



Climate change is not a future threat to wildlife — it is happening now, and animals around the world are already responding. From Arctic polar bears losing sea ice to tropical birds losing cloud forest, from monarch butterflies shifting migration timing to coral reefs bleaching en masse, the signatures of a warming planet are visible in ecosystems on every continent.

■ ■ How Climate Change Affects Wildlife

The IPCC Sixth Assessment Report (AR6, 2021–2022) concluded that human-caused climate change is unequivocal. Global average temperature has risen approximately 1.1°C above pre-industrial levels. At 1.5°C of warming, 6% of insects, 8% of plants, and 4% of vertebrates are projected to lose more than half their geographic range. At 2°C, those figures roughly double. The mechanisms by which warming affects wildlife are multiple and interacting:

- **Phenological mismatch:** The timing of biological events — flowering, insect emergence, bird migration, fish spawning — is shifting, but not all at the same rate. When caterpillars peak two weeks earlier than migratory birds arrive to feed their chicks, breeding failure follows. These "phenological mismatches" are now documented across hundreds of species pairs.
- **Range shifts:** Species are moving poleward (toward higher latitudes) and upward (to higher elevations) as temperatures rise. The average species is shifting its range poleward at about 17 km per decade. Species that cannot move fast enough — or that are blocked by habitat fragmentation — face local extinction.
- **Physiological stress:** Temperature extremes beyond thermal tolerance limits cause direct mortality. Marine heat waves bleach corals. Extreme heat events kill flying foxes by the hundreds of thousands in Australia. Cold-blooded reptiles and amphibians are acutely sensitive to temperature fluctuations.
- **Altered precipitation patterns:** Droughts dry up wetlands critical for breeding waterfowl, amphibians, and migratory shorebirds. Intensified rainfall floods nesting sites. Snowpack changes affect mountain species timing.

■ International Case Studies

Polar Bear (*Ursus maritimus*) | *Arctic — circumpolar* | **Status:** Vulnerable (IUCN); projected Endangered under 2°C scenario

Arctic sea ice extent declining ~13%/decade. Polar bears depend on sea ice to hunt seals. Longer ice-free seasons mean longer fasting periods, lower body condition, reduced reproductive success. Some populations showing significant decline.

American Pika (*Ochotona princeps*) | *Rocky Mountains, USA* | **Status:** Near Threatened; extirpated from many historical sites

This small mammal of high mountain talus slopes cannot thermoregulate above ~25°C. As temperatures rise, pikas must move to higher elevations — but eventually run out of mountain. Local extinctions in lower-elevation ranges already documented.

Monarch Butterfly (*Danaus plexippus*) | *North America* | **Status:** Endangered (IUCN)

Migration timing and wintering sites disrupted by temperature shifts. Milkweed (essential host plant) range contracting. Western population declined >99% from historical levels. Listed Endangered by IUCN in 2022.



Great Barrier Reef Corals | *Queensland, Australia* | **Status:** Corals globally: CR to VU depending on species

Five mass bleaching events since 1998, three in seven years (2016, 2017, 2020, 2022, 2024). Ocean warming of 1-2°C above average triggers bleaching. Two-thirds of the Reef affected in 2022. Recovery requires sustained cool periods.

Arctic Foxes vs Red Foxes | *Arctic Europe/Russia* | **Status:** Arctic Fox: Least Concern globally but Endangered in Scandinavia

Red foxes — historically absent from high Arctic — are moving northward, directly competing with and displacing endemic Arctic foxes from their burrow sites.

Atlantic Cod (*Gadus morhua*) | *North Atlantic* | **Status:** Vulnerable (IUCN); collapsed stocks in some regions

Shifting distribution northward as the Gulf of Maine — one of the fastest-warming ocean regions on Earth — becomes too warm. Spawning timing disrupted.

■ New York City and Regional Climate Impacts

NYC is not isolated from these changes. Regional impacts already observed include:

- Tick expansion: The lone star tick and Asian longhorned tick — historically rare in New York — are now established, expanding the geographic range of Lyme disease, ehrlichiosis, and other tick-borne illnesses.
- Shifting bird ranges: Species previously rare or absent in the NYC area — such as the Black Vulture and Carolina Wren — have expanded northward and are now regular presences.
- Earlier springs: Flowering times, frog calling seasons, and insect emergence are all shifting earlier, creating mismatches with migrant arrivals.
- Intensified storms: Superstorm Sandy demonstrated how vulnerable coastal wildlife habitats — Jamaica Bay, the Rockaways, Staten Island's coastline — are to sea-level rise and storm surge.

■ **Conservation Optimism:** Species and ecosystems are remarkably resilient when given the chance. Reducing habitat fragmentation increases species' ability to shift ranges in response to warming. Marine Protected Areas allow coral reefs to recover from bleaching events. Rewilding projects restore connectivity. Reducing greenhouse gas emissions remains the single most important action for protecting wildlife from climate change — and it requires collective action at every level.



■ Final Summary

Climate change is the defining challenge of this century for both human civilization and wildlife conservation. The good news: conservation efforts that protect habitat connectivity, reduce other stressors, and support adaptive management give species the best chance of surviving a warmer world. Act locally. Advocate globally.

■ Related XVC Guides:

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