MAMCA 2013

Wednesday, March 13

1) Keynote: NPDES, One Year Later - Joe Conlon
    a) A bit of the past
        i) Lawsuits 2001-2010
        ii) Mosquito control won all but one case
        iii) EPA did not believe mosquito control was polluting
            (1) Exemption ruling in 2006
            (2) Environmental groups sued
            (3) Big Agricultural groups (Cotton Council) sued for inclusion in exemption
        iv) 6th Circuit Court disagreed
            (1) Vacated EPA ruling
            (2) NPDES permit required
            (3) Pesticides are pollutants according to the Clean Water Act
            (4) EPA got right on board with the new administration
        v) Proposed environmental benefits - mosquito control was already doing these
            (1) Mandatory equipment calibrations
            (2) Annual reporting
            (3) Enforceable under CWA as a permit violation
            (4) Requires IPM
            (5) Immediate notification of adverse events
        vi) Environmental groups do not think this is enough
    b) Negative impacts
        i) Direct cost of permit
        ii) Redirecting of limited resources
        iii) Man-hour costs
        iv) Increased liability issues
            (1) Loss of programs in small municipalities and rural communities -
            (2) Social injustice
        v) Loss of preventative mosquito control
            (1) Increases use of adulticiding
            (2) Increased costs
        vi) Increased administrative and monitoring costs
        vii) Allowing more human cases before responding to risk
        viii)Burden on state water agencies
    c) The California Experience
        i) Physical monitoring
            (1) Lab costs - $702,000
            (2) Most of the required testing has nothing to do with pesticide application
        ii) Program manager
        iii) Visual/physical monitoring
        iv) Administrative costs
        v) Total amount > $1 million
    d) Endangered Species Act

i) Required consultation with USFWS & NMFS
ii) End results
(1) BiOp (biological opinion) with authorizations and conditions
(2) Cherry picking data
iii) Rejected by 4th Circuit Court of Appeals - sent back to be reworked to use real data

e) National Research Council
i) Best available scientific data and info
ii) Sub-lethal, indirect, and cumulative effects
iii) Mixtures and inerts
iv) Models
v) Interpretation of uncertainty
vi) Geospatial info and data sets

f) Legislative relief
i) Senate agriculture committee
(1) HR 6087 - FIFRA precludes need for NPDES
(2) Restoring
ii) HR 872
(1) Passed House
(2) Hold put on it in Senate
(a) Sent to Agriculture Committee
(b) Should have gone to Environment and Public Works Committee
(c) Barbara Boxer working against it
(d) Harry Reid (Senate Majority Leader) uninterested
(3) Was going to be put as a rider in the appropriations bill - rejected
iii) HR 935 - reducing regulatory burden
iv) Other legislation being proposed -
(1) most are FIFRA based
(2) One is looking to seek a middle ground between FIFRA and the CWA
v) Farm Bill - still in play, sort of

g) Strategy
i) Mosquito Control is protecting public health
ii) NPDES is an unnecessary expenditure and diversion of resources
iii) Danger of lawsuits
iv) EPA should defend their own registration protocols
v) Zoonotic disease risk increase
vi) NEED FOR SPOKESPERSON
vii) NEED FOR DATA

2) AMCA Update - Henry Lewandowski
a) Professional organization
i) Established in NJ in 1935 as the Eastern Association of Mosquito Control Workers
ii) 1500+ members
iii) 52 member countries
iv) Diverse membership

b) Supports sound science

c) Advocates Integrated Mosquito Management
d) Recognized as a member of the EPAs Pesticide Environmental Stewardship Program
e) Provides information and testimony having impacts on policy decisions
f) Regional directors on Board
g) 2006 - hired Association Headquarters Inc to run the association's business
    i) Executive management
    ii) Membership services
    iii) Financial management
    iv) Web/tech services
    v) Data management
    vi) Others
h) Membership needs
    i) Communication by social media
        (1) Twitter
        (2) LinkedIn
        (3) Facebook
    ii) Variety of groups, scholarships, and competitions within association aimed at increasing membership
i) Legislative and Regulatory Affairs
    i) Presence in Washington DC
    ii) Technical advisor
j) Washington Conference
    i) Held annually since 1999
    ii) Typically 80-90 attendees
    iii) Some travel assistance available
k) Sustaining Membership - support legislative activities

3) Sustaining Member Presentations - Industry Director (Jim Andrews)
a) AllPro - Joe Andrews/David Sykes (http://www.allprovector.com/)
    i) Adulticides
        (1) Oil-based pyrethroid products
        (2) Chlorpyriphos- based product
        (3) Water-based pyrethroid products
    ii) Larvicides
        (1) Bti extended release granules
        (2) Bs product
        (3) Temephos
b) AmVac - Peter Connelly (http://www.amvac-chemical.com/Home/tabid/36/Default.aspx)
c) Central Life Sciences - Charlie Pate (http://www.centrallifesciences.com/)
    i) Altosid
    ii) Mavrik - barrier product
    iii) Zenivex - ether pyrethroid
    iv) FourStar microbial product line
d) Clarke - Joe Strickhouser (www.clarke.com)
e) Electronic Data Solutions - Ryan Pierson (http://www.elecdata.com/)

    i) Sentinel GIS (Univar & Clarke) - desktop application
    ii) FieldSeeker GIS (Clarke) - web-based application
4) Addressing Environmental Issues at Chatham County Mosquito Control - Henry Lewandowski
    a) Trained staff
    b) Use IMM techniques
        i) All control is based on surveillance and not pre-scheduled
        ii) Test mosquito samples
        iii) Use the best control method for the problem
        iv) Use thresholds
        v) Equipment calibration
        vi) Efficacy testing
        vii) Raise mosquito fish for use in larval mosquito habitat
    c) Evaluate program continually
        i) Cut out things that do not work
        ii) Change strategies as needed
        iii) Keep up with new technology
    d) Ditching operations
        i) Dredge and spoil sites - 5000 acres
        ii) Breeding seen in ditches
            (1) Made changes to ditching procedures
            (2) Set distance further apart to facilitate spot treatment of ditches
    e) Careful product choice to reduce development of resistance
    f) Disposal of hazardous waste
        i) Incinerate where possible
        ii) Reduce amount put into landfill
    g) Publications and research
    h) Be part of the community
        i) Internships
        ii) Public education
        iii) School program
        iv) Community projects
        v) Youth programs
        vi) Work with fire department, police department, and search and rescue
5) Honey Bees & Mosquito Control - Bobby Moulis
    a) Both commercial beekeepers and backyard enthusiasts
        i) Commercial are easier to work with
        ii) Trying to keep track of the backyard beekeepers can be difficult
            (1) Bee hive registration is required by county
            (2) Mosquito control info available on the county site
        iii) Coastal Empire Beekeeper's Association
            (1) Attend meetings
            (2) Open lines of communication
            (3) Bee hive info form
        iv) Courtesy call list
    b) Make sure the bees are not being worked the day before the mission

c) Issues
    i) All bees do not enter hive at night in the south so are outside where they can come into contact with pesticides
    ii) Swarming
    iii) Change in wind patterns when spraying
    iv) Non-compliant beekeepers
d) What can be done to protect the bees
    i) Exclusion areas for large numbers of beehives
    ii) Covering hives with cloth or plastic
    iii) Some states have laws - not Georgia
    iv) Ultimately it is the beekeepers responsibility to protect their hives
    v) Take home message - be a good neighbor

6) Sustaining Member Presentations
a) Univar - Mike Leahy
b) Valent BioSciences
    i) Products
        (1) 2 different strains of Bti
            (a) VectoBac
            (b) Teknar
        (2) Bs - VectoLex
        (3) Mixed Bs and Bti - VectoMax
        (4) Bactimos - Bti for midge control
        (5) MetaLarv S-PT - new methoprene product
    ii) Some name changes occurring

Thursday Morning, March 14

1) Storm water Management Facilities & Mosquito Control - Tim DuBois
a) What is a storm water management facility?
    i) Holding areas
    ii) Removes sediment from water before it is released into a larger body of water
b) Types
    i) Retention basins
        (1) Hold water after rain event
        (2) Can become very overgrown
        (3) Inlet placement is vital
        (4) Can breed many mosquitoes
    ii) Detention basin
        (1) Hold water for very short periods
        (2) Sediment accumulation can cause ruts that hold water and breed
    iii) Bio retention cell
        (1) Mostly underground
        (2) Filters storm water
        (3) Sends water to an existing storm water line
        (4) Trash buildup will clog filter
    iv) Manufactured BMP
        (1) Similar to a catch basin

(2) Breed mosquitoes
v) Green BMPs
(1) Permeable pavement
(2) Rain barrels
c) Inspection process
i) Check inlet for clogs
ii) Outlets should be clear
iii) Check for vegetation growth in storm water facility
2) Validity of Morphological Characters Used to Distinguish Culex restuans and Culex pipiens - Brian Byrd
a) Primary WNV vectors in the eastern US
i) Enzootic cycling
ii) Culex pipiens primary human vector
b) Difficult to differentiate morphologically
i) Harrington & Poulson 2008
ii) Molecular ID more accurate but not readily available
c) Characters used
i) Presence or absence of pale scutal dots
ii) Abdominal banding pattern
(1) Straight across - restuans
(2) Half moon - pipiens
iii) Pale or dark scales in center of vertex of head
(1) All dark - restuans
(2) Fade to pale in center - pipiens
d) The study
i) Collected mosquitoes from various areas
ii) ID'ed based on the three known morphological differences
iii) Confirmed ID using molecular techniques
(1) Culex spp ID PCR
(2) Crabtree et al 1995
iv) Preliminary results
(1) 236 mosquitoes reviewed to date
(2) 56 mosquitoes paired correctly
(a) Sensitivity -
(i) proportion that will be correctly identified by character
(ii) TP/(TP+FN) * 100
(b) Specificity
(i) Proportion of individuals not members of a particular species that will be correctly identified as not that species
(ii) TN/(FP+TN) * 100
(c) Character scoring
(i) Pale scale spots - they are good characters if they are there
1. Sensitivity - 32%
2. Specificity - 100%
(ii) Abdominal banding - a fairly good character
1. Sensitivity - 87%

2. Specificity - 84%
(iii) Head scales - good character
1. Sensitivity - 92%
2. Specificity - 94%
(d) Presence of character
(i) White spots
1. Good if they are there
2. If they are missing, 69% are actually restuans misidentified as pipiens
3. Absence of spots is not diagnostic
(ii) Bands
1. Good validity
2. Usually present
(iii) Head scales
1. Best character
2. Missing a large proportion of the time
(3) Limitations
(a) One reviewer
(b) Small sample size
(c) All collected in gravies traps - may not hold true for specimens collected in light traps
(4) The future
(a) Continue to test
(b) Add Culex quinquefasciatus

3) Sea Level Rise & Delaware's Coastal Mosquito Control Program - Paul Zarebicki
a) Background
i) Delaware is in the top ten for population density and wetland cover
(1) 15% estuarine wetlands
(2) Typical species
(a) Oc sollicitans
(b) Oc cantator
(c) Oc taeniorhynchus
(d) Ae vexans
(e) An bradleyi
ii) Mosquito control since the 1950s
iii) IPM
iv) OMWM
b) Sea level rise has been 1 foot over the past century with models showing a rise of 1-3 feet over the next century
i) Changing vegetation in coastal areas
(1) Areas converting to open water
(2) Upland-wetland interfaces are changing
(a) Dead trees
(b) Vegetation changes
(c) Agricultural fields are becoming low salt marsh
ii) Salinity changes are occurring

iii) Salt marsh mosquitoes
(1) Some areas are no longer producing
(2) New areas inland are producing giant broods

4) LAC in North Carolina - Brian Byrd
a) Hot spots
i) Eastern TN
ii) MI
iii) OH
iv) Western NC
(1) 6 counties in LAC "belt"
(2) 2005 peak year
(3) Increasing trend since 1988
(4) Potentially an emerging infectious disease
b) LAC cycle
i) Beaty & Marquardt (1996)
ii) Small mammal amplifying system
(1) 3-4 day viremia
(2) Oc triseriatus
iii) Humans are dead end hosts
(1) Primarily a disease of children
(2) Low mortality rate
iv) Transovarial transmission
(1) Overwintering mechanism
(2) Adds mosquitoes into the cycle at a younger age
v) Venereal transmission
vi) Other species potentially involved
(1) Aedes albopictus
(2) Aedes japonicus
c) Lab study
i) TAP - transmission amplification transmission
(1) Dissemination of virus within the mosquito
(2) Transovariol transmission
ii) Oc triseriatus is 7x more successful in spreading the virus
iii) Probably not that straightforward
d) What drives LAC risk?
i) Risk factors
(1) Human behaviors
(a) Protective
(b) Risky
(2) Location
(a) Regional
(b) Microscale/microhabitat
(3) Vector ecology
(a) Temporal risk
(b) Native vs invasive species
ii) Study design

(1) Peridomestic sites
(a) 6 historical LAC case residences
(b) Comparable forested area
(2) Sampling
(a) One week twice a month
(i) Ovitrap
(ii) May-Sept
(b) Nasci aspirator
(3) Eggs
(a) 93000 collected
(b) 11700 identified
(c) Ovitraps - peridomestic
(i) Primarily triseriatus
(ii) Also albopictus and japonicus
(d) Nasci aspirator - forested area
(i) Similar results
(ii) Fewer triseriatus
(e) Looked at number of wet containers in area
(i) More artificial containers - highly disturbed
1. Increased proportion of triseriatus in peridomestic area
2. Increased japonicus in peridomestic area
3. Saw more gravid mosquitoes in peridomestic area
(ii) Low disturbed sites had more natural containers
1. More triseriatus found in forested area
2. No difference seen between forest and peridomestic
(iii) Also affected egg production

e) Bottom line - source reduction
f) Other studies are underway

5) Control Techniques for Reduction of Aedes albopictus and Ae aegypti Populations - Chris Lesser
a) Needed a effective and rapidly deplorable control strategy for domestic mosquitoes
i) Quality of life issues
ii) Disease vectoring issues -
(1) Dengue in FL
(2) Control strategies for this system just don't work anywhere
b) Traditional habitat
i) Remote/rural
ii) Isolated areas
iii) Easy access
iv) Nocturnal
v) Concentrated breeding
c) Domestic
i) Diffuse
ii) Amongst residents
iii) Difficult to access

- iv) Urban/endophilic
- v) Daytime biter

d) Domestic mosquito control
- i) Sanitation and source reduction
- ii) Far too many breeding sites to get effective control
  - (1) Public won't do it
  - (2) Can't use forced sanitation in the US
  - (3) Education is quickly forgotten
  - (4) Access can be very difficult
  - (5) Labor intensive and time consuming (20 min minimum per house)

e) Research objective
- i) Study location - Manatee County
- ii) Treatments
  - (1) Larvicide
  - (2) Adulticide
  - (3) Both
  - (4) Neither
- iii) Use ovitraps for surveillance year-round
  - (1) 30 sites
  - (2) Randomly placed
  - (3) Counted eggs and any hatched larvae
- iv) Methodology
  - (1) Each area treated once a week
  - (2) Started in mid-July
  - (3) Products applied by ULV spray truck
    - (a) Altosid 5%
    - (b) 30:30 permethrin/PBO
- v) Results
  - (1) Collected baseline data
  - (2) Larvicide plus Adulticide treatments showed best reduction

f) Application
- i) 25000 acres needing treatment
- ii) Need 2 trucks
- iii) Becomes cost and time prohibitive

g) What about aerial applications of larvicides?
- i) Used altosid 5% from a helicopter
- ii) 3 treatments
- iii) Large drop in population size - 73% reduction
- iv) Reduction in complaints
  - (1) Ovitrap count > 30 COMPLAINTS
  - (2) Ovitrap count <30 no complaints
- v) Lower cost than truck spraying
- vi) More doable than source reduction
- vii) Has desired effect

h) What about aerial application of adulticides?

i) Studies from SE Asia show good control of Ae aegypti, but with much higher application rates allowed in the US
ii) Doesn't work well when aegypti are endophilic (Caribbean study)
iii) What product would work best?
iv) Study
(1) Methods
(a) Malathion - seeing resistance to permethrin products
(b) 1300 acre spray block
(c) 20 minutes before sunset
(d) Completed before sun set
(2) Landing counts results - 78 to 97% reduction seen
(a) Temporary reduction
(b) Older adults being removed from population
(c) Effective for reduction of dengue transmission
(3) High level of public acceptance

i) Publications - WingBeats 2011

Board Meeting

1) Committee reports
a) Financial audit - all good
b) Awards
i) 2013 RE Dorer - Joe Conlon
ii) 2 others will be given
c) Constitution and Bylaws
i) A few changes are needed
ii) TN will be joining as a member state
d) Newsletter
i) One per year (Nov)
ii) Sent electronically
e) Program and Local Arrangements - fill out evaluation form
f) Nominating - VP elect (Rosmarie Kelly)
2) Cy Lesser Fund will be moved to Florida
3) Future meetings
a) Maryland: March 4-6, 2014
b) Georgia: Jan 12-15, 2015 (proposed)

Thursday Afternoon, March 14

1) Student Presentation: Testing Hypotheses for Aedes japonicus Invasion Using Community Ecology – T. Zachary Freed
a) Supposes non-equal competition
b) Applied to container breeding larvae
c) Aedes albopictus is a superior competitor
d) Hypotheses for coexistence
i) Keystone predation
(1) Toxorhychytes rutilus feeds disproportionately on the superior competitor
(2) Relieves effects of competition

ii) Spatial segregation - Ives 1988
(1) Patch segregation - refuges
(2) Intraspecies aggregation is greater than interspecies aggregation
iii) Fluctuating resources
(1) Highly variable spatial or temporal inputs of resources relieve competition
(2) Refuges provided for inferior competitors

e) Methodology
i) Lab experiment
(1) Varying densities of Ae japonicus and competitor
(2) Presence or absence of Tx rutilus larva
(3) 3 replicates
(4) Measured per capita rate of population increase and contributing fitness correlates
ii) Field survey
(1) Two habitat types
(a) Tree holes - 5 sites
(b) Used tires - 6 sites
(2) Controlled for edge effects
(3) Recorded abundances of
(a) Ae japonicus
(b) Ae albopictus
(c) Oc triseriatus
(d) Presence of Tx rutilus
(4) Recorded resource amounts
(5) Calculated aggregation at the individual container level

f) Results
i) Keystone predation
(1) Predation negatively affected both species
(2) Japonicus is an inferior competitor to albopictus
(3) With albopictus present, Tox did not positively impact japonicus - NOT Keystone predation
ii) Mosquito abundance by field site
(1) Tires produced more mosquitoes than tree holes
(2) Japonicus does not do well in tires that contain albopictus
(3) Indirect support for fluctuating resource hypothesis
iii) Aggregation
(1) Both species clump around some kind of distribution
(2) Low amount of interspecific aggregation
(3) Provides strong observational evidence for aggregation

g) Conclusions
i) Albopictus is a superior competitor
ii) Keystone predation hypothesis does not hold
iii) Japonicus and albopictus aggregate separately - sufficient for coexistence
iv) Tox may be a a greater barrier to invasion than competition by albopictus
v) Oc triseriatus and Ae japonicus have equal competition so can coexist

2) Losing an Ally: White Nose Syndrome is Killing Our Bats - Mary Bunch

a) How are bats an ally?
    i) Mosquito control - not really
    ii) Agricultural pest control
    iii) Keystone species in some cave systems
b) Bat dietary info comes primarily from examining guano
    i) There are keys for ID to group
    ii) 1996 study
c) What is WNS?
    i) Fungal disease of hibernating bats
        (1) First found in bats in 2006 in New York State
        (2) Die offs began in 2007
            (a) High mortality associated with WNS
            (b) Emerge early from hibernacula and die
        (3) Fungus damages wing membrane
        (4) Causes water loss
        (5) Affected bats are emaciated
        (6) Does not grow on active bats
    ii) Caused by Geomyces destructans
        (1) Named in 2009
        (2) New to science
        (3) Spores survive year round
        (4) Skin fungus
        (5) Optimum growth range is 54-60 degrees
    iii) Species affected
        (1) Big brown bat
        (2) Eastern small-footed
        (3) Gray bat
        (4) Indiana
        (5) Little brown
        (6) Northern long-eared
        (7) Tri-colored
        (8) Non-hibernating bats are not affected
        (9) Some species get the fungus but do not die
    iv) Smaller bats appear to be more vulnerable
    v) There appears to be a reproductive reduction
d) Found in Europe but does not appear to kill bats
e) Emerging disease in the US
    i) Rapid spread
    ii) Now found in Georgia
f) Why is this important?
    i) Many of these species are endangered
    ii) Bats reduce crop damage
    iii) Will likely be a bottleneck effect on bat genetics
g) whitenosesyndrome.org

3) State Reports
    a) PA - Andy Kyle

i) DEP administers
    (1) WNV program
    (2) Blackfly program
    (3) Tick work - new
ii) WNV
    (1) 2012
        (a) 60 cases - 4 deaths
        (b) 49 horse cases
        (c) 135 birds (contract with rehabers)
        (d) Lots of positive mosquitoes (primarily Cx pipiens)
    (2) Mosquito density map
    (3) Earliest detection May 3rd
        (a) Started earlier
        (b) Lasted longer
iii) EEE
    (1) One positive horse
    (2) Found Culiseta melanura, but no positives
iv) Future
    (1) More reliance on larviciding
    (2) Will continue on with the rest of the program

b) West Virginia - Eric Dotseth
i) Ticks
    (1) Lyme disease becoming an increasing concern
    (2) Tick survey for Ixodes scapularis
    (3) Fall 2007
        (a) Only recovered from Jefferson County
        (b) No bacteria found
    (4) Spring 2012
        (a) New county records
        (b) 15% infection with Lyme disease
        (c) 8% anaplasmosis
        (d) One Dermacentor variabilis with a dog rickettsia
    (5) Fall 2012 - continue to see ticks in new sites
    (6) Attached ticks from animals and humans
ii) Mosquitoes
    (1) Surveillance May-Sept
        (a) Weekly sampling for select counties
        (b) Samples from collaborators
    (2) Mosquitoes tested for a variety of pathogens
    (3) Cases
        (a) 14 LAC
        (b) 10 WNV
        (c) 2 travel-associated malaria cases
    (4) Season started early in 2012
    (5) Saw virus in a number of species
    (6) Found Anopheles crucians - new state record

c) Delaware - Paul Zarebicki
    i) Delaware Division of Fish & Wildlife
        (1) Acreage treated were below 10 year average
        (2) Dry conditions through most of season
    ii) 8 WNV+ cases - 1 death
    iii) No EEE
d) Maryland - Jeannine Dorothy
    i) Most WNV since 2003
        (1) 47 cases
        (2) 6 deaths
    ii) No EEE
    iii) Lowest mosquito populations on record
    iv) Aedes albopictus complaints were highest yet
    v) Funding
        (1) All state money has been pulled
        (2) Funding now has to come from counties and cities
        (3) Not a good situation
e) Virginia - Tim Dubois
    i) Cases
        (1) Worse WNV season since 2003
            (a) 25 cases
            (b) 5 VPBD
        (2) First human EEE case since 2003
        (3) LAC
    ii) Gulf Coast Tick study
f) North Carolina - Brian Byrd
    i) Cases
        (1) EEE - 1 probable, 1 confirmed
        (2) WNV - 7 probable, 3 confirmed
        (3) LAC - 26 probable, 18 confirmed
        (4) Travel-associated
            (a) Malaria - 32
            (b) Dengue - 1
    ii) Ticks
        (1) Lyme - 127 (33)
        (2) RMSF - 598 (14)
        (3) Anaplasmosis
        (4) Ehrlichia
g) Georgia - Jeff Heusel
    i) Only 6 counties involved in mosquito testing in 2012
    ii) WNV
        (1) 1st positive mosquito and human reported in May
        (2) 2012
            (a) 100 cases
            (b) 17 PVBDs
            (c) 6 deaths

iii) EEE - 1 case
iv) Veterinary cases increased in 2012
v) Loss of funding has led to loss of ability to test

h) South Carolina - Tammy Brewer
i) 2/3 of state still in drought
ii) WNV
(1) Positive animals
(2) Positive birds
(3) Positive mosquito pools
(4) 41 human cases with 3 fatalities
iii) EEE
(1) 1 human cases
(2) Horse cases
iv) Imported dengue

4) Pennsylvania Tick Surveillance and Testing Results - Mike Hutchinson
a) Why a TBD program?
i) Human powassan case late 2011
ii) In top 3 for human Lyme disease cases
b) Surveillance
i) Flags
ii) Drags
iii) Dry ice traps
iv) Animal host collections
(1) Human
(2) Groundhogs
(3) White-tailed deer
(4) Black bear
(5) Cats
(6) Dogs
c) Results
i) 2500 from 5 species
(1) Ixodes scapularis
(2) Dermacentor variabilis
(3) Dermacentor albipictus
(4) Amblyomma americanum
(5) Ixodes cookei
ii) 52% of I scapularis positive for Borrelia burgdorferi
iii) Ran a number of quality assurance / quality control tests to confirm results
iv) Detected low rates of a few other pathogens
d) Future plans
i) Do additional surveillance
ii) Determine co-infection rates
(1) Babesia microti
(2) Anaplasma phagocytophilum
(3) Borrelia burgdorferi
iii) Look for the Borrelia miyamotoi

Friday, March 15

1) WNV Surveillance & Intervention in TN - Kimberly Freyman
    a) WNV
        i) 2001 - 18 cases
        ii) 2012 - 33 cases
        iii) Spread throughout state
    b) Mosquito control
        i) Primarily larviciding
        ii) Many city programs
        iii) Davidson County
            (1) Backyard inspection day
            (2) Larval surveillance and larviciding
            (3) Adult surveillance and testing
            (4) No adulticiding since 2008
        iv) Knox County
            (1) Educational outreach
            (2) Adult traps
            (3) Adulticide based on CDC recommendations
            (4) Larval surveillance and larviciding
        v) Shelby County
            (1) Most human cases
            (2) Larval surveillance and larviciding
            (3) Adult surveillance and adulticiding
            (4) Mosquito fish
            (5) Look at restuans/quincs crossing point to determine probable risk
    c) Mosquito pool testing
        i) Multiplex
            (1) WNV
            (2) LAC
            (3) Flanders
        ii) 3 counties
        iii) Flanders virus used as a predictor of WNV
            (1) Peaks about 2 months before WNV
            (2) Found in same general area
    d) Lessons
        i) Early intervention
        ii) Surveillance and testing
2) Why Do Larval Surveillance Anyway? - Rosmarie Kelly
3) The Role of Wildlife and Humans in VBDs - Jane Huffman
    a) Ticks
        i) Live slow
        ii) Environmentally tolerant
        iii) Long lived
        iv) Different stages feed on different hosts
        v) Feed for long periods and consume large volumes of blood
        vi) Feed on a variety of species

vii) Overwinter
viii) Lay massive numbers of eggs

b) One Health perspective - Lyme Disease
    i) Reservoirs
        (1) White-footed mouse
        (2) Some others may be involved
        (3) "Bed and Breakfast" Host - white-tail deer
        (4) Deer not good hosts or reservoirs but are the place where ticks meet and mate
    ii) Vectors
        (1) Ixodes scapularis
        (2) Other species may be involved
    iii) Pathogen ecology
        (1) Extended feeding time required for spirochete activation
        (2) Other agents in white footed mice
            (a) Borrelia burgdorferi
            (b) Anaplasma phagocytophilum
            (c) Babesia microti
    iv) Sentinels
        (1) Black bear
        (2) Coyotes and other canids
        (3) Raccoons
    v) Risk of transmission
        (1) Needs to feed for an extended time (18-24 hrs) to transmit the bacteria
        (2) Some areas are better than others
        (3) Can be found outside the high risk areas
    vi) Vector control
        (1) Guinea hens love ticks
        (2) Damminix tube - good for ticks on deer mice
        (3) 4-poster systems to kill ticks on deer
        (4) Mosquito Squad - commercial pest control
        (5) Protective clothing and repellents
        (6) Eliminate vector habitat
            (a) Forest fragmentation adding to TBD burden
            (b) Create tick safe zones
    vii) Education
        (1) Trailhead signs
        (2) Target risky behaviors
        (3) Know the disease symptoms and treatment
            (a) There are different strains of Borrelia burgdorferi
            (b) These can have different symptoms and signs
            (c) Lyme-Aid tick testing kit
        (4) Treat your animals
            (a) Against ticks and fleas
            (b) Vaccinate
c) Borrelia miyamotoi

i) Found in turkeys in TN, PA, and NJ
ii) Probably in other areas
iii) First human case in 2012

d) What is needed
i) Tick surveillance
ii) Testing - if you look for it you will likely find it
iii) Keep an eye out for Cytauxzoon felis
(1) Disease in cats
(2) Vectored by ticks
(3) Reservoir - bobcats

4) Progress on Development of Identification Keys - Charles Sither
a) Several keys for mid-Atlantic area but all are outdated
b) New key
i) 8 state area
ii) New characteristics
iii) New drawings and pictures
c) Methods
i) Not just an update of old data
ii) Review of literature
iii) Search through museum pictures
iv) Adobe Illustrator
(1) Illustrations will be zoomable
(2) Master images
d) Parts of key
i) Adult females
ii) 4th larval instars
iii) Keys to taxa
iv) Morphology
v) Couplet sequence for species
vi) Sibling species
vii) State distribution records
viii) Figures will be digital
e) Progress
i) All figures and couplets are drafted
ii) Layout prepared
iii) Some editing done
iv) Still need Bruce's notes
v) Should be done by next MAMCA
f) Distribution
i) Paper copy on water-resistant paper and spiral bound
ii) Electronic copy will also be distributed
iii) Web posting

5) Chikungunya Fever: The Probability of an Outbreak in the Southern US - Chris Evans
a) Some basics
i) Chikungunya means that which contorts or bends up

ii) Associated with bent appearance
iii) http://www.cdc.gov/chikungunya/index.html
iv) Togaviridae (Alphavirus)

b) History
i) First recorded in the 1770s
ii) First described in 1952
iii) Sporadic activity until 2004
iv) Epidemic: 2004-2006
(1) Started on the Kenya coast in 2004
(2) Spread to various islands in the Indian Ocean
(3) Moved to India
(4) Spread throughout Asia by viremia travelers
(5) Reached Italy in 2007
(a) Aedes albopictus was the vector
(b) 217 cases reported
(c) Peaked in August
(6) Attack rate was 33-68%
v) After the epidemic
(1) Imported cases continued to occur in 2010
(2) Little to no local transmission has occurred
(3) Areas at risk include Africa and India and parts of Asia

c) The disease
i) Vector
(1) Prior to 2000 - Aedes aegypti was the primary vector
(2) After 2000 - Aedes albopictus became a primary vector due to a gene mutation in the virus
(3) Transovariol transmission occurs
ii) Life cycle
(1) Humans are the main epidemic reservoir
(2) Non-epidemic reservoirs
(a) Primates
(b) Rodents
(c) A few others
(3) Sylvatic and urban cycles
iii) Incubation periods
(1) Viremia in humans: 3-10 days
(2) Extrinsic incubation: period 10 days
(3) Incubation period: 2-3 days
(4) Disease in humans
(a) Acute - week to 10 days
(b) Subacute - 3 months
(c) Chronic - 3 years
iv) Symptoms
(1) Vary
(a) Symmetrical joint pain
(b) Rash in 50% of patients

(c) Fever
(d) Skin peeling after rash
(e) Fatigue
(2) Can have chronic illness that lasts for years
(3) Recovery depends on age
(4) Chronic arthritis can occur
(5) Atypical symptoms do occur infrequently
(6) High risk groups >65 years of age

v) Treatment
(1) Treat symptoms
(a) Fever
(b) Joint pain
(2) No vaccine

vi) 3-28% of people are a symptomatic

d) Risk to US
i) No natural immunity
ii) Competent vectors present
iii) Seasonality
(1) Travel timing
(2) Mosquito populations at time of potential introduction

iv) Number of travel related cases is increasing
v) Model shows a 30% or greater probability of outbreak occurring
(1) In Miami 25% of population could be affected
(2) In Atlanta about 0.1% of population could be affected
(3) Epidemics are affected by season

vi) Resources
(1) http://www.ncbi.nlm.nih.gov/pubmed/22897347
(2) Guidelines for Preparedness and Response for Chikungunya Virus Introduction in the Americas - http://www.cdc.gov/chikungunya/
(3) http://www.ncbi.nlm.nih.gov/pubmed/17448935

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