



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: Year 2; 2/1/2015-1/31/2016 MLPA Region: North Coast

Project Title & Number: North Coast MPA Baseline Program: Sandy Beach R/MPA-38B

PI name: Karina Nielsen 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

The overarching goal of this project is to provide a comprehensive, regional characterization of sandy beach and surf zone ecosystems in northern California. Our specific project objectives include:

- Produce a quantitative baseline characterization of ecologically and culturally important surf zone fishes: surfperch (especially redbtail surfperch) and night smelt including data on their abundance, size structure, sex ratios, feeding habits and movement patterns.
- Conduct targeted sampling of sand crabs, *Emerita analoga*, in conjunction with surfperch sampling to assess spatial and temporal correlations and investigate trophic connectivity.
- Engage local fishing communities in the MPA baseline survey, thus providing a foundation for long-term monitoring of North Coast MPAs using collaborative fisheries research techniques and fostering community support for MPA related management.
- Continue to develop and strengthen collaborative working relationships among fishermen, academic researchers, and state agencies (via mutual data collection, workshops, reports, publications) in order to conduct effective fisheries research and management along the North Coast.
- Complete a comprehensive baseline description of the ecology of MPA and non-MPA sandy beach ecosystems on the North Coast of California. The ecological description includes a one-time macroinvertebrate study of abundance and diversity, monthly surveys of macrophyte wrack, birds, people and physical conditions on the beaches from September 2014 through June 2016.

## Summary of Project Activities Completed to Date

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

February-April 2015: Preparation for field work

- Took inventory and purchased necessary gear
- Prepared and organized gear

May-August 2015: Monthly hook and line sampling for surfperch and dip net hauls for night fish at 4 MPAs and associated reference sites

- Data entered into Microsoft Excel as collected
- Gut content analyses conducted on redbait surfperch
- Monthly sampling at South Samoa Beach, an additional reference site for Samoa SMCA, serving as data for an M.S. thesis for Ms. Michelle Succow
- Conducted targeted sampling of sand crabs to assess spatial and temporal connectivity to redbait surfperch populations

September-January 2016: Continued sampling, data analysis

- Continued sampling at Samoa SMCA and 2 associated reference sites to examine redbait surfperch and sand crab trophic links. This data will serve as a M.S. thesis for Ms. Michelle Succow
- Summarized catch data in tables and figures
- Continued gut content analyses on redbait surfperch
- Begin to examine subsamples of night smelt for sex, length, and weight

February 2015 – January 2016

- Continued beach surveys
- Completed sorting, ID and quantification of macroinvertebrates
- Initiated sand sample processing
- Entered all data, created summary figures

Progress towards Education and Collaboration goals:

- Strengthened working relationships with CDFW, members of the Tolowa Dee-Ni' Nation, local community members, and members of the California Commercial Beach Fisherman's Association
- Attended and presented project methods and initial results at The Western Society of Naturalists annual meeting and the North Coast Collaborative Forum
- Involved ~20 different volunteer anglers and sand crab collectors consisting of Humboldt State students
- Involved graduate students from Sonoma State and San Francisco State in beach surveys and sample processing.

During Year II, a total of 566 (compared to 305 during year I) redbait surfperch were sampled from MPA and paired reference sites. Catches ranged from a high of 53 at Mad River Beach reference site, to a low of 0, at both the Ten Mile SMCA/SMR and its paired Ten Mile Beach reference site. Average surfperch size ranged from a high of 271 mm (TL) at the South Samoa Beach reference site to a low of 228 mm (TL) at the Ten Mile SMCA/SMR site.

For night smelt, a total of 3 sampling trips each to 4 MPAs and associated reference. Spawning aggregations of night smelt were observed on Kellogg Beach, Reading Rock SMCA, Samoa SMCA, and Gold Bluff Beach during 6 of the 27 total sampling trips. Walker Scale values ranged between 0 and 3, with level 3 spawning events documented in Samoa SMCA and on Gold Bluff Beach. Subsamples of 100 night smelt collected during each sampling trip were processed at the Humboldt State Marine Laboratory. The total length of night smelt was measured to the nearest millimeter and gonads were examined for sex determination.

*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*

- Beach driving permits were obtained from the Redwood National and State Parks for sampling at the Reading Rock SMCA and Gold Bluffs Beach sites, improving our beach access and sampling success for surfperch and smelt
- Collaboration with the Tolowa Dee-Ni Nation permitted extra sampling in September at the Pyramid Point SMCA and Kellogg Beach sites.
- Preliminary gut analyses indicate that surfperch may be opportunistic foragers; in areas where rocky outcrops are common (i.e. Pyramid Point SMCA and Kellogg Beach) they appear to feed preferentially on barnacles, while over strictly sandy beaches (i.e. Samoa SMCA and Mad River Beach) they appear to feed predominantly on sand crabs and other epifauna.
- Graduate student Ms. Michelle Succow and PI Nielsen presented preliminary results from the project at the Western Society Naturalists Conference in Sacramento and graduate student Ms. Michelle Succow and research technician Megan Wood presented at the North Coast Collaborative Forum.

*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).*

- Unforeseen delays in obtaining beach driving permits for Reading Rock SMCA and Gold Bluffs Beach sites extended our sampling period into July through September

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

- All field collection data for surfperch have been entered into excel spreadsheets and summarized in tables
- All field data for wrack, birds and people and macroinvertebrate sample data have been entered into excel spreadsheets and summarized in tables and figures
- Surfperch gut content data is currently being collected/processed and has begun to be transformed into excel spreadsheet format
- Sampling dates, locations, relative abundance data (walker scale), individual fish lengths and sex determination for night smelt have been entered into excel spreadsheets.

**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.

- Continued sampling until April 2016 at Samoa SMCA and its adjoining reference sites for Ms. Michelle Succow's M.S. thesis examining redbait surfperch and sand crab trophic links.
- Surfperch gut contents will be identified to the lowest possible taxon by Dr. Helen Mulligan, HSU. Special attention will be given to sand crabs (*Emerita analoga*), another focal taxon in this study. Basic calculations will be used to compute an Index of Relative Importance (IRI) for each food class for each size/seasonal grouping of fish. Data will be processed/analyzed February – August 2016.
- Further processing and analysis of night smelt data is expected to continue until May 2016.
- Further processing and analysis of sandy beach physical samples
- Data analysis and synthesis in preparation for final report
- Presentation of methods and results at collaborative forums and scientific meetings
- Preparation of graduate thesis, manuscripts, and final report
- Upload data into Ocean Spaces data archive

**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>			
<i>Undergraduate</i>	3	15	<i>Beach sampling, surveys and sample sorting, identification and quantification.</i>
<i>Masters</i>	2	3	<i>Supported: Beach Sampling, scheduling and logistics, preparation of reports, input &amp; analysis of data Volunteers: Beach sampling</i>
<i>PhD</i>			

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

~6 volunteers from the community and the California Commercial Beach Fisherman’s Association participated in the project as volunteer anglers

*Additional PI contact info not listed on first page:*

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<b>Cooperating Organizations and Individuals</b> - 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.)
California Commercial Beach Fisherman's Association	Commercial Fishing	Lead field sampling in 2014 and participated in field sampling in 2015
California Department of Fish and Wildlife	CA State	Laboratory sample processing, Data analysis and storage (2014 size distribution and sex ratio data), Field sampling assistance
HT Harvey and Associates	Private	Laboratory sample processing, Data analysis and storage (2014 size distribution and sex ratio data), Field sampling
<b>Project Outputs and Materials:</b> Please provide any other project-relevant information, such as descriptions of attached materials, media coverage your project has received, presentations, publications, images etc.		
<ul style="list-style-type: none"> <li>• Talks presented at the Western Society of Naturalists meeting in Sacramento, CA. November 2015:</li> <li>• <i>Got crabs? Predation by redbtail surfperch, Amphistichus rhodoterus, on pacific sand crabs, Emerita analoga.</i> Talk presented by Michele Succow</li> <li>• <i>Connecting communities, building capacity and creating ecosystem resilience through MPA monitoring in Northern California.</i> Talk presented by Karina Nielsen</li> <li>• <i>Challenges and opportunities for citizen science monitoring of mpas in california: case studies and recommendations.</i> Talk presented by Ryan Meyer (Nielsen et al. as co-authors)</li> <li>• Collaborative Research on the Spawning Population of Night Smelt (<i>Spirinchus starksi</i>) in Humboldt and Del Norte Counties, California. Final Report submitted to Collaborative Fisheries Research West , April 2015</li> <li>• Table 1 (attached): Counts of Redtail surfperch species at MPAs and reference sites during year 2 sampling season (April-December, 2015). Sampling after August 2015 is to collect data for Ms. Michelle Succow's M.S. thesis. Poor weather conditions in October and December restricted sampling. Fish collected via hook and line sampling.</li> <li>• Table 2 (attached): Mean total lengths (mm) of surfperch species at MPAs and reference sites during year 2 sampling season (April-December, 2015). Sampling after August 2015 is to collect data for Ms. Michelle Succow's M.S. thesis. Poor weather conditions in October and December restricted sampling. Fish collected via hook and line sampling.</li> <li>• Table 3 (attached): Relative abundance of spawning night smelt at MPAs and associated reference sites during year 2 sampling season (May - August, 2015). Relative abundance determined using a modified Walker Scale.</li> <li>• Table 4 (attached): Length characteristics of spawning male night smelt at MPAs and associated reference sites during year 2 sampling season (May - August, 2015).</li> <li>• Table 5 (attached): Length characteristics of spawning female night smelt at MPAs and associated reference sites during year 2 sampling season (May - August, 2015).</li> </ul>		

**Table 1:** Counts of Redtail surfperch species at MPAs and reference sites during year 2 sampling season (April-December, 2015). Sampling after August 2015 is to collect data for Ms. Michelle Succow’s M.S. thesis. Poor weather conditions in October and December restricted sampling. Fish collected via hook and line sampling.

Site	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total Site Catch
Pyramid Point	0	0	23	30	5	9	0	0	0	67
Kellogg Beach	0	0	7	4	20	20	0	0	0	51
Gold Bluffs Beach	0	0	0	17	24	21	0	0	0	62
Reading Rock SMCA	0	0	0	15	28	26	0	0	0	69
Mad River Beach	3	21	2	36	7	6	53	13	0	141
Samoa SMCA	0	33	2	11	2	1	0	12	0	61
South Samoa Beach	6	2	16	8	12	7	0	5	0	56
Ten Mile SMCA/SMR	0	0	8	17	0	0	0	0	0	25
Ten Mile Beach	0	0	27	0	5	0	0	0	0	32
<b>Total Monthly Catch</b>	<b>9</b>	<b>56</b>	<b>85</b>	<b>138</b>	<b>103</b>	<b>90</b>	<b>53</b>	<b>30</b>	<b>0</b>	<b>564</b>

**Table 2:** Mean total lengths (mm) of surfperch species at MPAs and reference sites reference during year 2 sampling season (April-December, 2015). Sampling after August 2015 is to collect data for Ms. Michelle Succow’s M.S. thesis. Poor weather conditions in October and December restricted sampling. Fish collected via hook and line sampling.

Site	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean Total Length
Pyramid Point	-	-	277	275	182	280	-	-	-	254
Kellogg Beach	-	-	246	278	258	234	-	-	-	254
Gold Bluffs Beach	-	-	-	251	287	248	-	-	-	262
Reading Rock SMCA	-	-	-	257	272	267	-	-	-	265
Mad River Beach	233	224	272	276	267	197	232	278	-	247
Samoa SMCA	-	248	248	251	215	333	-	297	-	265
South Samoa Beach	271	310	279	270	247	289	-	233	-	271
Ten Mile SMCA/SMR	-	-	272	235	-	-	-	-	-	254
Ten Mile Beach	-	-	224	-	231	-	-	-	-	228
<b>Total Total Length</b>	<b>252</b>	<b>261</b>	<b>260</b>	<b>262</b>	<b>245</b>	<b>264</b>	<b>232</b>	<b>269</b>	<b>-</b>	<b>256</b>

**Table 3:** Relative abundance of spawning night smelt at MPAs and associated reference sites during year 2 sampling season (May - August, 2015). Relative abundance determined using a modified Walker Scale.

Site	May	June	July	August
Pyramid Point	-	0	0	0
Kellogg Beach	2	-	0	0
Gold Bluffs Beach	-	-	3	2
Reading Rock SMCA	-	-	1	0
Mad River Beach	0	0	-	-
Samoa SMCA	0	3	-	-
Ten Mile SMCA/SMR	0	0	0	-
Ten Mile Beach	0	0	0	-

**Table 4:** Length characteristics of spawning male night smelt at MPAs and associated reference sites during year 2 sampling season (May - August, 2015).

Site	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Sample Size (n)
Pyramid Point	-	-	-	-
Kellogg Beach	107	133	118	95
Gold Bluffs Beach	110	138	122	265
Reading Rock SMCA	108	130	119	96
Mad River Beach	-	-	-	-
Samoa SMCA	108	125	117	88
Ten Mile SMCA/SMR	-	-	-	-
Ten Mile Beach	-	-	-	-

**Table 5:** Length characteristics of spawning female night smelt at MPAs and associated reference sites during year 2 sampling season (May - August, 2015).

Site	Min Length (mm)	Max Length (mm)	Mean Length (mm)	Sample Size (n)
Pyramid Point	-	-	-	-
Kellogg Beach	96	105	101	5
Gold Bluffs Beach	101	128	114	35
Reading Rock SMCA	104	110	107	4
Mad River Beach	-	-	-	-
Samoa SMCA	102	120	106	12
Ten Mile SMCA/SMR	-	-	-	-
Ten Mile Beach	-	-	-	-