

2010 PROGRAM REVIEW

Mosquito Control Program
Environmental Health
Cabarrus Health Alliance

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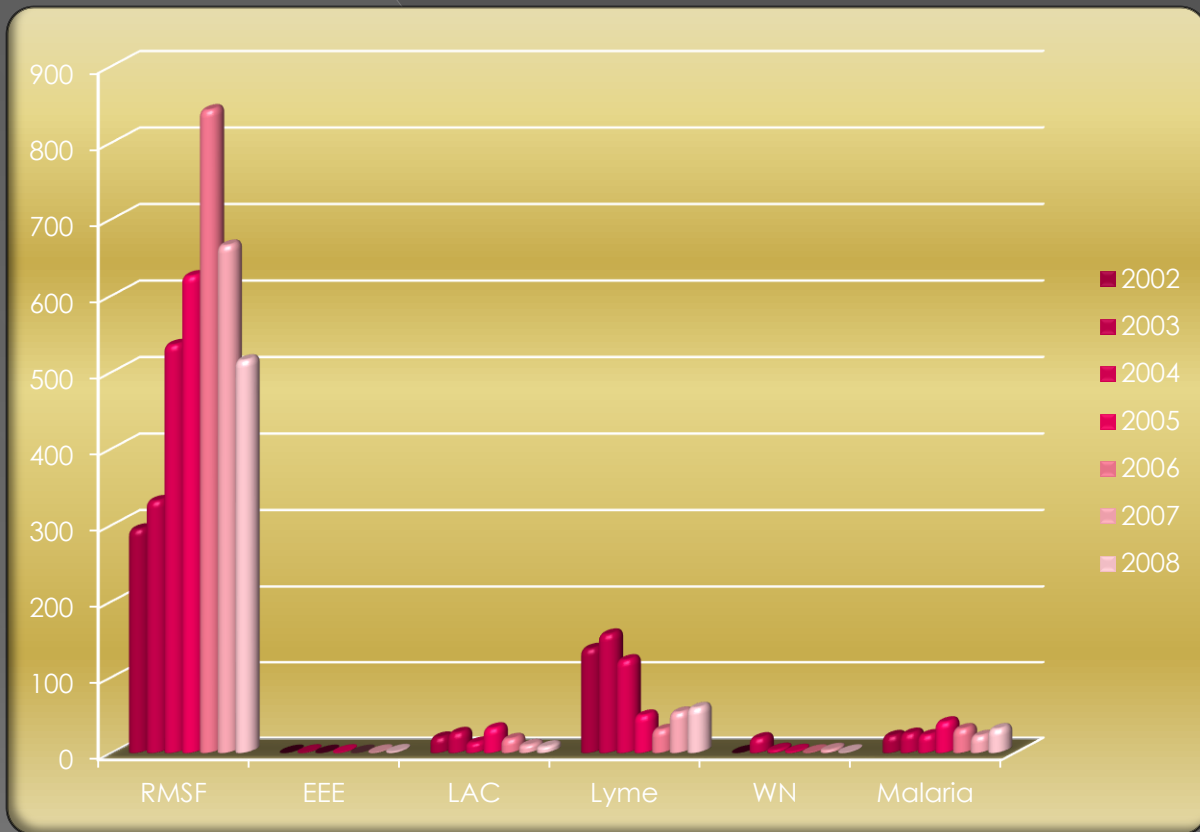
- ✓ 2010 statistics
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2010 Statistics

46	Permanent Sites (PS)
264	Visits made to PS
6.6	Average treatment rate in weeks
29	Service Requests (SR) received
0	Media outreach/Presentations
12	Mosquito pools collected (larval and adult)

Arboviral Reports

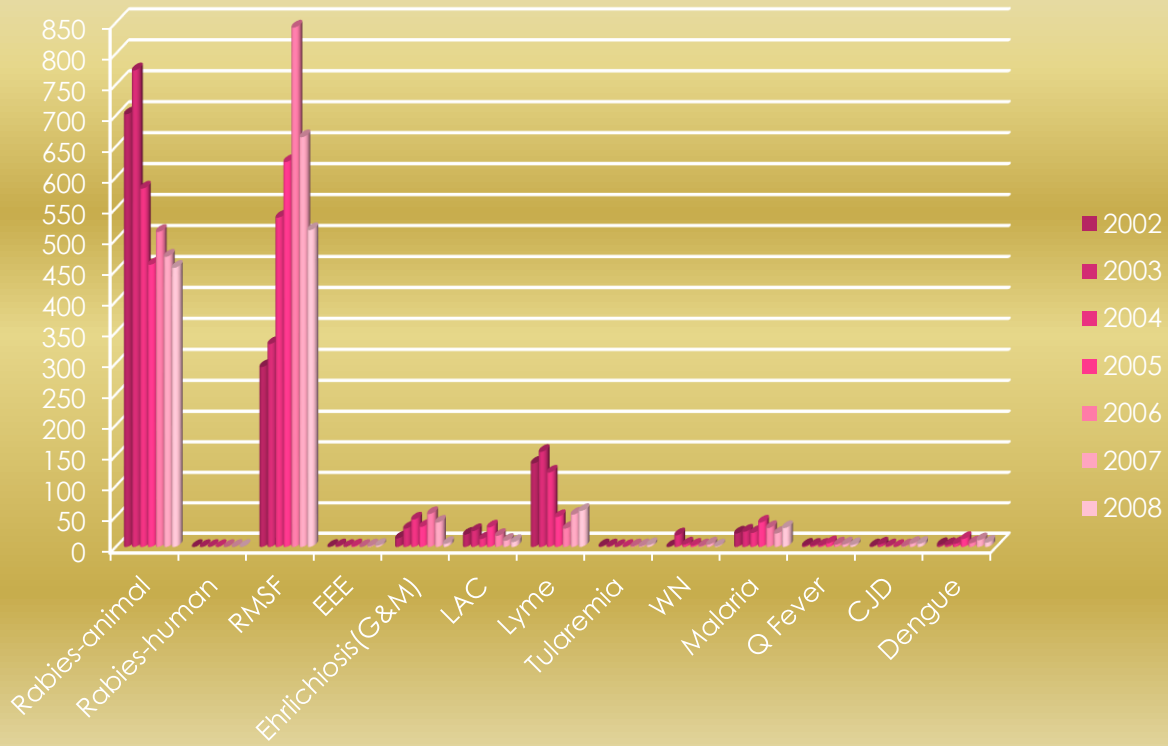
NC Statistics



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

VECTOR REPORT

Select NC Reportable Diseases-Statistics



	2002	2003	2004	2005	2006	2007	2008	2009	2010
Rabies - animal	702	773	582	459	512	472	454	473	397
Rabies - human	0	0	0	0	0	0	0	0	0
RMSF	294	331	535	625	842	665	515	325	505
EEE	0	1	0	1	0	1	2	1	0
Ehrlichiosis (G&M)	14	30	45	33	54	40	5	76	194
LAC	20	26	13	32	18	10	8	16	22
Lyme	137	156	122	49	30	53	59	252	417
Tularemia	1	1	0	0	1	1	3	1	3
WN	0	19	4	2	1	4	1	0	0
Malaria	22	25	23	40	31	22	31	33	46
Q fever	2	2	2	6	4	4	3	1	1
CJD	1	4	1	0	1	5	5	13	13
Dengue	3	3	5	13	6	11	7	0	6

CDC GUIDELINES

Arboviral Families

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

Surveillance

Equine

- Few positive clusters reported, mostly isolated cases
- Benefit – early sentinel indicators
- Disadvantage – expensive lab workup and vaccination is becoming more widely used; dead end host; difficulty getting timely information if any at all

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

Surveillance

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/missed.
- “It has been estimated that approximately 20 WNF cases occur for every WNME case”.
- Human sampling includes cerebrospinal fluid, serum, tissue
- Enhanced passive – monitoring clinical for any encephalitis cases
- Active – inquire at clinics and hospitals for any diagnosis and also contact labs for confirmed or potential cases
- 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.”
- Measurement of WNV activity using avian mortality and mosquito infection rates can decrease the risk of human infection.
- “Data from NYC indicate that human WNV disease cases were more likely to occur in counties that had experienced more than 0.1 dead crow reports per square mile per week.”
- 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	Definition	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. Conduct audience research to develop/target education and community involvement.
1	Remote	Spring, summer or fall; areas anticipating WN activity based on previous data in the region; no current surveillance indicating increased WN amplification in the community	Response as in category 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 entomologic survey and targeted at likely amplifying and bridge vectors species, vector and virus surveillance, expand community outreach and public education programs focused on risk potential and personal protection and emphasizing residential source reduction; maintain surveillance (mosquito density/IR, human encephalitis/meningitis and equine illness)
2	Low	Summer or fall; areas with limited or sporadic WNV epizootic activity in birds and/or mosquitoes. No positives prior to August	Response as in category 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). Implement adulticide applications if vector populations exceed locally established threshold levels, emphasizing areas where surveillance indicates potential for human risk to increase
3	Moderate	Spring, summer or fall; areas with initial confirmation of WN in birds before August; a horse and/or a human case or sustained WNV activity in birds/mosquitoes	Response as in category 2, plus; intensify adult mosquito control in areas where surveillance indicates human risk, initiate adult mosquito control if not already in progress, initiate visible activities in community to increase attention to WNV transmission risk, work with collaborators to reduce risks to elderly ; <u>adulticiding with light trap</u>

Response

4	High	<p>Spring, summer, fall; WNV activity suggesting a high risk of human infection (e.g. early summer high bird counts, sustained high mosquito positives of multiple species, rising vet cases and/or a human case. Areas with a positive where WN activity has occurred before.</p>	<p>Response as in category 3 plus: Expand public information program to include TV, radio 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.</p>
5	Outbreak in progress	<p>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)</p>	<p>Response as in category 4, plus; intensify emergency adult mosquito control program repeating applications as necessary to achieve adequate control. Enhance risk communication about adult mosquito control. Monitor efficacy of spraying on target mosquito populations. If outbreak is widespread and covers multiple jurisdictions, consider a coordinated widespread aerial adulticide application; emphasize urgency of personal protection through community leaders and media and emphasize use of repellent at visible public events. <u>Aerial adulticiding application</u></p>

Prevention

- “Responsible control programs target vector and nuisance populations for control and avoid managing habitats that support benign species” – LARVAL IDENTIFICATION/IPM
- Monitors species within the community and monitor the abundance of population dynamics – ADULT MOSQUITO COLLECTING
- Tracking virus activity in the community provides information on the concentration of WNV and other arboviruses. Positive pools are helpful in alerting the public to health threats but it does not provide a measurement of virus prevalence – VIRUS TESTING
- Source reduction can be split into two; sanitation (of the property owner) and water management (usually falls within the municipalities’ jurisdiction).
- Chemical control includes larviciding (effective part of IPM) and adulticiding (use based on surveillance data and confirmed cases).
- Resistance management is not a forefront issue due to the change in products used in the earlier mosquito program and what is currently used. Also the monitoring that is done in treated areas will help to detect any build of resistance. Once a summer a test area is chosen. This treatment site usually has a high larval count and after treatment is applied, it is revisited later that day to confirm the kill rate. Both the MMF and the Bti substances are verified for efficacy at least once a season.

Control

- *Gambusia* 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
- Other predators include “*Toxorhynchites rutilus*, predaceous copepods, the parasitic nematode *Romanomermis* and the fungus *Lagenidium giganteum*”. Only *Toxorhynchites rutilus* is used as a part of IPM due to the ease of capture and identification.
- 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
- Mass mailers are sent out to local tire dealers informing them of the importance of storing tires long term under shelter or removing tires weekly to prevent mosquito breeding. Also, all county elementary 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 – newspaper articles, cable television interviews, partnering with community leaders, health fair exhibits and presentations

Research Priorities

- Establish geographic distribution of WN in the community
- Determine the vector species for the area and the range of such

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 \$10,761.90
 - 2. Concord \$18,578.85
 - 3. Mt. Pleasant \$417.60
 - 4. Kannapolis ~~\$12,249.60~~
 - 5. Harrisburg ~~\$1,492.05~~

III. Administrative/Logistics

- A. Annual evaluation of Vector Control Plan - equipment
 - 1. Replace as needed
 - 2. Add technology components to increase efficiency
- B. Enforcement of abatement
 - 1. No county ordinance regarding such
 - 2. CHA only recourse is the imminent health hazard clause
 - 3. Recourse for problem areas: education, on site visits, letter, phone call, referral to code enforcement agency.
- 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 and quarterly data
 - 8. Local rainfall and weather patterns
 - 9. CE courses

D. Mosquito species

1. Aedes

- a. albopictus
- b. japonicus
- c. vexans

2. Anopheles

- a. bradleyi/crucians
- b. quadrimaculatus
- c. punctipennis

3. Culex

- a. erraticus
- b. nigripalpus
- c. pipiens
- d. restuans
- e. salinarius
- f. territans

4. Ochlerotatus

- a. atlanticus
- b. canadensis
- c. triseriatus

5. Orthopodomyia

- a. signifera

6. Psorophora

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

7. Toxorhynchites

- a. rutilus

8. Uranotania

- a. sapphirina

IV. Community

A. Treatment areas

1. Complaint driven service requests
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

2011

PROGRAM OUTLOOK

Light traps are placed in areas of known adult mosquito populations. Once there is a collection of made, the mosquitoes are then identified and sorted. All collections made are documented with the location, species and count. Larvae samples are collected along with any egg rafts that are found. Egg raft collections are counted as to the average number of eggs per raft. This data will be compared to the weather trends to see if there is any correlation. Most of the sampling during the summer are adults from CDC light traps. Majority of the collection sites are identified through service requests from residents concerned about high mosquito population at their residence.

The website for mosquito control has weekly updates during the summer on any virus activity and any specific bulletins that need public attention. There is a virtual rain gauge that is update regularly. Annual statistical data from 2002 through to the present is listed on the home page for viewing. There is also the availability of submitting a service request on line or sending an email directly to active personnel.

Projected budget cuts may significantly hinder the efforts for community intervention and disease prevention. Since the program is dependant on the individual municipalities, it is a very real possibility that only particular geographical areas of the county may receive mosquito control services.