Florida Mosquito Control Arbovirus Response Plan – West Nile Virus (FMCARP-WNV)

Guidelines for Mosquito Control Responses 2003

Walter J. Tabachnick Florida Medical Entomology Laboratory, Institute of Food and Agricultural Sciences, University of Florida

This response plan was developed for the Florida Coordinating Council for Mosquito Control in order to provide additional <u>guidance to mosquito control districts</u> dealing with West Nile virus events. The Florida Mosquito Control Response Levels outlined here are intended to guide mosquito control districts on appropriate responses based on their professional evaluation of real time local mosquito surveillance data. When appropriate, mosquito control districts have an obligation to make necessary vector control responses to rapidly developing arboviral threats, even if the responses differ from existing Florida Department of Health guidelines. Public information should be coordinated between health departments and mosquito control districts. However, it is ultimately the responsibility of the county health department administrator or director to issue public health advisories and alerts.

Table of Contents

| Florida Mosquito Control Response Plan Purpose/Overview I. Introduction A. Population Size B. Time of the Year C. Risk of Disease vs. Actual Occurrence of Disease D. Reporting Interval E. Surveillance Information F. Surveillance Information, Human Population Size and Estimating Risk | | | |
|--|---|----|--|
| II. | Considerations for Mosquito Control Response Plan | 6 | |
| III. | Mosquito Control Response Levels | 7 | |
| IV. | Mosquito Control Responses at Response Plan Levels | 8 | |
| V. | Examples | 10 | |
| VI. | Spreadsheet to Estimate Human Risk– Pinellas County as an example | 14 | |
| VII. | Acknowledgements | 14 | |

Florida Mosquito Control Arbovirus Response Plan – West Nile Virus (FMCARP - WNV)

PURPOSE/OVERVIEW

The purpose of the following plan is to provide guidelines to assist Florida mosquito control organizations in providing appropriate mosquito control operational responses to West Nile virus (WNV). The guidelines are presented as a starting basis for mosquito control organizations to use to assess information on the risk for WN in their jurisdictions and apply mosquito control operations commensurate with risk of human disease.

These are recommended guidelines only, and are intended for the use of professional mosquito control organizations. Each mosquito control organization must use all available information and the best professional assessment in using the recommended guidelines. For example, the guidelines provide a framework to assess surveillance information. Depending on the time of year that the surveillance information is collected, local circumstances, and other information, the recommended surveillance levels used to make an assessment in the guidelines may have to be changed. This requires the best professional judgment of the local mosquito control organization.

I. Introduction

Florida mosquito control organizations have the responsibility to mitigate the impact of mosquito borne disease on human health and well-being through the efficient, effective, and environmentally proper use of mosquito control methods. The objective of this document is to provide guidelines for mosquito control organizations to assist them in interpreting mosquito borne disease information that may be available to their local jurisdictions. These guidelines provide a framework for mosquito control agencies to use available arthropod borne pathogen and disease information to apply mosquito control efforts commensurate with the extent of arthropod borne disease and/or the risk of disease to their human clientele.

The Florida Mosquito Control Arbovirus Response Plan – West Nile virus (FMCARP-WNV) must take into account the great diversity in mosquito control organizations in Florida and the diversity of the issues each faces due to the variety of ecologies in different regions, and the variety of available resources for mosquito control in the state. The FMCARP-WNV attempts to integrate guidelines for mosquito control agencies in Florida with the companion Florida Department of Health (DOH) Mosquito Illness Response Plan. Florida mosquito control agencies require a FMCARP-WNV containing specific guidelines for mosquito control efforts commensurate with public health risks from mosquitoes. The DOH Illness Response Plan is not meant to provide such guidelines.

The FMCARP-WNV plan considers the following factors in interpreting the status of WNV transmission and disease prevalence that will impact any mosquito control program's assessment of how to respond:

A. Human Population Size

The absolute size of the human population in any jurisdiction is a critical factor in determining the problem for human health from an arthropod borne disease. It must be understood that even with precisely the same risk of mosquito borne human disease,

districts or counties with large numbers of humans will likely report a larger number of human cases compared to smaller counties. This is illustrated simply by using the incidence of disease per human population as the measure of disease in an area. For example, if Indian River County and Miami Dade County have the same disease incidence for West Nile (for example, the actual incidence is 10 cases per 100,000 people in each county), there is no difference in the transmission risk in the two counties. The chance of someone getting West Nile is the same in both counties. A Miami-Dade resident has the same likelihood of getting West Nile as in Indian River resident. However this means that there are 12.5 cases in Indian River (population size 120,000) but 230 cases will be reported in Miami Dade (population size 2,300,000). It is important to consider population difference when evaluating actual case numbers.

The above consideration of risk contingent on the numbers of the exposed human population is also relevant within jurisdictions. Surveillance information and/or disease information may be useful only for specific regions within larger jurisdictions such as counties or mosquito control districts. For example, the at risk human population in Miami during the late summer of 2004 was the ca. 60,000 people living in the Coconut-Coral Gables neighborhoods and not the entire 2.3 million people living in Dade County. Likewise, sentinel chicken surveillance information is relevant to the immediate local human population living close to the sentinel chicken flock and not to district or county wide populations.

The mosquito control guidelines recognize that the absolute number of human cases that occur in any area will be an important consideration in determining the need for increased mosquito control responses. It could be acceptable for any mosquito control program to respond aggressively to the appearance of 20 human cases during a surveillance week. However this does mean that a very populous district might expend greater resources at a lower level of risk than a less populous county.

The guidelines address this issue by using two different measures of the numbers of human West Nile cases in establishing response recommendations. Incidence of disease in the population is used which gives the equivalent risk to humans regardless of the population size of the at risk population. The absolute number of human cases is used but note that this number depends on the size of the at risk population and will result in more aggressive responses in some jurisdictions, likely those with large human populations, although there is no difference in actual risk compared to areas with small human population size.

B. Time of the Year

Information addressed in the guidelines must be viewed with consideration to the time of the year that the surveillance data are collected. Mosquito control organizations recognize that the same surveillance information collected early in the transmission season (May-August) may demand a more aggressive response than this same data collected later in the year (September-December).

C. Risk of Disease vs. Actual Occurrence of Disease

The FMCARP-WNV provides guidance for the "risk" for human disease when the numbers of human cases are not known, or have not yet occurred, but is projected on the basis of other information. In addition guidance is provided based on the actual "occurrence" of human cases. The other information used to determine "risk" may be any, some, or all of the following: surveillance information (mosquitoes, wild birds, sentinel chickens, equines) in the local jurisdiction or in the absence of surveillance information, information obtained from

a geographically adjacent county that has surveillance information. The risk of human cases is provided in terms of incidence and the absolute number of cases in order to provide large and small jurisdictions the option of reacting where and when the data indicate that a response is necessary. Once human cases are reported, mosquito control responses are provided commensurate with these numbers using both incidence and the absolute numbers of human cases.

Note: A DOH Medical Advisory is triggered by the appearance of a single human case regardless of other surveillance indicators. The FMCARP-WNV provides guidance for various situations with the occurrence of more than 1 human case. Since the appearance of a single human case establishes a Medical Advisory by itself, the FMCARP-WNV provides guidance for the appearance (actual occurrence) of more than the single human case, also taking account for the appearance of cases during different time intervals. The Mosquito Alert B and Mosquito Emergency levels are the two levels that pertain to more than a single human case.

D. Reporting Interval

The FMCARP-WNV provides guidance to account for specific reporting periods. For example, surveillance information is only appropriate for the specific time period in which the information is collected. It is important for agencies to recognize that a 20% rise in surveillance positives totaled over the course of the entire year could be the result of substantial activity reported during a short time period. In this case mosquito control responses should be focused in the actual periods of transmission risk. The surveillance information used in the FMCARP-WNV is based on the shortest surveillance time period, which is usually a one week reporting period. Therefore all surveillance indicators in the FMCARP-WNV plan are based on a one week surveillance data reporting period. A 30% annual seropositive rate in sentinel chickens provides little information concerning the temporal changes in risk to the human population that occurred during the year. However, a 30% increase in the number of WNV-positive sentinel chickens reported in a one week surveillance period in a one week surveillance based on a sentinel chickens reported during the year. However, a 30% increase in the number of WNV-positive sentinel chickens reported in a one week surveillance period may indicate a significant increase in the local transmission rate of WNV.

E. Surveillance Information

There is a wide diversity in the abundance and quality of arboviral surveillance data collected in jurisdictions throughout Florida. A variety of information may be available that can be used to assess WNV transmission risk in different Florida localities. Some localities have well developed surveillance information that can be used prior to and during the occurrence of human West Nile cases to assess risk and apply appropriate mosquito and disease control strategies. Each of the different surveillance tools provide different information which needs to be assessed and evaluated by knowledgeable mosquito control and mosquito borne disease epidemiologists.

The most precise surveillance tools are those that provide direct associations with actual mosquito transmission frequencies. Dead bird reports and the percent of WN positive wild birds are dependent on collection effort and the original infection site for these wild birds is usually unknown. Therefore, this type of information is less useful than mosquito infection rates and sentinel chicken surveillance data where the location of infection is more clearly defined.

No matter what surveillance technique is used, the utility of the resulting surveillance data is critically dependent on the timeliness of the data collection and the summary reports. Surveillance information must be provided in the most efficient, effective, and quickest

means possible. It is critical that mosquito control and public health agencies have information on WN positive samples within days of their submission for testing. Information that is based on infections that occurred 2-3 or more weeks prior to final positive diagnostic test may be too late for appropriate intervening actions on the part of the responsible agencies. Surveillance data must be collected in a way that minimizes the time between actual infection and the issuing of a positive report. Any significant gaps between infection and reporting severely compromise the effectiveness of an arboviral surveillance program.

The FMCARP-WNV assumes timely and accurate reporting of surveillance information to make full use of the information for risk assessment. Delays in reporting of diagnostic results will serve to increase confusion on the risks due to WNV transmission in a location.

F. Surveillance Information, Human Population Size, and Estimating Risk It is possible to obtain crude estimates of the risk of human West Nile cases by using sentinel chicken seroconversion rates to estimate the frequency of mosquito transmission of WNV in a specific area. Weekly sentinel chicken seroconversion rates can be used to gauge the magnitude of overall risk. Of course, any estimates of risk are likely to be more accurate if the risk estimate is confined to the smallest local human population that is near the sentinel chicken flocks. Also information about mosquito abundance and mosquito age structure will greatly improve these estimates. Finally information about the mosquito attack rates on humans will also improve the estimate.

Despite having to use estimates of some parameters, the sentinel chicken information can be used to assess the magnitude of WNV transmission risk. By using a variety of estimates for mosquito biting intensities the magnitude of the risk can be discerned.

II. Issues Considered in developing the Florida Mosquito Control Arbovirus Response Plan – West Nile virus

- a. Integration with DOH Response Plan for Mosquito-borne Diseases.
- b. Appropriate control responses commensurate with human risk of disease.
- c. Dynamic and flexible responses appropriate for variations in the human population size and WNV transmission risk for specific counties.
- d. Consideration for public and media perception of the observed "absolute numbers" of human cases and perception of the appropriate vector control efforts commensurate with the absolute number.
- e. Assume that, where available, surveillance data will precede human cases.
- f. Incorporate regional surveillance data to allow for risk assessment in regions with little or no arboviral sentinel surveillance.
- g. Conservative use of surveillance data in the absence of human cases. The conservative use of surveillance data in the absence of human cases allows mosquito control to conserve resources when WNV transmission is reported, but human risk is at a minimum due to seasonal and environmental factors.
- h. Conservative use of mosquito control resources in the absence of indicators of human transmission risk.
- i. An emphasis on the early impact of mosquito control efforts at the Mosquito Advisory level to minimize human cases.
- j. Integration with public policy at Mosquito Emergency level.

III. Mosquito Control Arbovirus Response Levels

- <u>Level 1</u> No activity.
- <u>Level 2</u> <u>Background.</u> Many regions of Florida are likely to be at level 2 for much of the year. Occasional sentinel chicken seroconversions are frequently reported and these sporadic seroconversion rates do not indicate an elevated human WNV transmission risk.
- <u>Level 3</u> <u>Mosquito Advisory</u>. Elevated detection in surveillance during any weekly testing period. Any of the following might trigger an advisory:
 - $\sqrt{10\%}$ above historical background percent levels for sentinel chickens, i.e. if sentinel background is 15%, 25% would be an advisory.
 - √ 20% above WN positives of total birds or three-fold increase in dead birds above previous years for the same period. Example; previous year level was 2% WN positive birds tested, 20% would be an advisory; previous year 50 dead birds reported then 150 dead bird reports would be medical advisory.
 - $\sqrt{50\%}$ of any individual sentinel flock.
 - $\sqrt{}$ Mosquito transmission levels of ca.1/10,000.
 - $\sqrt{\rm Risk}$ of more than 10 human cases based on human population size and mosquito transmission frequency estimates.
 - $\sqrt{}$ Risk of 10-50/100,000 humans during any week or reporting period based on mosquito transmission frequency estimates.
 - Status of adjoining counties and region if no local surveillance information is available. If surveillance information in adjoining county(s) is appropriate for issuing an advisory, an advisory should be considered in the absence of surveillance information indicated no risk.

Level 4 – Mosquito Alert.

Mosquito Alert A – single human case

- Mosquito Alert B Elevated detection in sentinels. Any of the following might trigger level 4.
 - $\sqrt{20\%}$ above historical background percent levels for sentinel chickens, i.e. if sentinel background is 15%, 35% would be "Mosquito Alert B."
 - $\sqrt{30\%}$ increase of WN positives percent of total birds compared to previous year(s) for the same period, example 10% seroconversions in previous years are considered background for reporting period, then 40% seropositive birds would be a medical danger..
 - $\sqrt{75\%}$ of any individual sentinel chicken flock.
 - $\sqrt{}$ Mosquito transmission levels estimated 1/1,000.
 - $\sqrt{\rm Risk}$ of 50-100/100,000 humans based on estimates of mosquito transmission frequency.

- $\sqrt{10}$ Risk of 50+ human cases based on the total at risk human population size and the mosquito transmission frequency.
- $\sqrt{}$ The occurrence of 3 or more human cases with disease onset showing infection during the same 1-2 week period.
- √ Status of adjoining counties and region if no local surveillance information is available. If surveillance information in adjoining county(s) is appropriate for issuing an alert, an alert should be considered in the absence of surveillance information indicating no risk.
- <u>Level 5</u> <u>Mosquito Emergency</u>. Elevated detection in sentinels. Any of the following might trigger a medical threat or emergency.
 - $\sqrt{50\%}$ above historical background percent levels for sentinel chickens for the same reporting period, i.e. if sentinel background is 15%, 65% would be an emergency/threat.
 - i. 75% increase in WN positive of total birds compared to previous years for the same period.
 - ii. 100% of the individuals in two or more individual sentinel chicken flocks.
 - iii. Mosquito transmission frequency greater than 1/1,000.
 - iv. Risk of 100/100,000 humans based on estimates of the mosquito transmission frequency.
 - v. Risk of 200+ human cases based on the human population size at risk and estimates of the mosquito transmission frequency.
 - vi. Occurrence of 20 human cases during any week or reporting period showing that the date of onset or infection occurred during the same 1-2 week period.
 - vii. Status of adjoining counties and region if no local surveillance information is available. If surveillance information in adjoining county(s) is appropriate for issuing an emergency/threat, an emergency/threat should be issued in the absence of surveillance information indicated no risk.

IV. Mosquito Control Responses at Response Plan Levels

1. <u>Level 1</u>

- Mosquito operations targeting nuisance and/or disease carrying mosquitoes.
- Surveillance sentinel chickens, mosquitoes, birds.

2. <u>Level 2</u>

- a. Continued Surveillance.
- b. Mosquito control operations targeting nuisance and/or disease carrying mosquitoes.
- c. Monitoring potential hot spots using surveillance tools.
- d. Coordinate communication with county health department regarding real time surveillance results.

e. Coordinated Public Announcements with the county health department – personal protection.

Level 3 – Mosquito Advisory

- Mosquito control targeting high risk vector mosquito populations and areas commensurate with arbovirus indicators for risk by performing <u>repetitive</u> nightly spraying operations in high risk areas until vector is suppressed to background levels.
- Consideration for increased surveillance using sentinels in high risk areas with attention to measuring mosquito transmission frequencies using chicken baited mosquito traps.
- Preventive ULV and aerial post-epic rainfall brood reduction, and control of nuisance mosquitoes as a lower priority.
- Coordinate communication with county health department regarding real time surveillance results.
- Coordinated Public Announcements with the county health department –avoid mosquitoes and use personal protection.

• Level 4 – Mosquito Alert

- Mosquito Alert A as Level 3.
- Mosquito Alert B
 - Focus mosquito control efforts to high risk mosquito populations and areas commensurate with arbovirus indicators for risk, adulticiding hot spots
 - Consideration for aerial adulticiding if not already in place with focus in high risk areas where wide area control measures are required to respond to the increased level of risk in a timely manner.
 - Increased surveillance to obtain estimates of mosquito transmission frequency in targeted areas.
 - Coordinate communication with county health department regarding real time surveillance results.
 - Coordinated Public Announcements with the county health department – avoid mosquitoes and use personal protection.

V. <u>Level 5</u> – <u>Mosquito Emergency</u>

- Public Announcements personal protection
- Mosquito control remains in close contact with local County Health Departments and other responsible government agencies providing them timely information about the increased public health risk for mosquito-borne diseases and advising them about potential strategies for increased disease prevention efforts (such as canceling outdoor events/activities, closing parks to overnight campers, etc.).
- Aggressive mosquito adulticiding by ground, air, consideration for control on protected lands with approval from FDACS, DEP, Fish and Wildlife, private owners etc. as needed, based on justified wide spread danger to public health.
- Regional inter-County/District and FDACS support as indicated for Counties in Emergency status.
- Increased surveillance to obtain estimates of mosquito transmission frequency in targeted areas.

- Coordinate communication with county health department regarding real time surveillance results.
- Request for state (FDACS) and federal emergency (FEMA) support for mosquito control operations
- Coordinated Public Announcements with the county health department

 avoid mosquitoes and use personal protection.

V. Examples.

The following examples are based on historical West Nile information from selected Florida counties. It is meant to illustrate how the proposed guidelines might have been used in specific realistic situations.

- I. Lee County 2003
 - A. Background In 2003 Lee County (pop. ca. 450,000) had 3 human West Nile cases reported on July 28 (incidence 1 case/150,000). The following represents the dates of reports from the Lee County sentinel chicken surveillance system (18 flocks X 6 birds ea. = 108 birds) indicating the number of positive birds and the date of report:

| • | | |
|----------|-----------|----|
| 1/7 - 1 | 7/29 - | 9 |
| 1/9 - 4 | 8/4 - | 12 |
| 1/21 - 1 | 8/10 - | 9 |
| 2/12 - 1 | 8/18 - | 6 |
| 4/8 - 1 | 8/25-26 - | 12 |
| 4/29 - 1 | 9/8-9 — | 16 |
| 6/17 - 1 | 9/16 - | 3 |
| 7/8 - 3 | 9/23 - | 7 |
| 7/14 - 4 | | |
| 7/21 - 4 | | |

- B. Temporal use of the Guidelines per Lee County Information
 - 1. January June 2003.
 - a. Lee County surveillance showed some West Nile transmission activity at a low level, likely background (ca. 1%-4% of total sentinel population). Level 2, although concern that the numbers of mosquitoes per chicken is likely lower than later in the year. Activity at this time cause for concern for later in the season.
 - 2. July 2003
 - a. West Nile transmission activity increased from 1-4% per week to 4-8%. Estimated incidence of cases based on ca. 1000 mosquitoes biting each sentinel bird is Level 2.
 - b. First Human Cases onset 7/15. This is Level 3 a Mosquito Alert A.
 - 3. August 2003 2 additional human cases (date of onset: 8/22 and 8/29) Mosquito Alert A.
 - a. West Nile activity similar to July levels, 6 -15% weekly sentinel seroconversions. Predicted disease incidence based on 1,000 mosquitoes biting each sentinel per week on average gives mosquito transmission of ca. 1/6750 with 15% highest sentinel seroconversion.

- b. Predicted no. of human cases with avg. max. 1-10 bites per person throughout Lee County for 10 bites per person (450,000 X 10 X 0.00015 = 675 infections) with 4.5 135 cases depending on whether infected: cases are 1:150 or 1:5. At 1 bite per person during a week (450,000 X 1 X 0.00015 = 67.5 infections) with 0 13.5 cases depending on whether infected: cases are 1:150 or 1:5.
- c. Still mosquito alert based on surveillance
- d. Mosquito alert A based on 2 human cases reported in 1 week.
- 4. September 2003.
 - a. No change from August.
- 5. October 2003
 - i. Consider reducing to mosquito advisory based on surveillance and absence of human cases in September.

II. Miami Dade 2004

A. Background - In 2004 Miami Dade County had a total of 20 WN human cases (incidence 1 case/115,000). The following represents the dates of reports from Miami-Dade surveillance through the Florida DOH including human cases, dead bird reports, WN positives in dead birds, the Miami-Dade County sentinel chicken surveillance system (initiated in late July with 5 flocks of 5 birds = 25 birds, changed to 5 flocks of 6 birds each = 30 birds in August). Surveillance information by week with number of individuals: Human Cases (date of onset) Jun 16 1 Jun 27 1 Jun 30 1 Jul 3 1 Jul 5 1 Jul 7 1 Jul 8 1 Jul 12 1 Jul 20 1 Jul 29 1 3 Aug 1 Aug 7 **Dead Bird Reports** May 29 Aug 14 4 2 June 12 12 Aug 21 3 June 19 2 23 Sept 4 July 3 43 Sept 11 3 July 10 66 Sept 25 0 July 24 81 Oct 0 July 31 15

Wild Bird positives for WN Jan 14 1

| Jun 19 | 1 |
|-------------|--------|
| Jul 10 | 2 |
| Jul 16 | 1 |
| Jul 19 | 6 |
| Jul 21 | 4 |
| Jul 22 | 1 |
| Aug 2 | 1 |
| Aug 4 | 2 |
| Aug 5 | 3 |
| Aug 9 | 1 |
| | |
| Sentinel Ch | ickens |
| Jul 26 | 1 |
| Aug 2 | 1 |
| Aug 9 | 1 |

Aug 91Aug 132Aug 242Sep 131Sep 281

- B. Temporal use of the Guidelines per Miami Dade County Information on a county wide level (note consideration should be made using surveillance and population size focused in the Coral Gables/Coconut Grove area as well)
 - 1. January June 2004.
 - a. Miami Dade County surveillance in WN positive dead birds showed some West Nile transmission activity at a low level, likely background (ca. 1%-4% of total sentinel population). Level 2.
 - 2. June 1 –Jul 3, 2004
 - a. 78 dead birds were reported. 1 WN positive of ?? (data unavailable at this time) tested. In the same period in 2003, Miami Dade County had 28 dead birds tested for WNV (4 were positive).
 - b. Three human cases, 2 with onset in the same week. Note reporting did not have both cases in a timely fashion – but this would have triggered a medical alert if this information had been known.
 - 3. July 5 -12
 - a. Several human cases within a 1-2 week period. This is Level 4, a Mosquito Alert B.
 - 4. July 5-30
 - a. Continued human cases at level 4 Mosquito Alert B.
 - b. 14 WN positive birds of ?? (data unavailable at this time) tested.
 - c. 1 Sentinel chicken positive
 - d. Human cases are maintaining the medical alert
 - e. A total of 47 birds were tested for WN in this period in 2003 of which 4 were positive (8.5%).
 - f. Note without human cases dead bird positives would be a mosquito advisory based on three-fold increase from previous year

- 5. August 2004
 - a. Additional human cases (date of onset: 8/4 and 8/29x2) Mosquito Alert B.
 - b. 7 dead bird reports; in Aug. 2003, 81 dead birds tested for WN (3 positives).
 - c. 6 sentinel chicken positives (max of 2 per reporting week) Predicted disease incidence based on 1,000 mosquitoes biting each sentinel per week on average gives mosquito transmission of ca. 1/15000 with 7% highest sentinel seroconversion.
 - d. Predicted no. of human cases with avg. max. 1-10 bites per person throughout Miami-Dade County for 10 bites per person (2,300,000 X 10 X 0.00007 = 1610 infections) with 11 322 cases depending on whether infected: cases are 1:150 or 1:5. At 1 bite per person during a week (2,300,000 X 1 X 0.00007 = 161infections) with 1 32 cases depending on whether infected: cases are 1:150 or 1:5.
 - e. Mosquito advisory or alert based on surveillance from chickens.
 - f. Mosquito advisory based on WN positives in wild birds (7) of ?? (data unavailable at this time) compared to 3 of 81 (4%) tested in 2003 for same period
 - g. Mosquito Alert B based on 3 more human cases with onset reported in 1-2 week.
- 6. September 2004.
 - a. No change from August.
 - b. Dead bird reports, WN positive wild birds suggest reduction in transmission.
- 5. October 2004
 - ii. Consider reducing to mosquito advisory based on surveillance and absence of human cases in September.

VI. Spreadsheet to Estimate Human Risk – Pinellas County as an example

| Pop.Size | # Sent Chick. | Est. bites/ chicken/week | Total # bites | # serocon. | Transmission Freq. | Avg # bites / person | Expect # WN Fever Cases | Expected # WN Enceph. |
|----------|---------------------|-----------------------------|---------------------|---------------|-----------------------|----------------------------|-------------------------------|-----------------------------|
| 926716 | 56 | 1000 | 56000 | 3 | 0.00005 | 10 | 99.291 | 4.96455 |
| 926716 | 56 | 1000 | 56000 | 3 | 0.00005 | 1 | 9.9291 | 0.496455 |
| 926716 | 56 | 1000 | 56000 | 10 | 0.00018 | 10 | 330.97 | 16.5485 |
| 926716 | 56 | 1000 | 56000 | 10 | 0.00018 | 1 | 33.097 | 1.65485 |
| 926716 | 56 | 1000 | 56000 | 25 | 0.00045 | 10 | 827.425 | 41.37125 |
| 926716 | 56 | 1000 | 56000 | 25 | 0.00045 | 1 | 82.7425 | 4.137125 |
| 926716 | 56 | 1000 | 56000 | 42 | 0.00075 | 10 | 1390.074 | 69.5037 |
| | 56 | 1000 | 56000 | 42 | 0.00075 | 1 | 139.0074 | 6.95037 |
| 926716 | 56 | 500 | 28000 | 3 | 0.00011 | 10 | 198.582 | 9.9291 |
| 926716 | 56 | 500 | 28000 | 3 | 0.00011 | 1 | 19.8582 | 0.99291 |
| 926716 | 56 | 500 | 28000 | 10 | 0.00036 | 10 | 661.94 | 33.097 |
| 926716 | 56 | 500 | 28000 | 10 | 0.00036 | 1 | 66.194 | 3.3097 |
| 926716 | 56 | 500 | 28000 | 25 | 0.00089 | 10 | 1654.85 | 82.7425 |
| 926716 | 56 | 500 | 28000 | 25 | 0.00089 | 1 | 165.485 | 8.27425 |
| 926716 | 56 | 500 | 28000 | 42 | 0.00150 | 10 | 2780.148 | 139.0074 |
| 926716 | 56 | 500 | 28000 | 42 | 0.00150 | 1 | 278.0148 | 13.90074 |

VIII. Acknowledgements

Many individuals provided constructive comments on various versions of the guidelines. I would like to thank Frank Van Essen, Jeffrey Stivers, Marin Brouillard (Collier County Mosquito Control), Bob Betts (Escambia County Mosquito Control), Doug Carlson, Alan Curtis, Donald Shroyer, John Beidler (Indian River Mosquito Control), Eric Cotsenmeyer (Lake County Mosquito Control), James Burgess, Wayne Gale (Lee County Mosquito Control), Mark Lathem, Robert Frommer (Manatee County Mosquito Control), Thomas Breaud (Orange County Mosquito Control), Dennis Moore, Doug Wassmer (Pasco County Mosquito Control), Nancy Page (Pinellas County Mosquito Control), James David, David Mook (St. Lucie County Mosquito Control), Jonas Stewart (Volusia County Mosquito Control), Jonathan Day, George O'Meara, Roxanne Rutledge (FMEL) and the members of the Florida Coordinating Council on Mosquito Control. The suggestions provided by these individuals greatly improved the guidelines. Although not all of the suggestions could be included in the final document for a variety of reasons, their consideration was valuable in developing the guidelines.