REQUEST FOR STATEMENT OF INTEREST FOR PROJECT TO BE INITIATED THROUGH THE COOPERATIVE ECOSYSTEM STUDIES UNITS (CESU) NETWORK

PROJECT TITLE: Detection Probability Modeling of Reef Fishes for a Multiagency Monitoring Protocol for Florida and the U.S. Virgin Islands

Response to this Request for Statements of Interest will be used to identify potential partners for a research project funded by the National Park Service (NPS). This project will be administered through a CESU only upon mutual agreement and official authorization by both parties of the acceptance of the application of the CESU Network IDC rate (17.5%). Approximately $80,000 is available in Fiscal Year (FY) 2022 to support this project. Approximately $80,000 is anticipated for FY 2023 to facilitate additional field data collection, however funding is not guaranteed per the Anti-Deficiency Act [ADA].

ELIGIBILITY INFORMATION

Eligible Applicants – This opportunity is restricted to non-federal partners of the Gulf Coast-Cooperative Ecosystems Studies Unit (CESU), Hawai'i-Pacific Islands CESU, Piedmont-South Atlantic Coast CESU, South Florida – Caribbean CESU and the Southern Appalachian CESU.

BACKGROUND

Reef fish populations are of great economic, cultural, and ecological significance throughout the Caribbean and are essential components of coral reef ecosystems in US waters including Florida, United States Virgin Islands (USVI), Puerto Rico, and Flower Garden Banks. Recent stressors on these populations include severe quality degradation of essential habitats, such as widespread coral bleaching and disease outbreaks, as well as substantial increases in recreational and commercial fishing efforts. Reef fish populations have historically been difficult to assess due to a lack of traditional fishery-dependent data and limitations on interpreting catch data at a fine spatial scale. *The Cooperative Multiagency Reef Fish Monitoring Protocol for the Florida and U.S. Virgin Islands Coral Reef Ecosystems* is a culmination of over 40 years of field work to assess reef fish communities and survey designs developed by fisheries scientists at multiple agencies and universities. The data collected by this protocol (https://irma.nps.gov/DataStore/Reference/Profile/662816) is useful for understanding the ecological effect of natural and man-made stressors as well as management actions to promote sustainability of reef fish populations and communities.

In order to efficiently sample within a heterogeneous environment, the sampling effort is optimized using a single-stage stratified random sampling design coupled with a Reef Visual Census (RVC). Before sampling occurs, the sampling domains are partitioned into 50 x 50 m grid cells, or primary units, which are each assigned a stratum designation based on habitat type, geographic sub-region, management type (open vs. closed to extraction), depth, and rugosity. The number of primary units to be sampled in each stratum type is based on a Neyman allocation scheme, which accounts for the stratum's size and standard deviations for focal fish species densities in each region. Once the optimal number of primary units per stratum is chosen based on a target precision and the capabilities of the agencies, primary units to be sampled are randomly selected from a list of all primary units for each stratum. Within each selected primary unit, one smaller second-stage unit is selected for survey.

The second-stage unit consists of a buddy pair of divers who each perform a RVC timed point count within a 15-m diameter cylinder. The RVC method allows divers to simultaneously collect data on the

relative density and size distributions of the entire fish community, as well as information on benthic habitat features. Atlantic and Caribbean sampling occurs every other year in the summer months, generally between May and September. The Florida Keys and Tortugas are surveyed during the same year and are alternated every other year with surveys in the USVI. Implementation of this protocol is a collaborative effort amongst federal, territorial, academic, and non-governmental organization partners[1].

OBJECTIVES

The National Park Service (NPS) South Florida/Caribbean Inventory and Monitoring Network (SFCN) seeks collaborators to model detection and occupancy coefficients for reef fishes utilizing a detailed analysis-ready database developed from 20+ years of reef fish visual census surveys in South Florida and the United States Virgin Islands.

Underwater visual assessments like the RVC method are not expected to be free of bias and report absolute probability detection across the entire reef fish community. The methods for estimating detection probability and understanding observer effects in underwater visual census methods are beginning to be understood. Thus, these methods could be applied to species specific detection probability and occupancy estimations for the multiagency reef fish protocol in Florida and the USVI.

Analysis of the existing historical dataset to determine detection and occupancy coefficients is the first step in this process and the primary objective of this study. Potential factors to be modeled include physical environmental variables (depth, visibility, habitat) and/or species characteristics such as species-specific size and behavior and training level of the observers.

The RVC sample data, stratum data, taxonomic data, and benthic data sets for Florida and the USVI are stored and managed by NOAA Southeast Fisheries Science Center (NOAA-SEFSC). Analysis-ready datasets and data attributes for the Florida Keys, Tortugas, St. Thomas/St. John and St. Croix regions are shared on-line at the South Florida National Coral Reef Monitoring Program data portal (https://grunt.sefsc.noaa.gov/rvc_analysis20/). All data collected in South Florida since 1999 and 2017-2021 in the USVI are available as comma-separated value (csv) spreadsheet files in uncompressed or compressed zip files for general use. Variable metadata are also available for each data set. Detection probabilities and occupancy coefficients are typically determined by double counts by observers surveying the same area for reef fish species. The RVC database is created by two observers surveying two paired non-independent survey plots located approximately tangential to one another that are averaged to create one survey unit. Thus, the two counts are not surveying the same area of water and do not meet the underlying assumptions of double observer surveys. Therefore, the coefficients based on the historical database will be treated as preliminary until these values can be assessed by a follow-up empirical study comparing standard paired RVC counts with double observers positioned within the same survey plots.

[1] Partners include but is not limited to the National Oceanic and Atmospheric Administration (NOAA) National Centers for Coastal Ocean Science (NCCOS), NOAA National Marine Fisheries Service's Southeast Fisheries Science Center (SEFSC), Florida Fish and Wildlife Conservation Commission's Florida Fish and Wildlife Research Institute (FWRI), National Park Service (NPS) South Florida/Caribbean Network (SFCN), Biscayne National Park, Dry Tortugas National Park, Virgin Islands National Park and Virgin Islands Coral Reef National Monument, Buck Island Reef National Monument, Virgin Islands Department of Planning and Natural Resources (DPNR), University of Miami's Rosenstiel School of Marine and Atmospheric Science (UM), University of Virgin Islands (UVI), and The Nature Conservancy (TNC).

In future years, field data would need to be collected and analyzed from a subset of sites to establish relationships for standardized estimates using covariates most likely to influence detectability. These questions will be explored in a long-term iterative process, by paired non-independent samples collected by trained and experienced observers using a single standardized visual assessment methodology with two observers surveying the same survey plot. Potentially these refined coefficients would be applied in the future to estimates of density, occupancy, and stock biomass.

NOTE: SFCN and other NPS staff will have significant involvement with the project to ensure the deliverables meet the NPS needs and provide any background references, documents, research, or other guidance. The success of this project will depend on the collaboration between the cooperator and the NPS.

DELIVERABLES

Deliverables shall include: 1) all metadata (organized by study regions: Florida Keys, Tortugas, St. Croix, and St. Thomas/St. John), protocols, and instrumental methods used in data collection; 2) a written report for internal use describing the data, as well as associated statistical analyses, findings, and management recommendations including future steps needed for a detection probability field study; and 3) a presentation on the data and results for SFCN staff and partners; 4) an electronic copy of all final products will be submitted to SFCN 12 months after the start date of the project.

START DATE

July 1, 2022 (Tentative)

END DATE

September 30, 2023 (Tentative, an extension of timeline may be possible)

MATERIALS REQUESTED FOR STATEMENT OF INTEREST

Please prepare a 2-3 page summary of your vision for implementing this project. Include your name, department, university or organization, contact information, CESU affiliation, and a brief biographical sketch. Please include the same information for any collaborators, including staff, faculty, or students who would work on the project. Successful applicants will demonstrate expertise in marine fisheries or quantitative ecology through relevant experience, projects, research, or other examples of their work. We are particularly interested in expertise related to population dynamics, predictive analytics, sampling design, ecosystem modeling and/or risk assessment utilizing large data sets. An understanding of sustainability risks of marine fishery resources from exploitation and environmental change(s) is also beneficial.

REVIEW OF STATEMENTS RECEIVED

All Statements of Interest received will be evaluated by an interagency panel (NPS, FWC, NOAA) with expertise related to the park unit or subject matter. Based on a review of Statements of Interest received, an investigator or investigators will be invited to prepare a full study proposal. Statements of Interest will be evaluated based on demonstrated experience and capabilities related to the project requirements. Previous experience and familiarity studying the resources of parks within the NPS Southeast Region is beneficial.

Please direct questions to Michael Feeley, Marine Ecologist, SFCN (michael_feeley@nps.gov).

Submit Statements of Interest to Michael Feeley with a copy to Carol Daniels, Senior Science Advisor, SFC-CESU (carol_daniels@nps.gov) by May 5, 2022, 6:00 PM EST.

PLEASE NOTE: A budget is not requested at this time.

Contact Information

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