MAMCA meeting
Jan 19-21, 2010

Tuesday, January 19, 2010

SESSION 1

1) Considering Aerial Programs – Scott Yackel
    a) Application options
        i) Scale
            (1) Large scale
            (2) Small scale
        ii) Control approach
            (1) IPM approach
            (2) Adulticide or larvicide only
        iii) Inspections
            (1) Ground
            (2) Air
    b) Specific programs
        i) Surveillance
            (1) Better access to difficult areas
            (2) Faster turnaround on inspection
            (3) Larger acreage
            (4) Work with ground inspectors
            (5) Saves time and money
        ii) Better "big picture" view for source reduction efforts
        iii) Adulticide
            (1) Impacts
                (a) Public perception
                    (i) Terrorism concerns
                    (ii) Feeling of inability to avoid spray
                (b) Environment
                (c) Non-target organisms
                (d) Air traffic
            (2) Benefits
                (a) Timing – much quicker than ground spray
                (b) Treatment area size
                (c) Consistent application
                (d) Less staff
                (e) Adulticide flexibility
                (f) Data logging
                (g) Area flexibility
            (3) Spray protocols may generate a need for quick response
    c) Aircraft options
        i) Vendor advantages
            (1) No financial investment unless services are needed

(2) County agency does not have to be aviation-oriented
(3) Program has less control
(4) Slower response
(5) Many requirements for choosing vendors

ii) Government- owned advantages
(1) Allows for an IPM approach
(2) Immediate response possible
(3) Program has control of operation
(4) Aircraft can be configured for your program
(5) Good PR –
(a) Use aircraft to help out in emergencies and trainings
(b) Use aircraft in educational outreach

d) Aerial info
i) FMCPA – FL Mosquito Control Pilots Association
ii) AMCPA – American Mosquito Control Pilots Association
iii) FMCA Aerial Fly-In
iv) Equipment guide – FMCA website

2) The History of Phragmites in the Eastern US With Some Implications for Mosquito Control – Bob Meadows
a) What is the big deal
i) Huge problem in NE US
ii) Will takeover marsh areas
iii) Loss of species diversity
iv) Changes hydrology
b) What happened
i) Started with a slow expansion
ii) Not quite sure why the sudden explosion
(1) Strain mutation?
(2) Anthropomorphic effects?
(3) Species introduction?
c) Figuring out the problem
i) Genetic ecology – Saltonstall, 2002)
ii) Genetic mutations have occurred
iii) M-type introduced to area
iv) All Phragmites is now an introduced strain
d) How did this happen
i) Ballast yard – areas where ships dumped ballast before taking on a load
ii) Introduction at Kaighn's Point NJ in the mid-1800s
e) Problems
i) Introduced species
(1) Spread by rhizomes
(2) Mats become very thick
(3) Dry out the marsh
(4) Prevent growth of other species
(5) Raise marsh level
(6) Fills in small channels

ii) Native
(1) Less dense
(2) More species diversity within phrag stands
(3) Tend to be higher up in drainage area

f) Telling the difference
i) Native
(1) Leaf sheaths loose
(2) Dark spots on stem
(3) Shorter
ii) Introduced
(1) Leaf sheaths tight
(2) Paler color
(3) Very tall and dense

g) Mosquito issues
i) Introduced phrag is very difficult to walk through – hard to do surveys
ii) Need to mow inspection trails
(1) Mowing creates open areas - does this increase access of mosquitoes and increase breeding
(2) Trail placement is critical
(3) Area accessed may not be representative of mosquito problem

h) Dealing with Phrag-dominated marshes
i) Mow – time consuming
ii) Burn – can be dangerous

3) Novel Transmission Cycle for EEE in the Southeastern US – Abelardo Moncayo
a) Coastal cycle – cypress swamps
i) Cs melanura
ii) Birds
iii) Bridge vectors – *Aedes, Coquilettidia, Anopheles, Culex*

b) Inland cycle – hardwood swamps
i) Unknown ecology
ii) Unknown vectors

c) Following up on EEE horse cases
i) Very few *Cs melanura* in area
ii) TVA found EEE in mosquitoes – *Cx erraticus*

d) Study
i) Trinidad mosquito trap - hamster baited
(1) Arboviral surveillance
(2) Vector incrimination
(3) Host incrimination
ii) Questions
(1) Is *Cx erraticus* present? YES
(2) Is *Cx erraticus* attracted to rodents? YES
(3) Can rodents elicit a viremia? YES
(4) Can rodents be infected in the field?
iii) Comparison of CDC light traps and Trinidad traps
(1) Trinidad traps primarily caught *Cx erraticus*

(2) Fewer *Cx erraticus* were caught in the Trinidad trap than the CDC light trap
(3) Diversity was much lower in the Trinidad trap
(4) Drought issues impacted data
(5) Recommendation – use CDC light trap initially

iv) Resting boxes
(1) Collected June through September
(2) Caught about 2000 blood fed mosquitoes
(3) Good data on 5 species
(a) *Cx erraticus* – mostly mammals, some birds
(b) *An quadrimaculatus* – primarily mammals
(c) *Cx nigripalpus* – 2:1 mammals to birds
(d) *An punctipennis* – mammal feeder
(e) *Cs melanura* – bird feeder
(4) Primarily feeding on mammals
(a) Mostly horses and deer
(b) Some smaller mammals
(c) Some reptile feeding – overwintering host??
(d) Some bird feeding
(5) *Cx erraticus* appears to be a good enzootic and bridge vector
(6) *Cx restuans* may also be an important enzootic vector

e) May be seeing a secondary cycle among small mammals/reptiles and *Cx erraticus* in areas where *Cs melanura* are not found
f) What about *Cx salinarius* and *Cx nigripalpus*?
g) Papers
i) J Med Entomol 46 (4): 862-865 (2009)
ii) Am J Trop Med Hyg 81 (3): … (2009)

4) Sustaining Members
a) Leading Edge Associates
i) Software applications
ii) http://www.leateam.com/
b) Southern Helicopter Leasing - http://southernhelicopterservice.com/files/SHL_BROCHURE_2008.doc

5) Map Vision: Mapping Operations for You and the Public – Jeff Stivers
a) From Leading Edge Associates
b) http://www.collier-mosquito.org/treatment_schedule.php
c) Uses
i) Public
(1) Public can find out where spraying is being done
(2) Complaints can be registered
(3) Pending missions can be seen
(4) Missions flown within the last week can be seen
ii) Colliers Mosquito Control
(1) All data are readily available to crew
(2) Easy to use
(3) Public can not see intranet site

(4) It can be put out to the public as needed

SESSION 2

1) How Black Fly Populations in PA are Affected When Black Fly Control Activities Cease Mid-Season – Andy Kyle
   a) Background
      i) Program started in 1985
      ii) Aerial application of Bti for black fly control
      iii) Largest black fly control program in the world
      iv) Treat 46 rivers and streams (1600 miles)
   b) Procedure
      i) Eggs hatch in April
      ii) Control begins in April or May
      iii) Control ends in early Sept
      iv) 3 river basin area contracts
   c) Monitoring and surveillance
      i) Larval surveillance ~900 sites
      ii) Adult sampling ~1100 sites
      iii) Samples taken back to lab and ID'ed
   d) What was new in 2009
      i) State budget impasse
      ii) No budget until Oct
      iii) Black fly program appropriation was slated to be reduced
      iv) Decision – stop treatments on July 21, 2009
      v) Continued to do surveillance
   e) What happened in August - 2 weeks after control was stopped
      i) Citizen complaints began to rise
      ii) Black fly numbers rose to impossible levels
      iii) Problems continued after the regular season was over
      iv) Businesses were complaining of loss of business due to black flies
      v) Legislative inquiries began – didn't seem to understand the connection between budget cuts and rising black fly populations
   f) What happened with the black fly populations
      i) Larvae were seen in late Sept and early Oct, even after colder weather had begun
      ii) Adult surveillance
         (1) <=10 are tolerable
         (2) 0-1 are normal after control
         (3) Considerably more adults were found in 2009 than in the 4 previous years – as many as 600 adults in a sweep net
   g) Implications for 2010
      i) Budget hasn't increased
      ii) Control will likely stop early again
      iii) Black fly populations got a head start due to lack of later season control in 2009

2) Surveillance Training for Public Health – Ros Kelly
    a) Do surveillance
    b) Keep good records
3) Natular XRG Formulation Field Trial on a Former Dredge Spoil Site in Portsmouth, VA – George Wojcik
    a) Site description
        i) Phragmites site
        ii) Old dredge spoil site – last pumped in the early 70s
        iii) Mosquito species depend on rainfall and vegetation density
        iv) Ditches all clogged
    b) Ground spot application
        i) Mow paths to allow access
        ii) Ability to control depends on water level
    c) Natular trials
        i) Sampling protocol
            (1) Simple transects
            (2) Stop at 10 sites – GPS sites
            (3) Dip 5 times for larvae
                (a) Find larvae in any of the 5 dips – positives
                (b) No larvae in any of the 5 dips – negative
            (4) Sampled 2 times after treatment
            (5) Ended up making 3 transects since the phrag grows so rapidly
        ii) Treatment protocol – aerial application of Natular XR
        iii) Post-treatment
            (1) 24 hour
                (a) Dead larvae found
                (b) Non-targets present
                (c) Untreated control (UTC) was all positive
            (2) 3 days
                (a) No larvae in treated site
                (b) UTC sites all positive
                (c) Non-targets present
            (3) 10 days – sites dry
            (4) Rainstorm
            (5) 17 days – same results as day 3 post-treatment
            (6) 20 days – same results as day 3 post-treatment
            (7) 24 days – sites dry
    d) Conclusions
        i) Effective for multiple species
        ii) Some residual out to 20 days even after a dry-down
        iii) Did not see a non-target affect
        iv) Some minor formulation issues – resolved by Clarke
4) *Culex pipiens/restuans* Oviposition Study: Determining Nocturnal Flight Activity – Christian Boyer
    a) Paper from Massachusetts – optimum flight activity 2 hours after sunset
    b) Needed to repeat study for PA

c) 2007 study
    i) Design
        (1) Establish trapping sites
        (2) Gravid traps
        (3) Total mosquitoes, not species
        (4) Record temp and wind speed
        (5) Collected between June and September
        (6) Collect once an hour
    ii) Results
        (1) Peak activity soon after sunset
        (2) Morning peak also occurred
        (3) Main activity at around 9 PM with a second smaller peak at 6 AM
        (4) More data needed
d) 2008 study
    i) Some variability - a few sites had pre-sunset peak
    ii) Most activity between 8 and 11 PM
e) 2009 study
    i) Questions
        (1) How small is the window?
        (2) Is collecting causing a disturbance?
        (3) Did setting the trap draw in mosquitoes?
        (4) Could the starting time and study length be changed?
    ii) Protocol
        (1) Set trap before sunset
        (2) Start collecting one hour before sunset
        (3) Collect every 15 minutes
        (4) Collect for 3 hours after sunset
        (5) Change entire trap at each collection
        (6) Establish trap sites where high numbers of *Culex* spp were found
        (7) Collect between July 27th and Aug 24th
        (8) Broaden study area
    iii) Results
        (1) Everything except one *Oc triseriatus* were collected just after sunset or later
        (2) Most collected within one hour after sunset
        (3) 10 species caught
        (4) 98% were *Culex* spp
    iv) Conclusions
        (1) Activity limited at 2 hours after sunset
        (2) Sunset correlates strongly with flight/oviposition activity
        (3) *Cx pipiens* were collected earlier than *Cx restuans*
        (4) Bottom line
            (a) Start treating at sunset
            (b) Treat a shorter time period of time
f) Questions for the future
    i) What happens as the days get cooler?

ii) What is going on with *Cx pipiens* and *Cx restuans*?

5) Sustaining Members
   a) ADAPCO – Steve Molnar (http://www.myadapco.com/)
   b) Clarke – Jeff Hottenstine (http://www.clarke.com/)
   c) Central Life – Charlie Pate (http://www.wellmarkinternational.com/mosquito.htm)

Wednesday, January 20, 2010

SESSION 1

1) Investigations Related to Bti Efficacy and Larval Black Flies – Elmer Gray
   a) UGA – black fly colony
      i) Established 1981 at Cornell
      ii) Moved to Clemson in 1991
      iii) Now the only established black fly colony in the world
      iv) Supported by Abbott Labs – now Valent BioSciences
      v) 9 tanks currently in place
      vi) Currently over 2 million flies in colony
   b) Projects
      i) Basic research
      ii) Quality control
      iii) Special requests
   c) Black fly
      i) Attach to substrate
         (1) Silk glands – spin a silk pad
         (2) Attach by hooks
      ii) Filter feed in current
      iii) Indiscriminate filter feeders
   d) Control
      i) Bti
      ii) Challenges
         (1) Flowing water
         (2) Habitat change through length of waterway
         (3) Water quality
   e) Efficacy Study - Antibiotics
      i) Susquehanna River
         (1) Threatened system
         (2) 2 branches join to form a main stem
         (3) Many different kinds of input
         (4) Antibiotic issue (Broderick et al 2006) from agricultural contamination
      ii) Study protocol
         (1) Larvae exposed to antibiotics for 48 and 72 hours in shakers
            (a) Exposed at rates in river
            (b) Exposed in combination
            (c) Exposed at higher rates

(2) Exposed to Bti
iii) Results – no loss of efficacy
iv) Paper accepted for publication

f) Efficacy Study – Turbidity
i) Suspended solids causing a reduction of >30% in Bti efficacy
ii) Dissolved particles had no effect on efficacy
iii) Re-suspension of solids also caused reduced efficacy
iv) Data suggest that there may be feeding competition between Bti and suspended clay particles
(1) Bti binds to clays
(2) However, adding clays to bioassays did not lead to reduced efficacy

g) Efficacy Study – Cations
i) Could these affect Bti proteins?
ii) No effect seen

h) Efficacy Study – pH
i) Ranges from 7-9 in the river
ii) No pH effect was seen during bioassay
iii) Some report increased efficacy at higher pH

i) Efficacy Study – Algae
i) Previous published work shows that green algae can reduce efficacy
ii) Appears to be related to particle size

j) The work continues!

2) AMCA Update: 75 Years of Service – Doug Carlson
a) History
i) Founded in NJ in 1935
ii) 1700+ members
iii) Broad range of disciplines
iv) Goal – promote high level of integrated mosquito management
(1) Leadership
(2) Advocacy
(3) Legislative & Regulatory
(4) Education

b) Current issues
i) CWA/NPDES permit
(1) Players
(a) NPDES – National Pollution Discharge Elimination System
(b) FIFRA – Federal Insecticide, Fungicide, and Rodenticide Act
(c) CWA – Clean Water Act
(2) Several pesticide problems on the west coast ended in a ruling that pesticide use needed an NPDES permit
(3) Pesticide applications had been exempt provided they were in compliance with FIFRA
(4) Battle between EPA and Circuit Courts
(5) Bottom line – we are likely going to need an NPDES permit to apply pesticides
ii) WNV funding

iii) Wildlife Refuge control
c) PESP partner (EPA initiative)
d) Webinars
e) Publications
f) Washington Day
g) www.mosquito.org

3) Recent Trends in Arboviruses Fund in the US – Janet McAllister
a) Many external influences on arbovirus transmission
b) Many unknowns
i) Vectors
ii) Role of incidental hosts
iii) Overwintering mechanisms
c) Many arboviruses found in the US from 5 different viral families
d) Some specifics
i) WNV
(1) Flavivrus
(2) Found in many different habitats
(3) Principal vertebrate host – birds
(4) Vectors – *Culex* spp
(5) Reported from 48 of 50 states
(6) Human cases reported from 47 states - no cases in
(a) Maine
(b) Hawaii
(c) Alaska
(7) First year reported - 1999
(8) Peak year – 2002
(9) Average human cases ~3000 per year
ii) SLE
(1) Flavivirus
(2) Vector – *Culex* spp
(3) Human cases reported from 42 states, including GA
(4) Last large outbreak 1975
(5) Average ~102 cases per year
(6) Numbers appear to be going down
iii) LAC
(1) Bunyavirus in the California serogroup
(2) Considered a more rural disease
(3) Vertebrate host – small mammals (squirrels and chipmunks)
(4) Vector – *Ochlerotatus triseriatus*
(5) Found primarily in the eastern US
(6) Average ~78 cases per year
(7) Under-reported
iv) Western Equine Encephalitis
(1) Associated with irrigated areas and flood plains
(2) Vector – *Culex tarsalis*
(3) Alphavirus

(4) Found in the western US
(5) No human cases since ~1999
(6) Last significant activity 1987
(7) Positive mosquitoes and seropositive birds are found

v) EEE
(1) Associated with freshwater hardwood swamps
(2) Vertebrate host – birds
(3) Enzootic vector – *Cs melanura*, may be others
(4) Needs a bridge vector
(5) Found in eastern US
(6) Average cases ~7 per year
(7) Last big outbreak in 2005

e) Appears to be a downward trend in arboviral diseases in the US over the last couple of years

f) Some non-endemic arboviruses

i) Yellow fever
(1) Was found from MA to LA
(2) Epidemics occurred from 1793-1905
(3) Vaccine available
(4) Still endemic in other places in the world
(5) Epidemic in US is currently unlikely
(a) Rare imported cases with travel history
(b) No local transmission

ii) Chikungunya
(1) Historically found in Africa and NE Asia
(2) Primary vector – *Ae aegypti*
(3) Primary host - humans
(4) Large outbreak in 2006 associated with *Ae albopictus*
(a) Vector common in US
(b) A number of imported cases reported in US
(c) Large outbreak in Italy in 2007

iii) Japanese Encephalitis
(1) Vaccine available
(2) Can infect a number of vertebrate hosts besides humans

iv) Rift Valley Fever
(1) Disease of humans and livestock
(2) Recent outbreaks occurring

v) Dengue
(1) Vector – *Ae aegypti*
(2) Can be transmitted by *Ae albopictus*
(3) Outbreaks have occurred recently in US
(a) Now a reportable disease
(b) Small outbreak in Key West, FL
(c) Periodic local transmission in Texas along the border
(4) A lot of travel-associated dengue seen in the US
(5) Resurgence of disease as *Ae aegypti* eradication programs fail

4) Sustaining Members
    a) Electronic Data Solutions – Mike Swan
        i) http://www.elecdata.com/
        ii) Sentinel GIS software
        iii) Programs
            (1) Forestry
            (2) Water quality
            (3) Mosquito control
        iv) Modular components
            (1) ESRI platform
            (2) Desktop application
            (3) Works with a variety of mobile devices
        v) Easy to use
    b) UNIVAR – Joe Andrews
        i) http://www.univarusa.com/
        ii) Pesticide
        iii) Spray equipment
        iv) Represent
            (1) Curtis DynaFog
            (2) London Fog
    c) Bayer Environmental Science – Don Botkin
        i) Distributed by ADAPCO
        ii) Many products
        iii) http://www.bayerprocentral.com/BAYER/CropScience/BackedByBayer.nsf/id/EN_Home

SESSION 2

1) A GIS Model for Predicting the Real-Time Risk of Arboviral Transmission in FL – Jon Day
    a) System
        i) Arbovirus - SLE
        ii) Primary vector – *Cx nigripalpus*
        iii) Amplification
            (1) Mosquitoes
            (2) Birds
        iv) Vector
            (1) Extreme drought will shut down breeding
            (2) Extreme flooding will as well
            (3) Floodwater Culex
            (4) Oviposition sites are in low-lying areas where periodic flooding occurs
    b) Setup
        i) 589 MWTD data recording stations across peninsular FL
        ii) Can measure rise and fall of ground water as well as other parameters
        iii) See a lot of variability in water table depth
    c) Historic data

i) 1977 – SLE outbreak
    (1) Water table showed a typical dry season dry down
    (2) Mid May – June initial wetting
    (3) Secondary dry down
    (4) Wet season increase
ii) 1990 – SLE outbreak
    (1) Similar profile
    (2) Defined dry and wet seasons
iii) Particular interest in the initial wetting period

d) Data Modeling
    i) Model water table depth
    ii) Look at how typical the water table data are for epidemic transmission
    iii) Turn data into a risk map
        (1) Take daily values at each MWTD site
        (2) Graph how closely data match risk model
        (3) Map data to risk map

e) Pinellas County Case Study – 2005
    i) 3 of 5 major SLE epidemics began in this county
    ii) 2005
        (1) 18 cases
        (2) Onset dates – 1 June to 22 Aug
        (3) 6/3/05 risk map showed high risk in Pinellas County area
        (4) 8/12/05 risk map showed decreasing risk in area
    iii) County Mosquito Control tracked virus in mosquito pools and birds
    iv) WNV
        (1) Mapped cases against the risk graphs
        (2) Human cases occurred when data matched model
        (3) Mosquito populations
            (a) High in year prior to epidemic
            (b) Populations skewed to older mosquitoes during epidemic year
        (4) Sentinels showed positives to match human cases

f) What is the effect of human populations density?

2) Assessment of Methoprene in Marine Waters After Catch Basin Treatment with Altosid XR Briquets – Gregg Hunt
    a) Study area – Beaufort County
        i) 600 sq mi
        ii) Many foreclosures in area
        iii) A lot of water and many small islands
    b) WNV detected in 2003
    c) Source of mosquitoes largely catch basins
        i) Plan - survey and treat all catch basins
        ii) 4000 storm water drainage ponds
        iii) Evaluated 3-day altosid briquets for treating catch basins
        iv) Switched to XR briquets due to manpower issues
    d) Media attention led to concern from environmental groups as to the effect of altosid on marine organisms

e) STUDY #1 – is there an unintended effect of altosid on marine organisms?
    i) Study area – downtown business district for the city of Beaufort
        (1) Several different types of habitat
        (2) 234 catch basins
        (3) 16 outfall structures
        (4) Drain into a primary river
        (5) Tidal creek and tidal pond
        (6) Tides are typically 6-9 feet
    ii) Procedure
        (1) Locate and map catch basin
        (2) Treat with one briquet
        (3) Sample outflow water at 13 collecting sites after rainfall
        (4) Track concentrations of methoprene over time (ppt)
    iii) Results
        (1) Pretreatment – no methoprene detected
        (2) During the following 6 months
            (a) Methoprene was detected at only 4 sites
            (b) Amounts were in parts per trillion
        (3) 17" of rain in area
        (4) Toxicology studies
            (a) Crustaceans: Grass shrimp and …
            (b) Very sensitive non-target
            (c) Amounts of methroprene that affect shrimp during toxicology studies are much higher than that found during study
            (d) Methoprene degrades rapidly in sunlight

3) Mosquito Control Management on National Wildlife Refuges Along FL's Indian River Lagoon – Doug Carlson
    a) 2 NWR refuges in area
        i) Merritt Island
            (1) 140K acres
            (2) Salt marsh
            (3) Maple bay swamps
            (4) Grass marshes
        ii) Pelican Island
            (1) 5300 acres
            (2) Mangrove swamps
            (3) Disturbed uplands
    b) Indian River Lagoon
        i) Lagoonal estuary
        ii) 156 miles long
        iii) 5 inlets to Atlantic Ocean
        iv) Very diverse habitat and plant and animal life
    c) Impoundment management
        i) 40,000 acres
        ii) Created in 1950s and 60s
        iii) Flooded during mosquito season

iv) Eliminates egg laying sites
v) Drawbacks
(1) Interferes with movement of water
(2) Changed habitat
vi) Benefits
(1) Resident fish populations thrive
(2) Can be managed for waterfowl
(3) Wading birds thrive

d) Mosquito control in area requires good cooperation between the NWR and the local mosquito control agency
e) Concerns from draft policy concerning control on NWR
i) What constitutes a health threat
ii) Determination of "no economic impact"
iii) These NWR are adjacent to residential areas
iv) Loss of ability to control in these areas will have an large impact on quality of life in residential areas adjacent to the NWR

4) Sustaining Members
a) Valent BioSciences – Jim Andrews
i) VectoMax –
(a) Combination of Bti and *Bacillus sphaericus*
(b) Toxins are fused together to prevent preferential feeding
(2) Studies show residuals of up to 10 weeks
(3) Seeing an IGR-like effect
ii) ULV spray technology for larviciding to combat *Ae albopictus* in containers
(1) Several studies are ongoing
(2) Vectobac
iii) http://www.valentbiosciences.com/
b) FourStar – Bill Mintz
i) Microbial products
ii) Create unique formulations
(1) 45 days control
(2) 90 days control
(3) 180 days control
iii) Objectives
(1) Long-lasting
(2) Primarily urban habitats
(a) Catch basins
(b) Swimming pools
iv) Bs to Bti ratio: 6% to 1%
(1) 3 sizes
(2) Dual action release technology
v) Distributed by ADAPCO

SESSION 3

1) The Clean Water Act and Mosquito Control: Past, Present, and Future – Joe Conlon

a) History
    i) Passed after the Cuyahoga River caught on fire
    ii) 1972 - Restore and maintain chemical integrity of navigable waters
    iii) 1973 – FIFRA defines navigable waters
    iv) The government is currently seeking to remove the term “navigable waters”
b) Comparing FIFRA and CWA
    i) FIFRA
        (1) Cost/benefit risk-based
        (2) Fine - $7000/incident
        (3) No citizen suits
    ii) CWA
        (1) No cost/benefit
        (2) Hazard-based
        (3) Fine - $37000 per day
        (4) Citizen suits
c) Pesticide General Permit (PGP)
    i) Notice of Intent (NOI)
        (1) Type or scale of application
            (a) Feds have no idea what this will be
            (b) Situation very fuzzy at the moment
        (2) Identify the responsible entity
            (a) Contact info
            (b) Description of entity
            (c) Type of discharge
            (d) Receiving stream(s)
        (3) 25(B) not exempt
    ii) Technology-Based Effluent Limits (TBEL)
        (1) IPM plan based on BMP
        (2) Assumed to be best technology
    iii) Water Quality-Based Effluent Limits (WQBEL)
        (1) States that if TBELs are met, WQBELs are met
        (2) Some very fuzzy language included
    iv) Monitoring
        (1) Required
        (2) Visual??
        (3) Enhanced??
        (4) Frequency and timing
        (5) No ambient water quality testing foreseen – yet
    v) Annual reporting
        (1) Required
        (2) Accessible by the public
        (3) Types, amounts, locations
d) General NPDES permit
    i) Based on writer’s best professional judgment
    ii) Open to public comment
    iii) EPA oversight

e) Endangered Species Act will come into play
f) Schedule
    i) April/May 2010
        (1) Draft permit
        (2) Public comment
    ii) Dec 2010 – final permit issues
    iii) www.epa.gov/npdes/training
g) State of Washington Draft Permit
    i) Coverage not needed:
        (1) Retention ponds if no discharge within 2 weeks
        (2) >5 acres constructed water body
        (3) Inland farm pond
        (4) …
    ii) Surveys
        (1) Larval dips
        (2) Representative sampling
        (3) Use of temephos restricted
    iii) Notification
        (1) Public notice in a newspaper >=10 days before first application
        (2) Must provide maps
        (3) NWR – 24 hour notification
    iv) Conditions for application
        (1) Larvicide
            (a) Must not cause long-term environmental harm
            (b) 1 larva/pupa per 3 dips needed
            (c) List of allowed larvicides
        (2) Adulticide
            (a) Not allowed for nuisance mosquito control
            (b) Set season, April 1 – Oct 1
            (c) ULV
            (d) Follow label
            (e) Authorized adulticides
            (f) Do recognize need for resistance management
        (3) Reporting
            (a) File online
            (b) Signed letter must be on file
            (c) Keep records for 5 years
        (4) Testing required
h) BMP – AMCA
    i) http://www.mosquito.org/secure/upload/articles/BMPsforMosquitoManagement.pdf
    ii) Components
        (1) Surveillance
        (2) Mapping
        (3) Action thresholds
        (4) Physical control/source reduction

(5) Biological control
(6) Chemical control
(7) Efficacy/resistance monitoring
(8) Education and community outreach
(9) Record keeping

i) NPDES permit
  i) This will be a nightmare as the environmental groups become involved
  ii) One mosquito control agency has already been sued for spraying without a permit EVEN THOUGH NO PERMIT YET EXISTS
  iii) Supreme Court has been petitioned about the 6th Circuit Court's decision
    (1) If accepted, oral arguments by Oct
    (2) If denied, mandate goes into effect 9 April 2011
  iv) Bottom Line – we will have permits
    (1) EPA will try to make permit as easy and unobtrusive as possible
    (2) Environmental activities will begin filing appeals to shut down mosquito control

2) A Global Perspective on the Renewed Interest in Public Health Pesticides – Cpt Stan Cope
  a) Some of the groups involved
    i) Public Health Pesticide Consortium (PHP)
      (1) Mission: ensure availability of effect public health pesticides
      (2) 8 Federal agencies represented
      (3) Priority issues include creating incentives, promote project development, and develop documents supporting public health pesticide use
      (4) http://www.lmca.us/program%20pdf%20files/2007/1%20300%20-%20315%20mcallister.pdf
    ii) EPA
      (1) Recognize the need for public health pesticide use
      (2) International workshops to promote development of new products
      (3) www.iphpw.org
      (4) Working on setting up a test case
      (5) Agricultural model exists
    iii) Innovative Vector Control Consortium
      (1) Gates Foundation
      (2) Led by the London Scholl of Tropical Medicine
      (3) Goal: delivery of new tools and product for public health pest control
        (a) Develop a new portfolio of pesticides- repurposing current chemicals
        (b) Focus on dengue and malaria control
      (4) http://www.ivcc.com/
    iv) Deployed Warfighter Protection Research Program
      (1) http://www.afpmb.org/dwfpresearch.htm
      (2) Administered by Armed Forces Pest Management Board
      (3) Area of emphasis
        (a) Novel insecticide chemistries/formulations
        (b) Personal protective systems

(c) Application technology
(4) DWFP competitive grants
(5) Many accomplishments
(a) Barrier spray work
(b) Permethrin clothing treatment process
(c) Improving residual treatments for materials
(d) Filth fly control
(e) Basic research on control issues
(f) Others

v) Inter-Regional Project 4 (IR4)
(1) http://ir4.rutgers.edu/
(a) http://www.entm.purdue.edu/IR4/
(b) http://www.csrees.usda.gov/fo/ir4minorcroppestmanagement.cfm
(2) Variety of ongoing projects

b) Many groups working together to keep public health pest control a viable reality

3) Identifying Females of *Ochlerotatus atlanticus* and *Oc tormentor* and Similar Species – Bruce Harrison
a) Needed specimens with associated larval and pupal skins
b) Species Identification
i) *Oc atlanticus* and *Oc tormentor*
(1) Similarities
(a) Median pale longitudinal stripe with straight margins on scutum
(b) Scales on head narrow
(c) Median pale longitudinal stripe on scutum
(d) Scales on head narrow
(e) Larval color patterns are the same
(2) Differences
(a) Can be separated using male genitalia
(b) Can be separated using larvae
(c) Female characteristics
(i) Head scale arrangement
1. Dark scales behind eye
a. *Oc atlanticus* – reach eyes on both sides
b. *Oc tormentor* – do not reach the eyes
(ii) Width of median longitudinal white stripe on scutum just before prescutellar area
1. *Oc atlanticus* – width remains the same throughout
2. *Oc tormentor* – width narrows before it reaches the prescutellar area

ii) *Oc infirmatus*
(1) Pale scales on thorax do not go to prescutellar area
(2) Usually rubbed
(3) Larval color different than *Oc atlanticus* and *Oc tormentor*

iii) *Oc dupreei*
(1) Stripe wider, margins not straight

(2) Tiny species
(3) Head scales are wide
(4) Males have all pale scales on scutum

c) DNA analysis is being done
   i) Hope to have primers for genetic analysis
   ii) Paper should be forthcoming

4) Sustaining Members
   a) Curtis Dyna-Fog – Matt Tandy
      i) Pesticide application equipment
         (1) >75 different models
         (2) Handheld to truck mounted
            (a) ULV and Thermal
            (b) Electric and gasoline
            (c) Truckmount options
               (i) GPS
               (ii) Varying HP
               (iii) Different pump types
               (iv) Digital tachometer
               (v) Others
         (3) Traps
            (a) UV
            (b) Incandescent
            (c) CO_2
      ii) http://www.dynafog.com
   b) AMVAC – Peter Connelly (http://www.amvac-chemical.com/amvacchemical.html)
   c) Summit Chemical – Jonathan Cohen (http://www.summitchemical.com/)

SESSION 4

1) Efficacy of Barrier Treatments on Natural populations of Mosquitoes and Sand Flies – Ken Linthicum
   a) Geared towards protecting military on deployment
      i) Hot/dry environments
      ii) Sparse vegetation
   b) Mosquitoes and flies
      i) Study areas
         (1) California desert
            (a) Artificial enclosure study
               (i) Barrier treatment
               (ii) Procedure
                  1. Several different types of equipment
                  2. Monitored weather stations
                  3. Collected mosquitoes using light traps
                  4. Bioassay using *Cx tarsalis*
               (iii) Results

1. Significant reductions in mosquito populations after treatment
2. Control for about a month

(iv) Conclusions - barrier treatment on netted enclosures successfully reduced mosquito populations

(b) Treating vegetation showed similar results

(2) Camp Blanding, FL

(a) Similar results seen with treated netting

(b) Very different environment

ii) Conclusions

(1) Good mosquito reduction of target species

(2) Treating either fabric and vegetation will reduce mosquito numbers

(3) Also useful in fly control

c) Sand flies

i) Material treated prior to shipping to site

ii) Significant reduction of sand flies up to 196 days after treatment

2) The Disaster Process and the Importance of Documentation During the Recovery Phase – Gary Rice and Robin English

a) Disaster declaration process (Gary Rice)

i) Where does it all begin

(1) Local damage assessment – local state of emergency

(2) State of emergency declared – freezes up state resources

(3) Federal disaster declaration

(a) FEMA comes in

(b) Reassessment is done

(c) Must meet per capita threshold for public assistance

(i) At state level – for any assistance

(ii) At county level – for assistance to a specific county

(d) Thresholds set for each fiscal year in Oct

ii) Documentation

(1) Most important thing to be done to get money back

(a) Overtime

(b) Materials

(c) Equipment

(2) Equipment and personnel MUST match

iii) Preliminary damage assessment

(1) Completed ASAP after life safety issues have been completed

(2) Paperwork sent to OHS-GEMA

(3) Work with field coordinator

iv) Issues to consider

(1) Roads

(2) Bridges

(3) School closures

(4) Water systems

(5) Sewage issues

v) Information helps show FEMA that the problem is too big for the county or the state to fix

vi) Vector control
    (1) Category B – emergency protective measures
    (2) Removal of health and safety hazards
        (a) Health hazard
        (b) Verification is required
        (c) Public health must be involved
    (3) Process
        (a) Contact – good to know who these people are before an emergency
            (i) County EMA Director
            (ii) State EMA Field Coordinator
        (b) Coordination between Public Works and Vector Control

b) Documentation During the Recovery Phase (Robin English)
    i) Important notes
        (1) Complete your own paperwork
        (2) Provide proof at time of submittal
        (3) Document, document, document
            (a) Include complaint info
            (b) Include larvicide given to the public
            (c) No documentation will go to waste
    ii) FEMA will only reimburse the difference in your vector control costs
    iii) Need evidence of a problem
    iv) FEMA will consult with the CDC
    v) You must be prepared to take action prior to reimbursement
    vi) No guarantee of reimbursement
    vii) Documents required
        (1) Current data
            (a) Population numbers
            (b) Arboviral data
        (2) Data from past 3 years
            (a) Mosquito surveillance data
            (b) Arboviral information
            (c) Work orders for mosquito control
            (d) Labor - Employee hours
            (e) Equipment use documentation
            (f) Pesticide use
        (3) Post-treatment data
        (4) Public Health Declaration
        (5) Map showing areas of need
    viii) Data collected
        (1) Keep good records before, during, and after the disaster
        (2) Don't try to put too much info on any one sheet – you will make mistakes
    ix) Websites of interest
        (1) FEMA Equipment Rates
        (2) FEMA forms
        (3) State emergency management info
        (4) FEMA Vector Policy

3) Importance of Droplet Knowledge – Bill Reynolds
    a) Why do we calibrate and measure droplets
        i) Historically, certain products caused paint spotting on automobiles
        ii) Early research discovered certain drop sizes were more efficacious
            (1) Too heavy: non-target mortality
            (2) Too light: no deposition of product
        iii) Various studies
            (1) Study in 1970
                (a) Relationship of minimum lethal dose to optimum droplet size
                (b) Lethal dose contained in an 18 micron droplet
                (c) Too large of a droplet wastes product and money
            (2) Droplet size effects drift
        iv) Droplet density is the inverse cube of the diameter in microns x 8
            (1) Smaller droplets waste less product
            (2) Have a higher probability of impinging on a mosquito – to a point
    b) Benefits of smaller droplet density
        i) Better kill
        ii) Better dispersal
        iii) Less product waste
    c) What are the driving forces now?
        i) New label language requires info on $Dv_{0.1}$, $Dv_{0.5}$, and $Dv_{0.9}$
        ii) XF (extra fine) droplet spectrum required
        iii) Relative span – distribution of droplets in curve
    d) Droplet collection methods
        i) Spinning impingers
            (1) Good for ground and aerial
            (2) Not effective for collecting far field or downrange smaller droplets
            (3) Biased
            (4) Various sized slides for different purposes
        ii) Cascade impacter
        iii) Silicon
    e) Measuring droplet spectrum
        i) By eye using a microscope ☹
        ii) DC-III hotwire
        iii) DropVision systems
4) LAC in Western North Carolina – Brian Byrd
    a) Background
        i) Principal vector – *Ochlerotatus triseriatus*
        ii) Isolated in 1960 in LaCrosse, WI
        iii) Pediatric illness
        iv) Low case mortality
        v) Substantial economic burden
    b) LAC hot spots seen in the US – PLoS One study
    c) NC data
        i) Clear focus in western part of state
        ii) Hoping to do some additional risk studies

iii) Increase in cases seen since 1996 with peak in 2005

d) LAC is very under-reported
   i) Szumlas et al. 1996, antibody study
   ii) High risk of transmission
e) Life cycle
   i) Small mammals – amplifying host
   ii) Vertical transmission occurs (transovarial)
   iii) Venereal transmission occurs
   iv) Humans are likely dead-end hosts
   v) Vector Competence
      (1) *Oc triseriatus* most competent (Hughes MT et al. J Med Ent. 2006.43 (4): 757-61)
         (a) Tree hole breeder
         (b) Will breed readily in tires
      (2) Evidence that *Ae albopictus* may be involved in transmission (invasive species)
      (3) *Oc japonicus* is competent in the lab (invasive species)
f) Studies done on WCU Campus
   i) Ovitrap collections
      (1) Show that species in area are primarily invasive species
      (2) Change from historic data
   ii) Morphological studies for ID of damaged adult *Aedes*/*Ochlerotatus* spp
   iii) Molecular methods for identifying container-breeding mosquitoes
g) Future studies
   i) Adult age structure/composition
   ii) Barrier spray effectiveness
   iii) Host seeking patterns and preferences

5) Hand-Held and Truck Mounted Application of Bti to Control Container Breeding Mosquitoes – LT James Dunford
   a) Reasons for this study
      i) Would be more time efficient
      ii) Population reduction prior to adult emergence
   b) Purpose
      i) Evaluate ability to control larvae using ULV application
      ii) Look at mortality and product penetration
   c) Methods
      i) Bti – efficacy known
      ii) Various equipment evaluated
      iii) Evaluated droplet size
      iv) Used *Aedes albopictus* in study
         (1) Larvae placed in cups
         (2) Cups placed in rows
         (3) Field plots had varying vegetation density
         (4) Cups placed at varying distances from applicator
   d) Summary
         (1) Particle deposition was usually low in areas with low mortality

(2) Shape/size of larval habitat affected particle penetration as did vegetation
(3) Deposition decreased with distance from sprayer
(4) Results vary depending on equipment used
(5) Environmental factors
(a) Weather conditions were a big factor
(b) Humidity affected spray distance
(6) Droplet size is important
(7) Dilution rates affected results

e) More work is needed

6) Sustaining Members: AllPro Vector Group – David Sykes
   a) Now selling directly
   b) Parent company – big formulator
   c) Products for 2010
      i) Evoluer
      ii) Provect – granular or liquid
      iii) Aqualuer –
         (1) Orange oil based
         (2) Very stable mixture
      iv) Envion – oil or water dilutable
      v) London Fog equipment
         (1) GPS capability
         (2) ADAPCO monitor is compatible
   d) www.allprovector.com

Thursday, January 21, 2010

SESSION 1

1) The Armed Forces Pest Management Board Web Site: Sine Qua Non of Cyber Entomology – Rich Robbins
   a) www.afpmb.org
      i) 99% of material is open access
      ii) Webmaster – David Hill
   b) Home page
      i) Google search specific for the website
      ii) What's new column
         (1) Frequently updated
         (2) Shows papers of particular significance to vector biologists
         (3) Also shown announcements
         (4) Items of particular importance are archived on bulletin page, which is crawled by major search engines
      iii) Multimedia column
         (1) Videos
         (2) Images
            (a) Link to submit an image to the database

(b) Useable images – follow copyright laws
(3) Resource column
(a) Living hazards database
(i) Most frequently visited page
(ii) Info on venomous animals
1. Alphabetically by animal
2. By country, then alphabetically by animal
(b) Walter Reed Biosystematics Unit
(c) Publications database
(i) Publications
(ii) Interactive teaching tools
1. Free DVD copies available
a. Mosquito larvae
b. Mosquito adults
2. Free CD copies available – tick ID
(4) Bulletin page
(a) Items of particular importance are archived here
(b) One for each year
(c) Takes the place of the old Technical Information Bulletin
iv) Literature Search –
(1) Free
(a) AFPMB literature database
(b) WRBU literature database
(2) Also have access to other databases
(a) Can create a bibliography of papers on a specific topic
(b) Will get article, create a pdf, and send it out to the researcher
(3) Request that researcher send any useful info – published or unpublished – for inclusion on site

c) Disease Vector Ecology profiles
i) By country
ii) Maintain hard copies as well

d) Technical Guides
i) Manuals
ii) Focus on control and management
iii) Not available in hard copy
iv) Formally Technical Information Memorandums

2) Educational Programming at Chatham County Mosquito Control – Bobby Moulis

a) History
i) Agency established in 1956
ii) Did limited out-reach from the very beginning
iii) History of vector-borne diseases in Savannah

b) Education program
i) Out-reach occurs in the off season
ii) Focus on grade school kids
iii) Also work with local colleges
iv) Give out promotional items

v) Educational brochures available
vi) Career Day
(1) Try to bring larger equipment
(a) Helicopter
(b) Scooter trailer – can be set up as an educational exhibit
(2) Use lots of visual aides
(a) Mosquito larvae
(b) Gambusia spp
(c) Light trap stand
vii) On-site visits
(1) Show off the facility
(2) Give talks about various topics depending on age group
c) College internship program
d) Local Events
i) Annual
(1) Earth Day
(2) Hurricane Awareness Day
(3) National Government Week
ii) Many others
e) Beekeeper out-reach
i) Attend meetings
ii) Visit sites
iii) Map areas for no-spray
iv) Spray calls for backyard beekeepers
v) One-on-one meetings
f) Media out-reach
i) Web-based mosquito forecast
ii) Local morning news show – usually associated with a problem
3) PA Dept of Environmental Protection Lab Operations – Mike Hutchinson
a) What happens to PA mosquitoes when they get to the lab?
i) Receiving process
(1) Samples in barcoded bottles
(2) Box is bar-coded
(3) Samples shipped on dry ice
ii) Receiving screen
(1) Barcode data are uploaded to database
(2) Field info uploaded by surveillance person
(3) Database flags samples from
(a) Positive counties
(b) Counties with large numbers of vectors submitted
iii) Samples placed into ULV freezer
iv) Cold chain maintained
v) Identification process
(1) Include non-*Culex* species when a county is positive
(2) Drop down menus for entering ID info
(3) Check boxes to indicate mosquitoes kept for side projects

(4) Quality control pop-ups included to let interns know to consult a taxonomist about the ID
(5) Samples placed into barcoded pool vials that correspond with original barcode

vi) Testing process
(1) 90 pools per test run
(2) Molecular testing
(3) BSL-3 lab
(a) Work under biosafety cabinet maintaining the cold chain
(b) Place BBs
(c) Vortex vial
(d) Add buffer solution
(e) Re-vortex
(f) Centrifuge
(g) Transfer to 96-well block containing lyses solution
(h) Extract RNA
(i) RT-PCR
(i) Prepare master mix, probes, and primers in new well plate
(ii) Add RNA samples to new well plate
(iii) Add controls
(iv) Taqman - ~30 minutes
1. Amplification
a. Polymerization
b. Strand displacement
c. Cleavage
d. Polymerization complete
2. Results in graph form

b) Other projects
i) Test pools for other less common viruses
ii) Molecular ID of blood meals
iii) Molecular ID of specific mosquitoes species
(1) Spot check on *Culex* spp ID
(2) Differentiate members of *Anopheles* complexes
iv) Collaborate with other researcher on a variety of projects
v) Photographic key of mosquitoes
vi) Lots of black fly work

SESSION 2

State Reports

1) DE – Robert Meadows
a) Weather
i) Dry winter, early spring
ii) Heavy rains after leaf-out
iii) Wet summer

iv) No hurricane activity
b) Arbovirus
i) WNV – low activity
ii) EEE – no activity
c) Budget cuts continuing – loss of employees
2) MD – Jeannine Dorothy
a) 23 counties
b) Programs in 22 of the counties
c) Budget cuts – loss of positions
d) *Ae albopictus* is a large and increasing problem
e) Weather
i) Similar to Delaware
ii) Lots of offshore winds and high tides
f) 3rd highest airspray year ever due to saltmarsh mosquitoes
g) Limited *Gambusia* release
h) Some WNV activity – lowest since 2001
i) Media activity in early June
3) NC – Walker Rayburn
a) Arbovirus activity
i) WNV
(1) One positive sentinel chicken
(2) No other activity
ii) LAC
(1) 11 human cases
(2) Down from previous year
iii) EEE
(1) Lots of horse cases
(2) Sentinel chicken positives
(3) 5 mosquito pool positives
(4) 1 human case
b) Weather
i) Coming out of a drought
ii) Amount of rain varied
c) Number of programs is shrinking
d) No longer in a drought – 2010 will be an interesting year
4) PA – Mike Hutchinson
a) Surveillance and Testing
i) Mosquitoes
(1) Surveillance
(a) 150 collectors at county level
(b) Primarily use gravid traps
(c) Collected over a million specimens from 46 species
(d) 5 species represented 80% of specimens collected
(i) Cx restuans
(ii) Cx pipiens
(iii) Oc trivittatus

(iv) *Ae vexans*
(v) *Oc japonicus*
(2) Testing
(a) Primarily tested *Culex* spp
(b) Tested about half of mosquitoes tested
(c) 311 positive pools
(d) Average MIR for *Cx pipiens* 2.26 (5-year)
(e) Lowest MIR since 2004
ii) Avian surveillance
(1) Limited to birds of prey and corvids
(2) 10 positives
iii) Horses
iv) Human cases
b) Funding is dropping
c) 2010
i) Mosquitoes
(1) Hope to increase gravid trapping
(2) Increase SLE surveillance
(3) Reduce June testing
ii) Black fly
(1) May have to end control early again
(2) See Andy Kyle's talk
d) www.pavectorcontrol.org
5) SC – Jeff Cary (Tammy Brewer)
a) Weather
i) Drought
ii) Rain came
iii) No hurricane activity
b) Surveillance
i) Mosquitoes
(1) Primarily gravid and CDC light traps
(2) Tested 27850 mosquitoes
(a) 17 WNV+ pools
(b) No other viruses reported
ii) Horses
(1) WNV - 1
(2) EEE - 16
iii) Birds – 2 WNV+
iv) Human cases – 3 WNV+
c) Peak year for WNV 2003
d) EEE appears to be building
e) Annual Meeting
i) Hickory Knob State Park
ii) Nov 3-5, 2010
6) VA – Kirby Foley
a) Budget issues

i) Northern VA – RAMP test (WNV only)
ii) Tidewater Region – tested for EEE and WNV (PCR)

b) Weather – similar to everybody else
c) Testing
i) WNV – saw an increase in positives
(1) Mosquitoes – 133 positive pools
(2) Birds – no testing
(3) Sentinel chickens - 3
(4) Horses -3
(5) Human – 4 cases, no fatalities
ii) EEE
(1) 144 positive mosquito pools
(2) 57 sentinel chickens
(3) 9 horses, 1 emu, 1 alpaca, 1 goat

7) WV – Anita Ray
a) Budget issues
b) Limited mosquito work
c) No dedicated staff for surveillance or control
i) Surveillance done through public health
ii) Some done through the university system
d) Weather
i) Drought in 2008
ii) Drought broke late in 2009
iii) Mostly cool and dry in 2009
e) Arboviral
i) WNV
(1) Mosquitoes
(a) Positive mosquito pool found in early June (*Ae albopictus*)
(b) Test May-Sept (130 pools tested positive)
(c) Positive pools in 5 counties
(2) One WNV+ horse
(3) 2 positive birds (test all species)
(4) No human cases
ii) LAC
(1) 10 human cases
(2) 5 counties
iii) 2 travel-associated malaria cases reported
f) Tick-borne
i) 3 RMSF
ii) A lot of Lyme
g) Black flies
i) Dept of Agriculture does some black fly control
ii) Primarily in area of big rafting industry
iii) This program may be cut – will negatively affect tourist industry

8) GA – Jeff Heusel
a) Weird weather

i) 2 flooding events
   (1) Spring – much of south GA
   (2) Fall – parts of north GA and metro Atlanta
ii) Huge numbers of nuisance species

b) WNV
   i) 4 human cases, 2 fatalities
   ii) 2 PVBDs
c) LAC – 2 cases
d) Dengue – 4 cases
e) Surveillance
   i) 25 counties submitted mosquitoes
   ii) 5 positive counties (24 total pools)
f) Dead birds – 1 WNV+ crow in metro Atlanta area
g) Vet Surveillance
   i) EEE cases more than doubled
   ii) Has been increasing over the last year or two
   iii) Cases occurred later in the season
   iv) 1 case occurred north of the Fall Line
h) GMCA meeting
   i) See www.GAmosquito.org for more info
   ii) 2010 meeting, Oct 20-22 in Athens