APPLICATIONS OF GIS TO WEST NILE VIRUS SURVEILLANCE PROGRAMS

A Study of Disease Ecology

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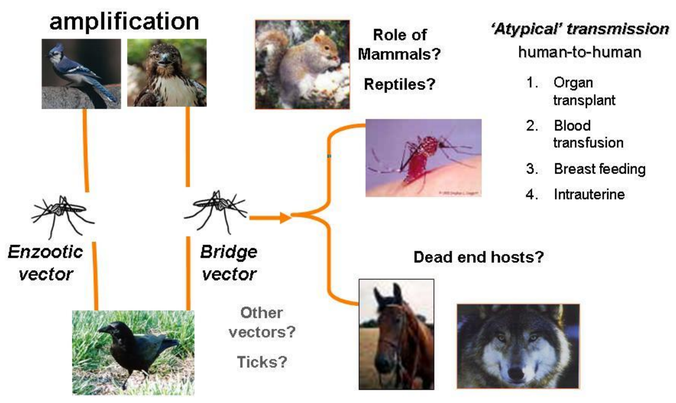
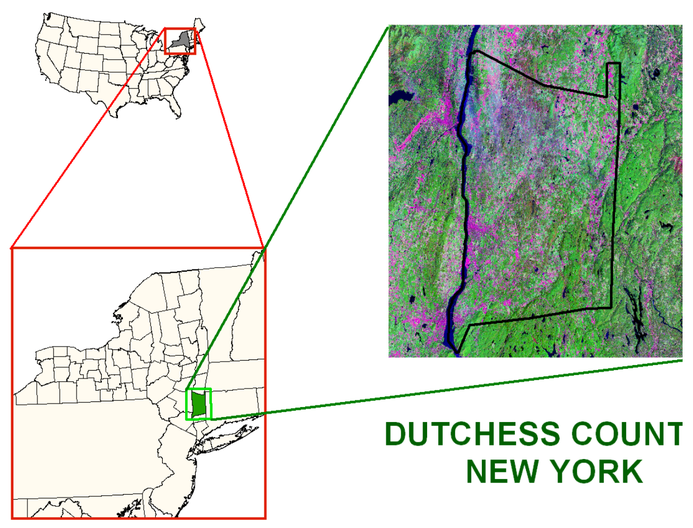
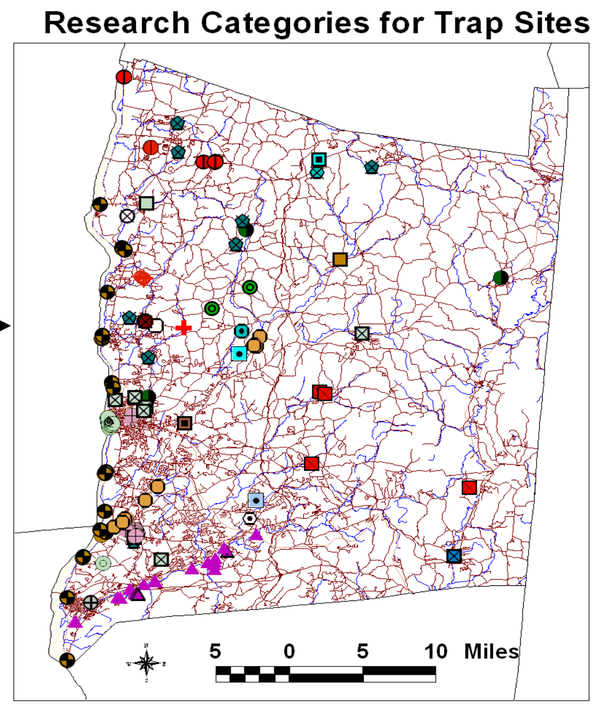
WNV Transmission Cycle



Research Area

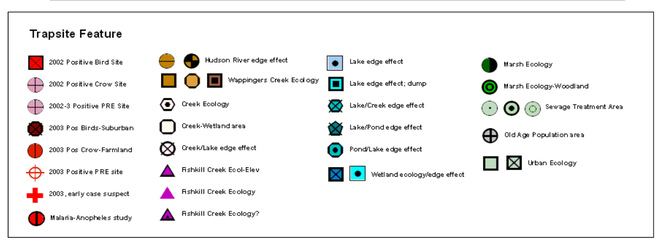


Mosquito Trapping

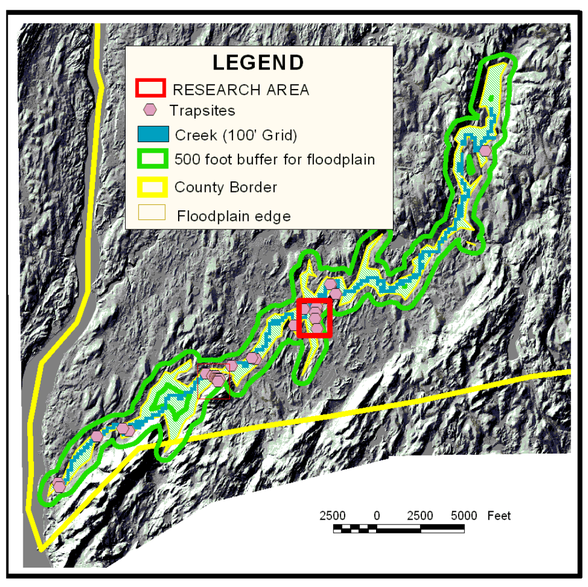


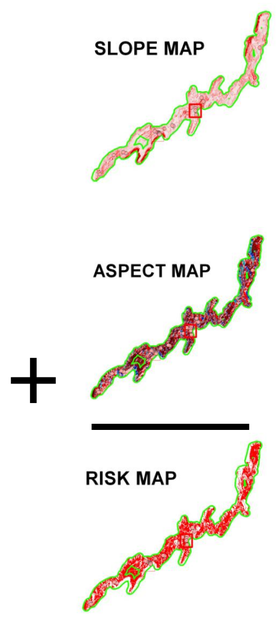
Interpreting Vector Ecology

Proximity to Water edge increases vector species diversity and competition for potential host species. This reduces the chance for West Nile spread from mosquitoes to humans during species-rich periods. This competition decreases for the most common West Nile vector, *Culex pipiens-restuans*, as distance from stream and water edge increases and seasonal or permanent wetlands share space with local residents.

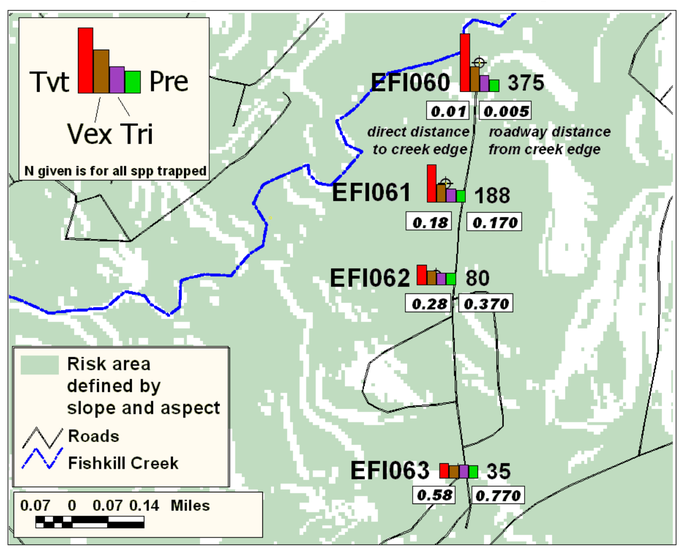


THE SOUTHWESTERN COUNTY BORDER, FISHKILL CREEK FLOODPLAIN REGION

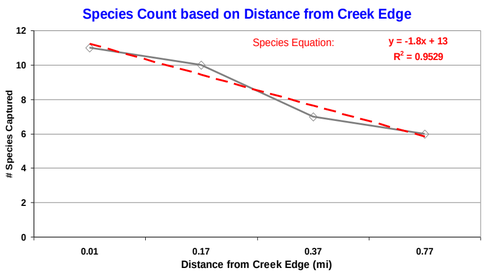


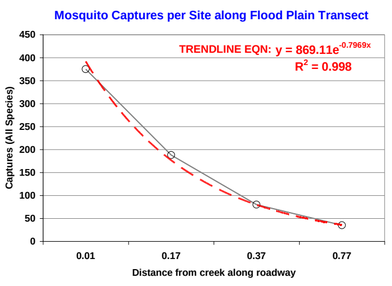


Distribution of four Woodland species of mosquito across a floodplain



Aedes trivittatus Ae. vexans Ae. triseriatus Culex pipiens-restuans

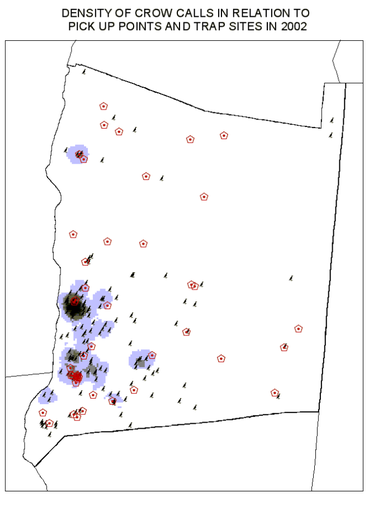




Positive-testing Animal Hosts may be related to West Nile-Infected Mosquito populations

Clusters of positive-testing hosts (crows) develop due to local demographic, ecologic and topographic features. A cluster or kernel density analysis of dead bird sites can be used to locate possible West Nile-infected sites based on dead crow clusters.

Using this method, a positive testing dead bird (host) cluster was identified.



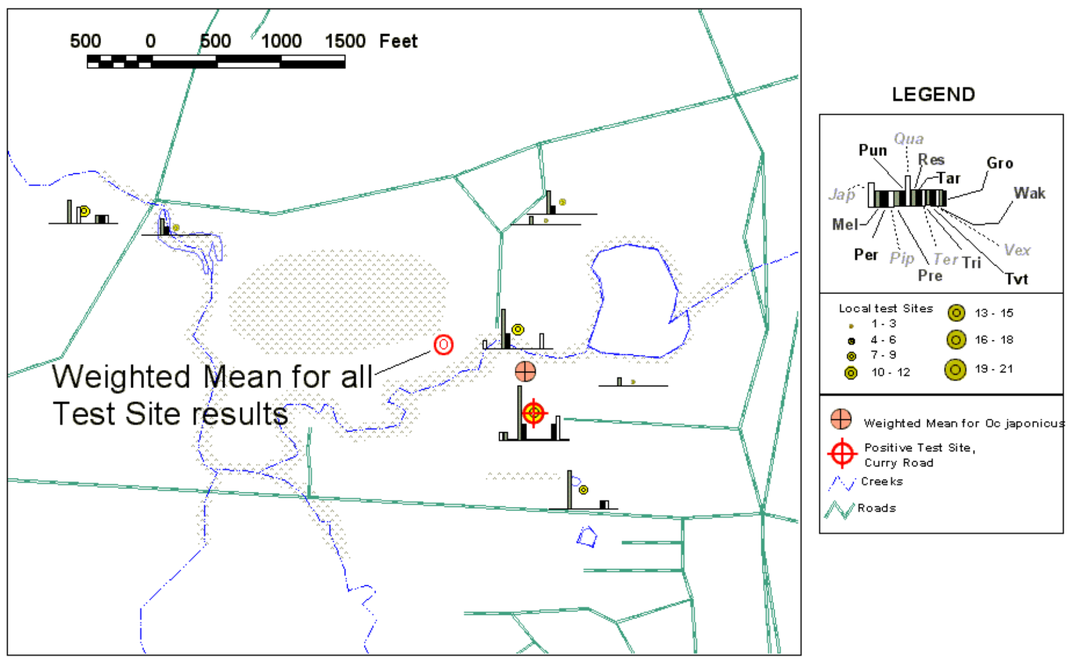
Weighted Mean points for West Nile vectors were then produced to approximate a disease origin or *nidus*. Use of Aerial photography, ground-truthing and proper trap placement then led to the identification of the positive mosquito pool.

Local host-vector ecology was then monitored in relation to local human population features.

The goal of these activities: reduce the likelihood for the initiation of local West Nile Fever cases.

TRAP RESULTS FOR POSITIVE TEST SITE, SEPTEMBER 2002

(Weighted-Mean based on sum of mosquitos trapped for each site)

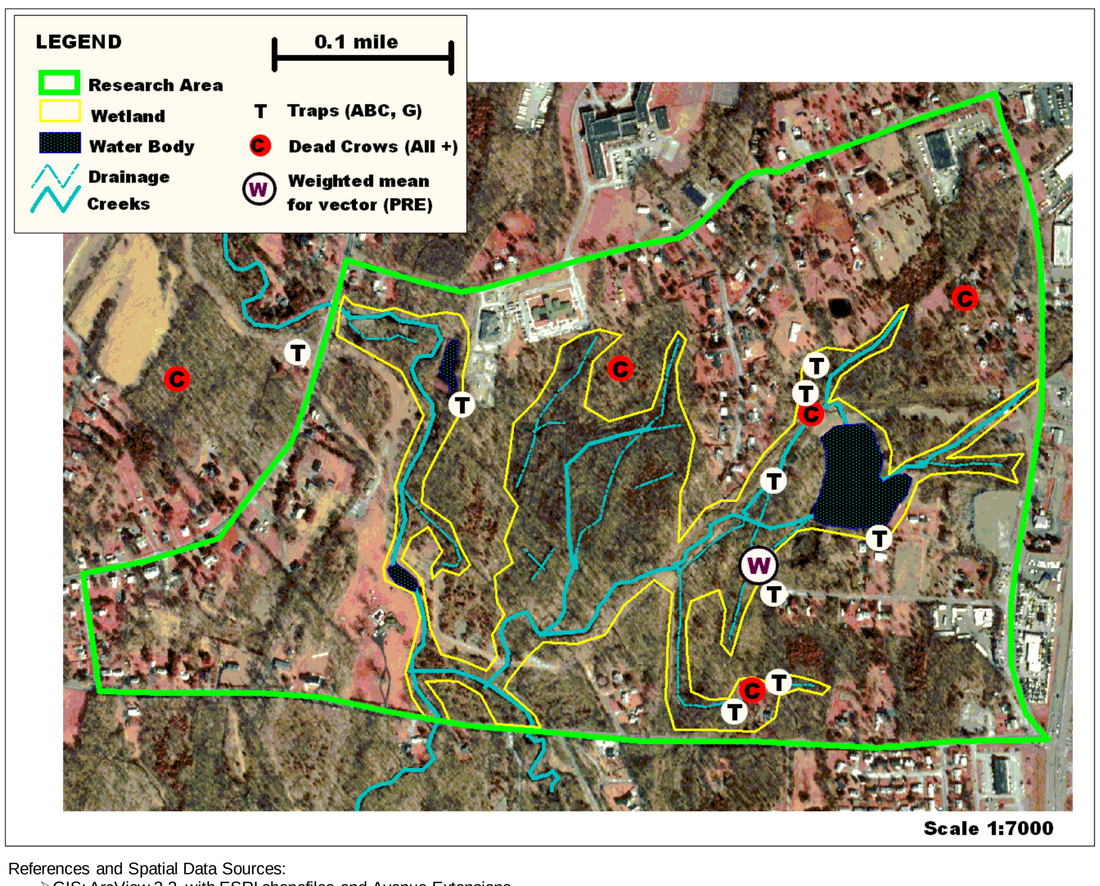


Abbreviations in use for most commonly trapped mosquito species

GRO Ochlerotatus grossbecki	RES Culex restuans
JAP Ochlerotatus japonicus (suspected originator vector)	TER Culex territans
PIP Culex pipiens	TRI Ochlerotatus triseriatus
PER Coquillettidia perturbens	TVT Ochlerotatus trivitattus
PRE Culex pipiens-restuans (most common West Nile vector)	URA Uranotaenia sappharina (frog hosts only)
PUN Anopheles punctipennis	VEX Aedes vexans
QUA Anopheles quadrimaculatus	WAK Anopheles walkeri

Source: *http://www.rci.rutgers.edu/~insects/njspp.htm*

IDENTIFICATION OF A POSITIVE CULEX PIPIENS-RESTUANS SITE, 2002



References and Spatial Data Sources:

- GIS: ArcView 3.2, with ESRI shapefiles and Avenue Extensions
- National Land Cover Data and state and company shapefiles from http://www.nysgis.state.ny.us/
- Shuttle Radar Topography Mission (SRTM) and Digital Orthophotos (in TIFF and MrSID format) from Geocommunity website (www.geocomm.com)
- Landsat 7 Imagery obtained from http://seamless.usgs.gov/
- Additional GIS software, shareware and freeware in use: IDRISI32, GeoTiff, MultiSpecW32
- GPS: Garmin eTrex; Magellan Map 320
- Data management tools: MS Access and Excel-Analysis toolpack
- Vector data managed by Dutchess County Department of Health; Vector and Host Ecology project self-supervised.