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Julie Cohen

Kelp Helping Kelp

After big winter storms, clumps of kelp forests often wash ashore along the Southern California coast. Contrary to the devastation these massive piles of seaweed might indicate, new research suggests the kelp may rebound pretty quickly, with help from neighboring beds.

The study, conducted by UC Santa Barbara scientists and colleagues at UC Santa Cruz, UCLA and the University of Wisconsin, Milwaukee, found that kelp forests can bounce back from destructive storms when the forests are in reasonably close proximity to healthy beds. In much the same way that the wind scatters plant seeds over the land, ocean currents carry trillions of microscopic spores from one kelp forest to another, where they create life for ailing populations. The marine scientists' findings appear in the journal Proceedings of the Royal Society B.

"Historically, researchers thought that kelp forest resilience depended on only the local environment," explained lead author Max Castorani, a postdoctoral scholar at the Marine Science Institute. "However, that turned out to be wrong, as we showed that kelp forests from miles away influence whether a local kelp forest persists or goes extinct. Declining kelp forests can be rescued or recolonized by neighboring populations, so the proximity among forests is very important."

For example, kelp forests off the coast of Santa Barbara are linked to neighboring beds near Montecito and Goleta Beach but also to those farther away — as far south as Carpinteria and as far north as Isla Vista and the Gaviota coast.

“From year to year, the ocean currents change and the size of kelp populations expand or contract,” Castorani said. “In a given year, we could estimate how many spores were sent among all the hundreds of kelp forests in Southern California, allowing us to identify important rescuing populations.”

To measure kelp abundance from San Diego to Point Conception, the researchers used data from a 32-year time series assembled from Landsat satellite images. This was calibrated to kelp abundance and spore production gathered from diving expeditions.

Also included was more than a decade of Southern California oceanographic modeling performed by co-authors David Siegel and Rachel Simons of the Earth Research Institute.

The analysis overall showed that the chance of a population being rescued depends on the size of the neighboring forest, the number of spores it produces and the strength of ocean currents that carry the spores.

“Of these factors, year-to-year changes in spore production turned out to be the most important to successfully rescuing neighboring kelp populations,” Castorani noted. “This is valuable to ocean conservation because it can inform which kelp forests should be prioritized for protection or where coastal restoration efforts could be most effective.”

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