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Global Warming Effects Seen in Animal and Plant Worlds

Study finds adjustments in habitats, breeding behaviors

Two American professors -- one a biologist, one an economist -- have released findings linking global warming to changing life patterns among plants and animals in the natural environment. Their report published in "Nature" January 2 documents how various species are apparently reacting to global warming by adjusting their range northward in search of cooler temperatures, or breeding earlier in the spring in response to warmer temperatures.

The "Nature" article was written by Professor Camille Parmesan, a biologist at the University of Texas at Austin and Gary Yohe, an economist at Wesleyan University in Connecticut. Both experts served as members of a panel of authors contributing to "Climate Change 2001," the third assessment report of the Intergovernmental Panel on Climate Change. The IPCC, established by the World Meteorological Organization and the U.N. Environment Program, assesses scientific, technical and socio-economic information relevant to the understanding of climate change and its potential impacts. It is considered among the world's most authoritative bodies on global warming.

A University of Texas press release says Parmesan and Yohe conducted an extensive global statistical analysis, examining the behaviors of a wide range of plant and animal species in North America and Europe. In studying data accumulated over several decades, they found that species such as birds, butterflies and alpine herbs had shifted their habitats northward an average of 6 kilometers per decade, or to higher altitudes of 6 meters per decade.

Other species have adjusted behaviors, in an apparent response to warmer temperatures. Migratory birds, amphibians and other animals are breeding earlier in the spring, and plants are blooming earlier, according to the Parmesan-Yohe study. In all, the researchers say that global warming has accounted for a shift to an earlier spring for 677 species studied.

Further information about Professor Parmesan is available at <http://www.biosci.utexas.edu/IB/faculty/PARMESAN.HTM>

The IPCC report to which Professor Parmesan contributed is available at http://www.grida.no/climate/ipcc_tar/wg2/index.htm

Following is the University of Texas at Austin press release:

(begin text)

THE UNIVERSITY OF TEXAS at AUSTIN
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Strongest evidence of global warming provided in new research study

AUSTIN, Texas -- A biologist at The University of Texas at Austin has teamed up with an

economist to provide the strongest statistical evidence yet that global warming is affecting the natural world. Even when the pair considered habitat destruction or other possible underlying causes for behavior changes in plants, animals and other wildlife, the analyses still pointed to global warming.

"Allowing there to be nonclimatic explanations in the model requires the global climate change pattern to be stronger to stand out," said Dr. Camille Parmesan, an assistant professor of integrative biology. "But even then, we still came up with the same overall conclusion" -- that these changes are linked to general global warming."

The research of Parmesan and Dr. Gary Yohe, an economist at Wesleyan University in Middletown, Conn., will be published in the Jan. 2 issue of *Nature*. The two met in 1998 as participants in the Intergovernmental Panel on Climate Change commissioned by the World Meteorological Organization and the United Nations Environmental Programme. Parmesan was a lead author of the panel's 2001 publication on the current impact and future effects produced by climate change.

Economists such as Yohe with whom Parmesan worked on the publication had difficulty believing that global warming was the only answer to the physical and biological changes in wildlife behavior that biologists were measuring. "I realized that if we couldn't convince these economists, who are very intelligent, are highly trained and have worked in the environmental field, then we were going to struggle to convince the general public or politicians that this change is real," Parmesan said.

In the extensive, global statistical analysis on climate change that they published, the two took steps to ensure that only the best studies were analyzed with a critical eye. Their most rigorous analysis of 99 species in North America and Europe showed that the range of territory of wildlife such as birds, butterflies and alpine herbs has shifted northward an average of 6.1 kilometers (3.79 miles) per decade, or to higher altitudes by an average of 6.1 meters (about 20 feet) per decade. Global warming has increased temperatures slightly (by about one degree), which would be expected to cause temperature-sensitive wildlife to favor cooler locations that are further north or higher in elevation.

The same approach was used to analyze 172 species and showed that migratory birds, amphibians and other animals were breeding earlier in the spring, and plants and flora blooming earlier. These behaviors have happened an average of two days per decade earlier than normal.

Studies that were used for these meta-analyses lasted an average of about 45 years. They also were selected because they involved data on more than one species and included findings that went counter to those expected as a result of global warming.

A review of a larger set of less-detailed studies produced similar results. Global warming accounted for a shift to an earlier spring for 677 species studied. And 80 percent of the changes in distributions of 893 species could be predicted by climate change.

Additional support came when Parmesan decided to put the global warming theory to test using data on dozens of species from the 20th century. If global warming affects temperatures in such a way that wildlife adjust their distribution as a result, then the species' range boundaries should move southward and to lower elevations during cooler periods, just as the opposite trend occurs when temperatures rise. The investigators documented this "diagnostic fingerprint" for global warming in the responses of hundreds of species in North America and Europe.

Parmesan noted that not all species have altered their lives in response to climate change, nor has it had a dramatic impact yet. But some species such as the golden toad in Costa Rica are believed to have gone extinct because of global warming.

The increased temperatures expected as global warming continues also will likely mean that regions once considered stable may no longer be that way in 50 to 100 years. That would mean nature preserves established without considering the impact of climate change will no longer suffice. "We've boxed all these species into these habitats that we thought we could maintain with some mild management and a little bit of restoration," Parmesan said, "and – boom -- climate change comes along and suddenly the very placement of these will be wrong."

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