

Current Status of Mosquito Control Programs in North Carolina: The Need for Cost-Effectiveness Analysis

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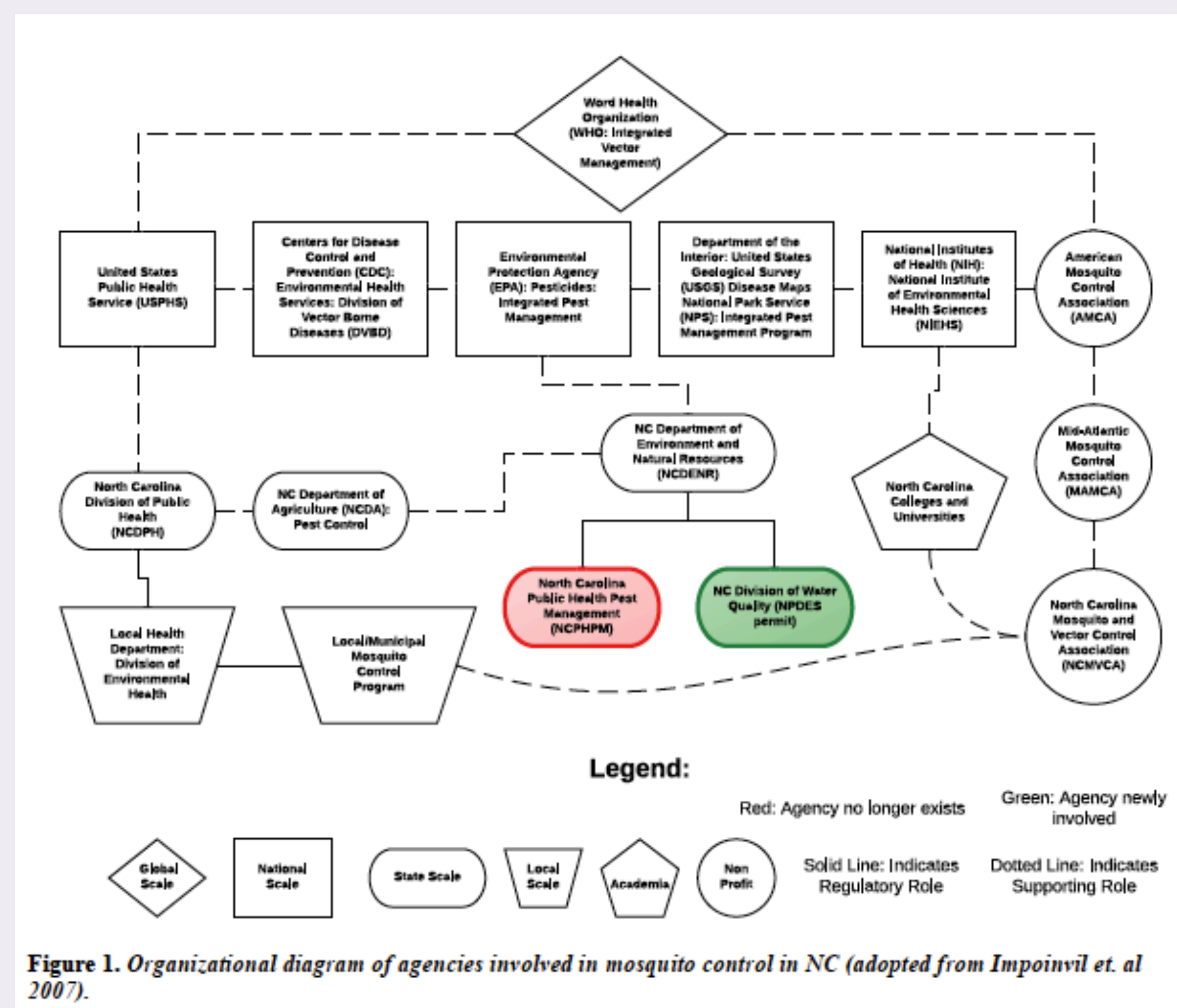
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INTRODUCTION

Mosquito control is technically specialized and labor-intensive with mosquito control programs (MCPs) carrying out services at federal, state, and local levels. In the 1970s, the North Carolina (NC) Department of Environment and Natural Resources formed the Public Health Pest Management (PHPM) section to play an active leadership role in training and support for local mosquito control programs across the state. However, PHPM was disbanded in July 2011 due to state budget cuts. The extent to which recent budget shortfalls have impacted services provided by MCPs is unknown. This study assesses the status of mosquito-borne disease surveillance in NC; hence, informing the legislature about potential public health consequences of budget cuts.

OBJECTIVES

- 1) Assess the current status of MCPs in NC.
- 2) Evaluate the extent to which the operational status of local MCPs affects public health.
- 3) Evaluate the impacts of losing the PHPM section in NC.



Study Area

- Three topographical regions in NC: 1) Coastal Plain (eastern), 2) Piedmont Plateau (central), and 3) Appalachian Mountains (western). There are > 60 species of mosquitoes found in NC, though not all act as pathogen vectors.

Survey

- 50-question survey regarding the status of MCPs distributed to departments of public and environmental health, public works, and vector control in all NC counties.

RESULTS

- Mosquito-borne viruses affecting public health in NC include:
 - Eastern equine encephalitis virus (EEEV)
 - La Crosse encephalitis virus (LACEV)
 - Saint Louis encephalitis virus (SLEV)
 - West Nile virus (WNV)

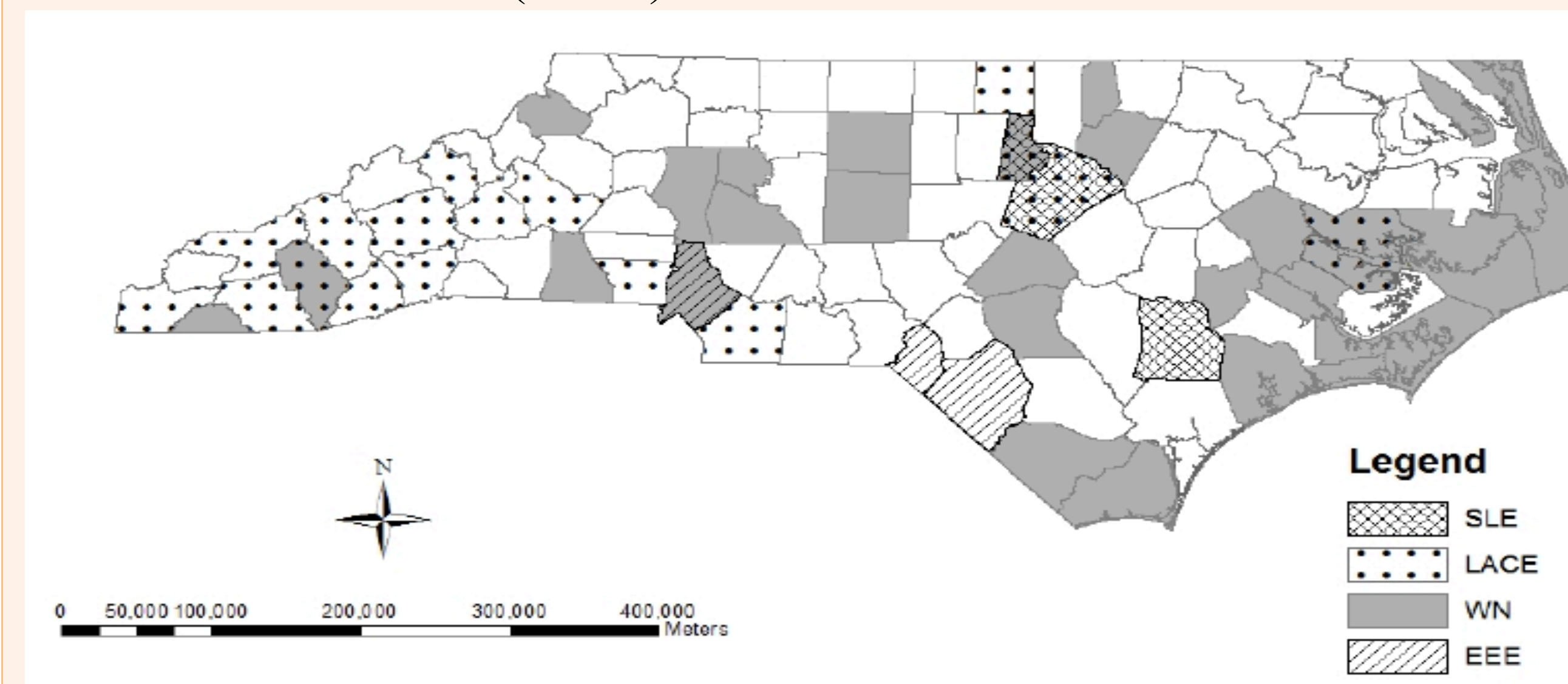


Figure 2. Distribution of human cases of mosquito-borne disease in NC reported to the CDC between 2002-2011.

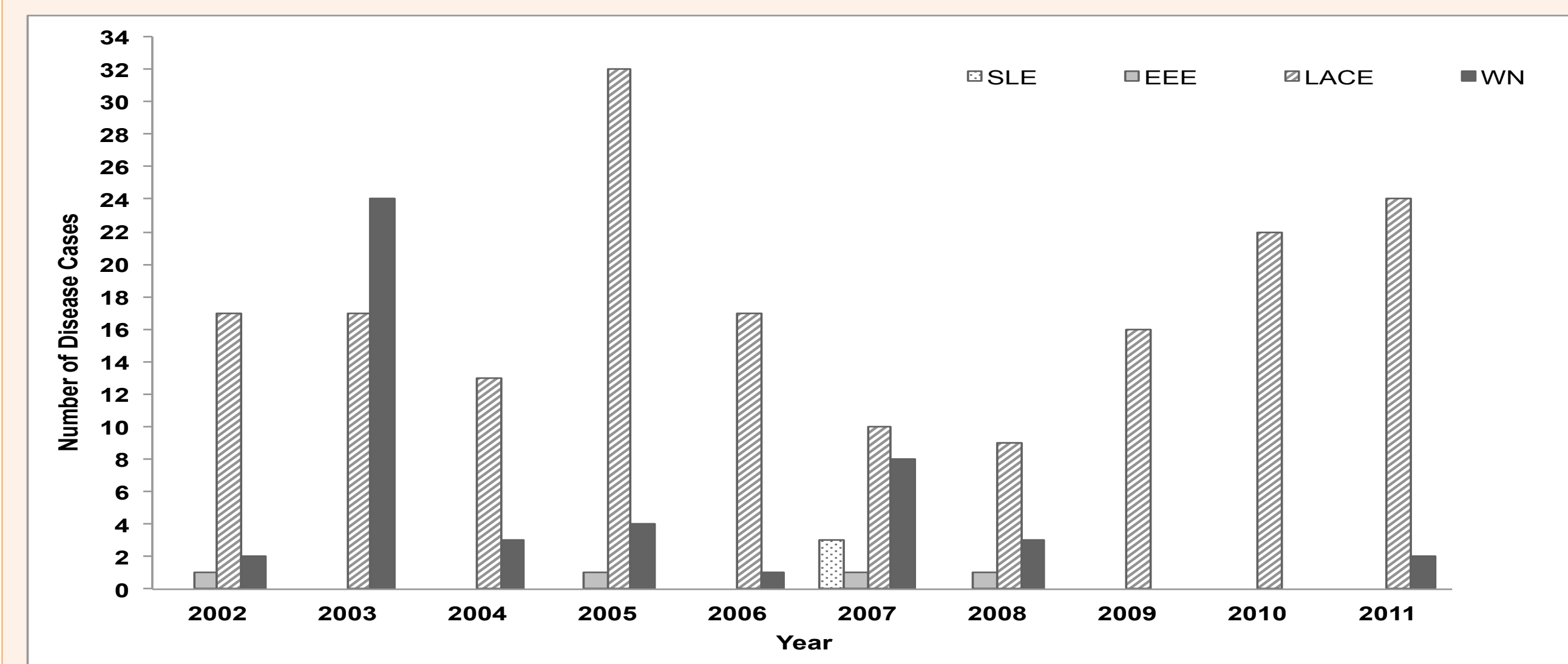


Figure 3. Number of human cases of mosquito-borne disease in NC reported to the CDC between 2002-2011.

- NC mosquito control programs current protecting 48% of population.
- 86 MCPs in NC (39 of 100 counties)

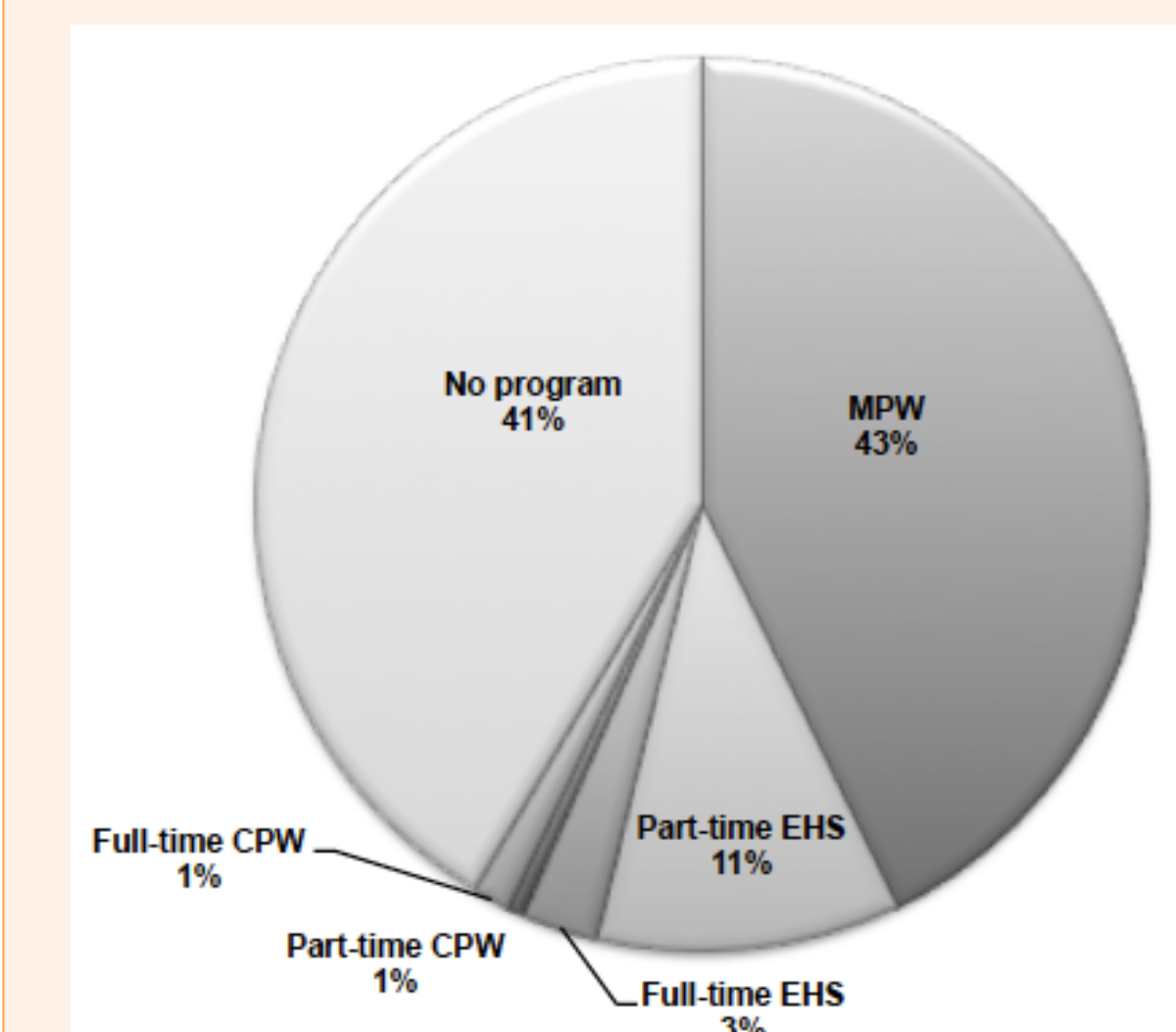


Figure 4. Agencies involved with mosquito control in NC. MPW= municipal public works, EHS=environmental health services, CPW= county public works.

- 83% of MCPs in Coastal region
- 12% of MCPs in Piedmont region
- 2% of MCPs in Appalachian region.
- 28 counties have no MCP
- 15 counties have reported human cases of mosquito-borne disease.
- Counties without a MCP are at greater risk of disease exposure than those with a MCP.

Survey Results

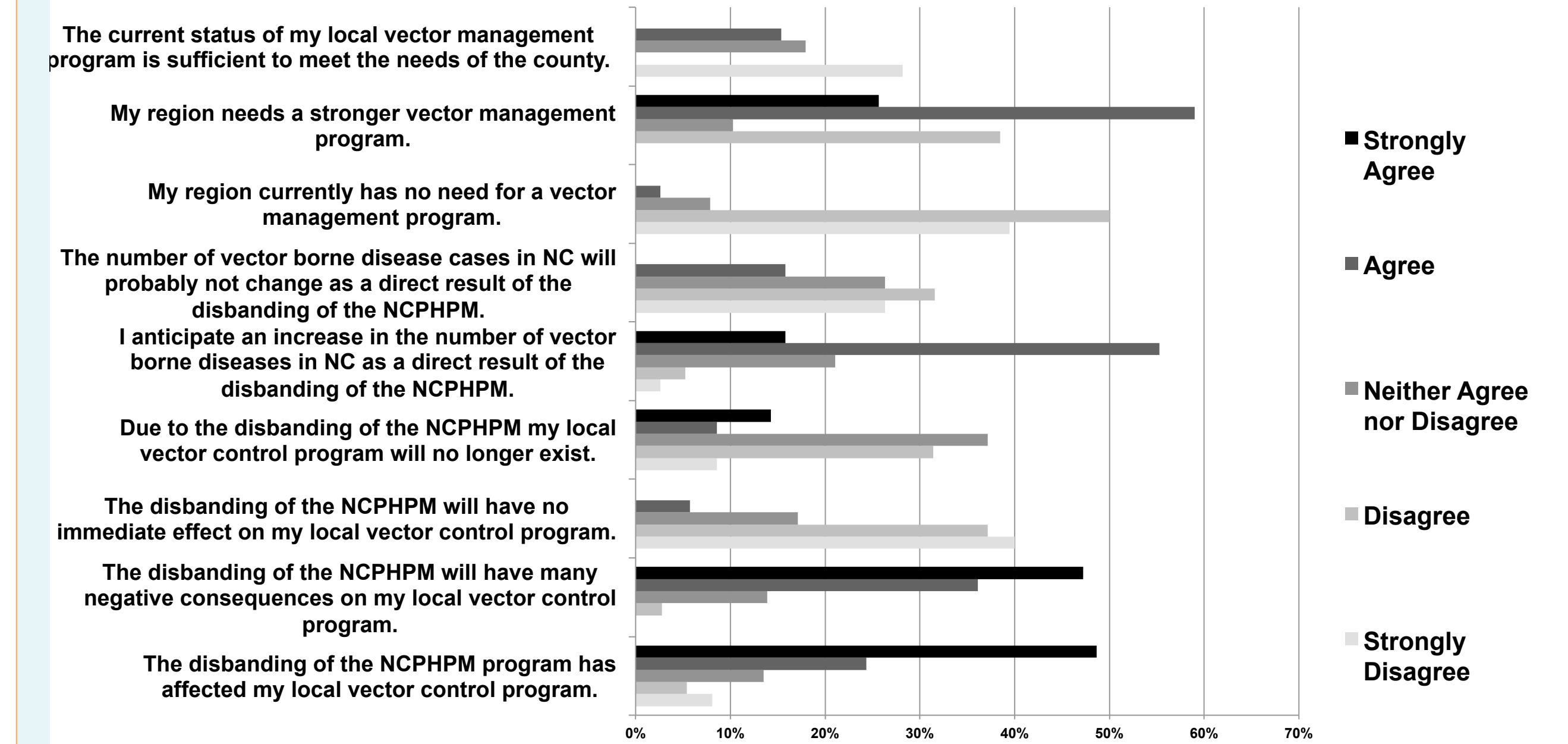


Figure 5. Opinions regarding the disbanding of the PHPM section of the NCDENR.

- In 2009: Highest MCP budgets were Onslow (\$921,017) and Brunswick (\$568,581) Counties
- Lowest budget was Sandy Creek (Brunswick County \$938)
- Average budget was \$66,303.45
- Cost per citizen ranged from \$0.02 (Buncombe and Cumberland Counties) to \$68.07 (Newport in Carteret County)
- 55% of respondents reported “just barely functional” budgets
- 10% of respondents reported “highly functional” budgets

DISCUSSION

It is likely that the disbanding of the PHPM section and recent MCP budget cuts have suppressed mosquito borne disease prevention capabilities in NC. There remains much important work for MCPs, especially with regard to economic evaluations of risk. The disparities in mosquito control budgets across NC may reveal, in part, differences in value placed on mosquito control. Future studies should analyze the socioeconomic costs (including medical expenses due to mosquito-borne diseases such as WNE, LACE, and EEE) of reducing MCP budgets versus the benefits of mosquito control. In addition, more work is needed to assess the relationship between public health and mosquito control. It remains uncertain what future role MCPs will play in NC.

REFERENCES

- Harrison, B. (2008). Mosquito species confirmed as occurring in North Carolina. Retrieved April 4, 2012, from <http://www.ces.ncsu.edu/depts/ent/notes/Urban/pdf/08MosqSpConfirmedNC.pdf>.
- McKeithan, T. (2011). NCMVCA's response to EPA information request to Office of Management and Budget regarding the costs associated with the reporting requirements as set forth in the NPDES proposed pesticide general permit (Docket ID No: EPA-HQ-OW-2010-0852). Retrieved November 5, 2011, from http://www.ncmvca.org/NPDES/NCMVCA_response_to_EPA_ICR_re_associated_costs_NPDES.pdf.
- Utz, J.T., Apperson, C.S., MacCormack, J.N., Salyers, M., Dietz, E.J., & McPherson, J.T. (2003). Economic and social impacts of La Crosse encephalitis in western North Carolina. *The American Journal of Tropical Medicine and Hygiene*, 69(5), 509-18.