**BACKGROUND FOR THE OCTOBER 11-12, 2011 GEIS VectorMap WORKSHOP**

**What is VectorMap?**

VectorMap (www.vectormap.org) is a public access online spatial database of mosquito, sand fly, and tick species collection records and distribution models that is aimed at medical entomologists, vector disease control workers, preventative medicine practitioners, and health planners. VectorMap, an outgrowth of MosquitoMap (Foley, et al. 2010), currently hosts around 280,000 vector records.

**Purpose of this workshop**

The goal of the workshop is to solicit ideas and advice to help guide the growth and shape of VectorMap. We want to refine our concept of VectorMap in terms of user needs, technology opportunities, organizational structure, implementation, and the activities of other organizations working in the same field. We are open to suggestions about the directions in which we should go and believe we have much to learn from other organizations and experts. At the same time, we would like to start a conversation about the importance of vector surveillance data, how to improve the quality of datasets and their interoperability, what priority gaps need to be filled, and how collectively we can work to strengthen surveillance, data collection, and information dissemination systems to help governments and the public health community make informed decisions and allocate scarce resources most effectively. We recognize that globally there are other initiatives that parallel elements of VectorMap, and we are keen to be collaborative and avoid redundancies.

**Four goals for the workshop**

1. Understand the “state of play” and the different trajectories of online resources related to vectors and vector-borne diseases
2. Identify opportunities for the use of information in VectorMap by DoD and the public health community to contribute to a better understanding of vectors and vector-borne disease risks
3. Develop a roadmap for VectorMap that increases its utility, usage, and sustainability
4. Explore how we as a community of information providers can work together more synergistically and with greater collective impact

**Why now?**

After a number of years of development, we feel that VectorMap is at a crossroads. This year, the Armed Forces Health Surveillance Center (AFHSC), through its Global Emerging Infections Surveillance and Response System (GEIS), has provided funds to convene a meeting of experts with experience in the field to guide this development. We need help with the following questions/issues:

* Can we make VectorMap financially sustainable?
* Can we identify and best fulfill the needs and wants of both funders and end users?
* Can the needs of military funders be met without jeopardizing the participation of non-military contributors and users?
* Can we ensure that there will be adequate staff human resources for VectorMap over the longer term?
* Can we reduce the amount of work for us and increase the informed input of data providers?
* Can we overcome the “territoriality” of some data providers, and accommodate the legitimate needs of potential partners to independently leverage their data with funders, e.g., if a data provider thought its chances of getting funding were increased by being sole custodian of the data.
* Can we build a network of data providers that maximizes contributions of data from ongoing surveillance efforts?
* How can we best collaborate with and make ourselves known to other vector database groups?

**Workshop website**

See [www.vectormap.org](http://www.vectormap.org) formeeting information and updates.

**What VectorMap currently offers**

Vector distribution and demography are important but neglected components of disease transmission. In the past, online resources have not been adequate to allow scientists to freely explore occurrence records and simultaneously access vector and disease models on a global scale. Such resources could help us understand the spatial relationship of vectors and disease for any area of interest.

VectorMap was established to address some of those needs. It makes available data from vouchered and unvouchered collections of all potential vector species, not just those species that are currently recognized. We regard information on all vector species (primary and secondary vectors) in an area as important for understanding the sustainability of disease and the challenges for vector control. We are committed to high standards of data quality; free, open access to data (to the extent permitted by data authors); and proper attribution of the sources of data.

Currently VectorMap provides (see the figure at the end of this document):

* Accessible data
  + Datasets: high-quality historical to recent georeferenced collection data on vectors, pathogens, and their hosts that include fields such as geographic coordinate error; detailed, up-to-date taxonomy of vector and host species; full reporting of georeferencing procedures; globally unique identifiers (GUIDs) for digital tracking of collection instances; and a number of new vector-specific data fields developed for VectorMap
  + Dataset histories
  + Extensive metadata and downloadable GIS-ready files to the models and layers
  + Records: access to the largest collection of published and unpublished records, as well as records from specimens at the Smithsonian Institution
* Ready access to data providers, including those from the DoD and Smithsonian Institution
* Tools
  + Online map viewer: MosquitoMap, TickMap, SandflyMap
  + Flexible GIS environment to explore information
  + Models (VectorMap provided one of the first homes for vector models): vector distribution, disease occurrence
  + Ability to see vector-relevant GIS layers in one place, a unique resource
  + Tools under development:
    - Mal-Area Calculator (MAC), a novel hazard/disease risk assessment tool. It focuses on where the disease (or vector or alternative host) hazard is more likely to occur rather than on predicting when disease is more likely to occur. It takes into account spatial variation in the relative roles of different vectors and hosts.
    - VectorSurv, which allows the display of temporal data
    - HostMap, which records pathogen and ectoparasite data from vertebrates, such as those from rodent surveys

**A brief history of VectorMap**

The Global Emerging Infections Surveillance and Response System (GEIS, see http://afhsc.mil/geis) Operations Division at the Armed Forces Health Surveillance Center (AFHSC) has been a funder of our vector databasing and mapping efforts since 2006. GEIS goals include surveillance and detection, response and readiness, integration and innovation, and cooperation and capacity building. Febrile vector-borne infections (FBVIs) are one of five emerging disease priority groups. (A description of GEIS activities in early detection and response to disease outbreaks can be found at <http://www.biomedcentral.com/1471-2458/11/S2/S10>.)

VectorMap grew out of the MosquitoMap web application ([www.mosquitomap.org](http://www.mosquitomap.org)), which was developed to meet the need for access to the results of mosquito vector distribution modeling and the collection data that underpinned those models. VectorMap’s purpose was to assist DoD researchers to understand the distribution of the major arthropod disease vectors.

From the beginning, it was obvious that users needed an online GIS platform that allowed them to zoom to and pan distribution models for areas of interest. We chose the commercial vendor (ESRI) for the geodatabase platform, and WorldView Solutions Inc. to build the application. We also thought it would assist data searching and database interoperability to use a standardized approach to recording collection data, which resulted in adoption of the DarwinCore schema and the development of data fields with controlled vocabulary terms (in addition to verbatim, or original, data). The data fields have evolved as new datasets were encountered, and they are made accessible to the general public via specially constructed Excel collection forms that can be found on our websites. Our attitude to data handling has been particularly influenced by the example and resources provided by the Mammal Networked Information System (MaNIS), which has advocated for strict standards of reporting and error checking georeferenced collection data. The Global Biodiversity Information Facility (GBIF) awarded us a small grant to digitize and make available mosquito collection records for its database. Although GBIF contains data for many types of organisms and provides a worthy home for vector data, we saw a need for a dedicated online resource for vector data and distribution models that would be mirrored, to a certain extent, in GBIF. Collection data initially came from unpublished specimen data from the Smithsonian Institution, but has since come from military and civilian collections and from the literature.

As GEIS communicated a broader interest in vector-borne disease risk, we began to think of ways to add value to the collection data and vector habitat suitability models that we were developing. As a result, we constructed the Mal-Area Calculator (see above), which we are further developing as a generic raster overlay calculator for disease, vector, and host layers. Most recently, we expanded the number of vector groups to include ticks ([www.tickmap.org](http://www.tickmap.org)) and sand flies ([www.sandflymap.org](http://www.sandflymap.org)), and we are considering map services for other vector groups. VectorMap services for host surveillance data and vector longitudinal data that focuses on temporal changes in abundance (VectorSurv) are under construction. In support of this effort we have purchased a new server for the application, which is located at the Kansas University Biodiversity Research Center, through our collaborator Dr. Townsend Petersen. Our client-side websites are hosted on a server at the Armed Forces Pest Management Board located in Maryland.



