



The ocean covers 71% of Earth's surface, produces 50% of its oxygen, and supports at least 250,000 known species. It is also absorbing the majority of the excess heat and CO₂ generated by human activity — with consequences for marine life ranging from coral bleaching and ocean acidification to shifting species distributions and collapsing fisheries.

■ Coral Bleaching

Coral reefs cover less than 1% of the ocean floor, yet support approximately 25% of all marine species. They are built by tiny coral polyps that harbor symbiotic algae called **zooxanthellae** (*Symbiodinium* spp.) in their tissues. These algae provide up to 90% of the coral's energy through photosynthesis and give coral its characteristic color.

When ocean temperatures rise even 1–2°C above the seasonal maximum for 4+ weeks, corals expel their zooxanthellae in a stress response — turning white. This is **coral bleaching**. Bleached corals are not dead, but they are starving. If temperatures return to normal quickly, corals can recover. If the heat persists, the coral dies. Bleached reefs become overgrown by algae, preventing recovery.

Great Barrier Reef: Five mass bleaching events have struck the reef since 1998. The 2022 bleaching event affected 91% of surveyed reefs — the first mass bleaching event on record during a La Niña cooling year. A 2024 bleaching event was confirmed as the most extensive on record globally. Scientists warn that at 1.5°C of global warming, 70–90% of the world's coral reefs will be severely degraded; at 2°C, more than 99%.

■ Ocean Acidification

The ocean has absorbed approximately 30% of all CO₂ emitted by humans since industrialization. When CO₂ dissolves in seawater, it forms carbonic acid (H₂CO₃), which dissociates to release hydrogen ions — lowering pH. Since pre-industrial times, ocean pH has fallen from 8.2 to 8.1 — seemingly small, but pH is logarithmic, meaning this represents a **26% increase in ocean acidity**.

This matters because many marine organisms — corals, oysters, mussels, sea urchins, pteropods (free-swimming sea snails) — build shells from calcium carbonate, which dissolves in acidic conditions. Pteropods, tiny organisms that are a critical food source for salmon, herring, and whales, are already showing dissolution of their shells in the Southern Ocean and parts of the Pacific. Ocean acidification also disrupts the sensory systems of fish, affecting their ability to detect predators and find suitable habitat.

■ Sea Level Rise and Coastal Habitats

Global mean sea level has risen approximately 20 cm (8 inches) since 1900, with the rate accelerating. IPCC AR6 projects 0.3–1.0 m of additional rise by 2100 under various emissions scenarios, with tipping points that could trigger much larger long-term rise from ice sheet collapse.

Coastal habitats — **mangroves, salt marshes, seagrass beds, and barrier islands** — are among the most productive and biodiverse ecosystems on Earth, and are directly threatened by inundation, storm surge intensification, and saltwater intrusion. These habitats serve as nurseries for countless fish species, feeding and nesting grounds for shorebirds, and carbon storage systems ("blue carbon"). Their loss has cascading effects on the species that depend on them, including commercially important fisheries.



■ Plastic Pollution and Marine Wildlife

Over 11 million tonnes of plastic enter the ocean each year. Large plastic items entangle marine mammals, sea turtles, and seabirds. As plastic degrades into **microplastics** (particles <5mm), it permeates the water column, is ingested by zooplankton and fish, and accumulates up food chains. Microplastics have been found in the deepest ocean trenches, in Arctic sea ice, in seabirds, in commercial fish consumed by humans, and in human blood. Chemical additives in plastics act as endocrine disruptors in marine wildlife.

■ Overfishing and the Marine Food Web

The global fisheries catch peaked in the 1980s and has been declining since. The FAO estimates that 35% of the world's marine fish stocks are now being fished at unsustainable levels. Beyond target species, **bycatch** — the unintended capture of non-target species — kills an estimated 38–40 million tonnes of marine life annually, including sea turtles, sharks, dolphins, and seabirds. Removal of apex predators like sharks through finning destabilizes reef ecosystems globally. Shark populations have declined more than 70% over the past 50 years.

■ **NYC Waters:** New York Harbor and surrounding waters are more alive than at any point since the Industrial Revolution. Humpback whales now feed regularly off Rockaway Beach and in the Lower Bay during summer. Harbor porpoises, seals, and dolphins are documented visitors. Atlantic menhaden — a keystone forage fish filtered nearly out of existence by industrial fishing — are recovering, bringing the whales with them. Clean Water Act compliance, stricter fishing regulations, and citizen advocacy made this possible.

■ Final Summary

The ocean is the foundation of life on Earth — yet it faces simultaneous threats from warming, acidification, plastic pollution, overfishing, and habitat destruction. Protecting the ocean means addressing climate change at its root, reducing plastic use, demanding sustainable seafood, and supporting Marine Protected Areas. The ocean's health is our health.

■ Related XVC Guides:

- [WLD_07: Climate Change and Wildlife](#)
- [WLD_09: Land Threats](#)
- [WLD_23: How You Can Help](#)



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