

**SUPPORTING STATEMENT**  
**Comprehensive Regional Decision Support Framework to Prioritize Sites for Coral Reef Conservation in the U.S. Virgin Islands: Survey of Professional SCUBA Divers**  
**OMB CONTROL NO. 0648-xxxx**

**B. COLLECTIONS OF INFORMATION EMPLOYING STATISTICAL METHODS**

**1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g. establishments, State and local governmental units, households, or persons) in the universe and the corresponding sample are to be provided in tabular form. The tabulation must also include expected response rates for the collection as a whole. If the collection has been conducted before, provide the actual response rate achieved.**

The target population for this data collection is “professional SCUBA divers” who live and work in the USVI at the time of data collection. We define a “professional SCUBA diver” as any person who engages in SCUBA diving activity for a purpose related to their profession, occupation or business.<sup>1</sup> This group of coral reef resource users was chosen for two reasons. First, professional SCUBA divers, as a part of their profession, spend many hours diving on the jurisdiction’s coral reefs each year. Therefore, these individuals will be able to comment on the biological and ecological characteristics of familiar reefs, as well as provide an assessment as to the potential of these areas to recover from stressors. Many professional SCUBA divers have been diving on local reefs for multiple decades as a part of their business or occupation and, thus, have ample history with local coral reef ecosystems allowing them to note changes at locations where they go most often. The collection and use of “local ecological knowledge” for marine research has been successfully accomplished by consulting groups of people who are known or anticipated to have specialized knowledge based on their experiences with natural resources, such as SCUBA divers and snorkelers.<sup>2</sup> Second, in terms of documenting the use-value of the jurisdiction’s coral reef ecosystems, professional SCUBA divers represent a major stakeholder group whose livelihood, in many cases, is directly tied to the status of the Territory’s coral reefs. Documentation of where professional SCUBA divers dive is necessary to understand the importance of the various reef areas to this community.

As seen in Table 1, we anticipate a population of professional SCUBA divers in the USVI ranging from 166 to 250 individuals. Because the upper range of the estimated population of professional SCUBA divers in the USVI is manageable from a data collection standpoint, and

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<sup>1</sup> We exclude from our definition commercial fishermen whose fishing practices include the taking of fish while SCUBA diving (e.g., spearfishing, traps, etc.). Researchers deemed it more appropriate to include this group of professionals with the commercial fishing community, as opposed to the professional SCUBA diving community. Additionally, we exclude persons who are volunteer divers for businesses, agencies or organizations. Finally, we include in our definition university students who are paid through a research assistantship and whose assistantship includes SCUBA diving as a part of their work.

<sup>2</sup> Taylor, R.B. et al. 2011. Establishing baselines for recovery in a marine reserve (Poor Knights Islands, New Zealand) using local ecological knowledge. *Biological Conservation* 144: 3038-3046.

because we want to maximize inclusion of all potential respondents, we plan to survey the entire population, as opposed to implementing a sampling protocol. Researchers have developed “seed list” of 166 qualified respondents through consultation with local partners and by accessing occupational and business directories specific to the USVI. All 166 of these individuals will be included in the initial survey population.

To further recruit respondents who are qualified for membership in the population, we will execute a chain referral strategy. Specifically, we will ask all respondents who complete the survey to provide referrals to other professional SCUBA divers who should be surveyed. We will keep track of persons who are referred versus those who have been previously identified as professional SCUBA divers in the USVI. All individuals referred by respondents will be assessed to determine if they meet the minimum qualifications to be included in our target population per the project definition. If referred individuals meet the qualifications, we will add them to the population for survey. We will know that we have identified all persons in the target population when we cease to receive new referrals from respondents, that is, when the names received by referring respondents are no longer unknown to us.

Professional SCUBA Diving Population	Seed List	Anticipated Referrals	Total Population	Anticipated Response Rate	Anticipated Responses
	166	≤ 84	≤ 250	80% to 95%	200 to 238

**Table 1: Population Description and Anticipated Responses**

Potential respondents will be contacted directly by research staff to explain the research project and invite them to participate in the study. Attempts to contact each potential respondent will be made until we verify that 1) the person no longer works as a SCUBA diver in the USVI or 2) he or she refuses to participate in the study. Once the potential respondent has agreed to participate in the study, he or she will be given the option to complete the survey unassisted or with the assistance of a research team member, either remotely or in-person. In this way, we will alleviate potential issues of respondents not being able to take the online survey because of a lack of access to, or familiarity with, computer technology or the Internet. Each respondent will be provided with a passcode to enter the survey administration tool so that he or she may take the survey when convenient, taking as much time as is wished or needed. Research staff will follow up with respondents who agree to take the survey, but do not launch or complete the survey.

In terms of response rate, we anticipate a response rate of 80% to 95%. Data collections employing or targeting SCUBA divers generally boast high participation and response rates. Previous work indicates that SCUBA divers are a highly motivated and interested resource-user group. For example, Goggrego et al. successfully recruited 2,536 divers who collectively dove 6077 hours to collect biological and ecological information about seahorses. According to the researchers, the participation rate for volunteer SCUBA divers “exceeded expectations” during the study.<sup>3</sup> In terms of collections focused on the divers themselves, in-person collections provide the highest response rates. Lucrezi et al. reported a 98% response rate while surveying

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<sup>3</sup> Goggrego, S. et al. 2004. Volunteers in Marine Conservation Monitoring: A study of the distribution of seahorses carried out in collaboration with recreational scuba divers. *Conservation Biology* 18(6): 1492–1503.

recreational divers encountered via intercept at beaches.<sup>4</sup> Similarly, Ong and Musa reported a response rate of 84.3% collecting data from divers who were intercepted dockside.<sup>5</sup> Finally, Thapa et al., intercepting recreational divers at a dive shop in Florida, reported a response rate of 88%.<sup>6</sup> Because divers respond well to in-person contact, we plan to contact potential respondents personally to invite them to participate in the study. While potential respondents have the option to complete the survey unassisted, we will offer in-person assistance to anyone who wishes for assistance and will follow up in-person with people who agree to take the survey unassisted, but do not follow through to complete the survey. In this way, we plan to benefit from high response rates related to engaging with divers on a direct, personal level during the research project.

Response rates from studies targeting recreational divers, but where divers were not personally recruited, do tend to have low response rates. For example, Lorenzo et al. reported a response rate of 24.6% in their study of recreational divers. However, this study relied on mass distribution strategies for engaging recreational diver participation, such as leaving surveys for pick up at diving centers and publishing the survey in popular dive magazines.<sup>7</sup> To increase our response rate, we will engage with potential respondents directly and personally, and follow-up with them as needed during the data collection process.

**2. Describe the procedures for the collection, including: the statistical methodology for stratification and sample selection; the estimation procedure; the degree of accuracy needed for the purpose described in the justification; any unusual problems requiring specialized sampling procedures; and any use of periodic (less frequent than annual) data collection cycles to reduce burden.**

#### *Stratification and Sample Selection*

For the reasons aforementioned, data for this collection will be gathered from the universe of professional SCUBA divers in the USVI. Therefore, we will not employ a statistical method for stratification or sample selection. It is not our intention to generalize data collected beyond the professional SCUBA diving community in the USVI. Data collected will be reflective only of the professional SCUBA diver community in the USVI; we are not generalizing to a broader population, so estimation procedures will not be used.

#### *Data Collection Procedure*

Data for this collection will be gathered using an Internet-based survey administration and mapping tool that was developed by Dr. Greg Brown, who is an Associate Professor of

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<sup>4</sup> Lucrezi, S. et al. 2013. Managing diving impacts on reef ecosystems: Analysis of putative influences of motivations, marine life preferences and experience on divers' environmental perceptions. *Ocean & Coastal Management* 76: 52-63.

<sup>5</sup> Ong, T.F. and G. Musa. 2012. Examining the influences of experience, personality and attitude on SCUBA divers' underwater behaviour: A structural equation model. *Tourism Management* 33:1521-1534.

<sup>6</sup> Thapa, B., A.R. Graef, L.A. Meyer. 2006. Specialization and Marine Based Environmental Behaviors among SCUBA Divers. *Journal of Leisure Research* 38 (4): 601-615.

<sup>7</sup> Lorenzo, B. et al. 2011. Involvement of recreational scuba divers in emblematic species monitoring: The case of Mediterranean red coral (*Corallium rubrum*). *Journal for Nature Conservation* 19: 312– 318.

Geography at the University of Queensland-Australia. Dr. Brown's work has pioneered methodological developments in the field of public participatory mapping in a natural resource management context, as well as the mapping of socially-held landscape values.<sup>8</sup>

The survey will consist of three sections: Diving Questions, Mapping Exercise, and Informational Coverage & Demographic Questions. Sections 1 and 3 will be questions delivered in a standard survey format. Section 2 will consist of an online mapping exercise. In this mapping exercise, respondents will be asked to place applicable "informational pins" on an electronic map of coral reefs in the USVI. Each of these pins signifies a particular type of information about the coral reef area that the respondent may "pin" to his or her reef location of choice. The three types of spatial information being collected are: Reef Characteristics & Features, Reef Activity Areas, and Stressors & Recovery Potential. The map will be displayed in a Google Earth format and respondents will have the ability to navigate the map in a fashion similar to this popular online mapping service.

Respondents will be given the option to complete the survey unassisted or to have a team member offer assistance, either remotely or in-person. In this way, we will alleviate potential issues of respondents not being able to take the survey because of a lack of access to or familiarity with computer technology or the Internet. Each respondent will be provided with a passcode to enter the survey administration tool so that he or she may take the survey when convenient, taking as much time as is wished or needed.

#### *Statistical Analysis*

Data analysis will be geared toward understanding the attributes of our target population, as well as the spatial distribution of their knowledge about coral reefs and their activities around them. Attribute profiles for professional SCUBA diver activity and demographic characteristics will be summarized using basic univariate descriptive statistics. Inferential statistics will be used to examine differences between subgroups in the population. The mapping data will be examined with spatial autocorrelation statistics.

#### *Degree of Accuracy Needed for the Purpose Described in the Justification*

As the study is focused on a population, the statistics will have no sampling error. Therefore, the issue of degree of accuracy is not applicable.

#### *Unusual Problems Requiring Specialized Sampling Procedures*

We do not anticipate any unusual problems that require specialized sampling procedures.

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<sup>8</sup> Brown, G. 2005. Mapping spatial attributes in survey research for natural resource management: Methods and applications. *Society and Natural Resources* 18: 17-39.; Brown, G. and C. Raymond. 2007. The relationship between place attachment and landscape values: Toward mapping place attachment. *Applied Geography* 27: 89-111.

**3. Describe the methods used to maximize response rates and to deal with nonresponse. The accuracy and reliability of the information collected must be shown to be adequate for the intended uses. For collections based on sampling, a special justification must be provided if they will not yield "reliable" data that can be generalized to the universe studied.**

#### *Maximizing Response Rates*

Because of the topic of the study and strong interest within the professional SCUBA diving community regarding coral reef resources in the USVI, we anticipate a highly motivated and interested target population.<sup>9</sup> However, we do anticipate that potential respondents may be busy and possibly difficult to contact initially. Therefore, to increase our response rate, we plan to engage with each potential respondent directly. Potential respondents will be contacted directly via telephone and/or email by research staff to explain the research project and invite them to participate in the study. In other words, a member of the research team will personally call and/or email a potential respondent to explain the project and invite participation. Once the potential respondent has agreed to participate in the study, he or she will be given the option of completing the survey unassisted or with the assistance of a research team member, either remotely or in-person. In this way, we will alleviate issues of potential respondents not being able to take the survey because of a lack of access to or familiarity with computer technology or the Internet. Each respondent will be provided with their own passcode to enter the survey administration tool so that he or she may take the survey when convenient, taking as much time as is wished or needed. Using this approach, the respondent may complete the survey at their convenience in sessions. When respondents opt to complete the survey unassisted, to increase our response rate, research staff will follow up with respondents who do not launch or complete the survey.

Also to minimize non-response or low mapping effort, we have limited the number of survey questions as well as the number of mapping activities. Related to the mapping exercise, we will provide features on the map to make the mapping activity easier for the respondent, such as the ability to zoom in or out and inclusion of data to help orient the respondent on the map. A number of additional data layers beyond what is typically provided via the Google Earth service, such as the locations and names of local landmarks, navigational markers, management unit boundaries, etc., will be displayed on the map to help orient respondents quickly. Finally, to help reduce the mapping effort for respondents, as well as standardize the spatial data collected, respondents will be instructed that the coverage of each informational pin placed will be set at a 50 meter radius. Employing this assumption will reduce the mapping effort for respondents as they will likely have to place fewer pins to cover the coral reef area to their satisfaction, in terms of mapping information.

#### *Approach to Non-Response*

Non-response analyses will be undertaken to assess the impact of non-response on data quality per guidance issued via the OMB Standards and Guidelines for Statistical Surveys. Response rates will be calculated for the collection as a whole, as well as for each item on the survey.

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<sup>9</sup> The research team has discussed plans for this data collection with a number of persons from the professional SCUBA diving community in the USVI. We have received positive feedback and encouragement from these individuals, and expressions of interested and excitement about their possible participation in such as study.

Where non-response is found to be an issue, we will examine patterns within the data to assess potential for presence of non-response bias in the data.

**4. Describe any tests of procedures or methods to be undertaken. Tests are encouraged as effective means to refine collections, but if ten or more test respondents are involved OMB must give prior approval.**

The survey instrument was pre-tested on a group of NOAA SCUBA divers who resemble the target population in that they dive as part of their profession, but are outside of the geography of focus and, therefore, are not among the target population. The pre-test was distributed to a total of 6 individuals and responses were received from 4 within the requested 10 day period. The aim of the pre-test was to roughly assess timing for completion, functionality of survey instrument, clarity of instructions and appropriateness of wording. The pre-test respondents were asked to complete the survey and to provide feedback in writing.

Largely, the respondents felt that the survey was clear, straightforward and easy to work through. From this group, we received minor comments related to wording, answer scales and the need for clarifying instructions. We were able to modify the scale for Question10 by adding a neutral option and removing the “Not a value I hold for coral reefs” answer choice. For the same question, we rephrased the value statements to orient to the individual as opposed to having a mix of individual and community statements. Revisions were made to the survey instrument in response to these comments.

**5. Provide the name and telephone number of individuals consulted on the statistical aspects of the design, and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.**

The research team has consulted with Dr. Greg Brown on the methodological and statistical design of the data collection:

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Data collection and analysis will be undertaken by NOAA employees, as well as NOAA contract staff employed by CSS-Dynamac and JHT, Inc. The data collection and analysis team includes:

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