

Wild Birds Critical to Understanding the WEST NILE VIRUS

1999: West Nile Virus Emerges In North America

Since the fall of 1999, the USGS has been testing wild birds and mammals for West Nile virus (WNV) infection and incorporating epidemiological data on the West Nile outbreak into a geographic-information system (GIS) for display and analysis. The West Nile virus is an insect-borne virus that had never been reported in the Western Hemisphere. Birds are the natural hosts for this virus, which can be transmitted from infected birds to humans and other animals through the bites of infected mosquitoes. Wild birds, primarily crows, were affected in last year's outbreak in the greater New York City area along with a few other native North American bird species, horses, and people. In 1999, the virus caused encephalitis in 62 people in the New York City area, seven of whom died. Thus far in 2000, eighteen people have been diagnosed with the disease and there has been one fatality.

2000: West Nile Over-Winters and Re-Emerges in Wild Birds and Mammals

This year (2000), wild bird mortality due to WNV was first detected in May in



southeastern New York and northeastern New Jersey. Since then, the disease has continued to expand both geographically and in the number and variety of species infected. The virus has been found in 70 bird species, including 54 free-ranging species from 11 States, ranging from Vermont to North Carolina. Free-living wild mammals in New York were found positive for WNV for the first time this year. Once again the virus was found in horses, causing illness in 38 horses from 6 States. Surveillance efforts have also detected a number of positive mosquito species including species that are active at dawn and dusk and species that are active during the day. The mosquitoes found positive include species that feed on both birds and mammals.

Surveillance of Wild Bird Diffusion of West Nile Virus

Wild bird mortality has been an accurate indicator of the extent of WNV, and it will continue to provide an early warning system for the emergence of the virus in new locations. The probable dissemination of the virus to the South offers new challenges for both public health and wildlife disease specialists. Wildlife involvement in expanding WNV activity in the United States has become more intense and complex with the increasing number and variety of bird species that are testing positive. In September 2000, the USGS alerted Federal and State wildlife and conservation agencies that the fall migration of millions of birds through the 500-mile-wide region where infection has been found will likely move the West Nile virus farther south into the Atlantic and Gulf coast states. USGS scientists are concerned about the wide variety of birds in which WNV has been found and has asked these agencies for assistance in reporting unusual bird mortality.

A USGS pathologist examines a suspect West Nile virus crow.



Wildlife disease scientists from the USGS National Wildlife Health Center (NWHC) are providing diagnostic support to Federal, State, and local wildlife agencies, as well as to public health departments and other Federal agencies that are utilizing dead wild birds as sentinels for detecting WNV in their area. Active surveillance to detect the geographic expansion of the virus is ongoing in collaboration with the U.S. Department of Agriculture, the U.S. Fish and Wildlife Service, the National Park Service, and State wildlife agencies that are sampling free-ranging wild bird populations in the eastern United States from New Hampshire to Louisiana. This year, the USGS-NWHC is working with the Centers for Disease Control in field investigations in New York and New Jersey to determine the level of WNV in wild birds and mosquitoes where WNV-positive dead birds were found.

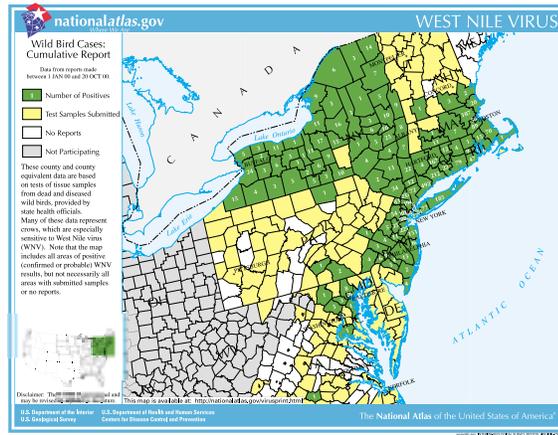
USGS' Mapping Supports West Nile Control Efforts

Scientists in the USGS Geographic Sciences Branch are providing the Centers for Disease Control and Prevention, as well as public health agencies, with a GIS incorporating Landsat 7 Thematic Mapper imagery, land-use and land-cover data, roads, and hydrography. This data is being used by scientists in the field to identify bird and mosquito habitat and for determining the best locations for placement of mosquito traps. Information from the National West Nile Virus Surveillance System is being used to compile and produce graphical displays and animation showing the pattern and spread of the outbreak. An additional analysis is being performed to detect clusters of infections and, possibly, the geographic origin of the outbreak. The staff of the U.S. National Atlas is creating online, interactive maps to track the geographical spread of the virus.

USGS Plans To Research West Nile Movements In Wildlife

The USGS is initiating studies, in collaboration with the Centers for Disease Control and Prevention, to learn the current geographic extent of WNV, to understand how it moves between birds, mosquitoes, and humans, and to predict future movements of the virus. The 3-year study will utilize active wild bird surveillance along the Atlantic Flyway, with simultaneous collection of mosquitoes, to detect the presence of WNV. The USGS will work with the U.S. Fish and Wildlife Service, the National Park Service, and other Federal agencies to identify appropriate sampling sites spaced along the Atlantic Flyway. Over-wintering birds at sites in Florida will be surveyed. This system, based on the ubiquitous presence of birds and their potential exposure to disease, indicates the diffusion of pathogens across eastern America and provides a mechanism to detect novel pathogens in the environment, their geographic extent, and their relations to the landscape and the environment.

The surveillance system will provide the basic information on the geography of WNV. The combination of this data with



This map shows the cumulative number of wild bird cases of West Nile virus between January 1–October 20, 2000; the counties in green are those in which wild birds tested positive for the virus. National Atlas maps that show the surveillance plans, the geographic locations of animals that tested positive for the West Nile virus, and the species affected are updated weekly on the world wide web at <http://www.nationalatlas.gov/virusmap.html>.

information about landscape characteristics and weather conditions, over space and time, will provide the data foundation for developing spatial analytical and forecasting models. Hypotheses about the necessary precursor conditions of landscape and weather that enable outbreaks can be formulated and tested.

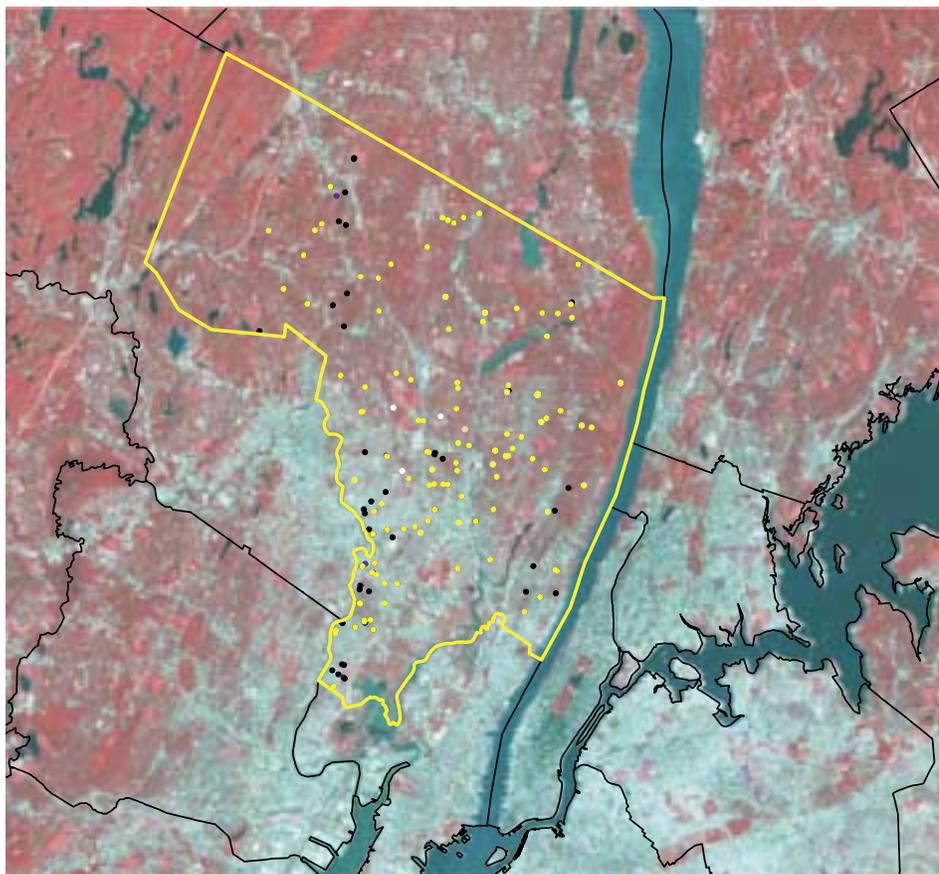
Determination of the Virulence of West Nile Virus

The USGS is also using its Biological Safety Level 3 containment facility in Madison, Wis. to conduct research studies to determine the virulence of WNV in

crows and waterfowl. The USGS recently reported that a study conducted at this facility demonstrated that in a confined experimental setting, the West Nile virus could be transmitted from crow-to-crow. It had been thought that the virus was transmitted only through the bite of a mosquito.

Additional Information

For more information on the West Nile virus you can access the USGS National Atlas web site at <http://www.nationalatlas.gov/virusmap.html> and the USGS-Wildlife Health site at http://www.umesc.usgs.gov/http_data/nwhc/news/westnil2.html or contact: Dr. Linda Glaser, USGS, National Wildlife Health Center, (608)270-2446, or Dr. Stephen Guptill, USGS, Geographic Sciences Branch, (703)648-4520.



The precise locations of West Nile virus-positive crows enable geographic analysis of the West Nile virus outbreak.