

Pacific Ocean acidifying at twice rate of global average

Trend could spell trouble for shellfish farmers

By KALE WILLIAMS
The Oregonian

The Pacific Ocean is acidifying at twice the rate of the rest of the world's oceans, according to researchers, with potentially catastrophic effects on shellfisheries.

The findings, published Monday in the journal *Nature Geoscience*, were the product of a seven-year study led by Emily Osborne, a researcher with the National Oceanic and Atmospheric Administration's ocean acidification program.

Osborne began collecting samples of sediment from the Santa Barbara Basin off the coast of Southern California in 2013. Because the basin has little oxygen and a dearth of plants and animals, the ocean floor has remained relatively undisturbed. The sediment cores she pulled from the basin contained the shells of foraminifera, a single-celled plankton, dating back to 1895.

After weighing and photographing each specimen, Osborne was able to use the thickness of the shells to establish a 100-year record of pH levels in the waters of the California Current, which runs along the West Coast.

She found that, since 1895, shell thickness had decreased by 20% due to increased ocean acidification.

"I started looking at the lowest, oldest parts of core and worked my way to top,"



Emily Osborne, a researcher with the National Oceanic and Atmospheric Administration, carries a sediment core taken off the coast of California.

she said. "It was crazy to see visually how the shell changed throughout the core."

The ocean absorbs carbon dioxide from the atmosphere, which reduces pH levels and concentrations of calcium carbonate, a mineral used by shellfish to calcify their shells. As more carbon is released into the atmosphere, concentrations of calcium carbonate decrease and the shells of organisms like foraminifera

get thinner, a trend Osborne saw clearly in the sediment cores she examined.

"The shell thickness record instantly showed a long-term declining trend," she said. "It was really obvious across entire record."

That trend could spell trouble for shellfish farmers on the West Coast, who depend on calcium carbonate-rich waters for their oysters, clams and mussels to grow. In 2007, the Whiskey Creek Shellfish Hatchery in

Netarts Bay on the Oregon Coast saw a catastrophic larval failure because of acidic conditions.

Looking at the chemical composition of the shells, Osborne found that the type of carbon in the shells was indicative of carbon dioxide absorbed from the atmosphere, the same greenhouse gas that is driving changes to the climate across Oregon and around the globe.

A 2015 survey of shellfish farmers, conducted by

Oregon State University, found that 75% of those asked reported some level of concern over ocean acidification. Of those respondents who said they have been affected by ocean acidification, 97% reported financial damage, while 68% cited emotional stress.

The record also showed evidence of natural variability, she said. The pH levels rose and fell with natural phenomenon like El Niño and the Pacific Decadal

Oscillation, a longer-term pattern of warming and cooling ocean waters. Those natural changes will offset effects of ocean acidification in some years, but amplify it in others.

"We now know that the Pacific Decadal Oscillation can intensify or alleviate (ocean acidification) in this region," Osborne said. "For those large swings to also have a human imprint, it's going to make the extremes more extreme."

Hemp harvest swamps market

By MATEUSZ PERKOWSKI
Capital Press

The surge of enthusiasm that spurred a five-fold expansion of Oregon's hemp acreage this year has been dampened by numerous problems that prevented many farmers from cashing in on the crop.

A shortage of equipment necessary to harvest, dry and process hemp has forced many growers to abandon fields they initially hoped would reap robust financial rewards.

"They got caught up in the grand illusion," said Rick Kozen, a hemp entrepreneur whose Operation: Hemp Aid is helping distressed growers. "It was almost set up for failure."

Expectations of strong revenues have often proven overly optimistic as the amount of hemp produced in Oregon and elsewhere has swamped the fledgling infrastructure needed to make finished products available to potential buyers.

"People heard there was a lot of money and they went into it fast and furious," said Mark Taylor, founder of the Southern Oregon Hemp Co-Operative. "Poor planning produces poor results in any commerce."

To compound the logistical issues facing hemp farmers, ill-timed rain downpours, hail storms and freezing weather damaged the crop's quality in certain areas.

While the 2019 season was bitterly disappointing for some hemp farmers, the turbulence and uncertainty are unfortunate "growing pains" that likely won't permanently hamper the industry's potential for profit, experts say.

"It's going to be a little bumpy until the infrastructure matures," said Beau Whitney a senior economist at New Frontier Data who tracks the hemp industry. Regulatory and market

factors converged to cause hemp acreage to surge in 2019.

The crop was legalized at the federal level by the 2018 Farm Bill, convincing farmers that hemp could be grown without the same legal jeopardy as marijuana, the psychoactive form of cannabis that remains illegal under federal law.

At the same time, the marketplace saw a profusion of new food, beverage and cosmetic products containing cannabidiol, or CBD, which is a compound contained in hemp that's touted for reducing inflammation and possessing other healthful qualities.

Nearly 2,000 farmers planted about 64,000 acres of hemp in Oregon this year, up from fewer than 600 growers with about 11,750 acres in 2018, according to the Oregon Department of Agriculture.

Farmers who were accustomed to earning a few hundred dollars per acre growing hay were inspired to switch to hemp after hearing about others earning \$50,000 per acre in revenues from the crop, Taylor said.

"Bragging has a funny effect on the market," he said. "It can make people jump in without thinking."

An early problem to emerge was with hemp seeds that were advertised as being "feminized," or altered to only germinate female plants that produce CBD-laden flowers, said Kozen.

In fact, some growers later found the seeds weren't actually feminized, meaning that half of them grew male plants that caused problems with cross-pollination and unwanted seed production, he said.

Farmers who grew widely spaced hemp plants on plastic-covered mounds — emulating techniques used for small-scale marijuana operations — later found the method didn't scale up to

bigger fields, he said.

"It's not conducive to harvesting large crops," said Kozen, who expects 40% of Oregon's hemp acreage went unharvested this year. "There's no congruity in the industry, there's no standard."

Once the 2019 crop was ready to harvest, many growers discovered that machinery needed to reap, dry and bale hemp wasn't as widely available as they'd been led to believe, said Jerry Norton, founder of American Hemp Seed Genetics.

"We've had some bottlenecks," Norton said. "A lot of people were sold a bill of goods."

Likewise, some purported hemp brokers misrepresented themselves as having existing deals to sell the crop to major processors and product manufacturers, when in fact such deals were only speculative or didn't exist at all, said Whitney.

Farmers who grew hemp based on such false promises learned at harvest time that they didn't actually have a market for their crops, he said.

"There are a number of people out there who are just corrupt," Whitney said. "It would put the cultivator into a false sense of security that their crop had been sold, then they had the carpet pulled out from under them."

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