As anyone who has ever gone tide pooling knows, sea stars are pretty cool. Clinging to rocks in the intertidal zone, these marine invertebrates move along on hundreds of tiny feet chewing up baby mussels, barnacles and snails. If they lose an arm or two, they can grow another one.

But sea stars are also a sentinel species that can tell scientists about what is happening in our marine environment. Now a researcher at the Romberg Tiburon Center for Environmental Studies has uncovered evidence suggesting that climate change may be driving these small creature north out of their historical ranges.

“This is preliminary data,” says biology professor Sarah Cohen, “but the answers we’ve gotten so far have been quite a surprise.”

A year ago, Laura Melroy, a graduate student at the Romberg center, began collecting specimens of Leptasterias, a little white sea star, at beaches from Alaska to Monterey, freezing them and collecting DNA to determine which species they belonged to.

Melroy, who is studying for a master’s of science in ecology, evolution and conservation at the San Francisco State University’s marine research station, says she wanted to see how the genes in different populations have changed and how their range and abundance have changed over time. She chose Leptasterias rather than its larger purple cousin because of its unusual habit of brooding its young.

Instead of sending their eggs out into the ocean, Leptasterias keep their eggs under their bodies until they hatch, she says. Then the little stars move only a few feet away from their mothers. This means they are “environmental sentinels,” she says.

“They have to adapt and their adaptations tell us a lot about their environment,” Melroy says.

Melroy decided to create a map in time and space to see what has been happening to populations of Leptasterias, how their abundance and range has changed over the past 100 years.

She collected sea stars from all over the San Francisco Bay Area, including Muir and Rodeo beaches and as far south as Monterey. She then compared them to DNA taken from star samples stored at the California Academy of Sciences, some dating from as far back as 1897. This gave her a snapshot of Leptasterias’ range 100 years ago compared to where they live now.

What she discovered is that a Leptasterias species once common in Monterey Bay, Leptasterias aquilus, is mostly found further north. In fact, the species was once found as far south as San Luis Obispo, but no more.

“We are seeing species commonly found in the south in the northern ranges,” she says. “They may be moving further north in response to climate change.”

Leptasterias would not be the first marine animal found to be moving north. Green anemones and types of barnacles are also on the march, according to Cohen, who is Melroy’s adviser.

Nevertheless, Cohen says, the findings are not proof that climate change is to blame.

“The findings are compatible with climate change but we need to do more work” to isolate the cause, she says. “It is probably an interaction of factors.”

Warming seas and an increase in rainfall might be impacting sea stars, but more study is needed, Cohen says. But that may be difficult to do. A devastating epidemic is killing large numbers of sea stars up and down the Pacific Coast. Once found in abundance in the Bay Area, little Leptasterias are suddenly gone from the beaches of West Marin, Melroy says.

“They were really common,” she says. “We used to see them all over the place but the last time we went there were only three where there used to be hundreds.”

The wasting disease, thought to be caused by a virus, may have a particularly devastating impact on this species, she says, because it stays so close to home and doesn’t broadcast its eggs great distances.

“I don’t know how it will rebound,” Melroy says. Under these circumstances it becomes costly and difficult to collect Leptasterias and Melroy says she can’t in good conscience take animals from their environment for study.

She can, however, take a tiny tip from a sea star’s arm for study back in the lab. The star’s arm will regenerate and the little star won’t suffer.

“It doesn’t hurt,” she says. “They don’t have a brain.”

Cohen says that research like Melroy’s has taken on new importance in light of the rapid changes undergoing climate and the environment.

“There is an urgency in this work,” Cohen says. “People aren’t learning about the environment fast enough. We need more scientists to be trained in ecology genetics. It’s critical that we identify these species and how they are changing so we know what they need to survive.”

Contributing writer Gretchen Lang of Belvedere covers the environment. She spent 15 years abroad writing for newspapers including the Boston Globe and the International Herald Tribune.