

Kelp! Scientists discover more about how sea otters come to the rescue of undersea forests

By Lottie Limb, 4.3.2025

A sea otter floating above ribbons of kelp is undoubtedly one of nature's cutest scenes.

It's well known that the marine mammals help make these sea surface 'pillows' more abundant, by eating the sea urchins that nibble away at the plant.

A study last year strengthened the link between recovering sea otter populations and the long-term health of kelp forests- the towering brown algae that provide food and shelter for thousands of species. But scientists were puzzled as to why the impact of otters on kelp- particularly along the coastlines of islands in Southern California and British Columbia- varied by location. Now, new research has found that sea otters' level of influence on how quickly kelp forests grow back depends on what other species the mammals interact with.



Inside two different sea otter ecosystems

"We always thought keystone species control their ecosystem the same way, regardless of where they are or what else is in the ecosystem," lead author Ryan Langendorf, an environmental studies researcher at the University of Colorado at Boulder, said in a statement about the new study.

"A more modern view is that they are still very important, but they can have different effects in different places."

Researchers conducted two 30-year data community collection studies documenting what happened after sea otters were reintroduced to Nicolas Island in California in the 1980's and Vancouver Island in British Columbia in the 1970's. Both areas were mostly 'urchin barrens'- sites where sea urchins had overgrazed in the absence of sea otters- when the studies began. But while kelp grew back off both coasts, forests in British Columbia regenerated far faster than in Southern California. The Canadian coastline was a classic example of the 'trophic cascade', the top-down ecological effect that follows the reintroduction of a keystone species. In short: otters eat urchins, so kelp thrives. But the slower return off California was something of a mystery. To understand what was going on in the ecosystem, Langendorf developed a model that created 'a movie of species interactions'. It revealed more competition between the different urchins, kelp, and other species in California, which slowed down the influence sea otters had on the entire

system. The animals didn't have as strong an effect as they did in the northern Canadian province.

Following the interactions of otters and kelp provides valuable ecosystem insights

Most studies assume that the interactions between different species stays the same, regardless of other factors like the abundance of species. Langendorf's model offers a more sophisticated approach that can help researchers better understand how ecosystems change when species are reintroduced.

"The dynamic nature of ecosystems has long kept ecologists from understanding what species need and how best to manage them," Langendorf said.

"Being able to turn common survey data into a movie of species reacting to changes in their environment and each other feels like renewed hope for a field that more than ever needs to offer useful advice about how to help the many complex living systems we live with and cherish.

This breakthrough is especially important in the water world of kelp forests, a highly valuable ecosystem that is threatened by warming waters and rising storms as the climate heats up.

Analysis Questions:

1. How do sea otters benefit kelp forests?
2. What type of organism is kelp?
3. What is an urchin barren?
4. What determines how quickly kelp grows back when reintroducing sea otters into an ecosystem?
5. Define keystone species. Why are sea otters classified as a keystone species?
6. Compare the kelp growth in CA to the kelp growth in British Columbia after sea otters were reintroduced.
7. Why are these studies important?