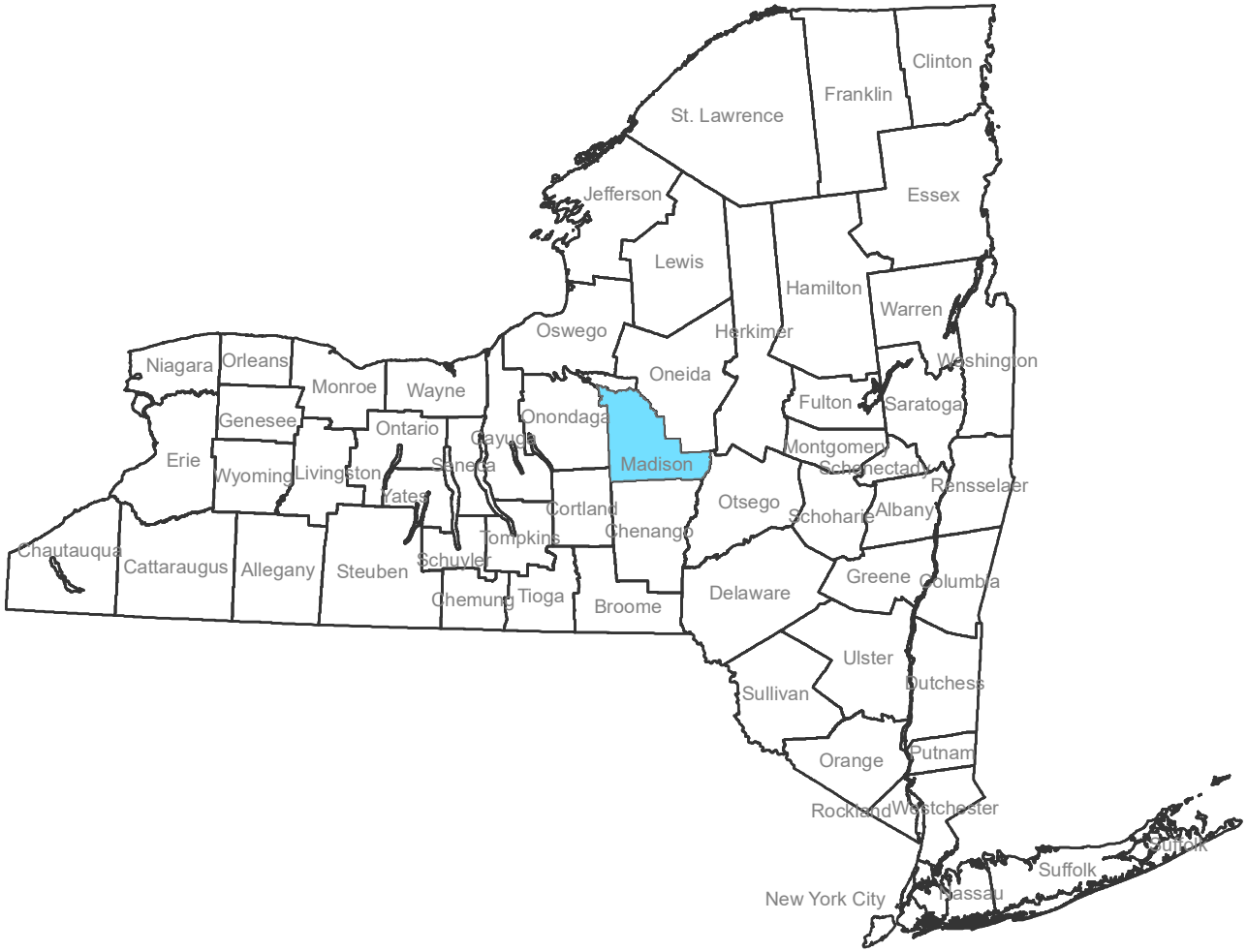
Heat Vulnerability Index
Madison County, NY



Center for Environmental Health

Bureau of Environmental and Occupational Epidemiology

NEW YORK STATE | Department of Health

The Heat Vulnerability Index (HVI) was developed by the New York State Department of Health to help local and state public health officials identify and map heat-vulnerable areas and populations in New York State (NYS) excluding New York City. The main purpose of the HVI is to assist in efforts to direct heat adaptation resources to vulnerable populations and inform long-term heat mitigation planning in the community.

Thirteen environmental and socio-demographic factors were identified as heat vulnerability factors from previous heat-health studies. Census tract data for these factors was obtained from the U.S. Census Bureau and the National Land Cover Database to determine heat vulnerability in each NYS census tract. The 13 factors were grouped into four categories that represent different aspects of heat vulnerability, which in turn were used to estimate the overall HVI for each census tract. The HVI and four categories were mapped to display heat vulnerable census tracts.

The four heat vulnerability categories include:
Language Vulnerability: Among populations with limited understanding of English, language is commonly a barrier to accessing resources and understanding alert messages issued in English during heat events. Heat awareness messages should be announced in commonly spoken languages of the specific area to best communicate the risks of heat.

Socio-economic Vulnerability: Economic status of an individual and their community can affect how one copes with extreme heat. While recommendations to use air conditioners during hot days are commonly a part of cool-down messaging, this may not be an affordable option for low-income households. Community resources like cooling centers can help provide the public with a few hours of relief from hot weather. Public transportation to these facilities make them accessible to families and individuals who may not have their own vehicle.

Environmental Vulnerability: Built environment and urban heat island effect contribute to heat vulnerability in urban areas. Unlike surfaces covered in vegetation, areas covered by sealed surfaces, such as asphalt and concrete (buildings and pavements) tend to retain heat. Developing parks, increasing green space, constructing green roofs, and using materials that cool rooftops and pavements can help with regional cooling.

Elderly Isolation/Elderly Vulnerability: Elderly people are often the first population to be affected by extreme heat. Elderly in rural areas are also vulnerable if they are socially isolated from family and the community and face additional challenges including fewer options for healthcare and timely assistance. For these reasons, efforts to reduce the health effects of heat should also target elderly in these areas.

The HVI helps to quickly identify heat-vulnerable populations in NYS using the four vulnerability categories to describe underlying causes of heat vulnerability. This can help inform interventions to target specific vulnerable populations. For example, local agencies can 1) set up more cooling centers in vulnerable areas where homes are less likely to have air conditioning; 2) provide transportation to and from cooling centers when public transportation is unavailable; 3) include risk communication and alerts in multiple languages for populations with low English proficiency; and 4) conduct additional outreach efforts to check on vulnerable populations (those with disabilities, elderly living alone, etc.).

The following figures display the spatial distribution of the overall HVI and the four heat-vulnerability categories that comprise the index.

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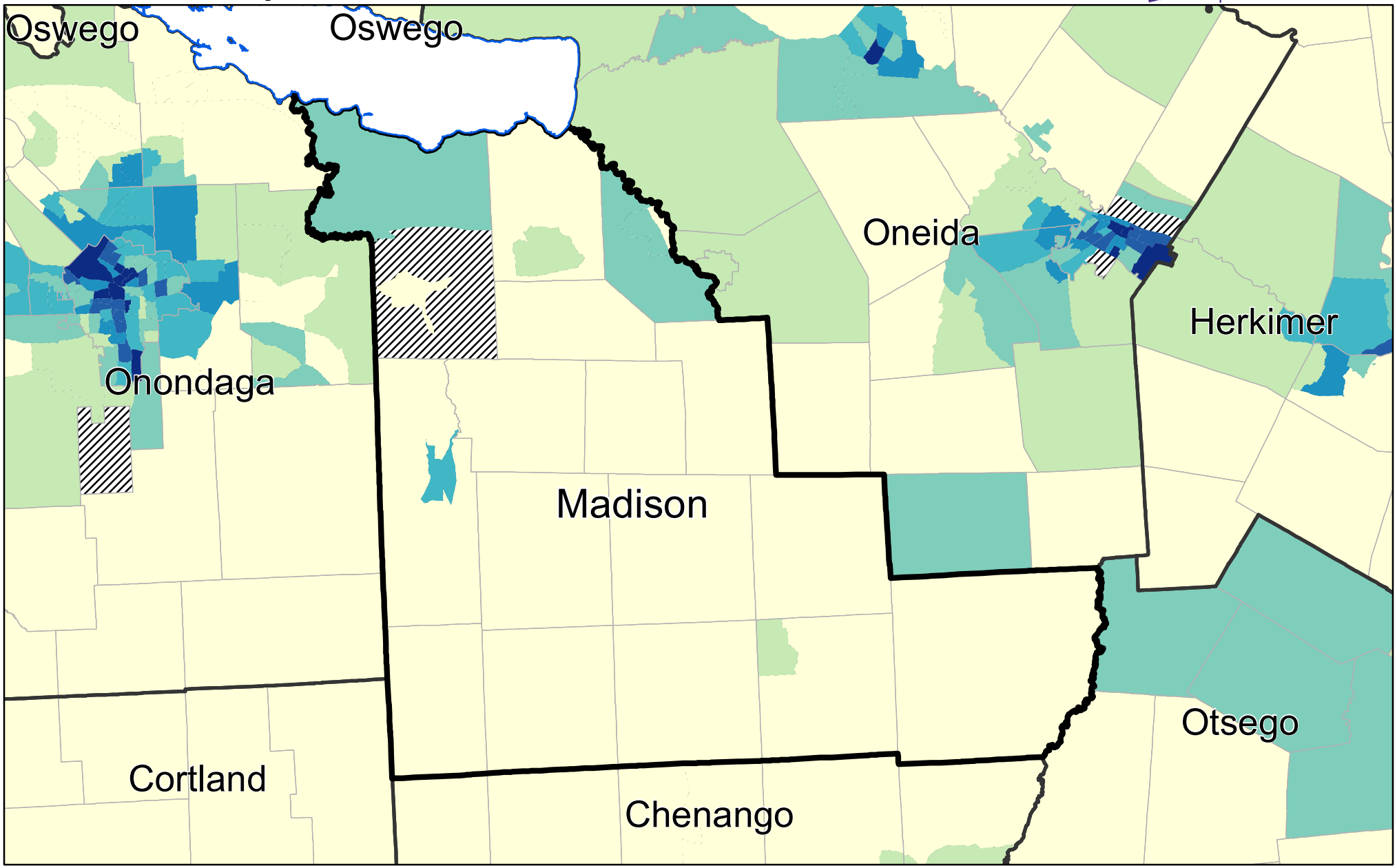

Low Vulnerability — High Vulnerability

County boundaries
Water boundaries
City/Town boundaries
Missing data

Data: 2010 US Census Bureau, 2011 National Land Cover Database

Language Vulnerability
Madison County

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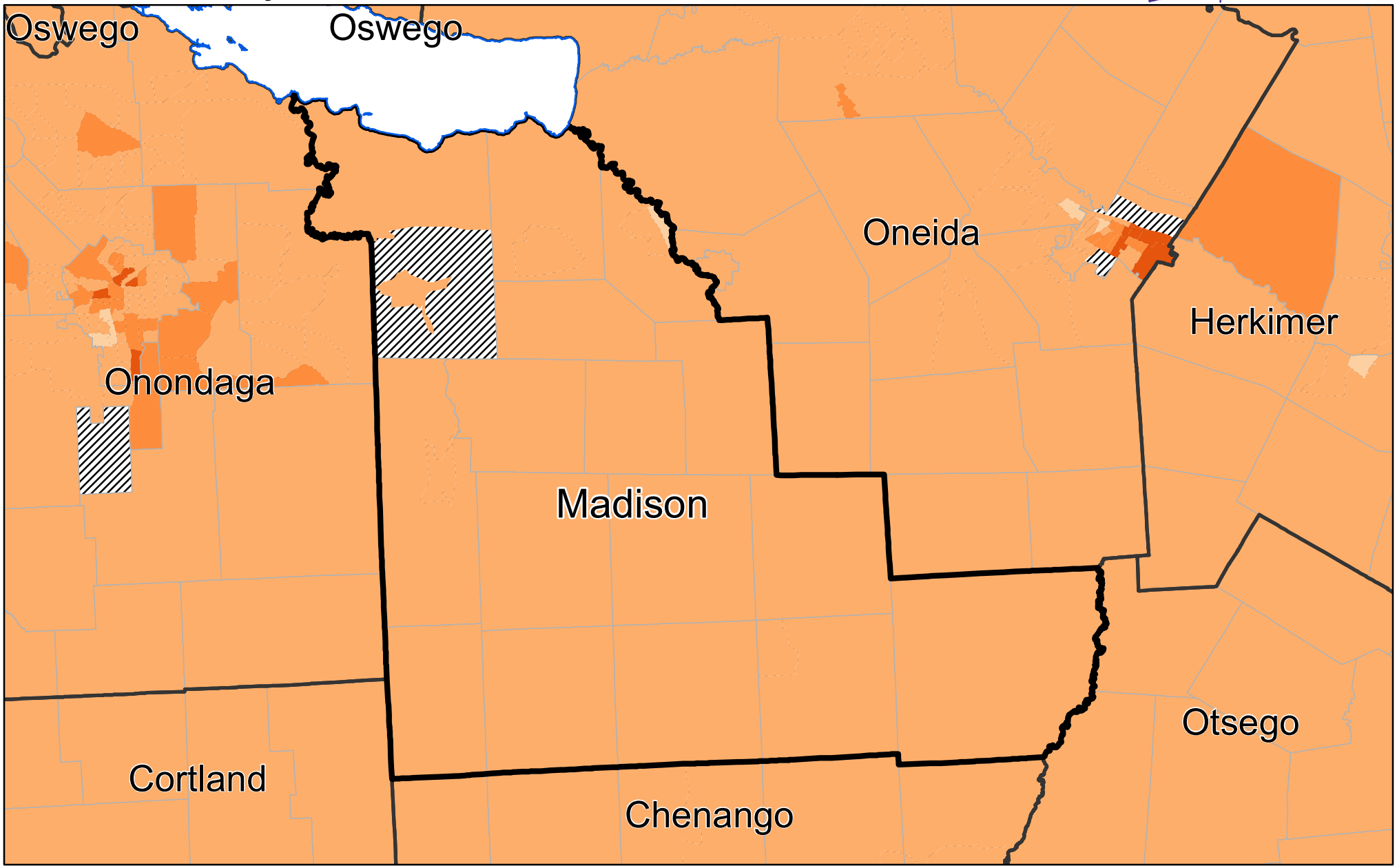

Low Vulnerability — High Vulnerability

County boundaries
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Socio-economic Vulnerability
Madison County

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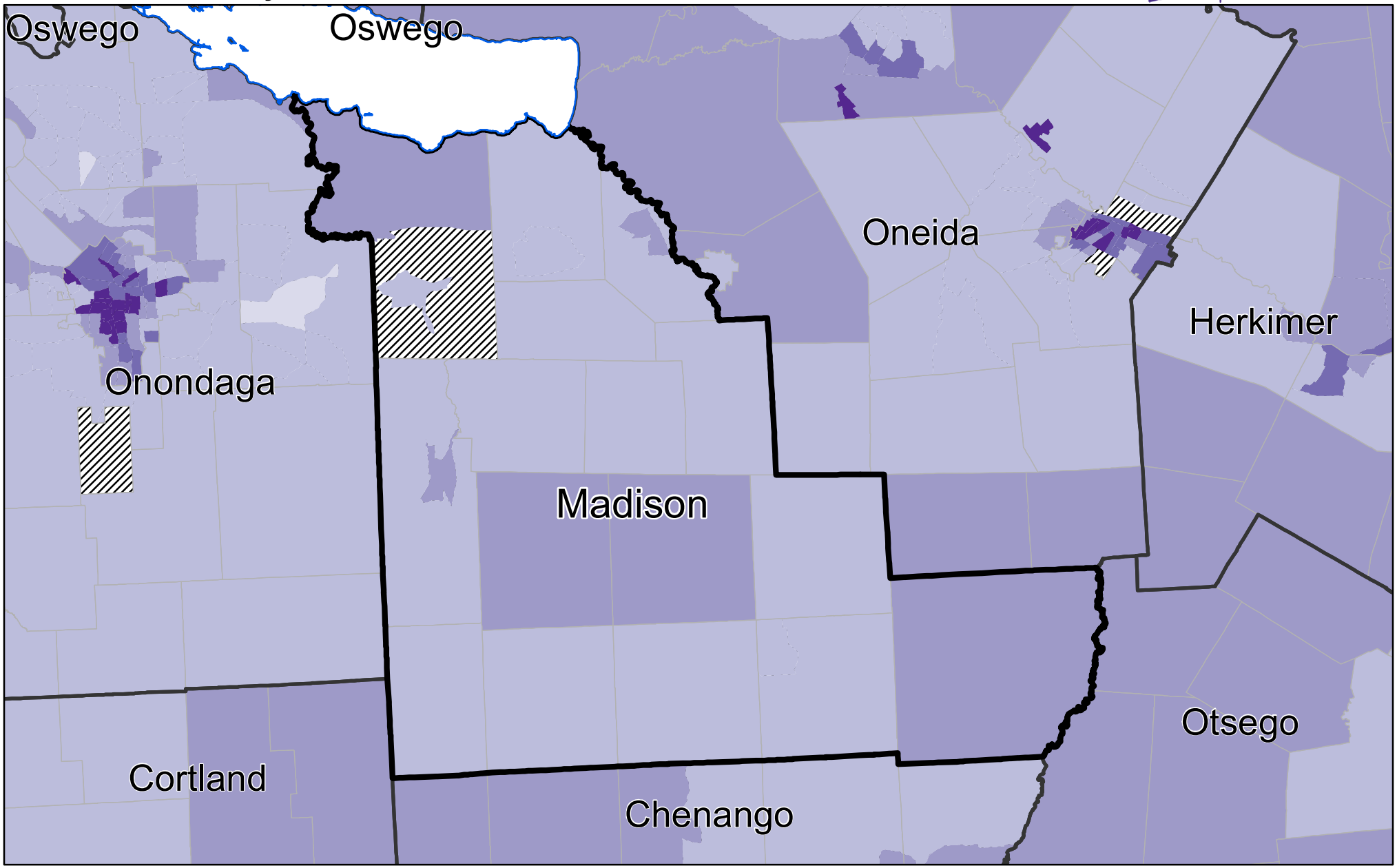

Low Vulnerability — High Vulnerability

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Environmental/Urban Vulnerability
Madison County

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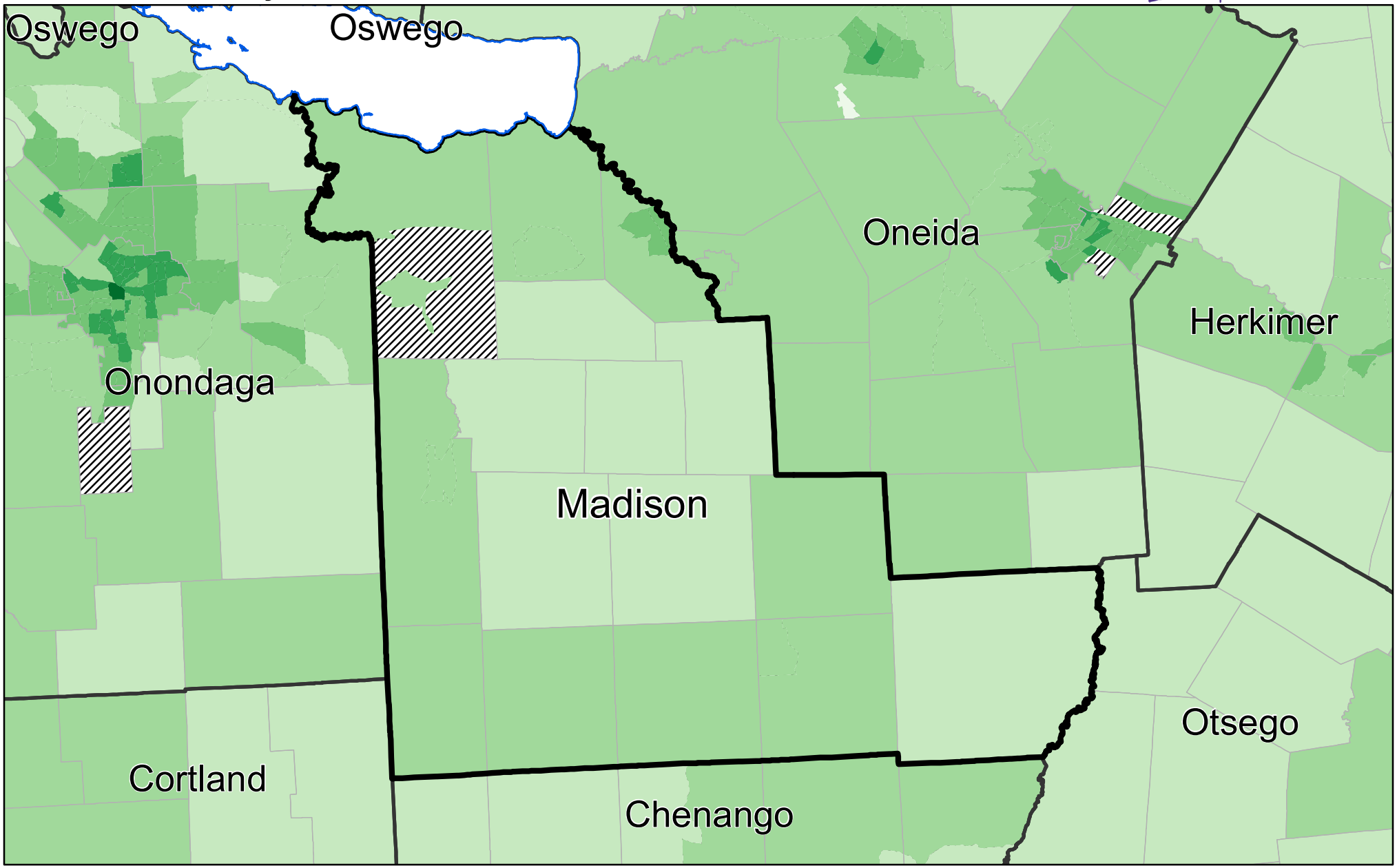

Low Vulnerability — High Vulnerability

County boundaries
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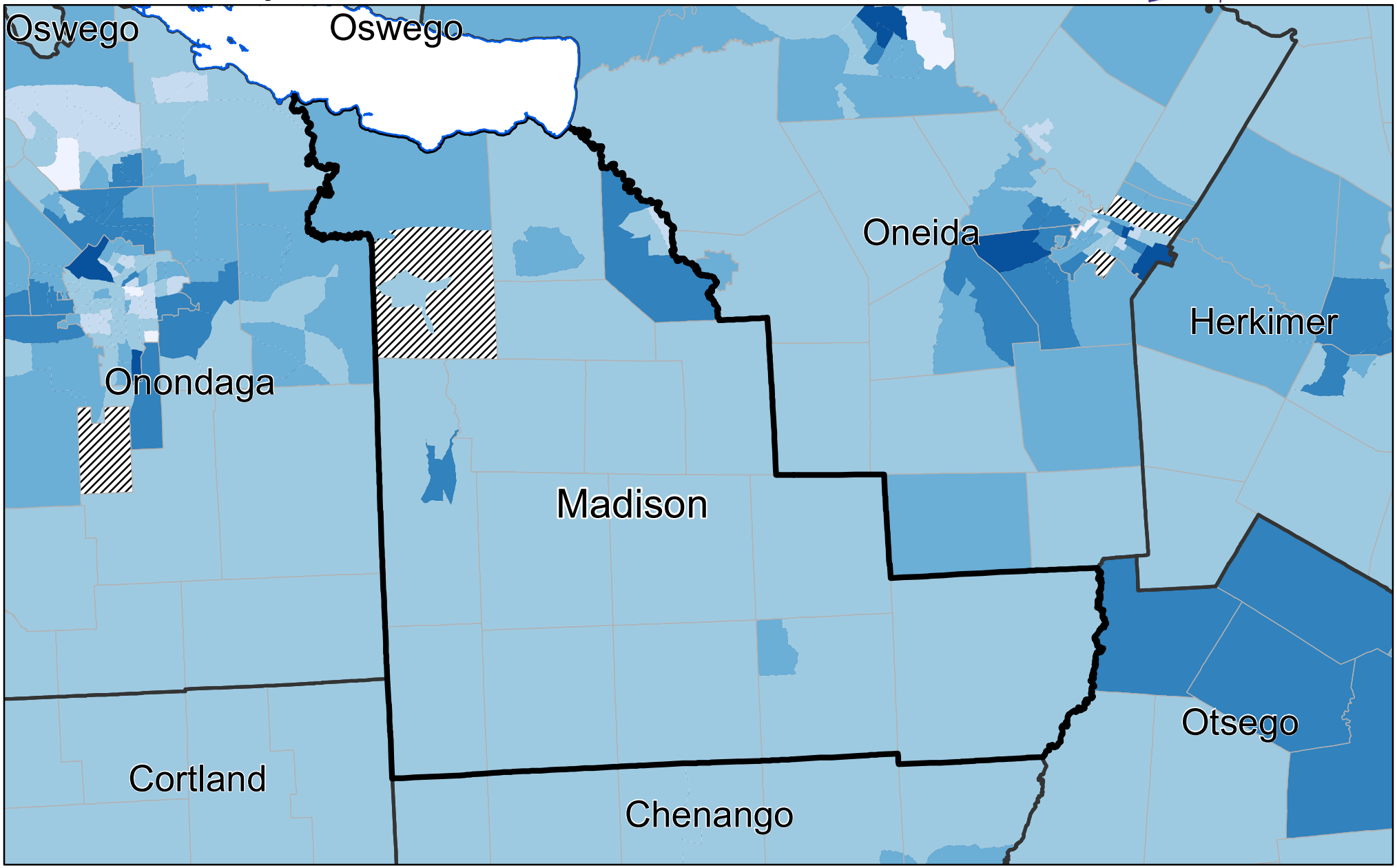
Elderly Isolation/Elderly Vulnerability
Madison County

NEW YORK STATE | Department of Health



Low Vulnerability — High Vulnerability

County boundaries
Water boundaries
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Data: 2010 US Census Bureau, 2011 National Land Cover Database

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For more information on the heat-vulnerability index contact the NYSDOH EPHT program at epht@health.ny.gov

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