

The Ecological State of Northern California's Sandy Beaches and Surf Zones: A Baseline Characterization for MPA Assessment

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Work plan

Year one

Eight long beaches and their surf zones will be surveyed to determine the abundance and diversity of macrophyte wrack, macroinvertebrates, birds, surfperch and night smelt (Table 1). Four pocket beaches will be surveyed for macrophyte wrack, macroinvertebrates and birds only (Table 1). We will conduct one comprehensive survey of macroinvertebrate abundance and diversity at each beach in July/August 2014, including a survey of macroalgal wrack and physical conditions, followed by eight monthly surveys of birds, macroalgal wrack and physical conditions from October 2014 to May 2015. Surfperch and night smelt will be surveyed three times on each of the eight long beach in 2014 in May, June and July.

Before field sampling starts, all proposed survey sites will be visited by the PIs for pre-survey scoping. Alternate sites, if deemed necessary for scientific or logistical reasons, may be chosen at this time. PIs will also establish survey transects and other sampling areas. During initial site visits, PIs Nielsen and Dugan, who are experienced with sandy beach survey and sampling methods, will initiate cross-training with co-PIs Craig and Laucci to ensure comparability across sites within the North Coast Region and with other MPA regions in California. We will also collaborate to establish any site-specific protocol modifications that may be required and assess the crew size required to survey each beach during the summer surveys (beaches with coarser sand require a larger team).

Personnel will be recruited, hired and trained, including tribal interns from Smith River Rancheria and the Intertribal Sinkyone Wilderness Council.

Laboratory processing of biodiversity, fish gut contents and sand samples will be initiated during year one, but the emphasis for this year will be on completing all field surveys, and associated data entry.

PI Mulligan will be in charge of all fish related field and laboratory work at all eight long beaches (Table 1). PIs Nielsen and Dugan will lead macroinvertebrate, macrophyte wrack and bird surveys as well as sample processing. They will cross-train PIs Craig and Laucci in methods used in prior MPA regions for field surveys and sampling of macroinvertebrates, macrophyte wrack and birds. PIs Nielsen, Dugan and Craig (and laboratory associated personnel) will participate in biodiversity field surveys at all twelve beaches in summer, and PI Laucci (and a tribal technician) will assist at Pyramid Point (SMCA) and Kellogg Beaches only. PIs Nielsen and Dugan will be responsible for all laboratory processing and identification of macroinvertebrate samples. Dugan will have primary responsibility for wrack-associated macroinvertebrate taxonomic identifications and associated processing. PI Laucci will be responsible for independent execution of monthly macrophyte wrack and bird surveys at Pyramid Point (SMCA) and Kellogg Beaches after cross-training with PIs Nielsen and Dugan. She will also be responsible for surfperch and night smelt surveys at these sites after cross-training with PI Mulligan. PI Craig will be

responsible for independent execution of monthly macrophyte wrack and bird surveys at Gold Bluffs, Reading Rock (SMCA), Mad River and Samoa (SMCA) beaches also after cross-training with PIs Nielsen and Dugan. PI Nielsen will be responsible for independent execution of macrophyte wrack and bird surveys at Ten Mile, South MacKerricher (SMCA), Jughandle Creek, Caspar, Russian Gulch (SMCA) and Van Damme (SMCA) Beaches.

Year two

Surfperch and night smelt will be surveyed three times again on each of the eight long beaches in 2015 in May, June and July. Surveys of macrophyte wrack, people, beach conditions, and birds will be completed (February – May 2015). PI Craig will also oversee limited within beach sampling of sand crabs coinciding with surfperch fishing surveys (to gain insights into possible trophic-based correlations in abundance along the beach) at two to four of the long study beaches. Specific beaches to be targeted will be determined based on the results of our surfperch and macroinvertebrate surveys from summer 2014.

A primary focus of year two will be completing the laboratory processing of preserved macroinvertebrate biodiversity samples (PIs Nielsen and Dugan), fish gut content samples (PI Mulligan) and any remaining sand samples (PIs Nielsen and Dugan). All specimens will be enumerated, weighed and identified to the lowest taxonomic level possible. Sand crab carapaces will be measured and their sex determined for analysis of population structure. Year two will involve more extensive, hands-on training of any new laboratory assistants by lead PIs, including tribal interns, in preliminary sorting and taxonomic identification, sample tracking and preservation (including creation of voucher specimens), data entry, etc. PIs will be involved in ongoing consultation with laboratory personnel to review and confirm taxonomic identifications, solve logistical problems, ensure data quality, etc. Initial data analysis and QC of field survey data will be initiated by project PIs and technicians.

Year three

Emphasis will be on final curation and QC of data sets, generation of metadata, data analysis, interpretation, synthesis and report writing by all PIs. We will convene 2-3, in-person 2-day PI workshops for data analysis and synthesis, with the final meeting emphasizing report writing.

Deliverables

The research team will provide all data and associated metadata described in Table 2. We anticipate the metadata standards will be similar to those used for the North Central and South Coast MPA regions. Our anticipated timeline for task completion is provided in Table 3. A final report will be produced detailing the spatially comprehensive baseline characterization of sandy beach and surf zone ecosystems in the North Coast MPA Region including information on the abundance and diversity of macroinvertebrates; abundance and types of wrack; abundance of birds and people on the beaches and their activities; abundance and diversity of surfperch and abundance of night smelt populations. We will integrate and synthesize these sources of data to develop an integrated report on the status north coast MPAs and reference sites and highlight similarities and differences that may exist. We will also identify and recommend useful monitoring metrics for the long-term monitoring of sandy beach and surf zone ecosystems in this region. We will complete annual and interim reports, as required, detailing progress to date and any changes to the workplan. We will write descriptive summaries to accompany data packages on OceanSpaces.

Table 1. Study Beaches

Sandy Beach and Surf Zone Study Sites								
Site Name	Site Type	Beach Type	Latitude	Longitude	Surf-perch	Night Smelt	Bio-diversity	Wrack, Birds & People
Pyramid Point SMCA	MPA	Long	41.98496	-124.20682	X	X	X	X
Kellogg Beach	Ref	Long	41.86942	-124.21135	X	X	X	X
Gold Bluffs Beach	Ref	Long	41.36684	-124.07461	X	X	X	X
Reading Rock SMCA	MPA	Long	41.29978	-124.09081	X	X	X	X
Mad River Beach	Ref	Long	40.94796	-124.13019	X	X	X	X
Samoa SMCA	MPA	Long	40.87328	-124.16013	X	X	X	X
Ten Mile (Inglenook) Beach South	Ref	Long	39.50794	-123.78469	X	X	X	X
MacKerricher SMCA	MPA	Long	39.47302	-123.80449	X	X	X	X
Jughandle Creek Beach	Ref	Pocket	39.37678	-123.81855			X	X
Caspar Beach	Ref	Pocket	39.36086	-123.81696			X	X
Russian Gulch SMCA	MPA	Pocket	39.32895	-123.80515			X	X
Van Damme SMCA	MPA	Pocket	39.27301	-123.79090			X	X

Table 2. Data products

Survey type & data sets		Format	Variables
<u>Bird, wrack, people surveys</u>			
birds		data table (*.csv)	species, no. observed per km, habitat, activity, date, site
wrack		data table (*.csv)	type, abundance per m, transect ID, date, site
people		data table (*.csv)	no. observed per km, habitat, activity, date, site
sand		data table (*.csv)	mean size, SD, skew & kurtosis, sample location, transect ID, date, site
physical conditions		data table (*.csv)	wind speed, air temp, beach slope, breaker height, breaker period, width of swash zone, surf zone and intertidal, date, site
transect and sample locations		data table (*.csv)	GPS coordinates, date, site
<u>Biodiversity surveys</u>			
cores		data table (*.csv)	species, no. per m (sizes and sex of sand crabs only), biomass per m, transect ID, date, site
net sweeps		data table (*.csv)	species, no. per transect, transect ID, date, site
sticky traps		data table (*.csv)	species, no. per trap per time, transect ID, date, site
wrack		data table (*.csv)	type, abundance per m, transect ID, date, site
sand		data table (*.csv)	mean size, SD, skew & kurtosis, sample location, transect ID, date, site
physical conditions		data table (*.csv)	wind speed, air temp, beach slope, breaker height, breaker period, width of swash zone, surf zone and intertidal, date, site
transect and sample locations		data table (*.csv)	GPS coordinates, date, site
<u>Sand crab surveys</u>			
cores		data table (*.csv)	species, no. per m, biomass per m, sizes, sex, transect ID, date, site
sand		data table (*.csv)	mean size, SD, skew & kurtosis, sample location, transect ID, date, site
physical conditions		data table (*.csv)	beach slope, date, site
transect and sample locations		data table (*.csv)	GPS coordinates, date, site
<u>Fish surveys</u>			
surf perch		data table (*.csv)	species, abundance, size, sex, reproductive state, tag/recapture, date, site
night smelt		data table (*.csv)	abundance, length, weight, date, site
GIS layer		data table (*.csv)	GPS coordinates, date, site
<u>Metadata (for each survey)</u>			
Survey protocol description		text document (*.pdf)	
Site and location table		data table (*.csv)	name, coordinates, access point/contact person
Variable definitions including units for each data set		data table (*.csv)	name, definition, units
Taxonomy table for all biological data sets		data table (*.csv)	Phylum, class, order, family, genus, species

