AUDUBON REPORT

SURVIVAL BY DEGREES

389 North American bird species are vulnerable to extinction from climate change.

We have time to help them if we get to work today.

Mountain Bluebird

FROM LEFT: DONALD M. JONES/MINDEN PICTURES; SCOTT SURIANO; DATA VISUALIZATION BY STAMEN DESIGN

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Common Loon

A CALL TO ACTION

Birds face unprecedented challenges from climate change. Audubon's report Survival by Degrees: 389 Bird Species on the Brink tells us that. It also tells us how to help them: If we limit global warming to 1.5 degrees Celsius (2.7 degrees Fahrenheit) above preindustrial levels, 290 bird species would be better off.

Of course, climate change harms people, too. To protect birds, and ourselves, we must stop venting greenhouse gases into our atmosphere before 2050, the study says, while transitioning to carbon-free energy sources. This requires attacking the problem from many angles, starting with urging our elected officials to:

- Back economy-wide federal legislation to drive large-scale emission reductions, such as pricing or capping carbon emissions.
- Support policies, such as energy-efficiency standards, that reduce electricity demand.
- Expand and incentivize clean-energy sources like wind and solar while reducing our dependence on fossil fuels.
- Reduce tailpipe emissions from vehicles by improving fuel economy, boosting electric vehicles, and expanding public transit.
- Preserve and restore landscapes, like wetland and forest, that sequester carbon.
- Invest in developing and deploying technologies to accelerate the clean-energy transition, including battery storage and carbon capture.

Some climate change is inevitable. What isn't inevitable is our action or inaction. Our choices today will ripple across decades and centuries to define the future for North America's birds, and so much else. Only by making changes now, in our lives, communities, and beyond, can we ensure their survival.

TAKEAWAYS

Just like us, birds need food, water, and a safe place to raise their young. The geographic area where each of North America's hundreds of bird species can find the unique resources, sustained by certain climate conditions, that best support it is known as its range. Already, expanding human populations have squeezed many species into tighter ranges. And now climate change threatens to throw those remaining safe places into upheaval, forcing birds to seek resources elsewhere—or go extinct.

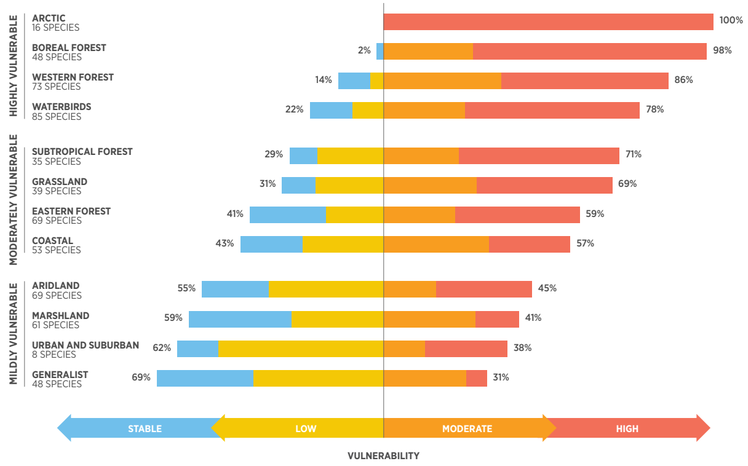
Survival by Degrees: 389 Bird Species on the Brink uses the latest science to predict how ranges might shift under future climate change, providing the insights we need to help birds persevere. For this report, Audubon scientists assembled 140 million observations of where birds live, recorded by millions of birders and scientists over many decades, to build a picture of the climate conditions and habitats that support each of 604 North American bird species investigated in the study. They then plugged this data into advanced computer models to project how birds' ranges could change in the future.

The findings: Two-thirds of North American birds studied—389 out of 604 species—may face unlivable climate conditions across most of their current ranges by 2080 if global temperatures remain on track to rise by 3 degrees Celsius (5.4 degrees Fahrenheit).

The birds most in harm's way depend on the Arctic tundra and boreal forest, both of which are warming rapidly and already undergoing dramatic transformation. Dozens of waterbird species, including waterfowl and shorebirds, nest in those northern habitats, putting them at great risk, too. Western forest birds, especially those that live on mountainsides, could see the cooler climatic zone they need shift rapidly upslope—and eventually off the top of the peak.

Learn more at **climate.audubon.org**.

SPECIES VULNERABILITY BY HABITAT GROUP

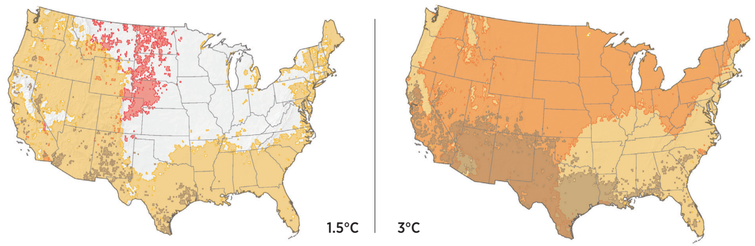


THREATS ANALYSIS

Climate change doesn't just shift a bird's range. It intensifies weather events that can have catastrophic local impacts, and it eats away at habitat through sea-level rise. Plus, humans continue to irrevocably alter land where birds find refuge. So Audubon scientists forecast how such threats, which compound the consequences of climate change, could affect 544 species across the Lower 48. If warming reaches 3 degrees Celsius, more than 95 percent of species may experience multiple threats across their ranges. If the temperature rises by just 1.5 degrees, 80 percent of species would face only one threat, or none at all.

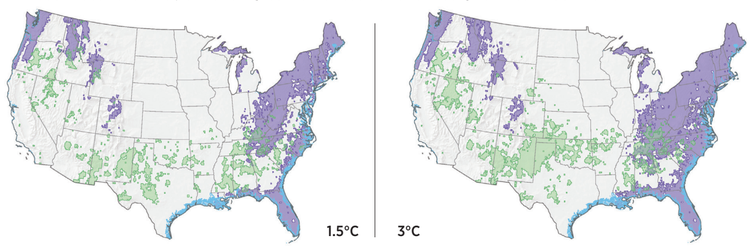
SPRING HEAT WAVES · FIRE WEATHER · DROUGHT

Spring heat waves endanger young birds in the nest, while fire weather and drought make habitat temporarily perilous.



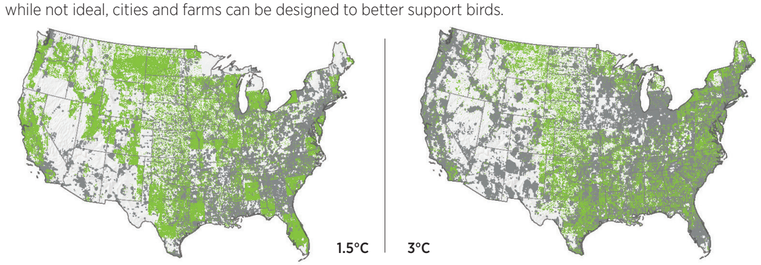
FALSE SPRING · SEA-LEVEL RISE · HEAVY RAINS

False springs (unseasonably warm, mid-winter weather patterns) kill plants needed by birds and insects. Sea-level rise permanently consumes coastal land. Heavy rains can flood nests.



URBANIZATION · CROPLAND EXPANSION

Urbanization and cropland expansion pave and plow over valuable habitats; while not ideal, cities and farms can be designed to better support birds.



VULNERABILITY MAPS (3°C, SUMMER RANGE)

Stable · Loss · Gain

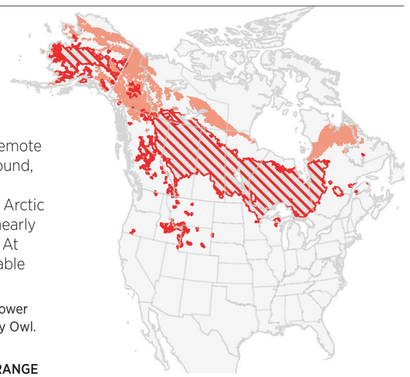
Common Loon

The Common Loon's mournful yodel, which currently echoes across North Woods lakes and rivers, could go silent across the southern quarter of the bird's breeding range if warming reaches 3 degrees Celsius. Stalling global warming at 1.5 degrees would help the iconic waterbird retain its U.S. territory.

Threats Spring heat waves could hurt the Common Loon's nesting success by stressing chicks or slowing parents' feedings. The species also faces habitat loss to urban sprawl.

1.5°C: 12% LOSS OF CURRENT SUMMER RANGE | **3°C: 27% LOSS OF CURRENT SUMMER RANGE**

Great Gray Owl

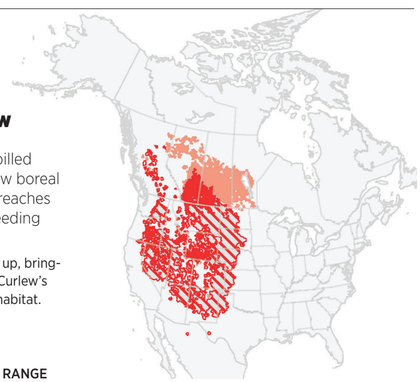


The Great Gray Owl has mostly escaped human impacts in the remote taiga forest where it lives year-round, but greenhouse gases emitted elsewhere are rapidly heating its Arctic habitat. If global temperatures rise 3 degrees, nearly all of its current range could become unlivable. At 1.5 degrees of warming, the bird would still be able to breed across Canada and Alaska.

Threats Because its breeding range is limited in the Lower 48, the threats analysis doesn't apply to the Great Gray Owl.

1.5°C: 59% LOSS OF CURRENT SUMMER RANGE | **3°C: 97% LOSS OF CURRENT SUMMER RANGE**

Long-billed Curlew



North America's largest shorebird, the Long-billed Curlew could be pushed north into what is now boreal forest, not the grassland it needs, if warming reaches 3 degrees. At 1.5 degrees, it could still find breeding habitat in parts of the southern Great Plains.

Threats What remains of the Great Plains is heating up, bringing drought, fire, and heat waves to the Long-billed Curlew's breeding area. Meanwhile, expanding cities destroy habitat.

1.5°C: 31% LOSS OF CURRENT SUMMER RANGE | **3°C: 73% LOSS OF CURRENT SUMMER RANGE**

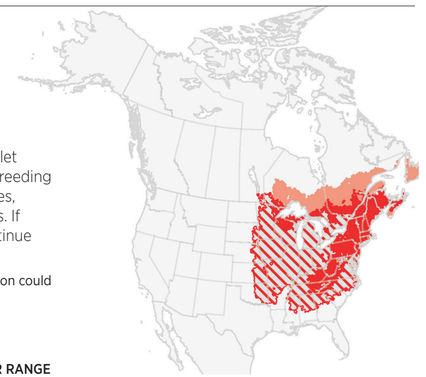
Mountain Bluebird

The Mountain Bluebird nests in sagebrush desert, mountain meadows, and alpine tundra, habitats expected to suffer under climate change. It could lose half of its current breeding range—much of it at high altitudes, which don't translate to a two-dimensional map—at 3 degrees. At 1.5 degrees it could retain lowland habitat.

Threats The Mountain Bluebird faces heat waves and dry weather primed for fire across its range.

1.5°C: 38% LOSS OF CURRENT SUMMER RANGE | **3°C: 53% LOSS OF CURRENT SUMMER RANGE**

Scarlet Tanager

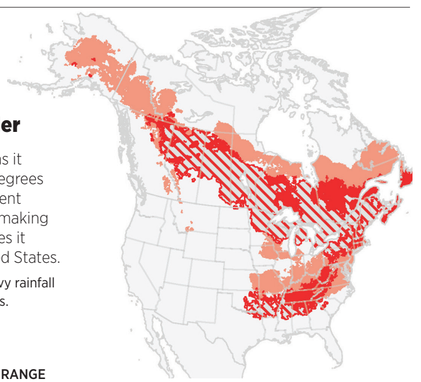


A gem of deciduous eastern forests, the Scarlet Tanager could find two-thirds of its current breeding range unsuitable if warming reaches 3 degrees, pushing it north into conifer-dominated areas. If warming is stalled at 1.5 degrees it could continue breeding in leafy Midwestern woodlands.

Threats Fire, heat waves, heavy rain, and urbanization could harm the Scarlet Tanager during breeding season.

1.5°C: 32% LOSS OF CURRENT SUMMER RANGE | **3°C: 68% LOSS OF CURRENT SUMMER RANGE**

Black-and-white Warbler



The Black-and-white Warbler is easy to spot as it climbs along tree trunks and branches. At 3 degrees of warming it could lose 70 percent of its current breeding range in boreal and eastern forests, making it less common during migration. At 1.5 degrees it could continue breeding in the northern United States.

Threats In the Lower 48, the warbler could face heavy rainfall in eastern forests, fire weather, and spring heat waves.

1.5°C: 30% LOSS OF CURRENT SUMMER RANGE | **3°C: 71% LOSS OF CURRENT SUMMER RANGE**

BIRD ILLUSTRATIONS: DAVID ALLEN SIBLEY; MAPS: STAMEN DESIGN