ZIKA AND OTHER VECTOR-BORNE DISEASES IN CALIFORNIA

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San Diego County Health & Human Services Agency

San Diego Zika Collaboration Meeting
5 June 2018

LIVE WELL SAN DIEGO

VECTORBORNE ILLNESS

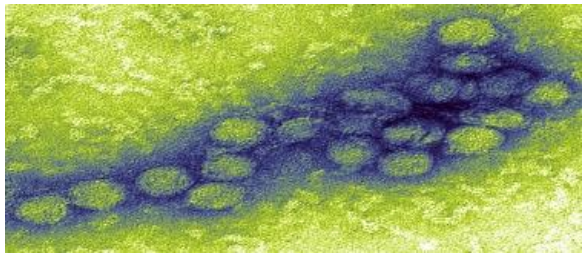
- **West Nile Virus**
- **Zika & other *Aedes*-borne Diseases**
- **Lyme Disease**
- **Rocky Mountain Spotted Fever**
- **Hantavirus**
- **Tularemia**
- **Plague**
- **Murine typhus**

West Nile Virus: Keep it on your radar!

LIVE WELL SAN DIEGO

WEST NILE VIRUS

West Nile virus (WNV) is a single-stranded RNA virus of the family Flaviviridae, genus Flavivirus.

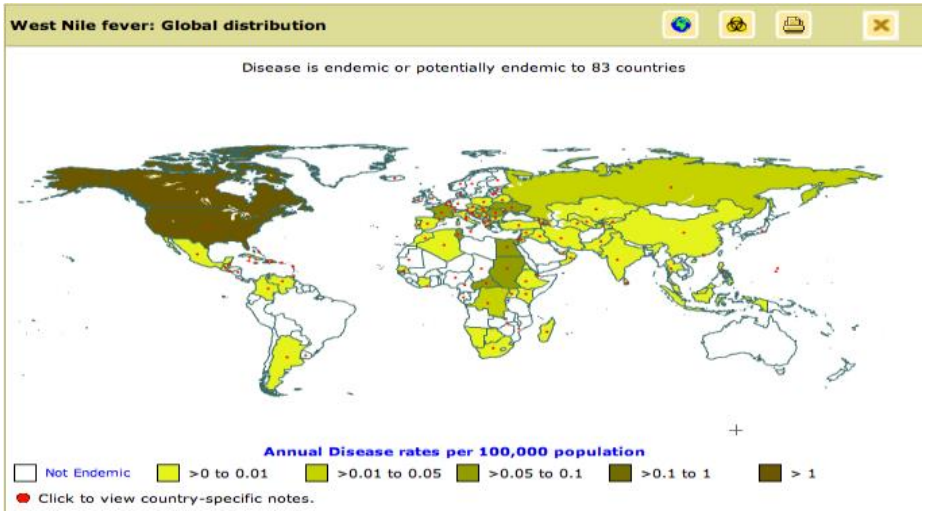


WNV belongs to the Japanese encephalitis antigenic complex.

WNV is closely related to:

- Yellow fever
- Dengue
- Japanese encephalitis
- St. Louis encephalitis

WNV is widely distributed in Africa, West Asia, & Middle East.



WNV was first detected in Western Hemisphere in 1999 during an outbreak of encephalitis in NYC and has since spread across U.S.

WEST NILE VIRUS

LIVE WELL SAN DIEGO

Most often, WNV is spread by bite of an infected mosquito.

- **Mosquitoes become infected when they feed on infected birds** *(reservoir for WNV).*
- **Infected mosquitoes can then spread the virus to humans and other animals when they bite.**

WNV has been spread through:

- **Blood transfusions**
- **Organ transplants**
- **Breastfeeding**
- **During pregnancy from mother to baby**

VECTOR – CULEX SP.

Photo credit: CDC

WEST NILE VIRUS

- **People may develop symptoms 2 to 14 days after they are bitten by infected mosquitoes.**
- **Longer incubation periods have been documented in immunocompromised persons.**
- **WNV is not communicable from person to person, with rare exceptions:**
  - **Blood transfusions**
  - **Organ transplants**
  - **Breastfeeding**
  - **Perinatal transmission**

WEST NILE VIRUS

LIVE WELL SAN DIEGO

Approximately 80% of those infected with WNV are asymptomatic.

Up to 20% of those infected with virus may develop West Nile fever (WNF).

Clinical features of WNF may include:

- **Fever, headache, fatigue**
- **Skin rash on trunk of the body**
- **Swollen lymph glands**
- **Eye pain**

WEST NILE VIRUS

Of those infected with WNV, 1 in 150 or <1% may develop severe illness called WN neuroinvasive disease (WNND) because it affects a person's nervous system.

Specific types of WNND may include:

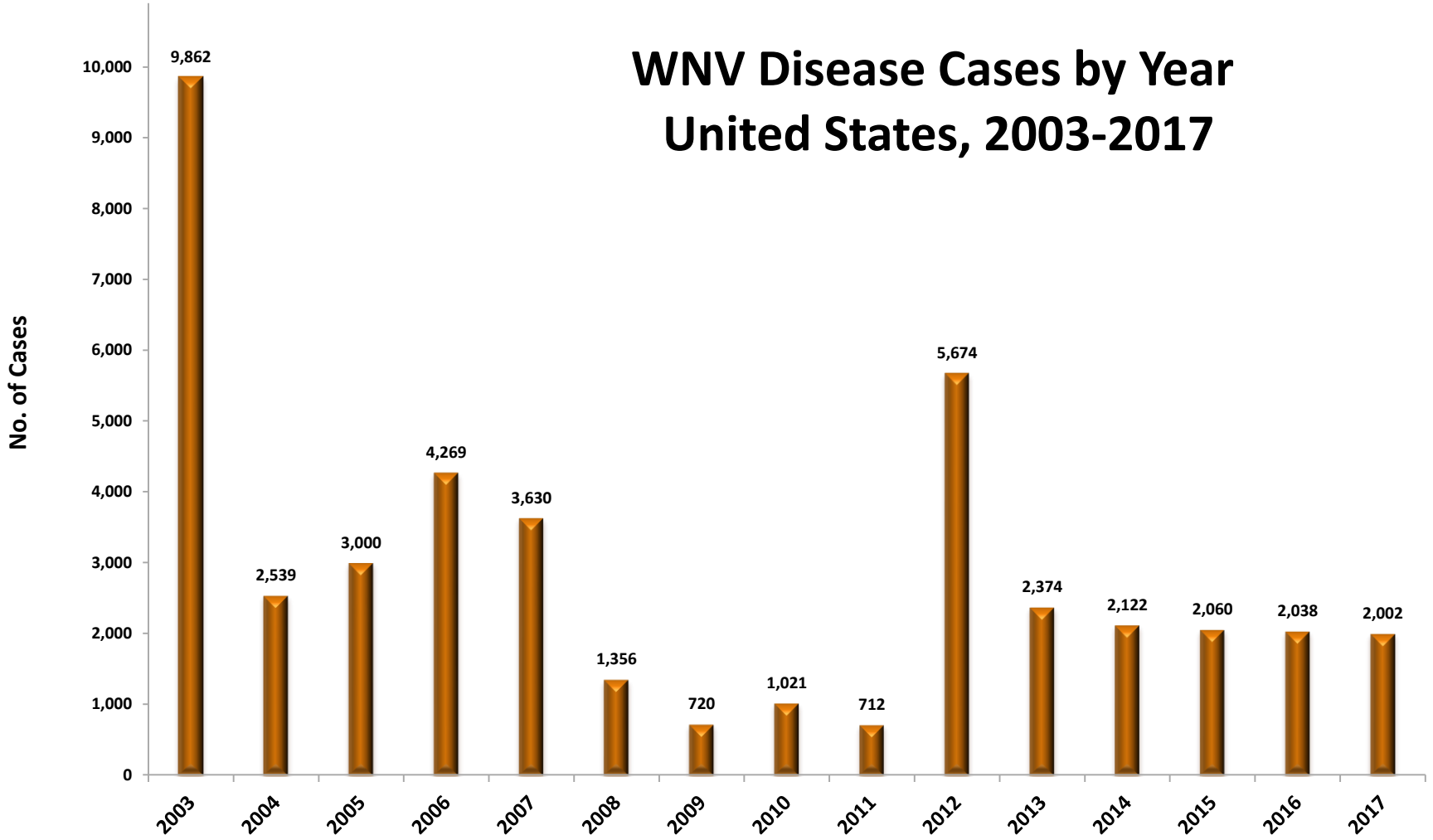
- **Encephalitis**
- **Aseptic meningitis**
- **Acute flaccid paralysis (AFP)**
- **Atypical Guillain-Barré Syndrome (GBS)**
- **Transverse myelitis**

WEST NILE VIRUS

Clinical features of WNND may include:

- **Fever, gastrointestinal symptoms, ataxia**
  (failure of muscular coordination; irregularity of muscular action)
- **Extrapyramidal signs** ***(e.g., extreme restlessness, involuntary movements, and uncontrollable speech)***
- **Optic neuritis** ***(inflammation of the optic nerve)***
- **Seizure, altered mental status**
- **Weakness, flaccid paralysis**
  (weakness or loss of muscle tone)
- **Myelitis** ***(inflammation of the spinal cord)***
- **Polyradiculitis** ***(inflammation of the nerve roots)***
- **Maculopapular or morbilliform rash involving neck, trunk, arms, or legs**

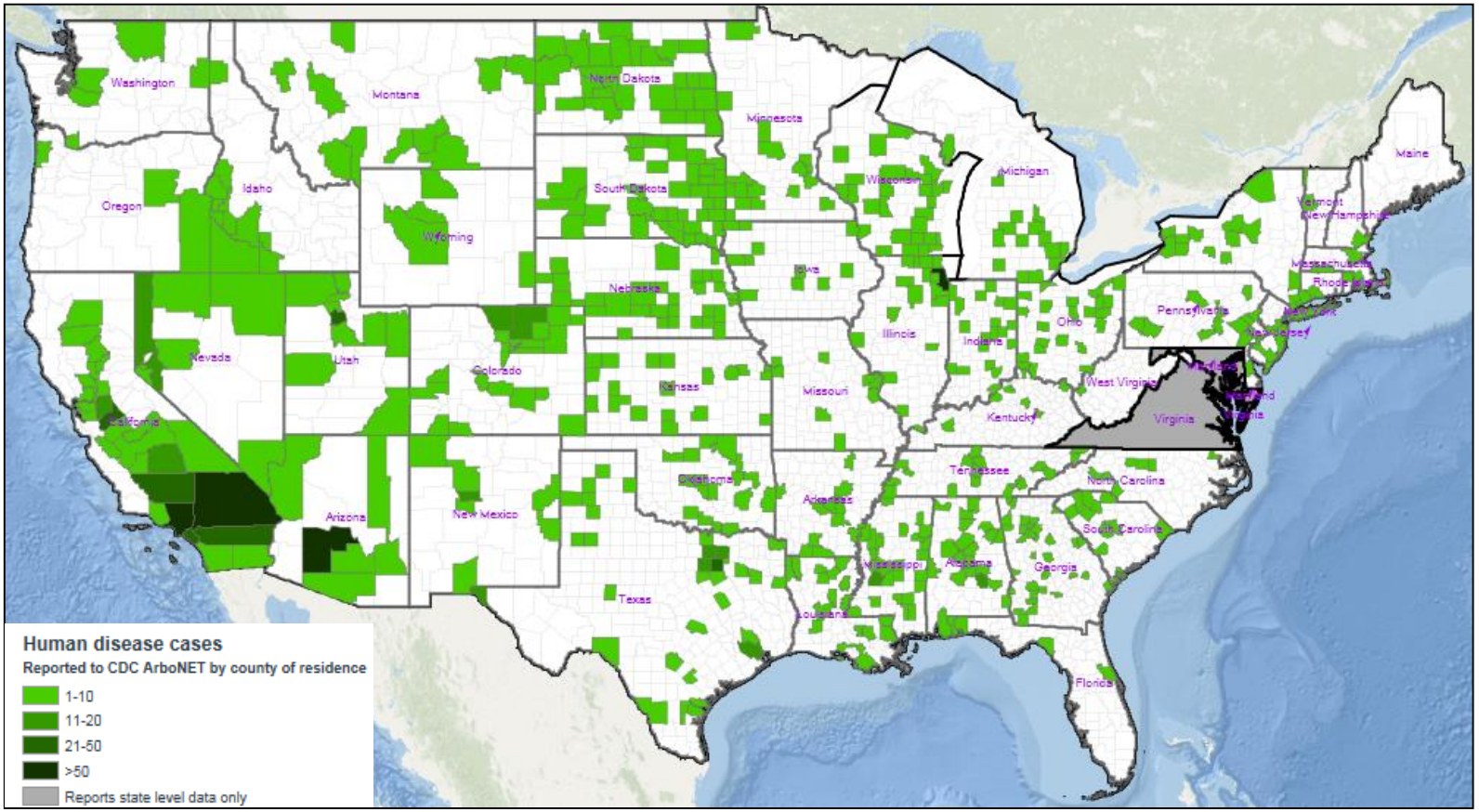
WEST NILE VIRUS- US



Data source: http://www.cdc.gov/westnile/index.html Prepared by: County of San Diego Epidemiology Program, 5/30/18

WEST NILE VIRUS – US 2017

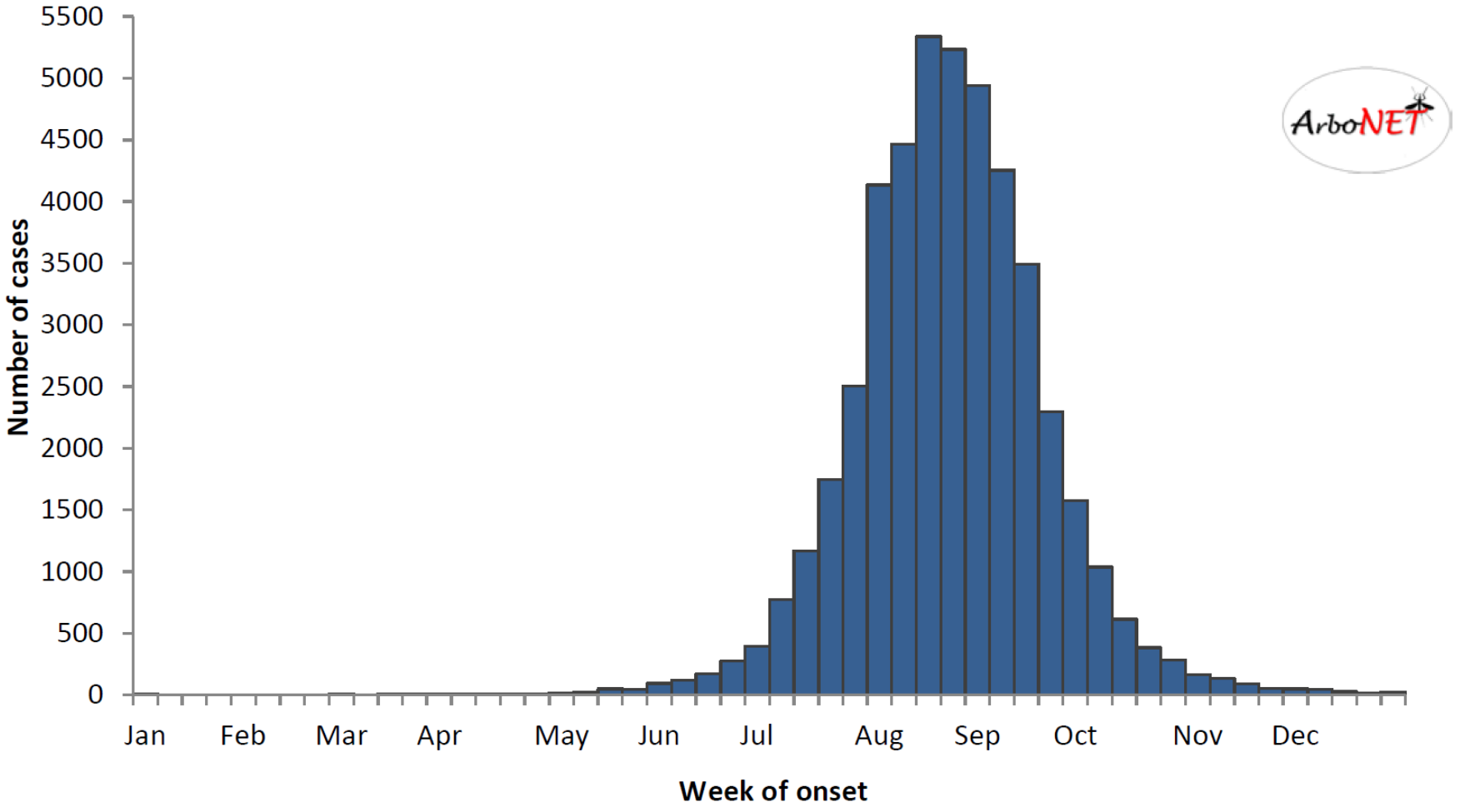
- **Overall, 2,002 cases of WNV disease in people were reported to CDC.**
- **1,339 (67%) were classified as WNND and 663 (33%) were non-WNND.**



Downloaded 5/25/18 from http://diseasemaps.usgs.gov/mapviewer/

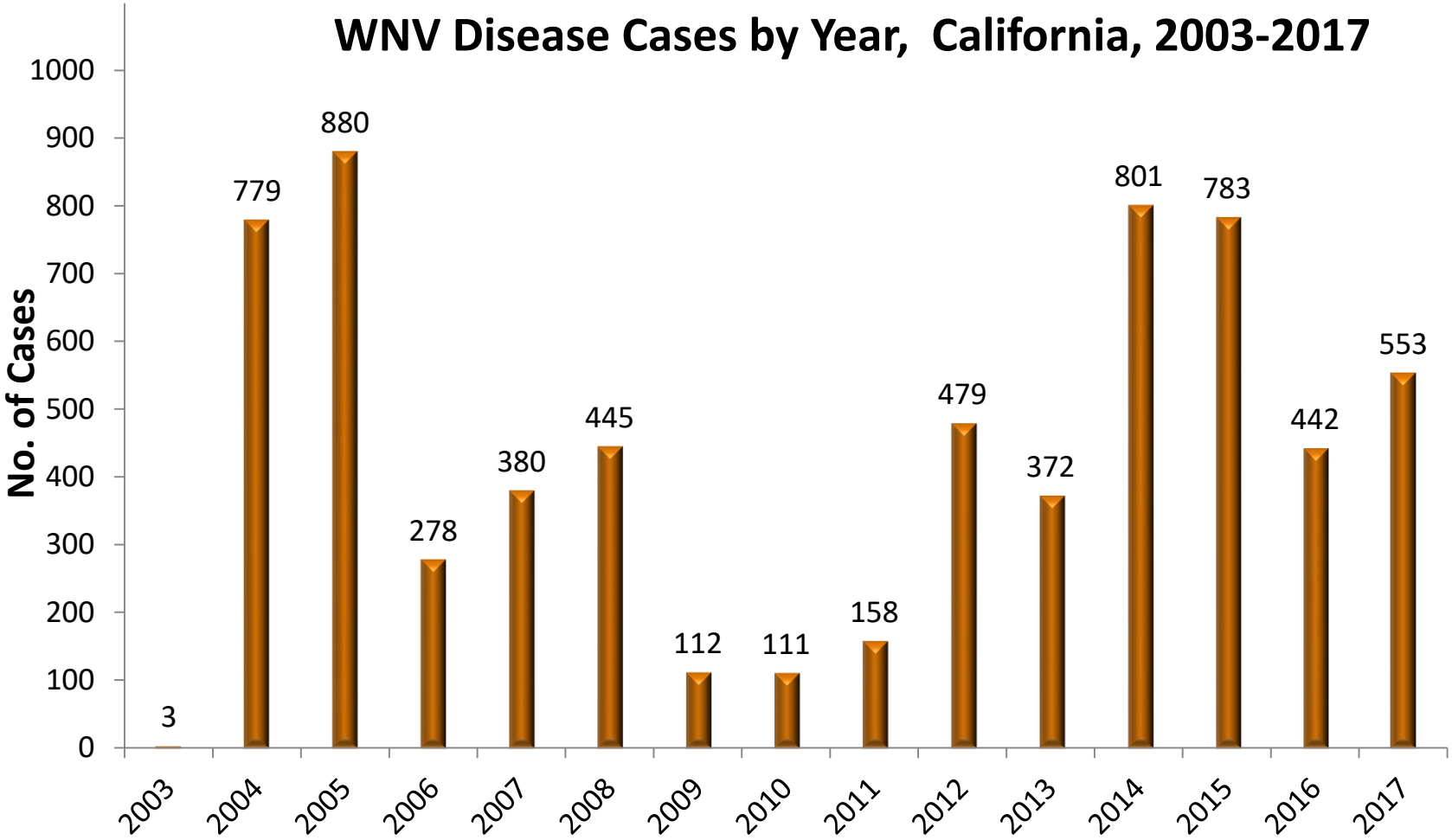
WEST NILE VIRUS – US

WNV disease cases reported to ArboNET, by week of onset – US, 1999-2016



https://www.cdc.gov/westnile/resources/pdfs/data/WNV-Week-Onset_for-PDF_1999-2016_09292017.pdf

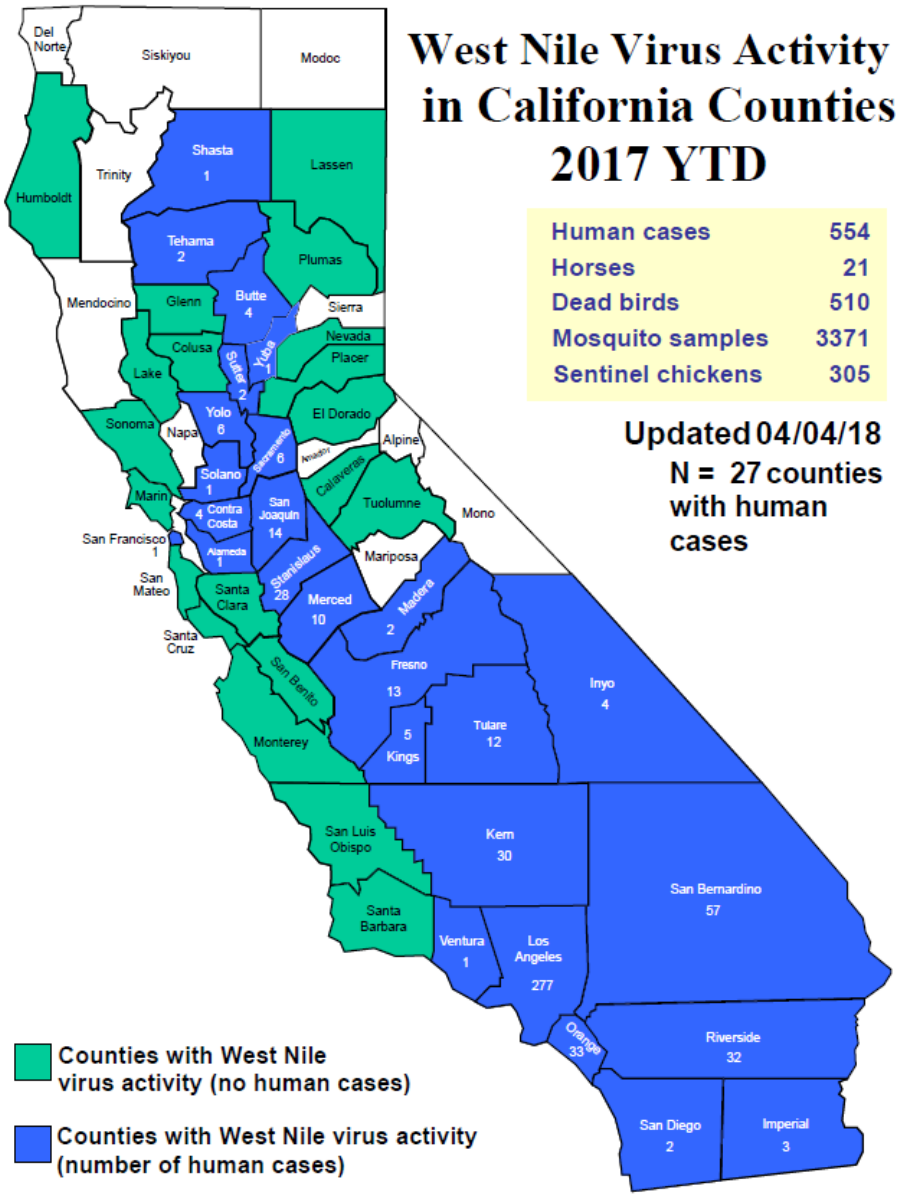
WEST NILE VIRUS- CA



Data source: http://www.cdc.gov/westnile/index.html Prepared by: County of San Diego Epidemiology Program, 5/30/18

WEST NILE VIRUS – CA 2017

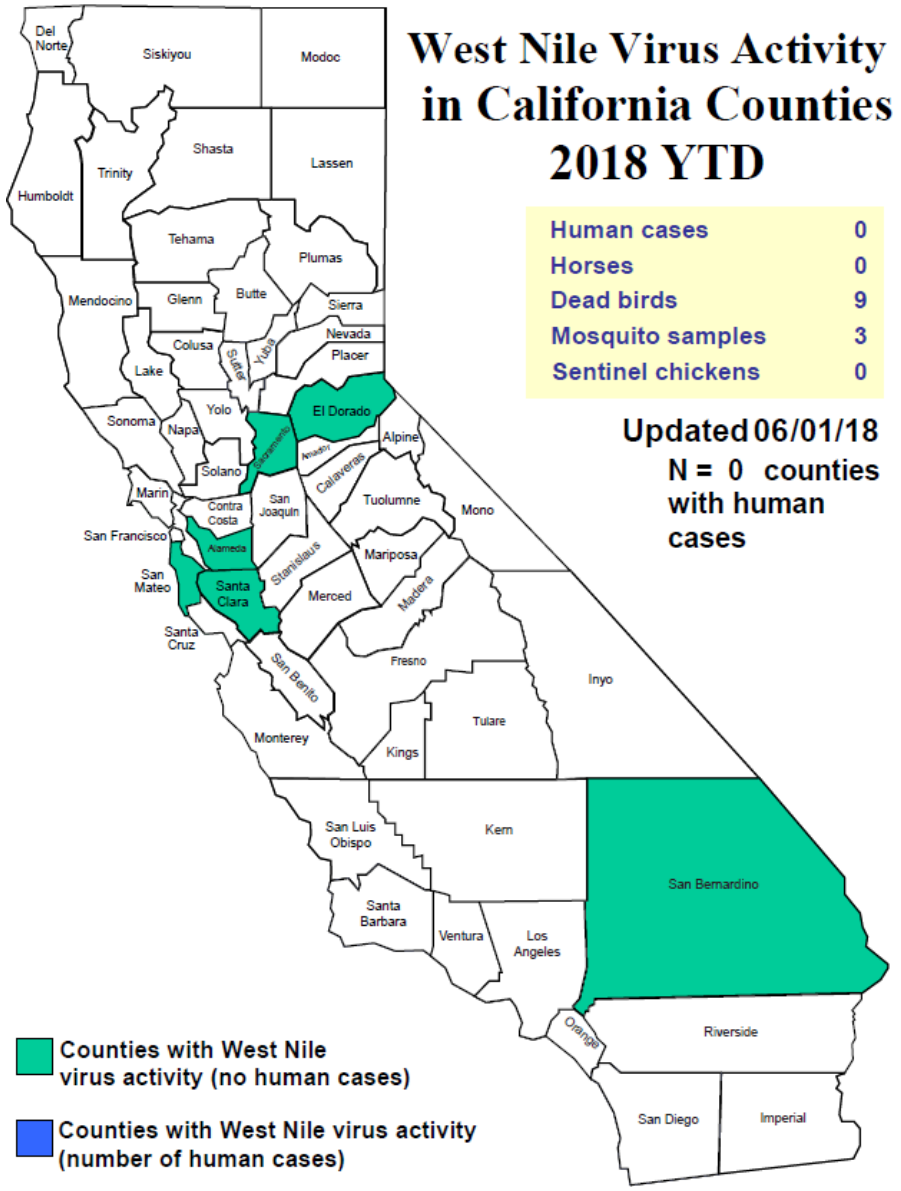
- **554** human cases from **27** counties have tested positive for WNV in 2017.
- **44** WNV-related fatalities were reported
- **2** confirmed WNV cases in San Diego, **0** deaths



Source: CDPH http://www.westnile.ca.gov/

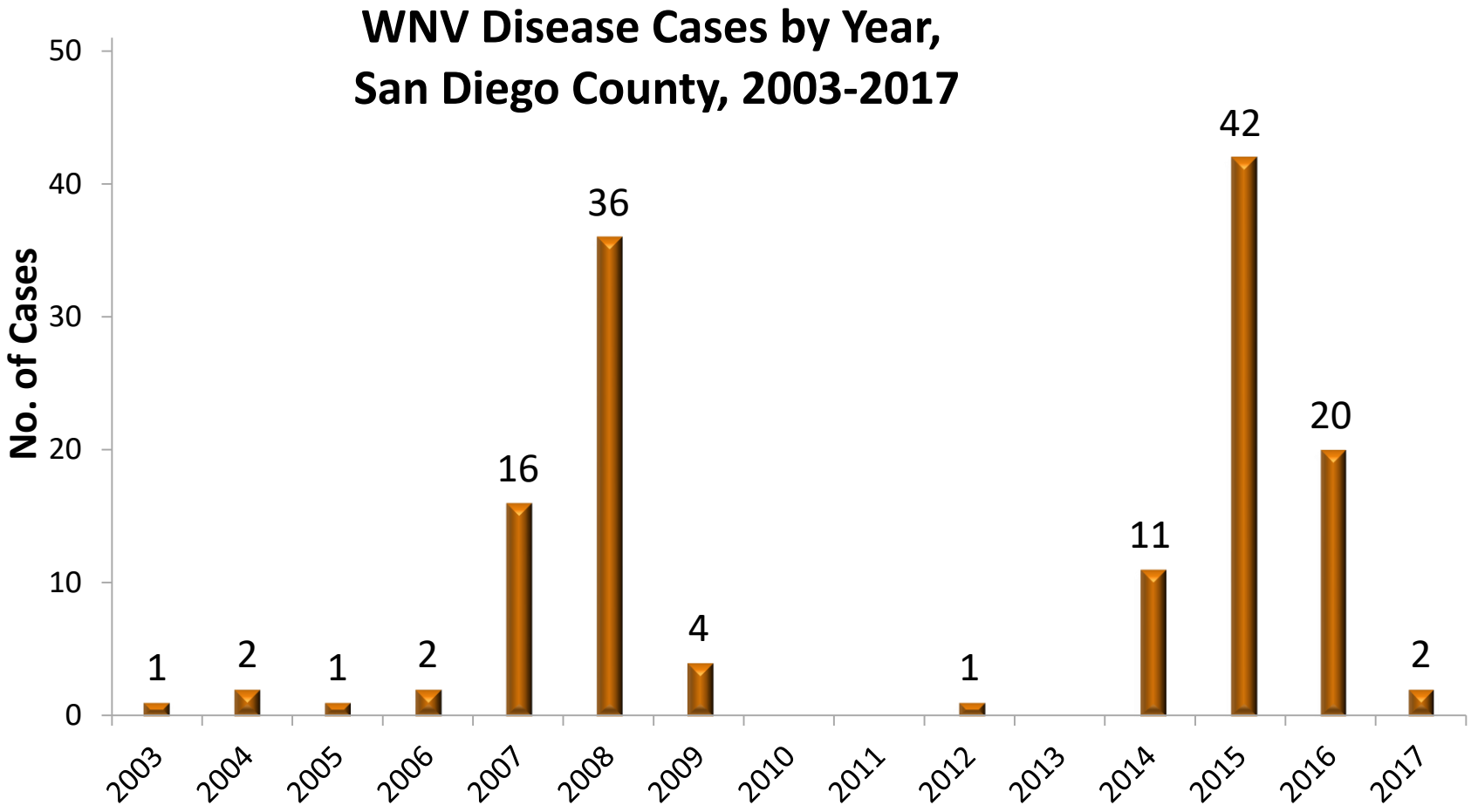
WEST NILE VIRUS – CA 2018

- **0** human cases from 0 counties have tested positive for WNV in 2018.
- **0** WNV-related fatalities have been reported
- **0** confirmed WNV cases in San Diego this year, **0** deaths, 0 cases pending



Source: CDPH http://www.westnile.ca.gov/
Downloaded 6/4/18

WEST NILE VIRUS- SAN DIEGO



Prepared by: County of San Diego Epidemiology Program, 5/30/18

WEST NILE VIRUS- LABS

- **Most efficient diagnostic method is detection of antibodies to WNV in serum and/or CSF collected within 7 days of illness onset.**
- **Routine testing for WNV includes tests by enzyme immunoassay (EIA) and/or immunofluorescent assay (IFA).**
- **Serological testing for WNV is no longer available at SDCPHL.**
- **CDPH Viral and Rickettsial Disease Laboratory (VRDL) continues to accept serum and CSF samples for WNV testing.**

WEST NILE VIRUS- LABS

WNV Testing capacities at VRDL include:

- **IgM and IgG EIA testing**
- **IgM and IgG IFA testing**
- **Plaque Reduction Neutralization Test (PRNT)**
- **Reverse Transcriptase – Polymerase Chain Reaction (RT-PCR)**

* ***Immunocompromised patients may not mount a demonstrable antibody response in sera. CSF from these patients may be sent to VRDL for virus detection by PCR.***

Required specimens are:

- **CSF: 1-2 cc (if lumbar puncture was performed)**
- **Acute Serum: ≥ 2 cc serum collected ≤ 7 days after onset †**

† ***If WNV infection is highly suspected and acute serum is negative or inconclusive, testing of a 2nd or convalescent serum collected 3-5 days after acute serum may be considered.***

WEST NILE VIRUS

There is currently no specific treatment for WNV infection.
More information at: http://www.cdc.gov/ncidod/dvbid/westnile/clinicians/

Key prevention messages:

- Stay indoors at dawn and dusk
- Avoid mosquito bites; wear long sleeves, long pants, and socks when outdoors
- Use mosquito repellent*
- Keep screens on windows and doors in good repair
- Identify and eliminate standing water sources that can be mosquito-breeding areas around the home

* Information on repellents can be found at: http://www.cdc.gov/ncidod/dvbid/westnile/RepellentUpdates.htm

Photo credits: MN Public Health

COUNTYNEWSCENTER

DIRECT TO YOU FROM THE COUNTY OF SAN DIEGO

May 4, 2018

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ENVIRONMENT

County Set to Conduct First Larvicide Drop of 2018 Mosquito Season

By Gig Conaughton, County of San Diego Communications Office

May 4, 2018 | 8:53 AM

https://www.countynewscenter.com/county-set-to-conduct-first-larvicide-drop-of-2018-mosquito-season/

West Nile Virus in San Diego County

West Nile virus (WNV) is a disease transmitted to humans, birds, horses, and other animals, by infected mosquitoes. Mosquitoes get the disease from feeding on infected birds and can later pass it on when they bite animals or humans.

WNV is established in San Diego County and can be found in all 58 counties in California! The virus was first isolated in the West Nile district of a Northern Province in Uganda in 1937. It was first detected in the United States in New York City in 1999. From there, the virus spread westward, arriving in California in 2003. West Nile virus is now the most prevalent mosquito-borne disease in the United States.

The Vector Control Program protects communities and the environment by controlling mosquitoes that can transmit diseases to humans.

Vector Control Program staff monitor WNV by trapping, pooling, and testing mosquitoes and by testing sentinel chickens and dead birds.

Current 2018 WNV activity is given below. Information for prior years is available here, and additional information on WNV can be found here.

Adult Mosquito Treatment Information

2017 WNV Activity Map

For more information on a specific source click on the source name (hyperlink) below

Source	Number of Positives to Date (2018)
Birds	0
Mosquito Batches	0
Horses	0
Humans	0
Total Source Positives	0

FIGHT the Bite!

For More Information On
WNV Or Other Vectors Contact:
(858) 694-2888
vector@sdcounty.ca.gov

Popular Services

Report a Dead Bird
Report a Green Pool
Report Mosquito Activity
Find Free Mosquito Fish
Request a Rat Inspection
Sign Up for Email Notifications

COUNTYNEWSCENTER


Summer's Here, so Check In Before You Get In!


Partner Network Relays Disaster Information to Vulnerable

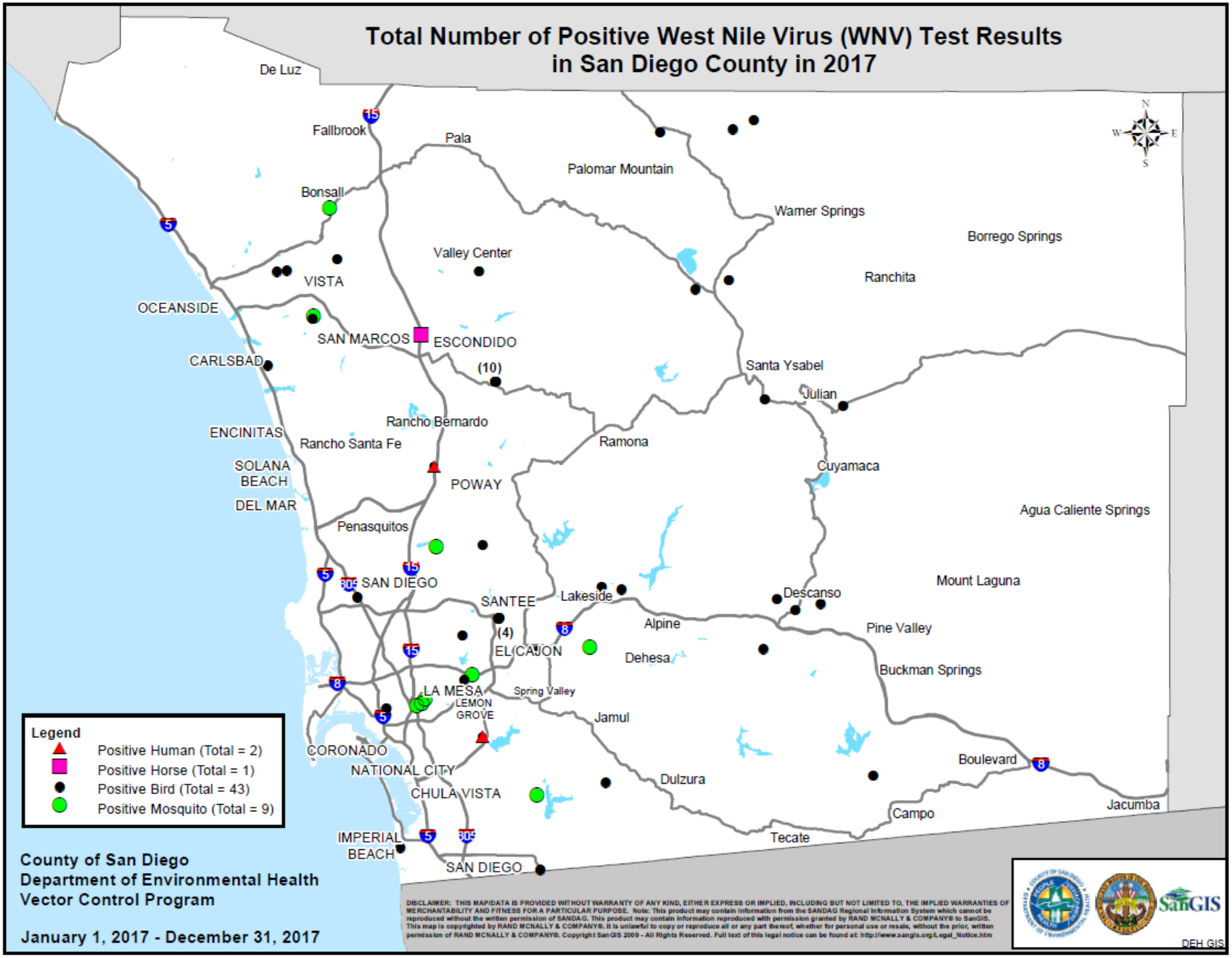

Tuesday is Deadline to Request Mail Ballot for June 5 Election

More Stories

County of San Diego Vector Control

www.sdvector.com

Total Number of Positive West Nile Virus (WNV) Test Results in San Diego County in 2017



County of San Diego
Department of Environmental Health
Vector Control Program

January 1, 2017 - December 31, 2017

SanGIS

DEH GIS

DISEASES CARRIED BY *AEDES* MOSQUITOES

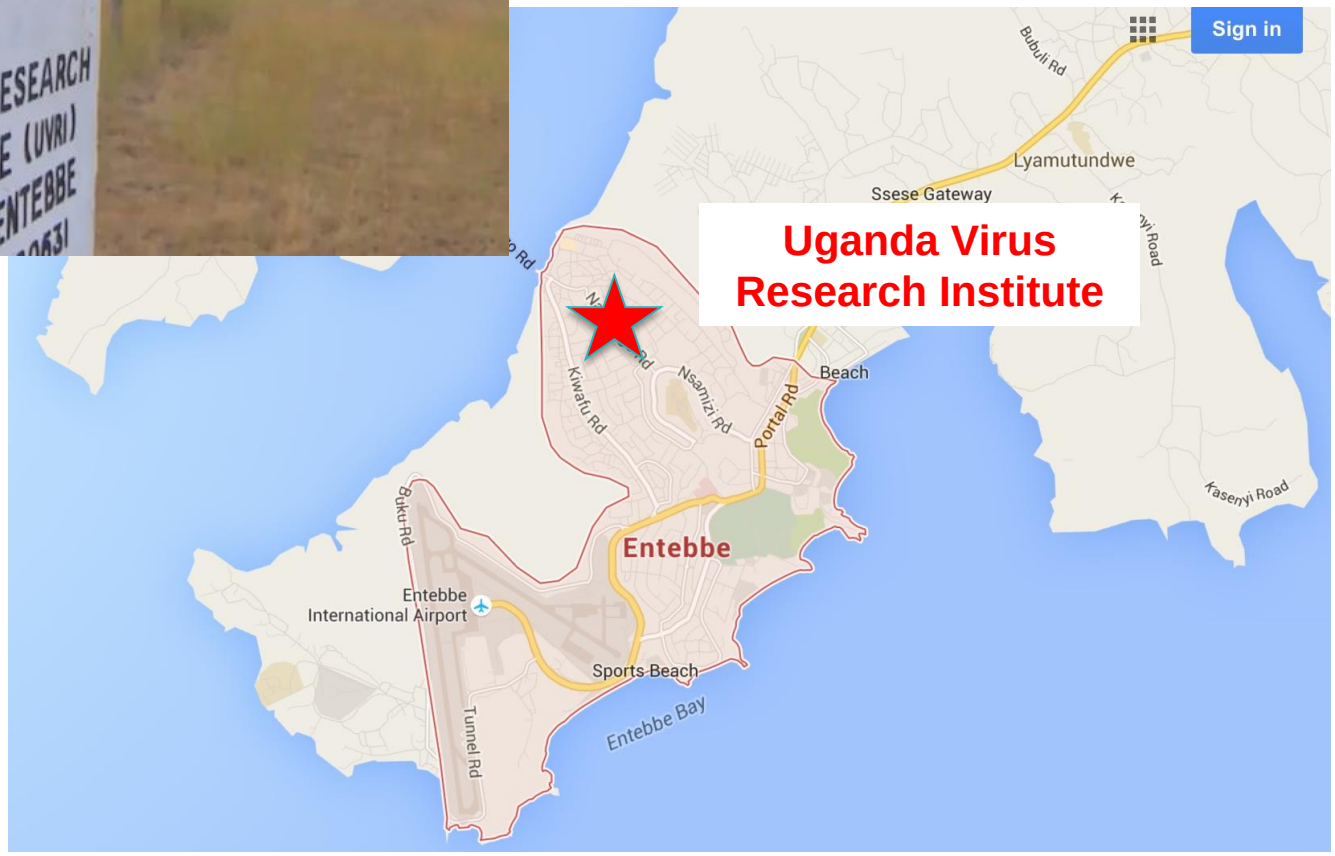
LIVE WELL SAN DIEGO

AEDES DISEASES

- **Zika**
- **Dengue**
- **Chikungunya**
- **Yellow Fever**

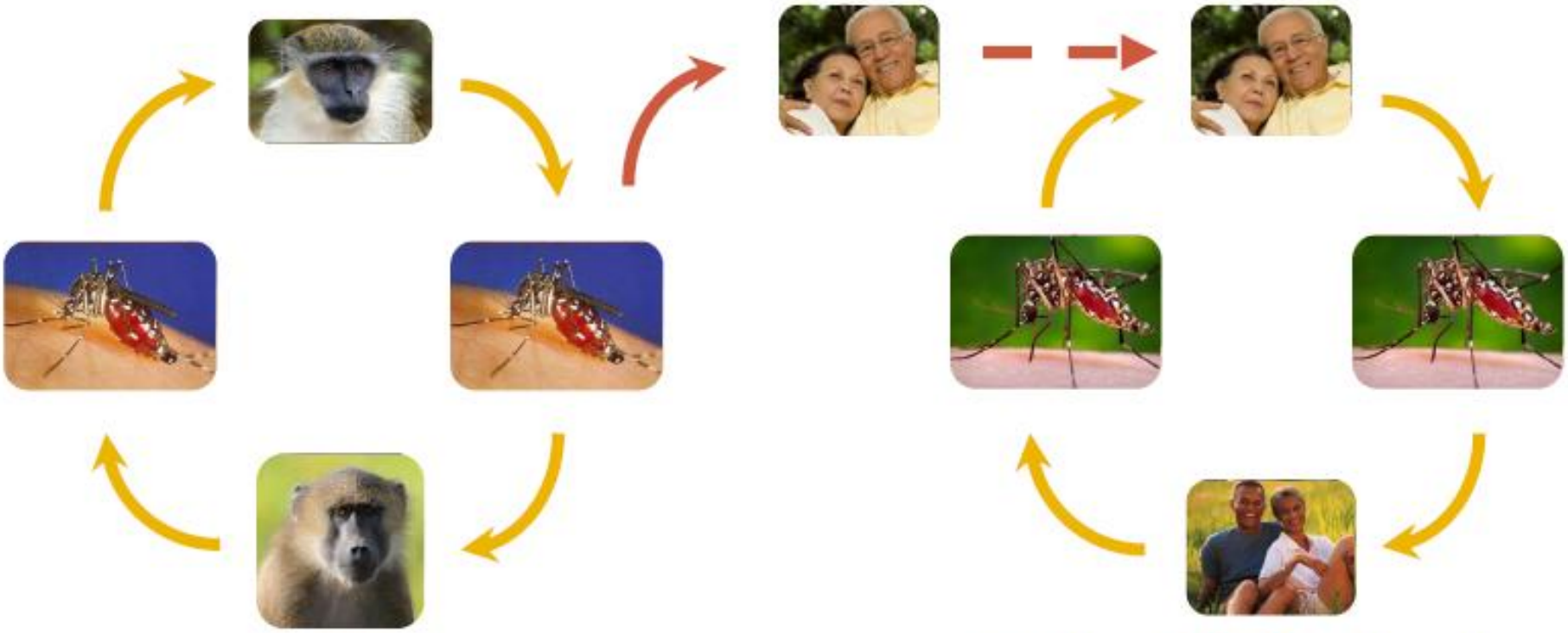
Map credit: Google maps. Downloaded 4/4/16.

Map credit: Google maps. Downloaded 4/4/16.



Map credit: Google maps. Photo credit: CNN. Downloaded 4/4/16 from http://www.cnn.com/2016/02/02/health/zika-forest-viral-birthplace/index.html

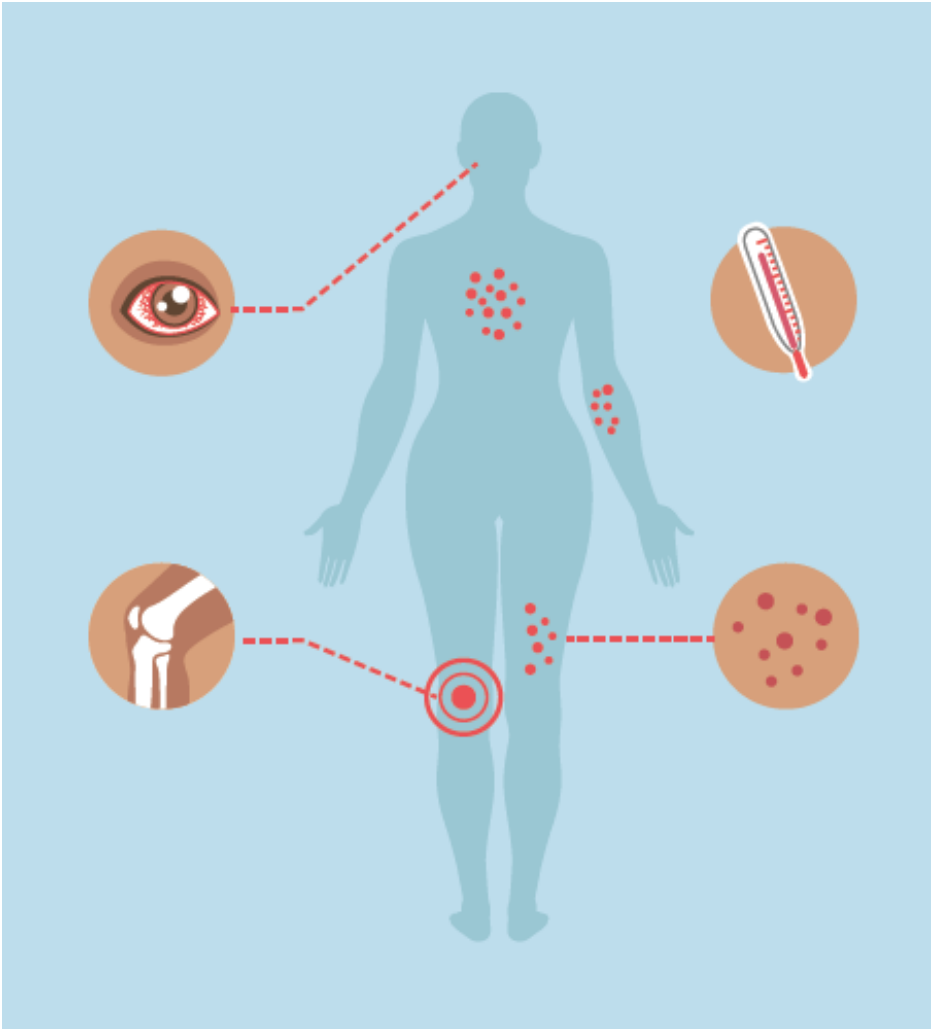
Zika Virus Transmission Cycles



Source: CDC. Downloaded 1.28.16 from http://www.bt.cdc.gov/coca/ppt/2016/01_26_16_zika.pdf

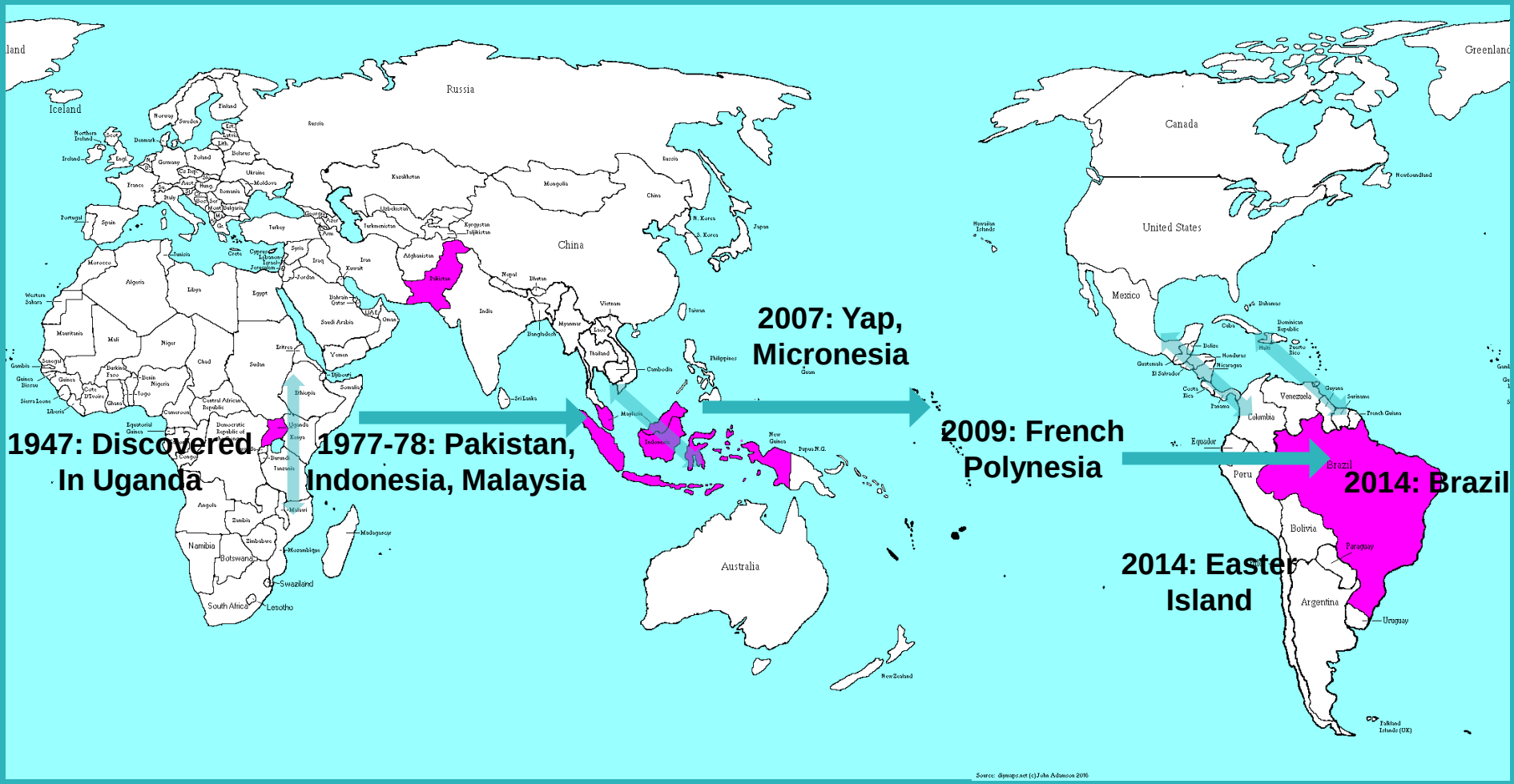
ZIKA

- **Before 2003, only 14 human cases described!**
- **80% of cases are asymptomatic**
- **Illness usually mild**
- **Symptoms last several days to a week**



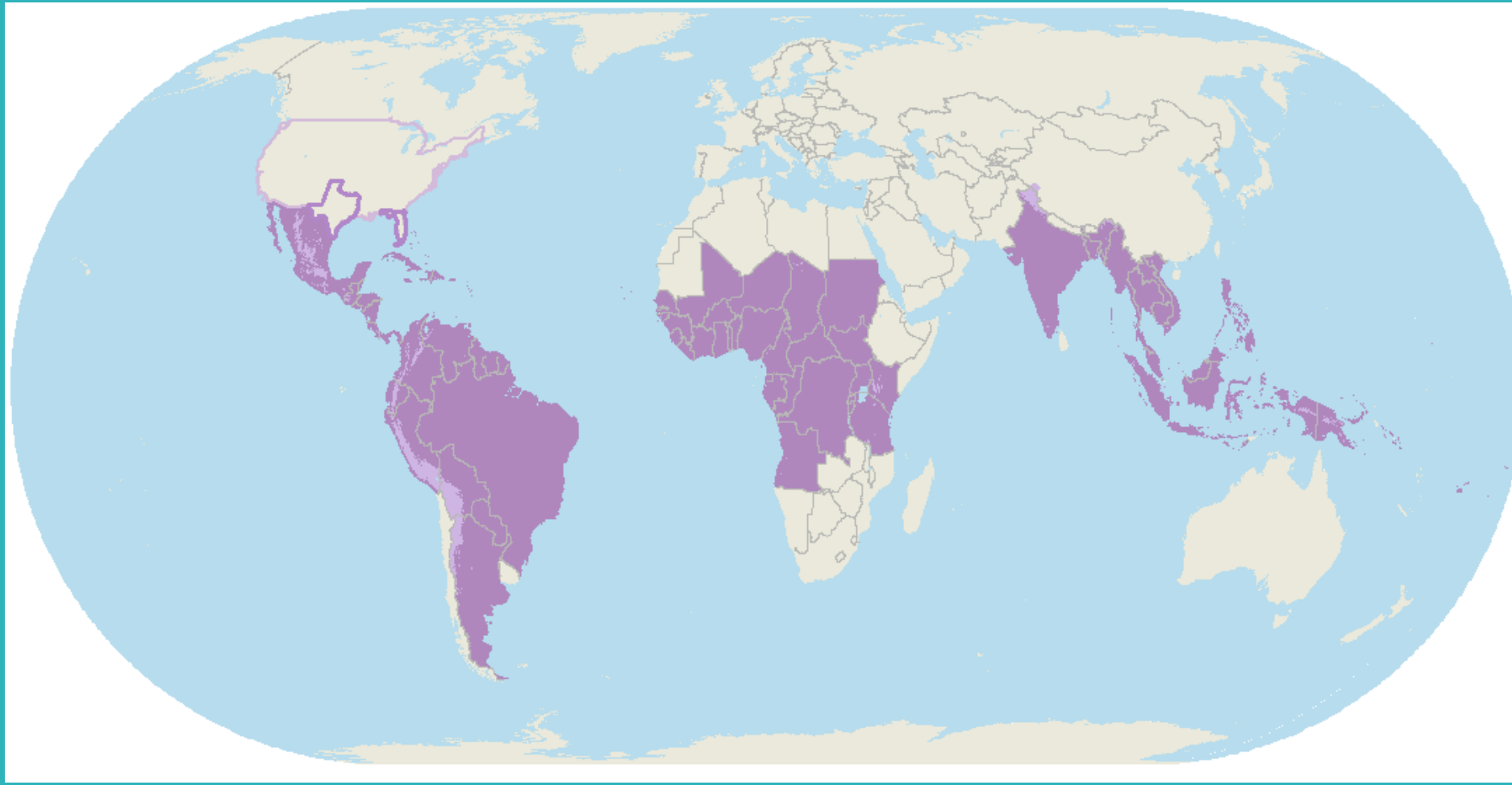
Source: CDC.

How Zika spread



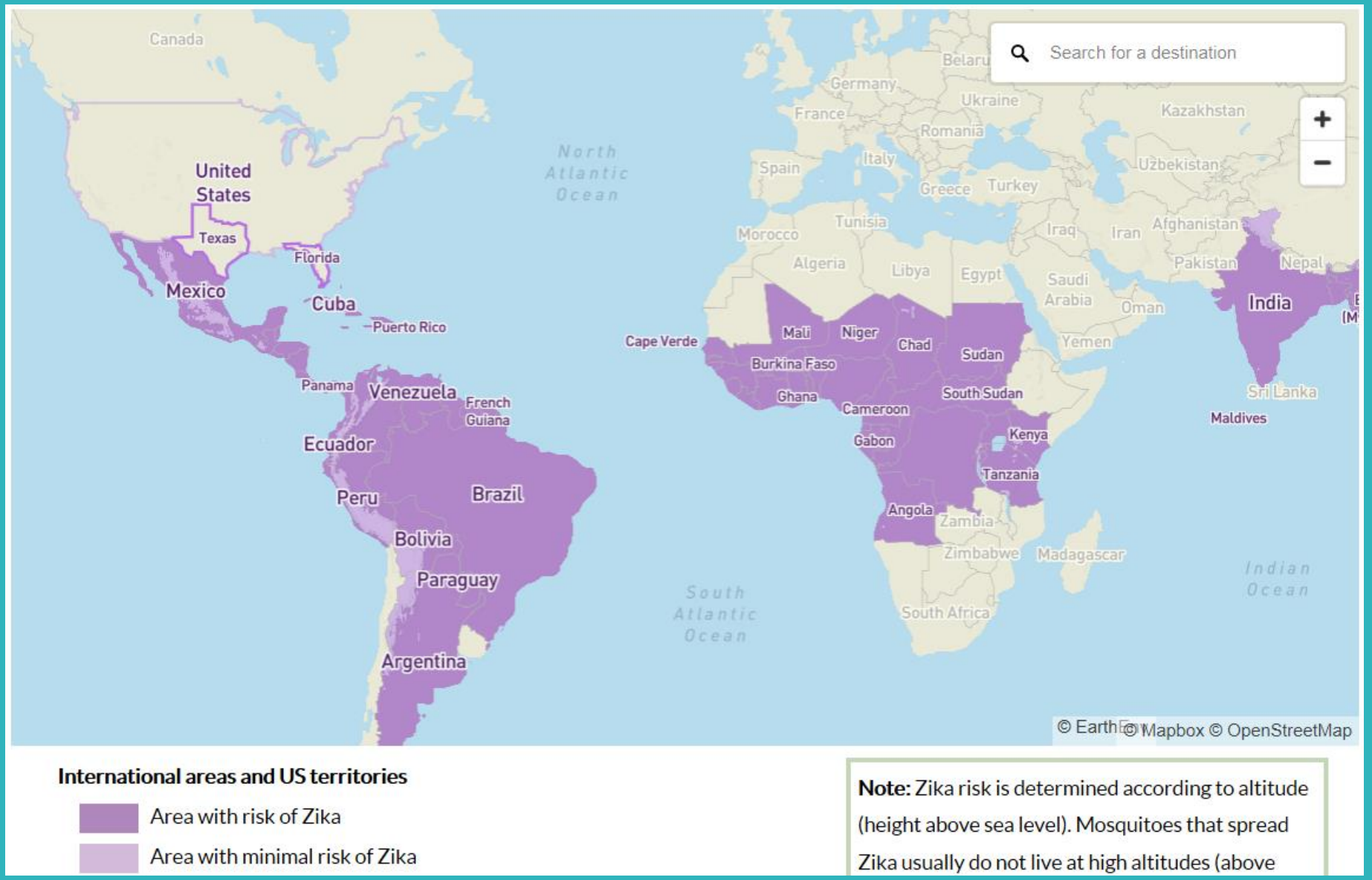
Map prepared on 4/12/16 using CDC data and software on: http://diymaps.net/

Where is Zika now?



Source: CDC. Downloaded 3/22/17 from https://wwwnc.cdc.gov/travel/page/world-map-areas-with-zika

Where is Zika now?



Source: CDC. Downloaded 5/26/187 from https://wwwnc.cdc.gov/travel/page/world-map-areas-with-zika

AREAS WITH ZIKA RISK

Africa: Angola, Benin, Burkina-Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo Congo-Brazzaville), Côte d'Ivoire, Democratic Republic of the Congo (Congo-Kinshasa), Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Sudan, Tanzania, Togo, Uganda

Asia: Bangladesh, Burma (Myanmar), Cambodia, India, Indonesia, Laos, Malaysia, Maldives, Philippines, Singapore, Thailand, Vietnam

Caribbean: Anguilla, Antigua and Barbuda, Aruba, Barbados, Bonaire, British Virgin Islands, Cuba, Curaçao, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Martinique, Montserrat, Puerto Rico, Saba, Saint Kitts and Nevis, Saint Lucia, Saint Martin, Saint Vincent and the Grenadines, Sint Eustatius, Sint Maarten, Trinidad and Tobago, Turks and Caicos Islands, US Virgin Islands

North/Central/South America: Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Venezuela

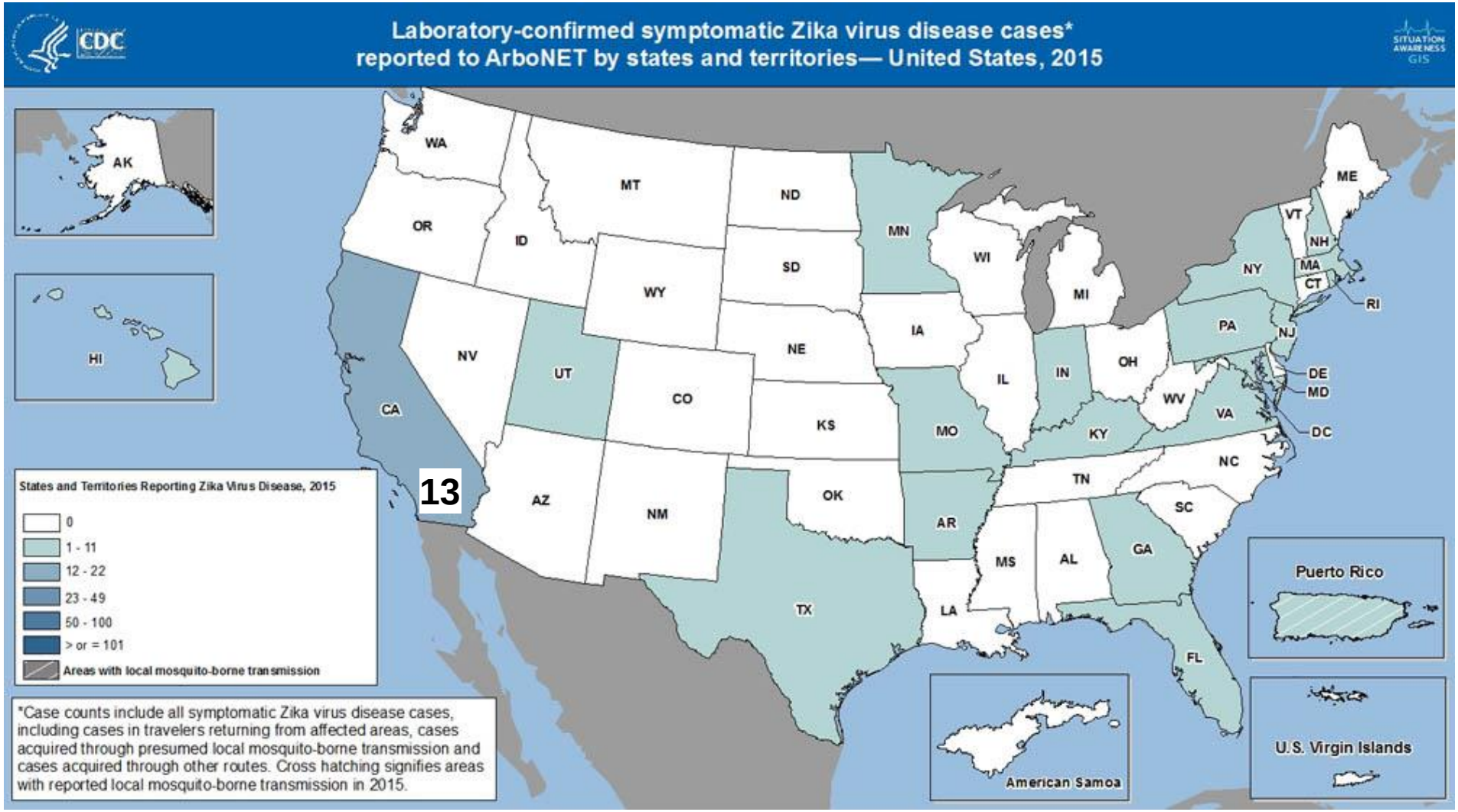
Pacific Islands: Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga

AREAS WITH INTERRUPTED TRANSMISSION

American Samoa (4/17)
Bahamas (2/18)
Cayman Islands (7/17)
Cook Islands (3/17)
Guadeloupe (6/17)
French Polynesia (3/17)
Ilsa de Pascua, Chile (3/17)
Marshall Islands (1/18)
Martinique (6/17)
Micronesia (11/17)
New Caledonia (3/17)
Palau (11/17)
Saint Barthelemy (5/17)
Vanuata (3/17)

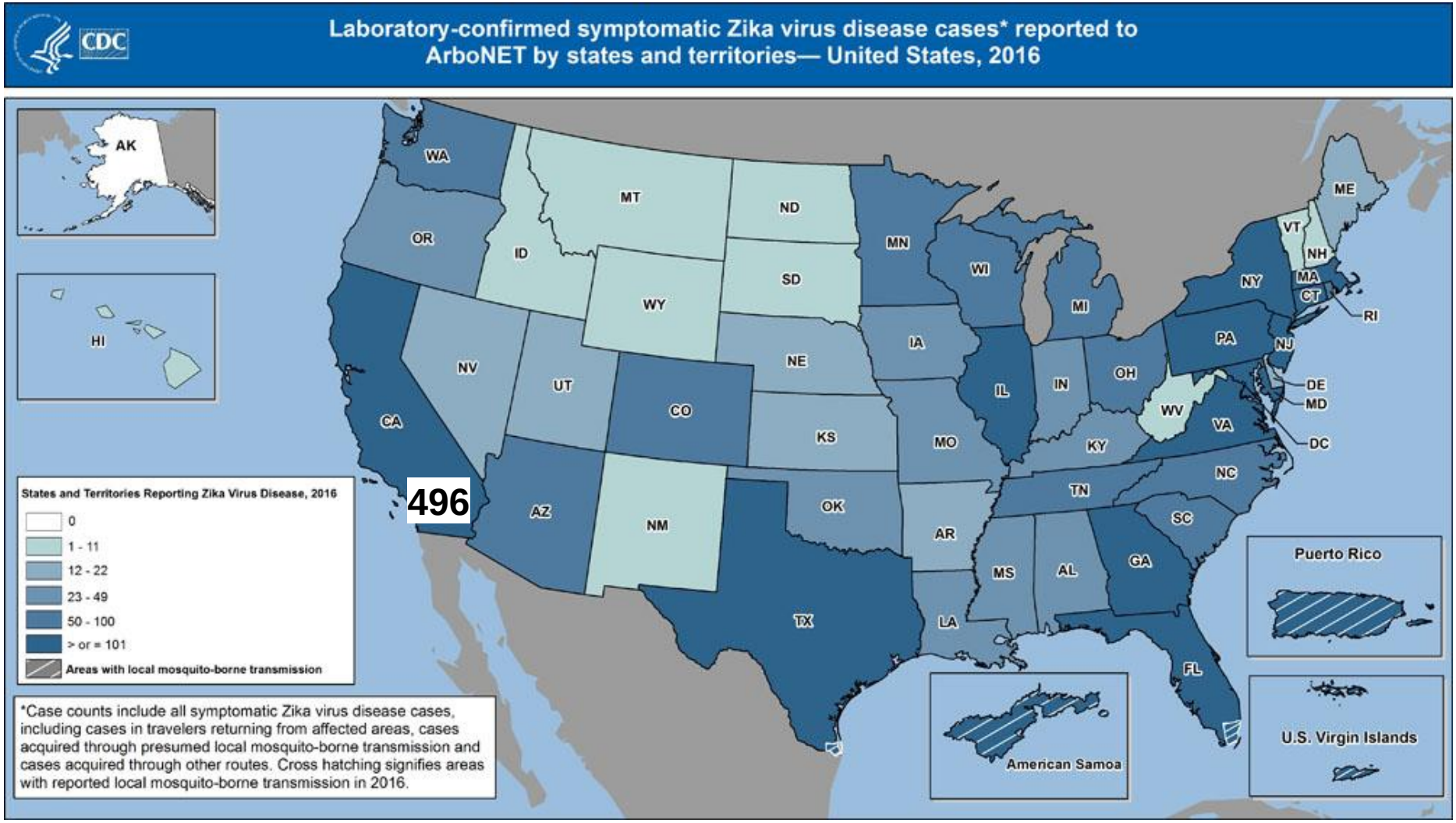
CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Travelers' Health



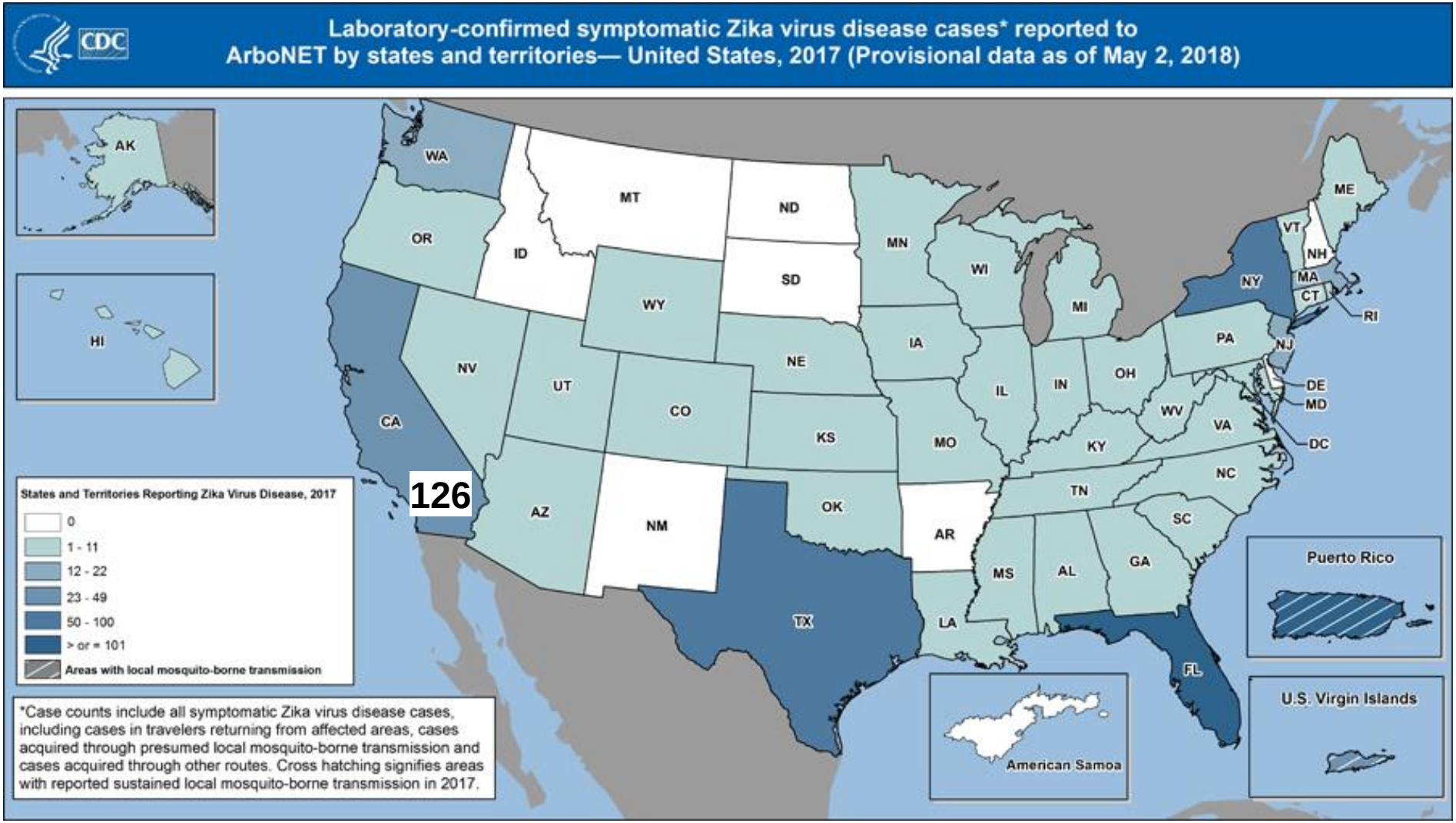
2015 Total : US States = 62 + 0 , US Territories = 10 + 0

Source: CDC. Downloaded 6/4/18 from:
https://www.cdc.gov/zika/reporting/2015-case-counts.html



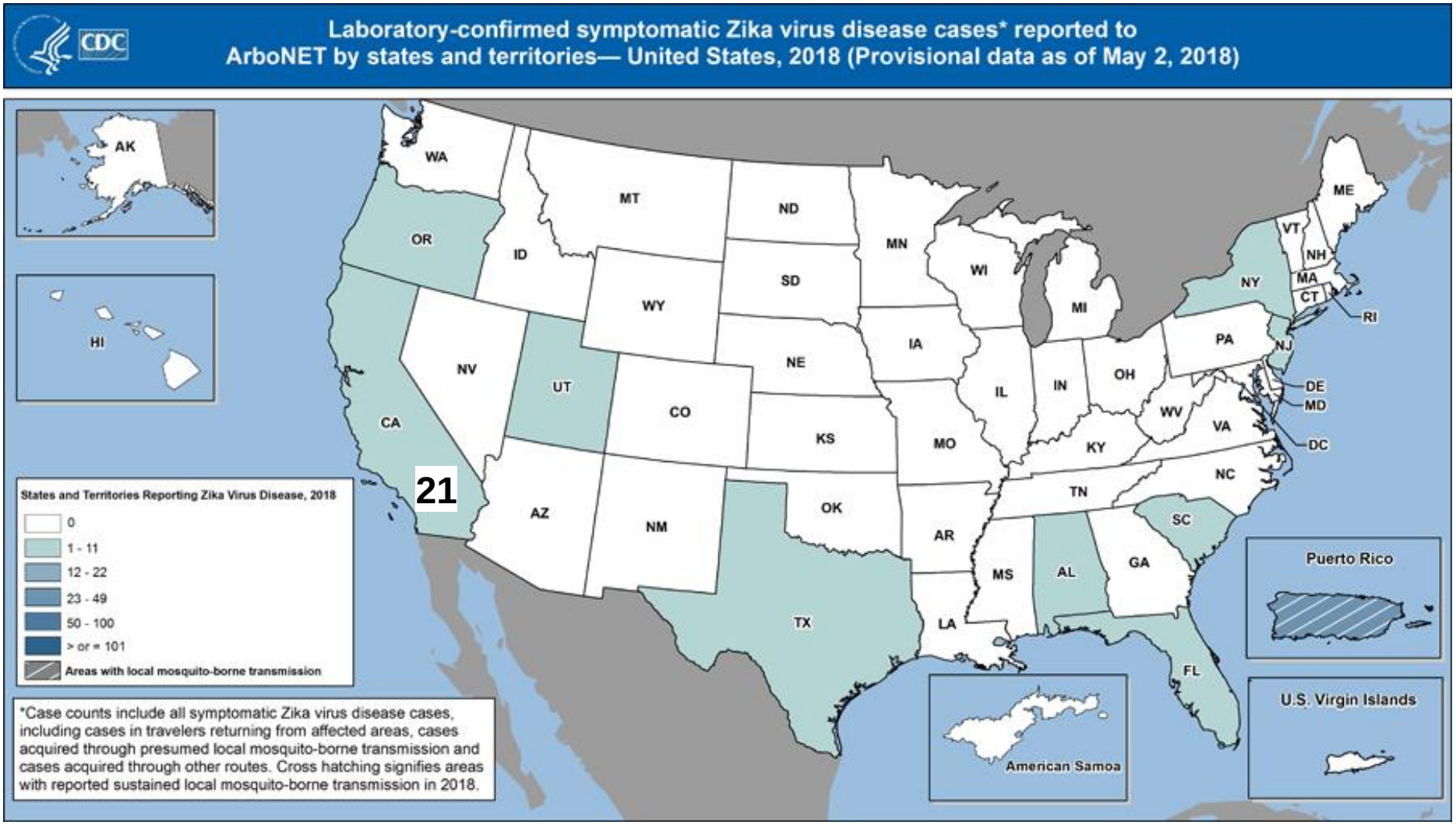
2016 Total : US States = 5,168 + 38 , US Territories = 36,512 + 325

Source: CDC. Downloaded 6/4/18 from:
https://www.cdc.gov/zika/reporting/2016-case-counts.html



2017 Total as of 5/2/18: US States = 449 + 31 , US Territories = 662 + 6

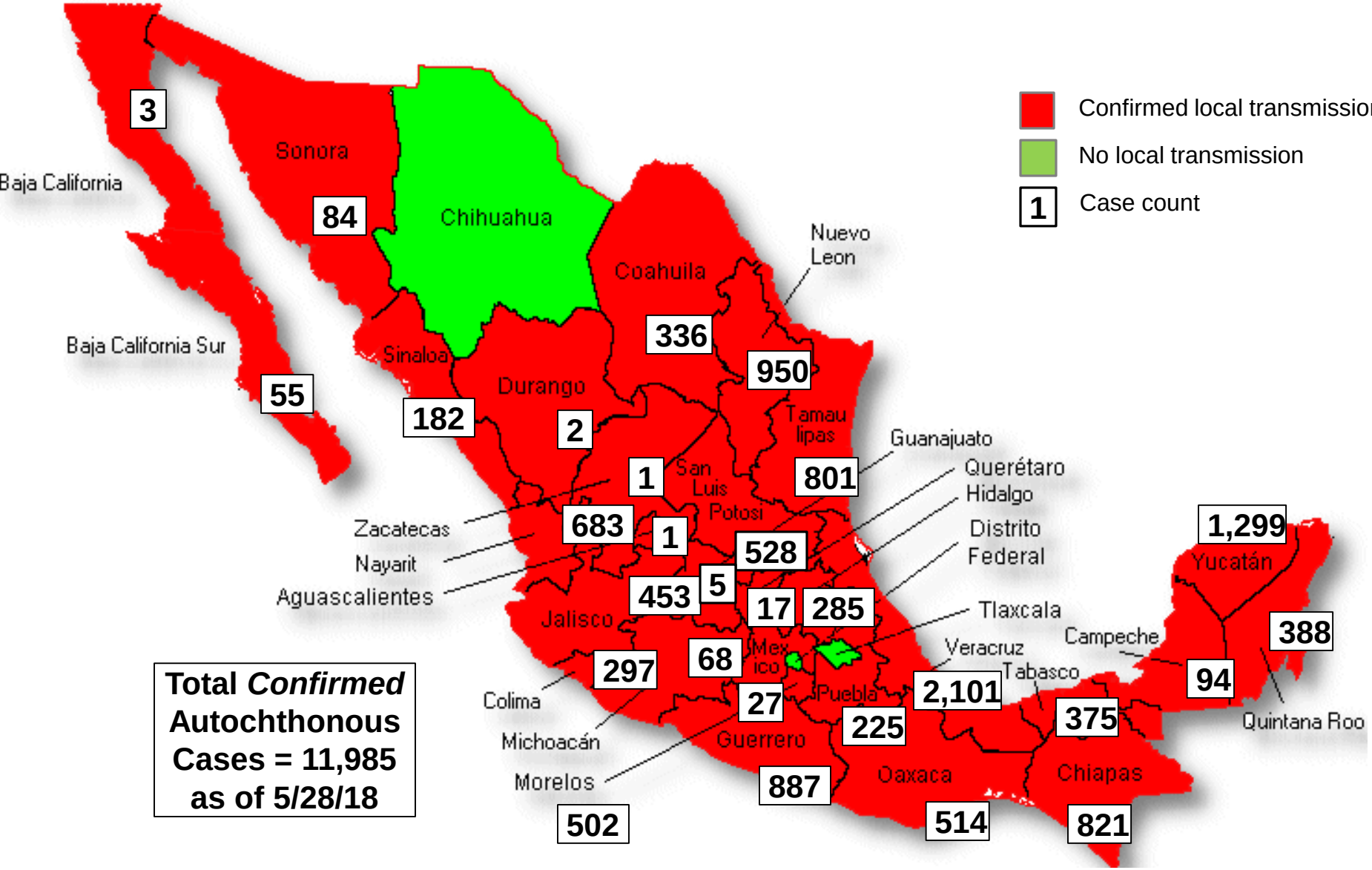
Source: CDC. Downloaded 6/4/18 from:
https://www.cdc.gov/zika/reporting/2017-case-counts.html



2018 Total as of 5/2/18: US States = 21 + 1 , US Territories = 45 + 0

Source: CDC. Downloaded 6/4/18 from:
https://www.cdc.gov/zika/reporting/2018-case-counts.html

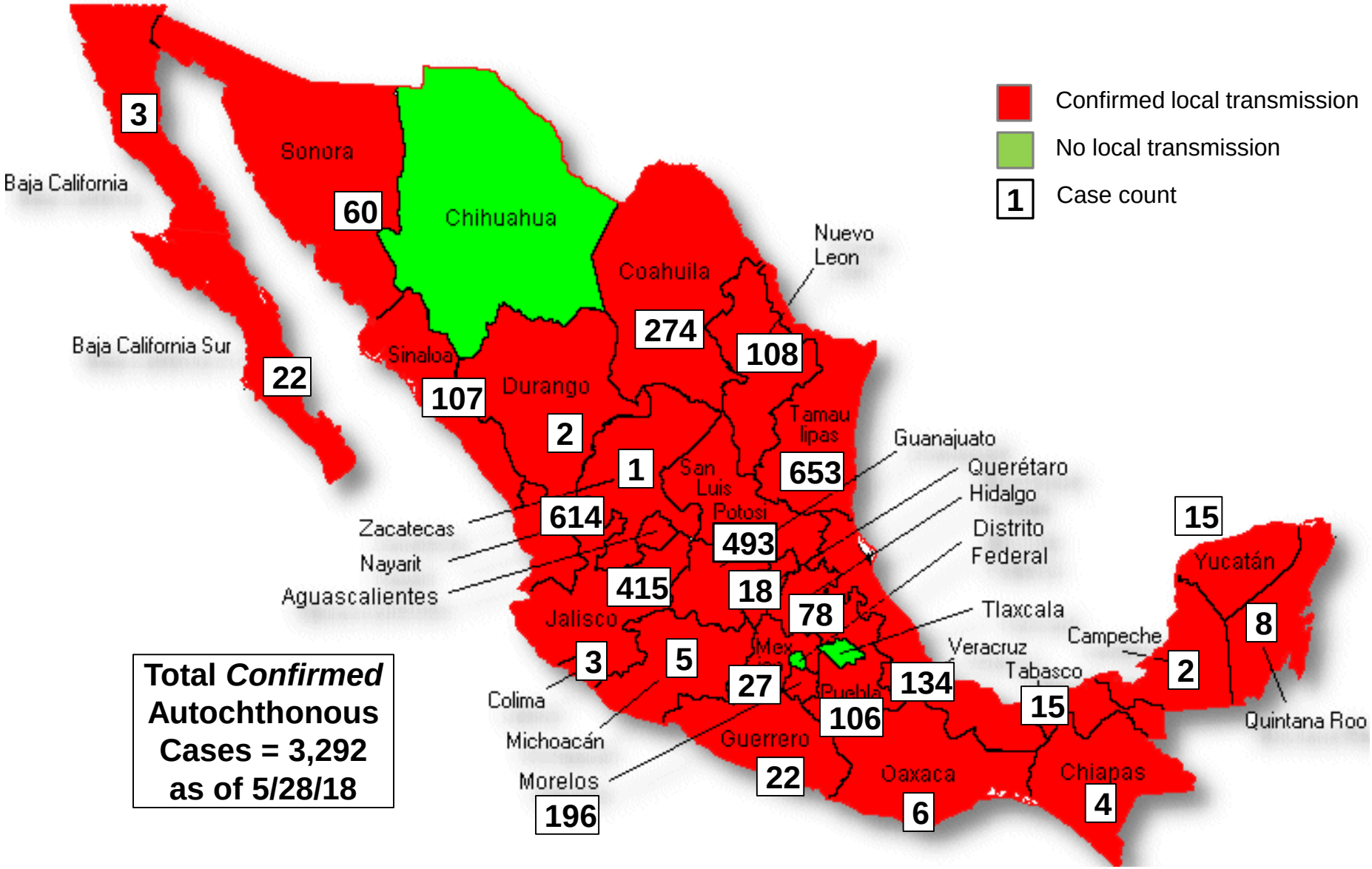
Mexican States with Confirmed Local Transmission of Zika, 2015-2018



Total *Confirmed* Autochthonous Cases = 11,985 as of 5/28/18

Map prepared on 6/4/18 using data from:
https://www.gob.mx/salud/acciones-y-programas/zika-informacion-relevante
and software on: http://diymaps.net/

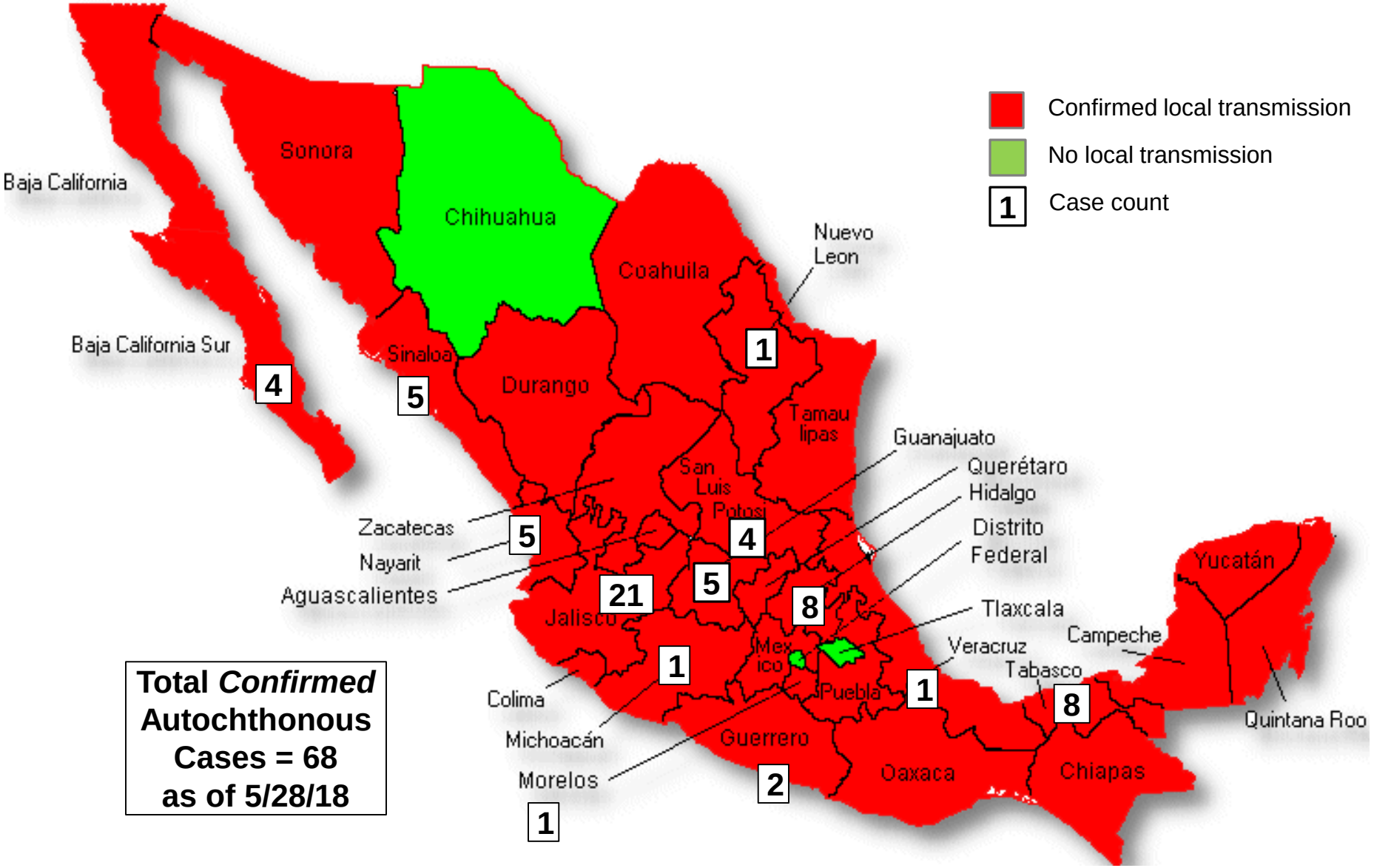
Mexican States with Confirmed Local Transmission of Zika, 2017



Total *Confirmed* Autochthonous Cases = 3,292 as of 5/28/18

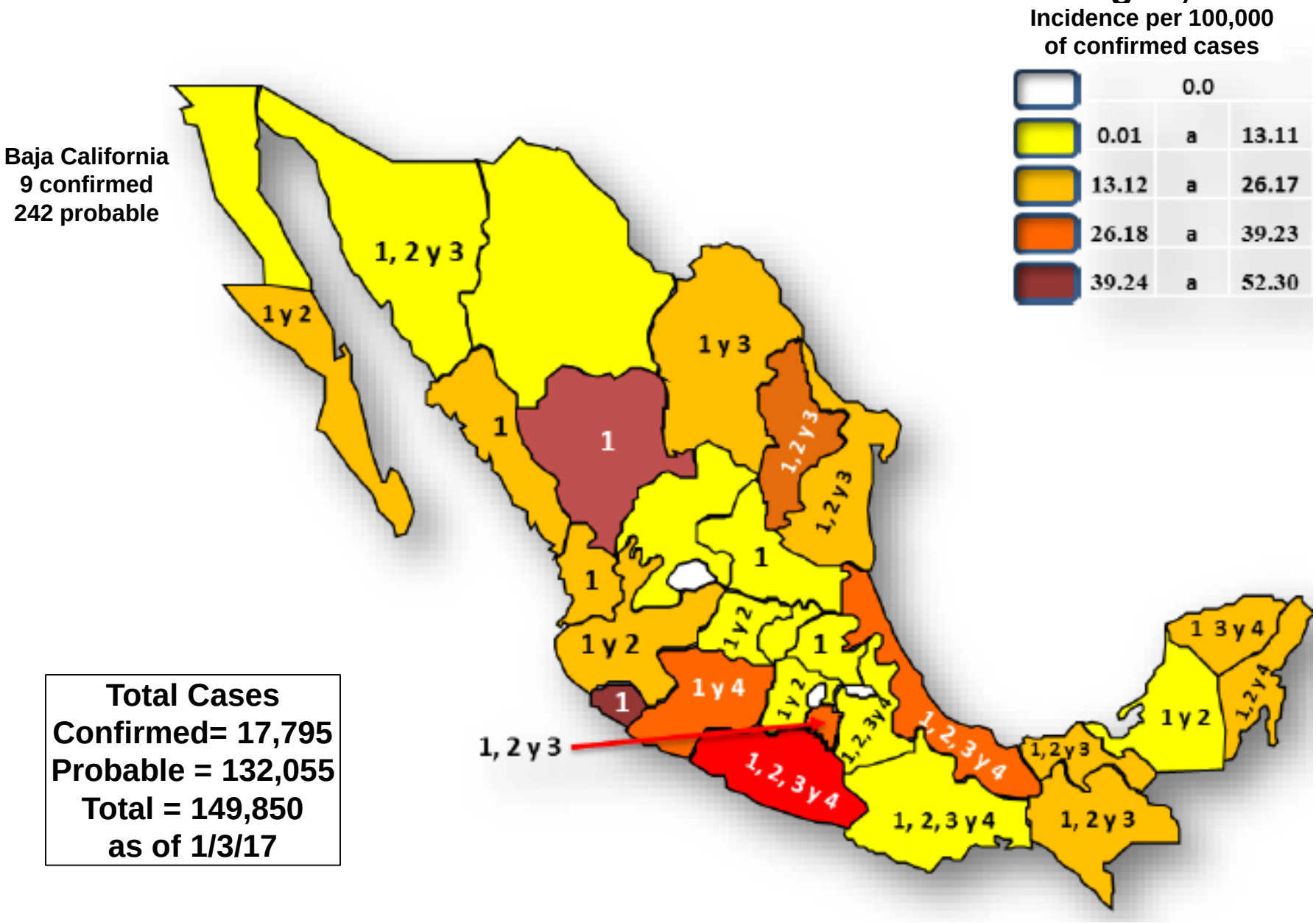
Map prepared on 6/4/18 using data from:
https://www.gob.mx/salud/acciones-y-programas/zika-informacion-relevante
and software on: http://diymaps.net/

Mexican States with Confirmed Local Transmission of Zika, 2018



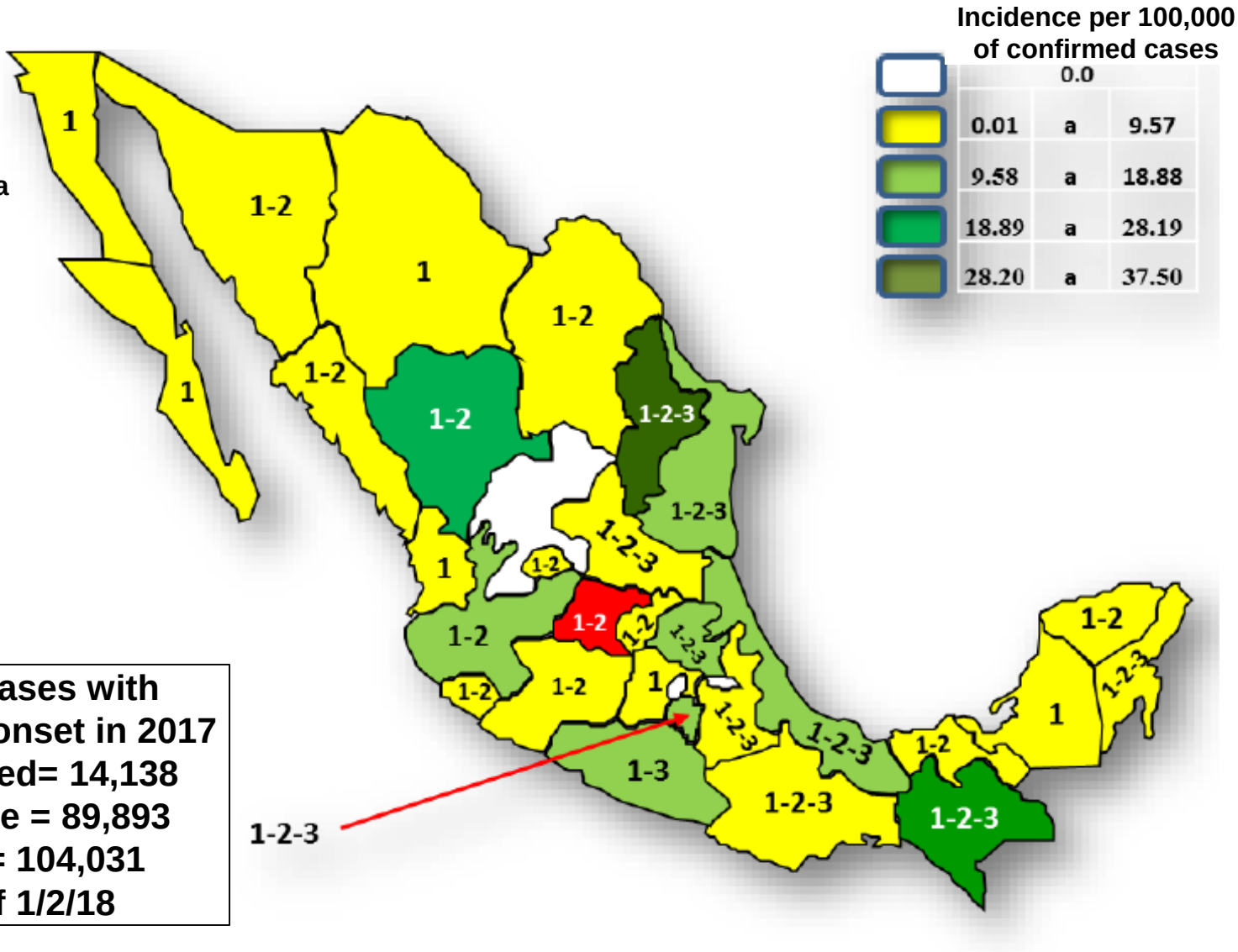
Map prepared on 6/4/18 using data from:
https://www.gob.mx/salud/acciones-y-programas/zika-informacion-relevante
and software on: http://diymaps.net/

Mexican States with Confirmed/Probable Cases of Dengue, 2016



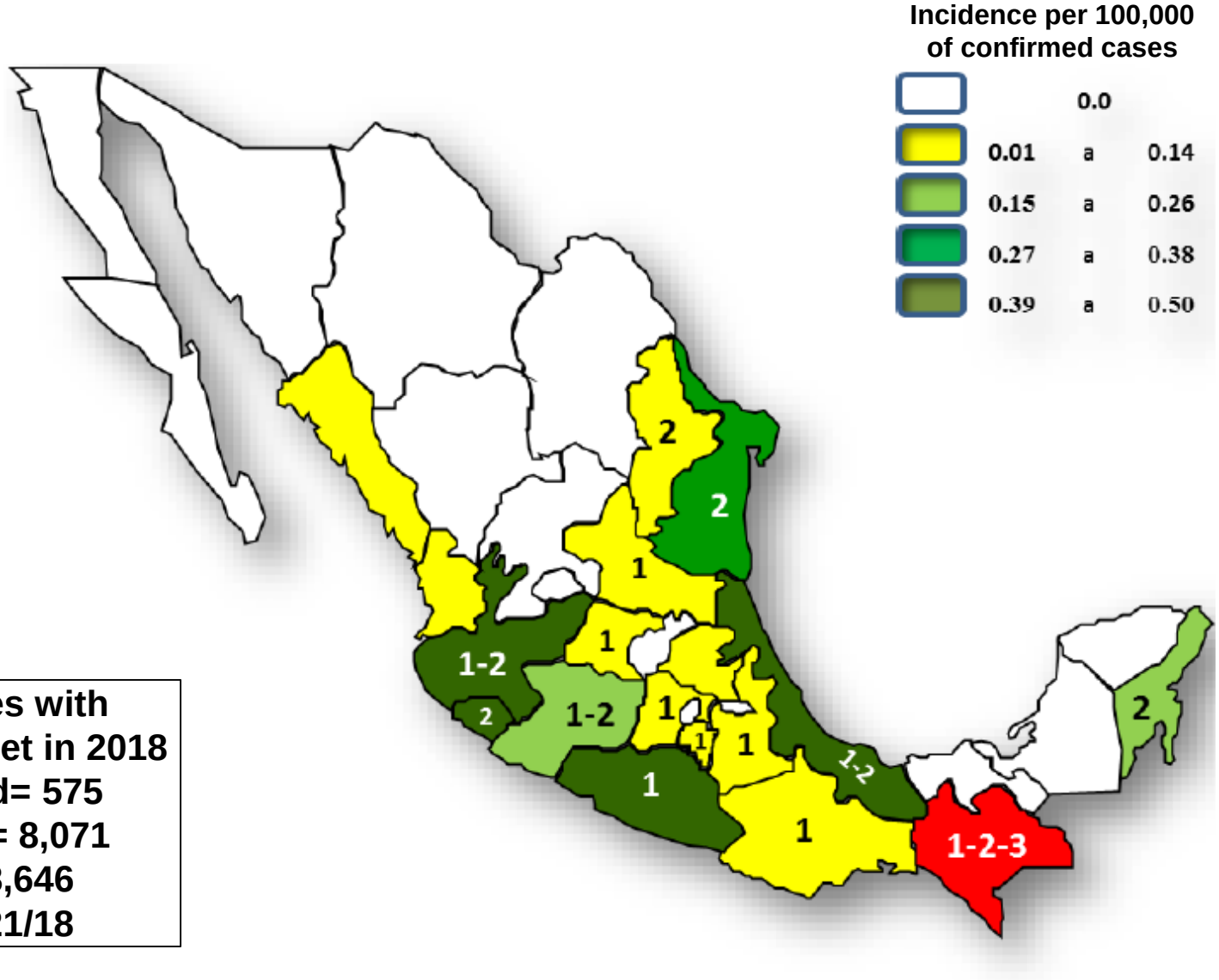
Source: Secretaría de Salud. Map downloaded on 1/9/17:
http://www.epidemiologia.salud.gob.mx/informes/2016/dengue-semanas.html

Mexican States with Confirmed/Probable Cases of Dengue, 2017



Source: Secretaría de Salud. Map downloaded on 1/29/18:
https://www.gob.mx/cms/uploads/attachment/file/285237/Pano_dengue_sem_52_2017.pdf

Mexican States with Confirmed/Probable Cases of Dengue, 2018



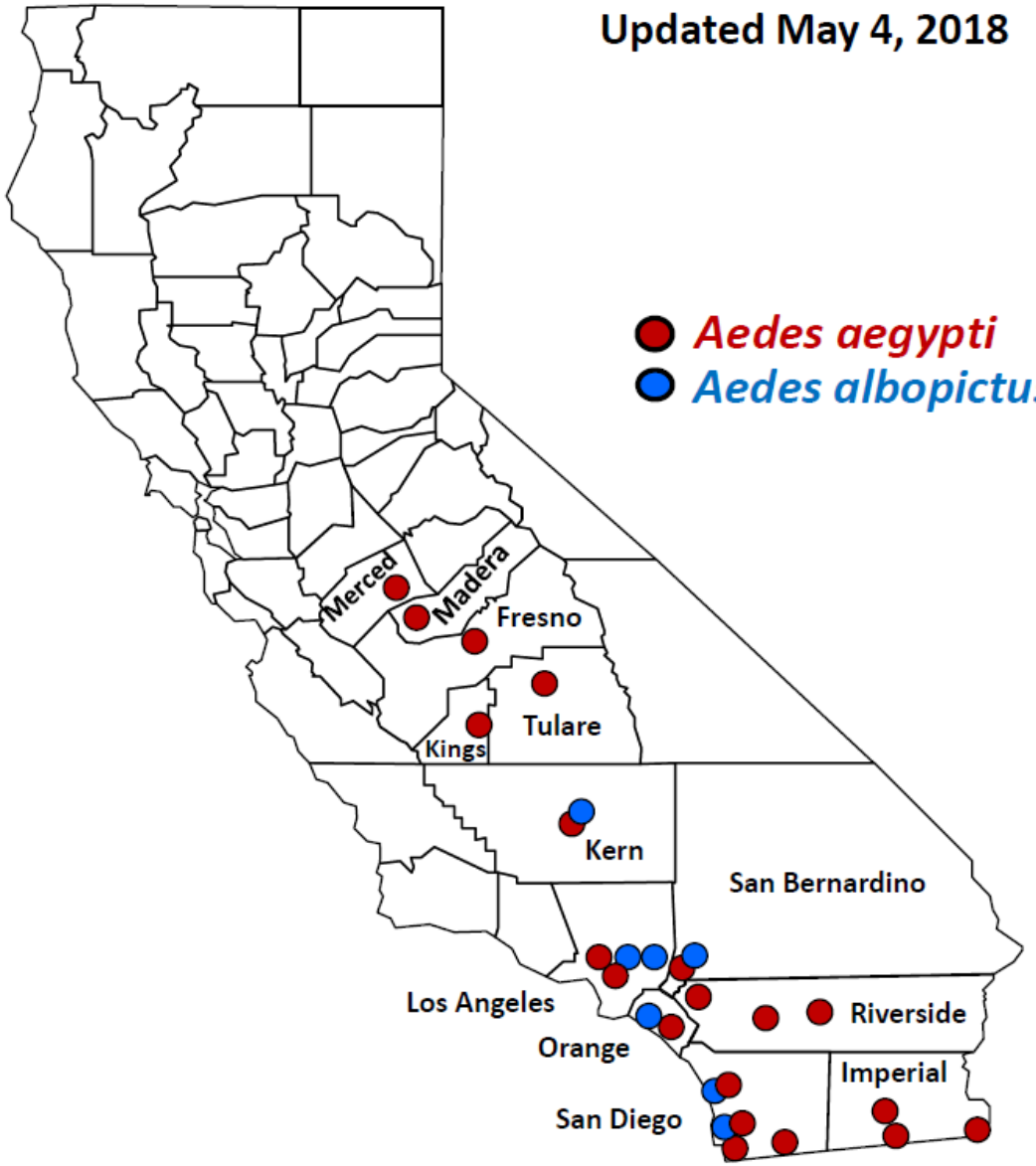
Total Cases with symptom onset in 2018
Confirmed= 575
Probable = 8,071
Total = 8,646
as of 5/21/18

El estado de Chiapas presenta la incidencia mas alta 7.92
*Por 100 mil habitantes.

Source: Secretaría de Salud. Map downloaded on 5/26/18:
https://www.gob.mx/cms/uploads/attachment/file/320667/Pano_dengue_sem_16_2018.pdf

Aedes aegypti and *Aedes albopictus* Mosquitoes in California
Detection Sites by County/City

Updated May 4, 2018



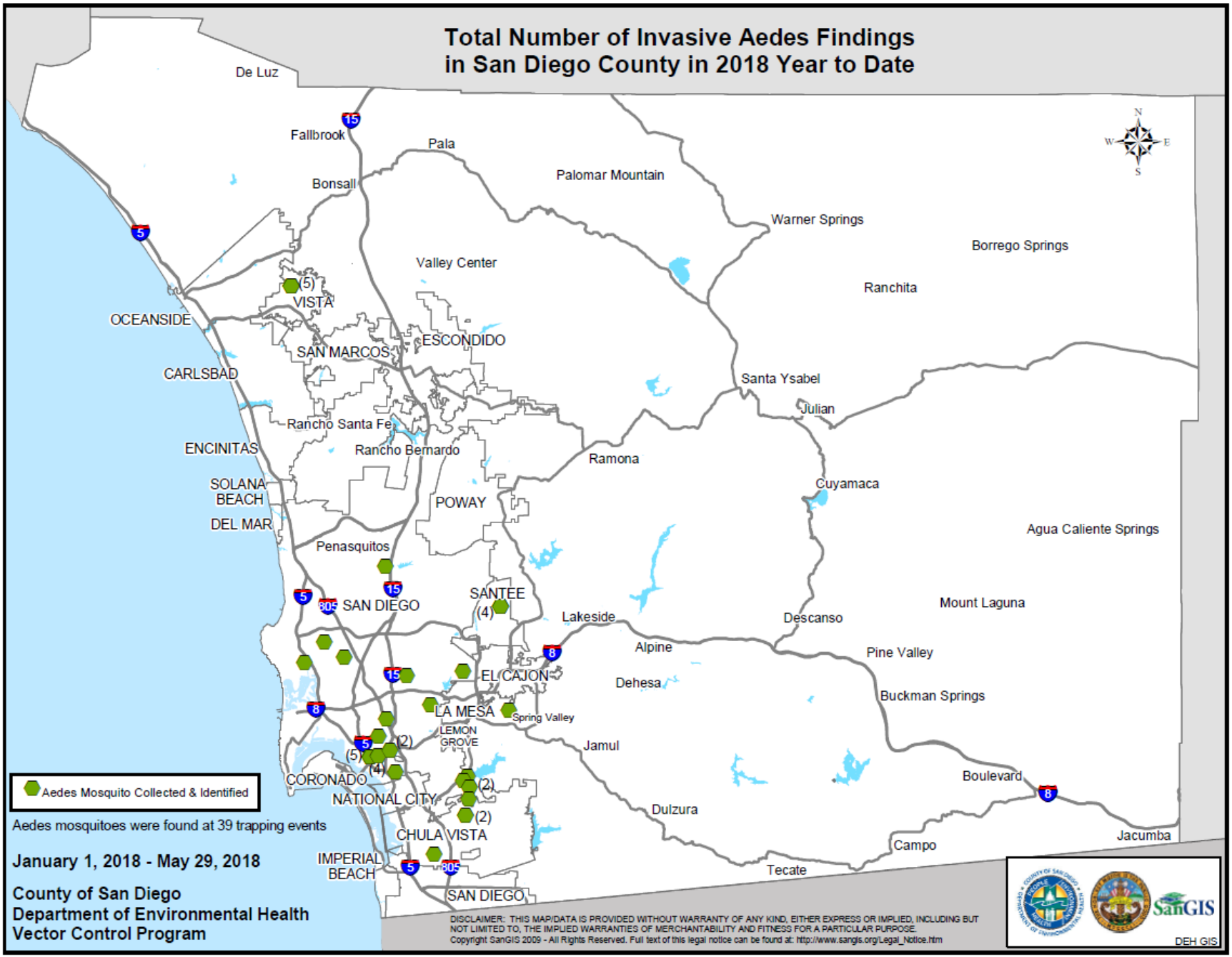
Counties with *Aedes aegypti* only:
Fresno, Imperial, Kings, Madera, Riverside, Merced, Tulare

Both *Aedes aegypti* and *Aedes albopictus*:
Kern, Los Angeles, Orange, San Bernardino, San Diego

See pages 2 and 3 for *Aedes* detections by city or census-designated place in each county.

Source: CDPH. Go to www.ZikaFreeCA.com

Total Number of Invasive Aedes Findings in San Diego County in 2018 Year to Date



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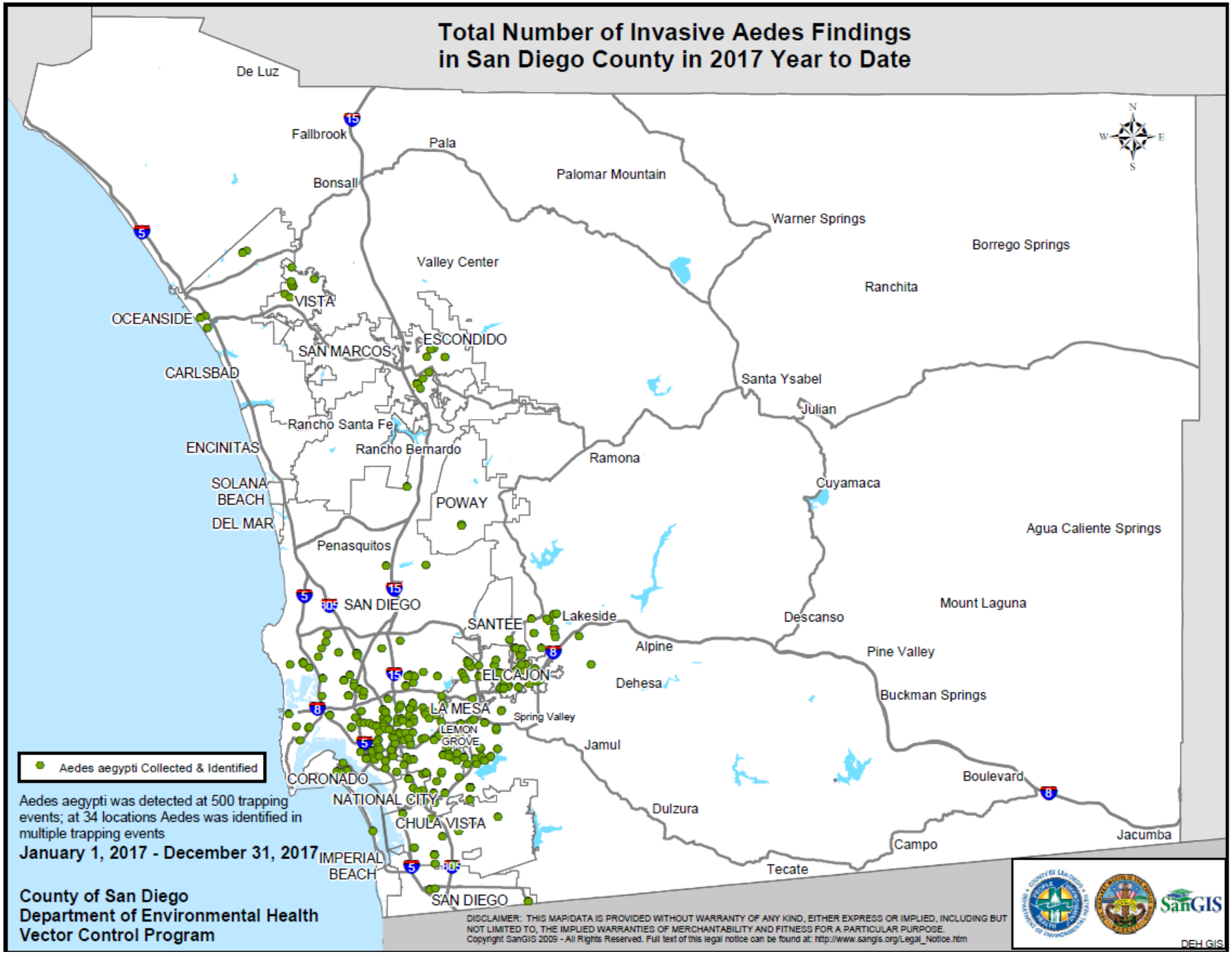
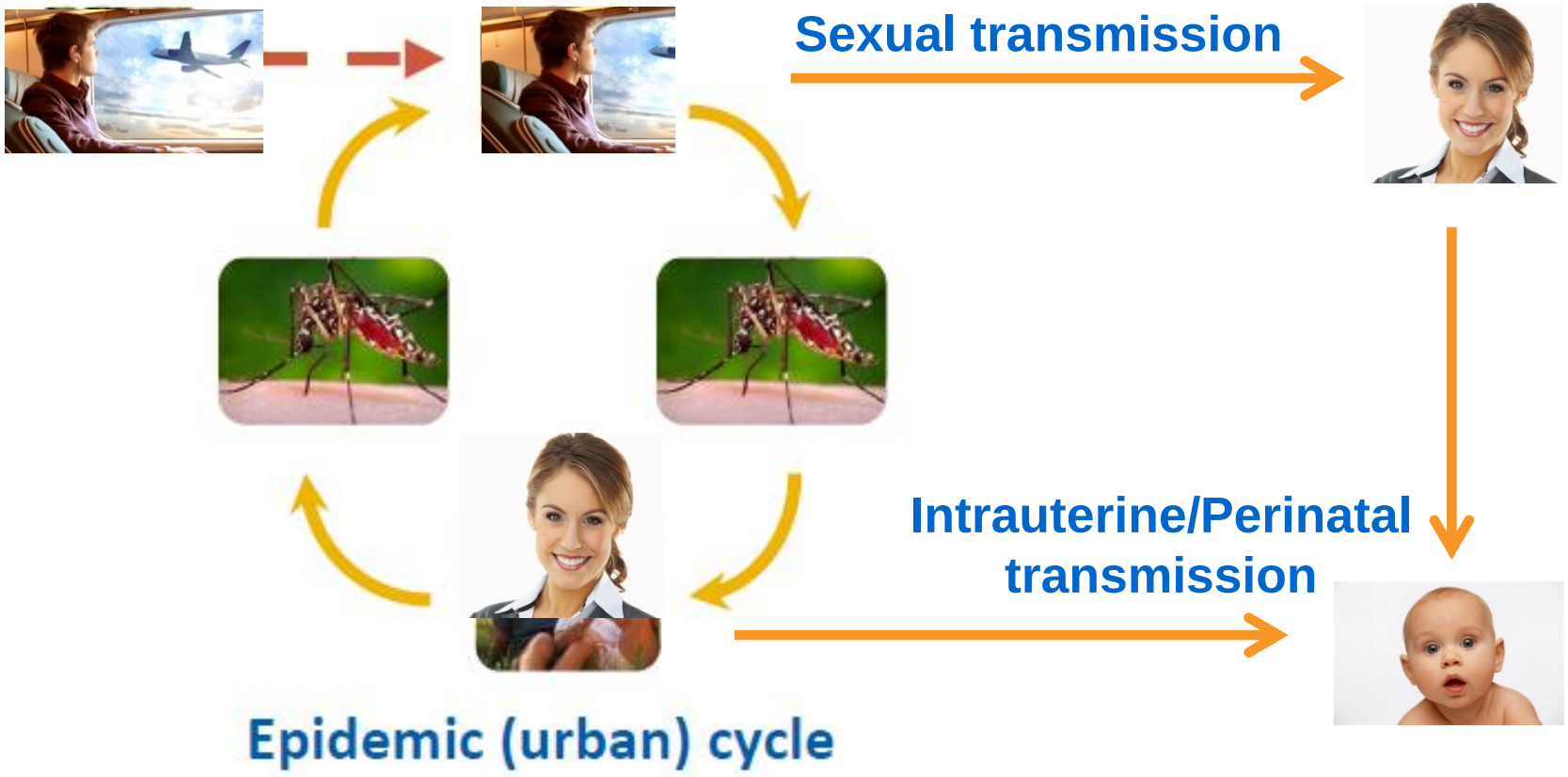
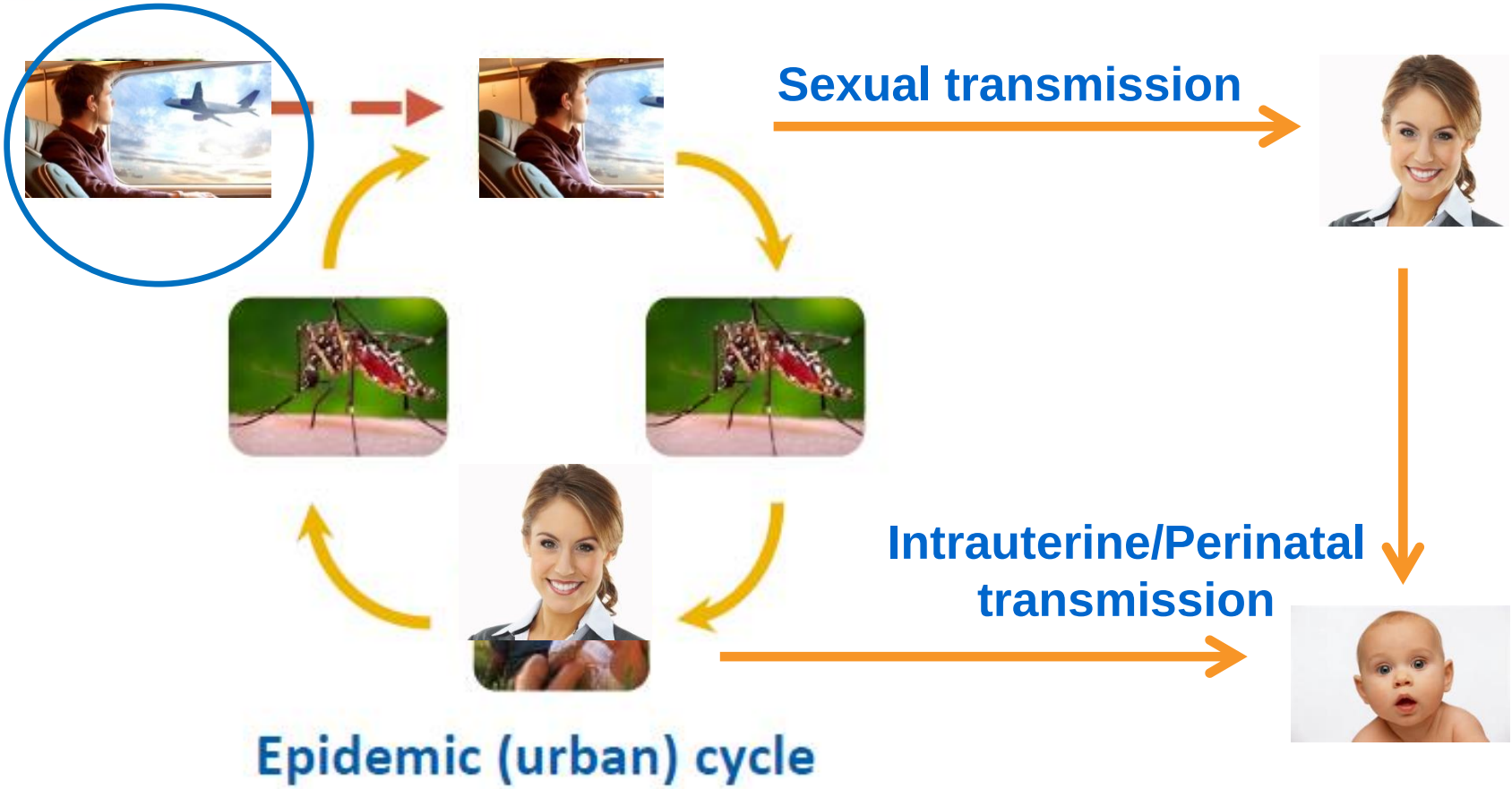


Zika Virus Transmission Cycles



Adapted from CDC diagram

Zika Virus Transmission Cycles

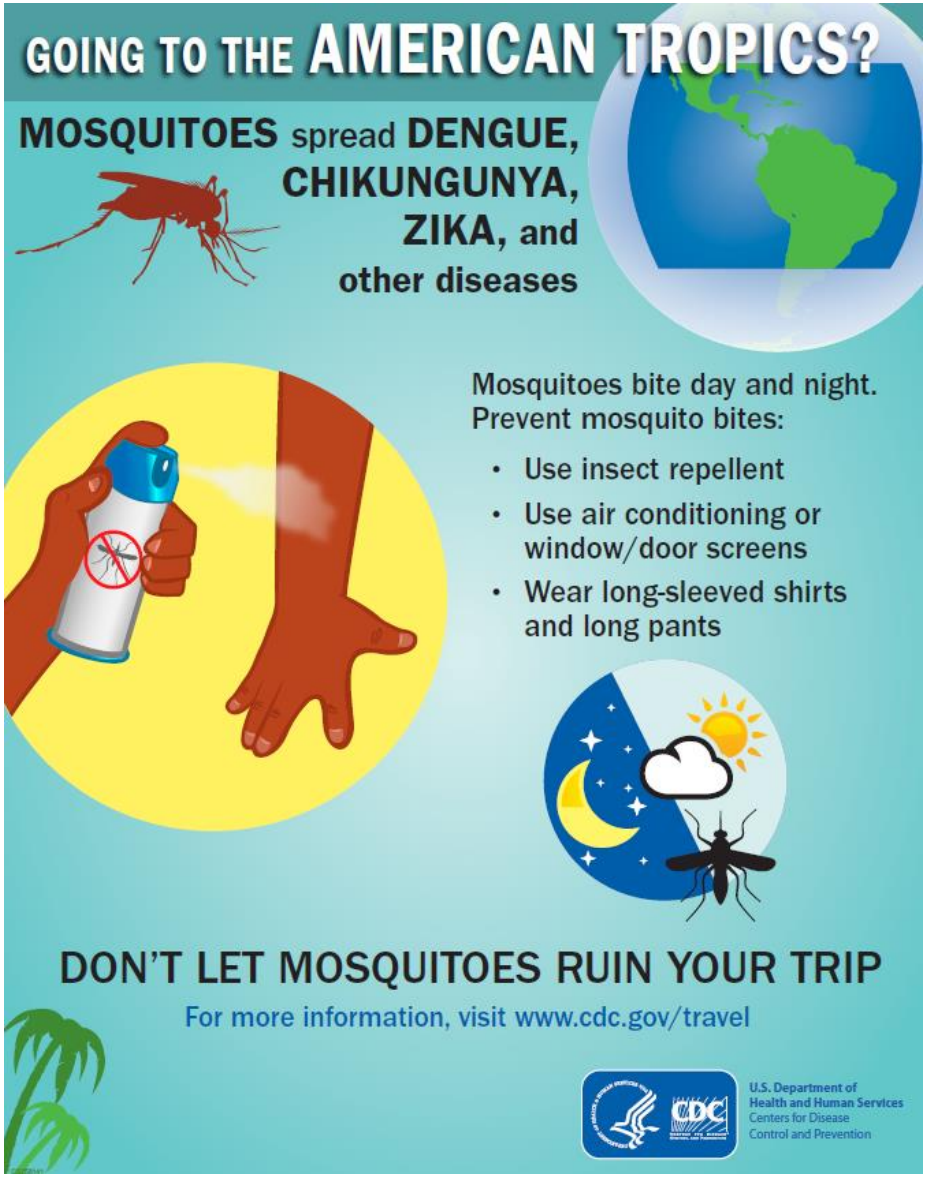


Adapted from CDC diagram

TRAVELERS

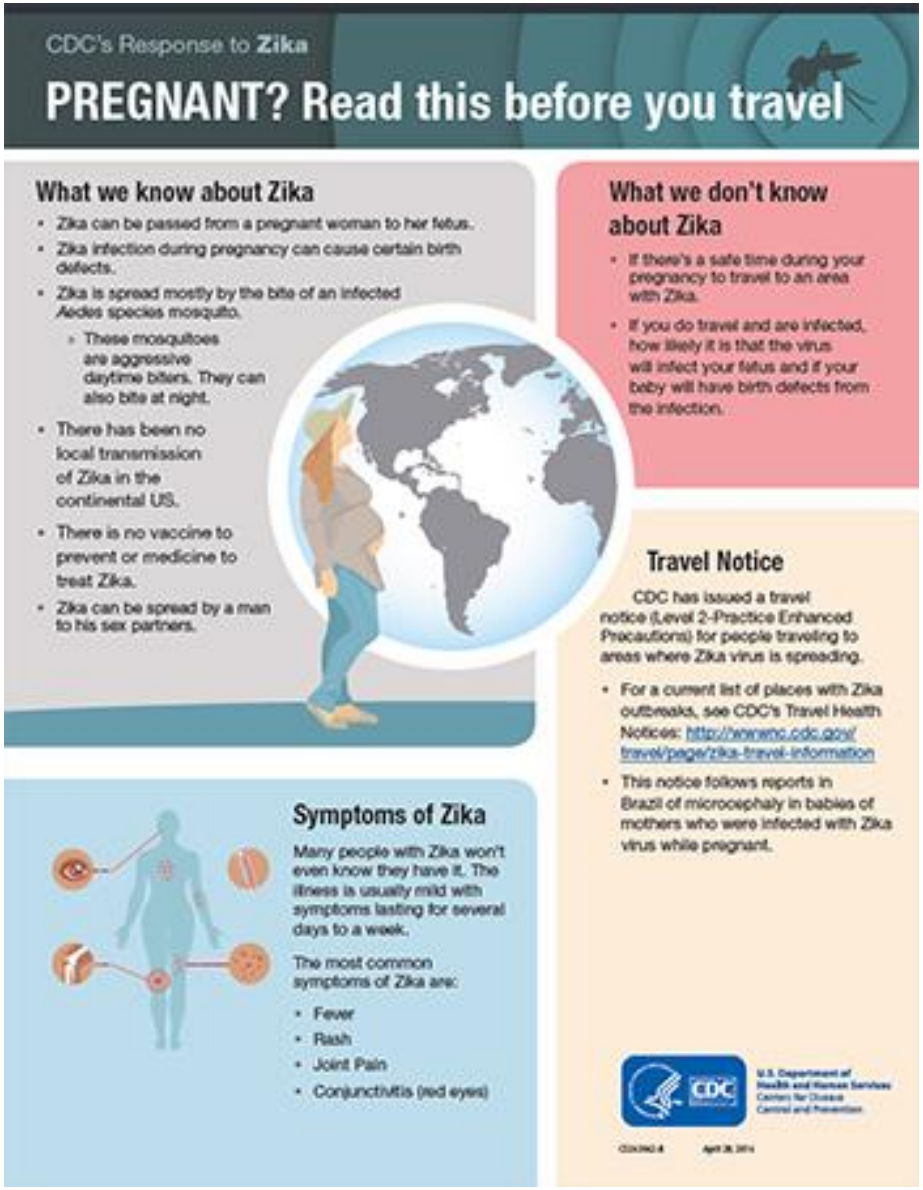
Photo: CDC

- **Do travelers know about Zika before they depart?**
- **Do they know how to protect themselves?**
- **Do they know the symptoms and when to seek care?**
- **Where are they getting information?**
  http://wwwnc.cdc.gov/Travel



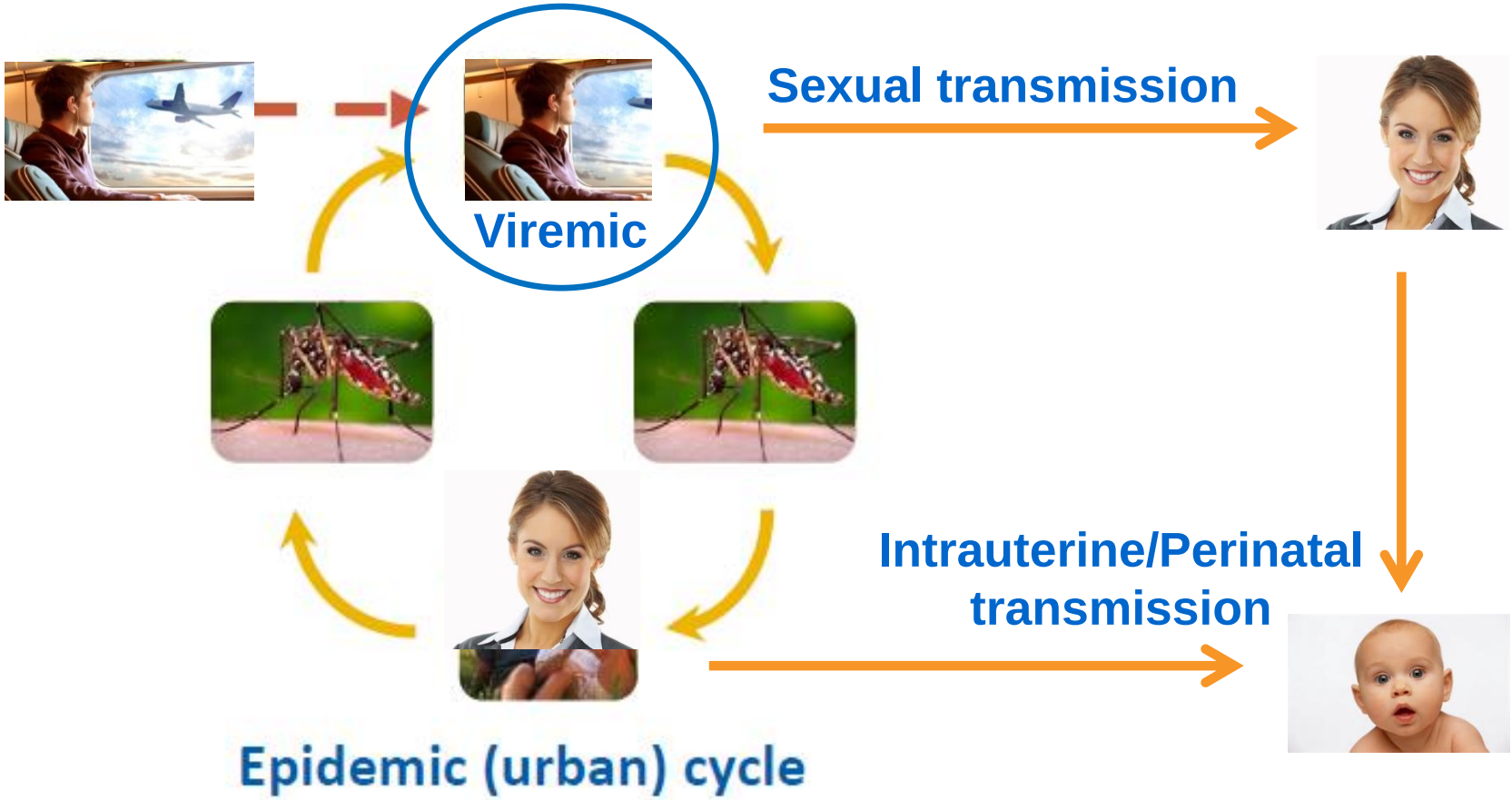
Source: CDC.

Downloaded 4/4/16 from http://www.cdc.gov/zika/fs-posters/index.html



Source: CDC.
Downloaded 7/7/16 from http://www.cdc.gov/zika/fs-posters/index.html

Zika Virus Transmission Cycles



Adapted from CDC diagram

VIREMIC TRAVELERS

Viremic

Photo: CDC

- **Will they seek care?**
- **Will providers evaluate for Zika?**
- **Will providers report suspected cases to public health?**
- **Will patients protect themselves from mosquito bites in San Diego?**
- **Will male patients protect their partners?**

Source: CDC.

Downloaded 4/4/16 from http://www.cdc.gov/zika/fs-posters/index.html

PROVIDER ACTIONS

- **Obtain travel history**
- **Consider Zika (and other vector-borne diseases) in differential**
- **Contact public health to obtain tests, report suspected case**
- **Symptomatic treatment (avoid ASA and NSAID's if dengue in the differential)**
- **Give patients precautions for mosquito, sexual transmission**

DIFFERENTIAL DX FOR ZIKA

- Dengue *
- Chikungunya*
- Leptospirosis
- Malaria
- Rickettsia

* Similar clinical features

- Parvovirus
- Group A streptococcus
- Rubella
- Measles
- Adenovirus
- Enterovirus

CLINICAL COURSE & OUTCOME

- **Clinical illness usually mild**
- **Symptoms last several days to a week.**
- **Severe disease requiring hospitalization uncommon**
- **Fatalities are rare**
- **Guillain-Barré syndrome reported in patients following suspected Zika virus infection**

CLINICAL SYMPTOMS

Symptoms	Number (N=31)	Percent
Macular or papular rash	28	90%
Subjective fever	20	65%
Arthralgia	20	65%
Conjunctivitis	17	55%
Myalgia	15	48%
Headache	14	45%
Retro-orbital pain	12	39%
Edema	6	19%
Vomiting	3	10%

Confirmed Zika Virus Disease Cases
Yap Island, 2007
Duffy M. N Engl J Med 2009

DIFFERENTIATING FEATURES

Symptom/Sign	Zika	Dengue	Chikungunya
Fever	++	+++	+++
Rash	+++	+	++
Conjunctivitis	++	-	-
Arthralgia	++	+	+++
Myalgia	+	++	+
Headache	+	++	++
Hemorrhage	-	++	-
Shock	-	+	-

Source: CDC. Downloaded 2.1.16 from
http://emergency.cdc.gov/coca/ppt/2016/01_26_16_zika.pdf

Photo credit: Foy BD, et al. Probable non-vector-borne transmission of Zika virus, Colorado, USA. **Emerg Infect Dis 2011;17(5):880–882.**

OTHER FLAVIVIRUSES

- **Dengue and chikungunya viruses transmitted by same mosquitoes with similar ecology**
- **Dengue and chikungunya can circulate in same area and rarely cause co-infections**
- **Diseases have similar clinical features**
- **Important to rule out dengue, as proper clinical management can improve outcome***

* WHO dengue clinical management guidelines:
http://whqlibdoc.who.int/publications/2009/9789241547871_eng.pdf

TESTING FOR ZIKA VIRUS

- **Reverse transcriptase-polymerase chain reaction (RT-PCR) for viral RNA in serum collected ≤7 days after illness onset (urine up to 21 days, probably a better test!)**
- **Serology for IgM and neutralizing antibodies in serum collected ≥4 days after illness onset**
- **Plaque reduction neutralization test (PRNT) for ≥4-fold rise in virus-specific neutralizing antibodies in paired sera**
- **Immunohistochemical (IHC) staining for viral antigens or RT-PCR on fixed tissues**

SEROLOGY X-REACTIONS

- **Zika virus serology (IgM) can be positive due to antibodies against related flaviviruses**
- **Neutralizing antibody testing may discriminate between cross-reacting antibodies in primary flavivirus infections**
- **Difficult to distinguish infecting virus in people previously infected with or vaccinated against a related flavivirus**
- **Healthcare providers can work with health departments to ensure test results are interpreted correctly**

LABS FOR TESTING

- **Diagnostic tests only now becoming commercially available (PCR only)**
- **Testing performed at CDC and CDPH**
- **San Diego healthcare providers should contact the County Epidemiology Program to facilitate diagnostic testing through the San Diego County Public Health Laboratory**

ASSESSMENT & TREATMENT

- No specific antiviral therapy
- Treatment is supportive (i.e., rest, fluids, analgesics, antipyretics)
- Suspected Zika virus infections should be evaluated and managed for possible dengue or chikungunya virus infections
- Aspirin and other NSAIDs should be avoided until dengue can be ruled out to reduce risk of hemorrhage

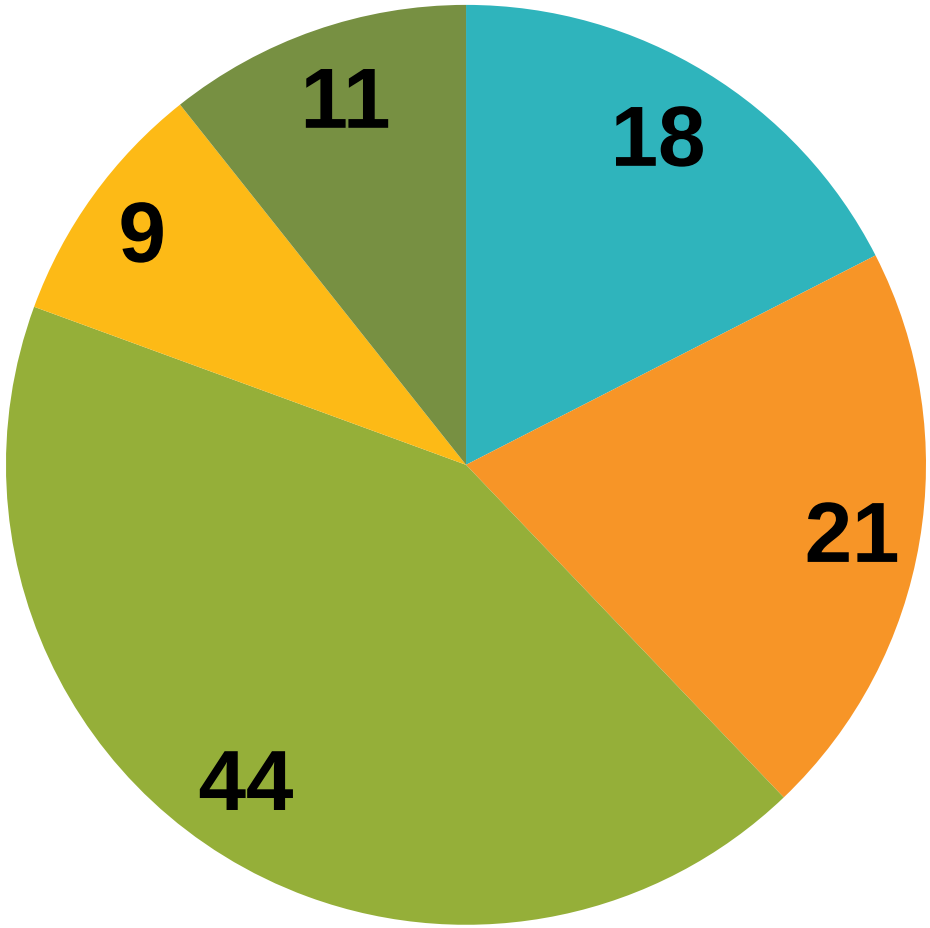
PUBLIC HEALTH ACTIONS WITH A SUSPECTED CASE

- **Obtain records from provider & interview patient**
- **Provide local prevention advice**
  - **Avoid mosquito bites, protect against sexual transmission**
- **Facilitate testing by CDC and CDPH**
  - **SDPHL can perform Zika PCR, but serology usually needed**
- **Inform vector control**
  - **No invasive *Aedes* have been found near the residences of any potentially viremic patient in San Diego County**

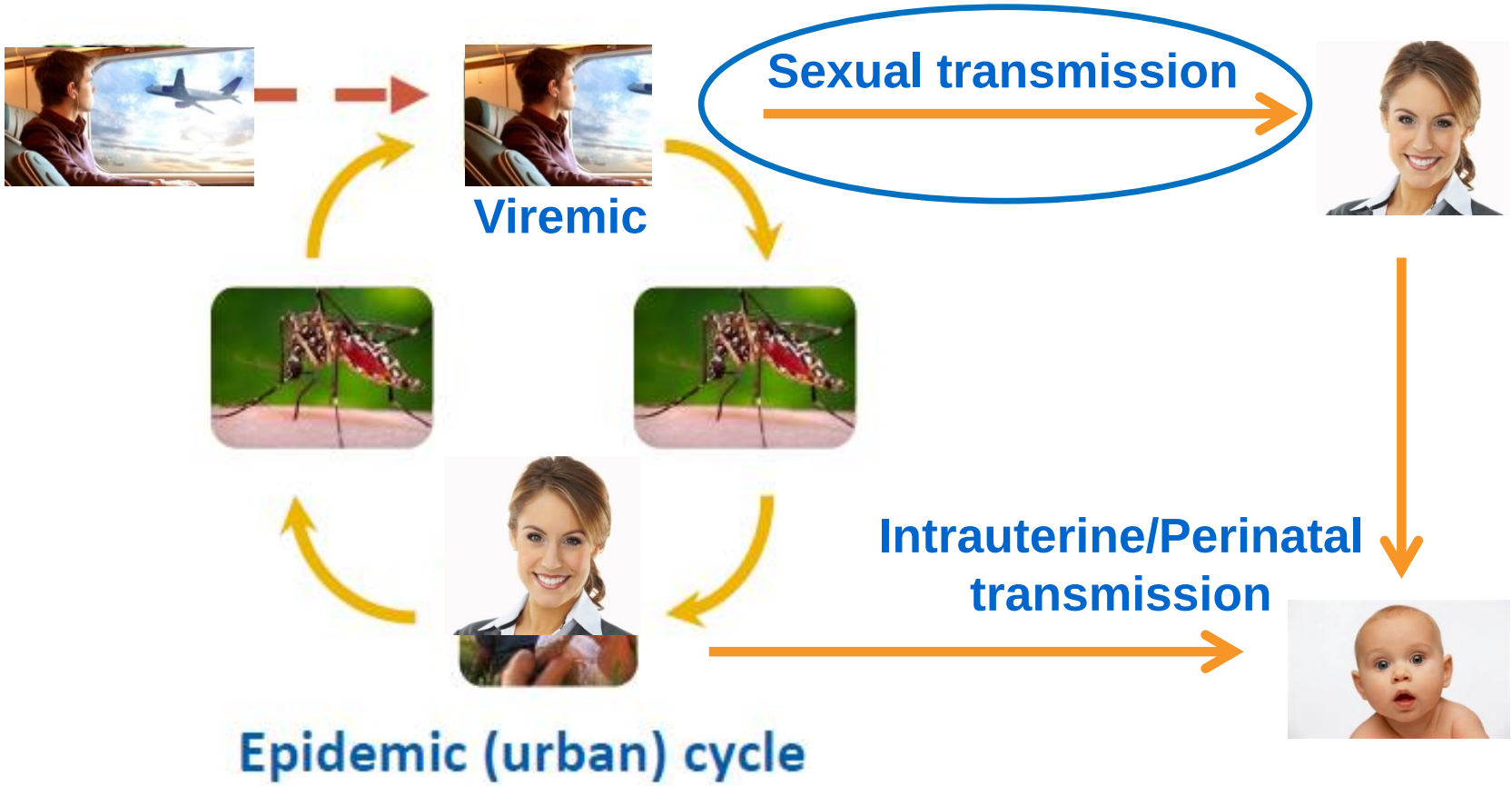
ZIKA REFERRALS IN SAN DIEGO 2015-18

- Total Zika referrals: **4,191**
- Confirmed/Probable Zika cases: **108**
  - **103** travel, **2** sexual, **3** congenital
- Confirmed cases in pregnant women: **15**
- Cases ruled out for Zika: **3,982**
- Cases pending lab results or submission**: 69**
- Cases pending lab results in pregnant women: **37**
- Cases referred to Vector Control: **449**

AREAS OF TRAVEL



Zika Virus Transmission Cycles



Adapted from CDC diagram

SEXUAL TRANSMISSION

- **Zika virus infection has been confirmed in women (and men) whose only known risk factor was sexual contact with an ill male partner who had recently traveled to an area with local Zika virus transmission**
- **52 US cases, two cases in San Diego**
- **Case report of a symptomatic woman passing Zika to male partner, and Zika has been detected in female genital tract**
- **Zika can persist in the semen for months**

Has your partner been to an area with risk of Zika?

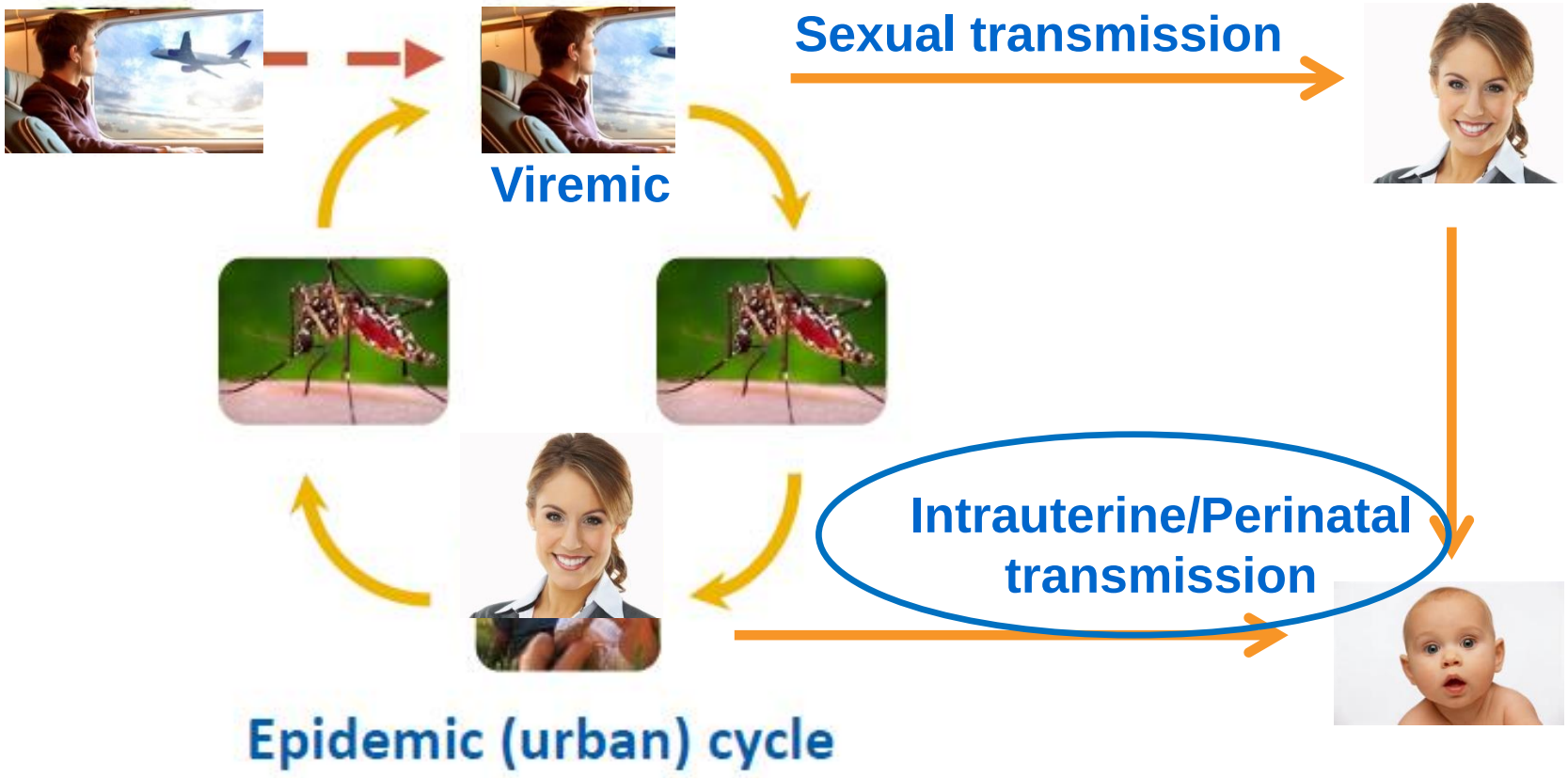
If yes, use condoms every time you have sex.

Women:
Use condoms for at least 8 weeks.

Men:
Use condoms for at least 6 months.

Source: CDC. Interim Guidance for Preconception Counseling and Prevention of Sexual Transmission of Zika Virus for Persons with Possible Zika Virus Exposure — United States, September 2016

Zika Virus Transmission Cycles



Adapted from CDC diagram

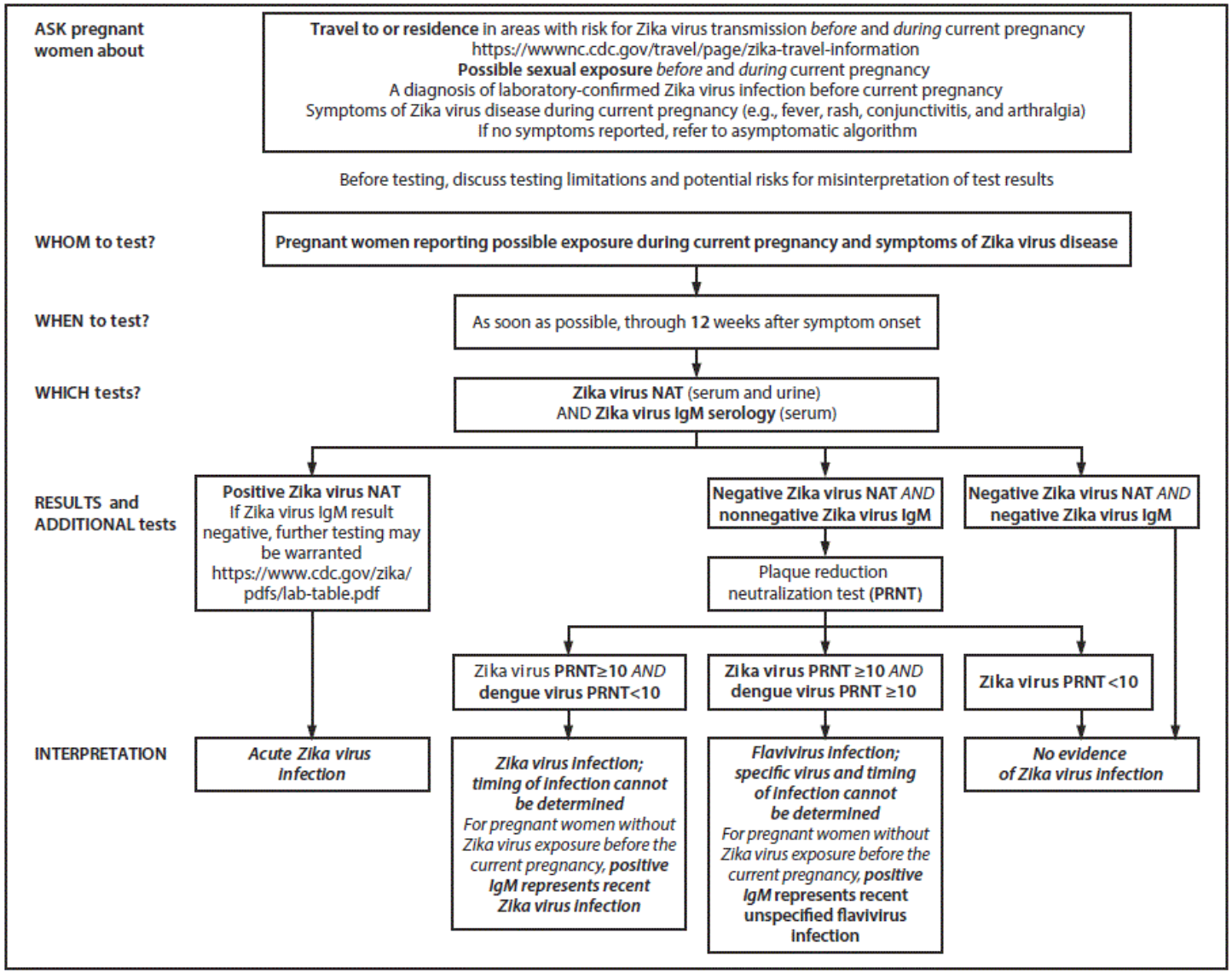
Range of Microcephaly Severity

Baby with Typical Head Size

Baby with Microcephaly

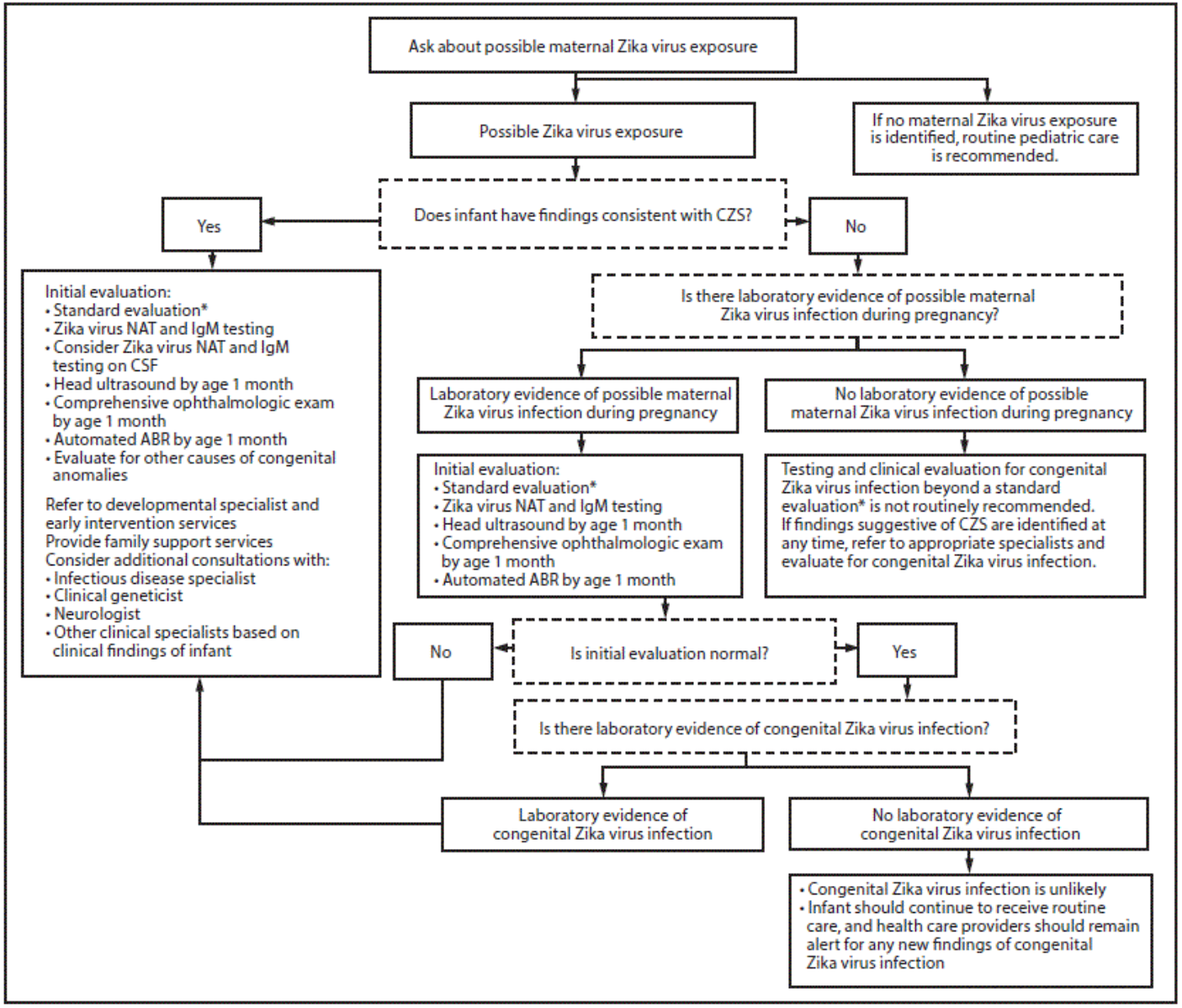
Baby with Severe Microcephaly

RECOMMENDATIONS FOR PREGNANT WOMEN



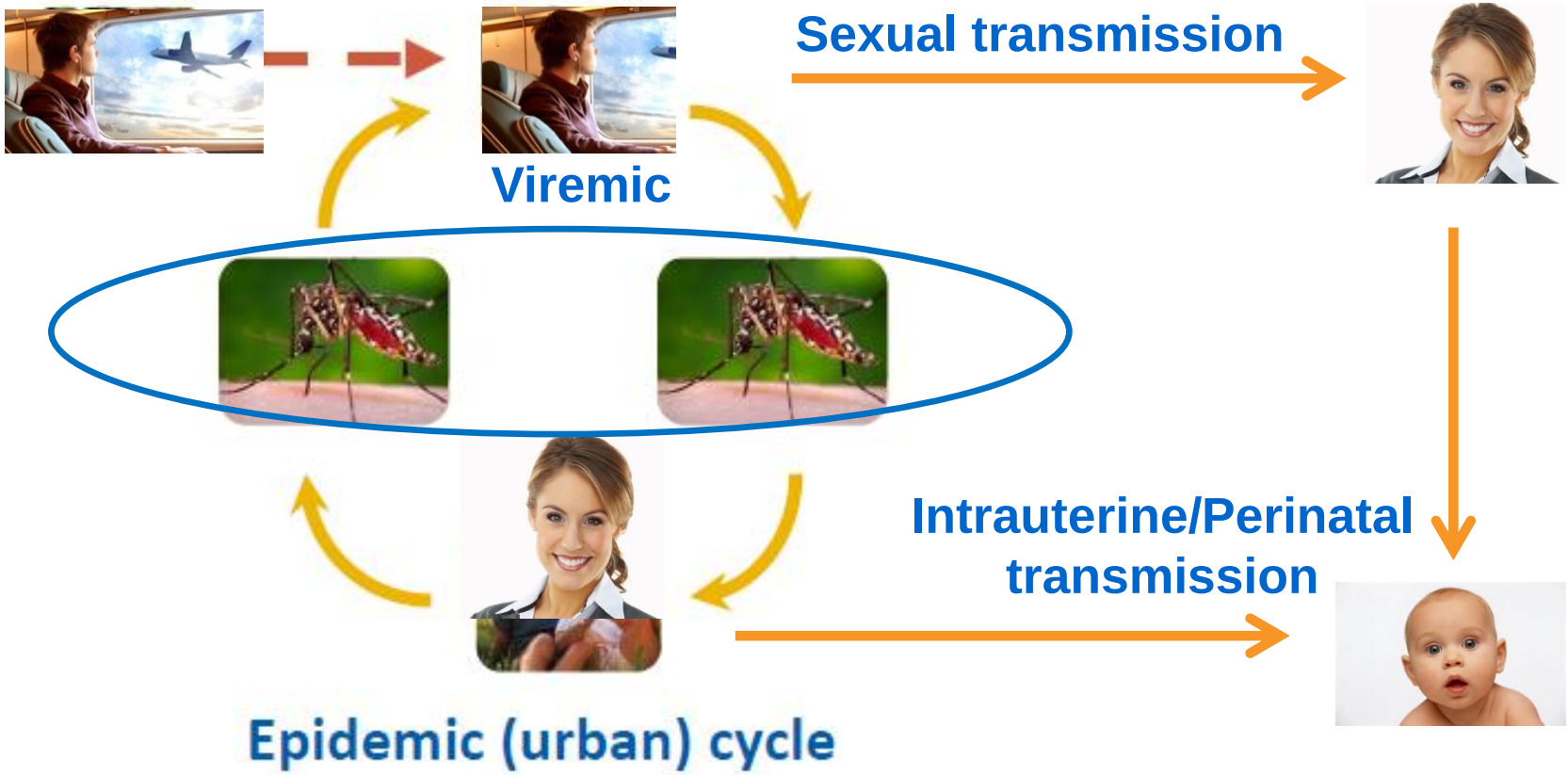
Source: CDC. Update: Interim Guidance for Health Care Providers Caring for Pregnant Women with Possible Zika Virus Exposure — United States (Including U.S. Territories), July 2017

Guidance for Possible Congenital Zika Virus Infection



Source CDC. Update: Interim Guidance for the Diagnosis, Evaluation, and Management of Infants with Possible Congenital Zika Virus Infection — United States, October 2017

Zika Virus Transmission Cycles



Adapted from CDC diagram

County of San Diego

Vector Control

Prevent – no standing water, dump once a week

Protect – use repellants with DEET, IR3535, oil of lemon eucalytus, picaridin (permethrin in clothes)

Report - dead birds, mosquito breeding sites, green pools, and day biting mosquitoes

www.sdvector.com

Para prevenir el zancudo Aedes invasivo, elimine el agua estancada por fuera y dentro de su casa

¡Alerta! Para Prevenir, Proteger y Reportar Los Zancudos *Aedes* Invasivos

1 Prevenir

Adentro

- Cambie el agua semanalmente en ollas, jarrones, y platillos de mascotas
- Use mosquiteros en las ventanas y puertas
- No deje agua estancada por más de 1 semana

Afuera (Semanal)

- Vacíe el agua que se acumula en las llantas, juguetes, contenedores y cubos de almacenamiento cuando no se estén utilizando
- Cambie el agua de los pilas de pájaros
- Circule el agua en fuentes y piscinas
- Elimine el agua de los platillos de plantas, huecos de los árboles, cajas de control de rociadores, charcos y canaletas de lluvia
- Elimine el agua que se ha acumulado en lonas, vehículos, y barcos que no esten almacenados

Mensual

- Asegurase de que no haya aberturas en los baldes utilizados para la recolección de agua

2 Proteger

- Instale o repare mosquiteros en las ventanas, puertas, aberturas en los barriles de lluvia y en baldes utilizados para la recoleccion de agua
- Use camisas de manga larga, pantalones, calcetines y zapatos cuando este afuera en el amanecer y al atardecer

- Aplique repelente como por ejemplo DEET, Picaridin, aceite de eucalipto de limón o IR 3535 en la piel y/o en la ropa (como indicado en la etiqueta del producto)

3 Reportar

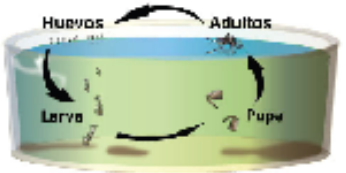
- Llame o envié por correo electrónico al Programa de Control De Vectores para reportar picaduras de zancudos durante el día (especialmente las picaduras recibidas en el interior de su casa), áreas de producción de zancudos y los zancudos que son de color negro con rayas blancas

Para Mas Información
(858) 694-2888 • vector@sdcounty.ca.gov
www.sdvector.com

Hechos sobre el *Aedes* Invasivo

- Encontrado en interiores y exteriores
- Negro con rayas blancas
- Prefieren picar a la gente pero también pican a los animales
- Los zancudos ponen huevos en pequeños recipientes que contienen agua como platos de plantas, jarrones, pilas de pájaros, fuentes ornamentales, juguetes, llantas abandonadas e incluso en huecos de los árboles
- Los huevos pueden sobrevivir sin agua por meses

Ciclo de Vida del Zancudo



Courtesy Greater L.A. County Vector Control

- Los huevos eclosionan en 1-2 días después de tocar el agua
- Las larvas se alimentan de algas, pequeños organismos acuáticos, plantas y material de origen animal en el agua
- Los huevos pueden crecer a ser adultos en tan sólo una semana
- Los zancudos adultos viven hasta 3 semanas
- Huevos y adultos se encuentran en y alrededor de las casas

REPORTE ZANCUDOS *AEDES* INVASIVOS • (858) 694-2888

PREVENTION

- **No vaccine or medication to prevent infection or disease**
- **Primary prevention measure is to reduce mosquito exposure**
- **Pregnant women should consider postponing travel to areas with ongoing Zika virus outbreaks**
- **Protect yourself from mosquito bites for three weeks after return from Zika affected after**

COUNTYNEWSCENTER
DIRECT TO YOU FROM THE COUNTY OF SAN DIEGO

June 1, 2018

ENVIRONMENT

Invasive 'Aussie Mozzie' Found in San Diego County

Have you mosquito-proofed your backyard by dumping out standing water? You should. The "Aussie Mozzie" has arrived in San Diego County.

By Gig Conaughton, County of San Diego Communications Office
Jun. 1, 2018 | 1:14 PM

https://www.countynewscenter.com/invasive-aussie-mozzie-found-in-san-diego-county/

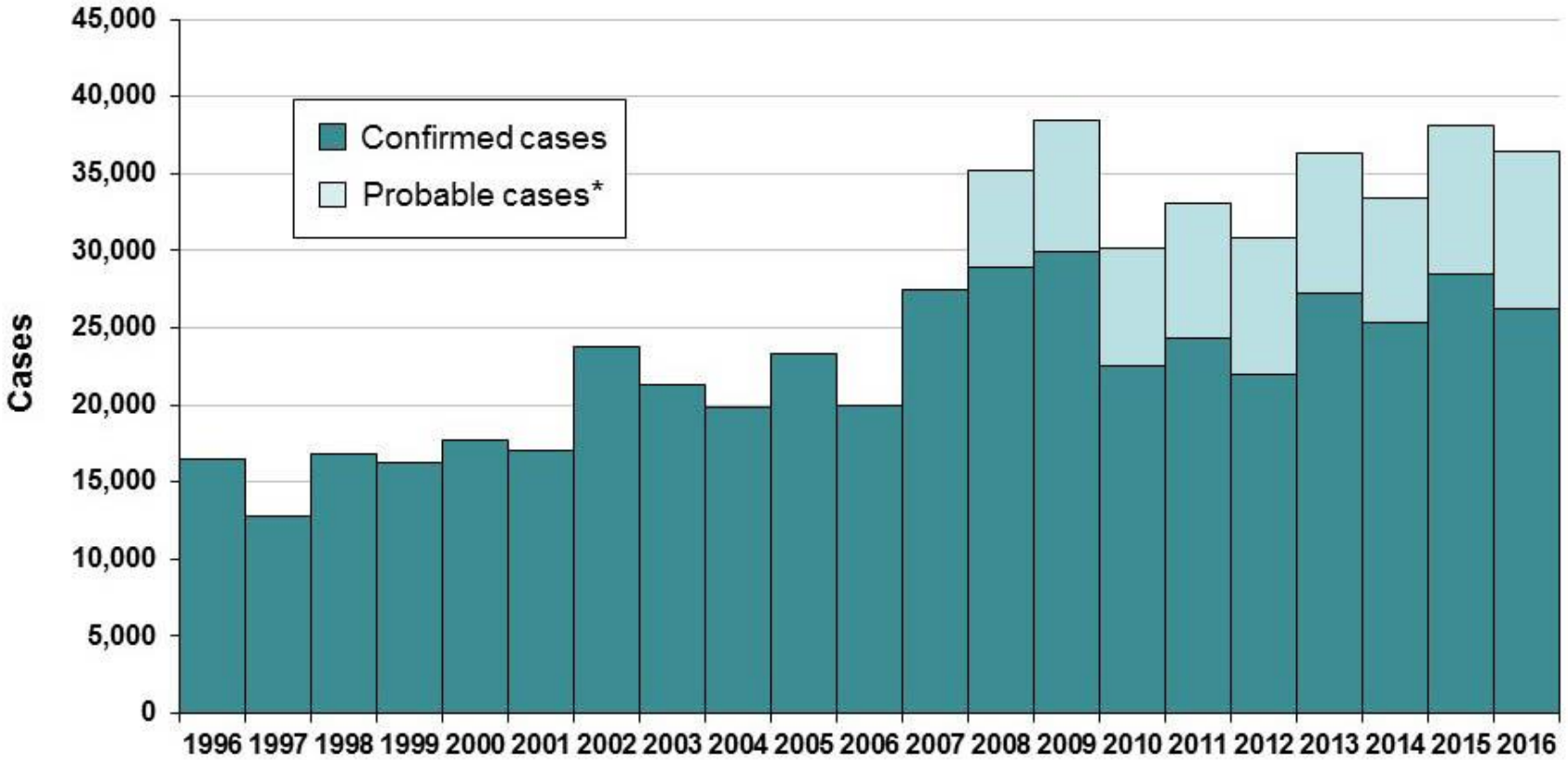
WHAT IS LYME DISEASE?

- **Caused by spirochete *Borrelia burgdorferi***
- **Occurs in areas of North America, Europe, and Asia**
- **~30,000 cases reported annually in US (most common VBD in US)**
- **Transmitted in US by *Ixodes* ticks**

Photo credits: CDC

LYME DISEASE

Reported Cases of Lyme Disease by Year, United States, 1996-2016

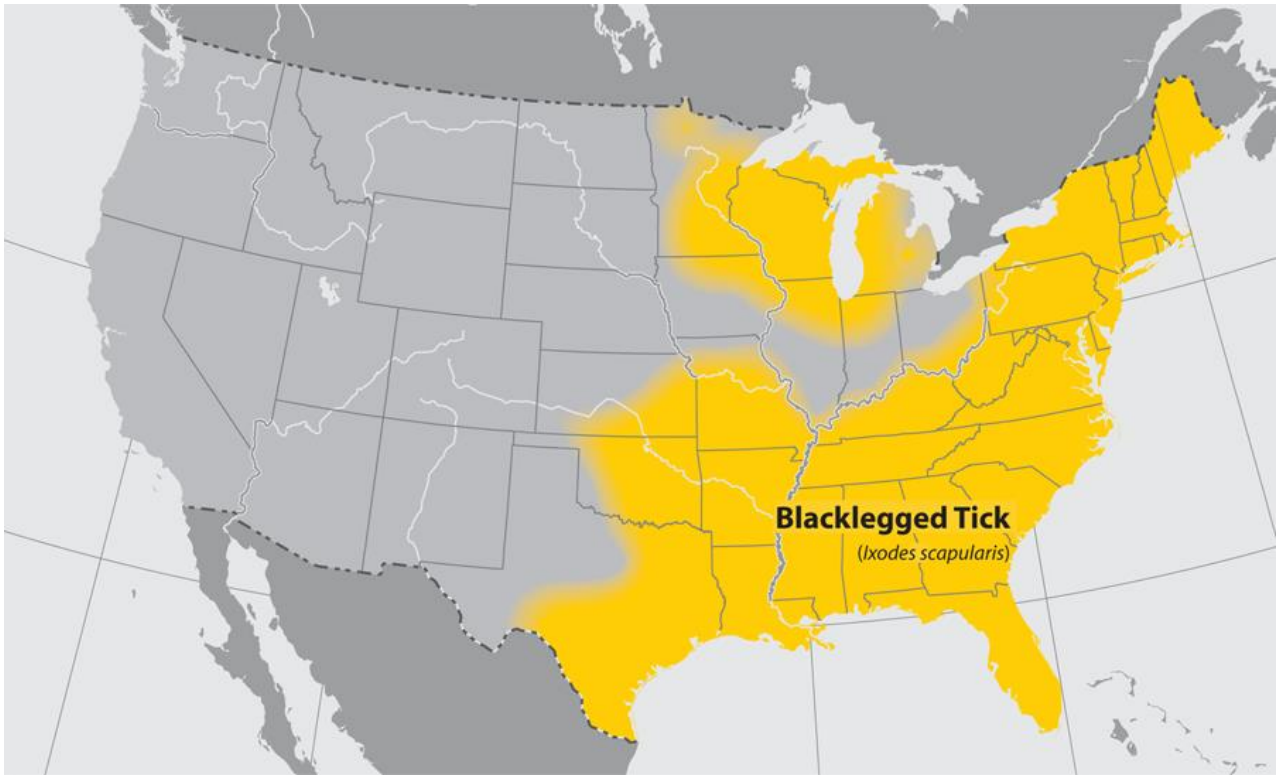


*National Surveillance case definition revised in 2008 to include probable cases; details at http://www.cdc.gov/ncphi/disss/nndss/casedef/lyme_disease_2008.htm

Source: CDC. Downloaded 5/26/18 from https://www.cdc.gov/lyme/stats/graphs.html

Deer Tick a.k.a. Blacklegged Tick

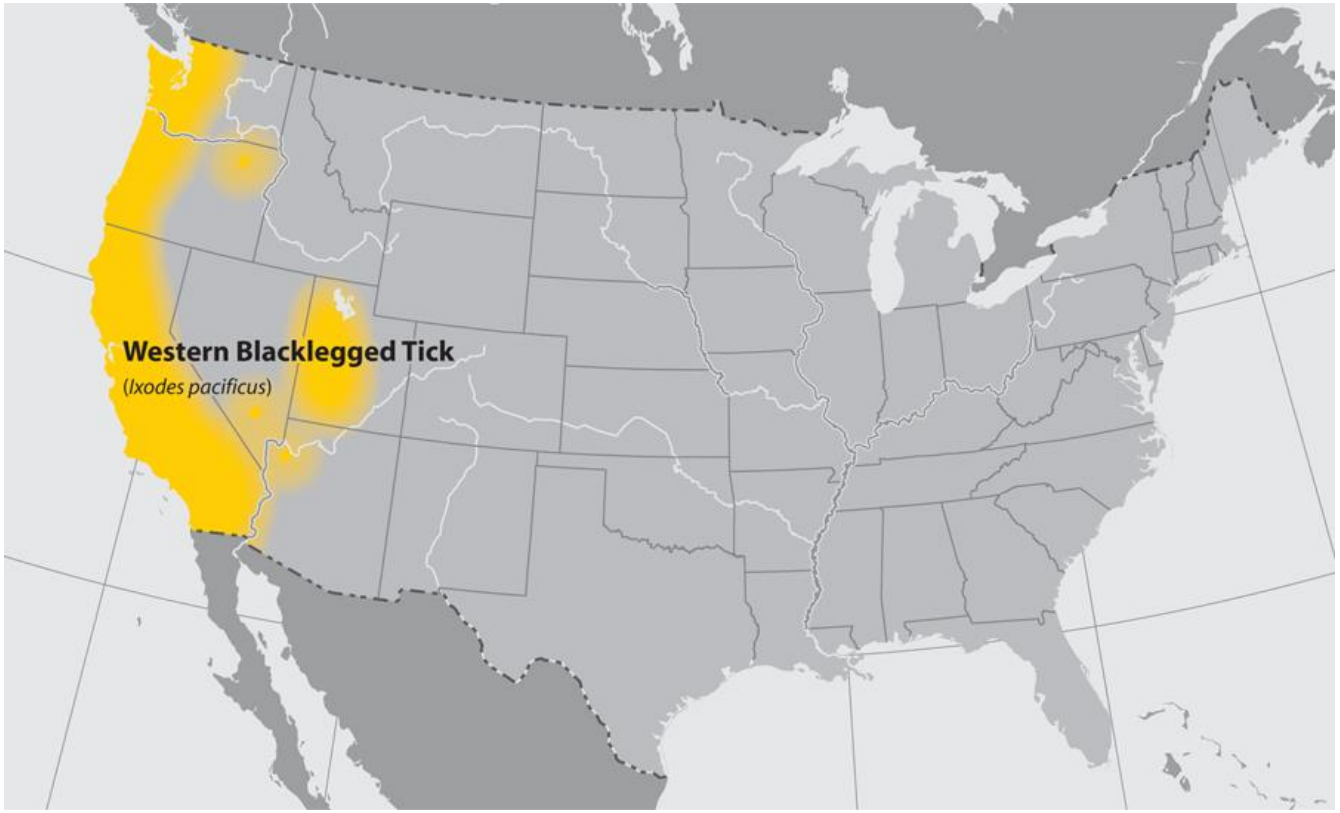
Ixodes scapularis



Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

Western Blacklegged Tick

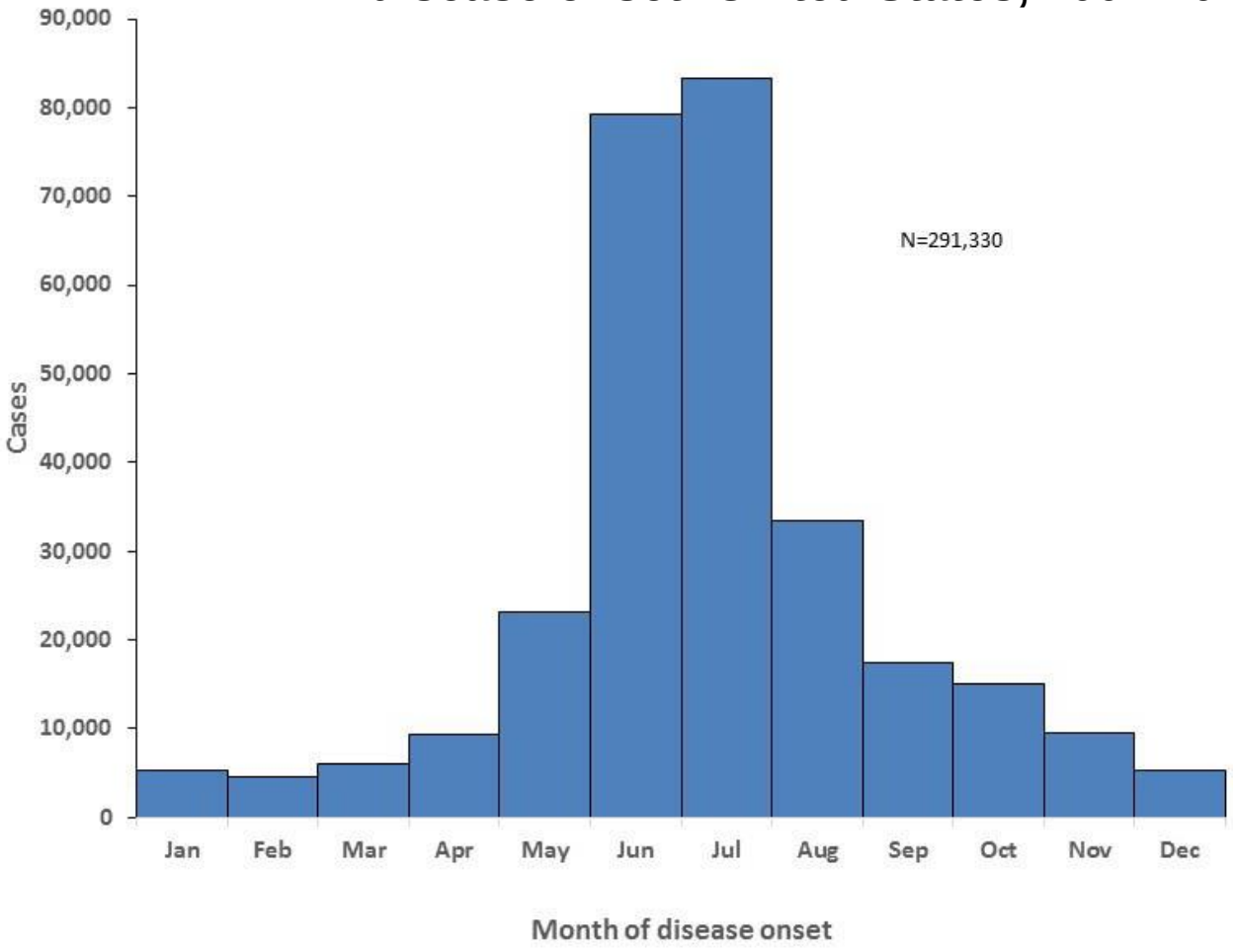
Ixodes pacificus



Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

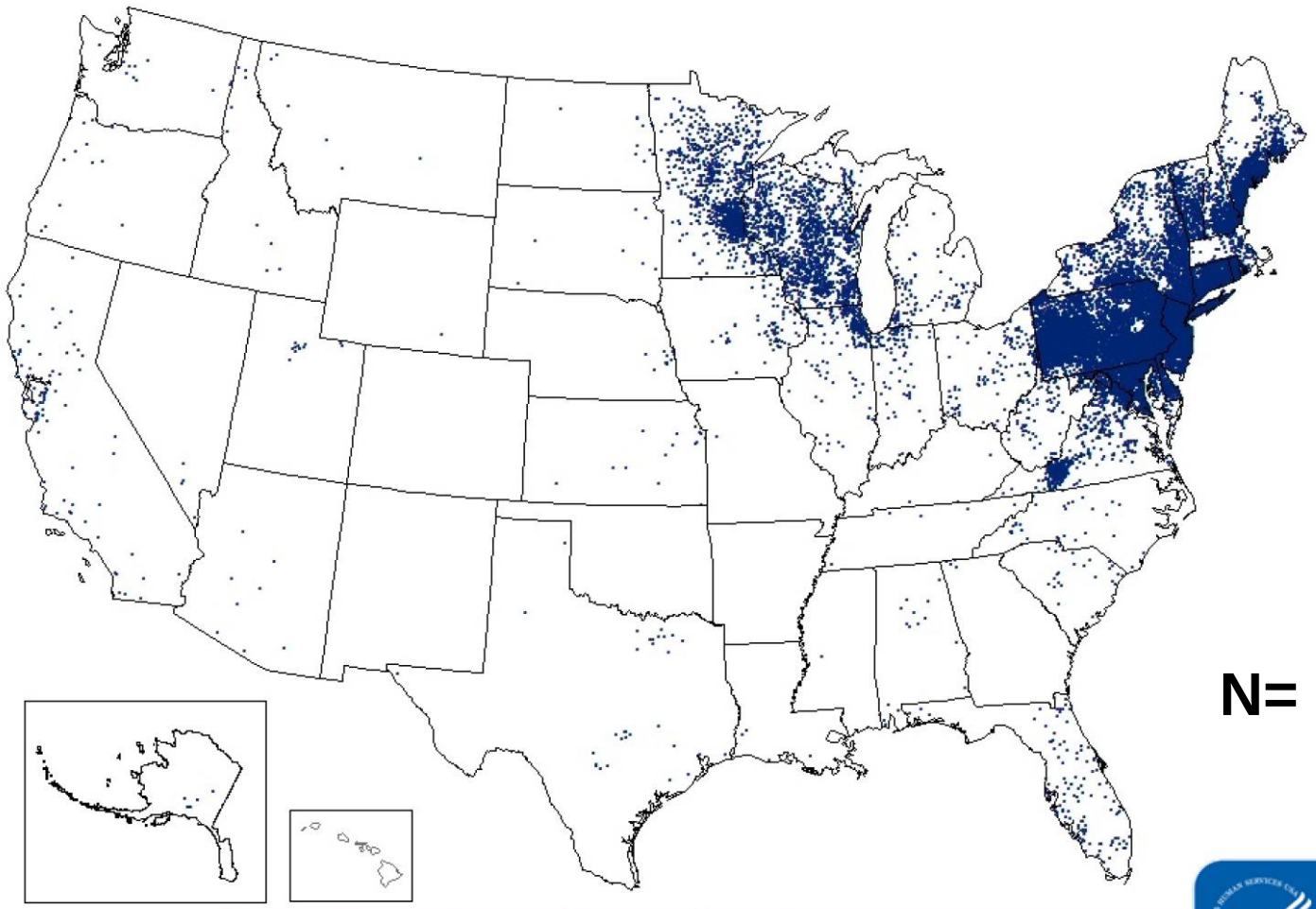
SEASONAL IN MOST OF US

Confirmed Lyme disease cases by month of disease onset--United States, 2001-2016



Source: CDC. Downloaded 5/26/18 from https://www.cdc.gov/lyme/stats/graphs.html

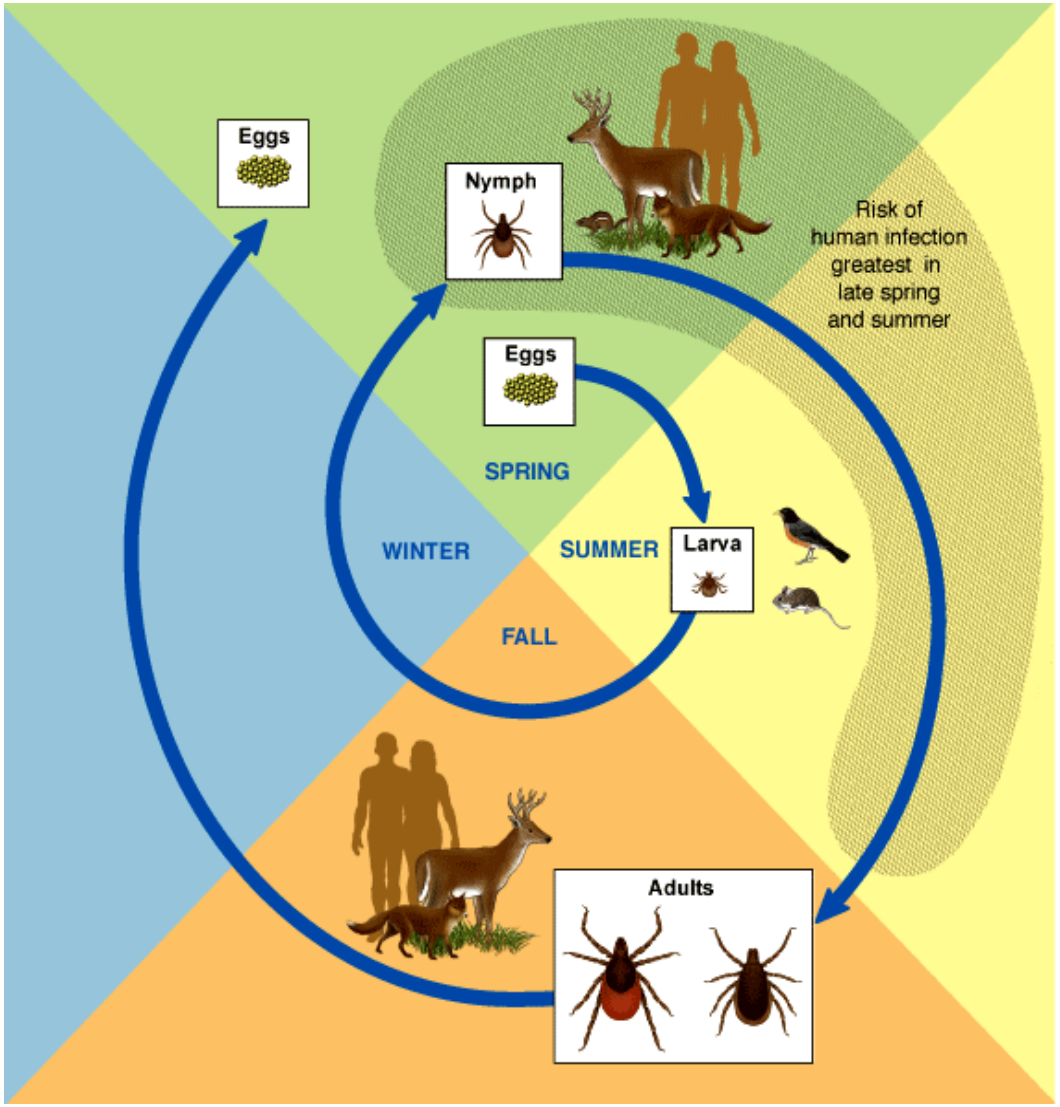
LYME CASES - 2016



N= 36,429

Source CDC. Downloaded 5/26/18 from http://www.cdc.gov/lyme/resources/reportedcasesoflymedisease_2016.pdf

VECTOR - IXODES



Downloaded 11/5/15 from http://www.cdc.gov/ticks/life_cycle_and_hosts.html

ERYTHEMA MIGRANS

70-80% of cases

~7-14 days after tick bite

Expands over days

Rarely painful

Distinguish from allergic reaction

Photo credit: CDC

ATYPICAL EM PRESENTATIONS

Photo credits: CDC

LATE STAGES

- **Facial (Bell's) palsy**
  - **Summer months**
  - **May be bilateral**
  - **± CSF pleocytosis**
- **Arthritis**
  - **Intermittent**
  - **Oligoarticular**
- **Late-stage neurologic**
  - **Peripheral neuropathy**
  - **Encephalopathy**

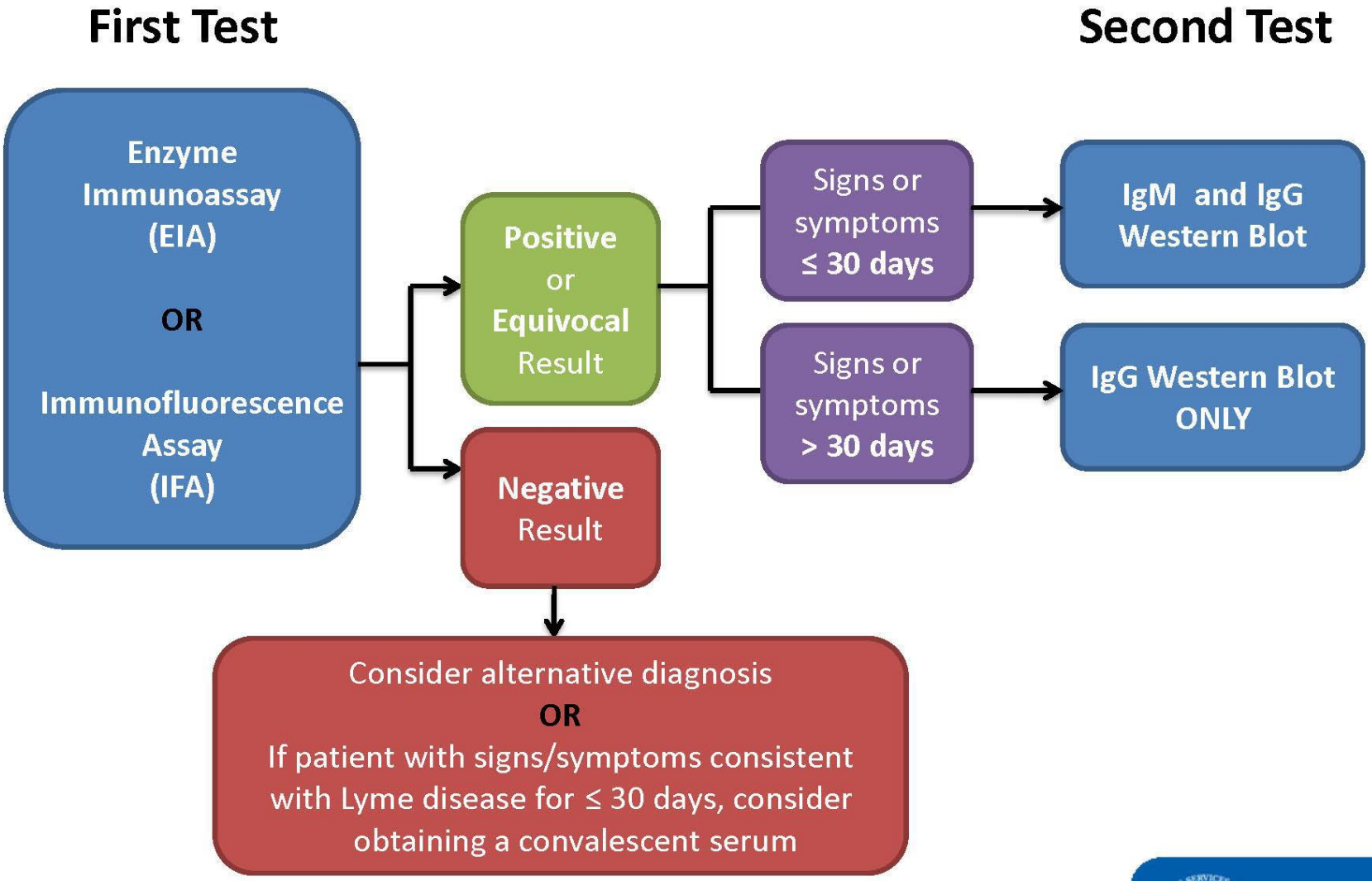
Photo credits: CDC

Clinical Signs of Confirmed Lyme Disease Cases United States 2001-2016

Symptoms	Percentage
Erythema migrans	70
Arthritis	30
Bell's palsy	9
Radiculoneuropathy	4
Meningitis/encephalitis	2
Cardiac	1

N= 253,690 **Source: CDC**

Two-Tiered Testing for Lyme Disease

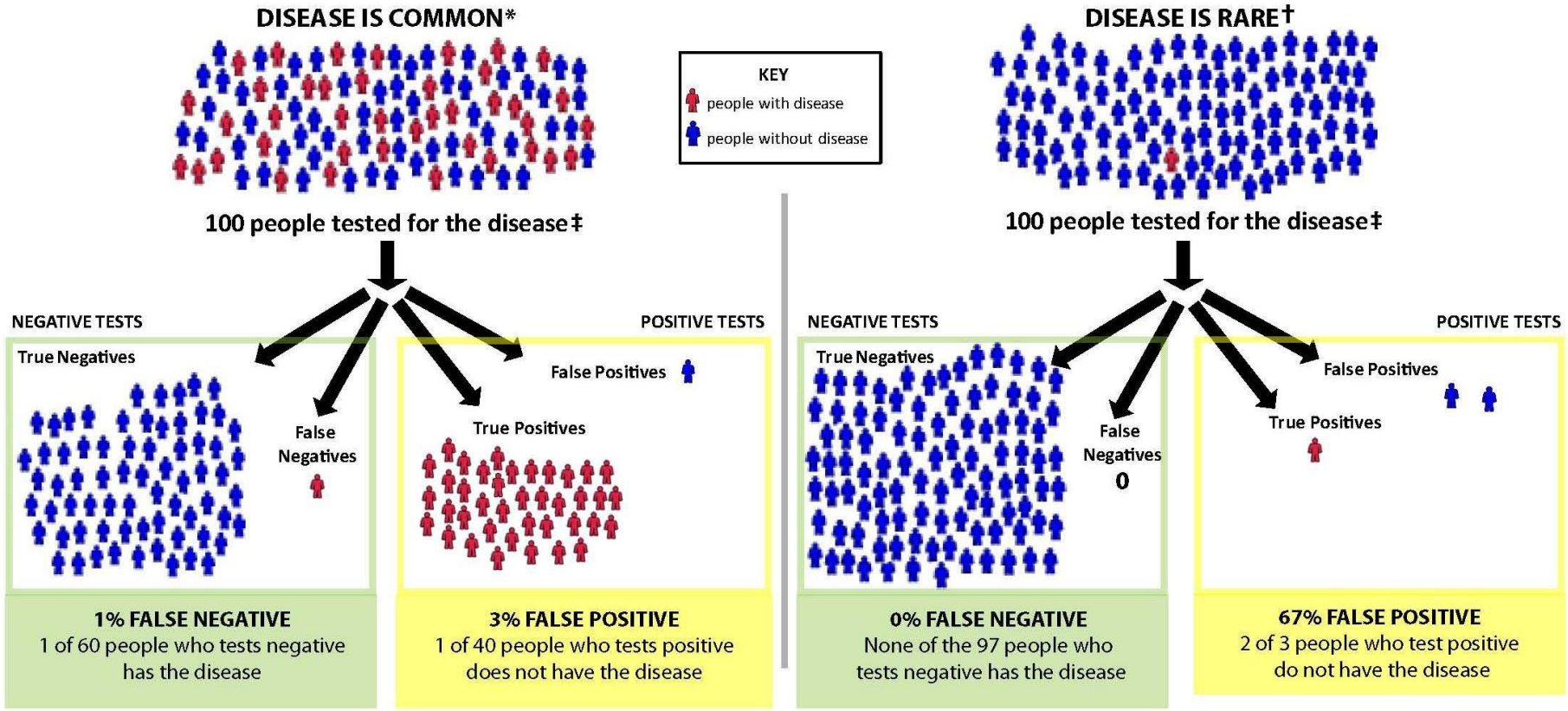


Understanding Test Results for Infectious Diseases

Consider the likelihood of disease ***before*** performing laboratory testing

The likelihood that a patient has a disease depends on many factors:

- Has the patient been in an area where the disease is found?
- Does the patient have signs and symptoms typical of the disease?
- Does the patient have risk factors for contracting or developing the disease?



* 40 out of 100 patients in this area have the disease.
† 1 out of 100 patients in this area have the disease.

‡ Test specificity = 98% (high) and test sensitivity = 98% (high)

National Center for Emerging and Zoonotic Infectious Diseases
Division of Vector Borne Diseases | Bacterial Diseases Branch

Sensitivity of Two-tiered Serologic Testing

Disease Stage	Sensitivity (%)
EM Rash (acute)	38
EM rash (convalescent)	67
Early neurologic	87
Late neurologic	100
Arthritis	97

Bottom line: Good in later stages of disease, testing of EM patients not generally necessary

ADDITIONAL TESTS: QUESTIONABLE UTILITY

- **Single-tier IgM or IgG immunoblot tests without a previous EIA/IFA**
- **In-house criteria for interpretation of immunoblots**
- **Capture assays for antigens in urine**
- **Tests for "cystic forms" of *B. burgdorferi***
- **Lymphocyte transformation tests**
- **Quantitative CD57 lymphocyte assays**
- **Measurements of antibodies in joint fluid (synovial fluid)**
- **Novel culture techniques**

  - **More info on www.cdc.gov/Lyme**

RED FLAGS FOR ALTERNATIVE LABS

- **Tests offered are not FDA approved**
- **Laboratory claims to “specialize” in Lyme and other tick-borne disease testing**
- **Do not accept insurance**
  - **Patient pays out of pocket ($500 - $1,000 ++)**

TREATMENT

- **Tick bite prophylaxis –** doxycycline 200 mg po x1

  (only in certain circumstances)

- **Erythema migrans:**
  - Doxycycline 100 mg po bid x 14 days, or
  - Amoxicillin 500 mg po tid x 14 days, or
  - Cefuroxime 500 mg po bid x 14 days
- **Patients with multiple EMs, facial palsy, and/or arthritis can be treated with the same oral regimens**
  - Duration 14-28 days, depending on clinical picture

PREVENTION

- **Avoid tick habitat**
- **Use DEET (at least 20%) or wear permethrin-treated clothing**
- **Shower soon after being outdoors**
  - **Washes away unseen nymphs and gets tick infested clothing off of the body**
- **Daily tick checks—remove attached ticks ASAP**
- **Call your provider if you develop a fever or rash**

ROCKY MOUNTAIN SPOTTED FEVER

Photo credit: CDC

LIVE WELL SAN DIEGO

WHAT IS RMSF?

- **Rocky Mountain spotted fever (Fiebre Manchada de las Montañas Rocosas) is a tick-borne disease caused by *Rickettsia rickettsia*.**
- **Infects endothelial cells, causes vasculitis**
  - **Non-specific symptoms**
  - **Multi-system organ failure**
- **No “classic” presentation**
- **Can be rapidly fatal**
  - **>20% case fatality rate in untreated cases**
  - **Median time to death 8 days**

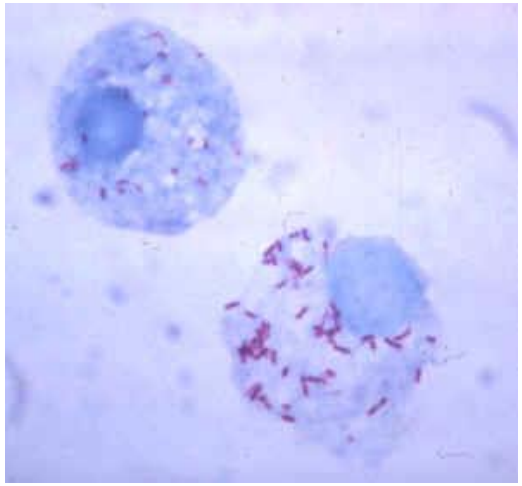
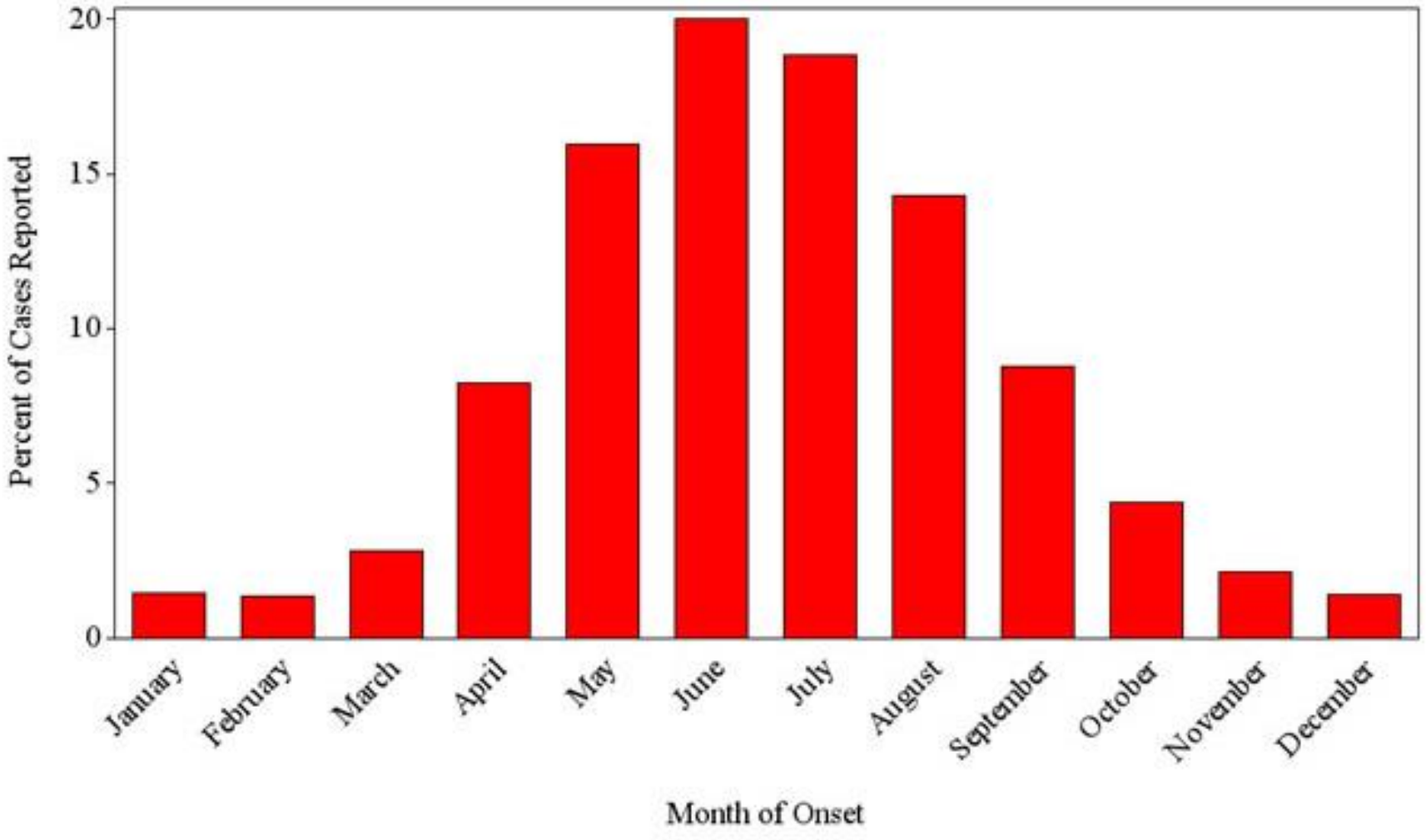


Photo credit: CDC

SEASONAL FOR MOST OF U.S.

LIVE WELL SAN DIEGO

SFR cases by month of onset 1993 through 2014

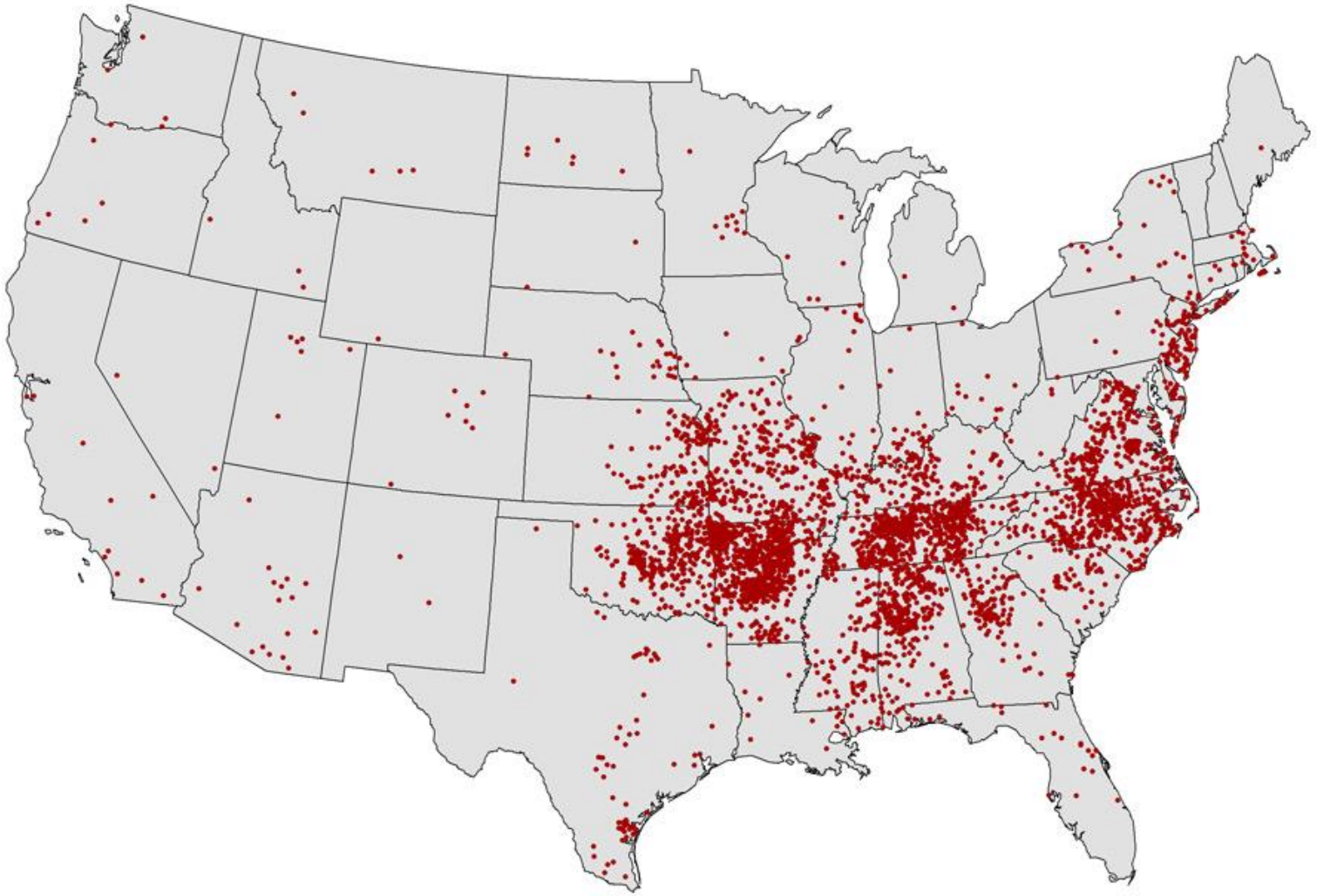


Source CDC. Downloaded 7/8/17 from http://www.cdc.gov/rmsf/stats/

RMSF CASES - 2015

LIVE WELL SAN DIEGO

Reported cases of RMSF in the United States for 2015



Source CDC. Downloaded 5/26/18 from https://www.cdc.gov/ticks/tickbornediseases/rmsf.html

Rocky Mountain Wood Tick

Dermacentor andersoni

Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

Photo credit: CDC

American Dog Tick

Dermacentor variabilis

Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

Photo credit: CDC

Brown Dog Tick

Rhipicephalus sanguineus

Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

Photo credit: CDC

BROWN DOG TICKS

Downloaded 8/17/15 from: http://www.saludbc.gob.mx/descargas/pandemia/Panorama_Rickettsiosi_2009_2010.pdf

Source: Álvarez-Hernández, et al. 2016. Downloaded 5/26/18 from: https://cursofiebremanchada2016.files.wordpress.com/2016/04/rocky-mountain-spotted-fever-in-mexico-past-present-and-future-lancet.pdf

RMSF – DAYS 1 - 4

Early clinical manifestations

- **Day 1-2**: fever, headache, myalgia *(may be responsive to OTC pain/fever meds)*
- **Day 2-4**: May develop respiratory signs (cough, community-acquired pneumonia) and/or gastrointestinal signs (nausea, vomiting, abdominal pain)
- **Day 2-4**: light maculopapular rash *may* appear
- **Day 2-4**: Thrombocytopenia, hyponatremia, elevated liver enzymes (AST, ALT) *may* occur

RMSF – DAY 5 & MORE

Later clinical manifestations

- Worsening systemic illness (cough, dyspnea, arrhythmias, hypotension, severe abdominal pain)
- Petechial rash may develop
- Thrombocytopenia, hyponatremia, elevated liver enzymes (AST, ALT) usually present
- Onset of neurologic signs (photophobia, altered mental status, seizures)

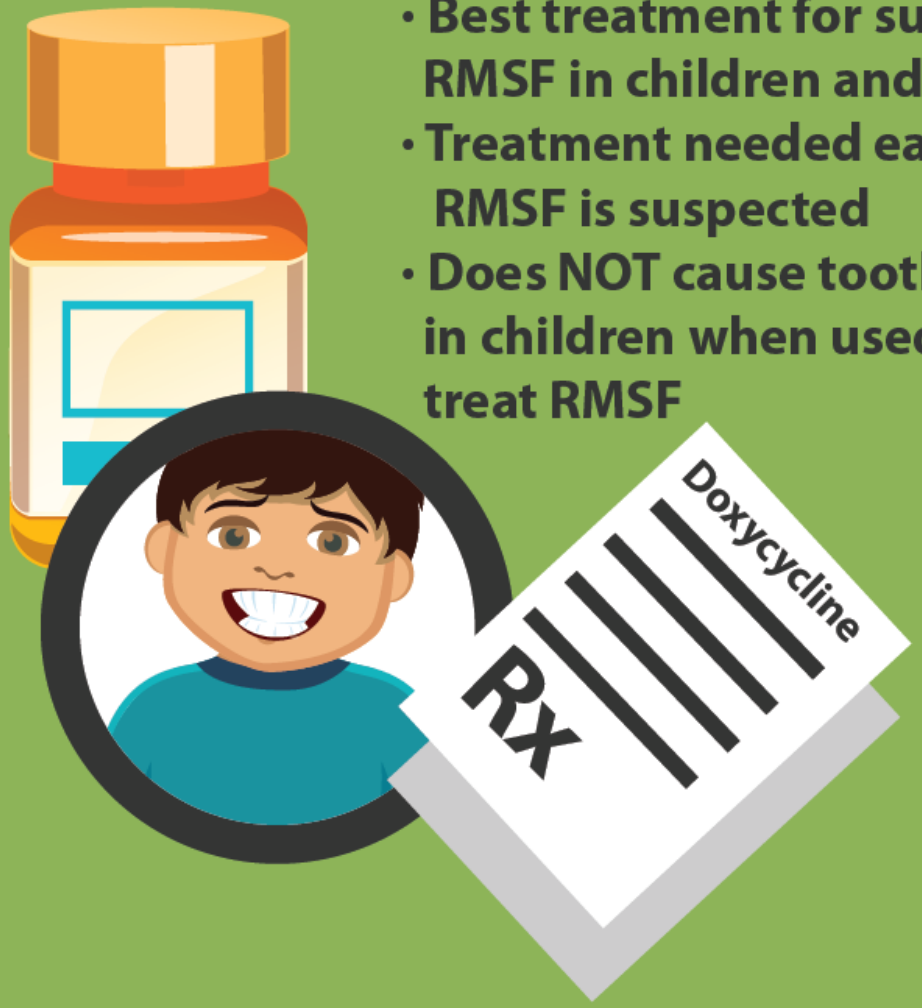
RMSF - TESTING

- **Testing is used for surveillance and public health (magnitude of cases, confirm risks)**
- **No early diagnostic test can definitively rule RMSF in or out**
- **Do not base treatment decisions on (or wait for) test results**

RMSF - TESTING

- **PCR or IHC of whole blood, serum, tissue**
  - Most accurate for severely ill/fatal cases
  - Unlikely to be positive for mild RMSF or samples taken early (day 1-4 of illness)
- **Serology (IFA)**
  - Detects antibodies
  - Testing of paired sera (acute, convalescent 2-4 weeks later) recommended
  - Can be difficult to interpret
  - Often negative during acute illness
  - Antibodies from prior infections may persist for years

Doxycycline saves lives!



- Best treatment for suspected RMSF in children and adults
- Treatment needed early when RMSF is suspected
- Does NOT cause tooth staining in children when used to treat RMSF

https://www.cdc.gov/rmsf/pdf/RMSFInfographic.pdf

PREVENTION

- **Avoid tick habitat**
- **Use DEET (at least 20%) or wear permethrin-treated clothing**
- **Shower soon after being outdoors**
  - **Washes away unseen nymphs and gets tick infested clothing off of the body**
- **Daily tick checks—remove attached ticks ASAP**
- **Treat pets appropriately for ticks year-round,**

  ESPECIALLY ANY DOGS THAT CROSS THE BORDER
- **Call your provider if you develop a fever or rash**

TULAREMIA

Photo credit: CDC

LIVE WELL SAN DIEGO

TULAREMIA

Tularemia is a disease of animals and humans caused by the bacterium *Francisella tularensis*

Rabbits, hares, and rodents are especially susceptible and often die in large numbers during outbreaks

Also called “Rabbit plague”

Named after Tulare County in CA!

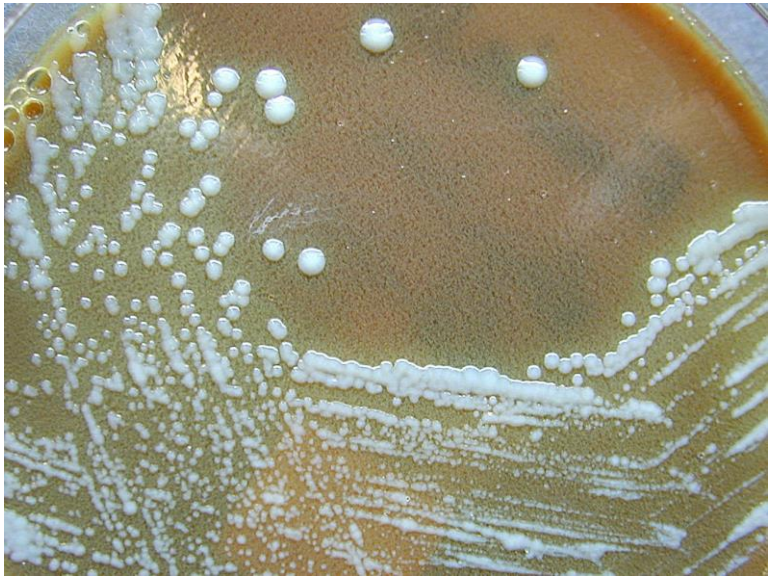


Photo credit: CDC

TULAREMIA

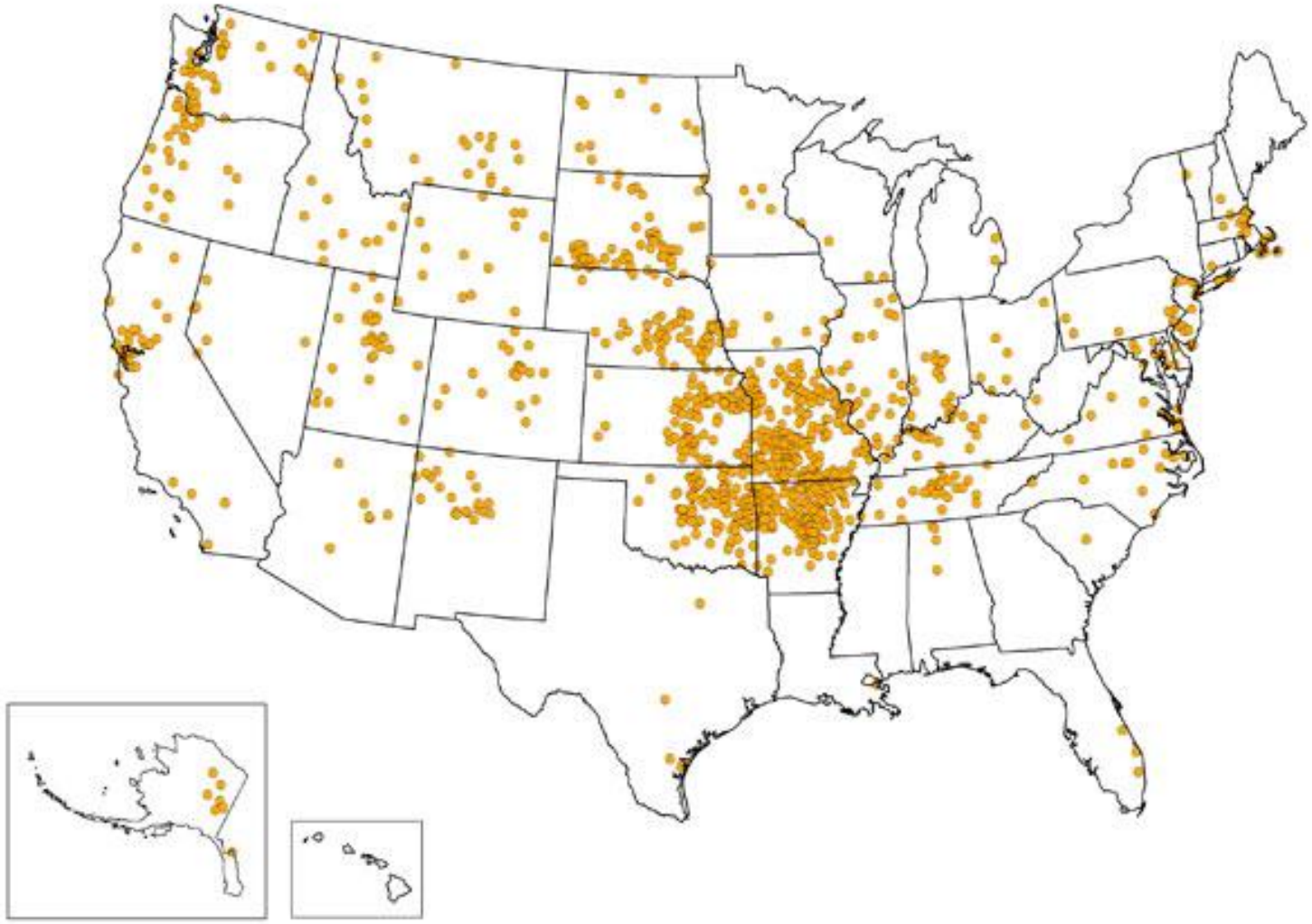
Humans can become infected through several routes, including:

- Tick and deer fly bites
- Skin contact with infected animals
- Ingestion of contaminated water
- Laboratory exposure
- Inhalation of contaminated

Photo credits: CDC

Humans could be exposed as a result of bioterrorism.

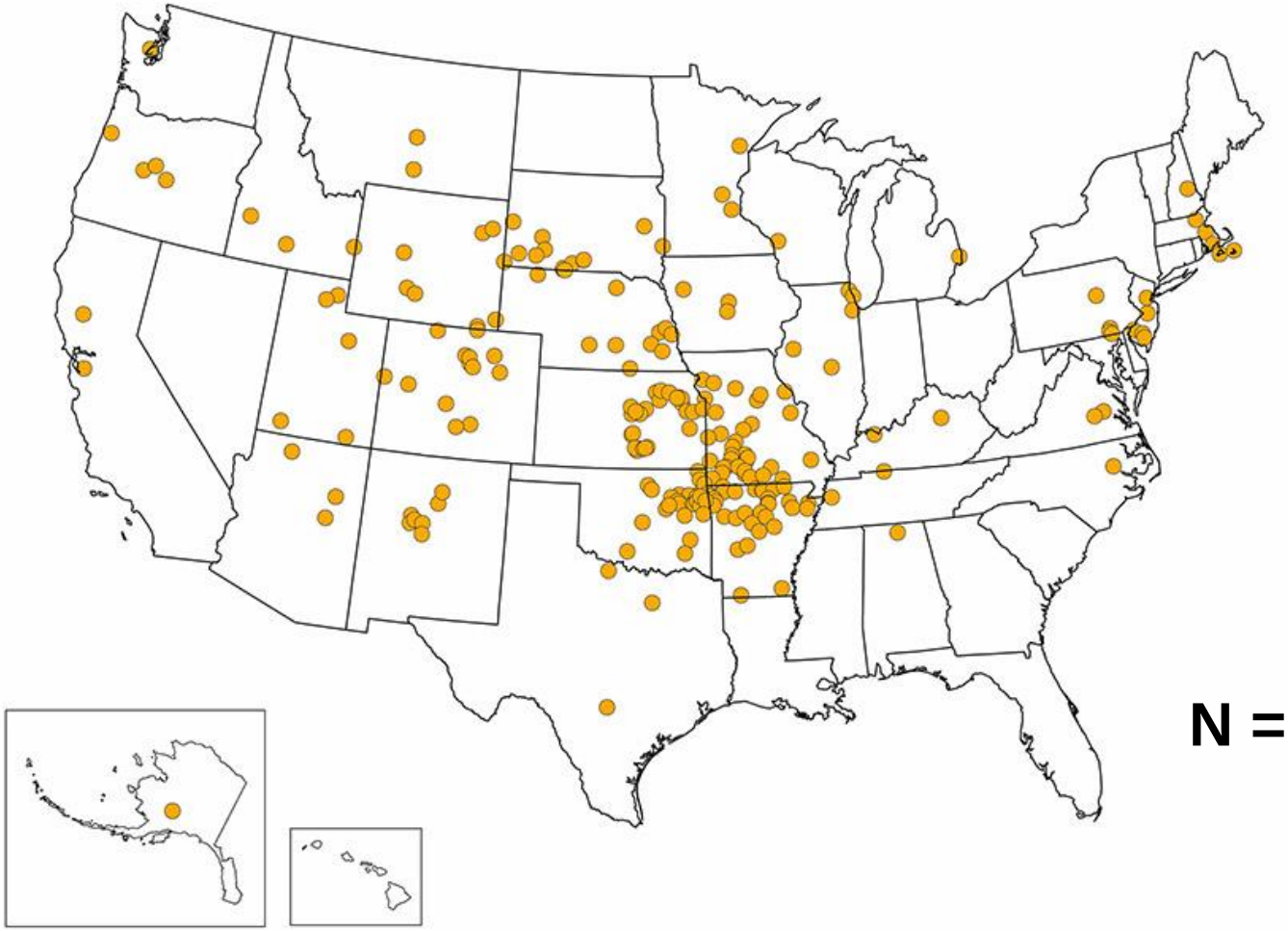
TULAREMIA CASES
US – 2004 - 2013



1 dot placed randomly within county of residence for each reported case

Source CDC. Downloaded 11/5/15 from http://www.cdc.gov/tularemia/statistics/index.html

TULAREMIA CASES, US – 2016



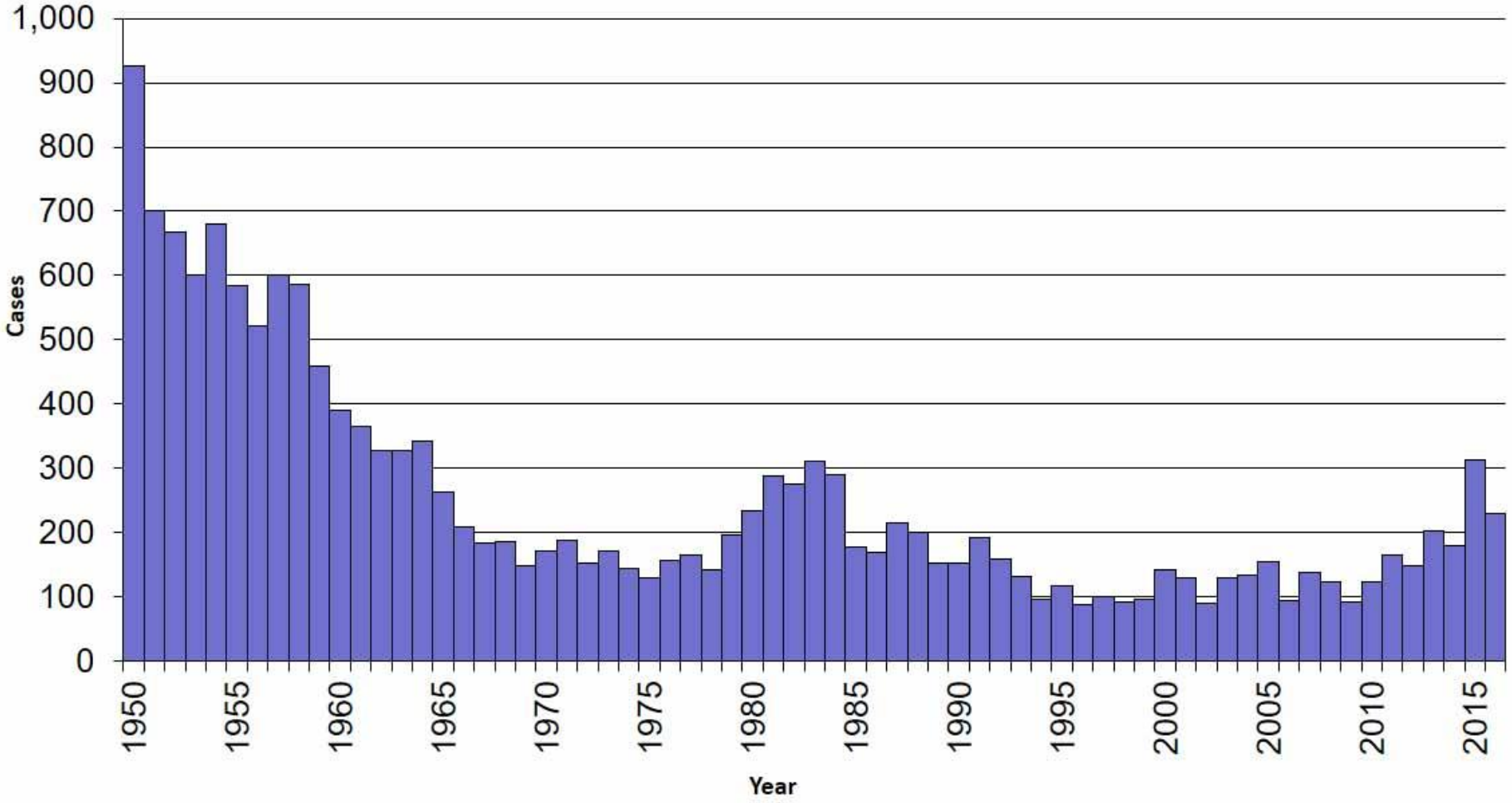
1 dot placed randomly within county of residence for each reported case

N = 230

Source CDC. Downloaded 5/26/18 from https://www.cdc.gov/tularemia/statistics/index.html

TULAREMIA

Tularemia – Yearly Reported Cases, United States, 1950-2016



Source CDC. Downloaded 6/4/18 from http://www.cdc.gov/tularemia/statistics/index.html

TULAREMIA

Ulceroglandular - most common form

- Usually occurs following a tick or deer fly bite or after handing of an infected animal
- Skin ulcer appears at the site where the organism entered the body.
- The ulcer is accompanied by swelling of regional lymph glands, usually in the armpit or groin.

Glandular

- Similar to ulceroglandular tularemia but without an ulcer.
- Also generally acquired through the bite of an infected tick or deer fly or from handling sick or dead animals.

TULAREMIA

Oculoglandular

- Occurs when the bacteria enter through the eye.
- Can occur when butchering an infected animal, then touching eyes.
- Symptoms include eye irritation and inflammation, swelling of lymph glands in front of ear.

Oropharyngeal

- Results from eating or drinking contaminated food or water.
- Patients may have sore throat, mouth ulcers, tonsillitis, & swelling of lymph glands in neck.

Pneumonic – most serious form

- This form results from breathing dusts or aerosols containing the organism.
- Can also occur when other forms of tularemia (e.g. ulceroglandular) are left untreated and the bacteria spread through the bloodstream to the lungs.
- Symptoms include cough, chest pain, and difficulty breathing

TESTING

Physicians who suspect tularemia should promptly collect appropriate specimens and alert laboratory for special diagnostic and safety procedures.

Rapid diagnostic testing for tularemia is available through the San Diego PHL!

Growth of *F. tularensis* in culture is the definitive means of confirming the diagnosis of tularemia. Appropriate specimens include swabs or scrapping of skin lesions, lymph node aspirates or biopsies, pharyngeal washings, sputum specimens, or gastric aspirates, depending on the form of illness. Paradoxically, blood cultures are often negative.

A presumptive diagnosis of tularemia may be made through testing of specimens using direct fluorescent antibody, immunohistochemical staining, or PCR.

Diagnosis can also be established serologically by demonstrating a 4-fold change in specific antibody titers between acute and convalescent sera. Convalescent sera are best drawn at least 4 weeks after illness onset; hence this method is not useful for clinical management.

TREATMENT

Streptomycin is drug of choice based on experience, efficacy, & FDA approval.

Gentamicin is considered an acceptable alternative, but some series have reported a lower primary success rate. Treatment with aminoglycosides should be continued for 10 days.

Tetracyclines may be a suitable alternative to aminoglycosides for patients who are less severely ill. Tetracyclines are static agents and should be given for at least 14 days to avoid relapse.

Ciprofloxacin and other fluoroquinolones are not FDA-approved for treatment of tularemia but have shown good efficacy in vitro, in animals, and in humans.

Bottomline: consult an ID physician.

Post-exposure prophylaxis may be indicated for certain exposures (doxycyline, ciprofloxacin)

COUNTYNEWSCENTER
DIRECT TO YOU FROM THE COUNTY OF SAN DIEGO

February 23, 2018

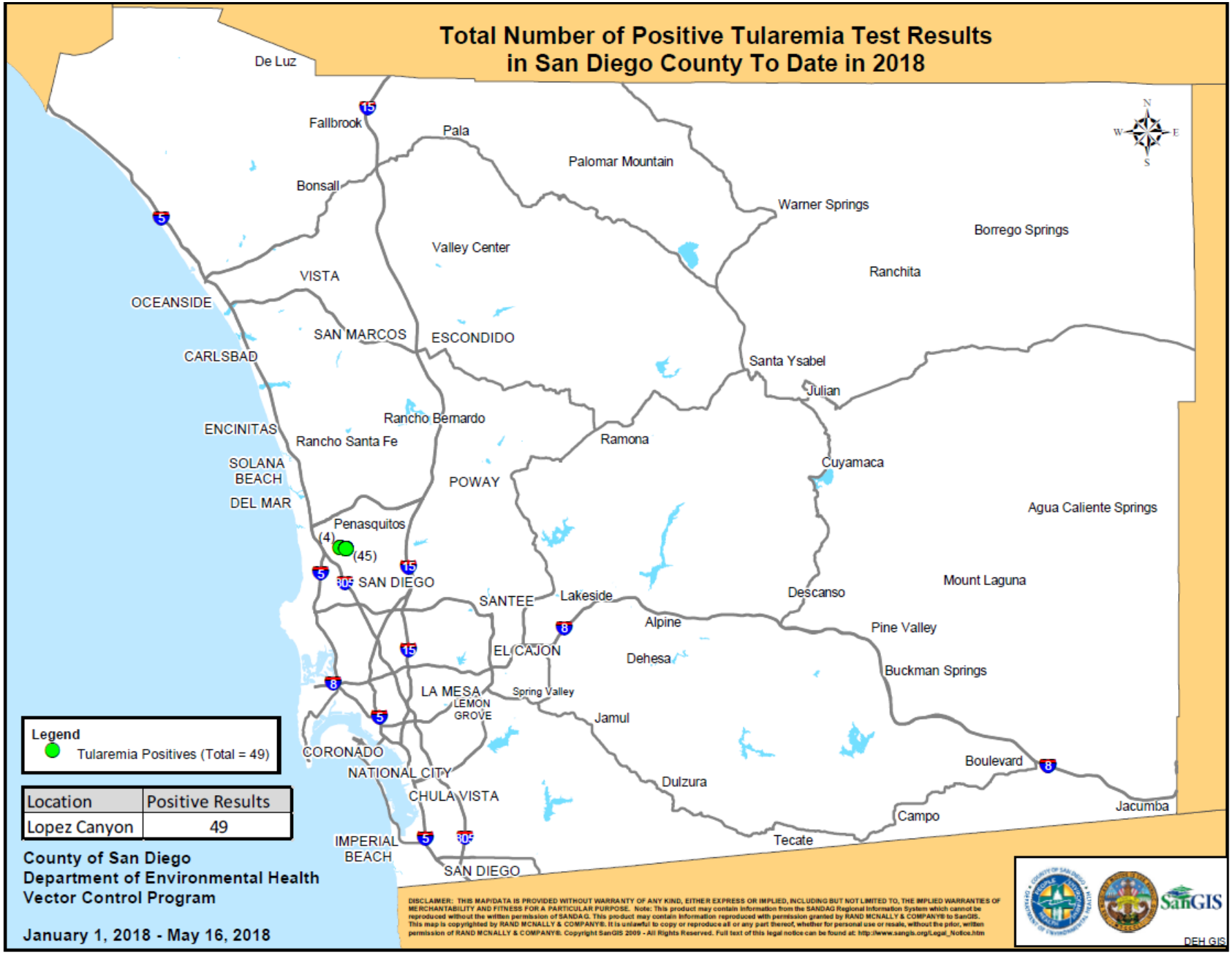
HEALTH

More Ticks Test Positive for Tularemia

By Gig Conaughton, County of San Diego Communications Office
Feb. 23, 2018 | 2:24 PM

County Vector Control officials said Friday that several more batches of ticks trapped along Lopez Canyon Trail in Sorrento Valley have tested positive for tularemia, a potentially dangerous bacterial disease also known as "rabbit fever."

Total Number of Positive Tularemia Test Results in San Diego County To Date in 2018



Location	Positive Results
Lopez Canyon	49

County of San Diego
Department of Environmental Health
Vector Control Program

January 1, 2018 - May 16, 2018

SanGIS

DEH GIS

PREVENTION

When hiking, camping or working outdoors:

- Use insect repellants containing 20% to 30% DEET (N,N-diethyl-meta-toluamide), picaridin or IR3535.
- Wear long pants, long sleeves, and long socks to keep tick and deer flies off your skin.
- Remove attached ticks promptly with fine-tipped tweezers.
- Don’t drink untreated surface water.

When mowing or landscaping:

- Don’t mow over sick or dead animals.
- Consider using dust masks to reduce your risk of inhaling the bacteria.

If you hunt, trap or skin animals:

- Use gloves when handling animals, especially rabbits muskrats, prairie dogs, and other rodents.
- Cook game meat thoroughly before eating.

HANTAVIRUS
(Sin nombre virus)

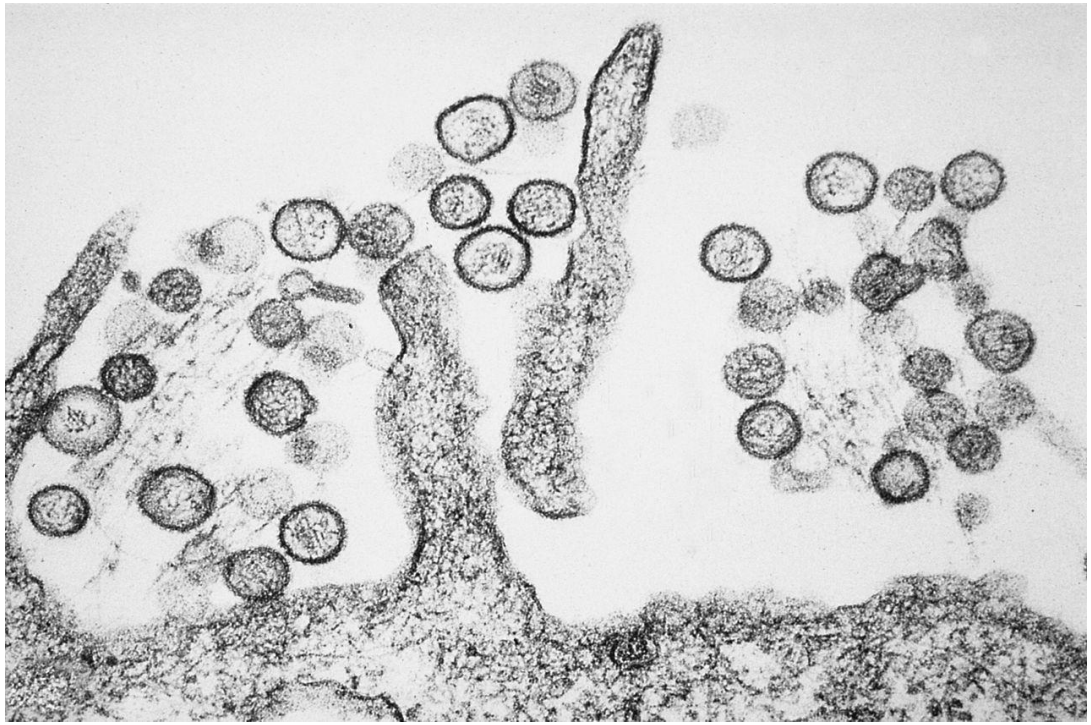


Photo: CDC

LIVE WELL SAN DIEGO

VECTOR

LIVE WELL SAN DIEGO

Deer Mouse

Cotton Rat

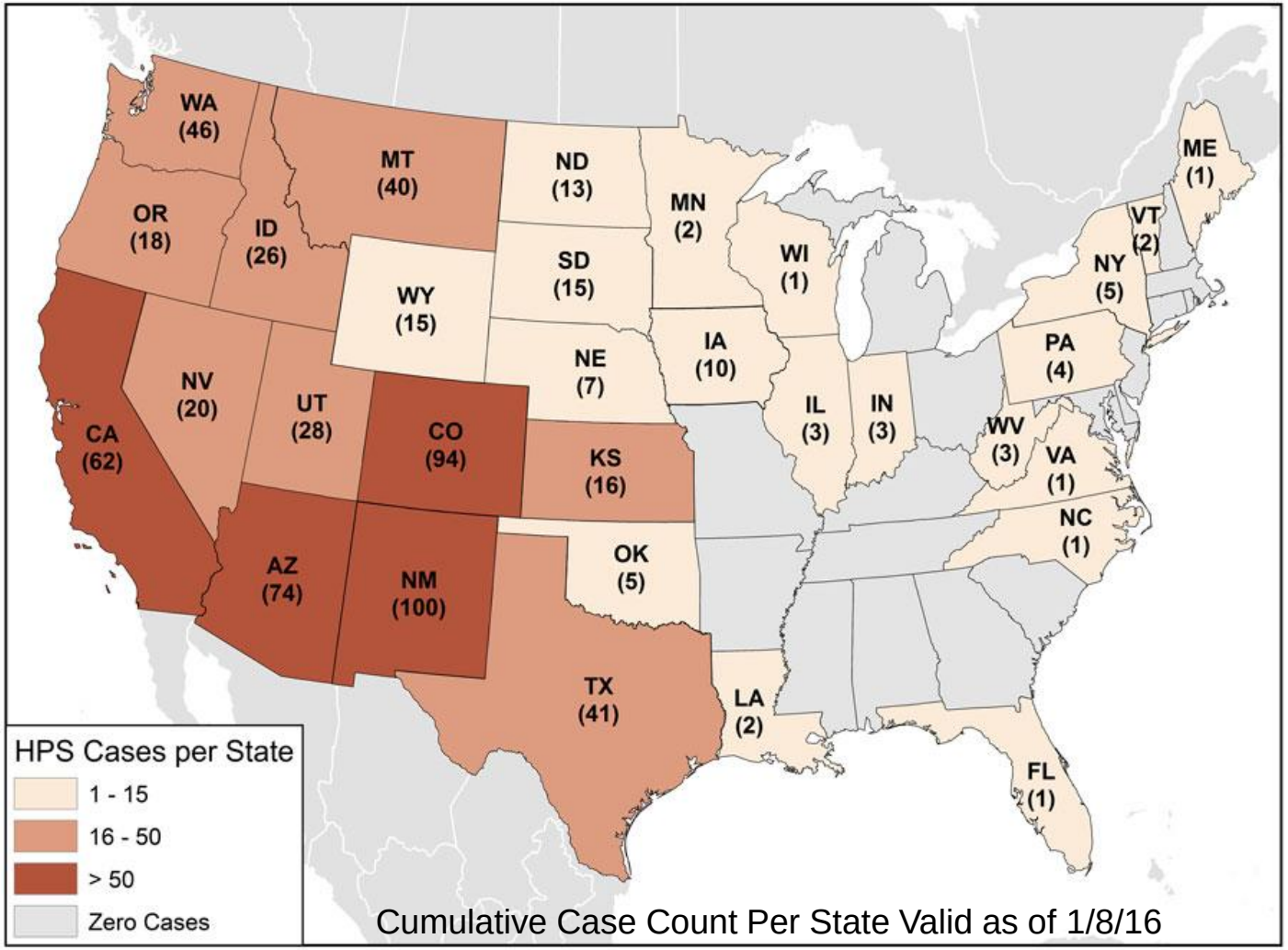
Rice Rat

White-footed mouse

Photos: COSD DEH

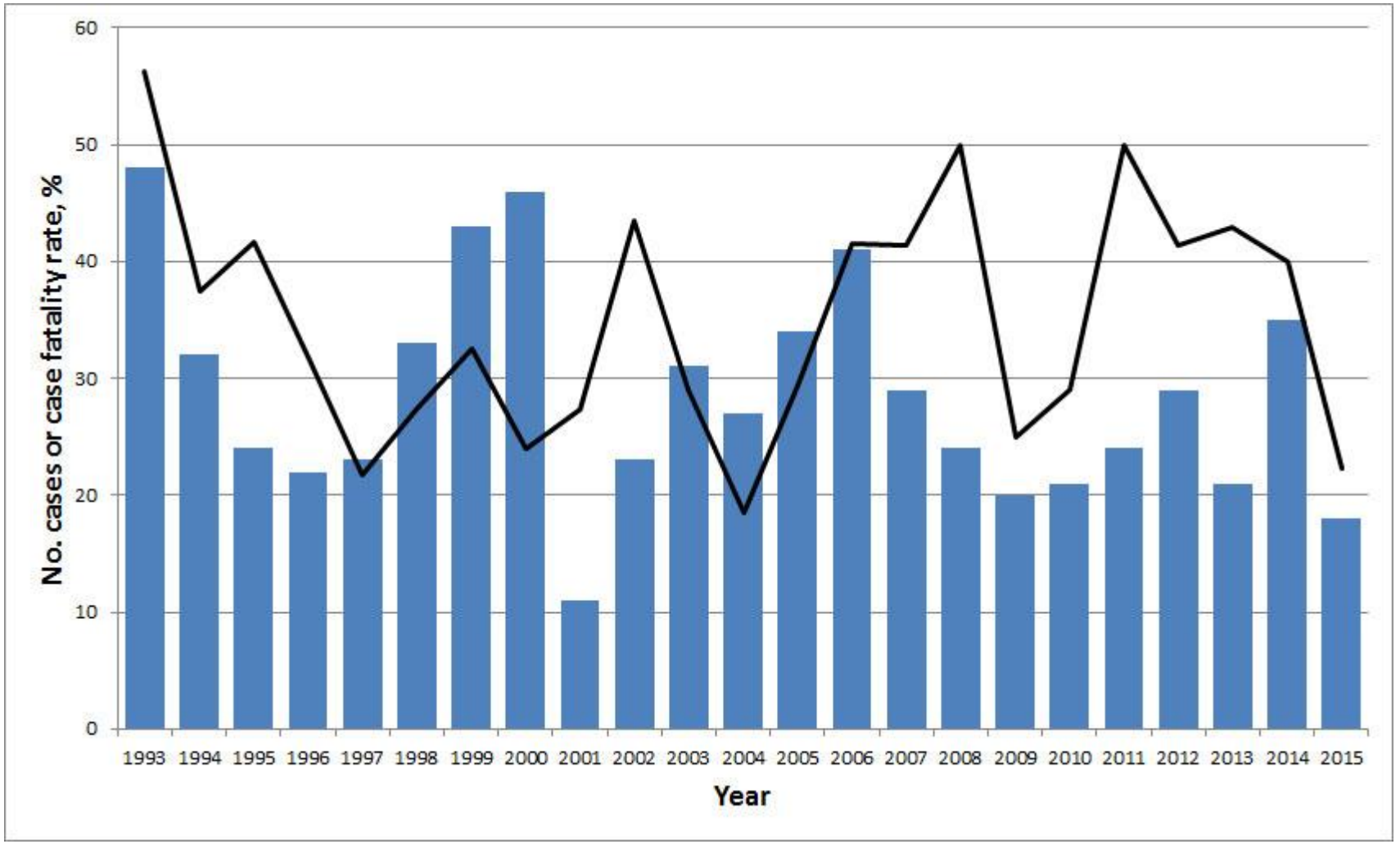
HANTAVIRUS

Hantavirus Pulmonary Syndrome (HPS) Cases, by State of Exposure



Source CDC. Downloaded 7/8/17 from: https://www.cdc.gov/hantavirus/surveillance/state-of-exposure.html

Annual U.S. HPS Cases and Case-fatality, 1993-2015



Source CDC. Downloaded 7/8/17 from:
https://www.cdc.gov/hantavirus/surveillance/annual-cases.html

HANTA PULMONARY SYNDROME

“Incubation time" is not positively known. Based on limited information, it appears that symptoms may develop between 1 and 5 weeks after exposure to fresh urine, droppings, or saliva of infected rodents.

Early symptoms include fatigue, fever and muscle aches, especially in the large muscle groups—thighs, hips, back, and sometimes shoulders. These symptoms are universal.

There may also be headaches, dizziness, chills, and abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain. About half of all HPS patients experience these symptoms.

Four to 10 days after the initial phase of illness, the late symptoms of HPS appear. These include coughing and shortness of breath, with the sensation of, as one survivor put it, a "...tight band around my chest and a pillow over my face" as the lungs fill with fluid.

TESTING

Call SDPHL!

Specimens (blood, sputum) will be submitted to the CDPH VDRL.

Detection of hantavirus-specific immunoglobulin M or rising titers of hantavirus-specific immunoglobulin G.

Detection of hantavirus-specific ribonucleic acid sequence by polymerase chain reaction in clinical specimens.

Detection of hantavirus antigen by immunohistochemistry.

COUNTYNEWSCENTER
DIRECT TO YOU FROM THE COUNTY OF SAN DIEGO

February 27, 2018

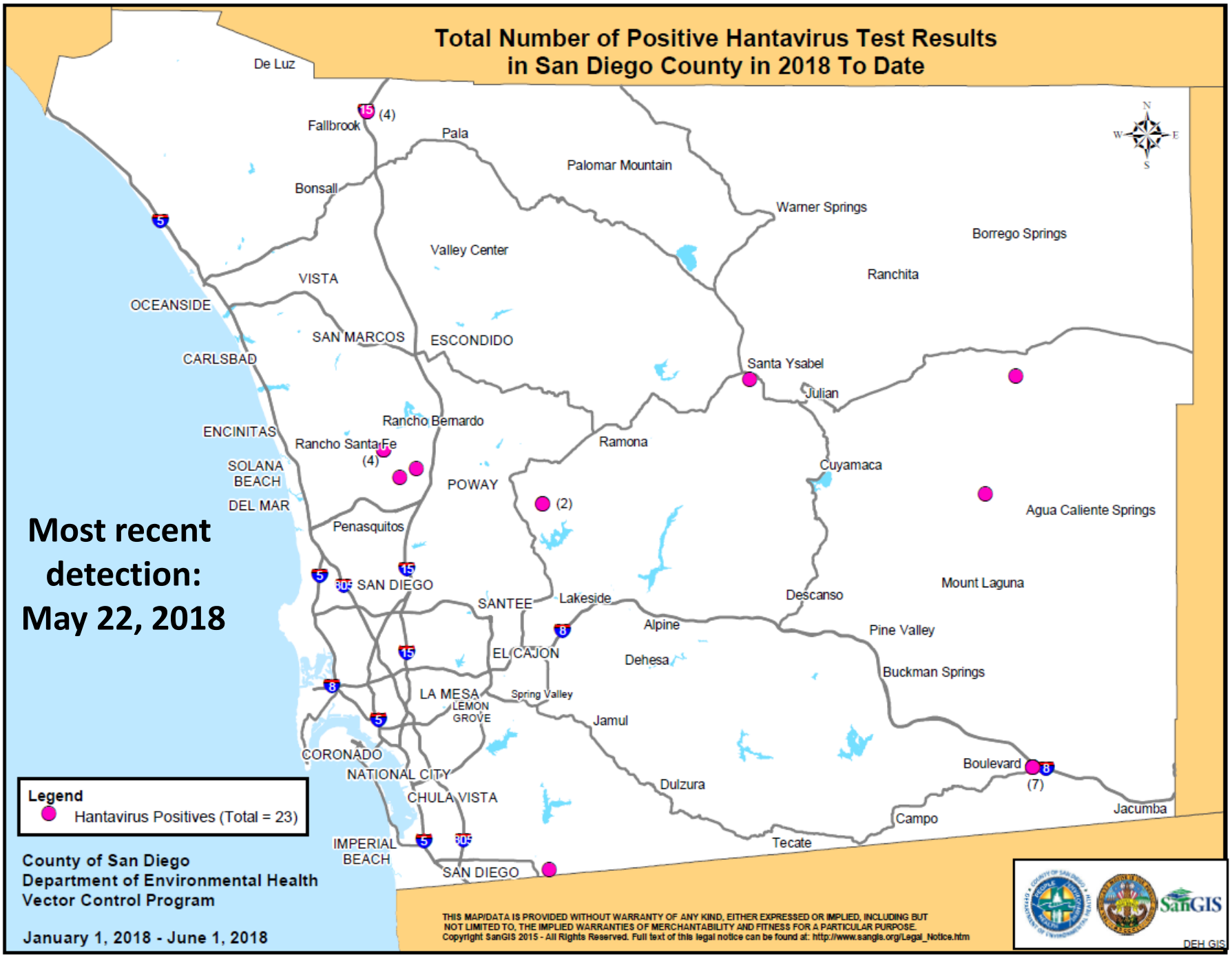
ENVIRONMENT

More Wild Mice Test Positive for Hantavirus

By Gig Conaughton, County of San Diego Communications Office
Feb. 27, 2018 | 1:03 PM

County Vector Control officials are reminding people to avoid rodents in the wild and to never sweep up or vacuum up rodent infestations if they find them in their homes, sheds and garages after more wild mice have tested positive for hantavirus.

Total Number of Positive Hantavirus Test Results in San Diego County in 2018 To Date



Most recent detection: May 22, 2018

Legend
- Hantavirus Positives (Total = 23)

County of San Diego
Department of Environmental Health
Vector Control Program

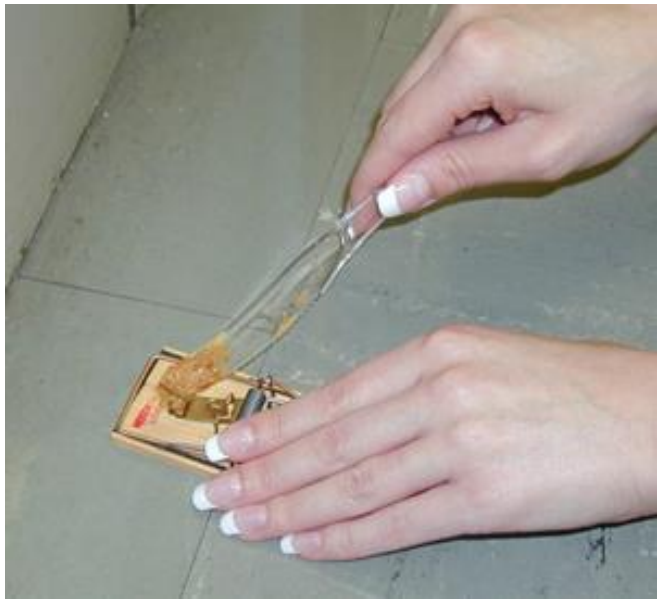
January 1, 2018 - June 1, 2018

SanGIS

DEH GIS

Got Mice?

Seal Up!



Trap Up!

Clean Up!

Photos: COSD DEH

Use care when cleaning up after rodents

Photos: COSD DEH

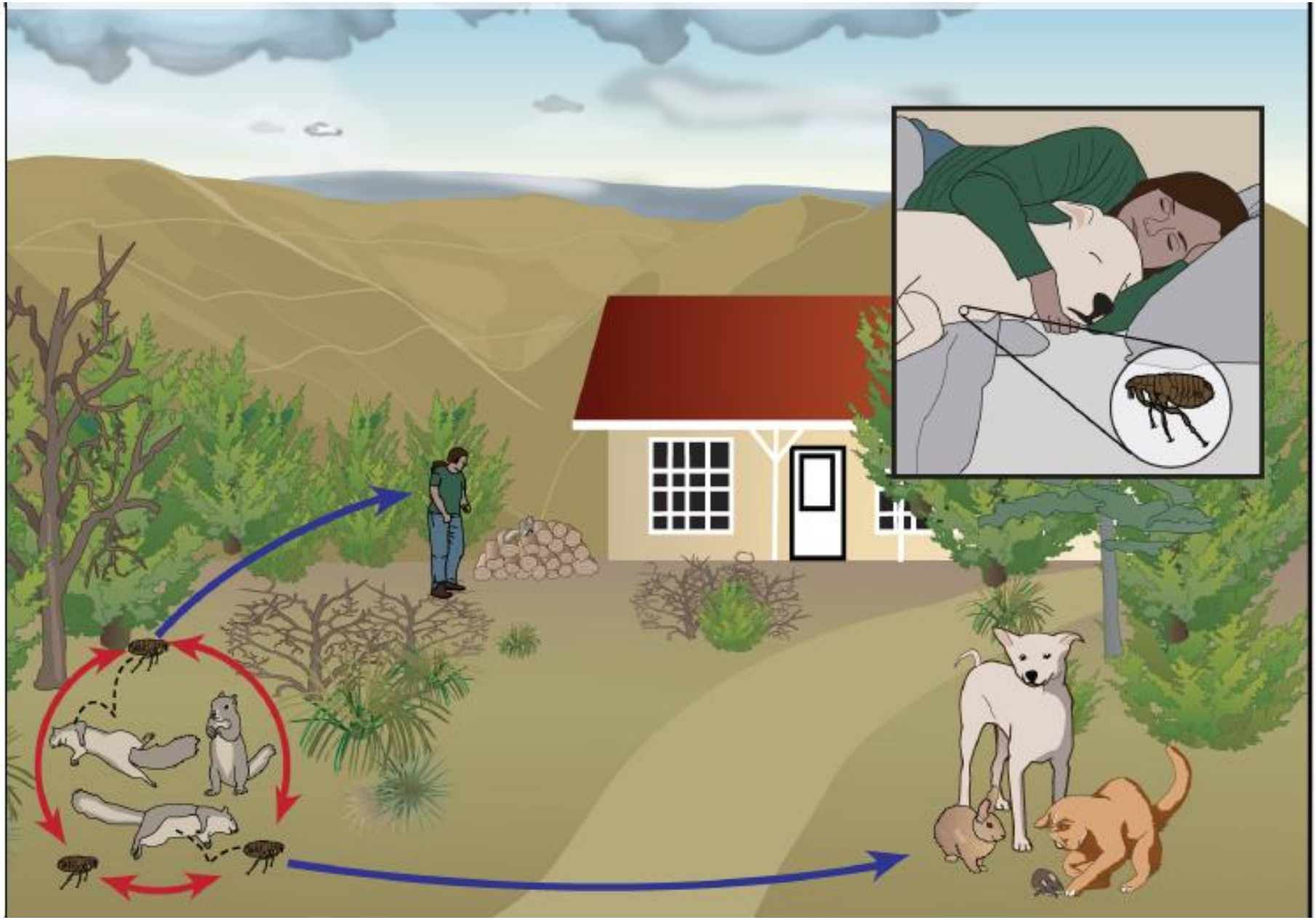
PLAGUE

LIVE WELL SAN DIEGO

PLAGUE

- **Caused by Yersinia pestis**
- **Reservoir - rodents**
- **Transmitted by fleas**
- **On every continent except Australia**

California ground squirrel
(*Spermophilus beecheyi*)



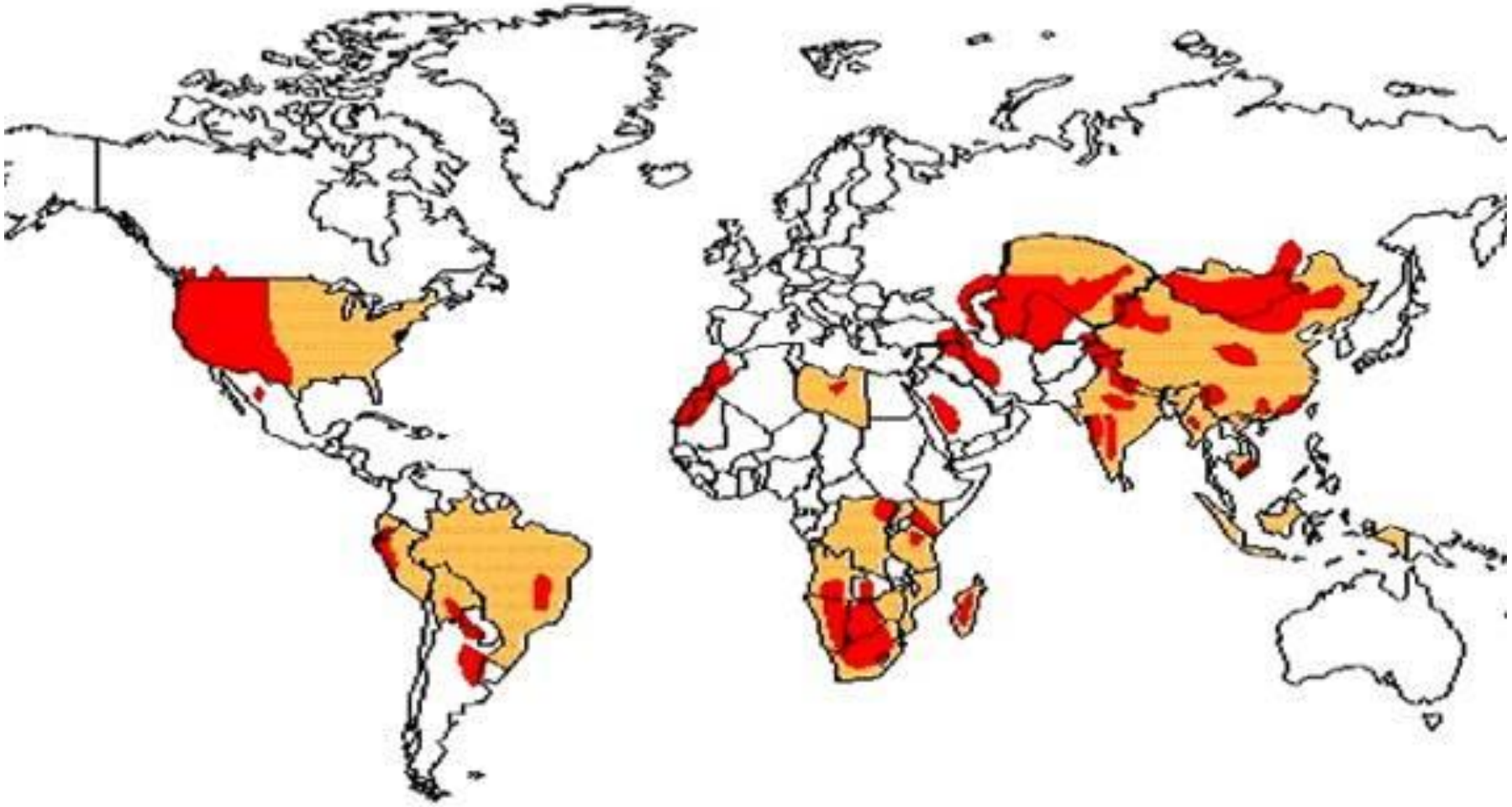
VECTOR

30 species are known vectors

- ***Xenopsylla cheopis*** (oriental rat flea; worldwide)
- ***Nosopsyllus fasciatus*** (worldwide)
- ***Oropsylla montanus*** (most important vector in US)
  - Hosts: California ground squirrels, prairie dogs
  - Will readily feed on humans
- **Cat and dog fleas not efficient vectors**

Photo: CDC

PLAGUE – WORLD

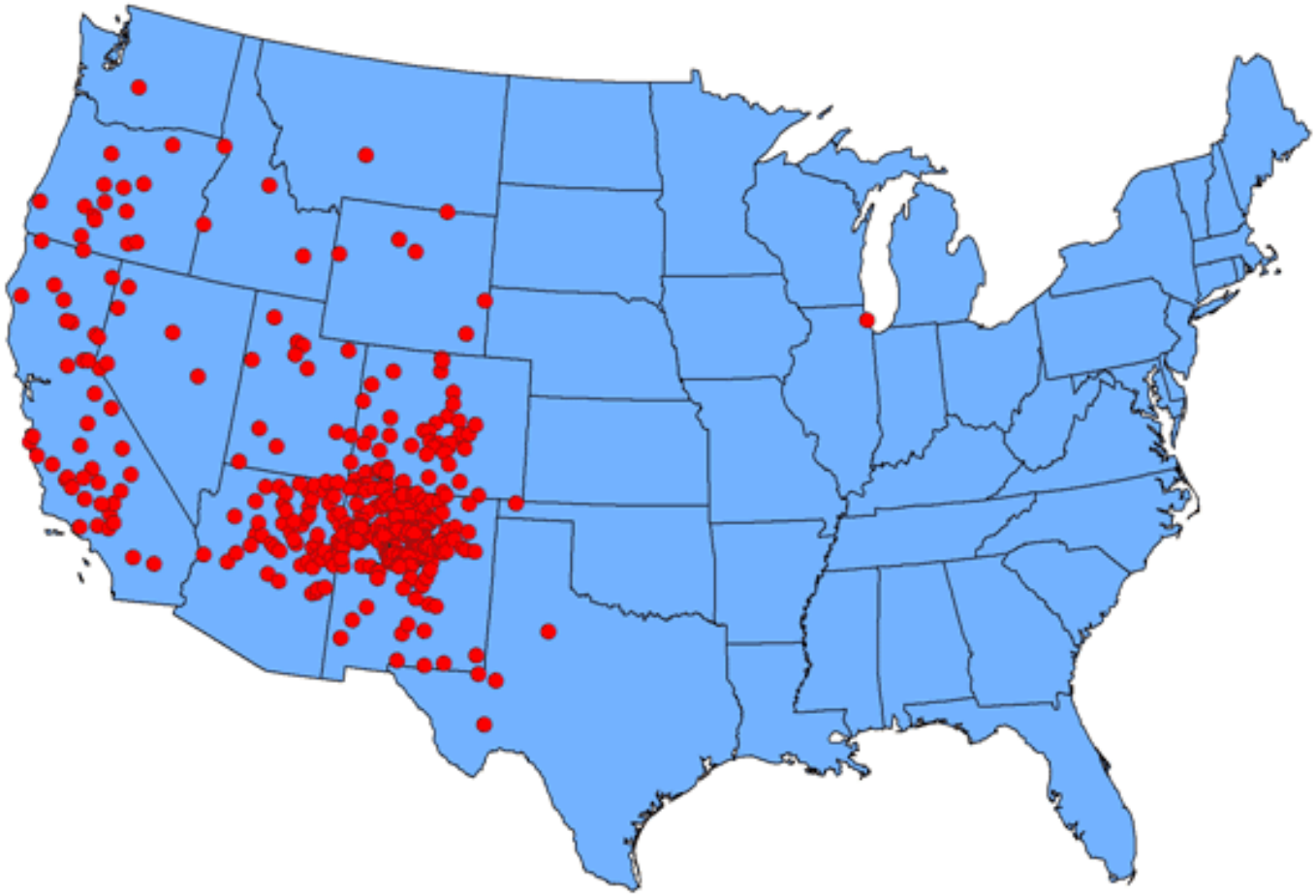


Orange – countries reporting plague **Red** – regions with plague vector Source: WHO 1998

PLAGUE – U.S.

LIVE WELL SAN DIEGO

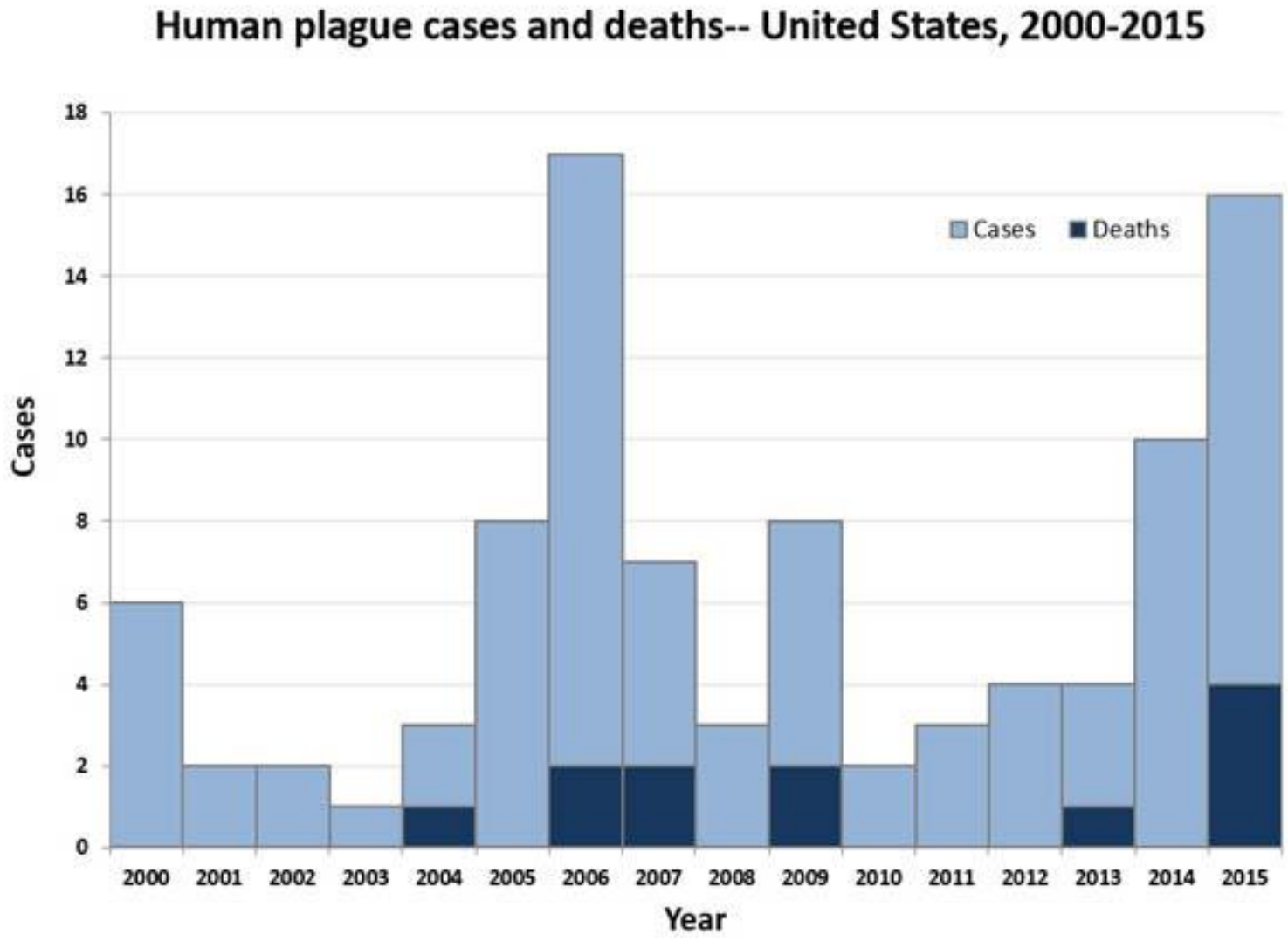
Reported cases of human plague--United States, 1970-2012



1 dot placed in county of exposure for each plague case

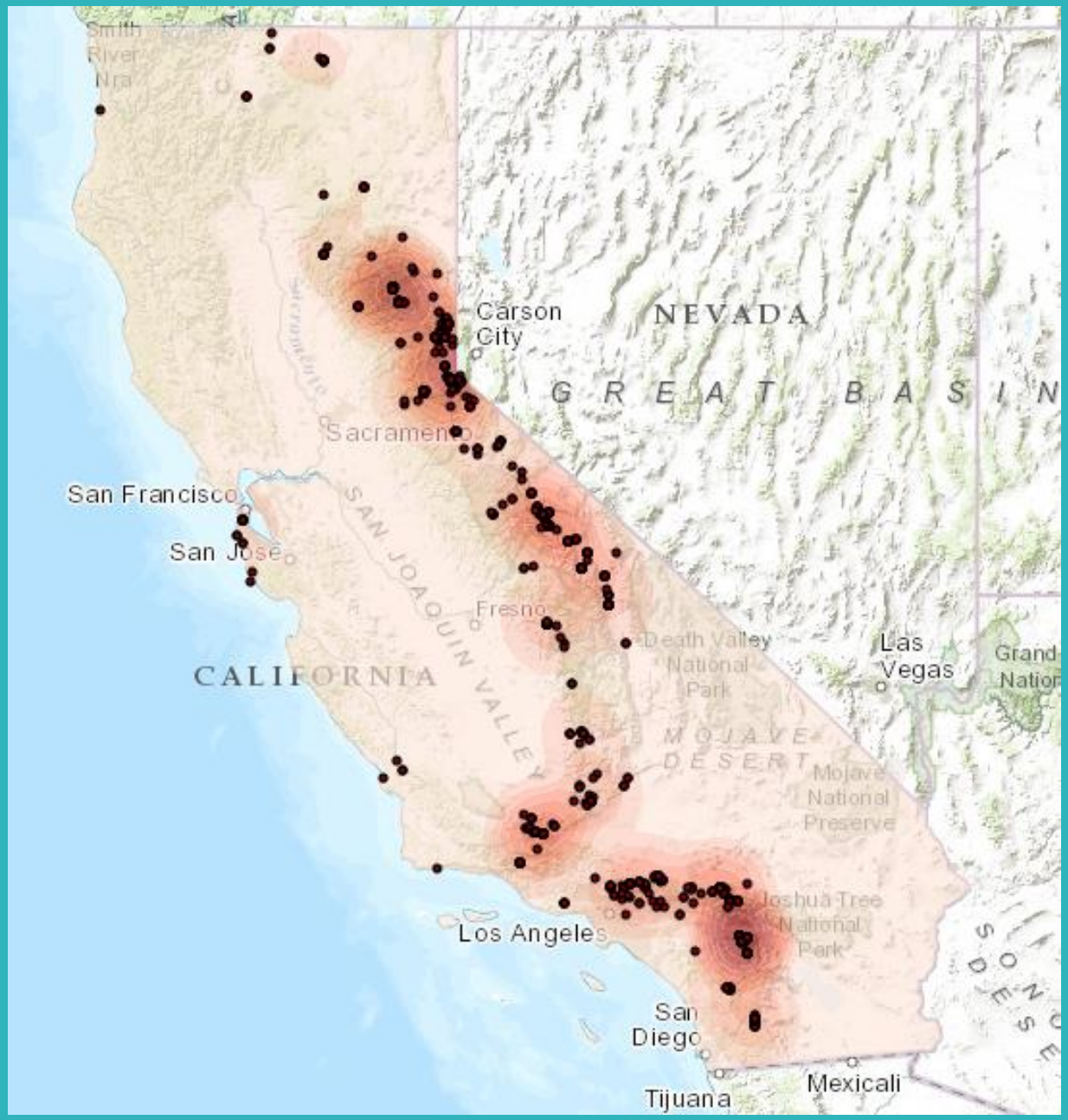
Downloaded 11/5/15 from http://www.cdc.gov/plague/maps/index.html

PLAGUE



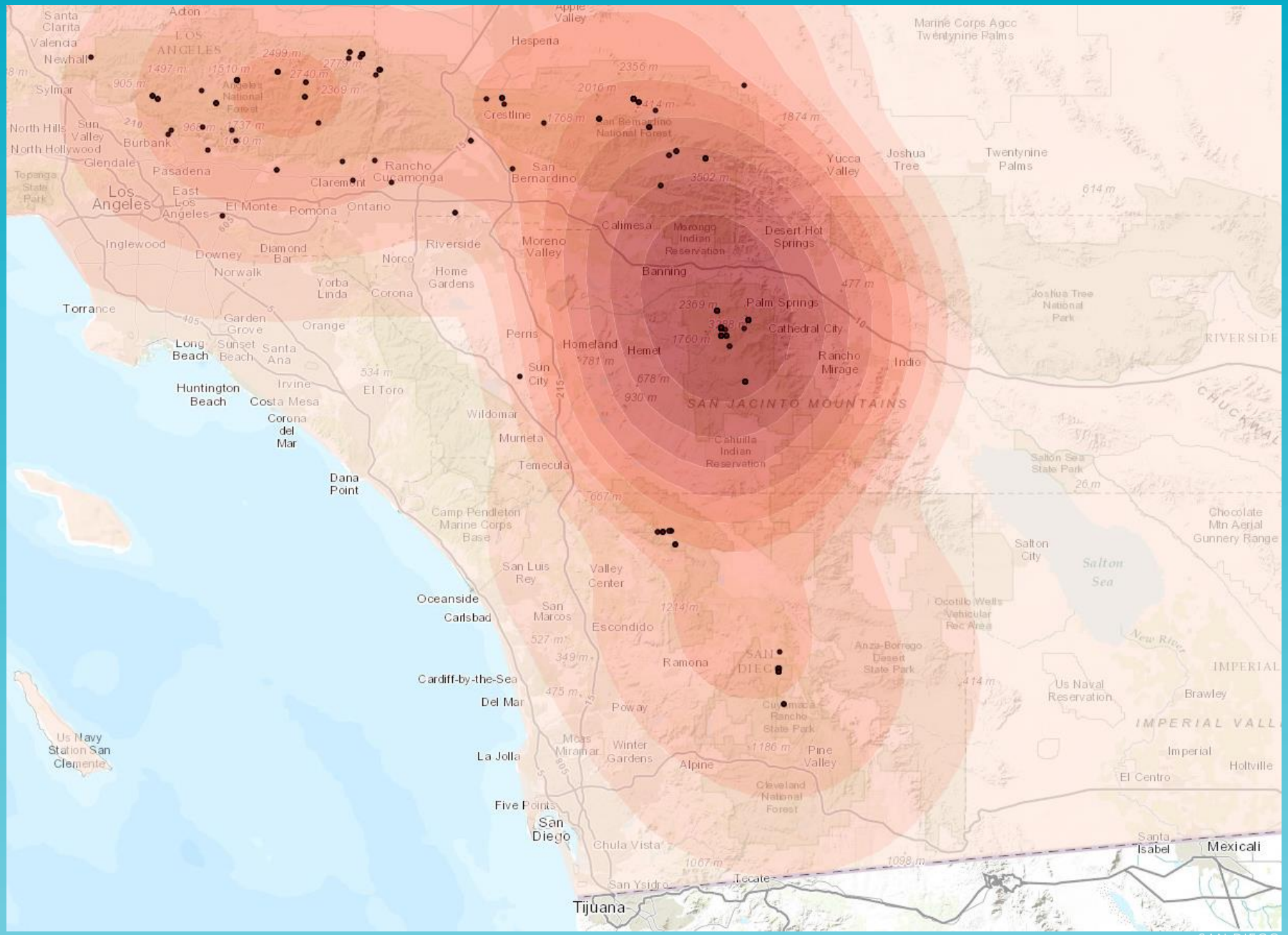
Source CDC. Downloaded 7/8/17 from: https://www.cdc.gov/plague/maps/index.html

Rodent Plague Surveillance in California



Interactive map available at http://www.cdph.ca.gov/HealthInfo/discond/Pages/Plague.aspx

Rodent Plague Surveillance in California



Interactive map available at http://www.cdph.ca.gov/HealthInfo/discond/Pages/Plague.aspx

PLAGUE

Bubonic plague – most common form

- Incubation is 2-8 days.
- Patients develop sudden onset of fever, headache, chills, and weakness and one or more swollen, tender and painful lymph nodes (called buboes).
- This form usually results from the bite of an infected flea.
- The bacteria multiply in the lymph node closest to where the bacteria entered the human body.
- If the patient is not treated with the appropriate antibiotics, the bacteria can spread to other parts of the body.

PLAGUE

Pneumonic plague – only form spread person-to-person

- Incubation for primary pneumonic plague 1-6 days, most often 2-4 days
- Patients develop fever, headache, weakness, and a rapidly developing pneumonia with shortness of breath, chest pain, cough, and sometimes bloody or watery mucous.
- Pneumonic plague may develop from inhaling infectious droplets or may develop from untreated bubonic or septicemic plague after bacteria spread to lungs.
- Pneumonia may cause respiratory failure and shock.
- Pneumonic plague is most serious form of disease.

PLAGUE

Septicemic plague:

- This form results from bites of infected fleas or from handling an infected animal, incubation 2-4 days.
- Septicemic plague can occur as first symptom of plague, or may develop from untreated bubonic plague.
- Patients develop fever, chills, extreme weakness, abdominal pain, shock, and possibly bleeding into skin and other organs.
- Skin and other tissues may turn black and die, especially on fingers, toes, and nose.

TESTING

- Bacterial cultures (sputum, blood, lymph node aspirate specimens) – should be handled in a Biosafety level 2 facility
- Wright, Giemsa or Wayson stain shows gram negative coccobacilli with bipolar “safety pin” appearance
- Organism grows slowly (48 for observable growth) on standard blood and Mac-Conkey agar
- Immunoflourescent staining for capsule (F1 antigen) is diagnostic
- SDPHL can do PCR testing!

TREATMENT

Strict respiratory isolation with droplet precautions (gown, glove, and eye protection) until patient has received at least 48 hours of antibiotics and shows clinical improvement

Streptomycin (15 mg/kg bid) is historically preferred but may be hard to obtain.

Gentamycin under an IND protocol (consult with ID and CDC)

Chloramphenicol for plague meningitis

Doxycycline and ciprofloxacin are used in prophylaxis for seven days after exposure to a case.

COUNTYNEWSCENTER
DIRECT TO YOU FROM THE COUNTY OF SAN DIEGO

September 15, 2017

HEALTH

Squirrel Tests Positive for Plague Near Palomar Mountain

File image

By Gig Conaughton, County of San Diego Communications Office
Sep. 15, 2017 | 1:44 PM

A ground squirrel trapped in routine monitoring at the Cedar Grove Campground on Palomar Mountain has tested positive for plague, San Diego County Vector Control officials said Friday.

PREVENTION


PLAGUE
WARNING
Chipmunks, ground squirrels or other wild rodents in this area may be infected with plague. Plague may be transmitted to humans by the bite of an infected flea or by handling an infected animal.
USE THESE PRECAUTIONS:
1. Avoid all contact with chipmunks, squirrels or other wild animals - DO NOT FEED.
2. Do not camp, rest, or sleep near animal burrows. AVOID ANIMAL FLEAS.
3. Keep pets on a leash. Treat your pets with flea powder and flea collar or LEAVE PETS HOME.
4. See a physician if you become
THE DISEASE IS

MURINE TYPHUS

Photo: CDC

LIVE WELL SAN DIEGO

MURINE TYPHUS

Acute febrile illness caused by *Rickettsia typhi*, is distributed worldwide.

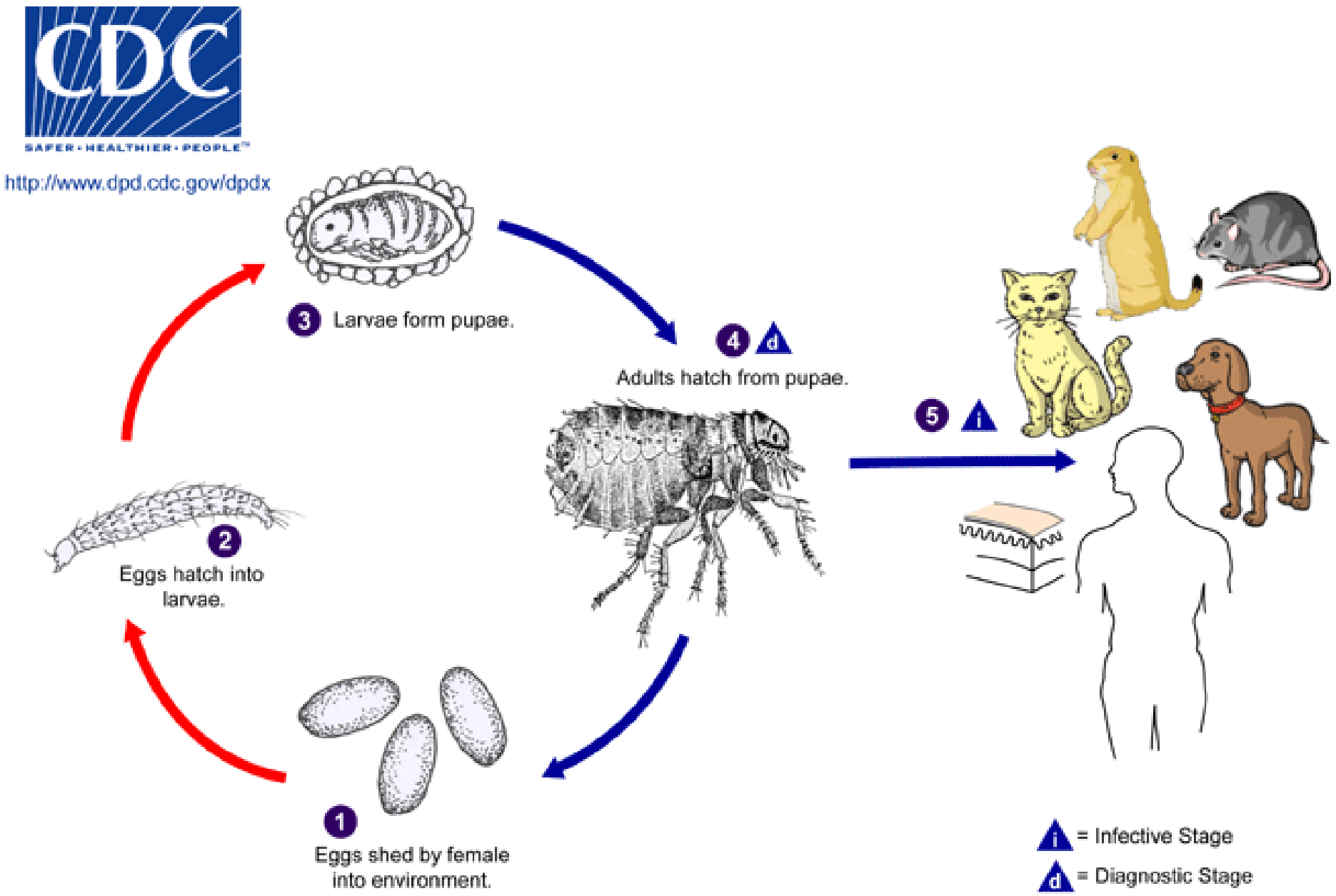
Mainly transmitted by fleas of rodents, associated with cities and ports where urban rats *(Rattus rattus* and *Rattus norvegicus)* are abundant.

In the US, cases are concentrated in TX and CA.

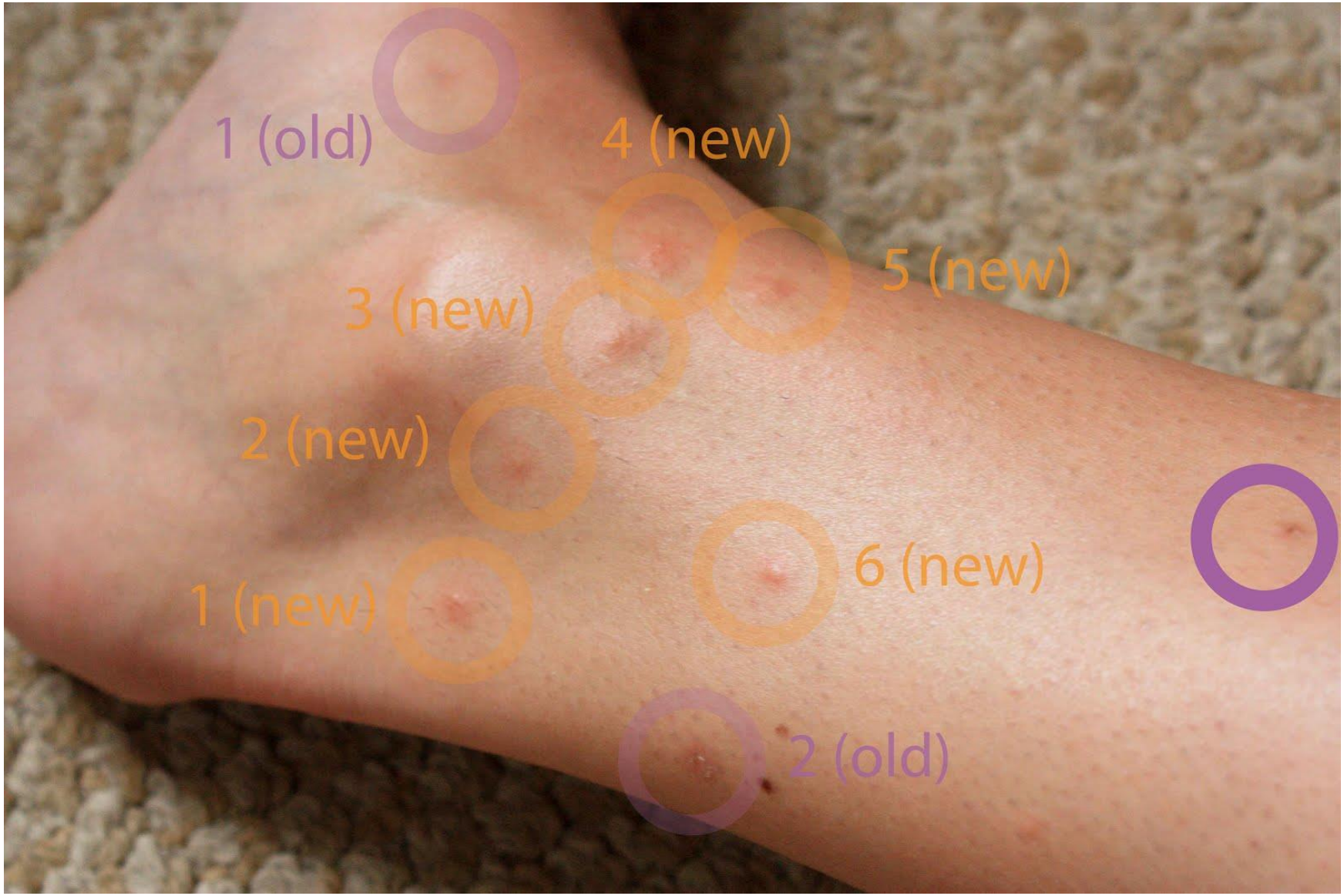
Contrary to the classic rat-flea-rat cycle, most important reservoirs of infection in these areas are opossums and cats.

Cat flea, *Ctenocephalides felis*, has been identified as principal vector.

Photo: CDC


CDC
SAFER · HEALTHIER · PEOPLE™
http://www.dpd.cdc.gov/dpdx
3 Larvae form pupae.
4 d
Adults hatch from pupae.
5 i
2
Eggs hatch into larvae.
1
Eggs shed by female into environment.
i = Infective Stage
d = Diagnostic Stage

FLEA BITES?



MURINE TYPHUS

TX: murine typhus cases occur in spring and summer.

CA: cases have been documented in summer and fall.

Most patients present with fever, and many have rash and headache.

Studies reporting clinical findings associated with murine typhus.

Clinical finding	Range of occurrence, %	References
Fever	98–100	[4, 13, 30–34]
Headache	41–90	[4, 13, 30–34]
Rash	20–80	[4, 13, 30–34]
Arthralgia	40–77	[4, 13, 30–34]
Hepatomegaly	24–29	[13, 30, 31, 33]
Cough	15–40	[4, 13, 30, 32–34]
Diarrhea	5–40	[4, 13, 30–34]
Splenomegaly	5–24	[13, 30, 31, 33]
Insect bite	0–39	[4, 30–34]
Nausea and/or vomiting	3–48	[4, 13, 30–34]
Abdominal pain	11–60	[4, 13, 30–32, 34]
Confusion	2–13	[4, 13, 30–34]

Rachel Civen, and Van Ngo Clin Infect Dis. 2008;46:913-918

Clinical Infectious Diseases

MURINE TYPHUS

Serologic testing with the indirect immuno-fluorescence assay is the preferred diagnostic method. (Do this through PHL!)

Doxycycline is the antibiotic of choice and has been shown to shorten the course of illness.

HEALTH

Typhus Case Prompts Flea Protection Warning

Image Credit: courtesy of Katja ZSM

By Gig Conaughton, County of San Diego Communications Office
Jun. 1, 2018 | 9:16 AM

MURINE TYPHUS

- **In addition to using flea-control products on pets, the public can also protect themselves and their pets by keeping rodents and animals away from their homes, workplaces and recreational areas.**

- **Remove brush, rock piles, junk, cluttered firewood and food supplies — especially pet food.**

- **Use Environmental Protection Agency (EPA)-registered insect repellent labeled for use against fleas if they think they could be exposed to fleas during activities such as camping, hiking, or working outdoors.**

- **Permethrin can be used to treat clothing and outdoor gear, but it should not be used on skin**

For more information contact:

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Public Health Services
County of San Diego Health and Human Services Agency

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