

Vector-Borne Disease Research



The Challenge: Lyme disease, which is caused by a tick-transmitted spirochete, is the most common vector-borne disease in North America, with well over 20,000 cases each year. West Nile Virus (WNV) is the most common mosquito-transmitted pathogen, with thousands of cases yearly. The purpose of this research is to elucidate the natural transmission dynamics of these pathogens, so that we can design well-targeted, efficient methods to prevent human disease.



The Science: Lyme spirochetes and WNV are both zoonotic pathogens, which persist in wildlife populations, and are sometimes transmitted to humans, although humans probably do not contribute to the transmission cycles. The factors that lead to human transmission are ecological in nature, so ecological study can help predict and prevent human cases. Studies of mosquitoes and WNV at Gateway National Recreation Area in New York City, and at Fire Island National Seashore and other sites in Suffolk County, NY, are designed to characterize the amplification and transmission patterns of this virus, and to develop surveillance methods that can provide early warning of potential human risk.



The Future: Lyme disease is common in the northern U.S., but rare in the south, even though the ticks are present in both areas. Patuxent is collaborating with scientists from several U.S. universities and from Canada on a large-scale project to determine the ecological reasons for this geographical gradient. This project will contribute to a deeper understanding of vector-borne disease ecology, will develop models that can predict patterns of disease spread as environmental conditions change, and will provide improved approaches to help manage Lyme disease.