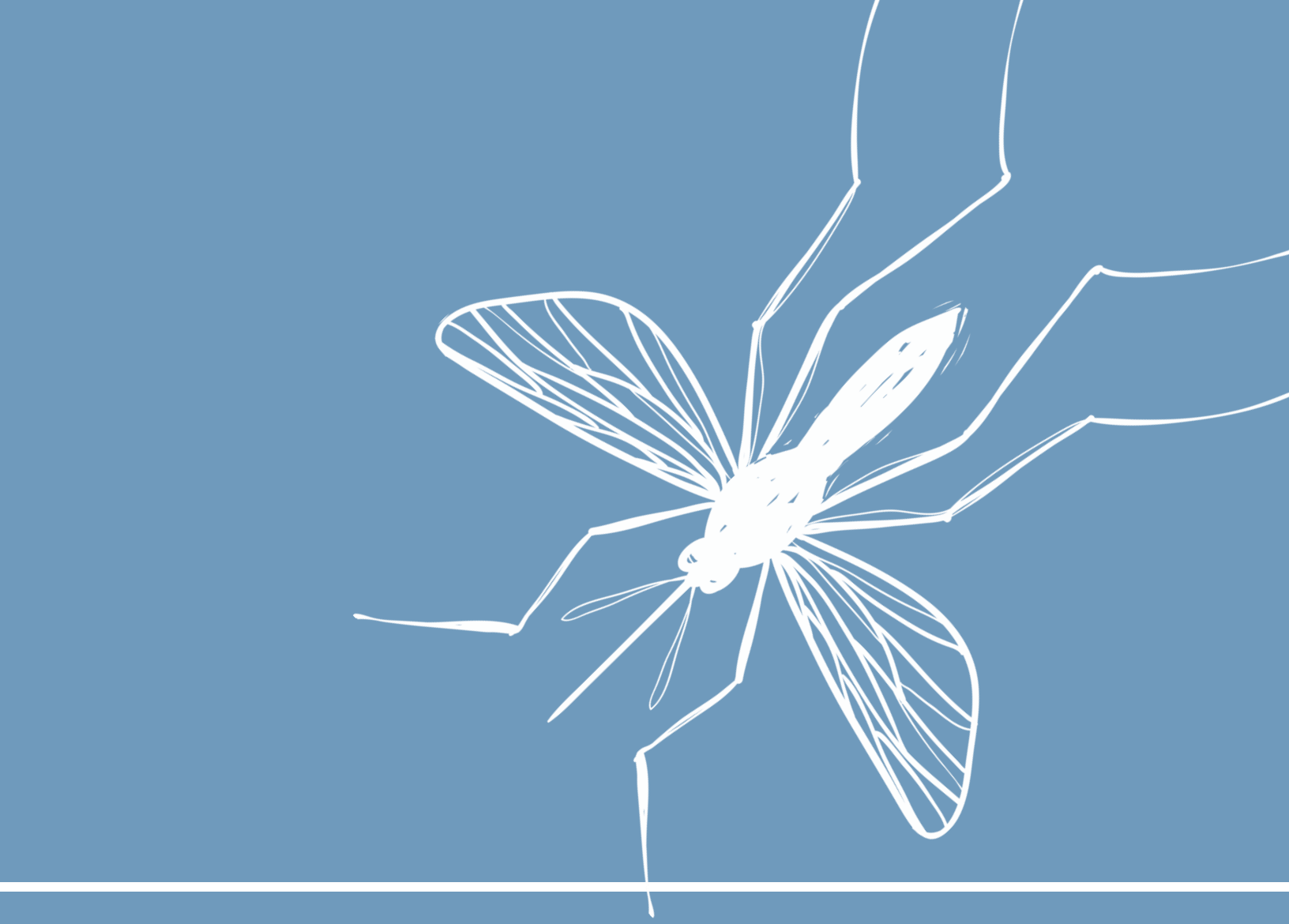

2015
Vector Program Review

March 3, 2016

Author: Chrystal Swinger, REHS II

Environmental Health
Cabarrus Health Alliance

CABARRUS HEALTH ALLIANCE

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This report is intended to provide information about the Cabarrus Health Alliance Vector Control Program to the public and policy makers. The purpose of the report is to ensure that the public and policy makers are aware of the risks of mosquito borne disease and efforts that are being made to control those risks.

2015 Statistics

12	**Permanent Sites (PS)**
53*	**Visits made to PS** ***one preliminary visit was made in March that is not include in the statistics***
4.7	**Average treatment rate in weeks**
2	**Service Requests (SR) received**
0	**Media outreach/Formal presentations**
43	**Mosquito pools collected (larval and adult)**
0	**New species identified in Cabarrus County [now totaling 36 different species]**

Looking Forward 2016

The importance of monitoring what species of mosquitoes are in the community is especially evident now. With the impending introduction of Zika to North Carolina, having a documented history of known vector species gives an indicator of what percentage of *Aedes aegypti* are in the community and how that will impact the purposed and perceived threat of Zika virus transfer.

There is an accrued historical collection record of *Aedes aegypti* in Cabarrus County*. Being the primary vector, *Aedes aegypti,* has a known presence here. The secondary vector, *Aedes albopictus,* is abundant and extremely common in urban areas. There is no need to try and collect *Ae. albopictus*; the best defense is to educate residents eliminating breeding sources. This is easily done by empting containers and dumping out all standing water. *Ae.aeygypti,* will be the focus of trapping in the 2016 year in order to find areas of highest probability of possible Zika virus transmission.

There are new viruses emerging into new areas where they have not previously been documented. Some viruses are either contained to a particular region, or migrates to other areas and where it takes hold. The advantage of being aware of infectious diseases throughout the world and knowing what vectors are resident in our community will go along way to stay ahead of potential epidemics and at worst, keep the general public informed and aware.

"Chikungunya and the Zika virus are newly emerging pathogens that CDC has been monitoring in the South Pacific region. These are of concern because they have now spread to other areas of the world where they previously had not thrived. Both of these arboviruses are listed as a Class C pathogen by the CDC and are worthy enough to merit attention. The mosquito vector for both of these viruses is *Aedes aegypti* which is present in Cabarrus County." - Quoted from 2014 annual report. The importance of monitoring and staying abreast of newly emerging pathogens is evident.

There is an efficient way to operate a minimal Vector Program. Without being fully funded, (100% attention to all of Cabarrus County), the best way to protect the public health is to frequently and strategically trap adult mosquitoes. Compared to a full scale program, this is the best approach to address potential vector diseases in our community. During the months of May through September, a light trap would be placed at strategic locations throughout the county. Testing of the mosquitoes for Zika is not possible at this time. The means and methods for this procedure do not even exist yet. Once the presence of a new virus is confirmed, concentrated efforts to abate breeding sources can be swift and focused since there will be records indicating the population density of these known vector species.

*collected and confirm by Dr. Bruce Harrison and Parker B Whitt; February 18, 2014

Resources and Operations

I. Management

A. Program Coordinator

B. Sidelined EHS (2) with pesticide license

C. 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
3. Request to the city of Concord and the city of Kannapolis to contribute funds to increase trapping and surveillance this year

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 arboviruses.

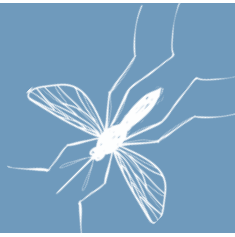
B. Enforcement of Abatement

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.

Resources and Operations



Cont.

D. Mosquito species

1.Aedes

a. aegypti
b. albopictus
c. atlanticus/tormentor
d. atlanitcus
e. atropalpus
f. canadensis
g. cinereus
h. fulvus pallens
i. japonicus
j. mitchellae
k. sticticus
l. taeniorhynchus
m. tormentor
n. triseriatus
o. Vexans

2. Anopheles

a. crucians group
b. punctipennis
c. quadrimaculatus

3. Coquillettidia perturbans

4. Culex

a. erraticus
b. nigrapalpus
c. pipiens complex
c. restuans
d. salinarius
e. territans

5. Culiseta

a. inornata
b. melanura

6. Orthopodymia signifera

7. Psorophora

a. ciliata
b. columbiae
c. cyanescens
d. ferox
d. howardii

9. Toxorhynchites rutilus septentrionalis

10. Uranotania sapphirina

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

V. Operational Procedures

A. Survey

B. Monitor through fieldwork

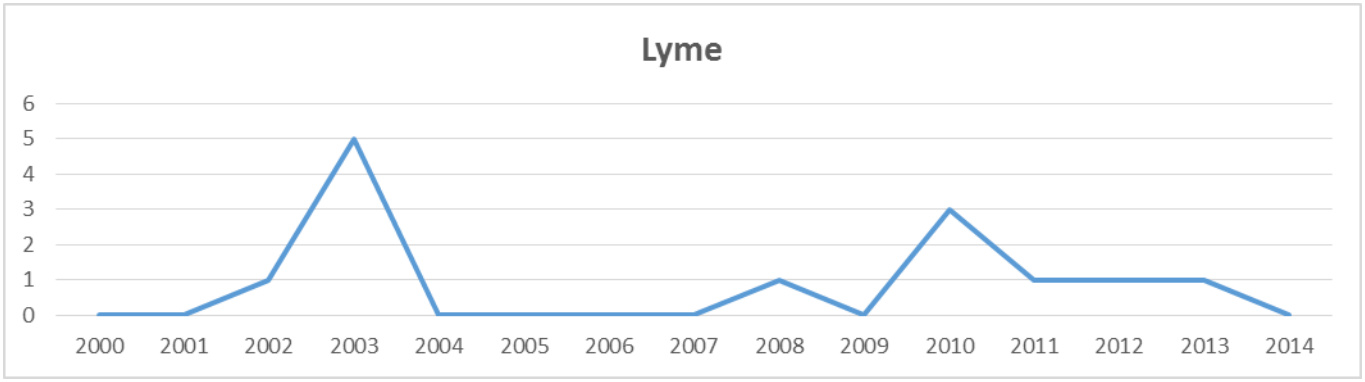
C. Control

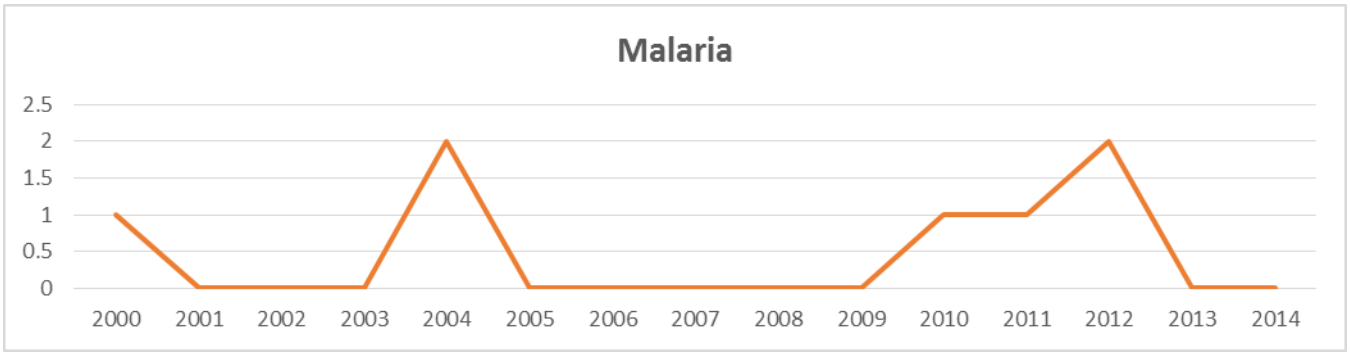
1. Larvicide
2. IPM
3. Source reduction
4. Light trapping
5. Education

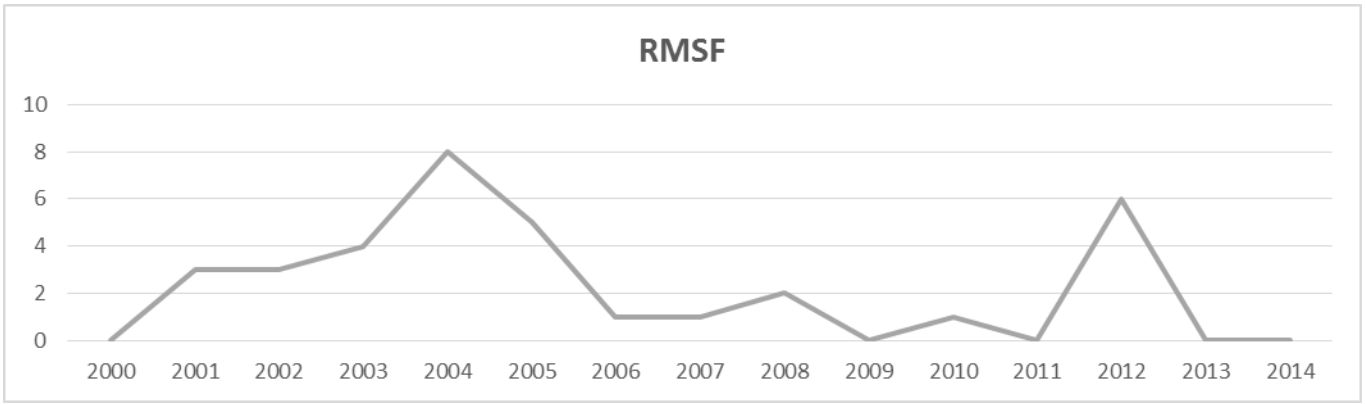
Arboviral Reports

Cabarrus County Statistics

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Lyme	0	0	1	5	0	0	0	0	1	0	3	1	1	1	0
Malaria	1	0	0	0	2	0	0	0	0	0	1	1	2	0	0
RMSF	0	3	3	4	8	5	1	1	2	0	1	0	6	0	0
WN	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
CHIK															1



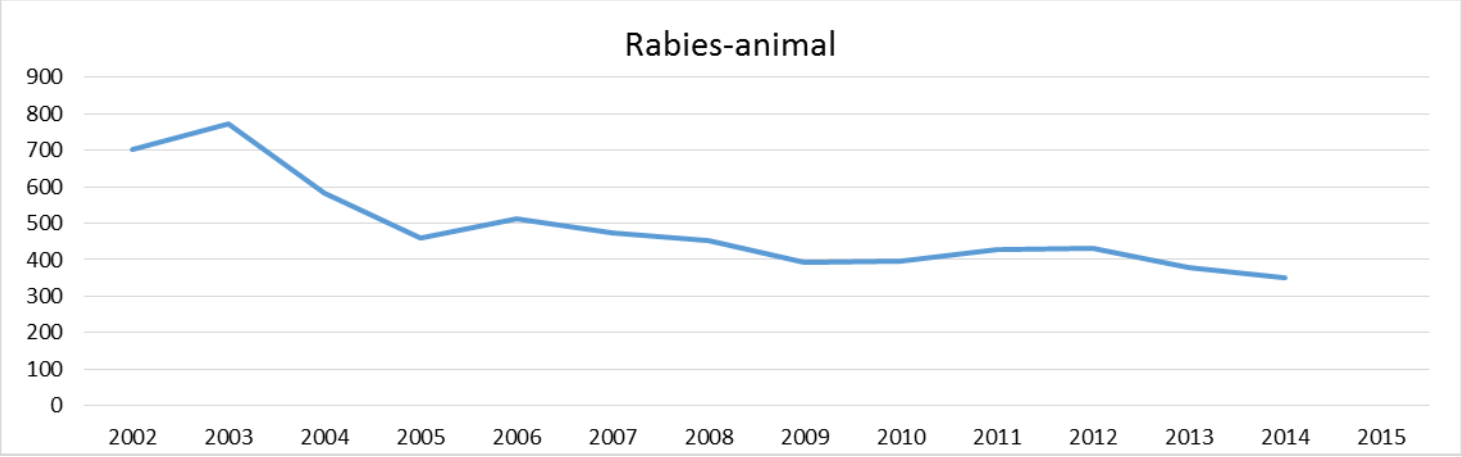


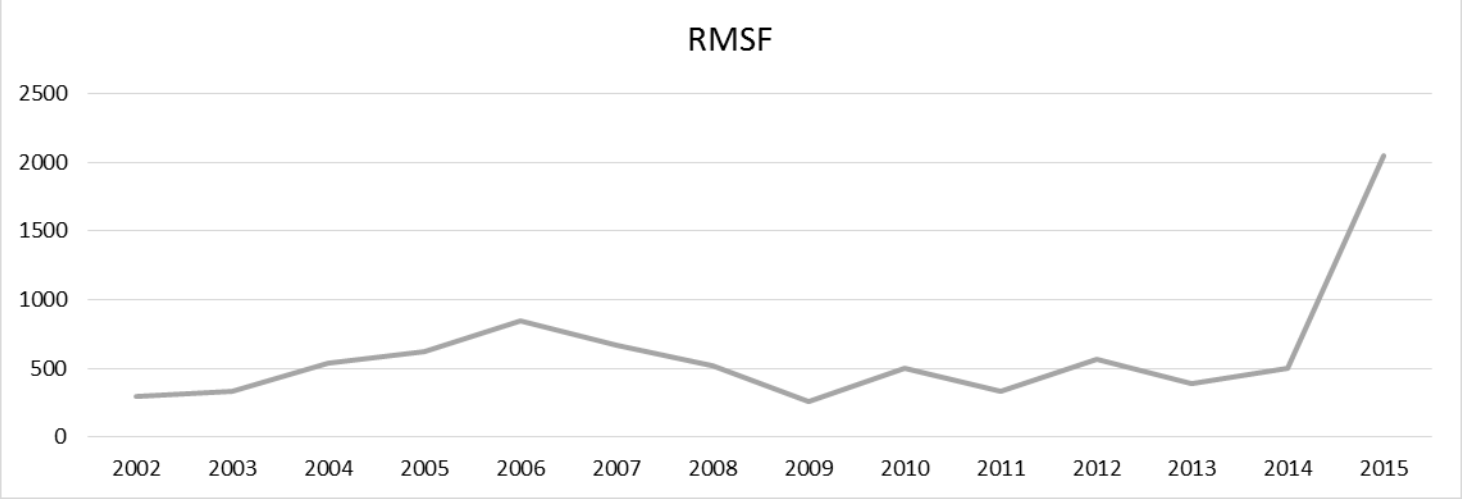


Vector Report

Select NC Arboviral Notifiable Diseases

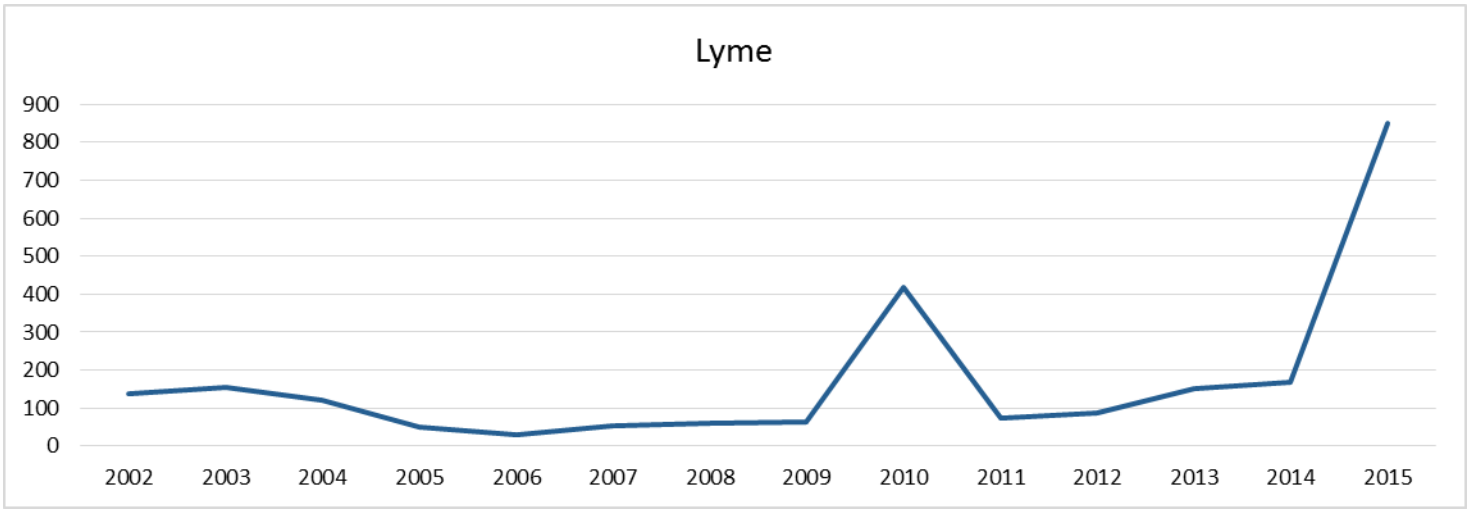
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Rabies-animal	702	773	582	459	512	472	454	392	397	429	431	380	352	
Rabies-human	0	0	0	0	0	0	0	0	0	0	0	1	0	
RMSF	294	331	535	625	842	665	515	259	505	332	570	393	496	2051
EEE	0	1	0	1	0	1	2	1	0	0	1	1	0	15
Ehrlichiosis(G&M)	14	30	45	33	54	40	5	31	194	107	99	79	73	199
LAC	20	26	13	32	18	10	8	11	22	26	22	12	22	14
Lyme	137	156	122	49	30	53	59	65	417	75	88	153	170	850
Tularemia	1	1	0	0	1	1	3		3	0	1	2	0	
WN	0	19	4	2	1	4	1	0	0	2	6	3	1	54
Malaria	22	25	23	40	31	22	31	21	46	49	26	22	37	29
Q Fever	2	2	2	6	4	4	3	1	1	0	3	6	3	
CJD	1	4	1	0	1	5	5	6	13	0	8	22	5	
Dengue	3	3	5	13	6	11	7	0	6	0	5	13	8	15
chikungunya													44	35

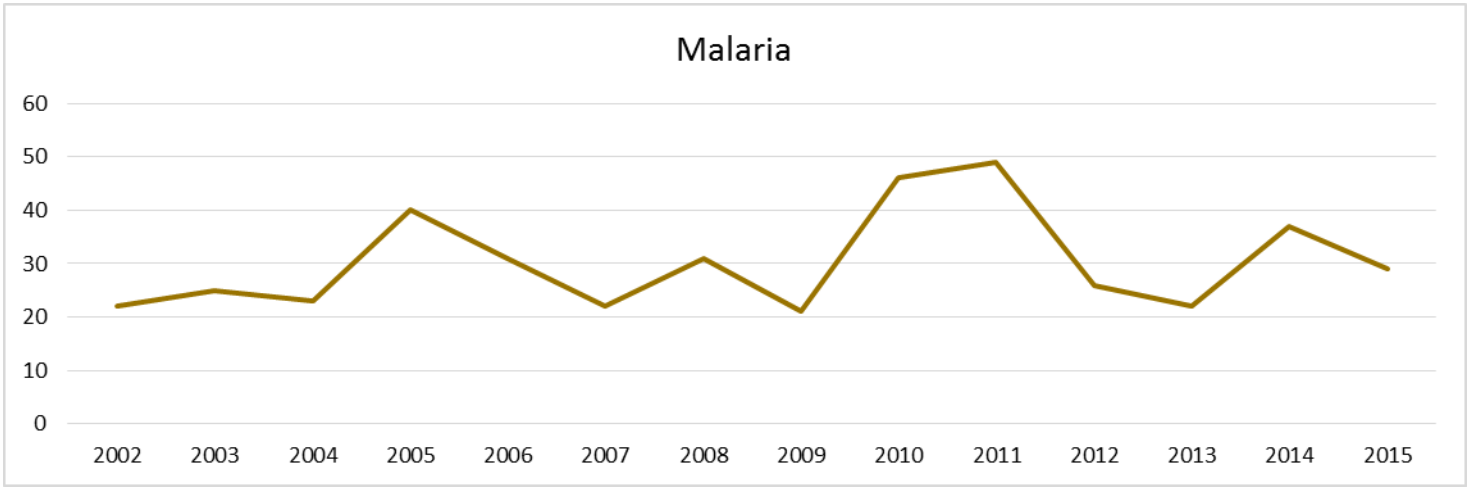


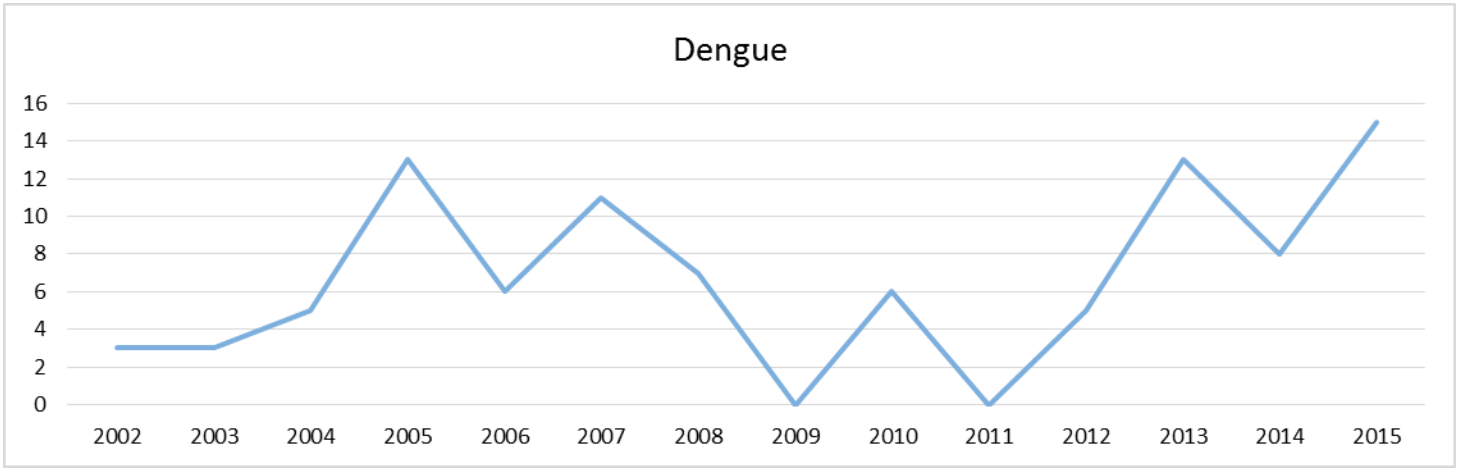


Vector Report

Select NC Arboviral Notifiable Diseases







CDC Guidelines

Arboviral Families	
Flaviviridae	West Nile
	St. Louis
	Dengue
	Yellow fever
	Zika virus
Bunyaviridae	LaCrosse
	Hantavirus
Togaviridae/Alphavirus	Eastern Equine
	Western Equine
	Chikungunya
Enterobacteriaceae	Plague
Rickettsiaceae	Ehrlichiosis
	Rocky Mountain Spotted Fever
Rhabdoviridae	Rabies
Spirochaetaceae	Lyme disease
Francisellaceae	Tularemia

CDC Guidelines

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.

Response

Phased response guidelines to surveillance data

- "Make informed, evidence-based decisions regarding pesticide applications in the areas where the risk for vector-borne disease is highest."
- "The success of a mosquito control program depends on its ability to use multiple surveillance methods to provide data on disease threats, including novel threats that may spread into the United States and become endemic."

*Before the Swarm – astho, CDC publication

Risk Level	Human outbreak probability	Recommended response
0	**None**	Develop arboviral response plan. Secure surveillance and control resources necessary to enable emergency response. Initiate community outreach and public education programs.
Off-season; adult vectors inactive; climate unsuitable		
1	**Remote**	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
Spring, summer, fall; areas anticipating vector activity based on previous data in the area; no current surveillance of arboviral activity in the community		
2	**Low**	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).
Summer or fall; areas with limited or sporadic epizootic activity in mosquitoes. No positives prior to August		
3	**Moderate**	**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 arboviral transmission risk, work with collaborators to reduce risks to elderly**
Spring, summer or fall; initial confirmation arboviral activity before August; human case or sustained arbovirus activity in non-human		
4	**High**	**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 mosquito biology; intensify adult mosquito control program, repeating applications in areas of high risk or human cases.**
Spring, summer, fall; adult species vector identification population suggesting a high risk of human infection. Repeated non-adjacent areas of arboviral activity.		
5	**Outbreak in progress**	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.
Multiple confirmed cases in humans; conditions favoring continued transmission to humans (e.g.. persistent high infection rate in mosquitoes)		

CDC Guidelines

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 laboratory 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.

CDC Guidelines

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."

Education and Information

- Website- latest news and updates, question submission, contact information
- Target personal, household and community
- Media –news interviews and presentations

Research Priorities

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

Case Description

- Defer to medical/clinical staff