

# THE *Current*

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## **Southern California Crustacean Sand-Dwellers Suffering Localized Extinctions**

Two types of small beach critters -- both cousins of the beloved, backyard roly-poly -- are suffering localized extinctions in Southern California at an alarming rate, says a new study by UC Santa Barbara scientists. As indicator species for beach biodiversity at large, their disappearance suggests a looming threat to similar sand-dwelling animals across the state and around the world.

Led by David Hubbard and Jenifer Dugan of UCSB's Marine Science Institute, the new work reveals a trend toward extirpation that has been growing slowly since 1905, steadily since the 1970's, and today reflects the "dramatic" impact of development, climate change, and sea level rise on the diminutive critters that are essential prey for shorebirds.

From Point Conception in Santa Barbara County, to Baja at the state's southern tip, the endemic isopods in question have vanished from some 60 percent of beaches where they were recorded 100 years ago. Barring the quick implementation of effective conservation strategies for sandy beaches, the pair say, the isopods -- and several other species -- may be wiped out altogether.

"The pattern is really strong, and it's a lot larger than we expected," said research scientist Dugan, co-author to Hubbard on the paper posted today in the online

edition of the journal *Estuarine Coastal and Shelf Science*. "The southern species has lost eight percent of its California range since 1971 -- there are only a few places where you can find it on the mainland coast now. The northern species isn't doing well in the southern California region either. Just a handful of populations still remain south of Ventura County."

By mining historical data and conducting modern surveys at beaches where the species were reported in the past, Hubbard and Dugan assembled something of a biography of the critters whose formal names are *Alloniscus perconvexus* and *Tylos punctatus*. Their research spans more than a century, dating back to a 1905 Smithsonian monograph on isopods that includes a section on Santa Barbara. But the bulk of earlier data came from surveys conducted in the 1970's, which were inspired by the 1969 Santa Barbara oil spill that affected a section of coast where both species today are flourishing.

They may not be so lucky in the future.

The nocturnal creatures, whose tell-tale burrows were once a familiar site to beachgoers, are caught in an ecological Catch-22. The beaches where they are currently thriving -- mostly on ungroomed, undeveloped coastlines -- are also those where they face the greatest threat from sea level rise. Such "natural" beaches, Dugan explained, are often also bluff-backed, leaving the slow, vulnerable critters with no place to go as sea level rises.

"Looking into the future is a little bit daunting," said Hubbard. "We have trouble coming up with more than 12 kilometers out of the more than 450 in the study where we have much certainty -- with current sea level rise projections -- that in 100 years biodiversity will be preserved unless active conservation strategies are adopted."

"Of all the zones on a beach, the upper intertidal zone of beaches is the most likely to have a house or a parking lot on it, to be groomed, or to be covered with a sea wall -- so our findings are a signal for this entire ecological zone," added Dugan. "These isopods are the proverbial canaries for upper beach macroinvertebrates and a whole suite of species that depend on the upper beach. Snowy plovers are another indicator of losses of this zone, and California grunion require upper beach zones that stay dry between spring tides to successfully incubate their eggs."

And therein lies the larger problem: a lack of widespread recognition of sandy beaches as ecosystems in their own right. Where the average sunbather may see only beauty -- wide, flat swaths of sand -- the scientists see peril for plant and animal life alike. The grooming process to make a beach towel-friendly, so to speak, can be disastrous for species like *Alloniscus* and *Tylos*. Ceasing that practice alone, argued Hubbard and Dugan, would do wonders to restore the beaches that may be those best-equipped to sustain biodiversity through sea level rise.

"There are opportunities for restoration, and that's one of the messages we're interested in people understanding," Hubbard said. "These wide groomed beaches could become places where endemic biodiversity could be conserved and preserved through sea level rise. Some beaches with virtually no animals on them now would be tremendous restoration sites, but it will require a mind shift."

"People think if we still have sand, the beach is ok, but that's not the case," Dugan added. "Beaches are often treated as something other than a coastal ecosystem -- they're viewed primarily as recreational venues and economic drivers. Those are very important features, but the backstory is that beaches are not yet appreciated as ecosystems that support endemic animals, processes and functions. If they lived in coastal wetlands these isopods would be protected by the recognition that wetlands now have as valuable ecosystems. But as species on beaches they're not protected at all. We need a sea change in how we think about beaches."

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