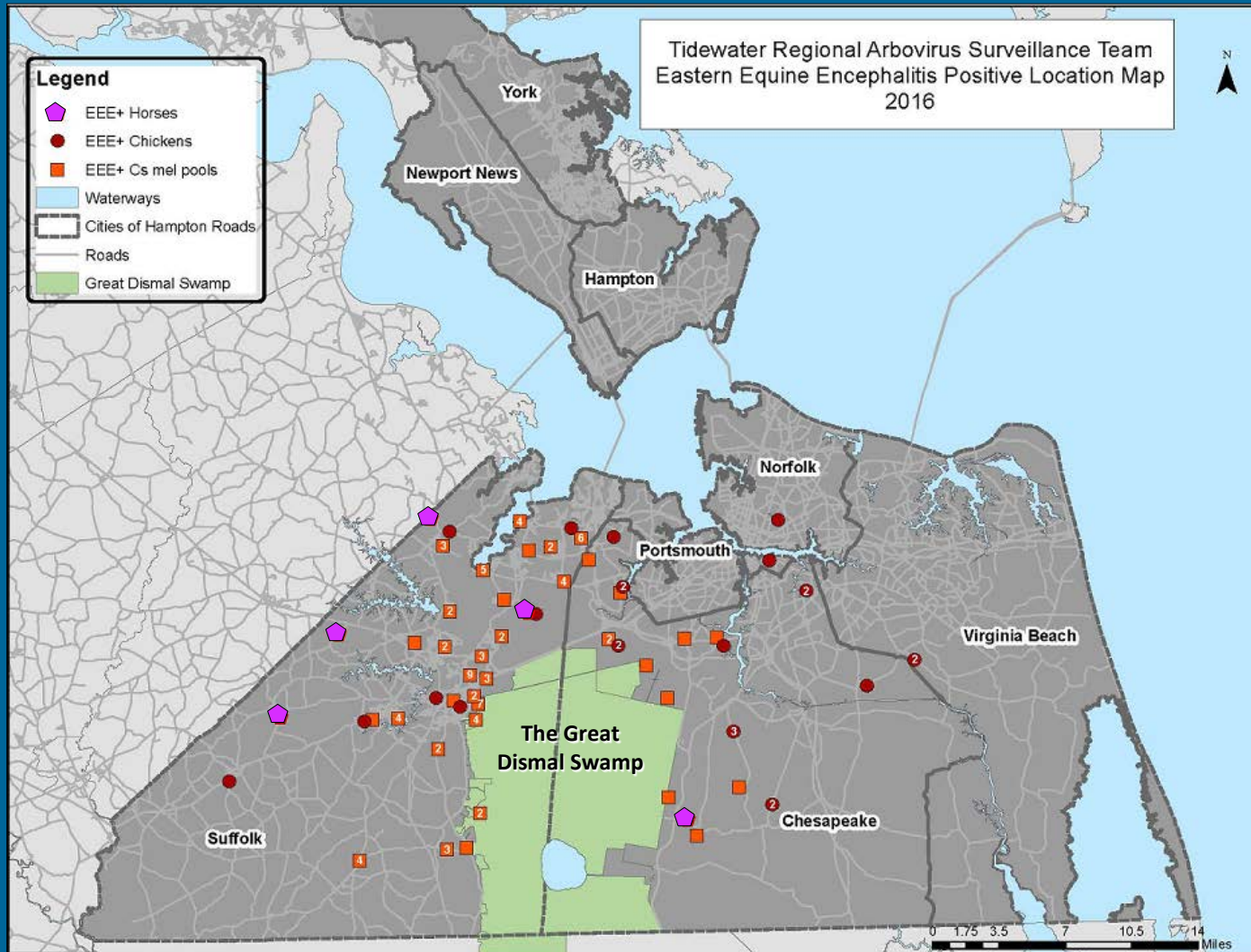


VIRGINIA ARBOVIRAL ACTIVITY IN 2016

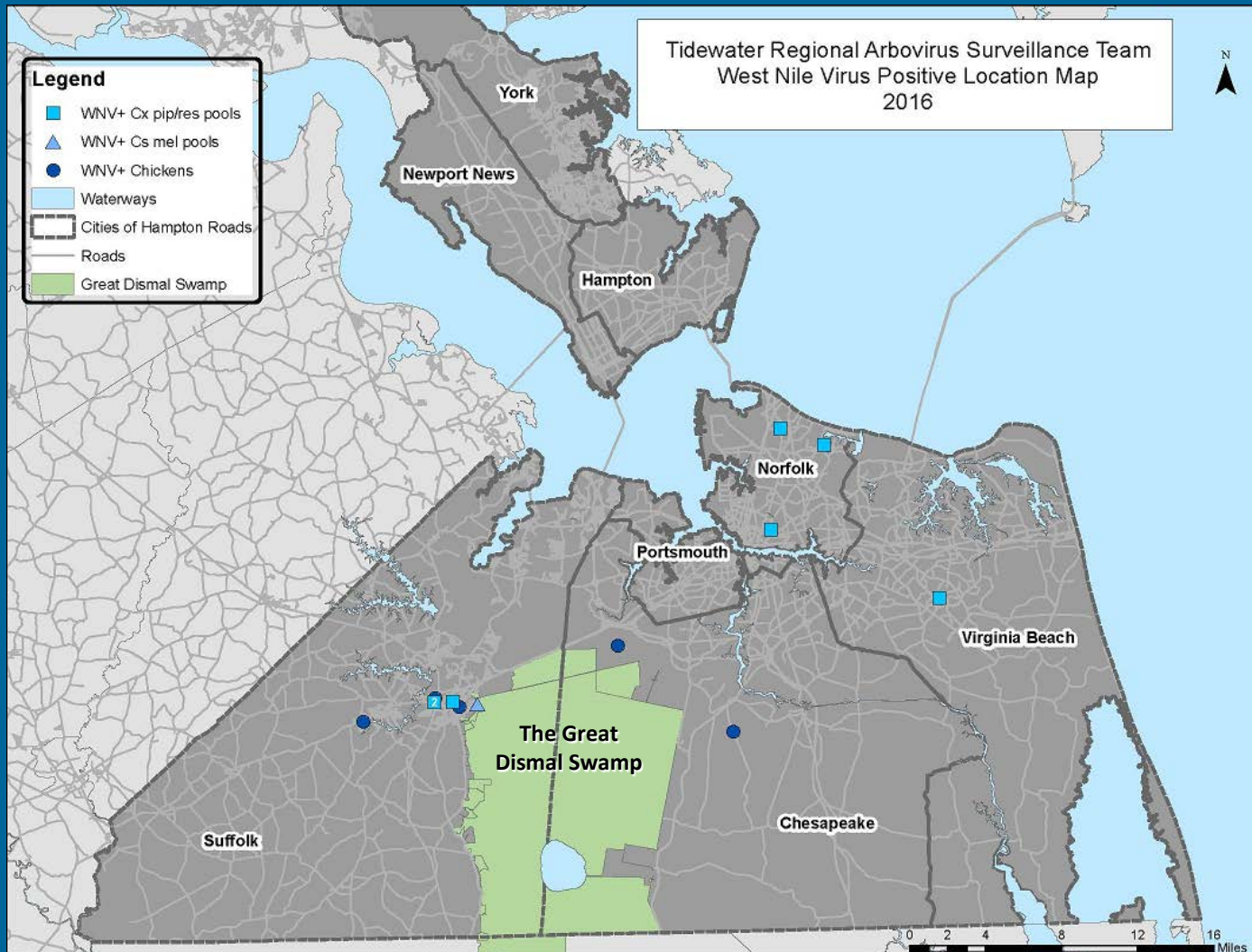
David N. Gaines, Ph.D.
VDH – Office of Epidemiology



Tidewater Region Arboviral Surveillance Team (TRAST)



Tidewater Region Arboviral Surveillance Team (TRAST)



HUMAN ARBOVIRUS CASES IN VIRGINIA IN 2016

Human infections from mosquito and tick borne arboviral disease in Virginia in 2016.

West Nile virus (WNV) - 8 cases (6 WN-neurological illness, and 2 WN-fever); there were also two WNV infected blood donors who had no symptoms.

St. Louis encephalitis (SLE) - None recorded.

La Crosse encephalitis (LAC) - None recorded.

Eastern equine encephalitis (EEE) - None recorded.

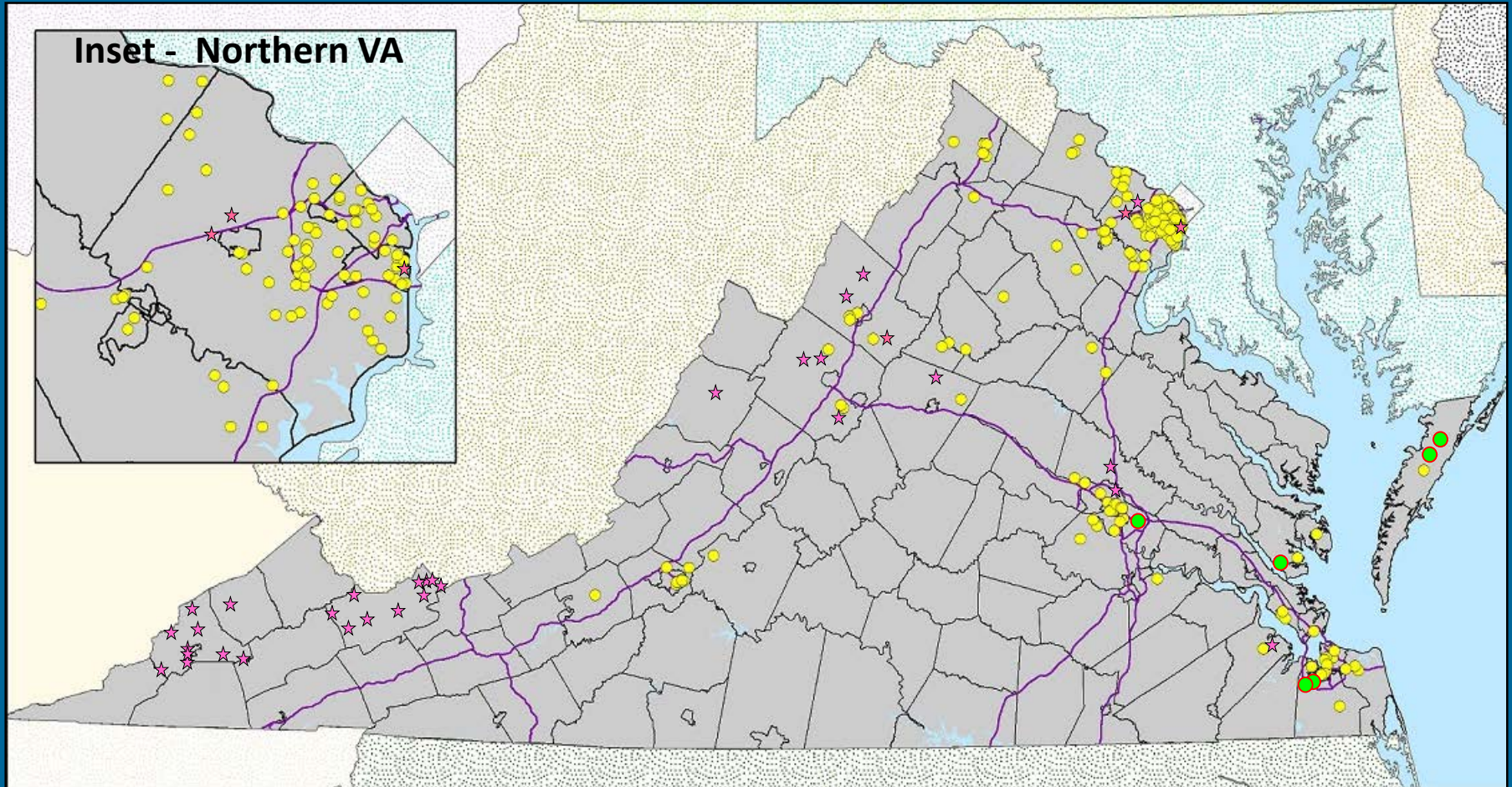
Powassan - tick borne encephalitis (POW) - None recorded.

Geography of WNV, LAC and EEE Infections in Virginia since 1990

● WNV - 153 cases (since 2002)




★ LAC - 38 cases

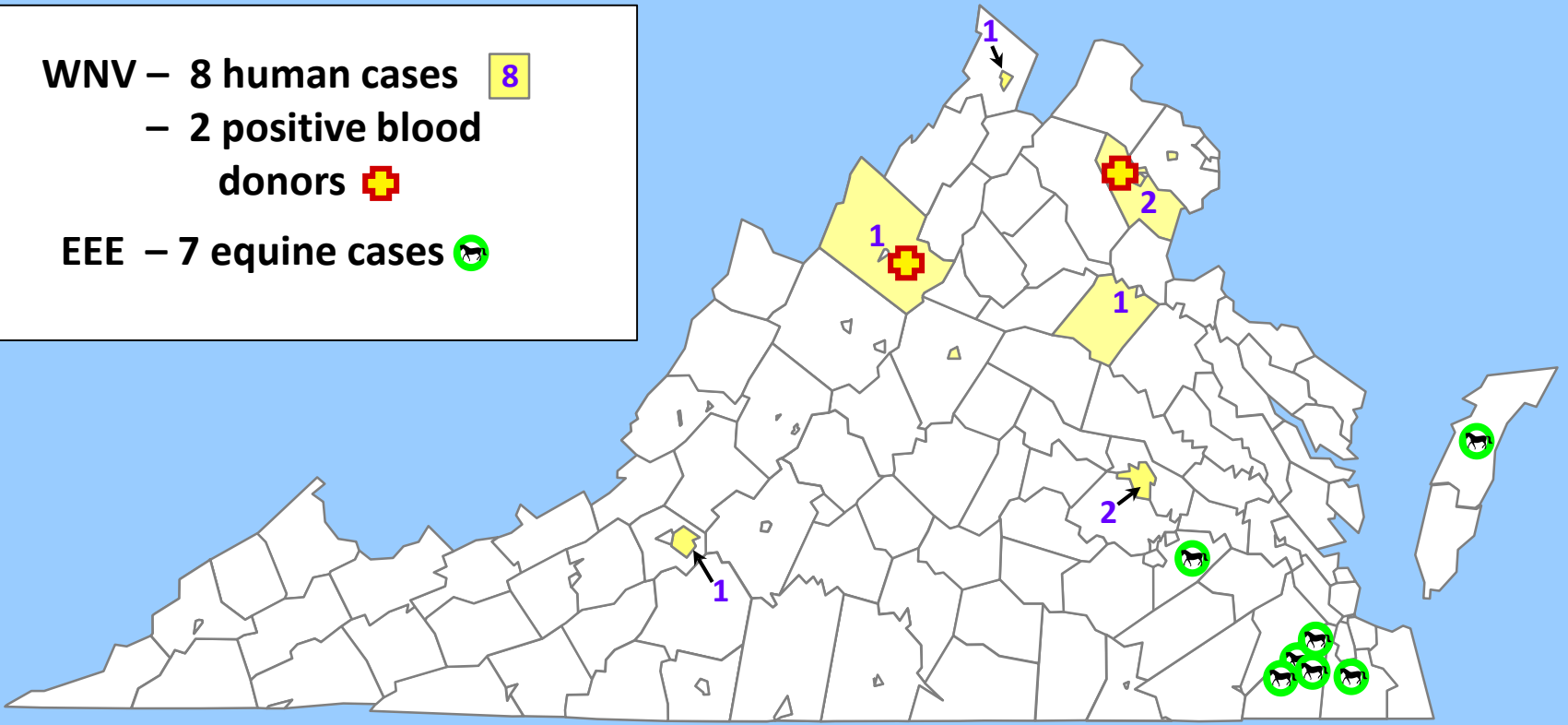
● EEE - 6 cases





Locally acquired WNV and EEE cases in humans and equines in Virginia in 2016 (no LAC cases were identified in 2016).

WNV – 8 human cases  8
– 2 positive blood donors 
EEE – 7 equine cases 



Imported human mosquito borne arboviral disease cases in Virginia in 2016.

Chikungunya (CHIK) - 5 imported cases: mostly from the tropical Americas (2 – Bolivia, 1 – Brazil, 1 – Mexico; one case also came from Asia (India).

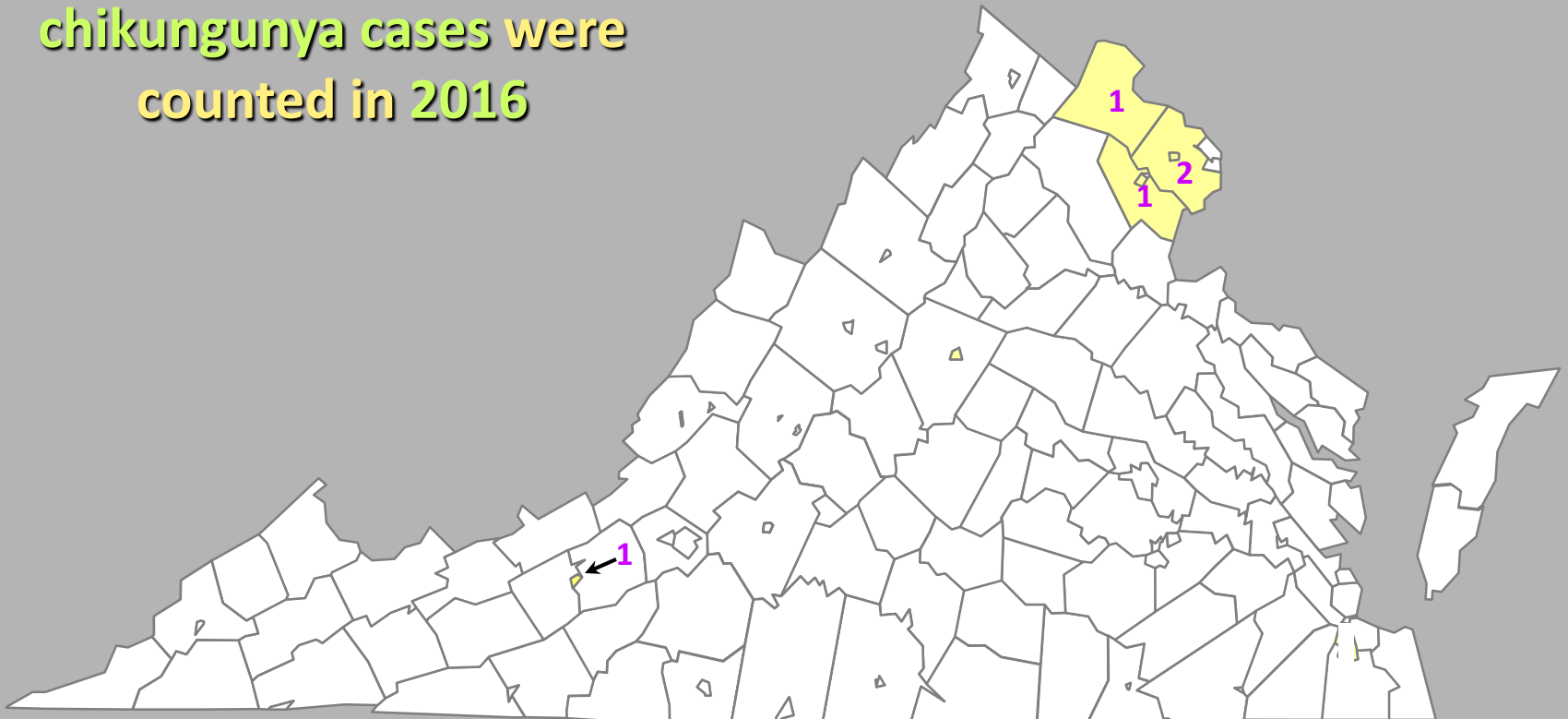
Dengue fever (DEN) - 25 imported cases: 13 cases came from the tropical Americas (4 – Jamaica, 3 – El Salvador, 2 – Costa Rica, 1 – Belize, 1 – Nicaragua, 1 – Peru, and 1 – Puerto Rico; 12 cases came from Asia and the Pacific Region (8 – India, 3 – Philippines, and 1 – Indonesia).

Zika Virus (ZIK) - 112 imported cases*: Four cases were acquired within the continental U.S. (2 – from Florida, and 2 – were acquired in VA by sexual contact with infected travelers from the tropical Americas); 107 cases were acquired directly in the tropical Americas (17 – Puerto Rico, 13 – Nicaragua, 12 – Guatemala, 10 – Dominican Republic, 8 – Jamaica, 7 – El Salvador, 7 – Haiti, 5 – Honduras, 4 – Venezuela, 3 – Mexico, 3 – Santa Lucia, 2 – Colombia, 1 – Costa Rica, 1 – Brazil and 14 others came from nine other Caribbean Islands; only one case came from the Pacific Region (Fiji).

*Note: Of these 112 Zika cases, four were counted in late 2015

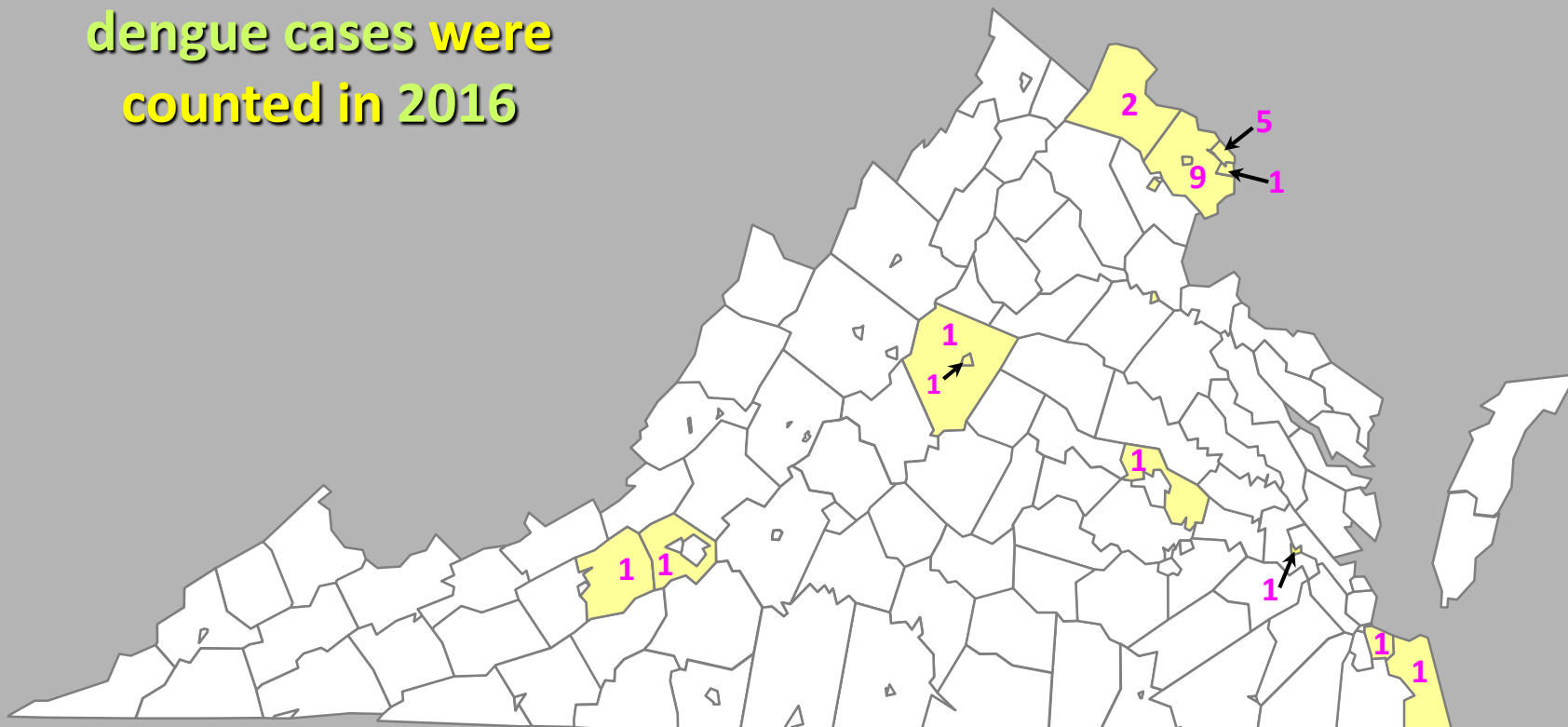
Chikungunya: 5 Imported Cases in Virginia in 2016.

Counties/Cities where
chikungunya cases were
counted in 2016



Dengue: 25 Imported Cases in Virginia in 2016.

Counties/Cities where
dengue cases were
counted in 2016



**EASTERN EQUINE
ENCEPHALITIS
IN VIRGINIA IN 2016**

EEE surveillance in Tidewater VA in 2016.

2016 appeared to be a moderately high year for EEE activity.

1. Surveillance for EEE in mosquito samples yielded 90 EEE positive pools. Although this was not a particularly high number of positive pools, the infection rate detected among the tested *Cs. melanura* mosquitoes was relatively high.
2. A total of 25 EEE - positive sentinel chickens was detected.
3. Seven EEE positive equines were also detected in eastern VA.
4. No human cases of EEE were recorded in 2016.

In **2016**, surveillance programs in the Tidewater Region of VA, tested a total of **117,683** mosquitoes (**2,641 pools**) for **EEE** and identified **90 EEE positive** pools. Almost of this testing was done by use of the **Vector Test™**

Mosquito Species	Number of Mosquitoes Tested	Number of Pools Tested	EEE Positive Pools*	EEE MIR
<i>Cs. melanura</i>	89,186	1,873	90	1.009
<i>Cx. pipiens/restuans</i>	24,876	590		
<i>Ae. albopictus</i>	2,752	65		
<i>Cx. salinarius</i>	463	14		
<i>Ae. vexans</i>	406	9		
Grand Total	117,683	2,641	90	

* All **VectorTest** EEE positive pools were **confirmed by RT- PCR** and several **VectorTest** negative “control” pools also tested **EEE positive by RT- PCR.**

Virginia's yearly EEE surveillance indicators (EEE positives) from 2003 through 2016

	2003	2009	2010	2011	2012	2013	2014	2015	2016
Humans:	1*	0	0	0	1	0	0	0	0
Sentinel: Chickens -	27	59	6	10	40	35	40	19	25
Flocks -	10	28	5	7	25	19	21	15	18
Horses (Equines):	9	9*	1	0	0	1	1*	3	7
Mosquito Pools:	43	141	8	1	153	122	212	53	90
EEE – MIR (<i>Cs. melanura</i>)	0.7	1.1	0.3	0.4	0.9	0.7	1.1	0.4	1.0

* Fatal human case of EEE.

* Other EEE positive animals = 9 equines, one goat, one alpaca and two captive birds

* Other EEE positive animals included three captive cassowary birds

WEST NILE VIRUS IN VIRGINIA IN 2016

WNV surveillance in VA in 2016.

2016 was a moderately low year for WNV activity.

1. Only **88** WNV positive mosquito pools were detected and the infection rate seen in *Culex pipiens/restuans* was quite low (this was the lowest number of WNV positive pools detected since 2001).
2. Sentinel chicken surveillance detected only **four** WNV positive birds in **four** flocks in the Hampton Roads Region.
3. No WNV equine infections were detected in VA in 2016.
4. **Eight** human cases of WNV were recorded.

In 2016, a total of **363,502 mosquitoes (10,518 pools)** were tested for **WNV** in Virginia, by RT-PCR, RAMP, or VectorTest.

Mosquito Species	Number of Mosquitoes Tested	Number of Pools Tested	WNV Positive Pools*	WNV MIR
<i>Cx. pipiens/restuans</i>	191,177	5,557	79	0.413
<i>Cs. melanura</i>	80,399	1,756	1	0.012
<i>Ae. albopictus</i>	49,158	1,519	2	0.041
<i>Cx. salinarius</i>	19,566	518	4	0.204
<i>Cx. erraticus</i>	10,054	359	1	0.099
<i>Ae. vexans</i>	6,199	210		
<i>Cx. spp.</i>	3,851	368	1	0.260
<i>Ae. triseriatus</i>	1,141	64		
<i>An. quadrimaculatus</i>	1,037	29		
<i>Ae. japonicus</i>	746	41		
<i>An. punctipennis</i>	79	3		
<i>An. crucians</i>	73	4		
<i>Cx. restuans</i>	11	1		
<i>Cx. pipiens</i>	10	1		
Grand Total	363,501	10,518	88	

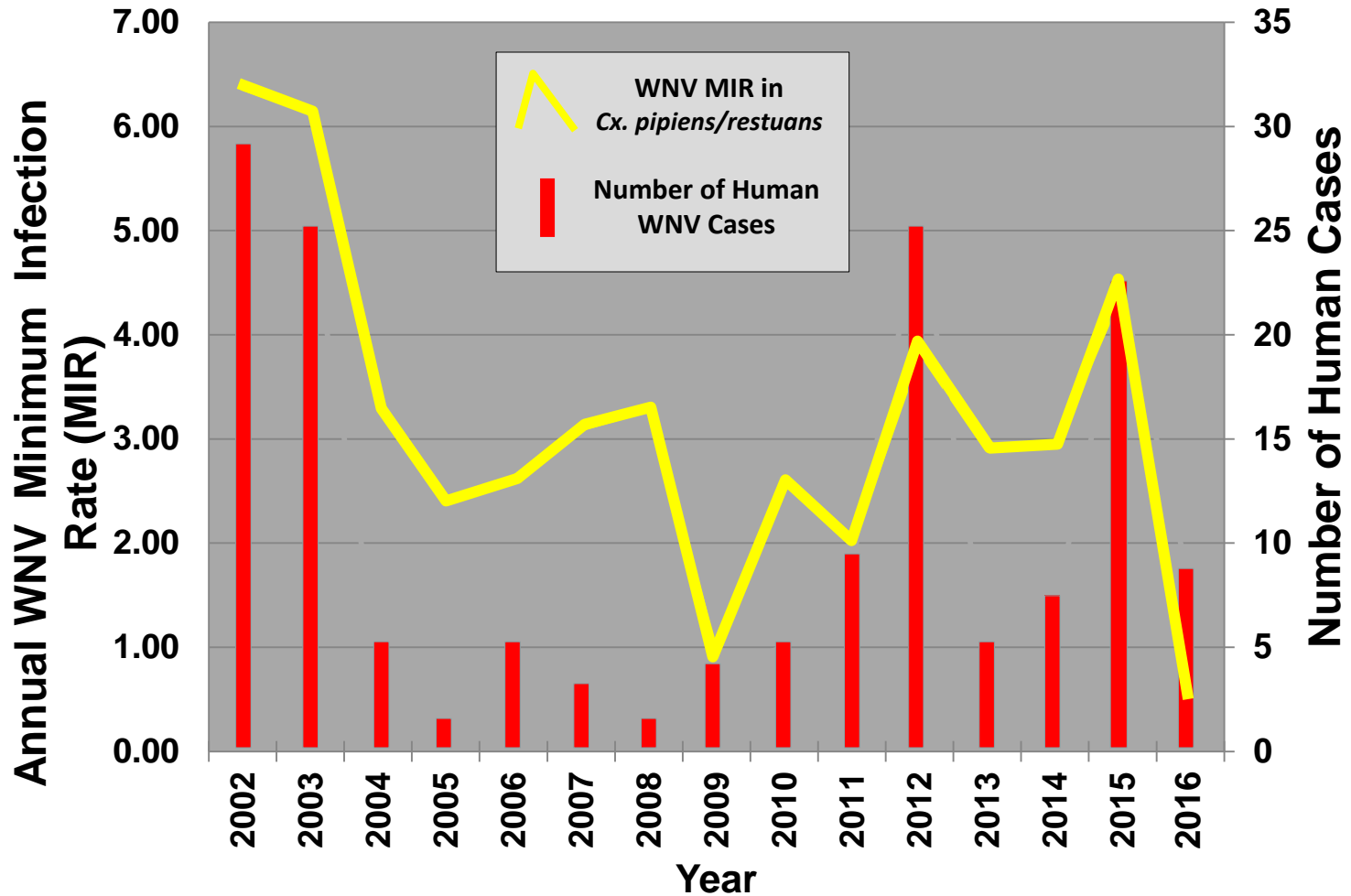
* All positive pools were confirmed by PCR, or conformed to RAMP standards used by VDH.

West Nile virus surveillance indicators (WNV positives) in Virginia from 2002 through 2016

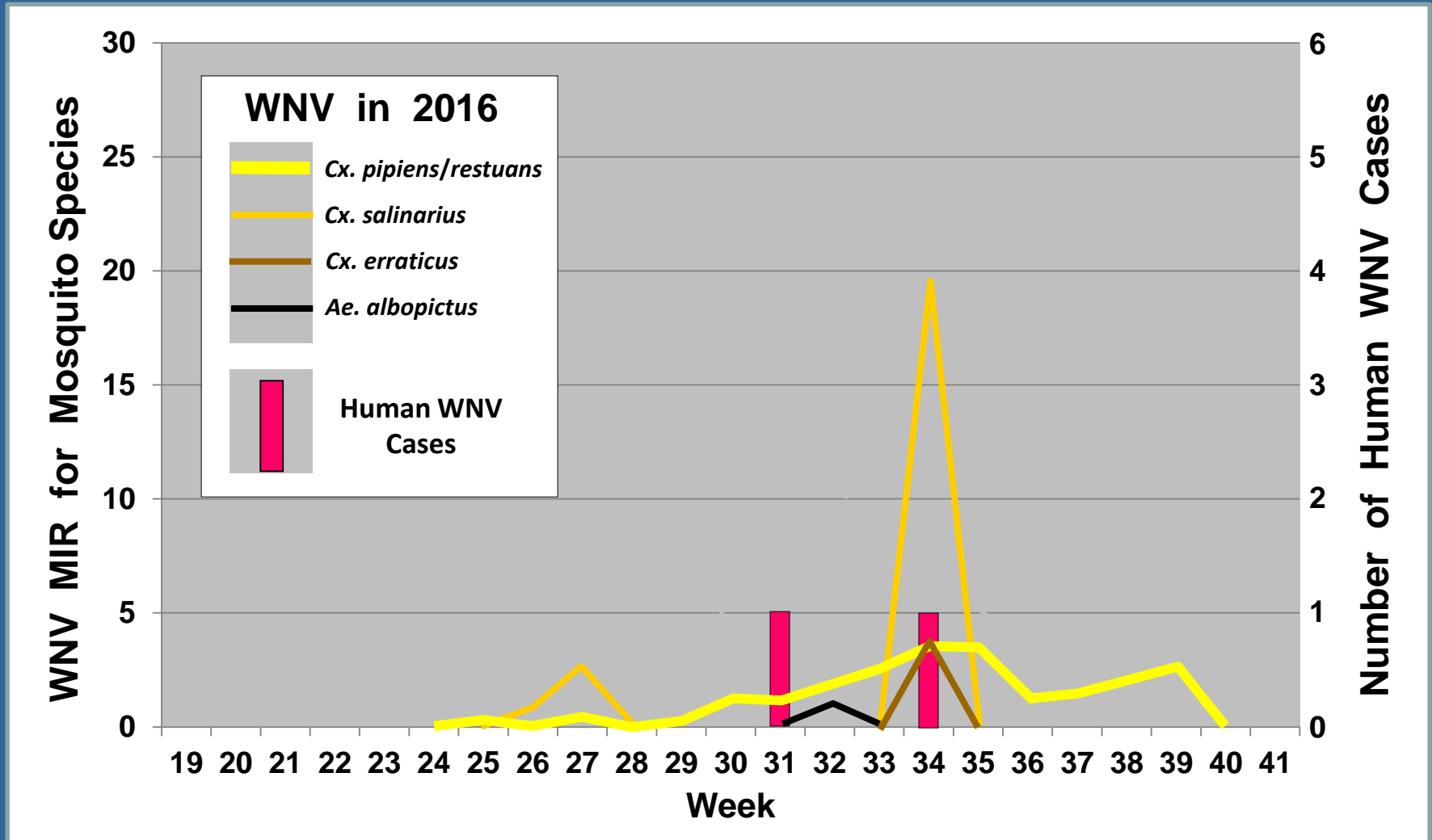
	2002	2003		2009	2010	2011	2012	2013	2014	2015	2016
Human WNV Cases (117 Total)	29	25		4	5	9	25	5	7	21	8
WNV+ Blood Donors	-	3		2	2	9	3	0	1	3	2
Wild Bird Positives	932	1,041		Not Done	ND	ND	ND	ND	ND	ND	ND
Sentinel: Chickens	10	54		16	15	4	25	13	30	27	4
Flocks	6	21		10	9	4	14	9	17	13	4
Equine Positives	48	234		3	0	1	1	1	3	1	0
Mosquito Positives	223	433		133	276	208	400	424	454	894	88
WNV – MIR (Cx. pip./res.)	6.9	6.5		1.3	2.6	2.1	4.1	3.0	3.0	4.6	0.4

* The human WNV cases counted in this table only include persons infected in Virginia.

Influence of *Cx. pipiens/restuans* annual WNV minimum infection rate (MIR) on the count human WNV cases in VA.



Weekly WNV minimum infection rates (MIR)* for *Cx. pipiens/restuans* and other mosquito species, and the locally acquired human WNV cases in Prince William County in 2016



* Positive pools detected by RT-PCR.

Acknowledgements

Laboratories:

PA Dept. of Health Laboratory

PA Dept. of Environmental Protection Laboratory

Fairfax County Dept. of Health Laboratory

The Virginia Division of Consolidated Laboratory Services (DCLS)

The Virginia Dept. of Agriculture and Consumer Services (VDACS) Veterinary Laboratories

Surveillance Programs:

Alexandria Dept. of Health _ Vector Control

Chesapeake Mosquito Control

Fairfax County Dept. of Health -Vector Borne Diseases Program

Hampton Mosquito Control

Henrico County Mosquito Control

Norfolk Dept. of Health Vector control

Portsmouth Mosquito Control

Prince William County Vector Control

Suffolk Mosquito Control

Virginia Beach Mosquito Control

Virginia Dept of Health (VDH)- Division of Environmental Epidemiology

VDH - Division of Surveillance and Investigation

VDH - Regional and District Epidemiology Staff

