

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	Year 2 (2011-2012)	Study Region	North Central Coast
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Project Title & Number	Baseline Monitoring of Ecosystem and Socioeconomic Indicators for MPAs along the North Central Coast of California - Sandy Beaches;R/MPA-14A
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PI name	Karina J. Nielsen	Co-PI name	Steven G. Morgan & Jenifer Dugan
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PI Contact Info

(please list additional PIs and contact info in the "Project Personnel" section if necessary)

Address	Sonoma State University, Department of Biology, 1801 E Cotati Ave, Rohnert Park, CA 94928	Address	Bodega Marine Laboratory, University of CA, Davis, P.O. Box 247, Bodega Bay, CA 94923-0247 & Marine Science Institute , University of California, Santa Barbara, CA 93106-6150
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Email	karina.nielsen@sonoma.edu	Email	sgmorgan@ucdavis.edu & jenny.dugan@lifesci.ucsb.edu
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Phone	707.664.2962	Phone	707.875.1920 & 805.893.2675
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Project Goals & Objectives

Sandy beaches and adjacent surf zones are important foraging areas for shore birds and fishes that feed on intertidal invertebrates. The amount of wrack and plankton cast onto beaches is dynamically linked to adjacent ecosystem features, ocean climate and the growth rates and reproductive output of invertebrates. These links are the critical pathways through which direct and indirect effects of MPA implementation and variation in ocean climate will cascade, making sandy beaches an important target for long-term monitoring to assess ecosystem condition and functioning of the NCC region. Sandy beaches are also used extensively for a variety of recreational activities, including shore-based fishing, bait collection, beachcombing, ATVs, surfing, birding, dog-walking and picnicking. We will 1) provide the first comprehensive, baseline description of the biodiversity of sandy beaches of the NCC region, 2) develop informative ecosystem indicators and a plan for long-term monitoring of the network of MPAs involving citizen scientists (e.g., students, recreational fishers, members of conservation clubs) and collaborations with similar established volunteer groups in the region (e.g., Gulf of the Farallones Beach Watch program), and 3) interpret the important ecological links among the components of the ecosystem, including humans, for use in evaluating the effectiveness of the network of MPAs.

Summary of Project Activities Completed to Date

Overview of Project Year _2_(2011-2012)_ Activities, including progress towards meeting goals & objectives

Since starting our project in March 2010 we have accomplished the major objectives outlined in our proposal and milestones chart. Moreover, we conducted more work than was proposed over the past two years. We conducted two surveys of sand crabs (*Emerita analoga*) and wrack-associated macro-invertebrates on our 10 core sandy beaches (5 inside marine protected areas and 5 reference sites) of the North Central Coast (NCC) region; the first in June and the second in August of 2010. We also surveyed an additional 7 non-MPA beaches during August 2010. We completed 12 monthly surveys of birds, wrack and people in May 2011 as well as the comprehensive biodiversity sampling of macroinvertebrates in August 2011 at all 10 of our core sites. We conducted an additional survey of people, dogs and their activities at all 17 of the beaches we surveyed in summer 2010 over a summer weekend in August 2011 to estimate peak usage by people as our regular monthly surveys were restricted to weekdays to maximize the ability to observe and quantify birds. Sorting, processing and quantification from macroinvertebrate samples collected during 2010 are completed and those from 2011 are close to completion. Initial species identifications of common taxa have been completed and we are now engaged in the more detailed taxonomic identifications of our biodiversity samples from 2011. This year we also compared two sampling protocols (our MPA baseline method and that used by the Long-term Monitoring Program and Experiential Training for Students [LiMPETS] program of the California National Marine Sanctuaries) for monitoring sand crabs (one of our indicator taxa) at 3 beaches in the NCC region in collaboration with staff and students from the LiMPETS program, as well as marine ecology students from Sonoma State University and Bodega Marine Laboratory. A synopsis of those results were communicated with the science advisory team for the LiMPETS program, at the Beyond the Golden Gate Research Symposium (November 2011 in San Francisco, CA) and at the Western Society of Naturalists annual meeting (November 2011 in Vancouver, WA). Nielsen's graduate student and primary project research assistant, Preston Malm, is working on an MS thesis related to this project at 4 non-MPA beaches in Sonoma & Marin Counties (Dillon, Doran, Salmon Creek and Miwok Beaches). Malm's thesis will investigate the relative importance of sand grain sizes and wrack inputs in determining the abundance of talitrid amphipods, and estimate their wrack consumption rates on local beaches and coPI Dugan is also a member of his thesis committee. Initial results of his research were presented at two regional meetings (Beyond the Golden Gate Research Symposium (November 2011 in San Francisco, CA) and at the Western Society of Naturalists annual meeting (November 2011 in Vancouver, WA). We worked in collaboration with co-PI Mark Carr (UCSC) during Winter 2011 to integrate kelp wrack data we collected during our monthly beach surveys in 2010 with an initial analysis of the spatial scales of connectivity between sandy beaches and nearby kelp forests. Results of those analyses were presented at the Second International Marine Conservation Congress (IMCC2) at the Society for Conservation Biology meeting in Victoria, BC, Canada in May 2011*. During late summer of 2011, we visited fishing clubs around the bay area and delivered presentations to recruit fishers to join our citizen science survey of surf zone fishes. These surveys were conducted from October through December at two beaches inside MPAs (Drakes, Salmon Creek South) and two beaches outside MPAs (Limantour, Salmon Creek North).

In summary we have already collected the vast majority of the data required to complete objectives 1-3 listed in our project summary (above) (we will complete data collection upon termination of the surf zone fishing effort this spring). We have taken initial steps with the data analysis and synthesis required for the baseline description of sandy beach ecosystems in the region (objective 1), and are on target to complete it during the final year of the project. We have worked closely with several volunteer groups in the region (including LiMPETS, many fly fishing clubs, and local university and high school students) to cultivate partnerships and to develop prototypes and protocols that might serve as a model for a long-term monitoring program involving citizen scientists (objective 2). Our final objective (3) to interpret the important ecological links for use in evaluating the effectiveness of the network of MPAs is the object of our collective efforts in this final year of the project.

Highlights from project progress so far, such as successes achieved or interesting stories from the past year

- Baseline surveys were conducted for 17 beaches in the North Central region
- Two citizen-science protocols were developed for economically monitoring key indicator organisms (sand crabs, fishes)
- Development of the citizen scientist protocols led to our joining the science advisory team for the LiMPETS program and will contribute to citizen science protocol calibration and implementation with the LiMPETS program in the South Coast region.

Related Presentations:

Carr, Mark, and Pete Raimondi 2011. Creating an Integrated Picture of MPA Baseline Conditions. Paper presented at the Second International Marine Conservation Congress (IMCC2), Society for Conservation Biology meeting, Victoria, BC, Canada, May 2011*

Malm, Preston and Karina J. Nielsen. The role of grain size and wrack composition in structuring talitrid amphipod populations on northern California beaches. Paper presented at the Western Society of Naturalists 92nd Annual Meeting, Vancouver, WA November 2011.

Malm, Preston and Karina J. Nielsen. Do macrophyte wrack species composition and input rates influence the distribution and abundance of talitrid amphipod (*Megalorchestia* spp.) populations on northern California beaches? Paper presented at the Beyond the Golden Gate Research Symposium, San Francisco, CA, November 2011.

Nielsen, Karina J., Steven Morgan & Jenifer Dugan 2011. Baseline characterization and monitoring of sandy beaches in California's north central coast MPAs. Paper presented at the Beyond the Golden Gate Research Symposium, San Francisco, CA, November 2011.

Nielsen, Karina J., Steven Morgan & Jenifer Dugan 2011. Sand crab monitoring in MPAs: A methodological comparison to inform development of ecosystem indicators. Paper presented at the Western Society of Naturalists 92nd Annual Meeting, Vancouver, WA November 2011.

* Data from this project included in presentation.

Description of any unforeseen events and substantial challenges, and resulting effect on data collection

None

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

Digital data entry into spreadsheet form from paper records collected during field surveys and lab processing of collected samples is more than 3/4ths completed (monthly rapid surveys are completely entered; macroinvertebrate data from 2010 are completely entered; sand crab methods comparison experiment data completely entered; biodiversity survey data from 2011 are ~2/3 entered as we are still in the final stages of sample processing and finalizing taxonomic IDs. We are in the initial stages of QA/QCing entered digital data against the original paper records.

Activities Planned for following Project Year _3 (2012-2013)_ (if applicable) – Please describe remaining work and approximate timelines for completing that work, including any anticipated budget variances necessary to complete the project.

We anticipate completing all taxonomic identifications to the lowest level of resolution possible (based on morphological characteristics) from 2011 biodiversity surveys, the surf zone fishing study, all associated data entry and QA/QC of the digital data records by August 2012. Over this year we plan to work on data analysis and synthesis within the sandy beach project we are leading on, and in collaboration with the other NCC MPA monitoring projects and co-PIs to produce the integrated ecosystem analysis of the region.

Project Personnel – Please indicate additional project personnel involved in your MPA baseline project, including students and volunteers, or additional PI contact information if necessary.

	<i>Students Supported</i>	<i>Student Volunteers</i>
<i>K-12</i>		
		<i>Katie Azcárraga Arthur Trombley</i>
<i>Undergraduate</i>		
	<i>Chelsea E Clyde-Brockway Russell V Di Fiori Kamala J Dionne Colin J Donlevy Trevor J Manger Elena B Meza Thomas T Nguyen Nadja G Quiroz Amanda Dawn Van Diggelen Samuel S Briggs Beatrice Cortina Elizabeth J Kelso Lars Clarke Jacob Moore</i>	<i>Katie Vedder Noelle Spence Athena Maguire Sarah Ganas Trevor Manger Sloane Viola Padraig O'Rourke</i>
<i>Masters</i>		
	<i>Preston Malm Jill Stokes Nicholas Schooler</i>	<i>Adele Paquin</i>
<i>PhD</i>		
	<i>Sarah Gravem</i>	<i>Sarah Hameed</i>

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Number of other Volunteers not counted above:

20 Sonoma State University undergraduate students, 6 Bodega Marine Lab/UCD undergraduate students, 30 members of fishing clubs, ~25 Lake County high school students,

Additional PI contact info not listed on first page:

N/A

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.

Name of Organization or Individual	Sector (City, County, Fed, private, etc.)	Nature of cooperation (If financial, provide dollar amount.)
Mark Won (aka "the fish-whisperer")	Private citizen	Advise, gave presentations, collaboration on surf zone fishing project
LiMPETS program	Federal	Collaboration and data sharing
Sonoma State University	State	Student volunteers, staff time to fabricate research equipment, temporary research space, meeting rooms for public presentations and recruitment of volunteer fishers, funding for undergraduate student interns to help with sample processing.
Sonoma County Office of Education	County	Funding for high school summer research intern
California Department Fish & Game	State	Advise, gave presentations, collaboration on surf zone fishing project
Coastal Fund, University of California, Santa Barbara, Associated Students	State	Funding for student field and laboratory assistants

Additional Information – Please provide any other project-relevant information, such as descriptions of attached materials, media coverage your project has received, etc.

N/A