

OCTOBER 2021

MARINE HEATWAVES

- Due to increased greenhouse gas emissions, extended periods of extreme warming in seas and oceans have increased in frequency by 50% in the past 10 years and are becoming more severe.
- These Marine Heat Waves (MHWs) threaten marine biodiversity and ecosystems, make extreme weather more likely, and negatively impact the fisheries, aquaculture and tourism industries.
- Governments must invest in nature-based solutions and ambitiously reduce fossil-fuel-based emissions to limit the impacts of the climate crisis.
- More research, better prediction and warning systems, and regional measures to build ocean resilience can help protect communities and ecosystems from MHWs.

What is the issue?

The ocean's average temperature has increased by 1.5°C in the last century, and for the past 10 years average annual ocean temperatures have been the highest ever recorded. In addition to this long-term, persistent warming, discrete periods of extreme regional ocean warming called **marine heatwaves (MHWs)** are becoming more frequent.

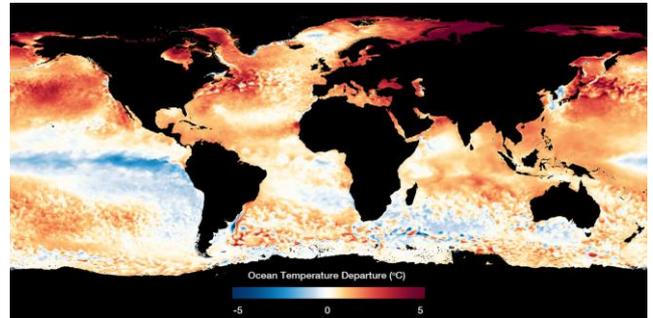
MHWs have increased by 50% over the past decade and now last longer and are more severe. MHWs can last for weeks or even years. They can affect small areas of coastline or span multiple oceans. MHWs have been recorded in surface and deep waters, across all latitudes, and in all types of marine ecosystems.

Projections suggest that by 2100 MHWs will occur as many as **50 times as often as in pre-industrial times**, and **increase 20-50 times in frequency and 10 times in intensity**. While these changes impact the entire ocean, **the Arctic and tropical regions** are expected to be most affected.

Anthropogenically-driven climate change is causing ocean warming globally, and regionally MHWs are driven by unusual weather patterns and disruptions in ocean currents and mixing.

Increasing average water temperatures **reduce marine ecosystems' tolerance** to local temperature rises. As MHWs become more frequent and extreme they risk pushing **ecosystems beyond their threshold of**

recovery; with lasting consequences for marine biodiversity, and many millions of people whose livelihoods depend upon it.



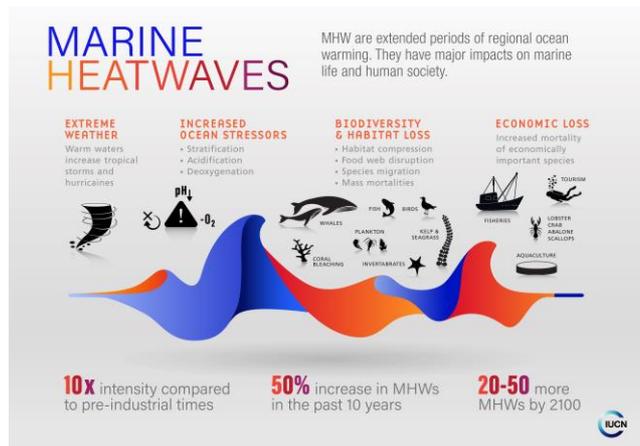
Sea surface temperature anomalies measured in September 2020. Blue shows where sea surface temperature is cooler than its long-term average (1981 to 2010). © NOAA

Why is this important?

Higher water temperatures associated with MHWs can cause **extreme weather events** such as tropical storms and hurricanes, and **disrupt the water cycle**; making floods, droughts and wildfires on land more likely.

MHWs have other profound **socio-economic impacts for coastal communities**. Aquaculture, for instance, requires water temperatures to remain suitable for farmed species, while fisheries rely on species that often relocate in response to changing environmental conditions. **MHWs have been shown to kill or reduce the productivity of economically important species** including lobster and snow crab in the northwest Atlantic and scallops off Western Australia. **MHWs can also harm regional tourism.**

MHWs have repercussions throughout marine ecosystems. **MHWs have been associated with the mass mortality of marine invertebrates**, and may force species to change behaviour in a way that puts **wildlife at increased risk of harm**. MHWs have been **linked to whale entanglements in fishing gear**, for example. Changing conditions can also help [invasive alien species to spread](#), which can be devastating for marine food webs.



The impacts of MHWs © IUCN

Among the species most sensitive to MHWs are those that form the basis of the most biodiverse marine ecosystems: **kelp forests, seagrass meadows, and coral reefs**. The severe event affecting the west coast of Australia in 2011, for instance, wiped out entire ecosystems causing some species to [disappear for hundreds of kilometres](#).

MHWs are not the only threat to marine ecosystems; often **they occur alongside other stressors such as ocean acidification, deoxygenation, and overfishing**. In such cases, MHWs not only further damage habitats, but also increase the risk of deoxygenation and acidification.

What can be done?

Given the severe and long-lasting impacts of MHWs on marine life and human society, it is necessary to implement measures to **slow ocean warming** and counteract the impacts of MHWs by **building ocean resilience**.

Governments must invest in nature-based solutions alongside ambitiously reducing fossil fuel-based emissions to achieve the goals agreed to under the Paris Agreement. [The IUCN Global Standard for Nature-based Solutions](#) should be applied throughout project design and implementation.

Funding agencies and governments must build research capacity to monitor MHWs, understand their impacts, and predict future heatwave events. Research should aim to establish a temperature baseline which considers species' thermal limits, and combine physical and biological data to better predict future conditions and highlight biodiversity most at risk. Developing networks, such as the [Marine Heatwave International Group](#), will allow experts to implement research programmes globally.

Effective responses to MHWs require action from a broad range of stakeholders: policymakers, researchers, the private sector (fisheries, aquaculture, ecotourism), conservationists, and civil society. **Local management agencies** should therefore **raise awareness across all stakeholders and implement forecast systems** to help achieve a coordinated response.

National and sub-national governments should design and implement measures to **protect communities and build regional ocean resilience**. Examples of such measures include creating and protecting marine protected areas to act as refuges for species of coral, kelp and seagrass; and enforcing catch management or fishing restrictions to help limit economic losses linked to MHWs.

Where can I get more information?

Explaining ocean warming: causes, scale, effects and consequences (IUCN, 2016):
doi.org/10.2305/IUCN.CH.2016.08.en

IUCN Marine and Polar Programme:
iucn.org/theme/marine-and-polar

IUCN Global Standard for Nature-based Solutions:
doi.org/10.2305/IUCN.CH.2020.08.en