YES, WE DO HAVE TICKS IN WASHINGTON:
WHY THAT'S IMPORTANT AND WHAT YOU
SHOULD KNOW

Liz Dykstra, PhD, BCE
Public Health Entomologist
Agenda

• Tick-borne disease in Washington
• Tick Surveillance in Washington
• Common Species
• Pathogen Findings
• Protective Measures
Historical Pathogen Identifications

- Human and canine case reports of Lyme disease in WA, OR, CA, and BC
- Anaplasmosis reported in canines in WA, OR, CA, and BC; human case reports from CA
- Babesiosis reported in humans in WA and CA
- Rocky Mountain Spotted Fever (RMSF) historically reported in WA
- (Soft tick transmitted) Tick-borne relapsing fever (TBRF) commonly reported in WA*
- Tularemia commonly reported in WA, but not usually thought to be tick-borne
- Clinical under-recognition and under-reporting are suspected

*No reported (hard tick transmitted) TBRF cases (caused by Borrelia miyamotoi)
Reported Tick-Borne Disease Cases in Humans, Washington, 2018-2019

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tick-borne relapsing fever</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lyme disease</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>Tularemia**</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Spotted Fever Rickettsiosis</td>
<td>0</td>
<td>3*</td>
</tr>
<tr>
<td>Tick Paralysis</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*First locally-acquired confirmed case of *R. rickettsii* in ~20 years
**None tick-related
Other Tick-borne Diseases

- Anaplasmosis
  - Anaplasma phagocytophilum
  - Only reported in dogs in Washington

- Hard tick-borne Relapsing fever
  - Borrelia miyamotoi
  - No reported cases in Washington
Washington State Tick Surveillance Project

- Increase our understanding of tick species populations and distribution and risk of tick-borne diseases in Washington through collection, identification, and testing of ticks for pathogens of interest.

- Raise awareness of tick-bite and tick-borne disease risk.

- Tick-borne disease case investigations.
Tick-borne Disease Surveillance

Note: The life cycle of a 3-host tick may take 1-2 years depending on whether or not the tick can find a suitable host between life stages.

1. Female tick lays eggs on ground.

2. Six-legged larva feeds on a small mammal, then drops off to the ground and molts.

3. Eight-legged nymph feeds on a small mammal, then drops off to the ground and molts.

4. Eight-legged adults feed and mate on a larger mammal, including livestock and pets, then drop off to the ground. Males die soon thereafter and females begin to develop eggs.
Tick Surveillance Results
2011 - 2016

>9,000 ticks collected
  - 4 genera
  - 10 species

>5,400 ticks collected from 38 vertebrate hosts
Results – 2011-2016

977 unfed, field-collected ticks from 52 sites in 19 counties
  - *I. pacificus*
  - *D. variabilis*
  - *D. andersoni*
  - *I. angustus*
  - *I. spinipalpis*
  - *I. auritulus*

62% of ticks were collected during March through May
Seasonal Tick Activity

- Number Ticks Collected
- Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
Ixodes pacificus

- Lyme Disease - *Borrelia burgdorferi s.s.*
- Hard Tick-borne Relapsing Fever - *B. miyamotoi*
- Anaplasmosis - *Anaplasma phagocytophilum*
Dermacentor andersoni & D. variabilis

- Rocky Mountain spotted fever - *Rickettsia rickettsii*
- Tularemia - *Francisella tularensis*
Rhipicephalus sanguineus

Brown Dog Tick
(Rhipicephalus sanguineus)

- Rocky Mountain spotted fever - *Rickettsia rickettsii*
Ornithodoros hermsi

- Tick-borne Relapsing Fever
  - Borrelia hermsii

Schwan TG et al., *Emerg Infect Dis*, 2007
## Pathogen detections 2011-2016

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>I. angustus</th>
<th>I. pacificus</th>
<th>I. spinipalpis</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Anaplasma phagocytophilum</em></td>
<td>0/95</td>
<td>5/258 (1.9%)</td>
<td>1/234 (0.4%)</td>
</tr>
<tr>
<td><em>Borrelia species</em></td>
<td>1/98 (1.0%)</td>
<td>4/379 (1.1%)</td>
<td>2/235 (0.9%)</td>
</tr>
<tr>
<td><em>Borrelia bissettiae</em></td>
<td>0/41</td>
<td>0/205</td>
<td>1/64 (1.6%)</td>
</tr>
<tr>
<td><em>Borrelia burgdorferi s.l.</em></td>
<td>1/99 (1.0%)</td>
<td>22/421 (5.2%)</td>
<td>4/235 (1.7%)</td>
</tr>
<tr>
<td><em>Borrelia burgdorferi s.s.</em></td>
<td>0/45</td>
<td>15/354 (4.2%)</td>
<td>0/66</td>
</tr>
<tr>
<td><em>Borrelia lanei</em></td>
<td>0/41</td>
<td>0/205</td>
<td>2/64 (3.1%)</td>
</tr>
<tr>
<td><em>Borrelia miyamontoi</em></td>
<td>0/42</td>
<td>10/227 (4.4%)</td>
<td>0/69</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>D. andersoni</th>
<th>D. variabilis</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Rickettsia species</em></td>
<td>0/26</td>
<td>2/46 (4.3%)</td>
</tr>
<tr>
<td><em>Rickettsia peacocki</em></td>
<td>8/22 (36%)</td>
<td>2/42 (4.8%)</td>
</tr>
<tr>
<td><em>Rickettsia rhipicephali</em></td>
<td>2/22 (9.0%)</td>
<td>1/42 (2.4%)</td>
</tr>
</tbody>
</table>
Pathogens
Ap = Anaplasma phagocytophilum
Bb = Borrelia burgdorferi
Bmiy = Borrelia miyamotoi
Ft = Francisella tularensis
R = non-pathogenic Rickettsia species
Reservoir Hosts in WA

- **Borrelia burgdorferi s.s.**
  - Deer mice (Peromyscus maniculatus)
  - Western gray squirrel (Sciurus griseus)
  - Tamias spp. Chipmunks

- **Anaplasma phagocytophilum**
  - Tamias spp. Chipmunks
## Tick-borne Diseases of WA

<table>
<thead>
<tr>
<th>Disease</th>
<th>Agent in WA</th>
<th>Ever identified in locally-exposed humans</th>
<th>Ever identified in vectors in WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyme disease</td>
<td><em>Borrelia burgdorferi</em> s.s.</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Tick-borne relapsing fever</td>
<td><em>Borrelia hermsii</em></td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Tularemia</td>
<td><em>Francisella tularensis</em></td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Rocky Mountain Spotted Fever</td>
<td><em>Rickettsia rickettsii</em></td>
<td>YES</td>
<td>YES^</td>
</tr>
<tr>
<td>Babesiosis</td>
<td><em>Babesia duncani, Babesia divergens</em>-like organism</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Anaplasmosis</td>
<td><em>Anaplasma phagocytophilum</em></td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>B. miyamotoi infection</td>
<td><em>Borrelia miyamotoi</em></td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

^Personal communication only, not confirmed by DOH
Avoiding Tick Bites

• Wear long pants and a long-sleeved shirt. Tuck your pant legs into socks or boots and shirt into pants.
• Wear light-colored, tightly woven clothing.
• Use tick repellent when necessary.
• Check yourself, your children, and your pets thoroughly for ticks
• Shower or bathe (preferably within two hours after being in tick habitat).
Properly Removing A Tick

- After removing the tick, disinfect the bite site and wash your hands.
- Send your tick to DOH for identification using form & directions at www.doh.wa.gov/ticks
Tick Management

• Focus on areas frequently used by your family
• Use brick, paving, decking, gravel, container plantings, and low water requirement plants to encourage bright sunny areas immediately around your home.
• Keep grass mowed and shrubs trimmed.
• Keep dogs and cats out of the woods.
• Widen woodland trails.
• Move swing sets, sand boxes, and other children play areas away from the edge of woods and place them on a wood chip or mulch foundation.
• Use plantings that don't attract deer or exclude deer through fencing.
• Control rodents in and around your home.
Resources

Washington State Department of Health
www.doh.wa.gov

Centers for Disease Control & Prevention
www.cdc.gov/ticks/index.html

Connecticut Agricultural Experiment Station’s
Tick Management Handbook Cdc-pdf
Acknowledgments

WA DOH

Hanna Oltean
Amy Salamone
David Kangiser
Anne Duffy
Questions?

Elizabeth.Dykstra@doh.wa.gov