Baltimore Data Jam: Mosquito Abundance in Container Habitat, 2013

The Baltimore Ecosystem Study, BES, is a Long Term Ecological Study funded by the National Science Foundation. Their goal is to conduct long term research at ecological sites in Baltimore City and the surrounding areas. They broaden the idea of ecology to not only focus on the natural world, but include the people and the cities they live in, to better understand their role in the environment. These data represent weekly abundance of container- breeding mosquitoes at sites located across the BES long-term stream sampling sties and Watershed 263. The numbers in each cell under a species heading represent relative total larval abundance per sample site (counts)

* **Dataset Variables:**
  + Date – date the traps were deployed
  + Dry cups – the number of traps at a site that were completely dry after one week (out of three traps total per site)
  + Site Name – location of each sampling site
  + Mosquito Species
* **Dataset Timeframe:** 
  + These data were collected weekly from April 23, 2013 to September 24, 2013
* **Data Collection Methods:**
  + Samples were collected by BES staff. Samplers resembling a plastic cup were placed at each site and left out for approximately one week. Each cup was partially filled with hay water. Seed paper was attached to the inner part of each cup with a paper clip. Adult mosquitoes laid their eggs in the sampler which were then hatched into mosquito larva.
  + Mosquito larval species were identified in a lab and recorded for each site.
* **Information About Sites** 
  + GFVN – Gwynns Falls at Villa Nova
  + GFGB – Gwynns Falls at Gwynbrook
  + GFCP – Gwynns Falls at Carroll Park
  + RGHT – Rognel Heights
  + OROX – Oregon Ridge Oxbow
  + MAWI – Maidens Choice at Wilkens Avenue
* **Contact Person for Dataset:** 
  + Dr. Shannon Ladeau
    - [ladeaus@caryinstitute.org](mailto:ladeaus@caryinstitute.org)
    - 845-677-5343 ext. 204
* **Background Information**
* Over the past 50 years many regions have experienced a (re)emergence of mosquito-vectored diseases, both due to novel pathogens and those previously eradicated. This phenomenon is increasingly evident in cities across the globe. Although developing nations still bear the heaviest burden of global mosquito-borne disease, countries like the United States are increasingly at risk. The emergence of West Nile virus (WNV) in New York City in 1999, reawakened many Americans to the threats of vector-borne infectious disease. In the past decade, West Nile Virus has had a persistent and dramatic impact on many North American bird species and has resulted in over 1000 human fatalities. The local intensity of avian and human incidence has been positively associated with human-dominated landscapes (LaDeau et al. 2007, 2008, 2011) and this is at least partially due to the ability for mosquitoes that transmit West Nile to breed effectively in urban habitats. Work at BES led by Dr. Shannon LaDeau of the Cary Institute of Ecosystem Studies investigates mosquito ecology and specifically, breeding opportunities for mosquito species who transmit diseases.
* In order to complete their life cycle, mosquitoes must lay their eggs in water. Once the eggs hatch, the larvae feed on microorganisms in the water before entering a brief pupa stage. The pupae metamorphose into terrestrial adults, completing the cycle.
* Finding suitable breeding habitat is essential to the success of mosquito populations. Although some species of mosquitos have eggs that can survive desiccation (being dried out), most require that the water source be available for at least a week and can utilize precipitation-filled tree holes, inundated floodplains, and stagnant water in any natural or man-made container. Additionally, temperatures and light levels must be favorable for a given period of time for the eggs to hatch and the larvae to be successful. Eggs, larvae and pupae must all escape predation and the stresses of competition in order to survive to adulthood—utilization of man-made containers almost always eliminate the threat of predators! Once adults, only females seek a blood meal from a host –which is not always human!—and mate with males to produce and lay eggs, thus completing the cycle.
* **Link to Maryland State Curriculum**

**Goal 3: Concepts of Biology**

Expectation 3.5 – Students will investigate the interdependence of diverse living organisms and their interactions with the components of the biosphere

Indicator 3.5.1 – Analyze relationships between biotic diversity and abiotic factors in environments

Indicator 3.5.3 – Investigate how natural and man-made changes in environmental conditions will affect individual organisms and the dynamics of populations

**Goal 6: Environmental Science**

Expectation 6.2 – Students will investigate the interdependence of organisms within their biotic environment

* **Inquiry Idea Starters**
  + How do mosquito species differ across the different sites?
  + Which mosquito species is most abundant?
  + How does urbanization explain differences in mosquito abundance?
* **Additional Resources**

<http://www.baltimoresun.com/health/bs-hs-mosquitoes-in-neighborhoods-20160217-story.html>

Becker, Brian, P. Leisnham, S. LaDeau. *A tale of two city blocks: Differences in Immature and Adult Mosquito Abundance between Socioeconomically different urban blocks in Baltimore*. International Journal of Environmental Research and Public Health, 2014. 11(3), 3256-3270.

[S. L. LaDeau](http://www.caryinstitute.org/science-program/publications?f%5bauthor%5d=3514), [P. Leisnham](http://www.caryinstitute.org/science-program/publications?f%5bauthor%5d=3475), [D. Biehler](http://www.caryinstitute.org/science-program/publications?f%5bauthor%5d=3476), and [D. Bodner](http://www.caryinstitute.org/science-program/publications?f%5bauthor%5d=3477), “[**Higher Mosquito Production in Low-Income Neighborhoods of Baltimore and Washington, DC: Understanding Ecological Drivers and Mosquito-Borne Disease Risk in Temperate Cities**](http://www.caryinstitute.org/publications/higher-mosquito-production-low-income-neighborhoods-baltimore-and-washington-dc)”, *International Journal of Environmental Research and Public Health*, vol. 10, no. 4, p. 1505 - 1526, 2013