Earth's Oceans Are Getting Hotter And Higher, And It's Accelerating

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Rebecca Hersher Twitter

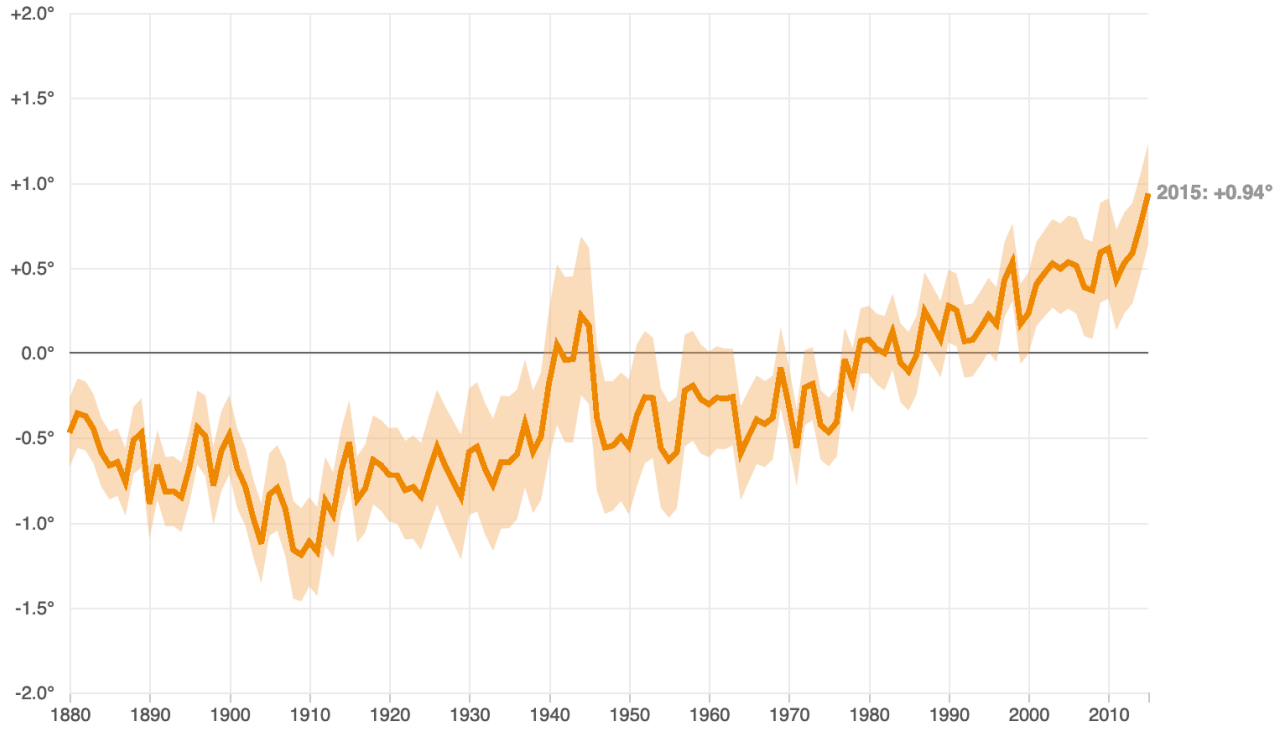
Salmon swim upstream in Seattle in 2017. A mass of abnormally warm water off the west coast of the U.S. that year contributed to a federal fishery disaster. Warming oceans and rising sea levels are threatening coastal economies as the world's climate changes. Elaine Thompson/AP

As the world's climate changes, ocean warming is accelerating and sea levels are rising more quickly, warns a new report by the U.N. Intergovernmental Panel on Climate Change.

The report is a synthesis of the most up-to-date climate science on oceans and ice, and it lays out a stark reality: Ocean surface temperatures have been warming steadily since 1970, and for the past 25 years or so, they've been warming twice as fast.

Sea Surface Temperature Is Rising Globally

Ocean surface temperatures have risen each decade by 0.13°F on average since 1900. Temperatures have been higher in the past three decades than at any other time since reliable measurements began.



Notes

Temperatures are shown in comparison to the average from 1971-2000, which is independent of the rising trend. The shaded area represents the 95% confidence interval for measurements.

Source: EPA

Credit: Thomas Wilburn/NPR

Sea levels are also rising increasingly quickly "due to increasing rates of ice loss from the Greenland and Antarctic ice sheets," the report states.

"For me, it's the complete picture that's kind of surprising and, frankly, concerning," says Ko Barrett, vice-chair of the U.N. panel and the deputy assistant administrator for research at the National Oceanic and Atmospheric Administration in the U.S. "This is, in some ways, a report about water. Water is the lifeblood of the planet."

The report also discusses a relatively new phenomenon in the oceans: marine heat waves.

"It's sort of remarkable that prior to 2012 [or] 2013, nobody had thought about heat waves in the ocean," says Andrew Pershing, chief scientific officer at the Gulf of Maine Research Institute in Portland, Maine. "And then, in 2012 we had a huge event here in the Northwest Atlantic, and the Gulf of Maine was right at the center of it. It was a real surprise."

The abnormally hot water affected animals that live off the coast of Maine, including lobster and other creatures that are crucial to the local fishing economy. What's more, it quickly became clear that the state wasn't alone.

"Subsequently, these kind of heat wave events have kind of popped up all over the ocean," Pershing says. "We've actually had three major heat waves in the Gulf of Maine — 2012, 2016 and 2018 — and now we're looking at repeat heat waves in the northern Pacific; Australia's had some repeat heat waves. So it's really becoming a part of the conversation in oceanography."

"It's kind of an emerging issue," Barrett says. "The report finds that these heat waves have doubled in frequency since the 1980s and are increasing in intensity."

That's a big deal for coastal communities whose economies rely on fish and other seafood. Marine heat waves in recent years drove a cascade of changes in marine life off the coast of the Pacific Northwest, which in turn led to disastrous seasons for commercial fishermen.

"We had two federally declared fishery disaster seasons in 2016 and 2017," says Noah Oppenheim, executive director of the Pacific Coast Federation of Fishermen's Associations. "The disaster seasons that we've experienced lately put a lot of fishermen right on the brink."

Abnormally hot water supported blooms of algae that polluted the Dungeness crab fishery on the West Coast, shutting it down for months. Meanwhile, the so-called blob of hot water off the coast was associated with drought on land, which decimated salmon runs, raised the risk of wildfires and strained water resources inland.

"Certainly, this is a phenomena we should be placing higher attention on because I think there are connections between marine heat waves and, say, weather as it impacts even the interior of continents," Barrett says.

Rising water temperatures in the Gulf of Mexico have also affected weather in that region. When sea surface temperatures are unusually high, it helps fuel larger, wetter tropical storms. For example, Hurricane Harvey and Tropical Depression Imelda came inland and dropped incredible amounts of rain on Texas in the past two years.

The U.N. panel's report suggests multiple actions that local, state and national leaders can take to slow ocean warming and rising, and to adapt to its impacts. First and foremost, the authors reinforce what has been known for decades: Greenhouse gas emissions from burning fossil fuels are the main driver of changes in the world's oceans, and the global economy must undergo a dramatic transformation to reduce those emissions.

The report notes that the oceans are getting more acidic, which could lead to mass extinction of marine organisms, especially animals with shells, such as oysters and clams.

However, the report also notes that if greenhouse gas emissions are immediately and dramatically curtailed, some impacts of ocean acidification could be avoided this century.

Some marine impacts of climate change will unfold in the coming years no matter what. Accelerating sea level rise, for example, will threaten billions of people and present an existential threat to millions who live in Indigenous coastal communities that are flood-prone and rely on fishing.

"Even if we cut carbon emissions right now, we are still looking at 20 to 30 years of change," Pershing explains. "That means, no matter what we do, we have to figure out how are we going to adapt to these changes."