

REVISED PLAN OF WORK

Project Title:

Baseline Characterization of Nearshore Fish Communities Associated With Rocky Reef Habitats in the Northern California MPA Study Region

Principal Investigator: Tim Mulligan (HSU)

Co-Principal Investigators: Dave Hankin (HSU), Joe Tyburczy (CA Sea Grant)

Co-Investigator: Drew Barrett (HSU)

Fishing Industry Collaborators:

Craig Strickhouser – CPFV Tally Ho II, Crescent City

John Collins – CPFV Toni Rae II, Trinidad

Tim Klassen – CPFV Reel Steel, Eureka

Tony Sepulveda – CPFV Shellback, Eureka

Jared Morris – CPFV Sea Hawk, Shelter Cove

Kevin Riley – CPFV Outcast, Shelter Cove

Kurt Akin – CPFV Fish On, Fort Bragg

Humboldt Area Saltwater Anglers Association

This document is in response to: **Revised plan of work, “The plan of work should include a detailed description and schedule of the work/tasks to be performed...”**

We also have addressed Reviewer and Panel Comments which has resulted in slight modifications to our work plan and we have provided clarification where requested.

Summary of Work

We will conduct collaborative hook and line sampling of rocky reef fish communities in the North Coast Study Region (NCSR) utilizing local charter vessels and volunteer anglers. We will sample four MPA/reference site pairs (Table 1). This is a reduction from our original proposal to sample 9 MPA/reference site pairs. This reduction in scope of work is roughly proportional to the reduction in funding, but will still allow sufficient sampling to adequately establish a baseline characterization of the nearshore rocky reef fish communities found in the NCSR. Strategic site selection has allowed us to retain two pairs of MPA/reference sites within each bioregion (Table 1). At each of the eight retained sites, we will randomly select four 500m x 500m grid cells from the available rocky habitat of appropriate depth (10-50m), and sample this set of selected cells throughout the study. During Year 1, between May and August, we will sample all four cells at each site three times; in Year 2 we will sample all sites twice over the same period. We had originally proposed to sample MPA/reference sites three times each year.

Sampling within each cell will consist of a total of at least 3 drifts for a combined total of 45 minutes of fishing by four volunteer anglers (gear types to be used remain the same as originally proposed). Fish caught will be measured (fork length), identified to species, tagged when of appropriate size and species, and then descended and released (via weighted inverted hook or customized weighted milk crate techniques) as quickly as

possible. Location of capture and gear type used will also be recorded for each fish sampled.

The only other significant change from our original proposed work is that we have eliminated the brief marine mammal and bird observations surveys, in response to reviewer and local expert advice.

Table 1. MPAs and associated reference sites to be sampled. Crossed through sites have been eliminated due to budget cuts.

MPA	Reference Site
Pyramid Point SMCA†‡	Damnation
Reading Rock SMR	Reading Rock
Reading Rock SMCA	Damnation
South Cape Mendocino SMR*	North Cape Mendocino
Sea Lion Gulch SMR‡	Pt. Delgada
Big Flat SMCA†	Bear Harbor
Double Cone Rock SMCA†	Bear Harbor
Ten Mile SMR*†‡	Westport†
MacKerricher SMCA†	Caspar†

*Sites that will be sampled by HSU/MARE ROV survey

†Sites that will be sampled by HSU SCUBA survey

‡Sites that will be sampled by Reef Check survey

Note that the ROV, HSU SCUBA, and Reef Check survey sites may change.

Outcomes and Deliverables

- A final report (Feb 2017) will be produced detailing the spatially comprehensive baseline characterization of the North Coast Study Region. It will include both MPAs and reference sites for the four year time period surrounding MPA implementation using newly collected data and the existing data set from our Resource Legacy Fund Foundation (RLFF) work as described in our original proposal. In addition to sharing project data via Oceanspaces.org as required, we will make our data available through the California Coastal Geoportal. The data and analyses in the final report will also:
 - Provide insight into fish spillover rates and the extent to which the North Coast MPA networks protect spawning adult fishes from harvest.
 - Recommend useful monitoring metrics for the long-term monitoring of nearshore rocky reef fish communities.
- Annual reports (Feb 2015, Feb 2016) will provide results, budget status, and progress to date on all deliverables and objectives.
- All data and metadata from the project will be provided to the Department of Fish and Wildlife, Ocean Protection Council, Sea Grant, and Ocean Science Trust. Datasets will include:
 - A GIS layer with locations of sampled grid cells.
 - Spreadsheets that include raw data for each fish sampled, including site, station coordinates, sampling date, gear type used, species, size, and tag number/recapture information if available.

- Results and recommendations will be disseminated via:
 - Submission of manuscript(s) to peer-reviewed journal(s) no later than 2018.
 - Completion of two M.S. theses no later than 2018.
- The project will actively involve stakeholders, including charter vessel captains and crew as well as volunteer anglers, in a scientific sampling process (May 2014-Aug 2015).
- The project will build strong partnerships and collaborative working relationships that will facilitate ongoing monitoring into the future.
- Public outreach and education meetings will be held prior to each field season to inform the community, to encourage participation of volunteer anglers, to encourage tag returns, and to share the results from prior seasons (April 2014, 2015, 2016).

Milestones Chart

TASKS AND MILESTONES	2014/2015												2015/2016												2016/2017											
	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J
1. Preparation for fieldwork	█												█																							
2. Hook & line sampling													█												█											
3. Data entry													█												█											
4. Analysis													█												█											
5. Report preparation													█												█											
6. Outreach prep. & events	█												█												█											
7. Theses & manuscript prep.													█												█											

Below we address comments and suggestions provided by reviewers and panels:

Reduced salary for senior personnel: As detailed in our recently submitted “Description of Proposal Modifications” and “Revised Budget” documents we have substantially reduced the salary requested for personnel.

Qualifications of Drew Barrett, Co-Investigator: Drew has extensive expertise vital to this work and served as the lead biologist on our previous local collaborative fisheries research (RLFF) project. He has developed a strong working rapport with most of the charter vessel captains with whom we are partnering. In addition, Drew is a highly respected commercial and recreational fisher and is well known in the fishing community making him an invaluable asset to our project. He will be responsible for management of all data collection activities and will assist with sampling design, data processing, and preparation of reports and manuscripts. His resume is included, as requested.

Utility of bird and marine mammal surveys: We have consulted with local experts, Drs. Dan Barton and Rick Golightly, who agreed with a reviewer that the bird and marine mammal surveys that we originally proposed would not be particularly useful, as they would be redundant with previously conducted work in the North Coast Study Region. We have therefore eliminated these surveys from our proposal.

Statistical methods for fish community analysis: We will analyze results from this work using many of the same statistical methods employed in our RLFF work as well as those used by the California Collaborative Fisheries Research Project (CCFRP). We will

estimate abundance of species at each site both via catch-per-unit-effort (CPUE) and through mark/recapture analysis of tagged fish. The abundance and size of fish, as well as species richness, evenness, and diversity (Shannon Diversity Index) will be compared among paired MPA/reference sites and sites stratified by distance from port. Non-metric multidimensional scaling (NMDS) analysis will be used to examine patterns of species abundance and size among sites and how this varies temporally and spatially (including among MPA/reference site pairs and with distance from port). Recaptured tagged fish will also allow an analysis of current fish movement patterns (into, out of, and within MPAs and reference sites). Repeating these analyses with additional data in future years will allow an evaluation of the impact on MPA designation on all of these parameters.

Collaboration with other proposals: We are coordinating with the HSU/Marine Applied Research and Exploration (MARE) ROV project and the HSU SCUBA and Reef Check surveys to maximize sampling of hard bottoms from shallow to deeper waters.

Match requirement: We have increased the fraction of matching funds to 25% of our funding request as required in the RFP.

Possibility of additional funding: A small amount of additional funding (~\$20,000) would enable us to sample a third time in Year 2 (for a total of 6 sampling intervals over 2 years).