Bird Advocates Fear That West Nile Virus Could Silence the Spring

ROCKVILLE, MARYLAND—Ellen Paul is cruising this Washington, D.C., suburb looking for crows. Thousands of the birds once gathered here in raucous roosts every night, but this evening, just three or four are flapping aimlessly above the strip malls as Paul, executive director of The Ornithological Council, a coalition of 10 major bird research groups, peers through her windshield.

The empty sky might be due to West Nile virus. Wildlife researchers are increasingly worried that the virus could take a big toll on wild birds, including some endangered species. It has already killed at least 100,000 crows, blue jays, and other birds, some scientists estimate. And they know it has infected at least 120 North American species, from tiny black-capped chickadees to hefty bald eagles, since it was first detected in New York City in 1999. (For a list, see www.nwhc.usgs.gov/research/west_nile/wnvaffected.html.)

But so far, most reports of absent avians are anecdotal, like Paul's drive-by survey, or are based on sketchy data. But that could change if some researchers get their way. Next week, at the 3rd North American Ornithological Conference in New Orleans, Louisiana, the council is expected to call for a major new federal effort to understand West Nile's impact on wild birds—which would also help scientists study its potential threat to humans.

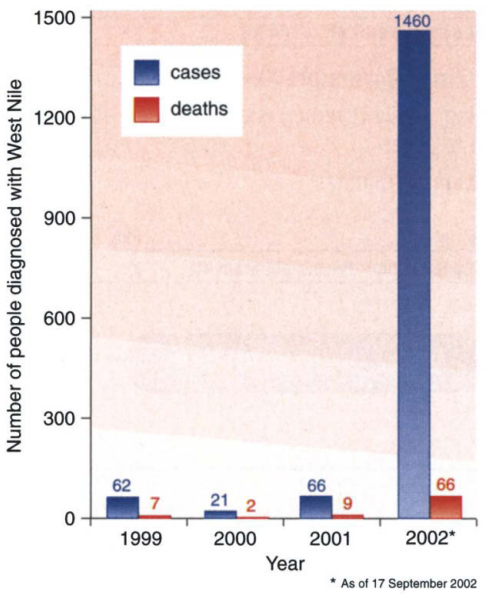
Although finding funding is expected to be a challenge, there are plenty of questions such an initiative might tackle, notes Peter Marra of the Smithsonian Environmental Research Center in Edgewater, Maryland. Researchers strongly suspect that migrating birds carry the virus to new areas, for instance, but it hasn't been proven. The Centers for Disease Control and Prevention (CDC) in Atlanta has funded Marra and colleagues at the New York State Department of Public Health's Wadsworth Center near Albany to screen migratory birds arriving in several Caribbean nations that are free of the virus. If the arrival of infected birds is followed by infections of humans or nonmigratory birds, Marra notes, it would be strong evidence that migrating birds can spread the virus.

It's also not clear whether wild birds need to be bitten by a virus-carrying mosquito to become infected. They might acquire the virus from each other or by eating tainted prey, suggest preliminary laboratory experiments by Robert McClean of the U.S. Department of Agriculture's National Wildlife Research Center in Fort Collins, Colorado, and Nicholas Komar of CDC in Fort Collins. If so, species that feed on sick animals or roost together could be at risk.

Infected. Antibodies for the virus have been found in at least 120 species, including the great horned owl.

Researchers aren't sure which species are most vulnerable to the virus. Infected crows and their corvid kin have suffered nearly 100% mortality in lab experiments, McClean and Komar note, raising fears for endangered crows in the Pacific Northwest and Hawaii. Other kinds of birds, such as gulls and pigeons, have proved relatively resistant. Marra and others are now combing through long-term census data—mostly collected by amateur bird watchers—to see if they can spot any trends in the wild. **–DAVID MALAKOFF**

ly spill over to humans. But there are no hard data to support this, says Harvard's Spielman. And Massachusetts has more cases than last year but fewer mosquitoes. During his trips into the storm sewers, Reiter finds very few of them; a year ago, the concrete would be "furry with mosquitoes."



Leap year. The number of cases exploded in the virus's fourth summer in the United States.

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Know your enemy

One of the goals of Reiter's work is to find out how best to control West Nile virus. Despite public opposition to spraying—which runs strong here in New England—many local authorities fight the virus with aerosols of insecticides from trucks. But surprisingly little is known about how useful spraying is, Reiter says, and there are reasons to doubt its efficacy. Spray trucks produce a relatively narrow swath of insecticide, whose dispersion is further blocked by buildings and vegetation. Furthermore, insecticides kill only flying mosquitoes; those that are resting—which might be the majority—survive.

To provide an answer, Reiter and Spielman are comparing mosquito activity in Massachusetts towns where spraying takes place with ones where it doesn't. But Reiter believes that improved control will require a better understanding of the intimate details of the mosquito life cycle. Where and when exactly do they feed? How long do they live, and when do they stop biting and start hibernating? And how does the virus get into overwintering mosquitoes, even though they usually don't bite before retiring to the underworld? Much of this is unknown, and the answers can be surprising.

When Reiter's team suspended caged pigeons a meter and a half above ground level, for instance, few mosquitoes came to bite the birds; but when they were hoisted 15 meters into the air, they attracted 150 to 200 mosquitoes per night. Apparently, the insects are canopy feeders, says Reiter—an important fact if you're trying to kill them.

Still, Reiter acknowledges that *C. pipiens* is just one part of a huge puzzle. South of a line that runs roughly through Atlanta and Los Angeles, *C. quinquefasciatus* is the most important vector, and it has its own peculiarities. *C. pipiens*, moreover, is an important catalyst for the epidemic among birds but only a minor player among the so-called bridge vectors: mosquitoes that bite both birds and mammals and are able to infect humans. Species with such catholic tastes, such as *Aedes vexans*, have different habits and require different control methods.

That complexity makes battling West Nile a bewildering problem—and makes watching the outbreak unfurl fascinating for researchers. "It's like a chess game," Reiter says, as he waits for the opponent's next surprise move. **–MARTIN ENSERINK**