The following represents a modified version of a poster presented at The Salton Sea Symposium, January 13-14, 2000, Desert Hot Springs, California, sponsored by the Salton Sea Authority.

SAMPLING THE BOTTOM-DWELLING ANIMALS OF THE SALTON SEA

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ABSTRACT

Benthic (bottom-dwelling) invertebrate animals form a major part of the diets of fish and many types of birds at the Salton Sea, and can be extremely numerous within different habitats. In fact, on submerged rocks, several thousand invertebrates can be collected from an area the size of a slice of bread! How are these animals collected from the different habitats? Our poster illustrates three techniques commonly used by ecologists for collecting animals: grab sampling, quadrat sampling, and sediment coring. In addition to depicting how we sampled the environments at the Salton Sea, we include images and natural history details of the animals collected by these methods.

Study Objective: To determine the seasonal abundance of benthic invertebrate animals within three major habitats of the Salton Sea:

The offshore environment is sampled by boat using a Ponar grab.

The rocky shore-line is an important habitat for many benthic animals.

Barnacle shell beaches also harbor a great abundance of animals.

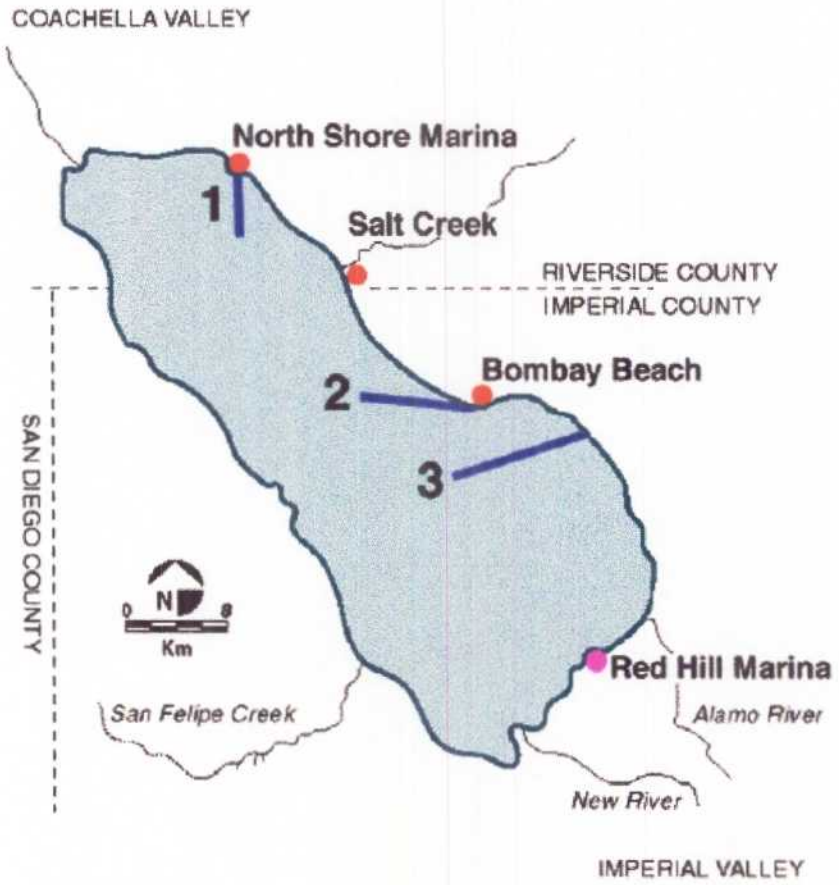


Figure 1. Map of Study Sites.

- Locations of barnacle sand sampling
- Location of rocky shoreline sampling
- 1, 2, 3 Transects for grab sampling

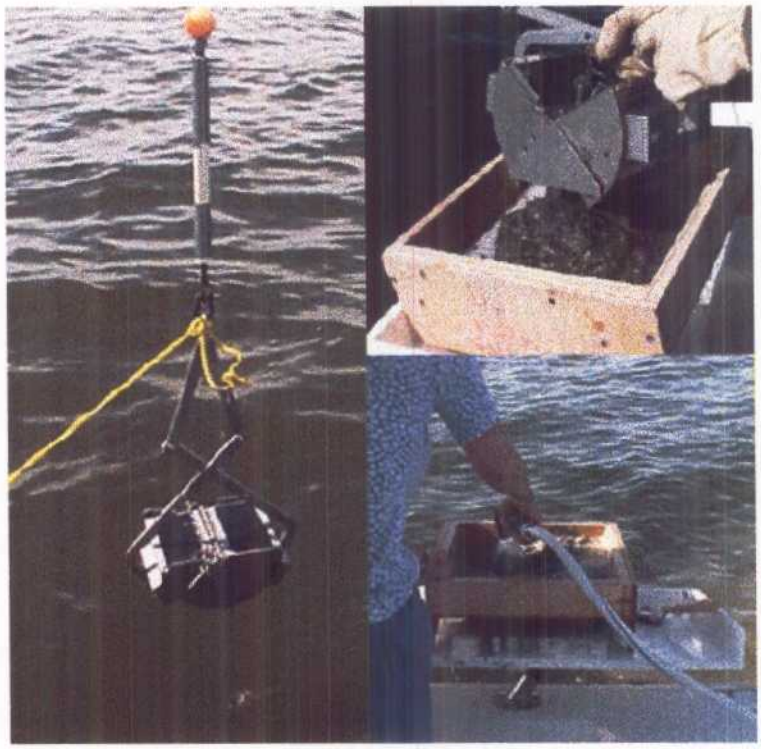


Figure 2. Steps involved in sampling the animals living within the mud at the bottom of the Salton Sea.Grab Sampling Procedure

Grab Sampling Procedure

- Grabs taken at 2, 4, 6, 8, 10 and 12 m depth along each of the 3 transects
- 3 replicate grabs taken at each depth
- Ponar grab samples a 15 x 15 cm area
- Sample is rinsed through a 1 mm mesh sieve to remove the bulk of the sediment
- Remaining sediments and animals retained on the screen are removed and placed in preservative for sorting back at SDSU

Figure 3. Typical sediment sample obtained with grab during spring.

Notice the lighter colored sediment on the surface layer. This material is oxygenated by the burrowing activity of the pileworm *Neanthes*, whose tubes are seen at the right.

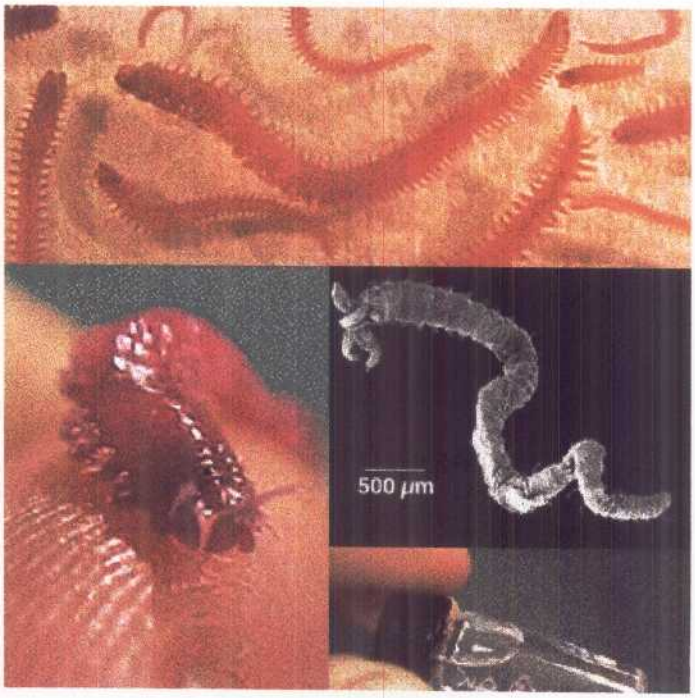


Figure 4. Animals of the offshore sediments.

A: The pileworm *Neanthes succinea*, the most abundant animal in the Sea, and food for fish and birds.

B: Closeup of head, note tentacles and 2 pairs of eyes.

C: SEM of a small marine worm, *Streblospio benedicti*.

D: *S. benedicti* (life size), 1/10 the size of the pileworm.

Barnacle-covered rock and algae-covered rock at Red Hill Marina are sampled using a scraping device which removes a 10 cm x 10 cm area from the rocks. Five replicates are taken from each habitat type.

The collected material is sieved through a 1 mm mesh to remove the mud and retain the animals.

At SDSU, animals in the samples are sorted, counted, and stored for future research. These jars contain 4,468 animals found within just one 10 x 10 cm scraping!

The amphipod *Gammarus mucronatus* is very abundant in rocky 3,183 were found within a 10 x 10 cm area in July! Unlike its rela the common "beach hoppers" or sand fleas, *Gammarus* spends entire life underwater. It is also an important food for fish and sh foraging at the Sea.

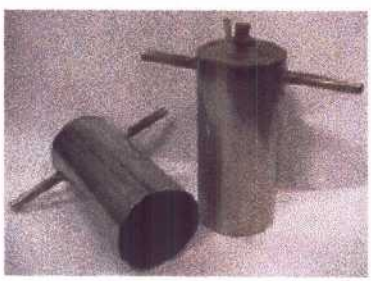
The Salton Sea is the only saline lake in the world with a resident barnacle. *Balanus amphitrite* was most likely introduced to the Sea on Navy seaplanes and buoys in the 1940's. This filter-feeding crustacean strains plankton from the water column with its setose (hairy) legs. Conditions in the Sea are favorable for its growth;

Barnacle shells

density on rocks can reach 252,900 per m^2.

provide an important habitat for amphipods and Neanthes.

The amphipod *Corophium louisianum* lives in mud tubes attached to hard substrata, in empty barnacle shells, and in the silty mud. This tiny crustacean grows no larger than a grain of rice. Very little is known about its ecology in the Salton Sea, or in any habitat that it has been reported from.



A stainless steel core (area 0.01 m^2) is used to sample barnacle shell sand to a 10 cm depth. Sand is sieved and Rose Bengal dye is added, to stain the tiny animals living between the grains of sand.

Sampling reproductive stages of Neanthes.

plankton net towed just at the surface.

The pileworm *Neanthes* has an interesting strategy for reproducing. At night, worms swim to the surface for mass spawning and their bodies explode, releasing eggs and sperm into the water. To collect these reproductive worms, we use a 1 m diameter

Most spawning occurred in March, when one 10-minute tow collected 286 worms! These would have provided a tasty meal for fish foraging that night.

Salton Sea Benthic Research Group

L-R: Greg Morris, Lindsay Harrington, Paul Detwiler,

Dr. Deborah Dexter. Not pictured: Marie Coe

For more information about the biology of the Salton Sea, please visit our website.