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A1 Project Title QUALITY ASSURANCE/QUALITY CONTROL STATEMENT
Salton Sea Benthos
Organization:Center for Inland Waters
Technical Project Manager: Deborah M. Dexter

This would be included with all of the other segments of the Limnology project

A4 Project/Task Organization and Responsibilities

All of the field sampling, sorting, laboratory analysis, and data synthesis will be conducted by 3 persons (Dexter, Coe, and Detwiler). Student assistants will help with field and laboratory work, but not in identification or quantification of organisms, nor in laboratory and statistical analyses.

Experience of personnel – ***probably more information than required in the QAPP, you already put this in the project proposal. However, you do mention some publications that probably have "standard methods" and protocols (SOPs) for doing this work. Those sections will be useful in some of the sections below.***

Deborah Dexter

Dr. Dexter has 35 years of experience in quantitative marine benthic field sampling, in particular on the ecology of soft bottom sublittoral benthic fauna (Menzies et al. 1963, Dexter 1978, Dexter and Crooks ms. submitted), especially on the ecology of intertidal sandy beaches (6 continents; Dexter 1983, 1992, 1996) analysis of sedimentary parameters, faunal identification, statistical analysis, and interpretation. All methods proposed in this study are standard methods utilizing well established protocols in marine benthic research, and all are very familiar to the principal investigator.

Paul Detwiler

Paul Detwiler is the technician overseeing the benthic project. Paul has a B.A. degree in Marine Biology and Genetics from University of California at Berkeley, and a M.S. degree in Biology (emphasis marine ecology) at San Diego State University. His thesis on the white urchin (Detwiler 1996) involved extensive sampling of the soft bottom benthos (using scuba as well as trawling from boats). His background includes

collecting and analyzing ocean water, sediments, benthic invertebrate and fish samples, and taxonomic identifications. He has a strong background in sampling and in using statistics to describe distribution and abundance data of populations. In addition to his extensive academic preparation in marine ecology and related subjects, he has had 10 years of field and laboratory experience. Paul has worked as a science technician (analysis of air samples for heavy metal and inorganic particulate content; bioassays on toxicity of industrial leachates; preparation of reaagents and equipment for trace metal analysis; ion chromatography), interpretive naturalist, park ranger, and instructor (marine science, oceanography, marine biology, introductory biology).

Marie Coe

Marie is a Ph.D. student in Joint Doctoral Program in Ecology at S.D.S.U. having graduated Cum Laude from S.D.S.U. with a B.S. in Biology, emphasis in marine biology. Her undergraduate course work, and 1 year of independent research, provided her with experience and technical skills in sorting, counting, and indentifying marine organisms, field sampling techniques, laboratory culturing of planktonic organisms (both species of Salton Sea copepods), and analysis of sedimentary parameters. Marie was a research assisant on a NOAA-SIO cruise for 3 months studying the effects of manganese nodule mining on the benthic infauna and epifauna. Marie's Ph.D. research will focus on the benthos of the Salton Sea.

A6 Project Task Description:

(Description of the work to be done and a timeline)

Techniques and procedures

1. Soft bottom benthic samples of the Sea bottom
   a. field collection

Six sites (at depths of 2,4,6,8,10 and 12 m) along 3 transects will be sampled using a petite ponar grabs. Three replicate grabs will be taken at each site. Each sample will be sieved through a 1000 µ sieve on site, and the remaining sediment preserved. These samples will be collected bimonthly.

On the 2nd and 5th sample date, small sediment cores will be collected from a 7th grab at each site for determination of sediment particle size (2nd date only), organic content (2nd and 5th date), and sediment C:N ratio (2nd and 5th sample dates). Cores will be frozen until laboratory analysis.

Bimonthly, replicate (2), timed offshore macroplankton tows (1 site) during the evening hours, will be conducted to determine the abundance of reproductively active Neanthes and Gammarus. Organisms will be washed to the cod end of the net, collected, and preserved on site.

   b. Laboratory processing

All organisms will be removed from each grab and macroplankton

sample, sorted to species, and counted using a dissecting microscope. All individuals of all species within each grab will be counted, unless they occur in very large numbers (not anticipated for grab samples, perhaps for macroplankton samples). In this case, a subsample will be counted.

Standard particle size analysis of sediments (Greenberg et al. 1995) will be conducted on replicates (2) from each site. Sediment organic content will be determined by burning replicate samples (2/site) in a muffle furnace for 1 hour at 700oC. A Perkins Elemer elemental analyzer will be used to determine the C:N ratio of replicate sediment samples.

2. Shoreline sampling

a. field sampling

Bimonthly , rocky substrates will be sampled for benthic species by scraping measured quadrats into 1000μ mesh bags. Five quadrats will be collected from barnacle covered rocks, and 5 quadrats will be collected from quadrats dominated by macroscopic algae. The contents of these quadrats will be scraped into 1000μ mesh bags.

Bimonthly, 3 replicate samples will be collected from barnacle shell/ sand substrates at State Park Headquarters, Salt Creek, and Bombay Beach . A stainless steel coring device with a surface sample area of 0.02 m2 will remove sediment to depth of 10 cm. The sediment will be sieved through a 1000 μ sieve, organisms will be separated from these sediments in the field using a saturated sugar solution, and preserved. Two replicate sediment cores will be collected (2nd sample date) for sediment particle size analysis.

b. laboratory processing

Sorting of organisms and sediment processing will use the same techniques as described for the soft bottom samples.

3. Identification of samples

Samples numbers will be assigned codes by basic collecting method, transect location, depth, date of sample, and replicate number, and other appropriate information.

a. Benthic grab samples (BG) (anticipated # of samples = 324)
Transect # (1,2,3) Depth (2,4,6,8,10,12 m)
Date (Jan, March, May, July, Sept., Nov. 1999) Replicate (1-3)
Example BG- 2-4m-March xx 99-R3

b. Sediment analysis (SedP = particle analysis, SedO= organic analysis) (anticipated # of samples = 36 from benthic grabs plus 6 from barnacle sand for particle size analysis); (anticipated # of samples for organic analysis = 72)
SedP-BG-4-8m-March xx 99-R1
SedO-BG-4-8m-March xx 99-R1

c. Macrozooplankton tows (MZT) (anticipated # of samples =12)
Date (Jan, March, May, July, Sept., Nov. 1999) Length of tow in minutes
Replicate (1-2)

Example MZT-Jan. xx,99- 10 min.-R1

d. Shoreline barnacle shell/sand substrate (BS) (anticipated # of samples = 54)
Location (State Park SP, Salt Creek SC, Bombay Beach BB) Replicate (1-3)
Date (Jan, March, May, July, Sept., Nov. 1999)
Example BS- BB-July xx 99-R-3

e. Quadrats taken from barnacle substrates (QBS) and algal substrates (QAS) at Red Hill Marina. (anticipated # of samples = 30 for each)
Date (Jan, March, May, July, Sept., Nov. 1999) Replicate (1-5)
Examples QBS-May xx-99-R4 and QAS-Nov. xx 99-R5

A7 Quality Objectives and Criteria for Measurement Data
Problem statement:
Although the distribution of benthic fauna is highly variable through time and space, ---
Data to be collected:

Conditions under which data are to be collected: the replicated sampling procedures will produce means and confidence limits (***precision, accuracy, data representativeness, data comparability)***that are representative of the specific habitats.

B1 Sampling Process Design

The sampling techniques have been presented in sufficient detail in the narrative ***(do you mean in the original proposal? If so, you may either add that section here or just refer to section, page, paragraph, etc.)*** to produce quality data.

B2 Sampling Method Requirements

It seems that you have referred to these in the publications cited above – again, either reproduce here or cite article, page, etc.. It would be good to have the procedures reproduced to be carried as SOPs on sampling events and available in the lab during analysis activities.

B3 Sample Handling... ditto

B4 Analytical Methods Requirements ... ditto

B5 Quality Control Requirements

This is where you describe whether you are going to take duplicates and what techniques will be used to verify identifications and counts (two persons separately count and identify 10% (or minimum of one per sampling event) of the samples collected. You may have some other standard way of validating that what is identified/counted is correct. If so,

describe it. We are not trying to tell you – the professional – how to do your job, we want you to tell us how professionals in your area of expertise validate their data.

B6 – B8 These may not apply to you unless there is some maintenance or testing needed on your samplers and microscopes, etc.

B9 If you are using historical data or someone else's describe how you decide to accept and use these data

B10 Data Management – this may be written by someone else for all the data generated from the various project segments.

C1 Assessments and Response Actions -- your project officer and I will be doing these assessments quarterly. At this time I am assuming that we will try to come along on one sampling trip and also visit your lab sometime when you are processing samples. This might be globally stated for all phases of the project.

C2 – another global response

D1 Data Review, Validation, and Verification – Here you briefly state what criteria you use to accept, reject or qualify data objectively and consistently. You may have some standard criteria listed in some of your publications and you can just reproduce them here.

D2 Validation and Verification Methods – Here you describe the process used to review and validate data, and verify that data requirements have been fulfilled and conclusions can be correctly drawn. Again, if you have a standard for doing these things just state it /them here. This is where you will state who is responsible (from above statement).

D3 Reconciliation with Data Quality Objectives (user's requirements) – Once you have validated and verified your data you will use some process to evaluate whether the data -- correctly, partially, or not-at-all -- demonstrate what the environmental situation is. You should also say that if there are any limitations on the use of your data, these will be included in your report(s).

Literature cited – *the QAPP doesn't require a list of literature references. If there are specific sections you are going to cite or use as an SOP or standard for identifying "quality" you might cite that in the B sections.*

Detwiler, P. M. 1996. Demography, growth, mortality and resource allocation in the white sea urchin Lytechinus pictus. M.S. Thesis. San Diego State University. 133 pp.

Dexter, D.M. 1978. The infauna of a subtidal sand-bottom community at Imperial Beach, California. Calif. Fish and Game. 64(4): 268-279.

Dexter, D.M. 1983. Soft bottom infaunal communities in Mission Bay, California. Calif. Fish and Game. 69: 5-17.

Dexter, D.M. 1992. Sandy beach community structure: the role of exposure and latitude. Journal of Biogeography. 19:59-66.

Dexter, D.M. and J A..Crooks. Manuscript submitted. The soft-bottom benthos of an urbanized bay and its invasion by an exotic mussel: A 27 year history.

Greenberg A.E., L.S. Clesceri, and A.D. Eaton (eds). 1995. Standard Methods: For the Examination of Water and Wastewater 18th Edition. American Public Health Association, American Water Works Association, and Water Environmental Federation, Washington, D.C.

Menzies, R.J., O.H. Pilkey, B.W. Blackwelder, D.M. Dexter, P. Hulings, and L.R. McCloskey 1963. A submerged reef off North Carolina. International Revue ges. Hydrobiology 51(3): 393-431.