

**Mid-Atlantic Mosquito Control Association
33rd Annual Meeting**

Session One - Wednesday, 27 February 2008

- 1) Opening Remarks - Tammy Brewer (current MAMCA President)
- 2) AMCA Update - Dr Bill Meredith (DE Division of Fish & Wildlife)
 - a) www.mosquito.org
 - b) Founded 1935 in New Jersey
 - c) 2006 - 1600+ members
 - d) Promotes Integrated Pest Management
 - e) Participant in PESP program
 - f) Current issues
 - i) Clean Water Act
 - ii) Endangered Species Act
 - iii) Pesticide Labeling & Registration
 - iv) USFWS - control on National Wildlife Refuges
 - g) Work with industry
 - h) Work with Legislature (Advocacy Program)
 - i) Education/Information
 - i) Journal of the American Mosquito Control Association
 - ii) AMCA Newsletter
 - iii) Wing Beats (with FMCA)
 - j) Useful publications for sale on web site
 - k) AMCA communications toolkit
 - l) Georgia Rep - Roxanne Connelly
 - m) Coming Events:
 - i) March 2-6, 2008 Annual Meeting
 - ii) Washington Day Conference
 - (1) 10th Annual
 - (2) May 5-7, 2008
- 3) USFWS' National Mosquito Management Policy for National Wildlife Refuges (NWRs) - Dr Bill Meredith (DE Division of Fish & Wildlife)
 - a) Will set policy for mosquito control on National Refuges
 - b) History
 - i) 1997 - NWR System Improvement Act
 - (1) Natural resource protection
 - (2) Mosquito control contents flawed
 - (3) Many errors of omission
 - (4) Focus too narrow - declared human health emergency
 - (5) Subsequent policies issued
 - ii) National Handbook for Mosquito Control Practices on NWRs
 - (1) 1997-2002: meetings to put together handbook
 - (2) National Mosquito Control Coordinator - Dr Michael Higgins
 - (3) No progress made
 - iii) Draft National Mosquito Management Policy
 - (1) May 2002 - Handbook put on "hold"

- (2) 2002-2007: collection of information primarily within USFWS
- (3) Oct 15, 2007 - draft policy published
 - (a) Deadline for comment - Feb 19, 2008
 - (b) ~150 sets of comments received
 - (c) ~30 from mosquito control
- c) Why is a policy needed?
 - i) Control on NWRs currently very variable
 - ii) Legal issues
 - iii) USFWS wanted some guiding principles before putting together a control handbook
 - iv) USFWS wanted more consistency and predictability
- d) Why does this need to be done right?
 - i) Policy could become the “gold standard” for control in “natural” or “wild” settings
 - ii) USFWS is a recognized and respected protection, conservation, and management agency
 - iii) This policy will dictate how mosquito control is done in about 50 Mosquito Control Districts (MCDs)
- e) Good Things (relatively)
 - i) Proposed policy seems to allow most existing control practices to continue
 - ii) Seems to allow mosquito control on NWRs where it has not previously been allowed
 - iii) Changes to language and/or clarifications/interpretations are needed
- f) Major Issues
 - i) Mosquito control is done for:
 - (1) Quality of life
 - (2) Economic impacts
 - (3) Public health issues
 - ii) Mosquito control districts actually do and pay for work done on refuge - critical partners
 - iii) Mosquito control is a necessary activity, not a refuge use
 - iv) USFWS needs to work with MCDs to prepare refuge-specific mosquito management plans (MMPs)
 - v) Status-quo control practices should continue until MMPs are in place
 - vi) MOSQUITO BITES CONSTITUTE A HUMAN HEALTH PROBLEM EVEN WHEN THERE IS NO PATHOGEN TRANSFER
 - vii) MCD should have the final say - we are the experts, not the USFWS - for setting spray threshold criteria (USFWS has the final say for whether spraying occurs)
 - viii) Spray threshold criteria need to be based solely on measures of mosquito abundance for species of concern, especially in enzootic areas - POPULATIONS ARE IMPORTANT, NOT POSITIVES
 - ix) Pesticide choice need to be determined by:
 - (1) Efficacy
 - (2) Product cost
 - (3) Non-target impacts

- x) Type of control done needs to be based on practicality and need, not a universal hierarchy of source reduction, larviciding, and adulticiding.
- g) What's next?
 - i) USFWS will analyze input and prepare responses to be published in the Federal Registry along with the Final policy
 - ii) USFWS staff might meet with mosquito control personnel to discuss our input and their reaction
 - iii) AMCA is requesting a "stakeholder" meeting with the USFWS
- h) What do we hope to see?
 - i) Changes to policy language
 - ii) Clarifications/interpretations of some type via follow-up documents crafted with the help of the AMCA
 - i) If it doesn't happen - AMCA may need to "go political"
 - j) Hoping for a positive end result
- 4) Environmental Activists: What They Don't Know Can Kill You - Joe Conlon (AMCA)
 - a) Environmental movement mindset
 - i) Faith-based (Eden - Gaia)
 - ii) Loss of Grace (Industrialists, etc)
 - iii) A coming doomsday (mosquito control included)
 - iv) Saviors (Rachael Carson, etc)
 - b) Very vocal minority usually do not base their opinions on scientific facts
 - c) Environmentalism has become a pseudo-science
 - d) Misconceptions
 - i) You can lead a chemical-free life
 - ii) Man-made chemicals are inherently dangerous
 - iii) Synthetic chemicals cause cancer and other diseases
 - iv) Exposure to chemical mixes is a ticking time-bomb
 - e) Strong belief that natural equals safe
 - f) Lots of incorrect info on the internet - this puts people at risk
 - g) Claims become accepted regardless of scientific validity
 - h) Example:
 - i) DDT banned by EPA in 1972
 - ii) Malaria - 50 million people affected since 1972
 - iii) Africa - >\$12 billion lost economic growth annually
 - i) What can we do?
 - i) Challenge misinformation
 - (1) Science-based
 - (2) Invite groups to visit district
 - (3) Utilize media outlets
 - (4) Support science education
 - ii) Personalize the issue in public
 - (1) Get inside the opposition decision loop (take offensive)
 - (2) Mobilize survivor groups
 - (3) Put a human face on disease control
- 5) Rapid Mosquito & Mosquito-Borne Virus Surveillance After Floods in Kansas, 2007 - Dr Bruce Harrison (NC DENR)

- a) Request for emergency management - July 2007
- b) Background info:
 - i) Kansas eliminated most of the state's mosquito control in early 2007 due to loss of funding
 - ii) Heavy rains (18+) inches caused flooding
 - iii) Mosquitoes were very bad
 - iv) Disaster relief was requested
- c) Mission Statement:
 - i) Survey, collect, ID & test
 - ii) Work with locals
 - iii) Provide control info
 - iv) Talk to media
- d) Methods:
 - i) Survey 4 counties
 - ii) Select productive sites
 - iii) Rapid assessment (10 days)
 - iv) Several trap types used
 - v) Needed to bring all equipment used
 - vi) Focus on sites where *Cx pipiens* were likely to be found
- e) Logistics:
 - i) 10 nights of trapping
 - ii) 2 people
 - iii) Total - 16 days, 405 hours work time total
 - iv) Set-up in EOC
- f) FEMA was not well-informed about mosquitoes and mosquito control
- g) Results
 - i) 17 traps set each night
 - ii) 27 trap sites in 4 counties
 - iii) 151 trap nights
 - (1) 41% CDC traps
 - (2) 58% gravid traps
 - iv) 10,375 female mosquitoes collected
 - (1) *Ae vexans* primary species collected
 - (2) *Cx pipiens* next most common
 - v) Also did landing counts
 - vi) 91% of total made up of 7 species
- h) Virus
 - i) 235 pools submitted
 - ii) 30 pools WNV+
 - iii) 37% of sites were WNV+
 - iv) WNV+ pools collected on 9 of 10 collection days
 - v) MLEs ranged from 1.94 to 22.57
 - vi) Collected WNV+ mosquito at EOC site
 - vii) No SLE or WEE positive pools
- i) Recommended spraying of hot spots - did get a WNV case close by one of the hot spots

- j) Collected/saw some new/interesting species
- k) Conclusions:
 - i) *Psorophora* spp major complaint driver
 - ii) *Ae albopictus* another major complaint driver
 - iii) Flooding not the cause of mosquito problems
 - iv) Rain in ditches and containers was a big problem
 - v) REAL LEARNING EXPERIENCE

Session 2: Wednesday, February 27, 2008

- 1) New Jersey's Surveillance System: A Partnership That Works - Robert Kent (NJ DEP)
 - a) Legislative mandate for mosquito control in NJ since 1902
 - i) State Mosquito Commission
 - ii) 6 public members
 - iii) 3 cabinet members
 - iv) Director, NJAES
 - v) A BUDGET!
 - b) Partners
 - i) Rutgers University - NJ Ag Experiment Station (NJAES)
 - (1) Parent agency
 - (2) Historical surveillance
 - (3) Service contracts with state mosquito control commission
 - (a) Vector surveillance
 - (b) State-wide adult mosquito surveillance
 - ii) 21 county agencies (21 counties)
 - (1) Control at county level
 - (2) Collect 70-80% of tested specimens
 - iii) NJ EPD
 - iv) NJ Dept of Ag
 - v) Military
 - (1) Army
 - (2) Air Force
 - (3) Navy
 - vi) State Health Dept
 - (1) Memorandum of agreement for testing (Public Health Lab)
 - (2) Arbovirus surveillance network database
 - (3) WNV multi-agency working group
 - vii) Changes to State protocols
 - (1) State surveillance is light trap only
 - (2) Expanded protocols
 - (a) Increased trapping of suspect adults
 - (b) Increased reporting
 - (c) Increased testing
 - (3) It takes money
 - (4) It takes partners
 - viii) Response

- (1) Bought surveillance equipment for every county
- (2) Bought every county equipment for processing mosquitoes
- (3) Provided a courier to bring samples to state lab
- (4) Agreement with State Public Health Lab for dedicated testing of mosquito pools
- (5) Data posted online
 - (a) Collection data entered
 - (b) GIS component
 - (c) Results entered
- (6) RAMP testing -
 - (a) Quick local response
 - (b) All but 2 counties are equipped with a complete RAMP system
 - (c) RAMP group meets to maintain standard practices
- ix) End result - increased communication
- 2) An Integrated Marsh Management Project at Wertheim National Wildlife Refuge: Evaluation after 3 Years - Dominick Ninivaggi (Suffolk County DPW)
 - a) Environmental impact statement approved March 2007
 - b) Regional perspective
 - i) Successfully used in 6 states with control levels of 90-100%
 - (1) Maryland
 - (2) NJ
 - (3) Delaware
 - (4) Connecticut
 - (5) Rhode Island
 - (6) Massachusetts
 - ii) Never done in New York
 - iii) Programs seem to work well at reducing use of pesticides AND reducing mosquito numbers
 - c) Suffolk County has a resource focus
 - d) Goal: rehabilitate ditched marshes
 - i) Needed to develop resources
 - ii) Need to create a plan
 - iii) Need permits
 - iv) Need to show positive impact
 - (1) Reduced mosquito populations
 - (2) Reduced phragmites
 - (3) Increased wildlife use
 - (4) Fish using site
 - v) Need to show minimal negative impacts - minimal damage to wetland
 - vi) Return to "natural" system
 - e) Plan features
 - i) Tidal creeks
 - ii) Ponds
 - iii) Shallow connectors
 - iv) Filling select ditches
 - v) Smoothing and blading of area

- f) Measures of success (USFWS protocols)
 - i) Many many parameters were measured
 - ii) 2 managed areas, 2 reference sites
 - iii) Prime focus
 - (1) Mosquito larvae
 - (a) Frequency of larvae in dips
 - (b) Amount of area breeding
 - (c) Likelihood of finding larvae - cluster analysis
 - (d) Used targeted sampling
 - (2) Vegetation
 - (a) Primarily phragmites
 - (b) Mapping and photography
 - iv) Also looked at:
 - (1) Nekton
 - (2) Birds
 - (3) Invertebrates
 - (4) Salinity/water table
 - (5) Marsh accretion
 - g) Results
 - i) Mosquitoes
 - (1) Reduced larvicide treatments
 - (2) Found fewer larvae compared to reference sites
 - ii) Vegetation
 - (1) Reduction of phragmites
 - (2) Increased high marsh vegetation
 - iii) Bird use increased
 - iv) More fish using marsh
 - v) Did not increase appreciably the amount of open water
 - vi) Not all measures were easy to analyze
 - h) See data posted on web site
- 3) Integrating Arc-GIS in a Spring Woodland Control Program - Paul Zaribecki (DE FW)
 - a) High human density in close proximity to larval habitat
 - b) Woodland control strategy
 - i) Main species needing control - *Oc canadensis*
 - ii) IPM approach
 - iii) Larval treatment by backpack and aerial control
 - iv) Treat 6,000-8,000 acres (high year 13,000 acres) a year on average
 - c) GIS component
 - i) Old way - AgNav units recorded flight data only
 - ii) New way
 - (1) Created spray blocks in Arc GIS
 - (a) 310 blocks
 - (b) 2 counties broken into 5 spray blocks
 - (c) Zones and subzones
 - (d) Used population density data
 - (2) Utilized historic flight/spray data

- (3) Wetland layers (SWMP)
 - (4) Aerial photos
 - (5) Institutional knowledge
 - (6) Ground proofed
- iii) Spray block maps can be displayed on AgNav unit
- d) Benefits
 - i) Increased efficiency
 - ii) Increased accountability
 - iii) Better coordination/less confusion
 - iv) Less fatigue
 - v) Decreased reliance on institutional knowledge
- e) 4 years of data
- f) Other uses
 - i) Plotted adult fog requests on top of larvicide spray data
 - (1) Look for clusters
 - (2) Identify gaps in coverage
 - (3) Find new control sites
 - ii) Refine spray blocks
 - (1) Eliminate some areas
 - (2) Mark some areas as “always check”
- g) GIS is a useful tool
- 4) Human-Biting Ticks in NC and Their Pathogens: The Interface with the Public - Dr Marcia Herman-Giddens (UNC School of Public Health)
 - a) www.tic-nc.org
 - b) Private, non-profit organization
 - c) Need to increase knowledge about ticks and tick-borne diseases
 - i) Not much publicity
 - ii) Lack of prevention knowledge
 - iii) Difficulty in finding informed medical care
 - iv) Lack of surveillance data
 - v) Lack of info in public areas
 - d) Typical life cycle
 - i) Larvae & nymphs feed on small animals
 - ii) Adults feed on mid-size to large animals
 - iii) Cycle takes 2-3 years
 - e) Ticks and pathogens
 - i) *Ixodes scapularis*
 - (1) Lyme
 - (2) Babesia
 - (3) HGA
 - (4) Bartonella
 - (5) Others
 - ii) *Rhipicephalus sanguineus*
 - (1) RMSF
 - (2) Others
 - iii) *Amblyomma americanum*

- (1) HME
- (2) *Borrelia lonestari* (STARI??)
- (3) Tularemia
- (4) Tick paralysis
- (5) Others
- iv) *Dermacentor variabilis*
 - (1) RMSF
 - (2) Others
- f) Tick-borne illness
 - i) Vary from person to person
 - ii) Seen up to 30 days after exposure
 - iii) “flu-like”
 - iv) May include:
 - (1) Rash
 - (2) Fever
 - (3) Headache
 - (4) Muscle aches and fatigue
 - (5) Joint aches and pain
 - v) Treatment needs to occur at system onset
 - vi) DO NOT WAIT FOR TEST RESULTS
- g) Disease transmission usually occurs when an infected nymph or adult bites - Lone star tick larvae CAN TRANSMIT disease
- h) Testing is problematic for many tick-borne diseases
- i) Tick-borne diseases are rising in most places
- j) Prevention is the key!
 - i) Use repellent
 - ii) Wear proper clothing
 - iii) Conduct tick checks
 - iv) Use correct tick removal
- k) Medical care
 - i) Providers uninformed about tick-borne disease symptoms
 - ii) Testing issues
 - iii) Confusing messages
 - iv) Lyme Disease controversy
- l) More surveillance is needed

Business Meeting

New President - Chris Lesser

New VP - George Wojcik

Industry Rep - Jeff Hottenstein

New State Reps:

GA - Jeff Heusel

PA - Andy Kyle

MD - Jeannine Dorothy

Newsletter - contact Dennis.Salmen@MecklenburgCountyNC.gov

VA hosting 2009 meeting - possibly Virginia Beach, similar time frame
GA will host 2010 meeting

Session 3 - Thursday, February 27, 2008

- 1) Objectives & Design of the USDA ARS Project for Area-Wide Management of the Asian Tiger Mosquito - Sean Healy (Monmouth County Mosquito Commission)
 - a) Centered on management of pests where effective control is best over a large area
 - i) First project targeting a mosquito
 - ii) Projected 5-year budget is \$3.8 million
 - b) Asian tiger mosquito
 - i) Aggressive daytime feeder
 - ii) Container breeder
 - iii) Wide host range
 - iv) Most important pest species in many areas
 - c) Current situation
 - i) First detected in mid-80s
 - ii) Now found in 30 states
 - iii) Good vector for many viruses
 - iv) Spread of the Tiger (paper)
 - d) Pilot study - New Jersey
 - i) 2 counties - Monmouth and Mercer
 - ii) *Ae albopictus* found in nearly every county in NJ
 - iii) WNV+ pools detected
 - iv) Objectives:
 - (1) Demonstrate an effective area-wide control - 95% reduction
 - (2) Demonstrate the public health and socio-economic importance - cost benefit analysis
 - (3) Establish strategies for continued control - manual
 - v) Multi-agency project
 - e) Proposed Methods
 - i) Risk assessment - GIS
 - ii) Surveillance
 - (1) Variety of traps
 - (a) BG Sentinel Traps
 - (b) Ovitrap
 - (2) Service calls
 - iii) Control
 - (1) Education
 - (2) Source reduction
 - (3) Tire remediation
 - (4) Larval and adult control
 - iv) Maintenance
 - (1) Residual barriers
 - (2) Personal protection

- (3) Other
 - v) Products
 - (1) Training manual
 - (2) Public education
 - f) Picking sites - considerations
 - i) Assessment
 - ii) Population genetics
 - iii) Insecticide resistance
 - iv) Overwintering
 - v) Control optimization
 - vi) Economic evaluation
 - vii) Human component
 - (1) Abundance
 - (2) Complaints
 - (3) Health
 - (4) SEC
 - viii) Dealing with control (non-treatment) sites
 - (1) Treated using current operational protocols
 - (2) Will respond to problems
 - ix) Project phases
 - (1) Collect baseline data - locating larval habitats
 - (2) Implement program at 2 sites - develop guidelines
 - (3) Expand program countywide - improve guidelines
 - (4) Extend approach to other areas
 - g) Analysis
 - i) Spatial using GIS
 - ii) Economic cost effectiveness analysis
 - iii) Measure public perception of nuisance and costs
 - iv) Measure social and health costs
 - h) Benefits to agriculture
 - i) Reduced threat of disease in livestock
 - ii) Reduced threat of zoonoses
 - iii) Reduced nuisance
- 2) Evaluating Efficacy of BGMesh Lure Using 3 Different Trap Designs - Holly Feltner (Alexandria Health Dept)
- a) Target species - *Ae albopictus*
 - b) Trap types
 - i) BG Sentinel Trap
 - (1) BG Lure
 - (2) Dry ice
 - ii) CDC light trap
 - (1) BG Lure
 - (2) Dry ice
 - (3) Light
 - iii) Fay-Prince trap
 - (1) BG Lure

- (2) Dry ice
- c) BG Lure
 - i) Lactic acid
 - ii) Fatty acid
 - iii) Ammonia
- d) Study site
 - i) City of Alexandria - 16 sq mi
 - ii) Cameron Knolls Community
 - (1) Developed in mid-80s
 - (2) ~95 town homes
 - (3) Surrounded by single family homes
 - (4) Lots of breeding and harborage sites
 - iii) Protocol
 - (1) Each trap ran for 24 hours
 - (2) Each trap was at each site once a week
- e) Results
 - i) Collected 7-10 different species
 - ii) Top three:
 - (1) *Ae albopictus*
 - (2) *Cx restuans/pipiens*
 - (3) *An punctipennis*
 - iii) BG trap caught the most albopictus (~16 per night)
 - iv) Fay Prince trap did second best (~8 per night)
 - v) CDC trap better at catching *Anopheles* spp
 - vi) Some variability by location, but BG trap always did best and CDC trap always did worst
 - vii) Urban areas had double or triple the number of albopictus compared to semi-urban areas
 - f) BG trap was useful in promoting public education
- 3) *Ochlerotatus dorsalis* Surveillance in Southwest PA - Bryan Diehl (PA EPD)
 - a) Little Blue Run Impoundment area
 - i) Waste facility for power plant
 - ii) Sludge from scrubbers pumped to impoundment
 - iii) 1200 acre total - 300 to 500 acres breeding mosquitoes at any time
 - iv) Originally an open water lake
 - v) Switched to a geotube plan in 2006 and expanded site
 - vi) "funky" water
 - (1) Brackish water
 - (2) Alkaline
 - (3) Grass seeded on hardened sludge - organic pools created
 - b) Populated areas surrounding impoundment
 - c) Issues - 2006
 - i) Numerous complaints began in mid-July
 - ii) Very aggressive mosquitoes found in area
 - iii) Species found
 - (1) *Oc sollicitans*

- (2) *Cx salinarius*
- (3) *Oc dorsalis*
- (4) Some others
 - (a) Will fly up to 20 miles for a blood meal
 - (b) Multivoltine
 - (c) Possible disease vector
- iv) Livestock issues
 - (1) Reduction in milk production
 - (2) Horses kicking stalls
- v) Human issue
 - (1) No one could mow grass
 - (2) Sports had to be discontinued
- vi) WNV activity near site
- d) Planning - 2007
 - i) Met with various agencies associated with power plant
 - ii) FirstEnergy contracted with ADAPCO to do control inside impoundment - start date May 1st
 - iii) Public meeting - May 1st
 - iv) FIRST BROOD CAME OFF APRIL 25TH
 - v) Control
 - (1) ADAPCO contracted with adjacent states that were being impacted
 - (2) PA DEP and local mosquito control did adult control outside of impoundment
 - (3) ADAPCO - aerial Bti
 - (4) Problems
 - (a) Very warm water - quick life cycle turn around
 - (b) Difficult access
 - (c) High grass
- e) What next - 2008
 - i) Starting control earlier
 - ii) Already doing surveillance
 - iii) Anticipating fewer problems
- f) Who is taking responsibility for control
 - i) They have a no-mosquito clause in their permit
 - ii) They have paid for control in the impoundment only
- 4) DDT & Malaria Control: Past, Present, & Future - Dr Donald Roberts (University of the Health Sciences, Bethesda)
 - a) Value of advocacy
 - i) Use of insecticides in disease control programs
 - ii) Especially for malaria control
 - iii) Opposition is not limited to the use of DDT
 - iv) Success: DDT is still available for malaria control for indoor residual spraying (IRS)
 - v) WHO, USAID, others now support use of insecticides for malaria control
 - b) Examples of IRS successes
 - i) Prespray

- (1) Swaziland -
 - (a) Ongoing spray program
 - (b) 2 to 8% infection rates
- (2) Mozambique - no spray program
 - (a) Children - 64%
 - (b) Adults - 30%
- ii) Postspray
 - (1) Swaziland - dropped to 0.25%
 - (2) Mozambique
 - (a) 2001: dropped to 38%
 - (b) 2002: dropped to 22%
- c) Why the opposition
 - i) Set of beliefs held by environmental groups
 - ii) DDT used from mid-1940s to 1970s
 - iii) Malaria control
 - (1) IRS
 - (2) No known environmental impacts
 - iv) *Ae aegypti* eradication program
 - (1) Perifocal spraying outside houses
 - (2) No known environmental impact
 - v) For malaria -
 - (1) Reductions in parasite rate due to spraying were very high
 - (2) Reduction in deaths was also high
 - vi) 1995 - global malaria eradication program based in IRS with DDT
 - vii) By 1969, nearly 40% of exposed population was free of malaria
- d) Tipping point
 - i) Behavior change on a large scale
 - ii) Collected information causes public opinion norm to shift
 - iii) Silent Spring - Rachel Carson
 - (1) Launched modern environmental movement
 - (2) Treatise on fear - natural world had no way to deal with man-made chemicals
- e) Reality
 - i) Plenty of natural chemicals behave in similar ways to DDT
 - ii) Natural world has a variety of mechanisms for dealing with DDT-like chemicals
- f) Focus has remained on DDT
 - i) Ignored other, sometimes more toxic chemicals
 - ii) Some of these were natural chemicals
- g) Claims against DDT
 - i) Robins being pushed to the brink of extinction - robins were actually increasing in number
 - ii) Bermuda petrel endangered due to DDT -
 - (1) Had been thought extinct before the use of DDT
 - (2) True problem was loss of habitat
 - iii) Bald eagles and DDT

- (1) Bald eagle was truly endangered
- (2) Eagle protection Act - 1940
- (3) 1940-45: bald eagle populations recovering
- (4) 1945
 - (a) DDT use began
 - (b) Number of juvenile bald eagles declined
- (5) 1972
 - (a) DDT banned
 - (b) Bald eagle populations rebounded
- (6) Proposed issue - eggshell thinning due to DDT
- (7) True story
 - (a) Before DDT
 - (i) Bald eagles eliminated by hunting, trapping, and poisoning
 - (ii) Golden eagles were not covered by the Bald Eagle Protection Act
 - (iii) Juvenile bald eagles not easily distinguished from Golden eagle
 - (iv) Eagle protection act amended in 1962 to include juveniles
 - (v) Eagle populations began increasing
 - (b) Millions of dollars became available to bald eagle recovery due to the endangered species act in 1973
 - (c) DDT does cause eggshell thinning, but it was not the real cause of bald eagle reduction, nor was its banning the reason for their recovery
- iv) Change is occurring in the interpretation of data associated with DDT
- h) 1960s - rapid growth of the environmental movement/advocacy groups began
- i) Concurrently, malaria programs began to be phased out
 - i) Due to lack of funding
 - ii) Change of strategy
 - (1) De-emphasize IRS
 - (2) Promote use of drugs
- j) Impact on the poor
 - i) IRS program - malaria rates low
 - ii) Remove IRS program - malaria increases exponentially
- k) Advocacy for IRS programs helps
 - i) Propaganda war continues
 - ii) Need to lobby for public health use of pesticides and spatial repellents
 - iii) Always provide accurate and true information
- l) NEED TO USE ALL AVAILABLE TOOLS

Session 4 - Thursday, February 28, 2008

- 1) Product Development Made Simple: 10 Years and \$240 Million - Peter Connelly (Bayer Environmental)
 - a) Innovation - size and experience matter
 - b) It all comes from crop pest control
 - c) Why has consolidation occurred?
 - i) Crop protection market is mature
 - ii) Must target one or more of big 6 crops

- iii) Regulatory requirements are increasing
- iv) Technology changes have occurred
- v) Increase in biotech use
- vi) Generic manufacturers
 - (1) Take successful chemicals once patent runs out
 - (2) Sell at a lower price
- d) Consolidation outcome
 - i) 1990 - 13 companies
 - ii) 2005 - 6 companies
- e) Product development curve
 - i) Cash outflow - years 1 through 10
 - ii) Profit doesn't begin to occur until after year 10
 - iii) Products are successful only about 1 in every 200 tries
- f) New products must be:
 - i) Highly researched
 - ii) Superior to other products
 - iii) Selective to pest/low non-target impact
 - iv) Broadly active to pest species
 - v) Long market life
 - vi) Active on a number of sites
 - vii) Fast acting
 - viii) For mosquito control - must have aerial application use
 - ix) Low priced
 - x) No/slow resistance development
 - xi) Low mammalian toxicity
 - xii) No crop residues
 - xiii) Preferably not a neurotoxin
 - xiv) Applicable to crop market
- g) Needs
 - i) Great deal of expertise is needed in a number of fields
 - ii) Academic partners
 - iii) Research facility
 - iv) Network of field trial facilities
- h) Regulatory output
 - i) Animal toxicology studies
 - ii) Environmental toxicology
 - iii) Product chemistry
 - iv) Metabolic studies
 - v) Residue chemistry
 - vi) Environmental chemistry
- i) Costs
 - i) 1980s - \$23 million
 - ii) 1990s - \$157 million
 - iii) 2000 - \$200 million
 - iv) 2004 - \$240 million
- j) Active ingredients get reregistered every 15 years

- i) All tests need to be repeated
 - ii) Products must be registered in each state in which they are used
- k) Patents
 - i) Filed during discovery
 - ii) Patent life is 20 years from application or 17 years from grant
 - iii) It takes 9-11 years from discovery to market
 - iv) <11 years to recoup investment before generics enter the picture
- 2) Florida Medical Entomology Laboratory Extension Program - Dr Roxanne Rutledge-Connelly (University of Florida)
 - a) Background
 - i) 1979 FMEL placed under University of Florida
 - ii) Land grant university
 - iii) Only research station dedicated to working on biting insects
 - iv) Located in conservation area on Indian River
 - (1) Impounded wetlands
 - (2) Good for salt-marsh mosquitoes
 - v) Outreach mandate
 - b) Extension products
 - i) Common Mosquitoes of Florida
 - (1) 33 of species represented
 - (2) Shows picture, data, habitat, range
 - ii) Florida Mosquito Control “white paper”
 - iii) Mosquito ID and Certification Workshop
 - (1) Offered every spring - 2 week course
 - (2) Adult and larval identification
 - (3) Sampling opportunities
 - (4) Control and surveillance
 - (5) Certification after passing exam
 - (6) Graduate credit available (through University of Florida)
 - iv) Mosquito info web site
 - (1) White paper available as a pdf
 - (2) Mosquito database
 - (3) Buzz Words
 - (4) <http://mosquito.ifas.ufl.edu>
 - c) Research
 - i) Extension works closely with research
 - ii) Arbovirus Transmission Risk Models - info available on web site
 - iii) Background
 - (1) Water table depth -
 - (a) Data collected by Global Energy and Water Cycle Experiment
 - (b) 589 reporting station throughout south Florida
 - (2) Targeting *Culex nigripalpus* populations -
 - (a) Primary WNV/SLE vector
 - (b) Populations increase greatly after droughts break
 - (3) GIS model
 - (4) Focus on control decision-making

- iv) Specifics: 1977-1990
 - (1) Looking at water table depth occurring during SLE outbreak and comparing to non-outbreak years
 - (2) 4 temporal phases
 - (a) Initial dry down
 - (b) Initial wetting - amplification period
 - (c) Secondary dry down
 - (d) Secondary wetting - virus spillover to humans
 - (3) Deviations from pattern seen in SLE year means lower risk
 - (4) Key is shape of secondary dry down/wetting periods
- v) Can create risk maps based on these data
- vi) Models show risk of epidemic transmission
 - (1) Environmental conditions considered
 - (2) Mosquito population data used
 - (3) Need to add bird population data
 - (4) Does give some info about the risk of focal transmission as well
- vii) Needs additional calibration
- viii) Plan to extend program to north Florida

Session 5 - Thursday, February 28, 2008

- 1) Pilot Assessment of Tires as Larval Habitat for Mosquitoes - Brent Odea (Fairfax County Health Dept)
 - a) Reason for study
 - i) Limited tire studies in VA
 - ii) *Ae albopictus* a big nuisance in the area
 - iii) Previous sampling showed albopictus accounted for >50% of species found in tires
 - b) Study
 - i) Tires tied upright and filled with 3 liters of water
 - ii) Added pin oak leaves
 - iii) Removed entire contents of tire each week
 - (1) Removed 3rd & 4th instars and pupae
 - (2) Everything else returned to tires
 - iv) Placed larvae and pupae into rearing chambers
 - c) Results
 - i) Removed Tox larvae (n=118)
 - ii) Species found:
 - (1) *Oc triseriatus*
 - (2) *Oc japonicus*
 - (3) *Ae albopictus*
 - (4) *Cx pipiens*
 - (5) *Cx restuans*
 - iii) More *Oc japonicus* larvae found in tires than anything else
 - d) Area adult trap counts showed more *Ae albopictus* than *Oc japonicus*
 - e) Conclusions
 - i) Tires produce significant numbers of mosquitoes

- ii) *Oc japonicus* appear to be under-represented in adult trap catches
- f) Plan to repeat and expand study in 2008
 - i) New sites
 - ii) Variety of containers
- 2) The Zumba Trap: A Novel Surveillance Tool for Host-Seeking Mosquitoes - Hina Bhalala (Fairfax County Health Dept)
 - a) Study looking at 4 trap types
 - i) Zumba trap
 - (1) Human height
 - (2) Uses lure and dry ice
 - ii) BG Sentinel - uses lure and dry ice
 - iii) CDC light trap
 - iv) Faye-Prince trap
 - b) Used trapping stations for Zumba and BG Sentinel to protect them from the elements
 - c) Results
 - i) Zumba
 - (1) Mostly *Culex pipiens* and *Ae albopictus*
 - (2) Did better in mean # species than any other trap
 - ii) BG Sentinel caught more *Ae albopictus*
 - iii) Zumba trap outperformed CDC light traps
 - iv) Collected WNV+ *Ae albopictus* in Zumba and BG traps
 - v) Collected comparable numbers of *Culex* spp to the CDC gravid trap
 - d) Problems
 - i) BG and Zumba need to be protected from rain
 - ii) Harder to transport and set
 - e) Summary
 - i) Zumba traps provided good WNV surveillance
 - ii) BG traps and Zumba traps will be used in a larger study in 2008
- 3) Revamp Your Education Material - Carl Silvertsen (Fairfax County Health Dept)
 - a) History of outreach program
 - i) Prior to 1999 - no program
 - ii) 1999-2000
 - (1) Blue flyer
 - (2) Poor quality
 - (3) Worked because it was new and unusual
 - iii) 2003
 - (1) Hired a graphic artist
 - (2) Developed new brochures and materials
 - iv) KAP Study - 2004
 - (1) New materials developed based on results
 - (2) Developed posters
 - (a) Too big
 - (b) Weren't utilized
 - v) 2005
 - (1) Demand for flyers decreased

- (2) Developed Fight the Bite calendar
- vi) 2006
 - (1) Demand for calendars was strong
 - (2) Demand for public appearances was high
 - (a) New look every year
 - (b) Big visible cover
 - (3) Demand for brochures continued to decrease
- vii) 2007
 - (1) Created a new look for brochures
 - (a) New cover
 - (b) New pictures
 - (c) Same message
 - (2) Demand increased
- b) Lessons learned
 - i) Outreach materials have about a 3 year shelf life
 - ii) Improve
 - (1) Paper quality
 - (2) Graphics
 - (3) Pictures
 - (4) Layout
 - iii) Don't get comfortable
 - iv) KEEP IT NEW
- c) 2008
 - i) Continue to use current "new" brochures
 - ii) Plan to change the covers in about 2-3 years
 - iii) Create a booklet to be mailed to residences
 - (1) English versions
 - (2) Spanish versions
 - iv) Fight the Bite calendar - given to schools
- d) Keep your message but give them new life
- 4) Current & Future Source Reduction Efforts in Portsmouth, VA - George Wojcik (City of Portsmouth Mosquito Control)
 - a) Need to work with stormwater management
 - b) Portsmouth stats
 - i) Population just under 100k
 - ii) 29 sq mi
 - iii) \$400,000 operating budget
 - iv) Falls under Public Works
 - c) Top 5 things for creating a mosquito habitat
 - i) Poor initial design of ditches
 - ii) Lack of elevation
 - iii) Maintenance program relying on hand labor of "problem spots"
 - iv) Add highly invasive plant species
 - v) Decades of neglect
 - d) Lots of mosquito production
 - e) Projects

- i) Phragmites site
 - (1) Spoil site
 - (2) Army Corp mowed down vegetation
 - (3) Leveled area to remove water
- ii) Ditch restoration project
 - (1) Low lying area used to store junk
 - (2) Reduce function of ditch line
 - (3) Purpose
 - (a) Restore ditch function
 - (b) Increase wildlife usage
 - (c) Reduce mosquito populations
 - (4) Methods
 - (a) Herbicide
 - (b) Remove dead material
 - (c) Clear neglected ditches with long-reach excavator
 - (5) Fish moved into area immediately
 - (6) Birds followed equipment and stayed
 - (7) Costs
 - (a) Excavator - \$20,000
 - (b) 700 gallons of fuel/212 hours on equipment
 - (c) Rented brush shredder - \$1,200
- f) Future plans
 - i) Use a consultant to work through regulatory process
 - ii) Hire contractors to clear certain areas/clear some in-house
 - iii) Conduct a detailed cost benefit analysis
 - iv) Use cost-benefit analysis
 - (1) Show in-house is cheaper
 - (2) Justify buying equipment
 - v) Railroad ditch fill-in project planned
- 5) Perspectives on *Aedes albopictus* Control in the US - Jim McNelly (Clarke Mosquito Control)
 - a) Background
 - i) Common species in Hawaii in 1890s
 - ii) First established mainland population identified - Texas, 1985
 - iii) Likely present 1-3 years earlier
 - iv) Used tire-mediated introduction and dispersal
 - b) US Public Health Service
 - i) 1988 - used tire inspection law
 - ii) CDC Division of Quarantine taxed with inspection and control
 - iii) Problems
 - (1) Half of tires enter through ports with no inspection facility
 - (2) CDC only inspects about 6% of tires entering country
 - (3) Infestations already present in 15 states when law was passed
 - iv) State regs
 - (1) Early 1990s
 - (a) State legislation to deal with used tires

- (b) Funded through surcharges
- (2) Late 1990s
 - (a) Encourage use of tires and tire-derived products
 - (b) Funding redirected from mosquito control to other projects
- c) Service calls jump considerably after *Ae albopictus* becomes established
- d) Various studies
 - i) Calcasieu Parrish
 - (1) 1988 survey
 - (a) N=86 residents
 - (b) Average residence had 14 containers around site
 - (c) Most were not things considered to be trash
 - (2) Late 1990s
 - (a) Door-to-door campaign was cost effective
 - (b) ~\$3.13 per house
 - (3) Source reduction through community education was unsuccessful
 - (a) Residents will dispose of trash
 - (b) Tend to forget non-trash containers
 - ii) Guatemala survey
 - (1) >83% containers are trash
 - (2) ~50% of this was tires
 - iii) Florida study
 - (1) Combination of larviciding and adulticiding
 - (2) Repeated every 3 weeks
 - (3) Largely unsuccessful
 - (4) Concluded that source reduction was needed
 - iv) Removal of dumped tires reduces albopictus problem
 - v) Los Angeles, CA
 - (1) *Ae albopictus* introduced in “lucky bamboo” shipments
 - (2) Initiated a comprehensive surveillance program
 - (3) Embargo on wet shipments of “lucky bamboo”
 - (4) Control
 - (a) Treat with larvicide
 - (b) Adulticide cargo containers
 - (5) Mixed success
- e) Design of Community Based Interventions
 - i) Lloyd et al 1994
 - ii) Considers:
 - (1) Vector ecology
 - (2) Subculture of community
 - (3) Cultural background
 - iii) Designed for control of *Ae aegypti*/dengue in other countries
 - iv) Integrated control and surveillance
 - v) Moving away from chemical control
 - (1) Integration of biorationals and biotechnology
 - (2) Involve community
 - (3) Source reduction

- vi) Mixed results depending on various areas
- vii) Sustainability is critical
- viii) Message must be varied
- ix) Requires a successful merger between top-down and bottom-up approaches
- f) Perspective
 - i) Control - reducing density
 - ii) Management - rigorous delineation of principle parameters and justification provided through cost effectiveness analysis
 - (1) Vector density
 - (2) Ecology
 - (3) Socio-economic
 - (4) Geospatial
 - iii) Eradication - is it even possible

Vendor Presentations - Thursday, February 28, 2008

- 1) ADAPCO
 - a) Reps
 - i) Ted Bean - NE
 - ii) Trey English - SE
 - b) Full line of larvicides and adulticides
 - c) Barrier treatments
 - d) New for 2008
 - i) Agnique MMF G
 - (1) Granular larvicide
 - (2) Pupicide
 - ii) Zephyr ULV + ESS Barrier
 - iii) ADAPCO Guardian ULV sprayers
- 2) B&G Chemical
 - a) Rep - David Sykes
 - i) Sentinel GIS System
 - (1) One device for all services
 - (2) PDA
 - b) New for 2008
 - i) Aqualuer 30-30
 - ii) Provect, temephos granules
 - iii) New equipment
 - (1) Phoenix 680 fogger
 - (2) Universal GPS pumping system
 - (3) Stinger models
 - (4) LandTamer all terrain vehicle
 - c) Sentinel GIS System - Mike Swan (Electronic Data Solutions)
 - i) ESRI-based
 - ii) Industry-standard platform
 - iii) Open format - customizable
 - iv) Uses PDA in field
 - v) Desktop software

- vi) Uses
 - (1) Collect data for all services
 - (2) Produce reports
 - (3) Plan work
- d) Cost
 - i) B&G Sentinel Model - \$4000 one-time purchase for site
 - ii) DataLink GIS - \$995 one-time purchase for site
 - iii) Archer Field PC w/GPS - \$1,815 per (can get cheaper PDAs)
 - iv) Tech Support - \$295 per handheld
 - v) ArcPad or ArcGIS license required per filed PC/desktop
 - vi) Optional on-site mobile GIS training available
- e) Partnership
- 3) Bayer Environmental Science
 - a) Rep - Peter Connelly
 - b) New products
 - i) 2009 - larvicide
 - ii) 2010 - adulticide
- 4) Central Life Sciences
 - a) Reps -
 - i) Jeff O'Neil - NE
 - ii) Charlie Pate - SE
 - b) Divisional Name - Zoecon
 - c) Barrier treatment - Mavrik
 - i) 3-week residual
 - ii) Good for ticks and fleas
 - iii) No phytotoxicity
 - iv) Does not kill honeybees once it has dried
 - v) No water set back
 - d) Altosid family
 - i) Prevention
 - ii) Efficiency
 - iii) Confidence
 - iv) Lots of formulations for every need
 - e) Wellmark Fellowship Program - sponsor for AMCA Legislative Day in Washington DC (AMCA makes selection)
- 5) Clarke Mosquito Control - Jeff Hottenstein
- 6) Curtis DynaFog
 - a) North American Director of Sales - Matt Tandy
 - b) Founded in 1947 in Westfield, IN
 - c) Sell through UNIVAR
 - d) Over 75 different application models
 - i) Handheld electrics
 - ii) Portable thermal foggers
 - iii) Portable ULV
 - iv) Backpack ULV
 - v) Truckmount thermal and ULV units

- (1) GPS compatible
- (2) 8 HP to 21 HP
- (3) Digital tachometer
- (4) Different gear types
- e) Surveillance traps
- 7) Dynamic Aviation
 - a) Caleb Stitley
 - b) Mosquito control applications
 - c) Emergency contracts
- 8) Summit Chemical - Jonathan Cohen
 - a) Bti briquettes
 - b) Many other products
 - c) Community outreach
- 9) UNIVAR USA
 - a) Brian Smith - northern rep
 - b) Consultation, products, equipment
- 10) Valent Biosciences
 - a) New product
 - i) Bti/*B sphaericus* mix
 - ii) Ready for field testing
 - b) Rep - Jim Andrews

Session 6 - Thursday, February 28, 2008

- 1) Off Season *Culex pipiens* Complex Mosquitoes in a Neighboring Stormwater/Sanitary Sewer System - Lane Carr (Henrico County Public Works)
 - a) Background
 - i) Density of WNV+ mosquitoes highest along border with Richmond city
 - ii) Richmond City hot spots also along border
 - b) Combined sewer system in Richmond city produces lots of *Culex* spp
 - c) Challenge - crossing city/county borders
 - d) Findings
 - i) Lots of trash in sewers under manholes
 - ii) Lots of larvae
 - iii) Combined sewer system with trap-type catch basins
 - e) Monitoring
 - i) Off-season
 - ii) 5 catch basins
 - iii) Twice a week in December
 - iv) 5 dips per catch basin
 - v) Location parameters collected
 - f) Results
 - i) Catch basins
 - (1) Copepods
 - (2) Sewer fly larvae
 - (3) Mosquito larvae - up to 7 per dip
 - ii) Highest concentrations found in catch basin with highest wall temp

- iii) Collected last egg raft Nov 28th
- iv) Many resting adults found under manhole cover
- v) Drop in water temp below 50° leads to a decrease in larvae collected
- g) What happens when it rains
 - i) Flushing depends on intensity of rainfall
 - ii) Also depends on whether catch basin receives additional water from an adjacent sub-basin
 - iii) Even in heavy rains there appear to be adequate “hiding places” for larvae
- h) Plan of action
 - i) Form a partnership with the city of Richmond
 - ii) Training employees on all aspects of mosquito control
 - iii) Find GIS/map of catch basins
- 2) Collection Methods for *Culiseta melanura* Larvae in the Winter in Tidewater VA - Mike Harrison (City of Portsmouth)
 - a) Close by Great Dismal Swamp
 - b) City is completely urban
 - c) Habitat
 - i) Woodland pools
 - ii) Larvae found in crypts and depressions in wetlands
 - iii) Prefer cool, acidic water
 - iv) Bird feeders
 - v) Important EEE maintenance vector
 - d) Tools for collecting larvae
 - i) Dipper
 - ii) Standard manual bilge pump with mesh strainer
 - e) GPS for all sites
 - f) Control - aerial larvicide
 - g) Allows abundance measure to be taken and control to be evaluated

Session 7 - Friday, February 28, 2008

- 1) State Reports
 - a) PA - Mike Hutchinson
 - i) Funding
 - (1) Budget ~\$7 million
 - (2) Allocated \$5.2 million in grants to counties
 - ii) Surveillance
 - (1) Mosquitoes
 - (a) Over 30,000 successful mosquito collections
 - (i) 44 species
 - (ii) *Culex restuans* and *Cx pipiens* most commonly caught
 - (b) Gravid #1 tool (Reiter type)
 - (c) Others
 - (i) Dipping
 - (ii) CDC light
 - (iii) BG
 - (iv) Other

- iii) Control
- iv) Virus testing
 - (1) Tested >450,000 pools
 - (a) Primarily *Culex* spp
 - (b) Positive pools
 - (2) 10 positive corvids
 - (3) 9 human WNV cases plus 2 blood donors
 - (4) Imported Chikungunya case
- v) 2008
 - (1) Mosquito lab will be able to test mosquito pools
 - (2) Discontinue sentinel chickens
 - (3) Continue to test corvids and raptors
- b) DE - Bob Meadows
 - i) Disease surveillance
 - (1) Sentinel chickens
 - (a) No EEE
 - (b) WNV in northern part of state
 - (2) WNV+ dead birds
 - (3) No horse cases
 - (4) One human WNV case
 - ii) Mosquito control
 - (1) Spring control problematic due to bad weather
 - (2) Need additional surveillance in high complaint areas
 - (3) Working on control on refuges
 - iii) Large reduction in mosquito control workforce
 - iv) Budget cuts
- c) MD - Zach Cohen
 - i) Atypical mosquito season due to drought
 - (1) *Ae albopictus* a problem in urban and suburban areas
 - (2) Big salt marsh problem due to frequent dry-downs
 - ii) Minimal arboviral activity
 - (1) 10 human WNV cases
 - (2) No WNV horse cases
 - (3) Some WNV+ positive pools
 - (4) Essential no EEE activity
- d) WV - Anita Ray
 - i) Extremely limited surveillance
 - (1) Permanent trapping in 3 counties
 - (2) No WNV-positive pools
 - ii) Essentially no control
 - iii) Hoping for change
 - (1) Working with Dept of Ag
 - (2) No funding increase
 - iv) Very dry year
 - (1) Very little mosquito activity
 - (2) *Ae albopictus* remained a problem

- v) Virus activity
 - (1) LAC a big problem in state - 7 cases reported in 2007
 - (2) No human or horse WNV cases
 - (3) Still testing dead birds
 - (a) 5 birds WNV+
 - (b) 4 counties
- e) VA - George Wojcik
 - i) See newsletter on MAMCA website
 - ii) Very dry year
 - iii) Budget cuts
 - iv) Imported cases
 - (1) Chikungunya
 - (2) Dengue
- f) NC - Walker Rayburn
 - i) Very dry year
 - ii) Arbovirus
 - (1) Human
 - (a) WNV - 3
 - (b) LAC - 7
 - (2) No animal cases
 - (3) Sentinel chickens
 - (a) 20 EEE+
 - (b) 1 WNV+
 - (4) Mosquitoes
 - (a) 2 EEE+ pools
 - (b) No WNV+ pools
- g) SC - Tammy Brewer
 - i) Very dry year
 - ii) Mosquito surveillance
 - (1) 69 sites in 26 counties
 - (2) Tested over 2500 pools
 - (3) 47 WNV+ pools
 - iii) Dead birds
 - (1) Decrease seen in dead birds submitted
 - (2) 4 WNV+ birds
 - iv) 5 human WNV cases
 - v) Horses
 - (1) 1 WNV+ horse
 - (2) 2 EEE+ horses
- h) GA - Ros Kelly
 - i) 2007 most active WNV year since 2003
 - (1) Fewer birds submitted
 - (2) No horse cases
 - (3) 55 human cases
 - (4) 75 positive mosquito pools
 - ii) Several mosquito emergency situations dealt with during the year

- iii) Integrated mosquito control has proved able to reduce WNV incidence in control area
 - iv) *Culex coronator* introduced to Georgia in 2006
- 2) Finding and Confirming Hot Zones for WNV Activity: Then What? - Dr Jack Gingrich (University of Delaware)
 - a) The paradox of having and epizootic outbreak of WNV without human cases
 - b) Bird surveillance has typically been passive
 - c) WNV has had the single most devastating impact on bird populations ever seen
 - d) Nature of WNV
 - i) Cyclical
 - ii) Erratic 4-7 year outbreaks
 - iii) May be moved around by migrating birds
 - e) Modeling WNV outbreaks
 - i) Dead crow density (Julian, 2002)
 - ii) Wild dead birds (Eidson, 2002)
 - iii) Infected mosquitoes (Brownstein, 2004)
 - iv) Human cases by Aug 13 (Brownstein)
 - f) Reservoir hosts
 - i) Kilpatrick, 2006 - robins most important (DC)
 - ii) Molaei, 2006 - robins most important (CT)
 - iii) Other birds also implicated
 - g) Collection sites
 - i) Mixture of urban, suburban, and rural sites
 - ii) Mosquito surveillance
 - iii) Sentinel chickens
 - iv) Mist netted birds
 - h) Results
 - i) Looked at amplifying vector and bridge vector populations
 - ii) Bird viral seroconversion
 - (1) Wild birds found positive (all low-nesting birds)
 - (a) Robins
 - (b) Catbird (temperate migrant)
 - (c) House sparrow
 - (d) Cardinal
 - (e) Mockingbird
 - (f) Tufted titmouse
 - (g) White-throated sparrow (migratory)
 - (h) Carolina wren
 - (i) Yellow-shafted flicker
 - (2) Sentinel chickens
 - iii) Some low bird infectivity prior to mosquito season - probably an old infection
 - iv) Bird antibody titers
- i) Conclusions
 - i) Bird positives can be seen even when virus levels are below the level of detection in mosquitoes (epizootic)

- ii) High abundances of *Culex restuans* and *Cx pipiens* needed to maintain focal enzootic activity
- iii) Bridge vector populations drive epidemics
- iv) Mist netting/testing wild birds provide an early warning
- v) Best reservoirs are low-nesting birds
- 3) Effect of *Culex pipiens* Hybridization, Feeding Behavior, and Parity Rates on Late Season WNV Activity - Linda O'Connor (University of Delaware)
 - a) Study period May 1 - Oct 1 in 2005 and 2006
 - b) Mosquito collections
 - i) Variety of sites - urban, suburban, rural
 - ii) Info collected
 - (1) Total # mosquitoes
 - (2) WNV status (MLE)
 - (3) Genotype of mosquitoes
 - (4) Gonotropic status
 - c) Mosquito species tested
 - i) *Culex pipiens*
 - (1) Avian feeder
 - (2) Diapauses in winter
 - (3) Anautogenous
 - ii) *Cx quinquefasciatus*
 - (1) Mixed species feeder
 - (2) Do not diapause
 - (3) Anautogenous
 - iii) *Cx molestus*
 - (1) Autogenous
 - (2) Mammal feeder
 - (3) Do not diapause
 - (4) Quinc/pipiens hybrids
 - d) Results - genetic variability
 - i) 20% of *Culex* spp collected could be considered hybrids
 - ii) Largest group seen were pure *Cx pipiens*
 - iii) Saw some tri-hybrids (pipiens/quincs/molestus)
 - iv) Overwintering populations
 - (1) ~17% of mosquitoes found in overwintering sites were hybrids
 - (2) Hybridization is not a recent phenomena in this area
 - e) Feeding trials
 - i) Mosquitoes in early part of season chose not to choose a host - more aggressive host seeking in later part of season
 - ii) *Cx pipiens* and *restuans*
 - (1) Avian feeders
 - (2) Some human blood meals during later part of year
 - iii) *Cx quinquefasciatus* and *molestus* - tend to feed on mammals
 - iv) No correlations for host choice based on hybridization status
 - f) Parity

- i) High percentage of parous females indicates that at least one blood meal has been taken
 - ii) Strong correlation between parity rate and seasonality
 - g) Conclusions
 - i) No seasonal trends in hybridization
 - ii) 17% overwintering *Culex* are hybrids
 - iii) Genetic signature is not indicative of host choice
 - iv) Late season *Culex pipiens* tend to be more aggressive feeders
 - v) May become more opportunistic feeders late season
- 4) RAMP Testing in PA - Mike Hutchinson (PA EPD)
 - a) Why it was considered
 - i) Turnaround time is a priority
 - ii) Need ability to test additional samples
 - iii) Less human error than with VecTest
 - iv) Elaborate facilities not needed
 - b) Results
 - i) 685 pools tested
 - ii) Low rate of false negatives
 - iii) High false positive rate
 - iv) Created an indeterminate range
 - (1) Sent indeterminate results to lab for PCR
 - (2) Reduced false positive rates to zero
 - c) Conclusions
 - i) Cheaper than PCR
 - ii) Still not cheap
 - iii) False positive rate was probably exaggerated -
 - (1) Likely low level positives
 - (2) Some things interfere with test
 - d) Recommendation - don't retest with PCR
- 5) Developing a Mosquito Control Outreach and Education Initiative - Tom Moran (DE FWS)
 - a) Why do education and outreach?
 - i) Public health protection
 - ii) Change public behavior
 - iii) Provide useful information
 - iv) Lessens workload
 - v) Advocacy
 - b) History of initiative
 - i) Distribution of literature during service calls
 - ii) Lectures at schools and civic associations on request
 - iii) Seasonal/crisis media coverage
 - iv) Staff visibility
 - v) Passive displays
 - vi) Problems
 - (1) Effort was opportunistic, disorganized, and inefficient
 - (2) Lack of continuity

- (3) Supplies scattered
 - (4) Lack of staff willingness
- c) What changed?
 - i) Became aware of an ability to do something besides core functions
 - ii) Support of management
 - iii) Position became vacant - reclassification
 - iv) Saw other success stories
- d) Pros & cons
 - i) Pros
 - (1) Educate/raise awareness
 - (2) Public health benefit
 - (3) Quality of life
 - (4) Public buy-in
 - ii) Cons
 - (1) Cost
 - (2) Time/effort/staff interest
 - (3) Off hour work
 - (4) Hard to measure success
- e) What was tried
 - i) Active
 - (1) Attended community events
 - (2) School program
 - (3) Civic associations
 - (4) Tire amnesty
 - ii) Passive
 - (1) Displays
 - (2) Brochures
 - (3) Door hangers
- f) Main message
 - i) Mosquito biology/life cycle
 - ii) Disease transmission
 - iii) Surveillance
 - iv) Control
- g) Other tools
 - i) Mosquitofish
 - ii) Specimens - adult & larvae
 - iii) Microscope
 - iv) Videos
 - v) AMCA board game
 - vi) Mosquito look-alike pinned specimens
 - vii) Models
 - viii) Traps
 - ix) Containers
- h) Successes and failures
 - i) Schools - SUCCESS
 - ii) Community venues - SUCCESS

- iii) Live props - SUCCESS
- iv) Tire amnesty program - FAILURE
- v) State Fair - FAILURE
- i) Lessons learned
 - i) Get the most value for your effort
 - ii) Personalities are important
 - iii) Media coverage is important
 - iv) Need to be knowledgeable about subject matter
- j) Future ideas
 - i) Senior citizen groups
 - ii) State parks and zoos
 - iii) City and county workers
 - iv) Nature Society programs
 - v) Boy Scouts/Girl Scouts