CWD Diagnostics and Surveillance

Hank Edwards – Wildlife Health Laboratory
Wildlife Health Laboratory

• Small laboratory located within the Wyoming State Veterinary Laboratory complex

• Wildlife disease diagnostics/surveillance
  • Statewide disease tracking/monitoring in all wildlife
  • Brucellosis surveillance and testing in elk and bison
  • Chronic wasting disease surveillance and testing
  • Respiratory disease in bighorn sheep
  • 9,000-10,000 samples/year
CWD Testing

- Federally regulated (NAHLN)
  - USDA/APHIS approved laboratory
  - Approved test methods (ELISA and IHC)
  - Standardized testing and QA/QC procedures/policies
  - Field test unlikely

- Diagnostic tissues:
  - Retropharyngeal LN
  - Obex (brain stem)
Approved CWD Assays

• **ELISA**
  • Rapid (~6 hours for tissue processing and testing)
  • Capacity of 200-300/day (5 lab personnel)
  • $30.93/sample (test, consumables, temporary help)
  • All samples tested at WGFD Wildlife Health Laboratory

• **IHC**
  • Confirmation on positives from nonendemic hunt areas

• **WSVL**
CWD Testing

• Reporting
  • Testing completed < 3 weeks from collection/submission
  • Results available on website
  • Notification letter sent to each hunter harvesting CWD positive animal

• Testing Capacity
  • Currently limited to 8,000/year
  • Expansion capacity to 15,000/year
CWD Surveillance

- **Hunter-kill**
  - Random sampling of harvested animals
  - Good for determining prevalence in a given area
  - ~90% Surveillance

- **Road-kill**
  - Biased towards CWD positive animals
  - Cost effective surveillance for detection in new areas
  - ~5% Surveillance

- **Targeted**
  - Animals showing signs of CWD (emaciation, excessive salivation, etc..)
  - Ideal detection method in new areas
  - ~5% Surveillance
CWD Surveillance

• Generally focused on disease detection in new areas and a few historic endemic hunt areas

• 65,399 total samples since 1997...
  • 40,477 Mule deer
  • 7,420 White-tailed deer
  • 16,381 Elk
  • 1,121 Moose

• Insufficient 5 yr prevalence data for most herd units
Chronic Wasting Disease (CWD) Prevalence in Hunter Harvested Adult Buck Mule Deer by Herd Unit 2014-2018

* Sample size is too low for estimation of prevalence

This map depicts prevalences calculated from 2014-2018 data only, see distribution map for statewide distribution of CWD
Chronic Wasting Disease (CWD) Prevalence in Hunter Harvested Adult Buck White-Tailed Deer by Herd Unit 2014-2018
Chronic Wasting Disease (CWD) Prevalence in Hunter Harvested Adult Elk by Herd Unit 2014-2018

*Sample size is too low for estimation of prevalence

This map depicts prevalences calculated from 2014-2018 data only, see distribution map for statewide distribution of CWD

Wyoming Game and Fish Department Wildlife Health Laboratory

CWD Prevalence
- 0%
- >0% - 5%
- >5% - 10%
- >10% - 20%
- >20%
- Insufficient Sample Size*
- No Data Available

*Sample size is too low for estimation of prevalence
2019 CWD Surveillance

• Shift from detection to monitoring prevalence
  • Better understanding of population impacts and ability to evaluate future management actions

• Balance laboratory capacity with disease surveillance requirements

• 5 year rotational sampling strategy
  • Hunter-harvested animals only
  • Focus on adequate sample sizes
    • Goal of 200 samples/herd unit
Adequate Sample Sizes for CWD Surveillance

<table>
<thead>
<tr>
<th>Confidence</th>
<th>1% Prevalence</th>
<th>2% Prevalence</th>
<th>5% Prevalence</th>
<th>10% Prevalence</th>
<th>20% Prevalence</th>
<th>50% Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>98%</td>
<td>556</td>
<td>821</td>
<td>1584</td>
<td>2748</td>
<td>4670</td>
<td>7188</td>
</tr>
<tr>
<td>96%</td>
<td>139</td>
<td>206</td>
<td>396</td>
<td>687</td>
<td>1168</td>
<td>1797</td>
</tr>
<tr>
<td>90%</td>
<td>23</td>
<td>33</td>
<td>64</td>
<td>110</td>
<td>187</td>
<td>288</td>
</tr>
<tr>
<td>80%</td>
<td>6</td>
<td>9</td>
<td>16</td>
<td>28</td>
<td>47</td>
<td>72</td>
</tr>
<tr>
<td>60%</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>12</td>
<td>18</td>
</tr>
</tbody>
</table>


Based on 98% sensitivity, 99% specificity of the CWD ELISA
2019 CWD Surveillance

- Tiered approach to mule deer and elk herd units based on priority and sampling feasibility
  - Tier 1: 200 samples collected in one hunting season
  - Tier 2: 200 samples collected over 3 years
  - Tier 3: Opportunistic sampling

- Surveillance focused on adult male mule deer and adult elk
  - Focus on white-tailed deer in some areas
  - Opportunistic sampling of moose

- CWD sample collection available at Regional Offices for individual hunters requesting CWD testing
Weighted Surveillance in Nonendemic Areas

• Included in the 5-year surveillance rotation
• Outside rotation: Yearly focus on road-killed and targeted animals
• Surveillance based on point system: 230 points = 90% confidence / 300 points = 95%

<table>
<thead>
<tr>
<th>Group</th>
<th>Weight/Points</th>
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<tbody>
<tr>
<td>Mule Deer</td>
<td>13.6</td>
</tr>
<tr>
<td>Elk</td>
<td>18.75</td>
</tr>
<tr>
<td>Targeted female</td>
<td>11.5</td>
</tr>
<tr>
<td>Targeted male</td>
<td>8.57</td>
</tr>
<tr>
<td>Road kill (male or female)</td>
<td>1.9</td>
</tr>
<tr>
<td>Other Mortality</td>
<td>1.9</td>
</tr>
<tr>
<td>Harvested adult male</td>
<td>1</td>
</tr>
<tr>
<td>Harvested adult female</td>
<td>0.56</td>
</tr>
<tr>
<td>Harvested yearling male</td>
<td>0.33</td>
</tr>
<tr>
<td>Harvested yearling female</td>
<td>0.19</td>
</tr>
<tr>
<td>Harvested fawns or calves</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Walsh et al 2012
CWD Surveillance in Moose

• 2003-2018: 1,121 tested statewide
  • 767 Hunter-killed
  • 149 Road-killed
  • 205 Targeted
• 5 year average harvest of 340/year
• 2008: Positive targeted animal near Bedford
  • 2009-18: 296 tested
Other CWD Assays

- Primarily used in research
- PMCA – Protein misfolding cyclic amplification
- RT-QuIC – Real-time quaking-induced conversion
- Not performed at the Wildlife Health Laboratory

Diagram from Eric Minikel at CureFFI.org
Questions?