

Data Management Plan. This plan provides for the preservation, documentation, and sharing of data collections, modeling results, and other related research and education products. It follows the guidance provided in NSF-11-060 Division of Ocean Sciences Data and Sample Policy, and will be completed within the 2 year post-project window.

1. Types of data and other materials produced in the course of the project. During the proposed project we will collect oceanographic data (water temperature, salinity, DO, pH, flow velocity and structure), ecological data (nearshore marine benthic and demersal organisms' abundance, biomass and size structure, community composition and structure, diversity, and spatial distribution, phytoplankton biomass and composition) and socioeconomic data and information (narratives about past responses to environmental variation, stakeholders' perception about current condition of resources and the drivers of their productivity, perceptions about conservation and adaptation strategies, including marine reserves and diversification of activities, stated and revealed preferences from interviews and economic experiments). Spatial data will be geo-referenced to coordinate with GIS and remote sensing data formats. We will also use existing data in analyses and modeling. Existing data include Sea Surface Temperature, SSH, QuickScat winds, chlorophyll (color) from satellite imagery (available from NOAA CoastWatch, coastwatch.noaa.gov), fisheries catch, effort, and catch per unit effort time series, published and unpublished data on focal species (e.g., past estimates of invertebrate abundance), and their vital rates (e.g., growth, mortality). R Scripts for data analyses and for models simulating population demography and management will be also produced during the project.

2. The standards to be used for data and metadata format. All data and metadata will be submitted to the National Oceanographic Data Center (NODC) or the NSF funded Knowledge Network for Biocomplexity (KNB) in the preferred format at the time of submission. Copies of the biological survey data and model parameters and results will be housed and managed on a server in the Micheli lab, while oceanographic data will be housed on a server at Stanford's EFML. Data on the server in the Micheli Lab will be stored in appropriate formats, including Microsoft Access, Excel/CSV, and Reach Text Format. Spatial analyses will be saved as coverages, shapefiles, rasters, and accompanying metadata. An HTML interface will be also created for easy access to the relevant information. Metadata will include a description of how the data were collected, where, when, and who collected them, where they are stored and how they can be accessed. We will also provide an explanation of variables measured, data analyses, and details on who has worked on the project and performed each task. Metadata for spatial datasets will include geographic extent, projections used, file formats, etc. In the case of biological samples, we will provide a description of how samples were collected, processed, stored and analyzed. For existing/historical data, we will provide and make accessible a full description of the source of the information, the type of data, ownership, geographical coverage, format, and accessibility. For ethnographic and economic data, we will provide a full description of how, when, and by whom the data were gathered, the sample size, the techniques used to interview stakeholders, and other relevant information relating to the context and design of the surveys and experiments. The confidentiality of information will be maintained as specified in human subjects research protocols approved by each of the institutions involved. Where possible, narrative metadata will be gleaned from relevant, currently existing or multi-purpose sources, such as progress reports and publications that are generated through this project. Metadata will be stored along with the data in the same folder file structure. Brief metadata for other datasets will be written as narrative as well and saved as a Rich Text Format file named 'readme.rtf'. The standards and approaches for metadata are chosen with respect to anticipated potential reuse of the data, data storage, appropriate software, and project personnel expertise.

3. Policies for access and sharing. New data generated by this project will be made available upon request after publication of results and analyses in peer-reviewed journals. Depending on the types of data (see above) requests for data will be made to one or more of the PIs and senior participants in the project: Drs. Fiorenza Micheli (email: micheli@stanford.edu), Stephen Monismith (monismith@stanford.edu), Giulio De Leo (giulio.deleo@unipr.it), Bonnie McCay

(mccay@aesop.rutgers.edu), Paul Ferraro (pferraro@gsu.edu), and Andrea Saenz-Arroyo (andreas.saenz@gmail.com). Access to the data will not be chargeable. There are no embargo periods for political, commercial, or patent reasons. All data used in peer-reviewed publications will be submitted to NODC or KNB at the time of publication. For data sharing, standard policies for access, e.g., obtaining permission from dataset owner(s), will be used as appropriate. For socioeconomic studies, texts and data on stakeholder perceptions, knowledge and behaviors will be treated to remain anonymous and/or confidential in accord with the Protection of Human Subjects protocol.

4. Policies for re-use of data. We envisage that the data and analyses generated by this project will be of wide benefit and interest to a variety of government agencies, NGOs, and the general public (see *Expected Project Significance*). We anticipate that the PIs and Senior Personnel on the project will be future re-users of the data for activities such as applying new analytical techniques to generate new insights, or using data in the context of comparative studies and reviews. The data are also being developed and stored with other future users in mind. The choice of formats and inclusion/extent of metadata provided will facilitate future use of the datasets. Measures of seawater oxygen content, pH, temperature and other physical and chemical parameters, abundance of monitored populations, and species lists have a wide range of applications, especially when analyzed over the long-term at various temporal resolutions. Environmental management decisions are often based upon the state of the environment. Understanding of the impacts of societal and organizational behavior with respect to the persistence of marine resources, and how they are affected by environmental drivers, may prompt recommendations and actions to be taken at various societal levels including local organizations and government (local, state, federal). In addition, our results will inform a set of institutional arrangements to help coastal communities adapt to environmental fluctuations, including climate change. These results might shed some light in understanding coastal societies resilience around the world and might be re-used in other geographic contexts. Finally few studies on willingness to invest in direct payments for conservation exist. Our results might also be used to guide future experiments investigating how people modify their investment in response of how the message is framed.

5. Plans for archiving data. For the oceanographic and ecological data, we will use three primary repositories that will be managed by the technician in Micheli's lab, the technician at our Mexican partner organization Comunidad y Biodiversidad A.C., and by Woodson at the Environmental Fluid Mechanics Lab (EFML) at Stanford. Biological survey data and model parameters and results will be housed and managed on servers in the Micheli lab and at COBI, while oceanographic data will be housed on a server at the EFML. Backup copies will be regularly made so as to preserve the data in the case of server failure. Biological and oceanographic data will be replicated and made available through secure FTP servers. Access to the data for this project will be provided to PIs, senior participants, and all researchers, students, and technicians involved in the project via a secure logon. For the socioeconomic analyses, data will also be stored in servers at COBI, the Instituto de Investigaciones Economicas at UNAM, and Rutgers and Georgia State University following the protocol approved by Institutional Review Boards of the participating universities. Within 2 years of data collection, data and metadata will be archived at the National Oceanographic Data Center (NODC) or the NSF funded Knowledge Network for Biocomplexity (KNB). Published materials will be available through searchable online databases commonly accessed through research university libraries. Data will be further available upon request to the PIs (see above).

6. Preservation of access to data, samples, and other research products. Citation of published materials will be dependent upon the location of publication (i.e. which journals etc.) but will likely be provided a Digital Object Identifier (DOI). Published materials will further be available on homepages and websites of the PIs. Since data will be available upon request after publication, the published materials will be the most appropriate to cite, rather than the raw data.