2013
PROGRAM REVIEW

Vector Program
Environmental Health
Cabarrus Health Alliance

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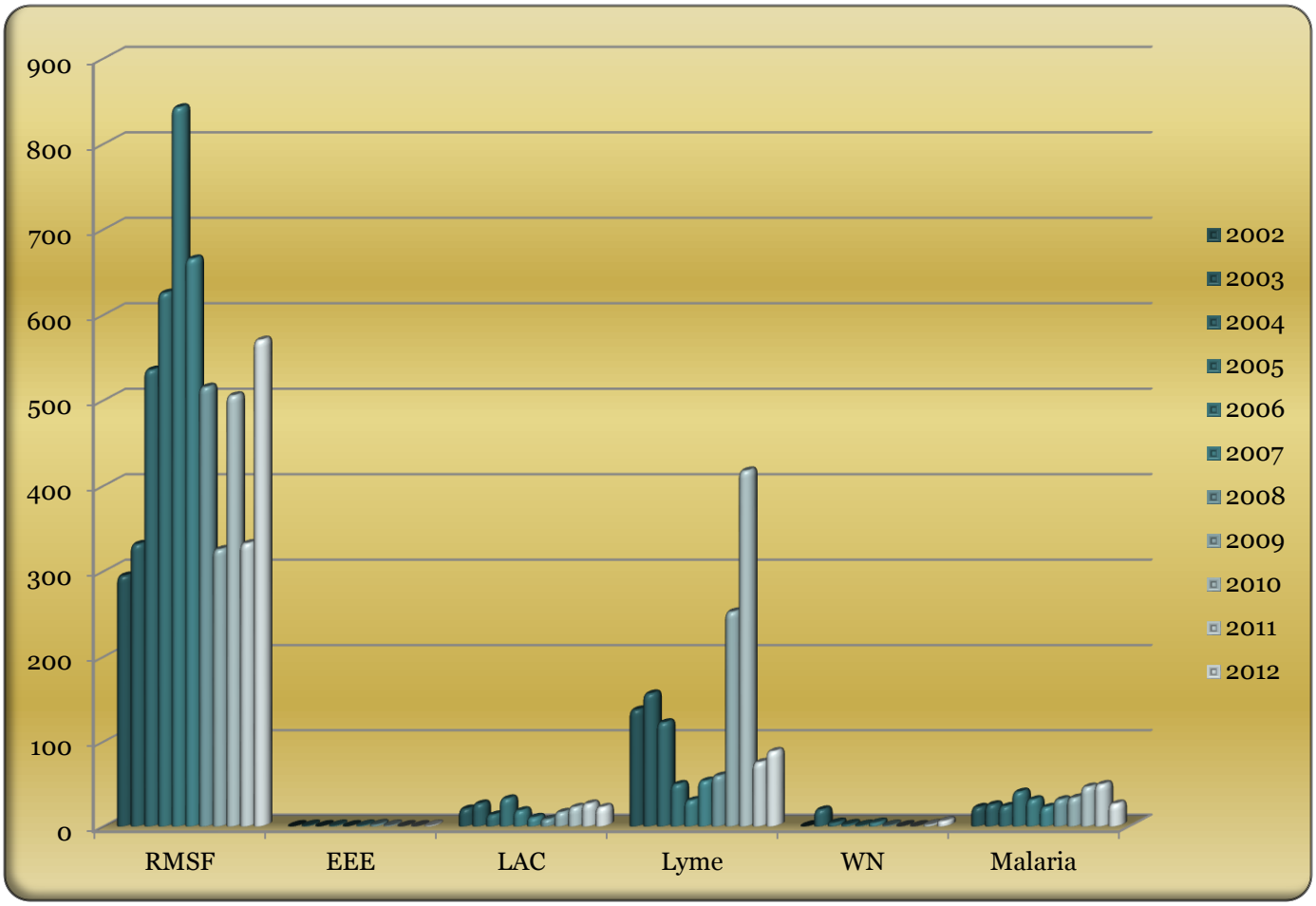
2013 Statistics

12	Permanent Sites (PS)
62	Visits made to PS
5.75	Average treatment rate in weeks
24	Service Requests (SR) received
0	Media outreach/Formal presentations
27	Mosquito pools collected (larval and adult)

Arboviral Reports

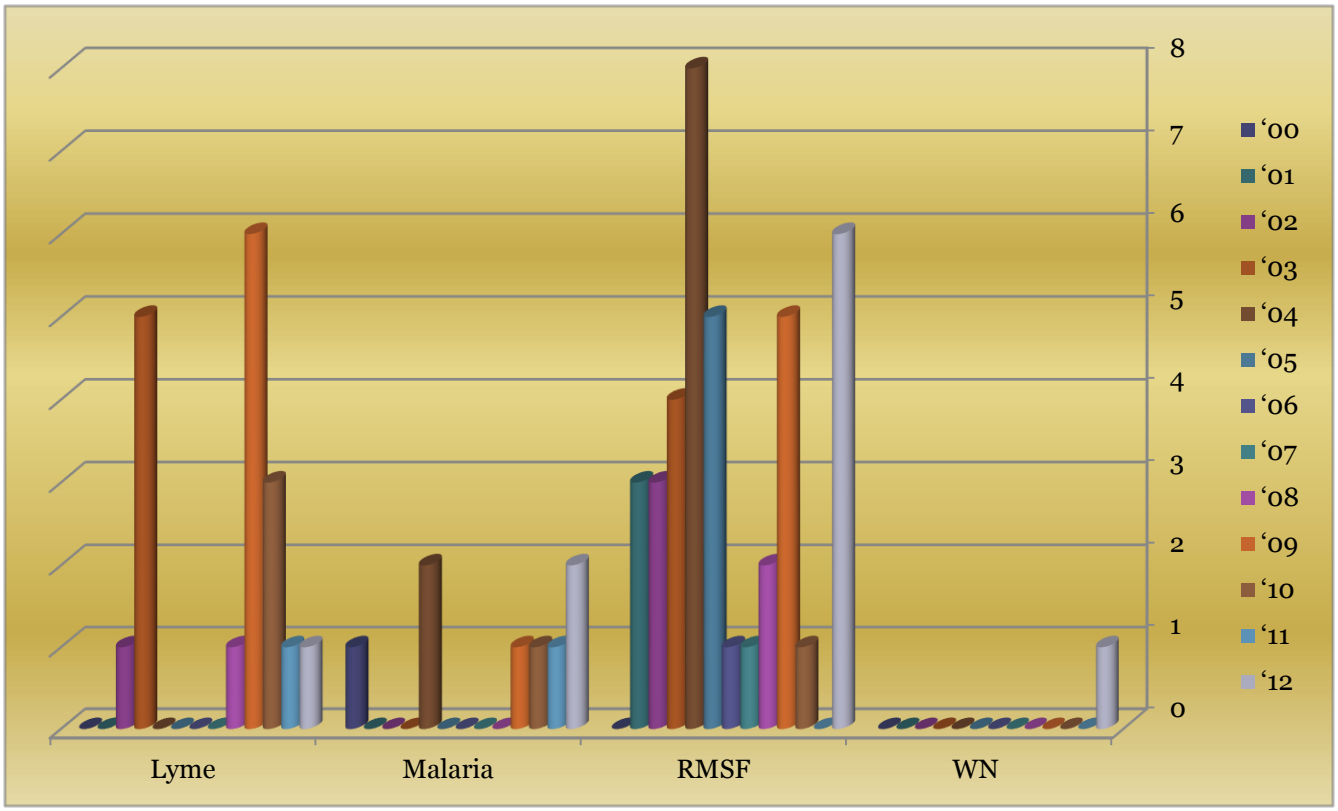
NC Statistics



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
RMSF	294	331	535	625	842	665	515	325	505	332	570	
EEE	0	1	0	1	0	1	2	1	0	0	1	
LAC	20	26	13	32	18	10	8	16	22	26	22	
Lyme	137	156	122	49	30	53	59	252	417	75	88	
WN	0	19	4	2	1	4	1	0	0	2	6	
Malaria	22	25	23	40	31	22	31	33	46	49	26	

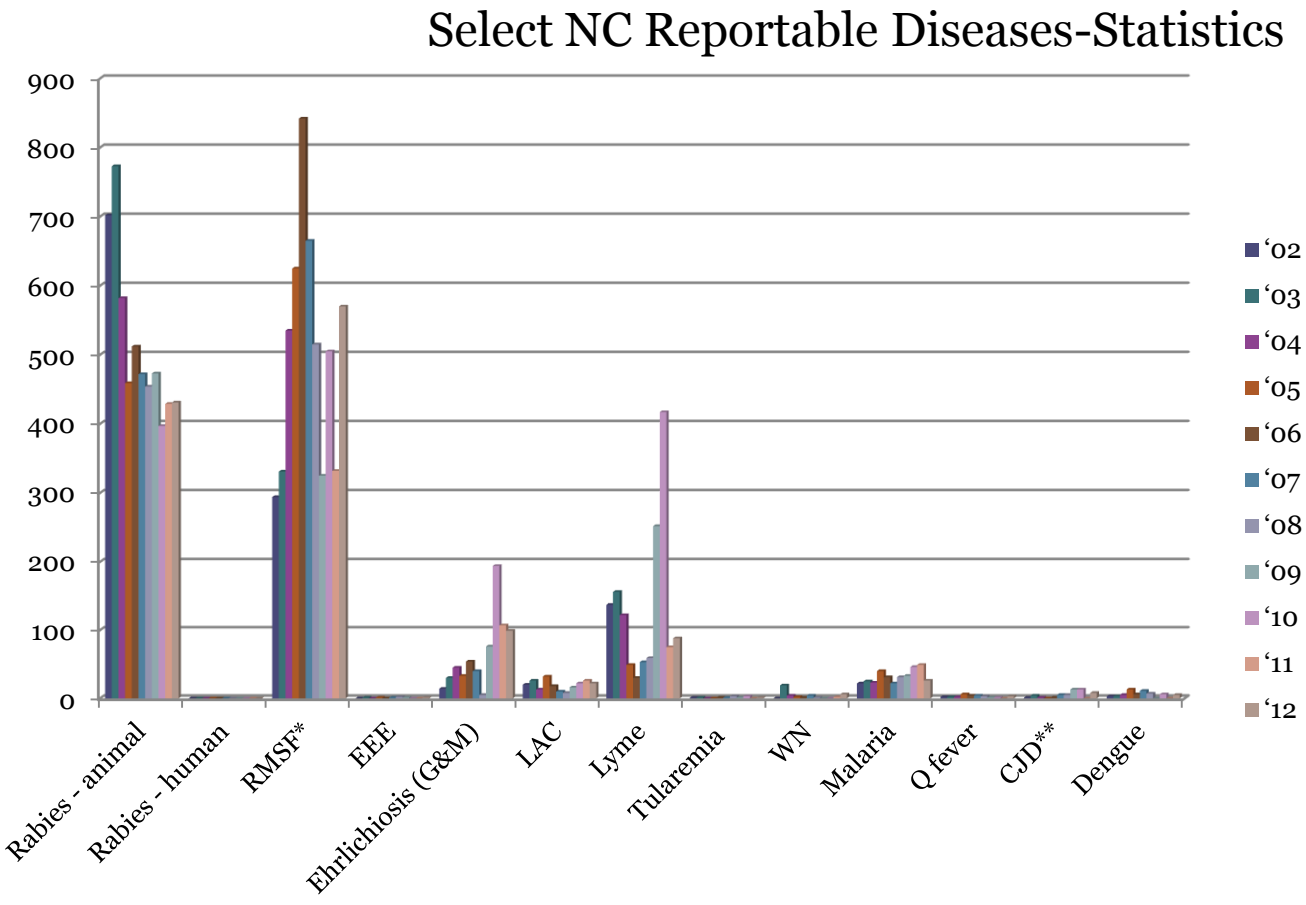
Arboviral Reports

Cabarrus County Statistics



	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12
Lyme	0	0	1	5	0	0	0	0	1	6	3	1	1
Malaria	1	0	0	0	2	0	0	0	0	1	1	1	2
RMSF	0	3	3	4	8	5	1	1	2	5	1	0	6
WN	0	0	0	0	0	0	0	0	0	0	0	0	1

VECTOR REPORT



* Includes probable and lab confirmed
** One confirmed case for Cabarrus County

	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12
Rabies - animal	702	773	582	459	512	472	454	473	397	429	431
Rabies - human	0	0	0	0	0	0	0	0	0	0	0
RMSF*	294	331	535	625	842	665	515	325	505	332	570
EEE	0	1	0	1	0	1	2	1	0	0	1
Ehrlichiosis (G&M)	14	30	45	33	54	40	5	76	194	107	99
LAC	20	26	13	32	18	10	8	16	22	26	22
Lyme	137	156	122	49	30	53	59	252	417	75	88
Tularemia	1	1	0	0	1	1	3	1	3	0	1
WN	0	19	4	2	1	4	1	0	0	2	6
Malaria	22	25	23	40	31	22	31	33	46	49	26
Q fever	2	2	2	6	4	4	3	1	1	0	3
CJD**	1	4	1	0	1	5	5	13	13	0	8
Dengue	3	3	5	13	6	11	7	0	6	0	5

CDC GUIDELINES

Arboviral Families

Flaviviridae	West Nile
	St. Louis
Bunyaviridae	LaCrosse
	Hantavirus
Togaviridae	Eastern Equine
Enterobacteriaceae	Plague
Rickettsiaceae	Ehrlichiosis
	Rocky Mountain Spotted Fever
Rhabdoviridae	Rabies
Spirochaetaceae	Lyme disease
Francisellaceae	Tularemia

Surveillance

Mosquito

•A key "tool for quantifying the intensity of virus transmission in the area"; important when making threat assessments

•Distinguishes between the vector density and infection rates

Human

"Human case surveillance alone should not be used for the detection of arbovirus activity" as **this is what vector control is trying to avoid**. Other surveillance tools need to be used in order to safeguard human health.

•Meningoencephalitis cases are the most accurate recorded diagnosis as WN fever is less severe and therefore has a higher likelihood of being misdiagnosed or a person does not seek medical attention.

•"Less than 1% of people who become infected with West Nile virus will develop severe illness.." According to CDC Division of Vector-borne Disease.

•Case definition combines confirmed and probable cases together for the purpose of counting.

Response

Phased response guidelines to surveillance data

•"Prevention and control measures, regardless of intensity, may not prevent all WNV infections in humans."

•Response to WN will vary by region and will depend on the surveillance data as evidence of activity levels.

•"..the following factors should be considered when translating these guidelines into a plan of action"

- •Current and predicted weather patterns
- •Surveillance data indicators and trends
- •Working budget and infrastructure
- •Public participation
- •Projected WNV activity for the area
- •Other ongoing control activities

Response

Risk Level	Human outbreak probability	Recommended response
0	None Off-season; adult vectors inactive; climate unsuitable	Develop WNV response plan. Secure surveillance and control resources necessary to enable emergency response. Initiate community outreach and public education programs.
1	Remote Spring, summer, fall; areas anticipating WN activity based on previous data in the area; no current surveillance of WN activity in the community	Response level 0 plus; conduct entomologic survey (inventory and map mosquito populations, monitor larval and adult mosquito density), initiate source reduction; use larvicide at specific sources identified by surveillance as likely amplifying and bridge vectors species, vector and virus surveillance; community outreach and public education programs focused on risk potential, personal protection, emphasizing residential source reduction; maintain surveillance
2	Low Summer or fall; areas with limited or sporadic WNV epizootic activity in birds and/or mosquitoes. No positives prior to August	Response level 1, plus; increase larval control, source reduction and public education emphasizing personal protection measures, particularly among the elderly. Enhance human surveillance and activities to further quantify epizootic activity (e.g.. mosquito trapping and testing).
3	Moderate Spring, summer or fall; initial confirmation of WN in birds before August; horse/human case or sustained WNV activity in birds/mosquitoes	Response level 2, plus; intensify adult mosquito collection in areas of perceived human risk, initiate adult mosquito control if available, initiate visible activities in community to increase attention to WNV transmission risk, work with collaborators to reduce risks to elderly
4	High Spring, summer, fall; WNV activity suggesting a high risk of human infection (e.g. early summer high bird counts, sustained mosquito positives of multiple species, rising vet/human cases. Repeated areas of WN activity.	Response level 3 plus: Expand public information program to include TV, CHA website and newspapers (use of repellents, personal protection, continued source reduction, risk communication about adult mosquito control). Increase visibility of public messages, engage key local partners (e.g.. government officials, religious leaders) to speak about WNV; intensify adult mosquito control program, repeating applications in areas of high risk or human cases.
5	Outbreak in progress Multiple confirmed cases in humans; conditions favoring continued transmission to humans (e.g.. persistent high infection rate in mosquitoes, continued avian mortality due to WNV)	Response level 4, plus; intensify emergency adult mosquito control program repeating applications as necessary to achieve adequate control. Monitor efficacy of spraying on target mosquito populations. If outbreak is widespread coordinate with adjacent counties for broad coverage ; emphasize urgency of personal protection media and emphasize use of repellent at visible public events.

Prevention

- "Responsible control programs target vector and nuisance populations for control and avoid managing habitats that support benign species" – LARVAL IDENTIFICATION/IPM
- Monitoring species within the community and documenting the abundance of population dynamics – ADULT MOSQUITO COLLECTING
- Source reduction is either through sanitation (by the property owner) and/or water management (usually falls within the municipalities' jurisdiction).
- Chemical control includes larviciding (effective part of IPM) and adulticiding (use based on surveillance data, confirmed cases and availability).
- Resistance management is not a forefront issue due to the change in products used in the earlier mosquito program and what is currently used. There are periodical evaluation of the efficacy of each of the pesticides used. An annual test area is chosen which is usually a treatment site that has a high larval count. After treatment is applied, it is revisited later that day to confirm the kill rate and if necessary, the following day. Both the MMF and the Bti substances are verified for efficacy at least once a season.

Control

- *Gambusia affinis* (mosquito fish) do provide some natural form of control. The native fish are found within Cabarrus county and are occasionally captured and released into areas where natural predators would help to reduce the mosquito population on a long term basis.
- Adult mosquito predators include "*Toxorhynchites rutilus*, the predacious mosquito; copepods, the parasitic nematode *Romanomermis* and the fungus *Lagenidium giganteum"*. Only *Toxorhynchites rutilus* are commonly used as a part of IPM due to the ease of capture, identification and in office rearing.
- Recent experiments have concluded that the fathead minnow, bluegill sunfish, freshwater killifish and the pumpkinseed sunfish eat enough mosquito larvae to be included in lists of options of use in IPM plans.
- Using biological control is ideal because there are no foreign elements introduced into the environment, only a rearrangement of local predators. Biological control does fall short in several areas. First of all, there is a lot of time involved in baiting and catching the desired predator (or culturing) and collecting enough to release into the breeding ground to survive and thrive. This is time and labor intensive and establishment of the introduced agent is always questionable; a 'wait and see' approach. Biological control is a good addition to IPM but cannot be used exclusively due to time restraints (mosquito life cycle and establishment of a new predator into the food web) and the need to control infested areas immediately.

Management

•"Detection of epizootic transmission of enzootic arboviruses typically precedes detection of human cases by several days to 2 weeks or longer. If adequate surveillance is in place, the lead time between detecting significant levels of epizootic transmission and occurrence of human cases can be increased, which will allow for more effective intervention practices. Early-season detection of enzootic or epizootic WNV activity appears to be correlated with increased risk of human cases later in the season. Control activity should be intensified in response to evidence of virus transmission, as deemed necessary by the local health departments. Such programs should consist of public education…,municipal larval control…,adult mosquito control…and continued surveillance to monitor virus activity and efficacy of control measures." "As evidence of sustained or intensified virus transmission in an area increases, emergency response should be implemented. This is particularly important in areas where vector surveillance indicates that infection rates in Culex mosquitoes are increasing or that potential accessory vectors (e.g. mammalophilic species) are infected with WNV. "

Education and Information

•Target personal, household and community

•Schools receive a letter offering a presentation and exhibition to fifth grade students on the topic of mosquito biology, physiology and attributes of virology.

•Media –news interviews and presentations

Research Priorities

•Monitor the vector species for the area and the immergence of new species

Case description

•Onset usually occurs between 2-6 days and can include the following; acute fever, headache, fatigue, joint and muscle pain and sometimes a rash. Average illness persists 2-7 days.

Budget

I. Management

A. Program Coordinator
B. Sidelined EHS (2) with pesticide license
D. Maintenance of RS status and active PCO-PH licensure

II. Funding

A. Municipalities – voluntary participation
1. Cabarrus County (rural) $10,761.90
2. Mt. Pleasant $417.60

III. Administrative/Logistics

A. Annual evaluation of Vector Control Plan - equipment
1. Replace as broken equipment as needed
2. Increased stable funding is needed to invest in technology that will allow in house testing of adult mosquitoes for West Nile virus.

B. Enforcement of abatement
1. No county ordinance regarding abatement. There is a city ordinance in Kannapolis and Concord that refers to standing water and miscellaneous containers that hold water including items such as rimless tires. Those referrals go through the local Code Enforcement agencies.
2. CHA's CEO has the recourse of declaring an imminent health hazard for a situation or the General Statutes defining of a Public Health nuisance is an option as well.
3. Standard protocol for community change is through education, on site visits, mailed letters, phone calls, or referrals to code enforcement officers.

C. Record keeping/Documentation
1. MSDS and labels maintained in designated areas to meet OSHA requirements.
2. On site visits, complaints calls, when and where of action taken
3. Phone calls requesting service
4. Meetings, presentation and media outreaches
5. Emergency plans and contacts
6.Reportable diseases and reports
7. Budget updates
8. Local rainfall and weather patterns
9. CE courses
10. Vector website under Environmental Health that includes all relevant information as a resource for the community.

D. Mosquito species

1. *Aedes*
    a. *albopictus*
    b. *aegypti*
    c. *vexans*
2. *Anopheles*
    a. *bradleyi/crucians*
    b. *quadrimaculatus*
    c. *punctipennis*
3. *Culex*
    a. *erraticus*
    b. *pipiens*
    c. *restuans*
    d. *salinarius*
    e. *territans*
4. *Culiseta melanura*
5. *Fulvus pallens*
6. *Ochlerotatus*
    a. *atlanticus*
    b. *canadensis*
    c. *infirmatus*
    d. *japonicus*
    e. *triseriatus*
7. *Orthopodymia signifera*
8. *Psorophora*
    a. *ciliata*
    b. *columbiae*
    c. *ferox*
    d. *howardii*
9. *Toxorhynchites rutilus*
10. *Uranotania sapphirina*

Red denotes a new species collected and identified in Cabarrus County

IV. Community

A. Treatment areas

1. Complaint driven service requests; **only for those that are in the participating areas**
2. Permanent sites
3. Log all on site visits made per year
4. Log of phone calls of people requesting service but were not in participating areas. See Appendix A

V. Operational Procedures

A. Survey

B. Monitor through fieldwork

C. Control

1. Larvicide
2. IPM
3. Source reduction
4. Light trapping

2013 PROGRAM OUTLOOK

All across the nation there were reports of increased West Nile activity throughout the summer of 2012. The amount of infections and confirmed cases along with the 'seasonal' virus made for national news. According to CDC, 48 states reported infection in people, birds or mosquitoes and human cases topped 5,387 and left 243 dead. Cabarrus county was no exception. There was a death in August here in Kannapolis. There were no other reported cases through the rest of the season. What needs to be considered is that 80% of those infected show no signs at all. So it is incorrect to assume that WN was not an active and very present virus right here within the local community on a much larger scale than the one casualty.

Across North Carolina there were 6 cases of WN, and interestingly, 4 of those occurred during week 33 (about the second week of August). Cabarrus, Mecklenburg, Scotland and Forsyth all had confirmed infections at the same time. In 2013, there will be anticipation of week 33 and focused control efforts during the weeks prior.

The benefit of an active Vector Control Program, is the accumulation of data and surveillance within the community that allows for quick recognition of heightened bridge vector populations. Being established in neighborhoods and areas with highly susceptible people and already having knowledge of areas of potential/observed breeding sources within the proximity, allows for a comprehensive and specific plan action when a positive case is identified. For those people in Harrisburg, Concord and Kannapolis city limits, there is no communication or support for any virus monitoring or prevention because those entities do not participate in the Mosquito Control Program.

The projections for virus activity this summer is largely focused on *Culex* identification and abatement in order to curb the WNV transmission that culminated to such a high virility last season. Intense focus will peak in late July and beginning of August as much as the funding will allow. In the years to come it can be expected to discover new invading species of mosquitoes and more pressing, the increase in population of those vector species already established in North Carolina.

Appendix A

Date called	Issue	Surname	Jurisdiction
8/21/12	Mosquitos and fleas	-	Concord
8/20/12	Mosquitos	-	Kannapolis
8/16/12	Mosquitos	-	Kannapolis
8/31/12	Mosquitos	Troutman	Concord
8/31/12	Mosquitos	Jackson	Concord
8/31/12	Mosquitos	Stry	Kannapolis
8/31/12	Mosquitos	Honi	Concord
8/31/12	Mosquitos	Cobb	Concord
8/31/12	Mosquitos	Tilley	Concord
9/4/12	Mosquitos	Morgan	Kannapolis
9/4/12	Mosquitos	Allan	Concord
9/10/12	Mosquitos	Van Wieren	Kannapolis
10/2/12	Mosquitos	LaSalle	Kannapolis