Appendix XX: Establishing a Baseline of Consumptive and Non-consumptive Human Use Indicators for MPAs in the North Central Coast of California

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I. Project Leaders and Associated Staff

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II. Project Goals and Objectives

In order to understand the interactions between human uses of the coastal ecosystem and the newly implemented marine protected areas, the central goal of the socioeconomic work is to collect data on coastal use patterns, operation costs, trip expenditures, and demographic characteristics of California's North Central Coast (NCC) consumptive and non-consumptive user communities. The objectives of this research are to

1. provide baseline estimates of the quantity, spatial distribution and economic impacts of the human uses of the study region;
2. integrate those with ecological indicators of MPA performance;
3. describe the initial response of these user communities to the MPAs immediately following their implementation; and
4. inform the planning and implementation of long-term monitoring, and the development of a modeling framework for understanding the causal links between ecosystem features, socioeconomic changes, and the implementation of MPAs.

We will establish a baseline of consumptive and non-consumptive data against which future comparisons can be made in an effort to empirically detect any MPA effects (e.g., increase in net benefits to users detected after controlling for exogenous factors). We eventually want to identify correlations between human use and the ecological responses that are hoped for under the Marine Life Protection Act (MLPA); therefore, an objective is to collect representative and geo-referenced baseline data both inside and outside of MPAs, including data from the ecological data sampling sites. While there are very few, if any, socioeconomic trend data at a spatial scale appropriate for MPA planning and evaluation, we will interpret the study region information in the context of socioeconomic data from protected and unprotected areas outside California.

Moreover, we will configure the baseline so that direct comparisons can be made with similar baselines established in other regions of California and the US West Coast (e.g. Leeworthy and Wiley 2002), and so that it can be integrated with the ecological data to inform a comprehensive set of modeling and analytical activities in year 3 of the project. We anticipate working closely with the Monitoring Enterprise and researchers both inside and outside the project on the development of appropriate indicators and modeling approaches. Particularly, we anticipate that the bioeconomic models developed for the MLPA Initiative (White et al. 2008), the integrated ecosystem model being developed for the Bering Sea (see http://bsierp.nprb.org/), a marine environmental/economic valuation model being developed by researchers at the Natural Capital

Project (http://www.naturalcapitalproject.org/InVEST.html), and the Atlantis Ecosystem Modeling Framework (Brand et al. 2007) will serve as useful points of departure for these deliberations with the rest of the monitoring groups.

III. Rationale

Humans are an integral part of the ecosystem in the North Central Coast, and their activities inside and outside the newly implemented marine protected areas are closely linked to the system's ecological responses to the implementation of MPAs. In order to understand these interactions, and to establish baseline data for monitoring and analysis, a comprehensive understanding of the current extent, pattern, and importance of human uses is required. This component augments existing data on spatial use, and closes socioeconomic information gaps in the region. Finally, we will demonstrate methods and tools that can be used to cost-effectively replicate human use data collection in the future, for monitoring purposes.

IV. Plan of work

Our approach builds on previous work in support of the design and implementation of MPAs in several regions of the MLPA, notably Scholz et al. (2008) and Pendleton and LaFranchi (2009), which demonstrated novel approaches for collecting, compiling and analyzing socioeconomic information at spatial resolutions to aide the design of MPA alternatives, including the final design implemented in the North Central Coast study region. By necessity, that work was focused on providing stakeholders and decision-makers a first order estimate of MPA impacts, and due to time and resource constraints did not contain the full range of consumptive and non-consumptive activities. It also constituted the first, comprehensive set of socioeconomic data at MPA-relevant scale, which, while recognized as desirable (Sala et al. 2002, Richardson et al. 2006), are typically absent from MPA design and implementation.

The work proposed here closes these information gaps and builds a baseline for long-term monitoring. We focus on three major categories of coastal users: 1) private recreation (both consumptive and non-consumptive); 2) commercial fishing; and 3) commercial charter (both consumptive, as in the case of sport fishing or "commercial passenger fishing vessels"; and non-consumptive, e.g., whale watching). We will collect a region-wide, spatially-explicit sample of private consumptive and non-consumptive recreation data that is representative of the entire population of the sample frame (i.e., that will allow us to extrapolate from sample to study population). The sample frame will be defined as all California residents or those from a set of California counties along or associated with the NCC study region. We will also collect a representative, region-wide, spatially-explicit sample of commercial fishing and charter operations and where possible obtain census. The sample frame will be primarily defined based on fishing vessels or operations that are based or homeport within the NCC study region; some consideration will be given to estimating and incorporating those operations that may fish within the NCC study region, but reside either north or south of the boundaries.

Based on our demonstrated and peer reviewed approaches (Scholz et al. 2004, Scholz et al. 2006, Wilen and Abbot 2006, Pendleton and LaFranchi 2009), we propose to develop survey instruments and methodology for collecting data on coastal use patterns, operation costs, trip expenditures, and demographic characteristics of California's North Central Coast (NCC) consumptive and non-consumptive user communities.

Using this approach we will be able to estimate:

1. The distribution of human spatial use, operational costs, and trip expenditures across the NCC region at a spatial scale that is sufficiently granular to compare use inside and outside MPAs and relate these observations to the ecological monitoring.
2. The quantity of coastal users in the sample frame (i.e. participation rate).
3. The quantity of fishing trips by commercial and commercial sport businesses.
4. The quantity of trips to the coast by recreational users, distributed across a set of consumptive and non-consumptive uses.
5. The direct economic impact of coastal trips.
6. Demographic and economic characteristics of coastal users (baseline for understanding existing factors influencing consumptive and non-consumptive use patterns and prospective or actual changes associated with MPA implementation).
7. A description of the consumptive and non-consumptive use patterns before MPA implementation.
8. Spatial and thematic association with ecologically and economically relevant species (rockfish, Dungeness crab, California halibut, lingcod, salmon, red sea urchin, abalone, seaweed, and/or clamming).

Private recreational (consumptive and non-consumptive)
The proposed survey instrument will merge Ecotrust's Open OceanMap, a web-based and desktop data collection tool used to effectively collect local expert knowledge in support of a marine spatial planning process with the sampling approach that was recently used to randomly sample California residents (*The California Coast Online Survey*), developed by NaturalEquity and the Coastal Oceans Values Center (Pendleton and LaFranchi 2009). The synthesis of these tools will allow us to acquire private recreation data that are directly comparable across all private consumptive and non-consumptive user groups. To ensure that we collect a sample that represents the greater sample frame population, stakeholder participants, and is also representative of infrequently used sites and infrequently practiced uses, the survey will be administered in three modes:

1. By randomly sampling from a standing internet panel, hosted by a private provider capable of probability sampling (note: respondents cannot self-select for this survey mode)
2. Through a non-random, internet "opt-in" process (leveraging the many user associations and their membership lists), and
3. By non-random, in-person sampling of coastal users at meetings, harbors, for-hire charter operations, and at key coastal intercept sites on the CA NCC.

Commercial fishing and commercial charter The same survey instrument will be used to acquire commercial fishing data using research methods designed to codify and analyze existing data (Scholz et al. 2008), collect new data through the use of standing panel focus groups and individual interviews, and conduct a comparative analysis of pre- and post-MPA implementation use patterns. The survey will be administered in three modes:

1. Through a non-random, internet "opt-in" process (leveraging or targeting individuals who participated in Ecotrust's previous study).
2. By non-random, in-person "opt-in" sampling of fishermen that may not have access or comfortable using the internet.
3. By a non-random panel of business owners/operators that are periodically re-sampled and provide on-going information about their business operations.

The internet opt-in process for the commercial and CPFV sector is not to be confused with the much more extensive internet panel that will be used in the recreational sector. In the commercial fishing and CPFV sector, the use of the internet opt-in process is used both as a cost-saving device and as a convenience for a likely small subsample of the target population that is already comfortable and familiar with these technologies based on participation in prior surveys conducted in the context of the MLPA implementation in the North Central Coast study region (Scholz et al. 2008). The majority of the survey with commercial fishermen and CPFV operators will be conducted through in-person interviews.

Coordination and Integration with Ecological Data Collection

We will actively exploit efficiencies with the other components of the project, e.g., in determining the timing of surveys, coordinating on field work, recruiting panel participants from the collaborative fisheries work and identifying potential future socioeconomic citizen science opportunities in conjunction with the ecological work. We will prepare our data for integration into a shared project database using a standardized and shared set of thematic, spatial and temporal resolution, and participate in the design and architecture of the project database early on in the project. This will facilitate the integrated analysis of the interactions between ecosytems and human uses. During the collaborative analysis in year 3, our data will form the basis for inquiries into the relationships between human use patterns and various ecological/biological conditions, e.g. species presence/absence, size distributions, etc., and also for estimates of the initial human use response to the MPAs in the study region.

The data produced in this component will establish a baseline against which future comparisons will be made in an effort to empirically detect any MPA effects on the socio-ecological system. This requires data both inside and outside MPA, and corresponding data from ecological data sampling sites. In contrast to the ecological sampling, in our case human respondents determine the site selection (indeed, our surveys elicit spatial use information from respondents). Since we collect human use data that correspond to a large set of sites (>200), however, the socioeconomic study will likely contain all ecological data collection sites. Indeed, we will produce data that reveal the relative importance of ecological data collection sites to users.

V. Outcomes and deliverables

The overall outcome will be a comprehensive set of geo-referenced consumptive and non-consumptive data for the North Central Coast, including 1) spatial use and intensity, 2) cost and expenditures associated with uses, and 3) a demographic profile of users.

In addition to delivering the data, we will provide analytical interpretations that include, but are not limited to the following set of questions/topics:

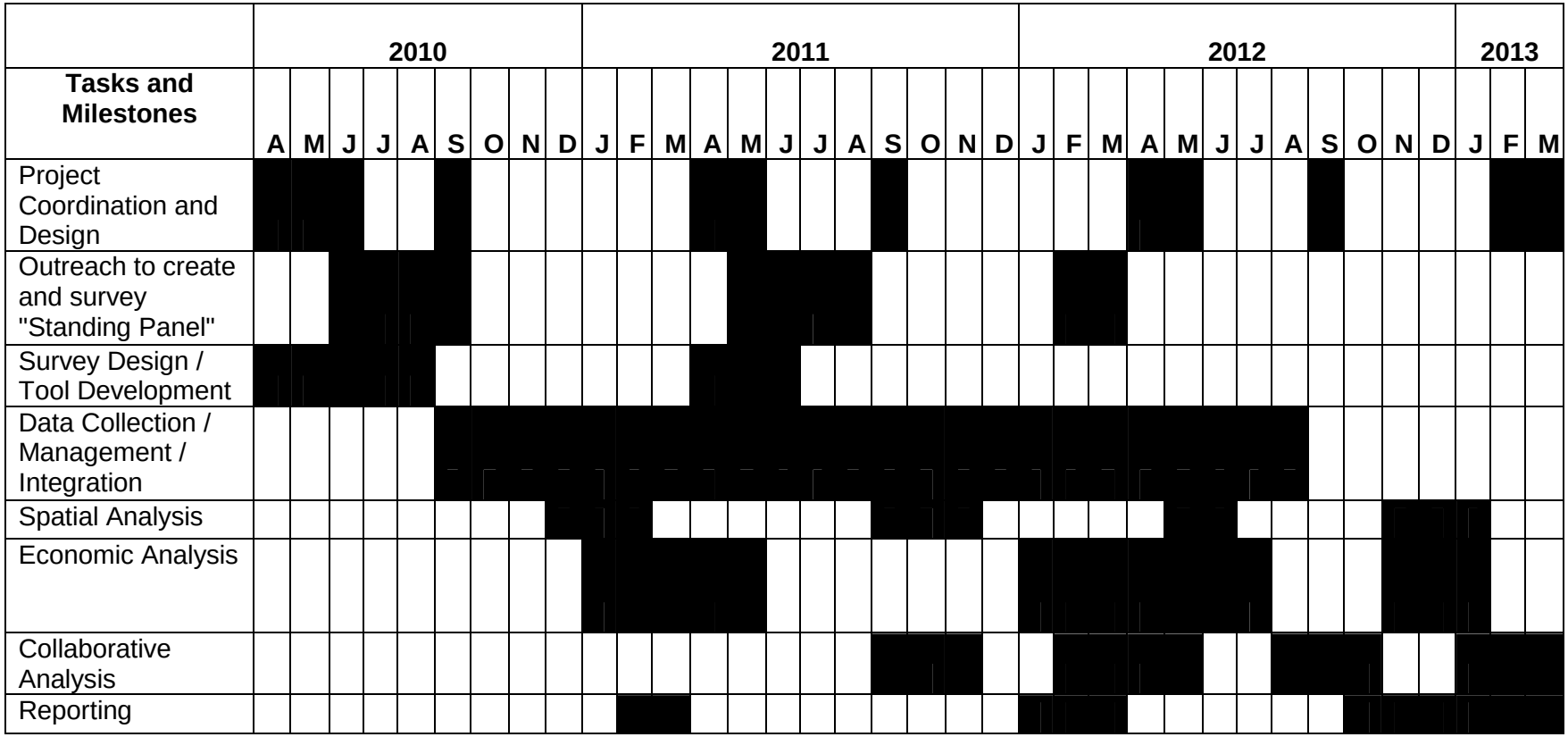
1. Shifting fishing patterns (e.g. areas accessed, number of trips, permits actively used) and knowledge, attitudes and perceptions related to MPA implementation and other key drivers of consumptive use (e.g. fisheries regulations, fuel costs, shifting environment, etc.).
2. Patterns of private recreational use, including the economic impact of recreational trips to the coast and estimates of total recreational use for the region, distributed spatially and across consumptive and non-consumptive users groups, e.g., divers, surfers, recreational anglers, kayakers, and beach goers.
3. An overview of demographic and economic attributes by county and recent trends in key fisheries and factors that affect recreational use. These summary descriptions provide a baseline for understanding existing factors influencing consumptive and non-

consumptive use patterns and prospective or actual changes associated with MPA implementation.

4. A description of the consumptive use patterns before MPA implementation.
    a. For commercial fisheries, this will include information on fishery participants and landings (pounds, value and distribution across ports and individuals).
    b. For commercial sport fisheries, this will include information on operators and basic operations (trips taken, clients, species targeted).
    c. For recreational fisheries, this will include information on effort, harvest, and target areas (and rationale for choosing these areas), among others.
5. An analysis of spatial data (from Ecotrust) to assess the distribution of existing consumptive (and non-consumptive) uses inside and outside MPAs.
6. Creating initial data points for ongoing monitoring.
7. An Assessment of implementation conditions using the final Ecotrust impact assessment for Proposal IPA.
8. A description of initial changes in consumptive uses. We will conduct comparative analysis of pre- and post-MPA implementation use patterns such as fishing effort, catch and value associated with individual MPAs, ports and the study region.
9. An initial estimate of the quantity of animals removed from the system, over time and space.

In addition to data, products from this component will include contributions to an overarching project report; 1-3 peer-reviewed publications; and several “plain language” summaries of this research for use in outreach and education activities, including future citizen science activities.

VII. Milestones Chart



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