

# Scientists Single Out a Suspect in Starfish Carnage: Warming Oceans

A Review

Kathryn Atherton

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## Reference

Pierre-Louis, K. (2019, February 5). Warmer Seas Appear To Be Killing Starfish. *The New York Times*, p. D3. Retrieved February 25, 2019

A concerned group of Arkansas schoolchildren's fundraiser sparked research into the cause of the disappearance of the sunflower starfish from the Pacific Ocean, which started in 2013. The starfish were suffering from a disease that causes them to lose their limbs and then die. The \$400 donation from the children caused the recipient, Dr. Harvell of Cornell, to put her own money into the project before another large donation was received. The donations lead to a paper published in the *Science Advances* journal.

The paper found that the Pacific Ocean has become unusually warm due to man-made climate change. However, the warming did not occur evenly. When the pattern of warming was compared to that of the sunflower star death, a correlation was found. While many starfish species were affected, the sunflower star was selected for this study because there was a lot of data available on its population before they started to die out. The data showed that wherever the warming of the ocean traveled, so did the sunflower star epidemic. This correlation supported the researchers' hypothesis that the heat is not necessarily directly affecting the starfish, but a virus which causes the loss of limbs prior to death. While the virus shows up in healthy sunflower stars, the addition of heat causes the stars to die out rapidly. Heat is also triggering the development of other diseases that are killing off frogs, toads, and coral.

Researchers claim that the only way to truly solve this problem is to stop climate change, though some temporary fixes, such as replanting seagrass beds and protecting mangroves can help marine life in general. Recently, some sea stars affected by the virus have returned to the West Coast and some small sunflower stars have been spotted off the coast of Alaska, but it is unknown whether they will survive.

I believe that the national general public should pay attention to this issue because it is one of the first known examples of the direct effect of global warming on organisms. The dying

of the sunflower star and other sea stars could have a ripple effect on their ecosystems, causing those organisms that interact with the sea stars to also begin to die out, organisms that interact with the new set of dying organisms to die, etc. The loss of these organisms could lead to problems for the fishing industry on the West Coast, including popular species of fish for human consumption becoming endangered and thus becoming protected by the Endangered Species Act. If actions to combat or even reverse man-made climate change are not done quickly, the story of the sunflower star could become all too common for other organisms, both of land and sea.

To address this issue, two policy actions were recommended in the article: replanting seagrass beds and protecting mangroves. These actions, however, would simply be a temporary fix for a devastating issue. To truly address the root of the problem, policies would need to be enacted to stop climate change. Ideally, these policies would include a combination of public education programs, research funding, and tax incentives to encourage people and businesses to turn to green energy alternatives.

The public education programs would target common practices of American society that are the most damaging to the climate and offer alternatives that are feasible to transition into today, within the next year, and within the next decade. The education programs should also provide information about the specific species that we know are dying because of climate change, like the sunflower star, and encourage people to look out for them and report any potential sightings to researchers who are studying their survival. Organisms as aesthetically interesting as starfish should especially be included in the education program because many people might see the starfish and try to disturb it so as to take photos with it.

Research funding would go toward projects like Dr. Harvell's that are looking to understand and solve the problems that organisms face due to man-made climate change as well

as projects which make green energy alternatives more affordable and efficient. The research projects should ideally be paired with a policy expert such that once conclusions are drawn, the policy expert can help the researchers draft a policy to bring to the respective institution to make feasible changes based upon the conclusions brought about by the research.

Finally, the tax incentives would encourage people and businesses to make changes in their daily lifestyles to cut down on their carbon emissions to help slow the warming of the planet rather than accelerate it. These tax incentives could be related to buying a product that is a green alternative to another product on the market or buying a product from a company that uses environmentally-friendly manufacturing practices.

## The New York Times

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# Scientists Single Out a Suspect in Starfish Carnage: Warming Oceans



By **Kendra Pierre-Louis**

Jan. 30, 2019

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In 2013, starfish — including the morning sun star, the richly hued ochre star and the sunflower star, whose limbs can span four feet across — started dying by the millions along the Pacific Coast from Mexico to Alaska.

They were succumbing to a wasting disease. It began with white lesions on their limbs, the dissolution of the surrounding flesh, a loss of limbs and finally death. Understanding, let alone solving, the problem would take research.

One day, shortly after the epidemic began, Drew Harvell, a professor of ecology and evolutionary biology at Cornell University who had been sounding the alarm about the disease, received a curious letter.

“I received a \$400 check in the mail from a group of schoolchildren from Arkansas,” Dr. Harvell said. “These kids were so upset about the idea of starfish disappearing from the oceans that they went out and they did this fund-raiser and raised 400 bucks for us to help in our research. I never asked them to do this. They just did it.”

Dr. Harvell matched it with her own money, and a donor kicked in quite a bit more. “That was what funded some of our early surveys,” she said. “These kids, who none of them had been to the Pacific Ocean, but they just needed to know those stars were there.”

One of the ultimate results of the children’s donation, a paper that sheds some light on the decline of the starfish, also known as sea stars, was published Wednesday in the journal *Science Advances*. The main suspect: our warming oceans.

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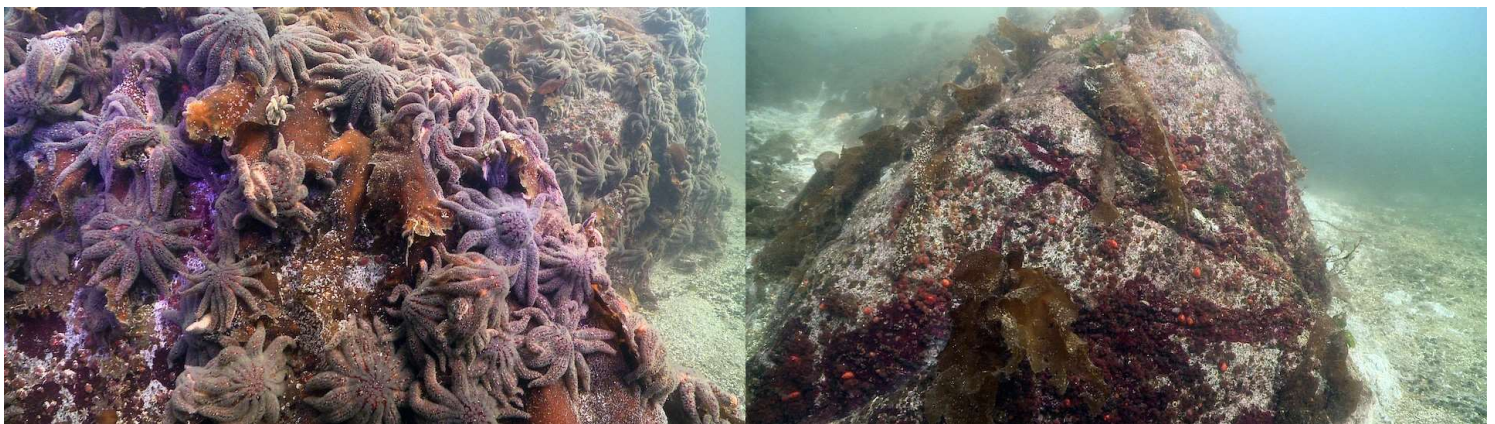
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In 2013, parts of the Pacific Ocean became unusually warm as part of a broader marine heat wave, nicknamed the Blob, that would last through 2015 and that was very likely exacerbated by human-caused global warming. But while the ocean warmed, it didn't warm evenly, making it hard to tell if the heat wave was contributing to the starfish deaths.

In the study, which was led jointly by Cornell and the University of California, Davis, Dr. Harvell and her colleagues compiled data from citizen-scientists and the National Oceanic and Atmospheric Administration. Then, they compared changes in the sunflower star population with changes in ocean temperature during the outbreak.

While the disease affected 20 species of starfish, the researchers focused on the sunflower star because it was especially hard hit and because there was good historical data on its population before the epidemic.

The researchers found that the die-off of the sunflower star matched the pattern of heat spreading through the ocean.



Images taken 20 days apart off British Columbia in October 2012, the outset of a starfish wasting disease.  
Neil McDaniel

According to Rebecca Vega Thurber, an associate professor of environmental microbiology at Oregon State University, who was not involved in the study, "What's really exciting about this paper is the really strong correspondence between this temperature anomaly that occurred during that year when the sea stars started dying."

Everywhere the warming went, the sunflower stars sickened and died.

The study showed a correlation between warming temperatures and the spread of the disease, not a direct cause. But it corroborates a hypothesis that was initially questioned because the virus that researchers think is responsible also shows up in healthy sea stars.

"That trigger, in the case of this paper, seems to be temperature," Dr. Vega Thurber said.

Dr. Vega Thurber pointed out that the presence of a particular pathogen does not necessarily mean a disease will develop.

For example, if you've had chickenpox you are carrying the virus that causes shingles. Roughly a third of carriers will develop the disease, but two-thirds won't. It takes something to prompt its emergence.

Heat has also been implicated as a trigger in the spread of a fungus that is wiping out frog and toad populations around the globe, as well as in coral diseases. In fact, when corals bleach or lose their symbiotic algae because of warming oceans, it's typically disease that ultimately kills them.

There are things we can do to help marine life, Dr. Harvell said. We can replant seagrass beds and protect mangroves, for instance. But, ultimately, we need to stop climate change, she said. The world's oceans have absorbed more than 90 percent of the atmospheric heat humans have caused by releasing greenhouse gases.

While some affected sea stars have begun to return to American waters on the West Coast, the sunflower star has not returned off the lower 48 states.

But last summer, on the south coast of Alaska, researchers saw a glimmer of hope: the reappearance of sunflower stars, which had disappeared from Prince William Sound during the outbreak.

"We don't know where exactly they came from," said Brenda Konar, a professor of marine biology at the University of Alaska, Fairbanks, who was not involved in the Science Advances study. "They were pretty small and we don't know if they're going to survive. So we're really curious about what we'll see next summer."

If they make a comeback, the Arkansas students, who are now teenagers, will likely be delighted.

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Kendra Pierre-Louis is a reporter on the climate team. Before joining The Times in 2017, she covered science and the environment for Popular Science. @kendrawrites

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