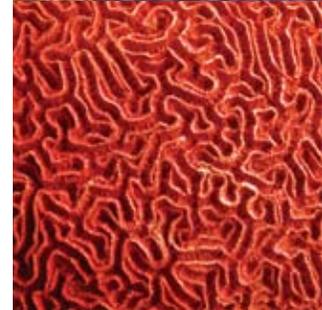




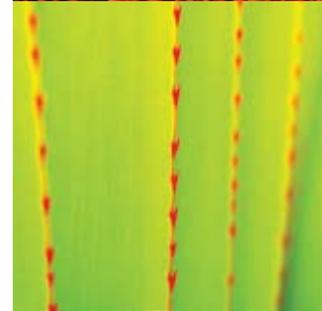
BIRDS TAKING FLIGHT

HOW CLIMATE CHANGE THREATENS BIRDS



BIRDS: AN AMERICAN VALUE AT RISK

It may seem as though birds could simply fly away from the impacts of climate change. However, bird species, especially migratory ones, exist in diverse ecological communities and depend upon reliable climate signals for successful nesting, feeding and migrating.



In addition to their vital role in many ecosystems, birds are an important source of recreation for the 64 million residents of the US who pursue activities such as bird watching, backyard bird feeding, hunting and photography.¹ These citizens substantially contribute to local economies throughout the country by spending nearly \$40 billion annually on these activities.² More importantly, these activities show how much Americans value their feathered friends and how much we all stand to lose if climate change negatively impacts migratory birds.



THE TIMES ARE CHANGING: CLIMATE CHANGE IMPACTS ON BIRDS

For many years plants and animals of all types have interacted with each other in well established patterns that depend on specific signals in the climate (cues), such as temperature ranges and precipitation levels. However, as climate change occurs, these reliable climate cues will shift, prompting new and different responses in the organisms that rely on these cues and on each other for survival.



Although this might not sound dangerous, the separating of ecological relationships is perhaps the largest climate change impact facing migratory bird species. As temperatures increase, models predict that some species, both plant and animal, will begin to migrate pole-ward and to higher elevations in search of cooler temperatures. In addition, it is likely that plants will change their seasonal pollination and seed dispersal events in response to changing climate cues.³ In other words, the resources that birds depend on for successful feeding, nesting and migration will no longer be available at the same times of year. Nesting, for example, is timed to coincide with favorable weather and food availability. If a trend towards warmer spring weather leads birds to nest earlier, breeding success may suffer because primary food sources will not yet be available when nestlings hatch.⁴



WORLD WIDE THREATS TO BIRDS

Similar to many other species, birds are particularly vulnerable to climate change because other human activities have already placed them at risk. Currently about 20% of bird species are already threatened with extinction.⁵ Some of the existing risks to bird species include:

- Loss of habitat due to development
- Pressure from introduced species and hunting
- Pollution and habitat contamination

CLIMATE CHANGE IS ALREADY AFFECTING BIRDS

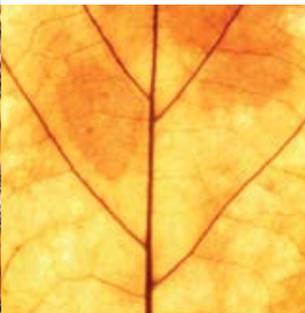
Scientists are already beginning to observe changes in the range, migration and breeding habits of birds which are correlated to temperature increases and/or precipitation changes. Projected changes in temperature and rainfall may worsen the existing pressures on wildlife and ecosystems as ecological relationships become separated.

- Evidence of climate-driven transformation is already evident in the Kenai Peninsula of Alaska, which has been losing wetlands to a dryer, wooded landscape since at least 1950. The loss of wetlands has meant a reduction in habitat for some migratory birds.⁶
- North American swallows are laying their eggs 9 days earlier, a trend associated with increasing air temperatures at the time of breeding.⁷
- A similar trend toward earlier egg-laying in Mexican jays is associated with significant trends toward increased monthly minimum temperature in Arizona.⁸
- Migratory birds in southern Wisconsin are arriving earlier, associated with earlier ice melt of a local lake and higher spring temperatures.



Did You Know?

Many human activities release carbon dioxide and other greenhouse gases which trap heat inside of the earth's atmosphere. Greenhouse gases are part of a natural process that keeps the earth warm. However, human activities, such as fossil fuel burning, have increased concentrations of greenhouse gases to unprecedented levels. These high concentrations are likely to effect global and local climates in many ways, and have already been implicated in temperature increases across the world. If we do not alter our behaviors, it is likely that weather patterns and sea levels will change, often resulting in increased stress on local wildlife and ourselves.



Spotlight: Migrating Birds in the Rapidly Warming Arctic

In the Arctic, important breeding and nesting areas for migratory birds may be lost as temperatures warm and trees shift their range northward, invading tundra areas. As thermal expansion and melting glaciers cause the sea level to rise, more tundra area, and thus more habitat for birds and their prey, will disappear. In addition, the timing of bird arrival in the Arctic may no longer coincide with the availability of their insect food sources.⁹ The combination of these factors could eventually affect the success or failure of the breeding of several hundred million birds that migrate to the Arctic each summer.

WHAT YOU CAN DO TO HELP:

Birds enrich the lives of Americans across the nation and it is our responsibility to do all we can to protect them from the impacts of climate change. Below are some suggestions of what you can do to help stop climate change and protect birds.

- Become well-informed about the issues. The Smithsonian Migratory bird center has information on research projects relating to birds and climate change, located at <http://nationalzoo.si.edu/ConservationAndScience/MigratoryBirds/Research/ClimateChange/default.cfm> Also check out the Intergovernmental Panel on Climate Change (IPCC) reports, located at <http://www.ipcc.ch/ipccreports/index.htm>
- Be aware of the activities you do which release greenhouse gases, such as driving and electricity use. There are simple things you can do, such as unplugging appliances, keeping car tires inflated, and avoiding unnecessary driving which will reduce your greenhouse gas emissions. Visit the Environmental Protection Agency's climate change website in order to find out more suggestions on what you can do to limit greenhouse gas emissions. <http://www.epa.gov/climatechange/wycd/index.html>
- Participate in citizen science projects such as bird counts that can help scientists better understand what is happening to birds because of climate change.

REFERENCES

1. Arctic Climate Impact Assessment. 2004. *Impacts of a Warming Arctic*. Available online at: <http://www.acia.uaf.edu/pages/overview.html>
2. Ibid.
3. U.S. Climate Change Science Program. Synthesis and Assessment Product 4.3 (SAP 4.3): *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*. May 2008. Janetos, A., Shaw, R., Meyerson, L., Peterson, W., Inouye, D. and B. Kelly. Chapter 7: Biodiversity. Available online at, <http://www.sap43.ucar.edu/>.
4. Ibid.
5. Rosenzweig, C., G. Casassa, D.J. Karoly, A. Imeson, C. Liu, A. Menzel, S. Rawlins, T.L. Root, B. Seguin, P. Tryjanowski, 2007: Assessment of observed changes and responses in natural and managed systems. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 79-131.
6. Canada Institute for Scientific and Technical Information (CIST). 2005. Climate Change Transforming Alaska's landscape. http://cisti-icist.nrc-cnrc.gc.ca/media/press/alaska_e.html
7. Dunn, P. and Winkler, D. 1999. Climate change has affected the breeding date of tree swallows throughout North America. *Proceedings of the Royal Society of London* 266:2487-2490.
8. Brown, J., Li, S. and N. Bhagabati. 1999. Long-term trend toward earlier breeding in an American bird: A response to global warming? *Proceedings of the National Academy of Sciences (PNAS)* 96(10):5565-5569.
9. Bradley, A.L.; Leopold, A.C.; Ross, J.; and Huffaker, W. 1999. Phenological changes reflect climate change in Wisconsin. *Proc. Natl. Acad. Sci. USA* 96: 9701-9704.

