

Association of State Territorial Health  
Officials  
2017 Environmental Public Health Tracking  
Peer to Peer Fellowship  
FINAL REPORT

Pilot Project: CNMI Zika and other Arboviral Disease Tracking and  
Surveillance

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## BACKGROUND

The Bureau of Environmental Health (BEH) under the Commonwealth Healthcare Corporation for the Commonwealth of the Northern Mariana Islands (CNMI) is tasked to ensure the protection of the general public and consumers against adverse effects that may result from hazardous environmental health and unsanitary conditions. The BEH administers the islands environmental public health programs ranging from food safety to vector control. Under the vector control program, I am tasked with identifying, eradicating and/or controlling the introduction and spread of vectors capable of transmitting disease through surveillance and mitigation of breeding sites.

The recent circulation of ZIKA and other arboviral diseases (CHIKV and DENGUE) in and around the Pacific region still poses a threat to our islands and communities. Though we are fortunate to not have any reported cases, the CNMI remains vulnerable for transmittal of these diseases and requires us to maintain a level of active surveillance and preparedness.

## INTRODUCTION

The Association for State and Territorial Health Official's (ASTHO) Peer-to-Peer Fellowship Program (referred to as, 'the fellowship') is funded by CDC's National Tracking Network to provide training opportunities for non-funded states and territories to learn more about the tracking network and build capabilities for tracking within each health program. Through the fellowship, we are able to expand our mosquito surveillance activities by learning key tracking methods from an experienced state health department.

The momentum to build and expand our vector surveillance program was supported by the Zika response efforts in 2016. In order to prepare and readily respond to public health threats related to arboviral diseases we strived to build our knowledge and capabilities for vector management and surveillance. The BEH first applied and was awarded the tracking fellowship in 2016. During that fellowship year, the BEH mentee under the program was able to visit the Florida State Department of Health to learn about specific tracking tools supporting their vector control program. This laid the foundation for incorporating geographic information systems (GIS) into our on-going mosquito surveillance activities. Building on that effort, the BEH reapplied and was awarded the fellowship again in November 2017.

The proposed tracking project as part of this fellowship was to develop an effective and robust tracking system for surveying mosquito trap locations, identifying environmental factors that may influence mosquito populations, and determining high-risk areas of mosquito activity through the use of GIS mapping.

BEH in partnership with the Public Health Emergency Preparedness-Epidemiology and Laboratory Capacity (PHEP-ELC) programs continue working to establish a sustainable vector surveillance program and through the fellowship, were able to explore feasible options applicable to our resources and capacity.

## MENTORSHIP

Due to some minor setbacks, a mentor state was not finalized until January 2018 when the Washington State Department of Health (WSDH) tracking program agreed to serve as the mentor state for this fellowship. The introductory conference call was on January 19<sup>th</sup>, 2018 with Glen Patrick, Deputy Director for the Office of Environmental Public Health Science WSDH, Tina Echeverria, Research Investigator under the Washington Tracking Network and Samantha Williams (ASTHO).

During this call, I shared background information on current activities under the vector program, staffing capacity and resources available. We discussed the overall project goal to incorporate GIS to analyze and display vector data that will prioritize efforts for targeted control and education, in the event that an arboviral disease is identified in the CNMI. Additional conference calls took place to help strategize the project goals and prepare for the site visit.

To help build GIS capacity, I was granted access to ESRI software which included ArcDesktop, ArcGIS online and Survey123. To familiarize myself with using the software, Lillian Morris, Spatial Epidemiologist from WSDH Environmental Public Health Division provided me with training modules and web training support.

## SITE VISIT

After a number of calls with the mentor state we discussed the possibility of a reverse site visit. Because of the CNMI's newness to tracking, limited resources, staffing, access to data, and computer systems, it proved more beneficial for Washington representatives to provide training and assistance here in the CNMI. The reverse site visit enabled them to see first-hand our strengths and limitations to reaching our project goals, and helped tailor a project specific to our needs and resources.

More importantly, by having the training in the CNMI additional BEH program staff including colleagues from the PHEP-ELC program were able to join the GIS training and contribute to the enhance of the project.

The site visit took place on the week of May 14- 17<sup>th</sup> 2018 with Lillian Morris and Tina Echeverria representing WSDH. The objectives for the site visit were:

- Overview and discussion of tracking in Washington and data priority areas
- Identify and assemble GIS data
  - Data access, data sources, how to clean and prepare data
  - Making data useful: data sharing, communication and outreach
- Build GIS capacity with BEH vector program
  - Introduction into ESRI software and best uses
  - Discussion and training on free online software- QGIS
- Routinely and spatially capture vector trap locations through the use of GIS
  - Developed field data collection survey using Survey123

- Map and report surveillance data and results
  - Introduction into ArcGIS online web apps
  - Adding data, joining data, displaying multiple layers
  - Create mosquito surveillance map

#### Day 1:

Washington tracking representatives Lillian Morris and Tina Echeverria met with BEH Director, John Tagabuel and ELC Team--Dr. Paul White (Territorial Epidemiologist), Portia Tomokane (ELC Program Coordinator), Jesse Sablan (IT Specialist). Our training convened at the PHEP conference room where we discussed training goals that were achievable based on data and resources available to us. Tina conducted a short presentation on the EPHTN website and Washington State tracking network structure, strategies and data reporting requirements. We reviewed sustainable GIS mapping options—QGIS, Google Maps, Google Earth and how to display the map/app on Commonwealth Healthcare Corporation website platform. We discussed data sharing techniques by creating a joint folder/catalog of GIS shapefiles and datasets to avoid duplicating data between PHEP and BEH programs.

#### Day 2:

We continued our hands-on training using different GIS software options and discussed best uses. We quickly jumped into creating the map and adding layers using ArcGIS online and QGIS. We practiced navigating through data sources to grab and import layers, querying data, cleaning data tables (QA), joining layers, testing color ramps, displaying values and symbols, managing pop-up windows, etc. By end of day two the draft mosquito surveillance map was complete. It is a choropleth map based on 2016 population estimated by villages. Mosquito trap locations are included with dataset for each site.

#### Day 3:

We continued day three focused on understanding the functionality and display options of ArcGIS. We worked on fine tuning the map display and datasets to show specific data and layers. With the amount of work accomplished in the first two days, we spent time exploring Google Earth and Google maps as options for tracking and displaying mosquito trap locations. With access to Survey123, we created a field sampling survey. We built the questionnaire to gather and store data on the field which links directly to the mobile app and easily uploads onto ArcGIS online for data mapping and analysis.

#### Day 4:

We began the day with introductions with the entire BEH team and presented on the work accomplished thus far, including future plans to incorporate GIS into sanitary and food safety inspections. We then met with the PHEP/HPP/ELC program Director, Warren Villagomez and his team to discuss GIS tracking related to Emergency Preparedness and Climate Change. We also discussed CDC's Tracking Network and how to become a part of the tracking discussion.

After three days of intensive but productive training using GIS, the final piece of the training focused on building an interactive web application to display trap locations and mosquito data. The web app will be used to support outreach and education activities, as well as sharing information with our partners. Unfortunately, we experienced an unexpected thunderstorm that caused an island wide power outage delaying some of the planned activities. With many of the GIS software already downloaded onto my laptop, we were able to make some progress with limited light and lack of power. Web app has yet to be published. Updates and changes are still being made and once complete, the link will be available on the BEH webpage.

## SUMMARY/OUTCOMES

Overall, the site-visit and GIS training was very successful and beneficial to not only myself as the fellow, but to my colleagues from other programs who are looking for new tools and techniques to track and display information. My mentors took the time to understand our needs and limitations, focusing their presentations and trainings based on our goals and what is feasible in our environment. With the high cost of an ESRI license and limited staff capabilities, it would be impractical at this stage to invest in such a software. Knowing this, Lillian and Tina explored affordable and sustainable options, incorporating it into the training. We were able to build the map, survey and app using a combination of software so when access to ESRI does expire, we will have the ability to continue our work using open alternatives.

### Accomplishments:

- Identified CNMI needs
- Reviewed obligations of CDC tracking state and overview of WTN
- Created finalized mosquito map display
- GIS training: data sources, downloading, formatting, QA
- Learn how to use ArcGIS desktop, ArcGIS online, Survey123, QGIS, Google maps/earth

### Outcomes:

- Establish vector baseline- *on-going*
- Establish and display spatial distribution- *complete*
- Estimate and display vector abundance and population densities- *complete*
- Build peer network and enhance our capacity to integrate environmental tracking into our activities- *complete*
- Increase understanding of tracking techniques and better prepared workforce to mitigate and respond to arboviral disease incidents - *complete*

## FUTURE ACTIVITIES

The project as part of this fellowship serves a pilot for tracking and mapping data. With its success we hope to expand it beyond vector surveillance and incorporate it into all health programs from illness/disease surveillance to sanitary inspections. At BEH, we plan to continue this work by tracking and mapping permitted food and drink establishments noting food safety violations, schools, daycares, swimming pools, etc. We continue to improve the current map and survey using ArcGIS while also exploring other options. We are now looking into applications such as Fulcrum and Carto as affordable options to sustain the work we've already accomplished from this fellowship.

## CONCLUSION

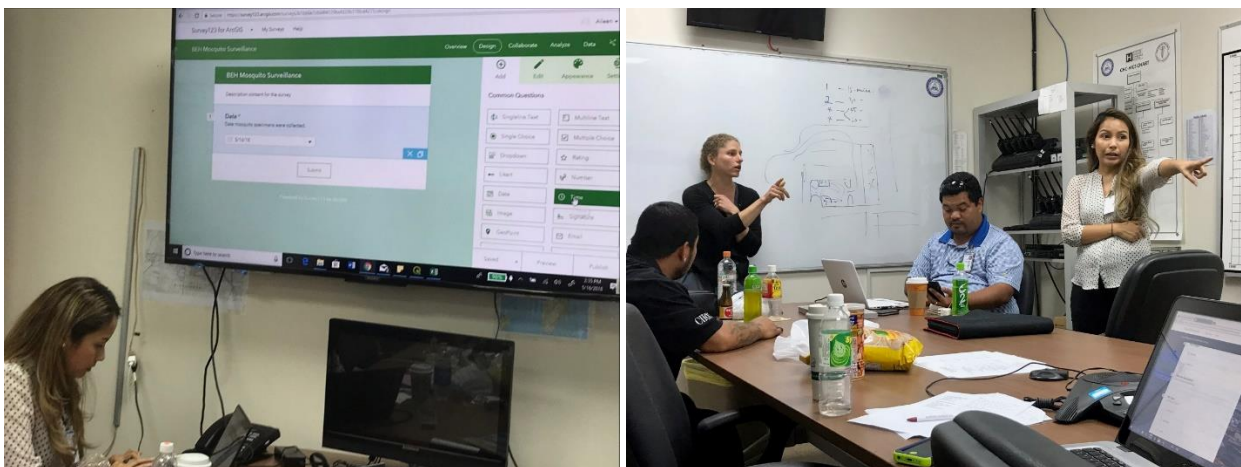
The fellowship and project provided a very unique learning opportunity and experience. The option to have the site visit here in the CNMI was a valuable experience, and we as a team were able to learn and absorb more of the material and training. Given that we only had four days, the training was introductory but so much was accomplished and the WSDH team have expressed support to continue their mentoring capacity beyond the project year.

There are advantages to experiencing first-hand what other states have accomplished, but if we don't have those capabilities and resources at home, then there isn't much benefit to us. With this site visit, the mentoring and training was specific to our environment and that is what will drive this project to continue beyond this fellowship.

## PHOTOS



*Introduction to GIS software*



*Building and testing the field survey*



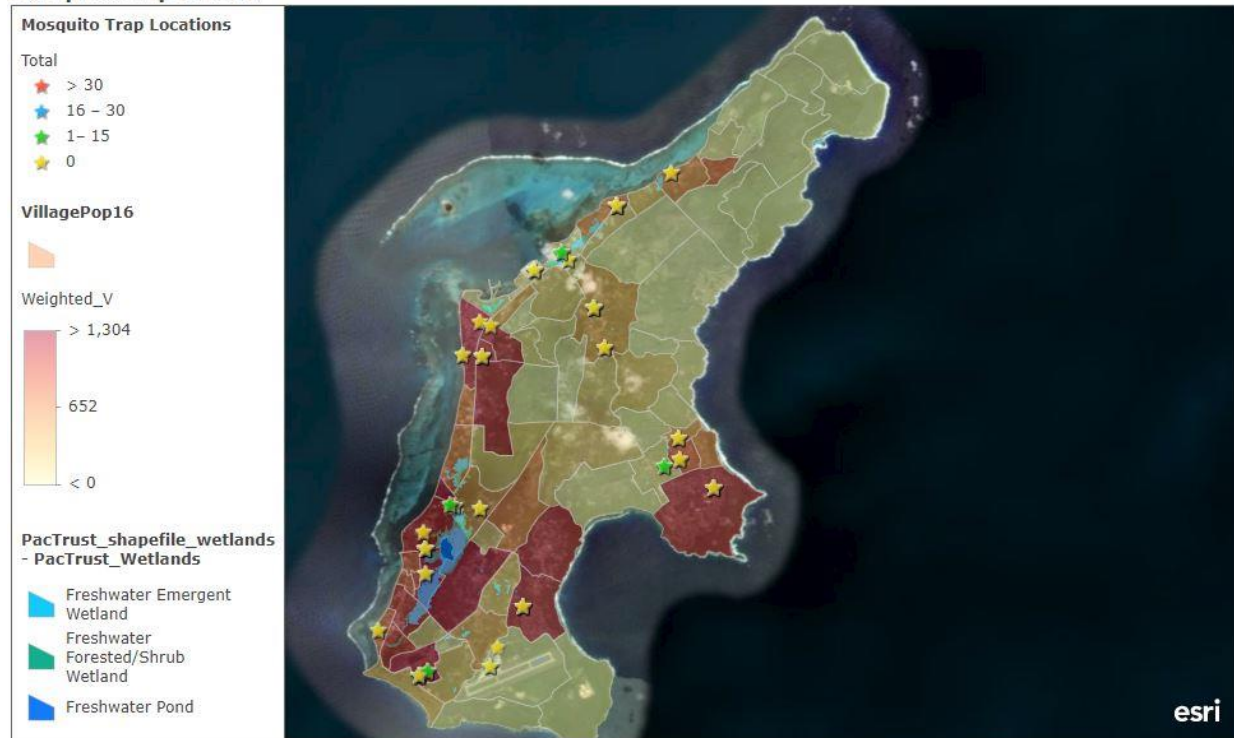
*Introductions with BEH team and presentation on GIS*



*Working through the power outage*



## Mosquito Map Draft 2



Current Mosquito map with population density by village, wetland locations, mosquito data, & buffer