Carbonate deposits and rock formations on islands in the Loreto region were surveyed using Thematic Mapper satellite images to determine the location and size of potential study sites. This was followed by field studies in January 2003 and 2004 that entailed visits to coastal zones and geological deposits on Carmen, Monserrat, and Coronado islands.
Survey results are fully compatible with the Punta Chivato model. Active dunes occur exclusively on the north sides of Carmen and Monserrat as well as the southwest end of Coronado, which is open to the north. Rhodolith debris contribute to beaches along the southeast flank of Carmen and southwest flank of Coronado. The largest known repository of fossil rhodolith debris in the gulf is located in a Pliocene basin covering 364 hectares (910 acres) at Arroyo Blanco on the east side of Carmen. Living corals are found on the south sides of Coronado, Carmen, and Monserrat. Extensive fossil coral reefs occur on the south sides of Coronado and Carmen. The largest known Pleistocene reef in the Gulf of California covers 50 hectares (125 acres) on the south side of Coronado. An acre foot (43,560 cubic feet) is a useful measure of carbonate volume. With an average diameter of 1.5 in (4 cm), it takes 600 rhodoliths that have been thoroughly crushed into coarse sand to fill one cubic foot (0.28 cubic meter). Thus, it requires more than 26 million rhodoliths to fill an acre foot equivalent to a beach at the southeast end of Carmen. When thoroughly crushed into fine sand, approximately 800 chocolate shells (3 in or 8 cm in length) are needed to fill one cubic foot. One acre foot of dune sand the size of a single dune on the north end of Carmen, thus requires the recycling of more than 348 million chocolate shells. An atlas based on these kind of data is planned for the Gulf of Californian.

Population Genetics and Phylogenetic Relationships of Gulf of California Squat Lobsters (Galatheidae: Munidopsis)

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Squat lobsters are found in a variety of habitats throughout the depths of the world's oceans. To date, there are three currently recognized species of *Munidopsis* that may exist in the Gulf of California (*M. alvisca*, *M. lentigo*, and *M. subsquamosa*). *Munidopsis subsquamosa*, is believed to represent a widespread species that occurs throughout the abyssal zone of the Mid-Atlantic Ridge and the East Pacific Rise. *Munidopsis lentigo* is only known from the hydrothermal vent systems at 21° N latitude on the East Pacific Rise, although it likely occurs at the Guaymas hydrothermal vents given the proximity. *Munidopsis alvisca* is documented only from the Juan de Fuca Ridge and the Gulf of California. *Munidopsis* individuals were collected from the Guaymas hydrothermal vents, wood-falls **(**terrestrial wood that has settled on the ocean floor) near the Tamayo fracture zone, and the 21° N latitude hydrothermal vents to study the phylogenetic relationships of Gulf of California squat lobsters. Using PCR and sequencing of a portion of the mitochondrial cytochrome oxidase I (COI) gene, the Gulf of California *Munidopsis* were compared to putative conspecifics from

the Mid-Atlantic Ridge, East Pacific Rise, Juan de Fuca Ridge, and Monterey Bay. Phylogenetic analysis of COI supports *M. alvisca* in the Gulf of California and the Juan de Fuca Ridge as being conspecific. In addition, a new species of *Munidopsis* endemic to wood-falls appears to be present in the southern portion of the Gulf of California as well as the Juan de Fuca Ridge and a whale-fall (a whale carcass that has settled on the ocean floor) in Monterey Bay. None of the *Munidopsis* sampled from the Gulf of California proper were phylogenetically similar to *M. subsquamosa*. However, a single *Munidopsis* sampled from the 21° N latitude hydrothermal vents was nearly identical to *M. subsquamosa* sampled from the East Pacific Rise (13 N° to 18° S latitude). The remaining *Munidopsis* (N = 14) sampled from 21° N latitude were all *M. lentigo*. From our phylogenetic analysis, it is clear that deep sea *Munidopsis* are not a single cosmopolitan species (i.e., *M. subsquamosa*). Additional sampling of genes and *Munidopsis* populations endemic to localized habitats (wood-falls, hydrothermal vents, and whale-falls) are required to fully understand the complex evolutionary history of this group.

Life History Comparison of *Zostera marina* from the Northwest Coast of Mexico

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The objective of this study was to compare the annual form of *Zostera marina* from the Gulf of California with the perennial form from the Pacific coast of Baja California, in order to understand the adaptations of this species to different environmental conditions. Knowing that the life history shown by a species at a certain location is determined by resource allocation patterns controlled by environmental conditions, we hypothesized that under the stressful conditions imposed by the high water temperatures characteristic of the Gulf of California, *Z. marina* would respond as a pioneer species. That is to say, that biomass changes would reflect changes in shoot density and all resources would be allocated to seed production. In contrast, on the Pacific coast eelgrass would respond as a stable species: biomass changes would be related to changes in shoot weight (size) and resources would be allocated to module reiteration (vegetative growth). The study took place from June 1996 to November 1997. At Canal del Infiernillo (CI) and San Quintin (SQ), shoots from different sites and depths were collected monthly and pooled together to characterize each region. Variables analyzed were: shoot density (shoots m^2), aboveground biomass (gDW m-2), shoot length (cm), presence of generative shoots (%), phenological phases, and number of seeds. Water temperature was recorded at each sampling.

Regions differed in shoot density and aboveground biomass with higher values at CI. Annual shoots (CI) reach extremely high values in density and aboveground biomass in a very short period of time, while SQ plants present lower values