

A functional collapse of persistent shell-gravel benthic ecosystem on the California shelf within the last century

Adam Tomasovych (1) and Susan M. Kidwell (2)

(1) Earth Science Institute, Slovak Academy of Sciences, 84005 Bratislava, Slovakia, (2) Department of Geophysical Sciences, University of Chicago, IL 60637 Chicago, USA

Death assemblages sampled from the muddy seabed of the inner and middle mainland Southern California continental shelf frequently contain dead shells of epifaunal terebratulid brachiopod and large-bodied scallop species that have not been encountered alive during annual surveys of this area over the last four decades. Instead, live-collected shelly benthos is dominated by infaunal species, especially chemosynthetic and deposit-feeding bivalves. Postmortem age-frequency distributions based on 190 individuals of the brachiopod *Laqueus* show (1) a mode between 100 and 300 years, (2) the absence of shells younger than 100 years old, and (3) the continuous presence of shells older than 300 years, ranging up to six thousands of years old, implying the relatively continuous active production of shells by this brachiopod species over millennia. The localized occurrence of small living populations of this brachiopod and of the scallops *Chlamys* and *Euvola* under the reduced sedimentation conditions along the outermost edge of the mainland shelf, and their occurrence on the sandy shelves of the isolated, offshore Channel Islands less affected by natural and anthropogenic runoff, indicates that, up until the last century, the inner and middle mainland shelf had also been characterized by extensive areas of mud-free, shell-gravel habitat. The shift in community structure to the spatially pervasive, infauna-dominated muddy habitats encountered today implies a change to higher siltation and sediment loading due to increased land clearance within recent centuries.