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While the kelp is declining, it won't all be gone anytime soon

Seaweed eradication effort working

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It's not just humans who emigrate to the United States, but plants and animals as well.

Many of the dozens of invasive species found in Monterey Bay and Elkhorn Slough came from far away places. One of the most recent arrivals in Monterey Harbor is Undaria pinnatifida, a seaweed native to Asia.

"Zero of the natives, about a billion of the invaders."

Kerstin Wasson
Elkhorn Slough National Estuarine Research Reserve

It's not clear whether it has caused any harm, but some scientists are worried it may compete with native kelp forests once it spreads into areas outside the harbor.

Now, more than three years after Luke Hunt, a graduate student at Hopkins Marine Labs, discovered it, efforts to eradicate the plant seem to be paying off.

The weed is at perhaps its lowest numbers for this time of year since he started to track it two years ago, said Steve Lonhart, a scientist with the Monterey Bay National Marine Sanctuary. Lonhart has been supervising efforts to eliminate the weed from Monterey

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Harbor since December 2002, with the help of dozens of volunteers, the city of Monterey and the Monterey harbormaster.

"From late 2004 we have seen a very sharp decrease," Lonhart said, "but the other thing, too, is that our level of effort has increased."

He said he removed hundreds of plants from half of the harbor's so-called D tier in February 2004, but found only a few dozen on the whole tier a year later.

Lonhart said the lower kelp numbers could at least in part be a result of the eradication effort.

"It's difficult to determine ... whether there are some environmental changes that we aren't aware of that have also contributed to the current decline," he said

No quick fix

Whatever the reasons for the kelp's decline, Lonhart and others say it's unlikely that it will be eradicated anytime soon.

"The sanctuary is a special place and we need to undertake these efforts even though others may view them as insurmountable," he said.

Once an invasive species has arrived, it's extremely difficult to remove it, said Kerstin Wasson, a scientist with the Elkhorn Slough National Estuarine Research Reserve who studies invasive species.

"But if you get the first patch of something soon after it's invaded," she said, "then you have a good chance of eradicating it."

There are only three successful eradications of invasive marine species worldwide, two of them in California, said Andrew Cohen, director of the biological invasions program at the San Francisco Estuary Institute.

For example, Cohen said, the seaweed Caulerpa was eradicated with chlorine almost immediately after it was found in 2000 in two lagoons in Southern California. Caulerpa is known to form carpets on the seafloor in the Mediterranean, choking native animals and plants and causing fish to leave the area.

Lonhart said Undaria is the only species authorities are trying to eradicate in Monterey Bay.

But it's not the only one there. A California Department of Fish and Game study conducted in 2000 and 2001 found 12 of 72 species in Monterey Harbor to be non-native, Lonhart said.

And while Undaria may be in decline, a moss animal called Watersipora subtorquata is spreading to areas outside the harbor, he said. Watersipora forms sheet-like or erect colonies that can overgrow other critters, killing them in the process. Last summer, Lonhart said, research divers for the first time found the animal outside the harbor, as far away as a kelp forest in the Hopkins Marine Life Refuge near Pacific Grove.

Elkhorn Slough is another area scientists are worried about. A new study to be published this summer found that it harbors 58 non-native "spineless" animals, whereas there are only eight along the open coast. Elkhorn Slough may be more susceptible to invasive species in part because it's heavily altered by humans, said Wasson, who conducted the study.

One of the invasive species in the slough is the Asian mud snail. It probably arrived several decades ago with Japanese oysters grown there, and by now has practically replaced the native Californian mud snail, Wasson said.

"Zero of the natives, about a billion of the invaders," she said.

Other species of concern are an Australian tubeworm that changes the habitat for native species because it builds reefs, and the European green crab which has been shown to cause reductions in native clam populations in Bodega Bay.

Many invasive species come here in two ways: First, they reach large harbors like San Francisco in the ballast water or on the hulls of large ships. They also use the hulls of smaller vessels to travel along the coast to small harbors like Monterey.

New federal law

Federal and state officials are trying to keep that from happening. Federal law that took effect last year requires ships coming to the United States from other countries change their ballast water 200 nautical miles offshore before they arrive at the coast, said Gary Gregory, chief of the marine facilities division at the California state lands commission in Long Beach. That way, ballast water dumped in harbors contains only critters that don't survive in coastal waters because they come from the open ocean.

In California, a law requiring ballast water exchanges went into effect in 1999, Gregory said. And in late 2003, he said, the state Assembly passed a bill called the Marine Invasive Species Act that requires ships coming to California from other states to exchange their ballast water as well.

He expects provisions of the bill to take effect in late summer.

"Hopefully this will take care of the problem with moving critters around in the coastal areas," Gregory said. "The (federal and state) regulations that are in place right now ... don't really effectively cover these sorts of coastal voyages."

Other states like Washington and Oregon are working on similar regulations, he said.

But to make sure that ballast water is regulated in every state, the Ocean Conservancy and other environmental organizations are suing the Environmental Protection Agency to include ballast water as a pollutant under the Federal Clean Water Act. This would force ships entering all states to get permits before dumping their ballast water, said Sarah Newkirk, the Conservancy's California Water Quality Programs Manager.

"It's a way to control the introduction of invasive species," Newkirk said.

But even that won't keep species from entering U.S. coastal waters from abroad, said Cohen of the Estuary Institute. Ten to 20 percent of the critters in ballast tanks remain in the tank even after the water has been exchanged, he said.

Cohen said the only efficient way to keep invasive species out of ballast water is to treat it, for example with nitrogen gas to suffocate the animals and plants in there.

Gregory said the state lands commission is working with industry and universities to test what the best treatment systems are. One day, he said, ballast water treatment is going to be required in every port in the world.

To keep invasive species from attaching to ship hulls, ship owners use mostly less-toxic chemicals. One of them, Tributyltin, is being phased out because it is toxic. That causes a dilemma, because less toxic chemicals are also often less efficient in keeping animals off of the hulls.

"I think that may be a trade-off," Wasson said.

But even with all these regulations, eradication efforts and chemicals in place, all it takes is one contaminated vessel entering Monterey Bay to make all efforts futile, Lonhart said.

"There is nothing to prevent a vessel from reinoculating Monterey Harbor," he said. "It's like catching a cold."