



MPA Baseline Program

Annual Progress Report



Principal Investigators - please use this form to submit your MPA Baseline Program project annual report, including an update on activities completed over the past year and those planned for the upcoming year. This information will be used by the MPA Baseline Program Management Team to track the progress of individual projects, and will be provided to all MPA Baseline Program PIs and co-PIs prior to the Annual PIs workshop to facilitate discussion of project integration. Please submit this form to California Sea Grant when complete (sgreport@ucsd.edu, Subject [Award Number, project number, PI, "Annual Report"].)

Project Information

Project Year: 2/1/14 - 1/31/15 MLPA Region: North Coast

Project Title & Number: Baseline monitoring of estuaries on the North Coast of California. R/MPA-40A

PI name: Frank Shaughnessy Co-PI name: Tim Mulligan

PI Contact Info Co- PI Contact Info (please list additional PIs and contact info in the "Project Personnel" section if necessary)

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Project Goals & Objectives:

Our first goal is to describe the baseline conditions in four estuaries (3 MPA, 1 non- MPA) on the north coast. By “baseline”, we mean metrics of biodiversity, the population structure of focal species, and the summarizing of abiotic variables that capture watershed, estuarine and oceanic effects (i.e. contextual information) on estuarine life. The second goal is to use data from the first goal in order to develop recommendations for the testing of future estuarine MPA effects.

Objectives during this reporting period were the following: recruitment of 2 graduate students; hiring of an intern from the Intertribal Sinkyone Wilderness Council area; permits (NMFS, CDFW, CA Parks, private property); scouting trip during May for Ten Mile and Big River estuaries; training of graduate and undergraduate students; sampling (infauna, mesofauna, algal and plant cover, fish) in 4 estuaries during June 2014 and January 2015; identification of invertebrates; development of an eelgrass shoot length to biomass relationship. In order to develop an environmental context for the baseline data, Dr. John Largier’s (UC Davis, Bodega Marine Laboratory) objective over this reporting period was to begin synthesis of available physical information about the 2 Mendocino estuaries.

Summary of Project Activities Completed to Date

Overview of Project Year __ Activities, including progress towards meeting goals & objectives

In short, all of the above objectives associated with starting up the project were met. The scouting trip to the Mendocino estuaries was helpful for planning logistics in these estuaries. All 4 estuaries were sampled in June 2014 and again in January 2015. There were 2 sites used within each estuary, and within each site the mid and low intertidal zones were sampled. A wide variety of sampling techniques (cores, quadrats, box traps, minnow traps, small mesh crab traps, beach seine, fyke net) were used to sample infauna, mesofauna, algal and plant abundance, crabs and fish. Birds and marine mammals are not being enumerated.

More specifically, and in chronological order:

- Following the June 2014 fieldwork, all of the fish catch data was entered into a spreadsheet. This included the species, an abundance count for each species, and the size of each fish caught.
- For all of the *Zostera marina* and *Ruppia maritima* collections, the following variables were measured: shoot density, shoot lengths, leaf widths, epiphyte cover, quadrat wet weight, quadrat dry weight. Specimens from both of these seagrasses were vouchered.
- Epifauna from the *Z. marina* and *R. maritima* collections were collected in order to represent species richness of this functional group, but not to estimate total abundance. All of the infaunal samples were examined and sorted in the same manner.
- All of the above macrophyte and invertebrate data were entered into a spreadsheet, as well as the % cover data taken in the field.
- The smaller epi- and infauna that could not be identified to species in the field (e.g. worms, isopods, amphipods) were identified for 20% of the 2014 samples (seagrass collections + infaunal cores).
- The Bodega Marine Lab physical-processes group have plotted field data collected during June 2014 fieldwork and collated a small amount of time series data that are available for Ten Mile and Big River estuaries. This work also occurred during the January 2015 fieldwork in the 2 Mendocino estuaries.
- None of the 2015 sample collections that have to be processed in the laboratory (IDing, measuring, weighing) have been examined yet.

Highlights from project progress so far, such as successes achieved, new collaborations or partnerships, or interesting stories from the past year that may be suitable for a blog post or other media venue

Although the sampling design represents only 2 of the seasons, it is clear that the geomorphological differences among the 4 estuaries produce distinctive estuarine ecosystems. The linear Mad River Estuary, with a regular supply of freshwater even during the summer, lacks eelgrass but contains a fringing bed of the seagrass *Ruppia maritima*. The latter, in combination with algal periphyton on a cobble bottom, supports amphipods and isopods, which in turn apparently feed a diverse fish community. The Humboldt Bay MPA, located in an embayment with a wide connection to the ocean and receiving small tributaries, should stay at a high salinity year-round. This MPA has a *Zostera marina* bed that is bisected by deep channels; this combination is associated with a distinctive set of fish and large crabs. South of Cape Mendocino, the Ten Mile River estuarine MPA had a highly perched beach during the summer that only allowed oceanic water to enter during the upper third of the flooding tide. This estuary exhibited seawater only in the deeper reaches of the river and there were varying levels of dissolved oxygen. This physical setting was associated with very low cover values of *Z. marina*, *R. maritima* and algal periphyton, and the anoxic layer of sediments was closer to the surface in this estuary versus the other 3 estuaries in this project. The fish community in Ten Mile estuary may rely more heavily on a planktonic than benthic food web. The mouth of Big River, in contrast, remains open and so is a partially mixed estuary with a strong oceanic influence during the summer and winter. This linear river estuary has well developed *Z. marina* beds along its margins and a diverse and abundant representation of infauna, mesofauna and fish.

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Description of any unforeseen events and substantial challenges, and resulting effects on project activities and progress. Please indicate any issues that may affect other PI's or require coordination with other Baseline partners (e.g., ME, DFG, Sea Grant).

The graduate student working on the non-fish portion of the project, who was being mentored by F. Shaughnessy, died during early February, 2015. Mr. Zachary Badaoui, who was very popular with our MPA crew, and who was exceptionally good at invertebrate identification, is really missed. With respect to the project, this means that about 75% of the June 2014 collections still need to have invertebrates identified, and none of the 2015 collections have received attention. All of them are preserved. This work consists of identifying taxa to species but not counting abundance of each species. Focal species that do get counted and sized are much larger and easier to work with than the amphipods, isopods and worms that are so important to the fish communities. Since the fieldwork is 50% complete, F. Shaughnessy is replacing Mr. Badaoui with 2 undergraduate students rather than finding a new graduate student. Both of the undergraduates have strong skills in marine invertebrate identification, and they will be starting in late May, 2015.

An advertisement for a tribal internship, developed by F. Shaughnessy and Mr. Hawk Rosales (Executive Director, InterTribal Sinkyone Wilderness Council), did not result in any applicants for 2014. After speaking with Mr. Rosales, we have agreed to broaden the search for 2015 to include people from other tribes on the North Coast.

Data status (i.e., paper/raw format or digitized; if digitized, what format?)

All of the data is at least on paper. All of the data obtained by using quadrat, trap and seine techniques have been entered into a spreadsheet.

The 2014 annual salvage report has been prepared for CDFW, and the monthly reports required by the MOU (for potentially sampling sensitive fish) have been prepared and delivered to CDFW as well. The NOAA NMFS report (we had to be added to an existing permit; after 12 mo our own NMFS permit has not been issued) is in the process of being written.

Activities Planned for following Project Year __ (if applicable) – Please describe remaining work and approximate timelines for completing that work, including any anticipated budget variances necessary to complete the project.

May 2015, reporting; June 2015, sampling of 4 sites & lab work; summer 2015, assessment of physical conditions in Humboldt Bay MPA and Mad River estuary; summer 2015 lab work for IDs & data input; there is no budget to support MPA work during fall 2015; 4 site fieldwork and physical assessment during January 2016; labwork during early 2016 with at least one of the undergraduates hired May 2015; data input & analysis 2016; reports 2016 & early 2017.

The budget has already been changed from the Stipend that supported Mr. Badaoui to Salary for the 2 undergraduates; this has been approved by SG and the HSU Foundation.

Project Personnel – Please indicate additional project personnel involved in your MPA baseline project, including students and volunteers, or additional PI contact information if necessary, as well as the nature of their assistance in the project project.

	<i>Students Supported</i>	<i>Student Volunteers</i>	<i>Nature of Assistance</i>
<i>K-12</i>		3	<i>Fieldwork</i>
<i>Undergraduate</i>	5	8	<i>Fieldwork</i>
<i>Masters</i>	2	1	<i>All aspects; thesis projects</i>
<i>PhD</i>			

Number of other Volunteers not counted above and the nature of their assistance in the project:

With the loss of Mr. Zach Badaoui, there is now only 1 graduate student on the project, Ms. Katie Osborn, who is mentored by Dr. Tim Mulligan.

Additional PI contact info not listed on first page:

Cooperating Organizations and Individuals - Please list organizations or individuals (e.g., federal or state agencies, fishermen, etc.) that provided financial, technical or other assistance to your project since its inception, including a description of the nature of their assistance.

Wiyot Tribe, in particular Mr. Stephen Kullmann who is the Natural Resources Director for the Wiyot Tribe, and Mr. Eddie Koch who is Yurok tribal member working for the Wiyot tribe on this project.

H.T. Harvey & Associates (private consultants), in particular Mr. Neil Kalson who is a fish biologist.

Dr. John Largier – the physical oceanographer at the Bodega Marine Laboratory; is developing the physical contextual information.

All of these people are listed as co-Pi’s on the grant, and they are all providing very substantial match dollars.

