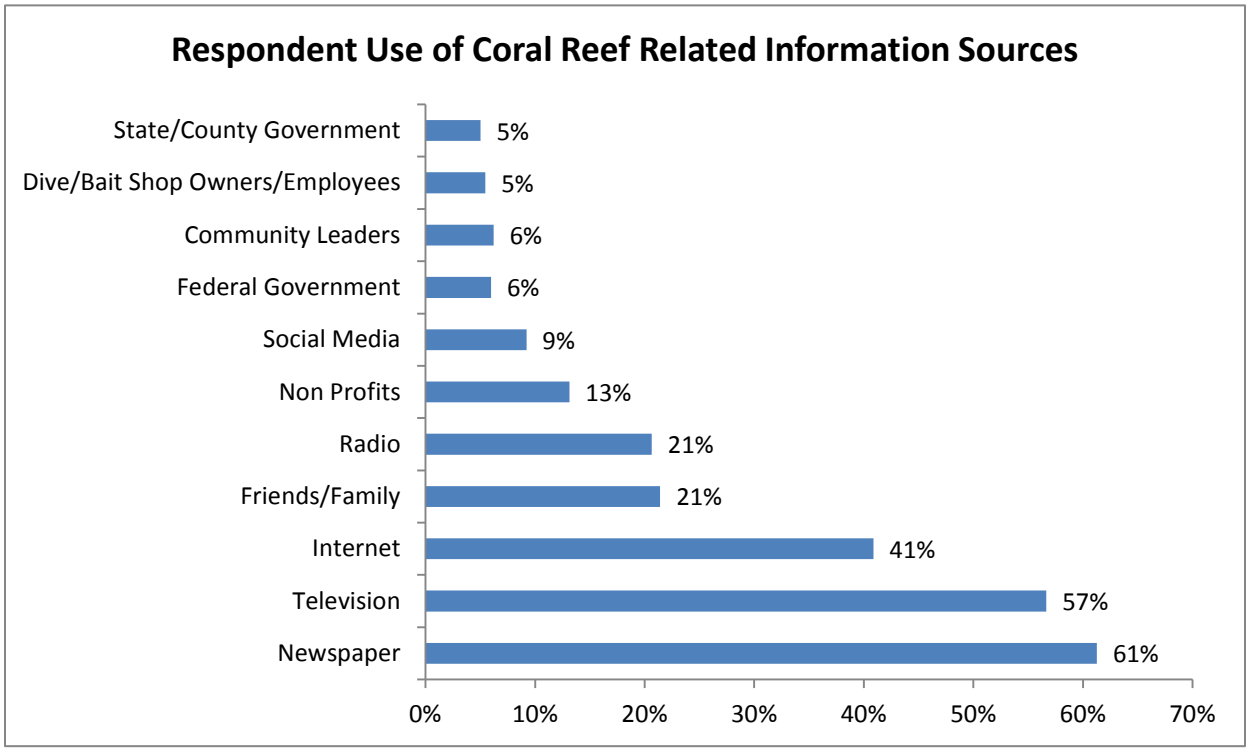

Figure 27: Top sources of information on coral reefs (n = 1,172)

Sixty-seven percent of respondents indicated that the newspaper is their source for information pertaining to coral reefs (first, second, or third choice). Respondents' top 3 sources for information about coral reefs and the environment were newspaper, television, and the internet

(Figure 27). The least used information sources were the state/county government and dive/bait shops.

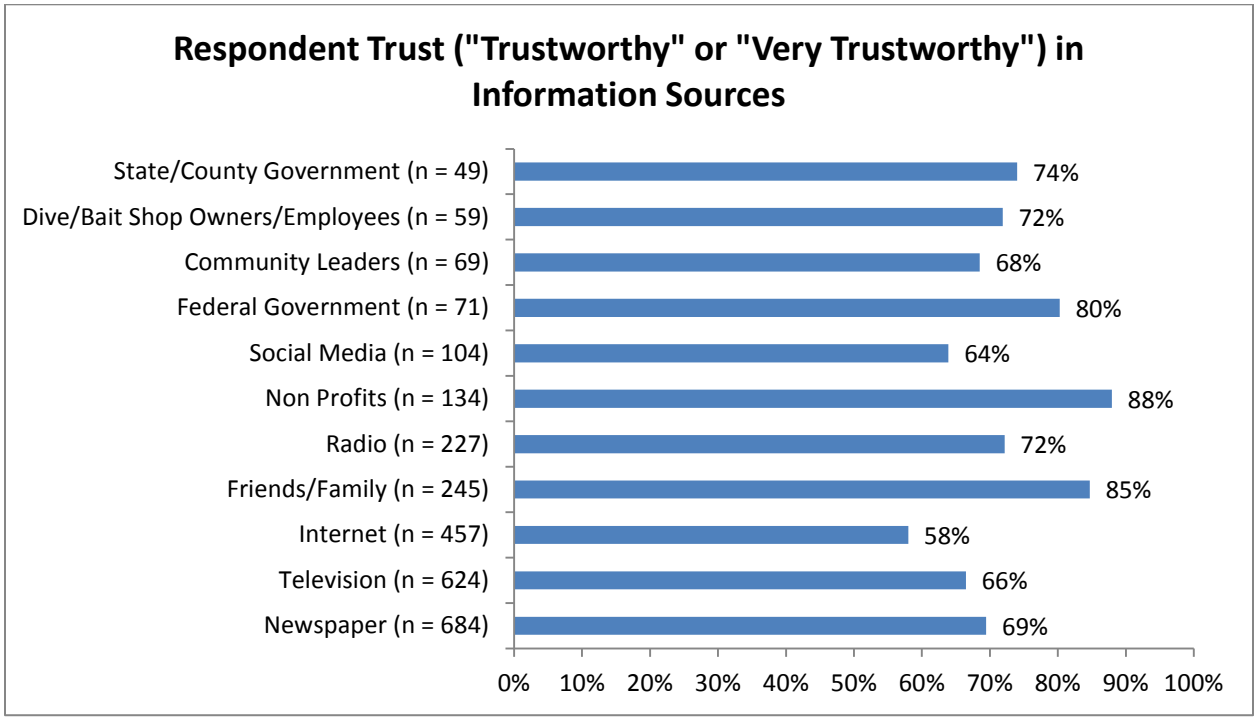

Figure 28: Respondent level of trust in each coral reef information source

In terms of trust, 69% (newspaper), 66% (television), and 58% (internet) of respondents indicated that these sources are "very trustworthy" or "trustworthy" (Figure 28). According to respondents, the most trustworthy information sources were non-profits (88%) and friends/family (85%), whereas the information sources found to be least trustworthy ("very untrustworthy" or "untrustworthy") were social media (16%) and the federal government (14%). It must be noted that respondents who did not provide a first, second, or third choice information source were not included in the calculations for Figures 27 and 28. That is, those who refused to answer or answered "not sure" to the questions concerning information sources were not included in the results. Additionally, respondents were only asked to rate their trustworthiness of an information source if they indicated that they used the particular information source.

Involvement in coral reef management decision making

Survey respondents in South Florida were asked how much they felt their communities were involved in protecting and managing coral reefs, with 35% stating that communities were at least "moderately involved," and 21% stating that communities were "slightly involved." Respondents were also asked this question at the individual level, with 21% indicating that they themselves were at least "moderately involved" in decisions related to protecting and managing coral reefs, and 19% indicating that they were "slightly involved." With respect to quantifying the

opportunities in place for residents to get involved in the protection and management of coral reefs in South Florida, 61% of respondents indicated that there were “never” any opportunities to get involved, and only 5% of respondents felt that there were “frequent” opportunities to get involved.

Other governance indicators

Based on the NOAA Marine Protected Areas (MPA) Inventory, 95.7% of all marine managed areas in South Florida had management plans in place (2014) (Table 11). The oldest inventoried marine managed area was established in 1908, while others were established as recently as 2009. Of the inventoried marine managed areas, cultural heritage was a primary conservation focus of 3 MPAs, sustainable production was the primary focus of 2, and natural heritage was the primary focus of 45 MPAs. Additionally, commercial and recreational fishing were prohibited at 3 of the marine managed areas. Investigation shows that 88.9% of the mapped coral reef ecosystems in and around South Florida were under some form of management regime (Florida Keys National Marine Sanctuary; Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute; Florida Natural Areas Inventory; National Marine Sanctuary Program; NOAA Marine Protected Areas Center). However, it should be noted that this analysis of known coral reef habitat falling within management boundaries is not intended to equate to an assessment of management adequacy or efficacy. Additional metrics would be required for this type of evaluation.

Table 11: Details of the Marine Managed Areas of South Florida

Site Name	Government Level	Management Plan	Area (sq. km)
Bahia Honda State Park	State	Site-Specific Management Plan	2.10
Bill Baggs Cape Florida State Park	State	Site-Specific Management Plan	1.75
Bill Sadowski Critical Wildlife Area	State	No Management Plan	2.83
Biscayne Bay - Cape Florida to Monroe County Line Aquatic Preserve	State	Site-Specific Management Plan	16.85
Biscayne Bay Aquatic Preserve	State	Site-Specific Management Plan	279.49
Biscayne National Park	State	Site-Specific Management Plan	708.90
Coupon Bight Aquatic Preserve	State	Site-Specific Management Plan	22.00
Crocodile Lake National Wildlife Refuge	State	MPA Programmatic Management Plan	32.40
Curry Hammock State Park	State	Site-Specific Management Plan	3.92
Dry Tortugas National Park	Federal	Site-Specific Management Plan	263.29
East Everglades Outstanding Florida Water	State	MPA Programmatic Management Plan	157.18
East Hump Marine Protected Area	Federal	MPA Programmatic Management Plan	171.50
Everglades National Park	Federal	Site-Specific Management Plan	6,282.70
Florida Keys National Marine Sanctuary	Federal	Site-Specific Management Plan	9,603.73
Florida Keys Wildlife and Environmental Area	State	Site-Specific Management Plan	10.53
Fort Zachary Taylor State Historic Site and State Park	State	Site-Specific Management Plan	0.22
Great White Heron National Wildlife Refuge	Federal	MPA Programmatic Management Plan	647.96
Half Moon Underwater Archaeological Preserve	State	Community Agreement	0.79
Hobe Sound National Wildlife Refuge	Federal	MPA Programmatic Management Plan	1.23
Hugh Taylor Birch State Park and Recreation Area	State	Site-Specific Management Plan	0.71
Indian Key State Historic Site and State Park	State	Site-Specific Management Plan	0.45
Jensen Beach to Jupiter Inlet Aquatic Preserve	State	Site-Specific Management Plan	93.61
John D. McArthur Beach State Park	State	Site-Specific Management Plan	1.73
John Pennekamp Coral Reef State Park	State	Site-Specific Management Plan	420.33
John U. Lloyd Beach State Park	State	Site-Specific Management Plan	1.27

Jonathan Dickinson State Park	State	Site-Specific Management Plan	50.45
Key Largo Hammock State Botanical Site	State	Site-Specific Management Plan	0.28
Key Largo National Marine Sanctuary	State	MPA Programmatic Management Plan	N/A
Key West National Wildlife Refuge	Federal	MPA Programmatic Management Plan	616.84
Lignumvitae Key Aquatic Preserve	State	Site-Specific Management Plan	34.48
Lignumvitae Key Botanical State Park	State	Site-Specific Management Plan	42.52
Lofthus Underwater Archaeological Preserve	State	Community Agreement	0.79
Long Key State Recreation Area	State	Site-Specific Management Plan	3.79
Looe Key National Marine Sanctuary	State	MPA Programmatic Management Plan	17.19
Loxahatchee River-Lake Worth Creek Aquatic Preserve	State	Site-Specific Management Plan	7.07
Martin County Tracts	State	MPA Programmatic Management Plan	0.34
National Key Deer National Wildlife Refuge	Federal	MPA Programmatic Management Plan	6.40
North Key Largo Hammock	State	MPA Programmatic Management Plan	17.71
Oleta River State Park	State	Site-Specific Management Plan	4.20
Pelican Shoal Critical Wildlife Area	State	No Management Plan	0.00
San Pedro State Underwater Archaeological Preserve State Park	State	Site-Specific Management Plan	2.62
Seabranch Preserve State Park	State	Site-Specific Management Plan	3.74
Southern Glades Wildlife and Environmental Area	State	Site-Specific Management Plan	123.66
SS Copenhagen Underwater Archaeological Preserve	State	Community Agreement	0.13
St. Lucie Hump Marine Protected Area	Federal	MPA Programmatic Management Plan	20.58
St. Lucie Inlet Preserve State Park	State	Site-Specific Management Plan	19.63
The Barnacle Historic State Par	State	Site-Specific Management Plan	0.04
Tortugas Marine Reserves	Federal	Non-MPA Programmatic Fisheries Management Plan	231.05
Windley Key Fossil Reef Geological State Park	State	Site-Specific Management Plan	0.13
Westlake Park	County	MPA Programmatic Management Plan	4.80
			19,935.88

Source: 2014 NOAA Marine Protected Areas Inventory

Discussion

Based on the survey findings, a few general conclusions about the population of South Florida and their interactions with coral reefs can be made. These can be considered preliminary findings, and more detailed analyses of this data are planned for the future. We conclude this section by proposing directions for future research.

With respect to **participation in reef activities**, South Floridians participated in purely recreational coral reef related activities (SCUBA diving, snorkeling) at a low frequency, with the exception of swimming and beach recreation. Residents in Monroe County participated more frequently in recreational activities when compared to residents of the other four South Florida counties. It is believed that these activity participation rates are conservative estimates for South Florida's coastal communities as these estimates do not take the participation rates of tourists into account.

Fishing and gathering of resources were two of the somewhat common nearshore reef related activities in which residents of South Florida participated. Our findings show that over 30% of households stated that they engaged in fishing or gathering. The survey found that 65% of households consumed fish/seafood once a week or more, and that most fishers (91%) did not sell the fish they catch; however, it is uncertain what proportion of fishing targeted coral reef species, and what proportion of fish protein consumed comes from coral reef versus non-coral reef fish species, as these distinctions were not specified in the survey. The need for this clarification has been noted, and as a result, the survey question will be adjusted in future iterations. Additionally, seafood consumed by South Florida residents is predominantly purchased in supermarkets, grocery stores, and restaurants.

Survey respondents were asked about their perceptions of the health of South Florida's coral reef resources. The findings showed that residents generally perceived **marine resource conditions** to be average, while residents tended to have a more negative perception concerning the change in marine resources over the last decade (that is, residents perceived that the condition of marine resources have worsened over time). When examining the effect of tenure (i.e. how long a resident has lived in the jurisdiction), it was found that residents who have lived in South Florida for more than ten years had a more negative perception concerning the current condition of marine resources, as well as a more negative perception concerning the change in the condition of marine resources over the last decade. Differences in perceptions concerning marine resource condition were identified between respondents based on county of residence. Because the sample is not statistically representative of the populations of each county, these differences cannot be explored statistically. The initial results provide strong support for this being an area of continued exploration and analysis as future data collections allow for greater sample sizes. If perceptions of coral reef health truly vary by location, this may correlate to differing resource

quality in different regions, which could, in part, explain the lack of consensus across counties concerning the condition of marine resources.

Regarding the public's **awareness and knowledge of coral reefs**, this study found that the majority of the population stated that they are familiar with threats facing coral reefs (except coral bleaching). That being said, over half of the respondents believed that the condition of coral reef resources would get worse in the next 10 years and over half believed that the threats to coral reefs are "large" or "extreme." This suggests a lack of confidence amongst South Floridians that current threats to coral reefs are being (or can be) effectively addressed by current efforts.

The study found that the public's **attitudes towards coral reef management strategies and enforcement** were largely positive. Residents expressed support for most of the potential marine management measures, some of which are in use in various parts of South Florida. In particular, 88% of the respondents supported designating marine protected areas and 74% supported seasonal fishery closures. The least supported management option was "limited recreational use" (62% support). Generally, respondents supported marine management policies and regulations, regardless of their reliance on marine resources. Given the substantial range of management options presented in the survey and the potential for these options to be applied in various combinations, this question was developed to provide a range of important feedback to resource managers. The responses allowed for evaluation of both support for each option, as well as the reaction to the particular words used to describe the management strategy. For example, although some marine protected areas may limit recreational use, respondents were extremely favorable when considering the designation of MPAs. However, when asked about limited recreational use alone, respondents' opposition was much greater.

With respect to **familiarity with coral reef management organizations and processes** in South Florida, residents indicated that they were most familiar with the Florida Department of Environmental Protection (71% familiar) and the Florida Fish and Wildlife Conservation Commission (71% familiar), and the least familiar with Our Florida Reefs Community Planning Process (18% familiar). We also attempted to track public participation and attitudes with respect to the **governance** of coral reefs and their resources. It was found that 95.7% of all marine managed areas in South Florida had management plans in place, and 88.9% of all coral reef habitat was under some form of management. There appeared to be a moderate level of community involvement in coral reef decision making, but there was low involvement in pro-environmental behavior aimed at improving the health of the marine environment and coral reefs (58% of survey respondents indicated that they never participate in pro-environmental behavior). The survey also found that South Florida residents rarely relied on the federal and local government for information regarding coral reef topics; however, these were considered to be

trustworthy sources by residents that do use them. The internet, while widely used, wasn't considered as trustworthy as other coral reef information sources.

The collection of **secondary data,** including economic impacts of tourism and fishing, as well as data contributing to the development of some of the community well-being indicators, will continue over time. As updated data sets are produced by relevant agencies, these will be collected, synthesized and housed within a centralized database, and will be used to track changes over time. These data may be incorporated into indicators that combine or compare biophysical parameters (e.g., fish biomass) with commercial landings data and public perceptions of general reef health. It is notable that population growth and net increase in population density in South Florida may have a potential impact on coral reef resources. Net growth could result in increased demand for coral reef ecosystem services including recreation and provisioning (food, products). Growth could also result in increases in impervious surfaces due to general urbanization as well as higher volumes of solid and sewage waste production, which in turn, can add more stress to coral reef ecosystems in South Florida.

Future approaches and research ideas

There were a few lessons learned from this first NCRMP socioeconomic data collection in South Florida. As similar surveys are implemented across other US coral reef jurisdictions, the NCRMP team will be making adjustments to the data collection effort to improve on the type of information generated. These findings can be considered as a starting point to develop more detailed research questions for future work. For example, there is a need to fine-tune the survey question on fish consumption and fishing activity to make it more specific to coral reef related fish and invertebrate species, as well as a need to distinguish between locally caught and imported fish. Also, within the participation in coral reef related activities, the team will add 'shelling' as an example under 'beach recreation.' As shelling is a particularly important activity in South Florida, this will ensure we are reminding respondents to consider the full range of coastal activities they engage in. A final recommendation from Florida partners is to modify the scale for the familiarity with management agencies and processes question to be simpler. This will allow us to assess the difference between respondents who are familiar, those who have heard of the agency or process, and those who are not familiar. The monitoring team will also aim to improve the level of comparability of questions across the different jurisdictions while maintaining questions that will provide information specifically relevant to the local context and management needs in South Florida.

Another future research direction is to conduct analyses that explore relationships between different socioeconomic indicators, as well as comparisons between sub-populations as defined by the sampled respondents. These may include categories such as: age, gender, or familiarity

with coral reefs, among others. For example, our results showed that there was a difference in the perceptions of those who fish versus those who do not fish in relation to their attitudes towards most coral reef management measures (fishermen tended to agree less with management). The study also found that resource extraction was more common in Monroe County than in the other counties. Additional future analysis will include an examination of the possible statistically significant differences in resident agreement levels pertaining to limited entry and access management measures versus top-down management measures in order to understand what types of management strategies are best suited to foster support and adherence amongst the population.

Other potential improvements include the elicitation of public awareness of climate change and ocean acidification and their potential impacts on humans. This might include adaptation measures that are perceived to be more effective for community resiliency. Additional improvements to the survey instrument might include better distinguishing the sources of information on coral reefs and level of trustworthiness. This would provide information that could be incorporated into specific public outreach and education programs for current and future management measures.

The NCRMP socioeconomic data collection builds on and supplements the considerable social science research that has been conducted in South Florida to date. Integrating NCRMP data with these studies, or comparing and contrasting findings, has the potential to provide a more complete understanding of human interactions with coral reef resources in the territory. For example, Graham's (2014) economic analysis of the Florida Coral Reef Tract calculated $2.76 billion in benefits from reef related activities and spending, including tourism, commercial and recreational fishing, diving, state park attendance, and boating registration. The socioeconomic monitoring data collected through NCRMP provides further evidence of the contribution of the Florida Coral Reef Tract to the economic stability of the communities within the five-county study area.

Coral reefs also have a significant non-economic value to local communities in South Florida, as presented by Costaregni and Walker (2015). As part of the "Our Florida Reefs Survey," respondents were asked to identify their favorite places, the main activity that they engaged in at each place, and their main reason for choosing this place. The top four chosen favorite activities were pleasure (diving by boat), pleasure (snorkel/freediving from shore), private vessel (recreational fishing) and pleasure (diving from shore). The top four reasons for choosing each location, or value placed upon a location, were activity-based (the site is perfect for my particular activity), beautiful (the site is beautiful or has striking natural features), water quality (the water is clean, clear and/or good to swim in), and marine life (marine life is abundant and diverse). By coupling studies like these with socioeconomic monitoring of coral reef-adjacent communities, we can help provide managers with useful information for determining resource management needs that will align to communities' use and value for the resource. At the highest level,

NCRMP socioeconomic data are intended to allow for analyses across jurisdictions and regions (e.g. comparisons of Pacific to Caribbean) and within a single jurisdiction over time. These investigations will be, in large part, aimed at answering questions related to the success of US coral reef conservation efforts.

In future years, NCRMP will continue to increase sampling so as to be statistically significant at smaller geographic scales within the jurisdictions. For example, in Florida, we intend to adjust our jurisdictional sampling schedule to enable us to increase the total sample size so that we can survey representative samples of each county. This enhanced sample will enable comparisons between areas with very different populations, levels of coastal development, and coral reef management. Expanding our survey sample will improve our ability to compare NCRMP socioeconomic data to biophysical data collected through NCRMP and jurisdictional agencies (for instance, comparing perceived coral reef resource condition to biological indicators), and to inform coral reef management and monitoring across the entire jurisdiction. Finally, ongoing analyses of the individual metrics presented here will move us toward reporting the survey and secondary data collection results for a variety of composite indicators such as governance and perceived resource condition. These indicators will aid in comparisons across jurisdictions, where individual metrics may not be the same. Further, the use of indicators will support communication of complex data in a way that facilitates resource management decision making.

Figure 29: Coral Reefs in South Florida (Photo credit: NOAA, John Brooks)

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Appendix 1: National Coral Reef Monitoring Program

Understanding Socioeconomic Connections

The Socioeconomic Component of the National Coral Reef Monitoring Plan (NCRMP) gathers and monitors a collection of socioeconomic variables, including demographics in coral reef areas, human use of coral reef resources, as well as knowledge, attitudes, and perceptions of coral reefs and coral reef management. The overall goal of the socioeconomic monitoring component is to track relevant information regarding each jurisdiction's population, social and economic structure, the impacts of society on coral reefs, and the impacts of coral management on communities. NOAA's Coral Reef Conservation Program (CRCP) will use the information for research and to improve the results of programs designed to protect coral reefs.

The main purpose of the Socioeconomic Component of NCRMP is to answer the following questions: What is the status of human knowledge, attitudes, and perceptions regarding coral reefs? And, how are human uses of, interactions with, and coral dependence on coral reefs changing over time?

More details can be found here: http://www.coris.noaa.gov/monitoring/socioeconomic.html

Appendix 2: The NCRMP Survey Instrument

OMB SUBMISSION

NOAA Coral Reef Conservation Program
National Coral Reef Monitoring Program (NCRMP)
Resident Coral Reef Survey
OMB Control Number 0648-0646

Florida Survey

Survey conducted in (circle one): *English* *Spanish*

Hello, my name is _____. We are only interested in obtaining your opinions on some important issues related to coral reefs and the environment in South Florida, which is defined as the following five counties: Martin, Palm Beach, Broward, Miami-Dade, and Monroe. You were selected because you live in a coastal area near coral reefs. Your participation is voluntary and will be kept strictly confidential.

Your participation is voluntary and will be kept strictly confidential. Notwithstanding any other provisions of the law, no person is required to respond to, nor shall any person be subjected to a penalty for failure to comply with, a collection of information subject to the requirements of the Paperwork Reduction Act, unless that collection of information displays a currently valid OMB Control Number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other suggestions for reducing this burden to Peter Edwards, National Oceanic and Atmospheric Agency, National Ocean Service, Coral Reef Conservation Program, (1305 East West Highway, Silver Spring, MD, 20910, USA.

PARTICIPATION IN REEF ACTIVITIES

1. How often do you usually participate in each of the following activities?

	Never	Once a month or less	2-3 times a month	4 times a month or more	No Response
Swimming/wading					
Snorkeling					
Diving (SCUBA or free diving)					
Waterside/ beach camping					
Beach recreation (beach sports, picnics, sunbathing, general beachgoing)					
Boating					
Watersports (surfing, kayaking, paddleboarding, kite surfing)					
Island/sandbar recreation					
Fishing [*interviewer prompt: fishing for finfish*]					
Gathering of marine resources (lobsters, conch, seaweed, examples)					

SKIP PATTERN-- If respondent answers 'never' to BOTH fishing and gathering of marine resources, then skip to #3:

CORAL REEF RELIANCE / CULTURAL IMPORTANCE OF REEFS

2. How often do you fish or harvest marine resources for each of the following reasons?

	Never	Rarely	Sometimes	Frequently	No Response
To feed myself and my family/ household					
To sell					
To give to extended family members and/or friends					
For fun					
For special occasions and cultural events					
For sport (tournament fishing)					

3. How often do you or your family eat fish/seafood?

    a. Every day
    b. A few times a week
    c. About once a week
    d. 1-3 times a month
    e. Less than once a month
    f. Never

SKIP PATTERN-- If respondent answers f. Never, skip to question #5

4. Where do you get the fish or seafood your family eats? Please pick the top 2.

    a. Purchased by myself or someone in my household at a store or restaurant
    b. Purchased by myself or someone in my household at a market or roadside vendor
    c. Caught by myself or someone in my household
    d. Caught by extended family members
    e. Other, please specify _____

PERCEIVED RESOURCE CONDITION

5. In your opinion, how are South Florida's marine resources currently doing? Please rank from very bad to very good.

	Very Bad	Bad	Neither Bad nor Good	Good	Very Good	Not sure
Ocean Water Quality (clean and clear)						
Amount of Coral						
Number of Fish						
Beach quality (long and wide, clean, not crowded)						
Mangroves						

6. How would you say the condition of each of the following has changed over the last 10 years: from 1=it has gotten a lot worse to 5=it has gotten a lot better.

	A lot Worse	Somewhat Worse	No Change	Somewhat Better	A lot Better	Not Sure
Ocean Water Quality (clean and clear)						
Amount of Coral						
Number of Fish						
Beach quality (long and wide, clean, not crowded)						
Mangroves						

7. In the next 10 years, do you think the condition of the marine resources in South Florida will get worse, stay the same or improve?
    a. Get worse
    b. Stay the same
    c. Improve
    d. Not sure

AWARENESS AND KNOWLEDGE OF CORAL REEFS

8. Please say whether you disagree or agree with each of the following statements.

    [*Interviewer prompt: remind respondent of the definition of South Florida so that they answer these questions with respect to all counties, not just the Keys*]

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Not Sure
Coral reefs protect South Florida from erosion and natural disasters.						
Coral reefs are only important to fishermen, divers and snorkelers.						
Healthy coral reefs attract tourists to South Florida.						
Coral reefs are important to South Florida cultures.						

9. How familiar are you with each of the following potential threats facing the coral reefs in South Florida?

	Very Unfamiliar	Unfamiliar	Neither Familiar nor Unfamiliar	Familiar	Very Familiar	Not sure
Climate change						
Coral bleaching						
Hurricanes and other natural disasters						
Pollution (stormwater, wastewater, chemical runoff, trash/littering, oil spills)						
Increased coastal/urban development (includes construction)						
Invasive species						
Fishing and gathering						
Damage from ships and boats						
Beach renourishment						
Snorkeling and diving						

10. Do you believe that the threats to coral reefs in South Florida are:

    a. Extreme
    b. Large
    c. Moderate
    d. Minimal
    e. None
    f. Not sure

ATTITUDES TOWARDS CORAL REEF MANAGEMENT STRATEGIES AND ENFORCEMENT

11. The following are common strategies used to manage the marine environment. We are interested in your opinion about the use of these strategies to improve the protection of coral reefs. Please indicate how much you disagree or agree with each of the following:

Example Management Strategies	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Not Sure
Law enforcement of existing rules/regulations						
Community participation in management						
Seasonal openings/closures of fisheries						
Stricter control of sources of pollution to preserve water quality						
Restrictions on coastal development						
Marine zoning						
Designated marine protected area						
Limited use (fishing, diving, snorkeling, boating)						
Restricted access						
No-take zones						
More restrictions on construction practices to prevent sediment going to sea						
Limits per person for certain fish species (size and amount)						

AWARENESS OF CORAL RULES AND REGULATIONS / MANAGEMENT

12. How familiar are you with the following organizations and processes that are working to improve the management of coral reefs and other marine resources in South Florida?

	Very Unfamiliar	Unfamiliar	Neither Familiar nor Unfamiliar	Familiar	Very Familiar	Not sure
SEFCRI Southeast Florida Coral Reef Initiative (SEFCRI)						
Florida Keys National Marine Sanctuary (FKNMS)						
Florida Department of Environmental Protection						
Florida Fish and Wildlife Conservation Commission						
Our Florida Reefs Community Planning Process						
Florida Keys National Marine Sanctuary Management Plan, Marine Zoning and Regulatory Review Process						

PARTICIPATION IN BEHAVIORS THAT MAY IMPROVE CORAL HEALTH

13. How often do you participate in any activity to protect the environment (for example, beach clean ups, volunteering with an environmental group, recycling)?

    a. Not At All
    b. Once a year or Less
    c. Several times a year
    d. At least once a month
    e. Several Times a Month or more
    f. Not Sure

14. Which of the following would you consider to be your top 3 sources of information about coral reefs and the environment in South Florida?
    Interviewer checks the top 3 sources of information in box below.

15. To what degree do you trust each of your top rated sources of information to provide you the most accurate information on coral reefs and coral reef related topics in South Florida?
Respondent rates only the top 3 sources of information in box below.

Top 3	Sources	Very untrustworthy	Untrustworthy	Neither Trustworthy nor Untrustworthy	Trustworthy	Very Trustworthy	Not sure
	Newspapers, other print publications						
	Radio						
	TV						
	Internet						
	Social Media						
	Friends and family						
	Community leaders						
	Dive and bait shop owners/employees						
	State and/or County governments						
	Federal government agencies (NOAA, EPA)						
	Non-profit organizations						
	Other						

16. How involved is the local community in protecting and managing coral reefs?

a. Not at all involved
b. Somewhat involved
c. Moderately involved
d. Involved
e. Very involved
f. Not sure

17. How often do you feel you are given the opportunity to be involved in making decisions related to the management of coral reefs in South Florida?

    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
    e. Not Sure

    SKIP PATTERN -- If respondent answers a, then skip to #19.

18. How involved are you in making decisions related to the management of coral reefs in South Florida?

    a. Not at all involved
    b. Slightly involved
    c. Moderately involved
    d. Involved
    e. Very involved
    f. Not sure

DEMOGRAPHICS

I just have a few more questions that will help us to interpret our results. As a reminder, the information you provide is completely <u>confidential</u>.

19. Are you male or female?
    a. Male
    b. Female

20. What is your year of birth? _____

21. How long have you lived in South Florida?
    a. 1 year or less
    b. 2-5 years
    c. 6-10 years
    d. more than 10 years
    e. all my life

22. Including your primary language, please name each language you speak. [***interviewer should not read options below, but should allow respondent to answer***]

1. English
2. Spanish
3. French
4. German
5. Italian
6. Portuguese

7. Arabic
8. Chinese
9. Japanese
10. Korean
11. Tagolog
12. Hindi
13. Hawaiian
14. Hawaii Pidgin English
15. Sāmoan
16. Chamorro
17. Carolinian
18. Creole
19. Crucian
20. Tongan
21. Other: Please list _____
22. No Response

23. What race/ethnicity do you consider yourself? [***interviewer should not read options below, but should allow respondent to answer***]

1. American Indian or Alaskan Native
2. Asian
3. Black or African American
4. Puerto Rican
5. Carolinian
6. Chamorro
7. Chinese
8. Cuban
9. Filipino
10. Japanese
11. White
12. Korean
13. Mexican
14. Native Hawaiian or other Pacific Islander
15. Samoan
16. Taino
17. Thai
18. Tongan
19. Vietnamese
21. Other/Mixed
22. No response
23. Hispanic or Latino

24. What is the highest level of education you have completed?
    a. 8th Grade or Less
    b. Some high school
    c. High School Graduate, GED
    d. Some college, community college or AA
    e. College Graduate
    f. Graduate School, Law School, Medical School
    g. No Response

25. What is your current employment status?
    a. Unemployed
    b. Student
    c. Employed full-time
    d. Homemaker
    e. Employed part-time
    f. Retired
    g. None of the above: Please specify _____
    h. No Response

26. What is your occupation? [***open ended***] _____

27. May I ask, what is your annual household income?
    a. Under $10,000
    b. $10,000-19,999
    c. $20,000-29,999
    d. $30,000-39,999
    e. $40,000-49,999
    f. $50,000-59,999
    g. $60,000-74,999
    h. $75,000-99,999
    i. $100,000-149,999
    j. $150,000 or More
    k. No Response

THANK YOU FOR YOUR TIME

If you would like a copy of the results, please provide us with your mailing address or email address (write on separate contact sheet that is not linked to survey answers).

Please note: The Spanish language version of this survey is available upon request.

Appendix 3: NCRMP Secondary Data Sources for South Florida

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
Central Intelligence Agency	The World Factbook Life Expectancy at Birth	2013	These data represent the average number of years to be lived by a group of people born in the same year, if mortality at each age remains constant in the future.	2014	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html
Central Intelligence Agency	The World Factbook Inflation Rate (Consumer Prices)	2014	Inflation rate (consumer prices) compares the annual percent change in consumer prices with the previous year's consumer prices.	2003-2014	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2092rank.html
Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), Ocean and Coastal Resource Management (OCRM), National Marine Protected Areas Center (MPAC)	MPA Inventory Database (10/2014)	2014	The MPA Inventory is a comprehensive catalog that provides detailed information for existing marine protected areas in the United States. The inventory provides geospatial boundary information (in polygon format) and classification attributes that seek to define the conservation objectives, protection level, governance and related management criteria for all sites in the database. The comprehensive inventory of federal, state and territorial MPA sites provides governments and stakeholders with access to information to make better	2014	http://marineprotectedareas.noaa.gov/dataanalysis/mpainventory/

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			decisions about the current and future use of place-based conservation. The information also will be used to inform the development of the national system of marine protected areas as required by Executive Order 13158.		
Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Office for Coastal Management (OCM)	Time-Series Data on the Ocean and Great Lakes Economy for Counties, States, and the Nation between 2005 and 2012 (Sector Level) (ENOW)	2015	Economics: National Ocean Watch (ENOW) contains annual time-series data for over 400 coastal counties, 30 coastal states, 8 regions, and the nation, derived from the Bureau of Labor Statistics and the Bureau of Economic Analysis. It describes six economic sectors that depend on the oceans and Great Lakes and measures four economic indicators: Establishments, Employment, Wages, and Gross Domestic Product (GDP).	2005-2012	http://coast.noaa.gov/dataregistry/search/dataset/C3722030-943C-4BEE-B063-06715F815891
Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Coastal Services Center (CSC)	Spatial Trends in Coastal Socioeconomics (STICS): Total Economy of Coastal Areas	2013	These market data provide a comprehensive set of measures of changes in economic activity throughout the coastal regions of the United States. In regard to the sources of data, establishments, employment, and wages are taken from the Quarterly Census of Employment and Wages (QCEW). These data series also is known as the ES-202 data. These data are based on the quarterly reports of nearly all employers in the	1990-2011	http://coast.noaa.gov/dataregistry/search/dataset/info/coastaleconomy

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			United States. These reports are filed with each state's employment or labor department, and each state then transmits the data to the Bureau of Labor Statistics (BLS), where the national databases are maintained. The data for the Coastal Economies have been taken from the national databases at BLS (except in the case of Massachusetts). Gross State Product (GSP) data are taken from the Bureau of Economic Analysis (BEA), which develops the estimates of GSP from a number of sources. In regard to "employment," data are reported by employers, not employees, and does not contain any information about age. There is no difference between "employed" and "employment". The source is known as the payroll survey, a survey filed by employers every 3 months showing the number of people employed at each establishment in each of the preceding 3 months.		
Environmental Protection Agency	EPA Annual Beach Notification Summary Reports -- Closures and Advisories	2007, 2011, 2012	These fact sheets summarize beach monitoring and notification data submitted to EPA for each swimming season. Beach water monitoring is conducted primarily to detect bacteria that indicate the possible presence of	2006, 2010, 2011	http://water.epa.gov/type/oceb/beaches/2011_season.cfm

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			disease-causing microbes (pathogens) from sewage or fecal pollution. People swimming in water contaminated with these types of pathogens can contract diseases of the gastrointestinal tract, eyes, ears, skin, and upper respiratory tract. When monitoring results show levels of concern, the state or local government issues a beach advisory or closure notice until further sampling shows that the water quality is meeting the applicable standards. Beach water pollution can occur for a number of reasons including stormwater runoff after heavy rainfall, treatment plant malfunctions,sewer system overflows, and pet and wildlife waste on or near the beach. To help minimize beachgoers' risk of exposure to pathogens in beachwaters, EPA is helping communities build and properly operate sewage treatment plants, working to reduce overflows as much as possible, and working with the US Coast Guard to reduce discharges from boats and larger ships. Under the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, EPA provides annual grants to coastal and Great Lakes states, territories,		

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			and eligible tribes to help local authorities monitor their coastal and Great Lakes beaches and notify the public of water quality conditions that may be unsafe for swimming.		
Environmental Protection Agency	Environmental Protection Agency; Air Quality Index Report	2016	This data set provides the number of days per year that air advisories were in effect (i.e. the number of "good" days, the number of "moderate" days, the number "unhealthy for sensitive groups" days, "unhealthy" days, and "very unhealthy" days). The data can be delineated by county or by city. The pollutants examined are CO, PM2.5, PM10, NO2, O3, and SO2.	1980-2016	https://www3.epa.gov/airquality/airdata/ad_rep_aqi.html
Environmental Protection Agency; Technology Transfer Network Clearinghouse for Inventories & Emissions Factors.	The 2011 National Emissions Inventory	2015	This data set summarizes ammonia, carbon monoxide, nitrogen oxide, particulate matter, sulfur dioxide, volatile organic compounds, mercury, acid gas, greenhouse gases, glycol ether, metals, VOC, PCBs, POM, and PAH emissions at the national, state, and county level for 2011. Data is measured in tons.	2011	http://www3.epa.gov/ttnchie1/net/2011inventory.html
Florida Department of Environmental Protection (FDEP), Florida Marine Research Institute (FMRI), 100 Eighth Avenue S.E., St.	Sensitivity of Coastal Environments and Wildlife to Spilled Oil: South Florida	1996-1997	This data set comprises the Environmental Sensitivity Index (ESI) maps for the shoreline of South Florida. ESI data characterize coastal environments and wildlife by their sensitivity to spilled oil. The ESI data include information for three main	1993	http://archive.orr.noaa.gov/topic_subtopic_entry.php?RECORD_KEY%28entry_subtopic_topic%29=entry_id,subtopic_id,topic_id&entry_id%28entry_subtopic_topic%29=

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
Petersburg, Florida 33701; and Research Planning, Inc., 1200 Park Street, Post Office Box 328, Columbia, South Carolina 29202			components: shoreline habitats; sensitive biological resources; and human-use resources		849&subtopic_id%28entry_subtopic_topic%29=8&topic_id%28entry_subtopic_topic%29=1
Florida Department of Environmental Protection (FDEP), Florida Marine Research Institute (FMRI), 100 Eighth Avenue S.E., St. Petersburg, Florida 33701; and Research Planning, Inc., 1200 Park Street, Post Office Box 328, Columbia, South Carolina 29202	Sensitivity of Coastal Environments and Wildlife to Spilled Oil: East Florida	1996-2004	This data set comprises the Environmental Sensitivity Index (ESI) maps for the shoreline of East Florida. ESI data characterize coastal environments and wildlife by their sensitivity to spilled oil. The ESI data include information for three main components: shoreline habitats; sensitive biological resources; and human-use resources	1993	http://archive.orr.noaa.gov/topic_subtopic_entry.php?RECORD_KEY%28entry_subtopic_topic%29=entry_id,subtopic_id,topic_id&entry_id%28entry_subtopic_topic%29=849&subtopic_id%28entry_subtopic_topic%29=8&topic_id%28entry_subtopic_topic%29=1
Florida Department of Environmental Protection (FDEP), Florida Marine Research Institute (FMRI), 100 Eighth Avenue S.E., St. Petersburg, Florida 33701; and Research Planning, Inc., 1200	Sensitivity of Coastal Environments and Wildlife to Spilled Oil: West Peninsular Florida Volume 2	1996-2008	This data set comprises the Environmental Sensitivity Index (ESI) maps for the shoreline of West Peninsular Florida Volume 2. ESI data characterize coastal environments and wildlife by their sensitivity to spilled oil. The ESI data include information for three main components: shoreline habitats; sensitive biological resources; and human-use resources.	1993	http://archive.orr.noaa.gov/topic_subtopic_entry.php?RECORD_KEY%28entry_subtopic_topic%29=entry_id,subtopic_id,topic_id&entry_id%28entry_subtopic_topic%29=849&subtopic_id%28entry_subtopic_topic%29=8&topic_id%28entry_sub

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
Park Street, Post Office Box 328, Columbia, South Carolina 29202					topic_topic%29=1
Florida Department of Environmental Protection; Beach Access and Safety Program	Florida Coastal Access Guide	2015	This data set records the number of beach access points, the amount of beach miles, the number of birding and wildlife trails, the acreage of state parks and national refuges, bays and inlets, and rivers/paddling trails by county for the state of Florida	2015	http://www.dep.state.fl.us/cmp/beachaccess/
Florida Department of Environmental Protection; Wastewater Facility Information	Wastewater Facility Lists – Standard Database Retrievals	2015	This data set is a compilation of all wastewater treatment facilities in the state of Florida. It can be delineated by county and by domestic or industrial use. The data include information such as: facility ID, facility name, county, district, facility status, facility type, environmental interest, facility address, ownership type, nature of business, capacity, ownership type (private/public), treatment process summary, issue date, effective date, and expiration date	2015	http://www.dep.state.fl.us/water/wastewater/facinfo.htm
Florida Department of Environmental Protection; Water Assurance Compliance System.	Solid Waste Facility Inventory Report	2015	This data set is a compilation of all solid waste facilities in the state of Florida. It can be delineated by county and includes information such as: facility ID, facility name, county, district, facility status, class type, class	2015	https://fldeploc.dep.state.fl.us/www_wacs/Reports/SW_Facility_Inventory_srch.asp

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			status, facility address, location latitude and longitude, responsible authority name, site supervisor name, and land owner name.		
Florida Legislature's Office of Economic and Demographic Research	Florida Population by County, 1970 through 2040	2014	The Florida Legislature's Office of Economic and Demographic Research annually provides to the Executive Office of the Governor population estimates of local governmental units as of April 1.	1970-2040	http://edr.state.fl.us/Content/population-demographics/data/
Gallup	Gallup Economic Confidence Index	2015	Gallup's Economic Confidence Index is based on the combined responses to two questions asking Americans, first, to rate economic conditions in the country today, and second, whether they think economic conditions in the country as a whole are getting better or getting worse. The Index is computed by adding the percentage of Americans rating current economic conditions (("excellent" + "good") minus "poor") to the percentage saying the economy is ("getting better" minus "getting worse"), and then dividing that sum by 2. The Index has a theoretical maximum value of +100 and a theoretical minimum value of -100. Values above zero indicate that more Americans have a positive than a negative view of the economy; values below zero indicate net-	2013-2014	http://www.gallup.com/poll/125735/economic-confidence-index.aspx

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			negative views, and zero indicates that positive and negative views are equal.		
HML Project Team	Environmental Use and Dependence - HML Project Team Collection	2014	This data set is comprised of uses occurring in study areas as well as attendance figures for parks located in the study areas. Park visitation to national, state, and county parks as well as National Wildlife Refuge areas is included in this data set. Use data includes fishing, diving, and boating in the study area. Sources: -FL Sources: US Fish and Wildlife Service, National Park Service, US Department of Homeland Security/US Coast Guard Office of Auxiliary and Boating Safety, Professional Association of Diving Instructors, Diveadvisor.com, Worldwidefishing.com, Florida Fish and Wildlife Conservation Commission, Florida Department of Highway Safety and Motor Vehicles, Florida Park Service.	2013	
Institute for Health Metrics and Evaluation (IHME)	United States Adult Life Expectancy by County 1987-2007	2011	This is a complete time series for life expectancy from 1987 to 2007 for all US counties, and released as part of IHME research published in Population Health Metrics.	2007	http://ghdx.healthdata.org/record/united-states-adult-life-expectancy-county-1987-2007

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
National Oceanic and Atmospheric Administration (NOAA), Coastal Change Analysis Program (CCAP)	National Oceanic and Atmospheric Administration, Coastal Change Analysis Program (CCAP) Regional Land Cover Data	2012	The Coastal Change Analysis Program (C-CAP) produces a nationally standardized database of land cover and land change information for the coastal regions of the US C-CAP products are developed using multiple dates of remotely sensed imagery and consist of raster-based land cover maps for each date of analysis, as well as a file that highlights what changes have occurred between these dates and where the changes were located. These data highlight the relative effects of different landscape features on water quality, such as increased polluted runoff from impervious surfaces and the mitigating impacts of forests. NOAA produces high resolution C-CAP land cover products, for select geographies. GIS and tabular data was accessed June 2012 and prepared for the project by NOAA Coastal Services Center, Charleston SC.	2001-2007 (various)	http://www.csc.noaa.gov/digitalcoast/data/ccapregional
State of Florida Department of Health	Florida Vital Statistics Annual Report 2012	2013	These data include records/reports of live births, deaths, fetal deaths, marriages, and dissolutions of marriage.	2012	http://www.flpublichealth.com/VSBOOK/pdf/2012/Deaths.pdf
The Henry J. Kaiser Family Foundation	State Health Facts: Infant Mortality Rate (Deaths per 1,000 Live	2013	These data represent the number of infant deaths per 1,000 live births based on linked birth and death	2007-2009	http://kff.org/other/state-indicator/infant-death-rate/

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
	Births)		records from the period from 2007-2009.		
The Henry J. Kaiser Family Foundation	State Health Facts: Number of Cancer Deaths per 100,000 Population	2013	These data represent age-adjusted rates per 100,000 US standard population. Rates for the United States and each state are based on populations enumerated in the 2010 census as of April 1. Rates for Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas are based on the 2010 census, estimated as of July 1, 2010. Since death rates are affected by the population composition of a given area, age-adjusted death rates should be used for comparisons between areas because they control for differences in population composition.	2010	http://kff.org/other/state-indicator/cancer-death-rate-per-100000/
The World Bank	World Bank – Fish/Mammal species threatened	2010, 2011	The World Bank is a vital source of financial and technical assistance to developing countries around the world. We are not a bank in the ordinary sense but a unique partnership to reduce poverty and support development. The World Bank Group comprises five institutions managed by their member countries. Fish species are based on Froese, R. and Pauly, D. (eds). 2008. Threatened species are the number of species classified by the IUCN as endangered,	2010, 2011	http://data.worldbank.org/indicator/EN.FSH.THRD.NO http://data.worldbank.org/indicator/EN.MAM.THRD.NO

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			vulnerable, rare, indeterminate, out of danger, or insufficiently known. Mammal species are mammals excluding whales and porpoises. Threatened species are the number of species classified by the IUCN as endangered, vulnerable, rare, indeterminate, out of danger, or insufficiently known.		
The World Bank	World Bank - Population, Total	2014	The World Bank is a vital source of financial and technical assistance to developing countries around the world. We are not a bank in the ordinary sense but a unique partnership to reduce poverty and support development. The World Bank Group comprises five institutions managed by their member countries. Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. The values shown are midyear estimates.	2012-2013	http://data.worldbank.org/indicator/SP.POP.TOTL
The World Bank	World Bank - GDP (current US$)	2014	The World Bank is a vital source of financial and technical assistance to	2005-2013	http://data.worldbank.org/indicator/NY.GDP.MK

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			developing countries around the world. We are not a bank in the ordinary sense but a unique partnership to reduce poverty and support development. The World Bank Group comprises five institutions managed by their member countries. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current US dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates.		TP.CD/countries/PR?display=graph
US Department of Commerce Bureau of Economic Analysis	Advance 2013 and Revised 1997-2012 Statistics of GDP by State	2014	These statistics reflect the results of the comprehensive revision of gross domestic product (GDP) by state for 1997–2012. This revision not only incorporates new and revised source data, but it also includes significant improvements in classification and statistical methods to more accurately portray the state economies. Significant changes introduced with this revision include: updated industry	1997-2013	https://www.bea.gov/newsreleases/regional/gdp_state/gsp_newsrelease.htm

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			definitions consistent with the 2007 North American Industry Classification System (NAICS), results of the 2013 comprehensive revision of state personal income, results of the 2013 comprehensive revision of the national income and product accounts and the 2014 comprehensive revision of the annual industry accounts, which included the recognition of research and development (R&D) expenditures as capital, the capitalization of entertainment, literary, and other artistic originals, the expansion of the capitalization of the ownership transfer costs of residential fixed assets, the use of an improved accrual accounting treatment of transactions for defined benefit pension plans, and improved methods for computing financial services provided by commercial banks		
US Department of Health and Human Services	National Vital Statistics Reports: Deaths: Preliminary Data for 2011	2012	These are preliminary US data on deaths, death rates, life expectancy, leading causes of death, and infant mortality for 2011 by selected characteristics such as age, sex, race, and Hispanic origin. Preliminary data in this report are based on records of deaths that occurred in calendar year 2011, which were received from state	2011	http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_06.pdf

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			vital statistics offices and processed by the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS) as of June 12, 2012.		
US Department of Health and Human Services	National Vital Statistics Reports: Deaths: Final Data for 2010	2013	These data represent final 2010 data on US deaths, death rates, life expectancy, infant mortality, and trends by selected characteristics such as age, sex, Hispanic origin, race, state of residence, and cause of death.	2010	http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf
US Energy Information Administration	EIA State Electricity Profiles	1991-2014	The State Electricity Profiles presents a summary of key State statistics for 2000, and 2004 through 2010. The tables present summary statistics; ten largest plants by generating capacity; top five entities ranked by retail sales; electric power industry generating capacity by primary energy source; electric power industry generation of electricity by primary energy source; utility delivered fuel prices for coal, petroleum, and natural gas; electric power emissions estimates; retail sales, revenue, and average revenue per kilowatt hour by sector; and utility retail sales statistics. Data published in the State Electricity Profiles are compiled from five forms filed annually by electric utilities and other electric power producers.	1990-2014	http://www.eia.gov/electricity/state/

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
United States Census Bureau	Census 2000	2002	Summary File 3 contains population and housing data based on Census 2000 questions asked on the long form of a one-in-six sample of the population. Population items include marital status, disability, educational attainment, occupation, income, ancestry, veteran status, and many other characteristics. Housing items include tenure (whether the unit is owner- or renter-occupied), occupancy status, housing value, mortgage status, price asked, and more. In addition to the 50 states and District of Columbia, the US Census Bureau also conducts censuses and surveys in the the United States' Island Areas. Census and survey operations are conducted in cooperation with the governments of the the Island Areas and frequently include modifications to the questionnaires to help the local and federal governments better understand the populations being counted.	2000	http://www.census.gov/main/www/cen2000.html
United States Census Bureau	2010 Census	2011	Summary File 1 shows detailed tables on age, sex, households, families, relationship to householder, housing units, detailed race and Hispanic or Latino origin groups, and group	2010	http://www.census.gov/2010census/data/

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			quarters.		
United States Census Bureau	2008-2012 ACS 5-Year Estimates	2013	The ACS provides information on more than 40 topics, including education, language ability, the foreign-born, marital status, migration and many more. Each year the survey randomly samples around 3.5 million addresses and produces statistics that cover 1-year, 3-year, and 5-year periods for geographic areas in the United States and Puerto Rico.	2012	http://www2.census.gov/acs2012_5yr/summaryfile/
United States Census Bureau	2013 Population Estimates: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2013	2014	The estimates are based on the 2010 Census and reflect changes to the April 1, 2010 population due to the Count Question Resolution program and geographic program revisions. The resident population for each year is estimated since the most recent decennial census by using measures of population change. The resident population includes all people currently residing in the United States.	2010-2013	http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2013_PEPANNRES&prodType=table
United States Census Bureau	2009-2013 ACS 5-Year Estimates	2014	The ACS provides information on more than 40 topics, including education, language ability, the foreign-born, marital status, migration and many more. Each year the survey randomly samples around 3.5 million addresses and produces statistics that cover 1-year, 3-year, and 5-year periods for geographic areas in the	2013	http://www2.census.gov/acs2013_5yr/summaryfile/

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			United States and Puerto Rico.		
United States Census Bureau	Building Permits Survey	2015	Data collected include number of buildings, number of housing units, and permit valuation by size of structure. This survey covers all places issuing building permits for privately-owned residential structures. Over 98 percent of all privately-owned residential buildings constructed are in permit-issuing places.	2004-2014	http://www.census.gov/construction/bps/stateannual.html
United States Census Bureau	Quarterly Workforce Indicators	2015	The Quarterly Workforce Indicators (QWI) are a set of economic indicators including employment, job creation, earnings, and other measures of employment flows. The QWI are reported using detailed firm characteristics (geography, industry, age, size) and worker demographics information (sex, age, education, race, ethnicity). QWI data are available through the following access tools:	2013-2015	http://lehd.ces.census.gov/data/
United States Census Bureau	County Business Patterns	2014	County Business Patterns (CBP) is an annual series that provides subnational economic data by industry. This series includes the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll.	1998-2012	http://www.census.gov/econ/cbp/
United States Department of	Supplemental Nutrition Assistance	2015	SNAP offers nutrition assistance to millions of eligible, low-income	2010-2014	http://www.fns.usda.gov/pd/supplemental-

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
Agriculture Food and Nutrition Service	Program: Average Monthly Participation (Persons)		individuals and families and provides economic benefits to communities. The number of persons participating is reported monthly. Annual averages are the sums divided by twelve.		nutrition-assistance-program-snap
United States Department of Labor Bureau of Labor Statistics	Southeast Information Office: Miami	2015	Miami-Fort Lauderdale-West Palm Beach, FL Economy at a Glance	2014	http://www.bls.gov/regions/southeast/fl_miami_msa.htm
University of Florida Bureau of Economic and Business Research	Florida Statistical Abstract Online	2014	FSA Online's currently published database consists of 3,314,445 data points which is contained in 104,661 time series. These time series comprise 2,699 variables for up to 519 locations since 1929. These include data at the state and county level for whatever time periods are available; some are reported by month and others by year. Annual time series go back at least 10 years.	1975-2014	http://www.bebr.ufl.edu/data
US Geological Survey; Water Use in the United States	Estimated Use of Water in the United States: County-Level Data	2010	These data files present water-use estimates by county for the United States, the District of Columbia, Puerto Rico, and the US Virgin Islands which support the State-level water-use estimates published in USGS Circular 1405, Estimated Use of Water in the United States in 2010. All States provided estimates for public supply, domestic, irrigation, livestock, aquaculture, industrial, mining, and	2010	http://water.usgs.gov/watuse/data/2010/index.html

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			thermoelectric power water use. All States also provided estimates of public supply deliveries for domestic use. All States have estimates of the total population served by public supply and how many people consume each type of water (groundwater, surface water, self-serviced). States optionally may have estimated public supply population served by groundwater and surface water. All States will have estimates of total irrigation. States optionally may have estimated subtotals for crop irrigation and golf-course irrigation. No consumptive-use data were collected nationally for any of the categories for 2010. No commercial water-use data were collected nationally for 2010. No wastewater release data were collected nationally for 2010. No hydroelectric power instream use data were collected nationally for 2010. Public-supply deliveries for commercial, industrial, and thermoelectric power were not collected nationally for 2010.		
VISIT FLORIDA	Florida Visitor Study	2014	The VISIT FLORIDA research department studies global consumer trends and travel patterns to learn	2002-2014	http://www.visitflorida mediablog.com/home/florida-facts/research/

Source (originator)	*Data Set Title*	*Publication Date*	*Abstract*	*Data Year(s)*	*URL*
			more about Florida's visitors and their preferences. Every year our Research Department prepares the industry leading Florida Visitor Study, in addition to many other useful studies. This Visitor Study is the premier reference guide for statistics on visitors to the Sunshine State.		

Appendix 4: NCRMP Additional Analyses for South Florida

Additional Analyses Requested by South Florida Partners

NCRMP – Socioeconomic Component
Social Survey for South Florida

Prepared in June 2015

Summary

- The following slides seek to examine relationships between specific user groups and their resource condition perceptions, management options perceptions, threat familiarity, organization familiarity, and coral reef-related information sources
- The user groups that are investigated are:
  - Those who dive and/or snorkel
  - Those who fish and/or gather
- Answers of "not sure" are coded as missing
- All analyses utilize post-stratification sampling weights

Investigating the Fish/Gather User Group

Differences between those who fish or gather and all others

Cross Tab of Fishing/Gathering Activity and Resource Condition Perceptions

Resource	Respondent DOES NOT participate in fishing or gathering		Respondent participates in fishing or gathering		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p
Current Conditions						
Ocean water quality	723	3.26	352	3.30	-0.39	0.69
Amount of coral	510	2.51	290	2.50	0.12	0.90
Number of fish	528	2.80	331	2.90	-1.10	0.27
Beach quality	728	3.44	341	3.40	0.61	0.54
Mangroves	514	3.34	311	3.15	2.16**	0.03
Change in conditions over last 10 years						
Ocean water quality	720	2.54	346	2.59	-0.73	0.47
Amount of coral	531	2.10	287	2.12	-0.31	0.76
Number of fish	562	2.24	325	2.25	-0.15	0.88
Beach quality	721	2.73	335	2.66	0.87	0.38
Mangroves	531	2.61	296	2.69	-1.02	0.31

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

- Higher mean values indicate a more positive perception.
- Respondents who participate in fishing or gathering activity had a more pessimistic perception concerning the current quality of mangroves when compared to respondents who do not fish or gather.

Cross Tab of Fishing/Gathering Activity and Management Option Perceptions

Management Approach	Respondent DOES NOT participate in fishing or gathering		Respondent participates in fishing or gathering		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p
Law enforcement of existing rules/regulations	776	4.18	345	4.09	1.44	0.15
Community participation in management	770	4.13	341	4.06	1.22	0.22
Seasonal openings/closures of fisheries	717	3.96	343	3.96	-0.03	0.98
Stricter control of sources of pollution to preserve water quality	791	4.34	350	4.35	-0.21	0.83
Restrictions on coastal development	770	4.10	345	4.05	0.79	0.43
Marine zoning	654	3.99	302	3.85	2.25**	0.03
Designated marine protected area	780	4.21	347	4.14	1.41	0.16
Limited use (fishing, diving, snorkeling, boating)	758	3.72	342	3.24	6.29***	<0.01
Restricted access	742	3.76	337	3.40	4.75***	<0.01
No-take zones	674	4.04	319	3.82	3.15***	<0.01
More restrictions on construction practices to prevent sediment going to sea	782	4.21	343	4.14	1.19	0.23
Limits per person for certain fish species (size and amount)	782	4.09	354	4.07	0.37	0.71

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

- Higher mean values indicate more agreeability with the management option.
- Respondents who participate in fishing or gathering activity were more likely to respond LESS favorably to marine zoning, limited use, restricted access, and no-take zones when compared to respondents who do not fish or gather.

Cross Tab of Fishing/Gathering Activity and Threat Familiarity

Threat to Coral Reefs	Respondent DOES NOT participate in fishing or gathering		Respondent participates in fishing or gathering		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p value
Climate change	784	4.00	342	3.87	1.89*	0.06
Coral bleaching	746	2.79	343	3.25	-5.15***	<0.01
Hurricanes and other natural disasters	798	4.17	355	4.31	-2.41**	0.02
Pollution (stormwater, wastewater, chemical runoff, trash/littering)	806	4.23	354	4.32	-1.64	0.10
Coastal/urban development	790	3.89	350	4.02	-1.66*	0.10
Invasive species	776	3.47	350	3.94	-5.97***	<0.01
Too much fishing and gathering	763	3.38	347	3.80	-5.22***	<0.01
Damage from ships and boats	785	3.79	352	3.92	-1.84*	0.07
Beach renourishment	749	3.25	333	3.59	-3.91***	<0.01
Snorkeling and diving	766	3.31	352	3.72	-5.04***	<0.01

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

- Higher mean values indicate more familiarity with the threat.
- Respondents who participate in fishing or gathering activity tended to be overall more familiar with the various threats posed to coral reefs (except for climate change) when compared to respondents who do not fish or gather.

Cross Tab of Fishing/Gathering Activity and Organization Familiarity

Reef Management Organization	Respondent DOES NOT participate in fishing or gathering		Respondent participates in fishing or gathering		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p value
SEFCRI Southeast Florida Coral Reef Initiative (SEFCRI)	779	2.22	339	2.58	-4.74***	<0.01
Florida Keys National Marine Sanctuary (FKNMS)	792	3.08	350	3.64	-7.16***	<0.01
Florida Department of Environmental Protection	793	3.43	353	3.86	-6.14***	<0.01
Florida Fish and Wildlife Conservation Commission	793	3.52	353	3.98	-6.70***	<0.01
Our Florida Reefs Community Planning Process	783	2.20	343	2.22	-0.29	0.77
Florida Keys National Marine Sanctuary Management Plan, Marine Zoning and Regulatory Review Process	784	2.48	346	2.96	-5.90***	<0.01

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

- Higher mean values indicate more familiarity with the organization.
- Respondents who participate in fishing or gathering activity were overall more familiar with the various coral reef management organizations when compared to respondents who do not fish or gather.

Cross Tab of Fishing/Gathering Activity and Information Source

Information Source	Respondent DOES NOT participate in fishing or gathering		Respondent participates in fishing or gathering		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p value
Newspaper/Print	815	50%	356	56%	-2.01**	0.04
Radio	815	21%	356	16%	1.72*	0.08
TV	815	59%	356	50%	2.88***	<0.01
Internet	815	50%	356	48%	0.61	0.54
Social media	815	14%	356	8%	2.84***	<0.01
Friends and family	815	25%	356	17%	3.41***	<0.01
Community leaders	815	5%	356	7%	-1.22	0.22
Dive and bait shop owners/employees	815	4%	356	11%	-4.12***	<0.01
Jurisdiction governments	815	4%	356	9%	-2.81***	<0.01
Federal government agencies (NOAA, EPA)	815	8%	356	6%	0.93	0.35
Non-Proft Organizations	815	13%	356	18%	-2.46**	0.01

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

- Higher mean values indicate more use of that particular information source.
- Respondents who participate in fishing or gathering activity were more likely to use the newspaper, dive/bait shops, the jurisdictional government, and non profits for coral reef information and less likely to use the radio, TV, social media, and friends/family when compared to respondents who do not fish or gather.

Investigating the Dive/Snorkel User Group

Differences between those who dive or snorkel and all others

Cross Tab of Diving/Snorkeling Activity and Resource Condition Perceptions

Resource	Respondent DOES NOT participate in diving or snorkeling		Respondent participates in diving or snorkeling		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p
Current Conditions						
Ocean water quality	709	3.31	360	3.20	1.38	0.17
Amount of coral	484	2.56	311	2.43	1.49	0.14
Number of fish	533	2.89	321	2.74	1.75*	0.08
Beach quality	719	3.49	344	3.30	2.53**	0.01
Mangroves	507	3.25	312	3.29	-0.45	0.65
Change in conditions over last 10 years						
Ocean water quality	704	2.59	356	2.48	1.53	0.13
Amount of coral	500	2.18	312	2.00	2.44**	0.01
Number of fish	557	2.31	324	2.15	2.12**	0.03
Beach quality	713	2.77	337	2.59	2.45**	0.01
Mangroves	517	2.65	304	2.62	0.36	0.72

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

- Higher mean values indicate a more positive perception.
- Respondents who participate in diving or snorkeling activity had a more pessimistic perception concerning the current number of fish and current beach quality and the change in the condition of the amount of coral, number of fish, and beach quality over the last 10 years when compared to respondents who do not dive or snorkel.

Cross Tab of Diving/Snorkeling Activity and Management Option Perceptions

Management Approach	Respondent DOES NOT participate in diving or snorkeling		Respondent participates in diving or snorkeling		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p
Law enforcement of existing rules/regulations	760	4.09	356	4.26	-3.23***	<0.01
Community participation in management	748	4.05	357	4.23	-3.47***	<0.01
Seasonal openings/closures of fisheries	703	3.86	352	4.15	-5.35***	<0.01
Stricter control of sources of pollution to preserve water quality	772	4.25	363	4.53	-5.79***	<0.01
Restrictions on coastal development	748	4.06	361	4.14	-1.25	0.21
Marine zoning	629	3.91	323	4.03	-1.91*	0.06
Designated marine protected area	758	4.16	364	4.25	-1.57	0.12
Limited use (fishing, diving, snorkeling, boating)	737	3.64	359	3.45	2.72***	<0.01
Restricted access	720	3.65	354	3.66	-0.04	0.97
No-take zones	646	3.92	342	4.05	-1.89*	0.06
More restrictions on construction practices to prevent sediment going to sea	759	4.12	360	4.32	-3.55***	<0.01
Limits per person for certain fish species (size and amount)	766	4.00	364	4.24	-4.28***	<0.01

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

- Higher mean values indicate more agreeability with the management option.
- Respondents who participate in diving or snorkeling activity tended to respond overall MORE favorably to the various management options proposed in the survey (except for limited use) when compared to respondents who do not dive or snorkel.

Cross Tab of Diving/Snorkeling Activity and Threat Familiarity

Threat to Coral Reefs	Respondent DOES NOT participate in diving or snorkeling		Respondent participates in diving or snorkeling		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p value
Climate change	765	3.93	355	4.01	-1.11	0.27
Coral bleaching	730	2.72	355	3.33	-7.07***	<0.01
Hurricanes and other natural disasters	781	4.16	366	4.33	-3.02***	<0.01
Pollution (stormwater, wastewater, chemical runoff, trash/littering)	788	4.19	366	4.40	-4.03***	<0.01
Coastal/urban development	772	3.82	362	4.14	-4.76***	<0.01
Invasive species	758	3.41	362	3.98	-7.08***	<0.01
Too much fishing and gathering	741	3.35	363	3.80	-5.78***	<0.01
Damage from ships and boats	764	3.72	367	4.04	-4.64***	<0.01
Beach renourishment	725	3.21	351	3.62	-4.86***	<0.01
Snorkeling and diving	749	3.16	363	3.96	-11.20***	<0.01

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

- Higher mean values indicate more familiarity with the threat.
- Respondents who participate in diving or snorkeling activity were overall more familiar with the various threats posed to coral reefs when compared to respondents who do not dive or snorkel.

Cross Tab of Diving/Snorkeling Activity and Organization Familiarity

Reef Management Organization	Respondent DOES NOT participate in diving or snorkeling		Respondent participates in diving or snorkeling		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p value
SEFCRI Southeast Florida Coral Reef Initiative (SEFCRI)	755	2.18	358	2.60	-5.53***	<0.01
Florida Keys National Marine Sanctuary (FKNMS)	773	2.98	364	3.77	-10.54***	<0.01
Florida Department of Environmental Protection	774	3.45	366	3.77	-4.35***	<0.01
Florida Fish and Wildlife Conservation Commission	774	3.46	366	4.06	-8.85***	<0.01
Our Florida Reefs Community Planning Process	764	2.18	356	2.26	-1.12	0.26
Florida Keys National Marine Sanctuary Management Plan, Marine Zoning and Regulatory Review Process	762	2.44	362	2.96	-6.14***	<0.01

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

- Higher mean values indicate more familiarity with the organization.
- Respondents who participate in diving or snorkeling activity were overall more familiar with the various reef management organizations when compared to respondents who do not dive or snorkel.

Cross Tab of Diving/Snorkeling Activity and Information Source

Information Source	Respondent DOES NOT participate in diving or snorkeling		Respondent participates in diving or snorkeling		Statistical test for difference	
	n	Weighted Mean	n	Weighted Mean	t	p value
Newspaper/Print	800	51%	366	55%	-1.26	0.21
Radio	800	21%	366	17%	1.48	0.14
TV	800	64%	366	41%	7.32***	<0.01
Internet	800	47%	366	54%	-2.19**	0.03
Social media	800	12%	366	13%	-0.65	0.52
Friends and family	800	25%	366	19%	2.21**	0.03
Community leaders	800	5%	366	8%	-1.90*	0.06
Dive and bait shop owners/employees	800	3%	366	12%	-5.18***	<0.01
Jurisdiction governments	800	5%	366	8%	-2.13**	0.03
Federal government agencies (NOAA, EPA)	800	6%	366	9%	-1.33	0.19
Non-Proft Organizations	800	11%	366	21%	-4.24***	<0.01

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

- Higher mean values indicate more use of that particular information source.
- Respondents who participate in diving or snorkeling activity were more likely to use the internet, dive/bait shops, community leaders, the jurisdictional government, and non profits for coral reef information and less likely to use TV and friends/family when compared to respondents who do not dive or snorkel.