

# Mussels able to adjust heart rate to cope with marine heat waves

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Credit: AI-generated image ([disclaimer](#))

Mussels are among the ultimate superfoods, high in vitamin B12, omega-3 and great for the heart. Now, new research shows they are also likely to withstand marine heat waves by adjusting their body functions.

In an experiment testing the impact of a marine heat wave on large and

small [mussels](#), both sizes came through with flying colors, demonstrating their remarkable ability to cope with [environmental stress](#), despite short term physiological changes. The study is published in the journal *Marine Biology*.

Researchers from the Chinese University of Hong Kong and University of South Australia tested vital signs of mussels exposed to three weeks of very warm ocean temperatures. Although their heart and clearance rates (the rate at which a certain volume of water is cleared from all particles) increased with the elevated temperatures, within a week of the heat wave ending, their vital signs had returned to normal.

"This bodes well for their survival under future marine heat waves, with these events predicted to increase in severity, frequency and duration," says UniSA environmental lecturer Dr. Laura Falkenberg, who was involved in the study.

"We expected to see some marked impacts of increased ocean temperature on their [vital signs](#), including survival, heart and respiratory rates, but to our surprise they were extremely resilient, persisting through—and recovering after—the marine heat wave."

Mussels are vital to [marine ecosystems](#), playing critical roles in recycling nutrients and improving [water quality](#) in coastal systems by filtering large volumes of water while feeding, which helps to keep the water clean.

They are also an important source of protein for humans, in particular iron, B-12 and omega-3, containing more than nine times the amount of B-12 than beef and five times more than salmon.

Dr. Falkenberg says very few studies to date have looked at the capacity of organisms to recover from marine heat waves, and which factors may

affect this capacity.

The mussel *Perna viridis* is abundant in the Indo Pacific region, which is projected to experience a higher increase in marine heat waves in coming decades, relative to other latitudes.

In the experiment, large and small Asian green mussels were collected from Tolo Harbor in Hong Kong, kept in laboratory conditions in tanks filled with seawater, and fed a phytoplankton diet. Half of the tanks were controls and the remainder were experimental tanks, where the temperature was increased by 1°C each day until it reached almost 27°C.

Elevated temperatures were maintained for three weeks, and the biological responses of the mussels were measured in the final two days. The temperatures of the heat wave tanks were then lowered to the control temperature and the mussels monitored over the next week.

Following the heat wave recovery period, all physiological traits—including [heart rate](#), temperature and clearance rate—returned to [normal levels](#), showing that the mussels' long-term functioning was unaffected by heat wave conditions.

"Mussels have limited strategies to regulate their [core body temperature](#), and adjusting their heart rate and clearance rate may be the primary ways they can respond," says Dr. Falkenberg.

Researchers say the ability of mussels to adjust their cardiac activity could help maintain normal functioning of the circulatory system, which is closely associated with feeding, growth and reproduction.

Notably, their ability to increase clearance rates under elevated temperatures may also benefit other organisms in coastal systems, as marine heat waves often drive algal and plankton blooms.

**More information:** James Ducker et al, Mussels show capacity for persistence under, and recovery from, marine heatwaves, *Marine Biology* (2023). [DOI: 10.1007/s00227-023-04274-5](https://doi.org/10.1007/s00227-023-04274-5)

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