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Voracious Purple Sea Urchins Are Ravaging Kelp Forests on the West Coast

The trouble started in 2013, when sea stars, an urchin predator, began to die off

The sea urchins are causing havoc. (Photo by Xavier DESMIER /Gamma-Rapho via Getty Images)

By Brigit Katz smithsonian.com October 25, 2019 26800128

The coastal waters of northern California were once home to undulating forests of bull kelp, a type of seaweed that offers shelter to a host of sea creatures. But a series of adverse ecological events have jolted the region's marine ecosystem out of whack. Populations of purple sea urchins, a voracious, kelp-eating species, have exploded.

And now, according to a new study in *Scientific Reports*, more than 90 percent of bull kelp canopy along 217 miles of California's coast is gone.

The first sign of trouble arose in 2013, when sea stars in the area were hit with a mysterious disease and began "wast[ing] to nothing," as the

University of California, Davis puts it in a statement. Sea stars play an important role in their ecosystem, preying on native purple urchins (*Strongylocentrotus purpuratus*) and keeping their numbers in check. With mass numbers of sea stars dead, the urchins proliferated, chomping their way through the kelp forests.

Researchers aren't sure where the sea stars' illness came from, reports *Discover*'s Leslie Nemo. But they believe climate change was responsible for what happened in 2014 when a record-breaking marine heatwave that fuelled the bull kelp's decline. Warm waters are nutrient poor, and as a result, the kelp was not growing high enough to reach the surface of the water for photosynthesis, Nemo explains. And all the while, the sea urchin population was thriving, growing 60-fold between 2014 and 2015.

The authors of the new study, Laura Rogers-Bennett and Cynthia Catton, looked at two decades of kelp ecosystem monitoring data to track the extent of the change—and the damage. "[W]e can confidently say, this is uncharted territory that we're in," Rogers-Bennett notes. "We've never seen purple sea urchins at these densities before."

And the problem is no longer confined to California waters. According to the *Associated Press*, urchins are spreading north to Oregon and wreaking havoc there. One recent count found 350 million purple urchins in a single Oregon reef, "a 10,000 percent increase since 2014," the *AP* reports.

"You can't just go out and smash [the urchins]," Scott Groth, a shellfish scientist with the Oregon Department of Fish and Wildlife, tells AP. "There's too many. I don't know what we can do."

As is usually the case when part of an ecosystem collapses, the decimation of bull kelp forests has had a devastating ripple effect. According to the study, 96 percent of red abalone, a type of sea snail that feeds on bull kelp, have died from starvation. Red sea urchins, which are bigger and meatier than their purple relatives, are similarly declining from a lack of food. Last year, a recreational abalone fishery worth $44 million had to close. The north coast commercial red sea urchin fishery has collapsed.

"That's a huge economic loss for our small coastal communities," Catton tells AP.

Amid these rather dire circumstances, there is some good news. Bull kelp is one of the fastest-growing plants on Earth, and if cooler water temperatures return, the seaweed may be able to bounce back—as long as excessive numbers of purple sea urchins aren't there to gobble it up. UC Davis researchers are currently collaborating with a Bay Area shellfish company on one potential plan: removing urchins from the sea floor, fattening them up—many of the critters are not in good condition because the competition for food is so steep—and selling them as seafood.

But there is, in all likelihood, no easy fix for restoring the health of kelp forest ecosystems along the northern west coast. In their report, Rogers-Bennett and Catton caution that even if the bull kelp recovers, "it may take decades before the complex biological communities, associates, and the ecosystem services provided by macroalgal [seaweed] forests rebound."