

# M. ovi strain virulence subcommittee

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- UT: Annette Roug
- ID: Frances Cassirer
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- AZ: Anne Justice-Allen
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- Pauline Kamath (conservation & disease geneticist)
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**Kezia's task for WSWG: Touch base with reps from other states/provinces about participation**

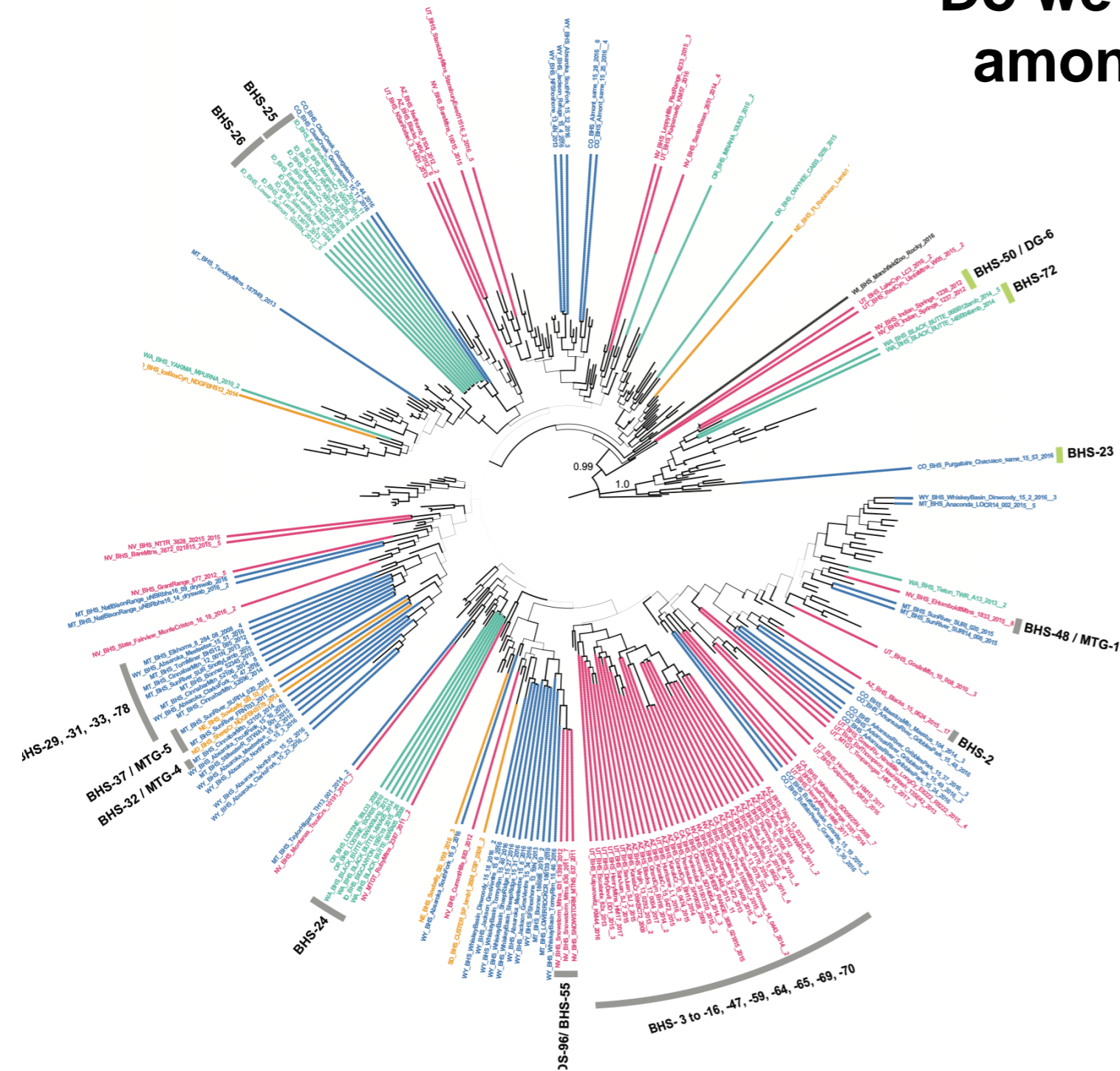
# M. ovi phylogeny



Kamath et al. (2019) Scientific Reports

# M. ovi phylogeny

Do we get cross-strain protection among closely-related strains?

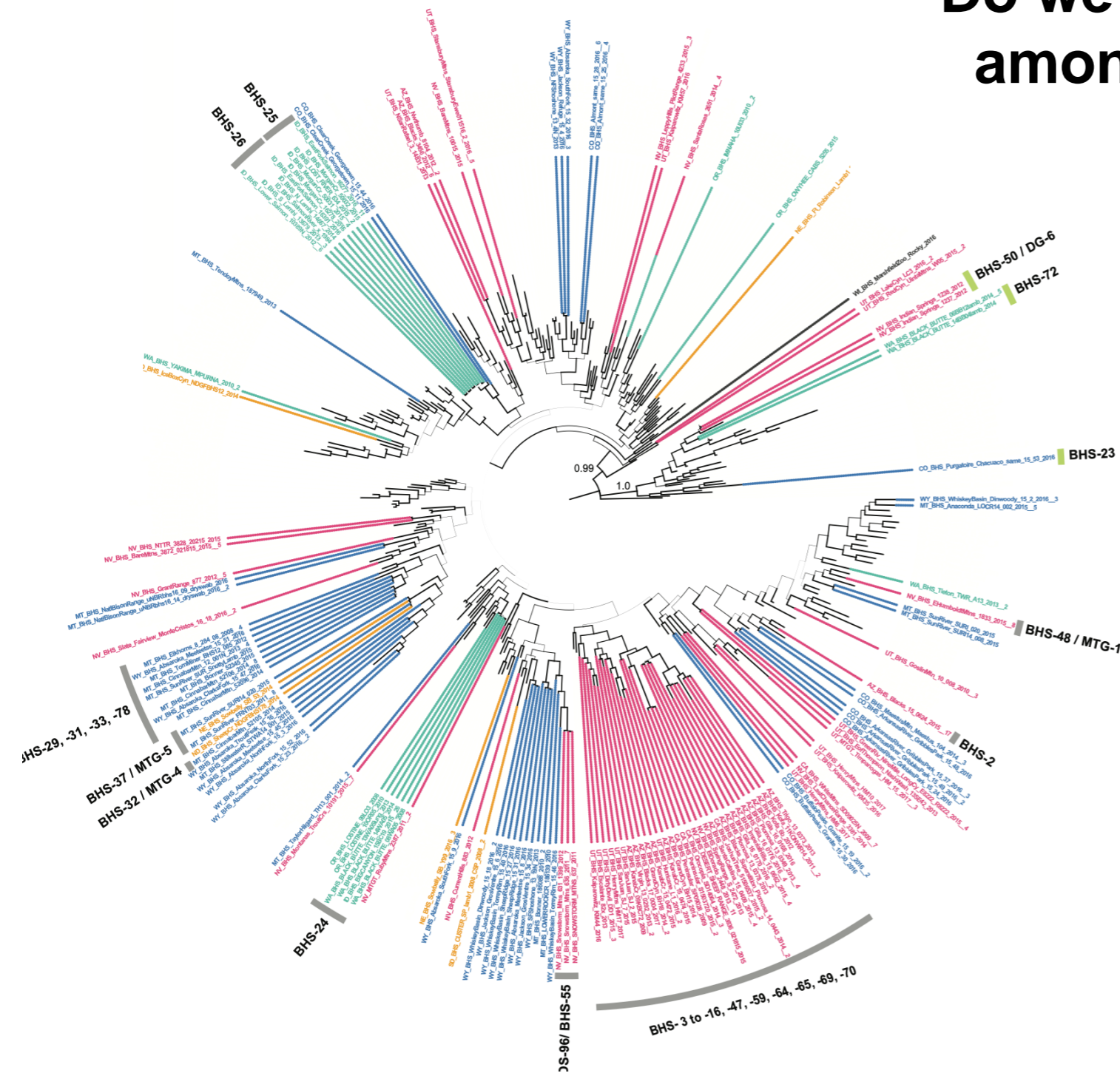


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Are strains from some parts of tree consistently “worse” for bighorn than strains from other parts?

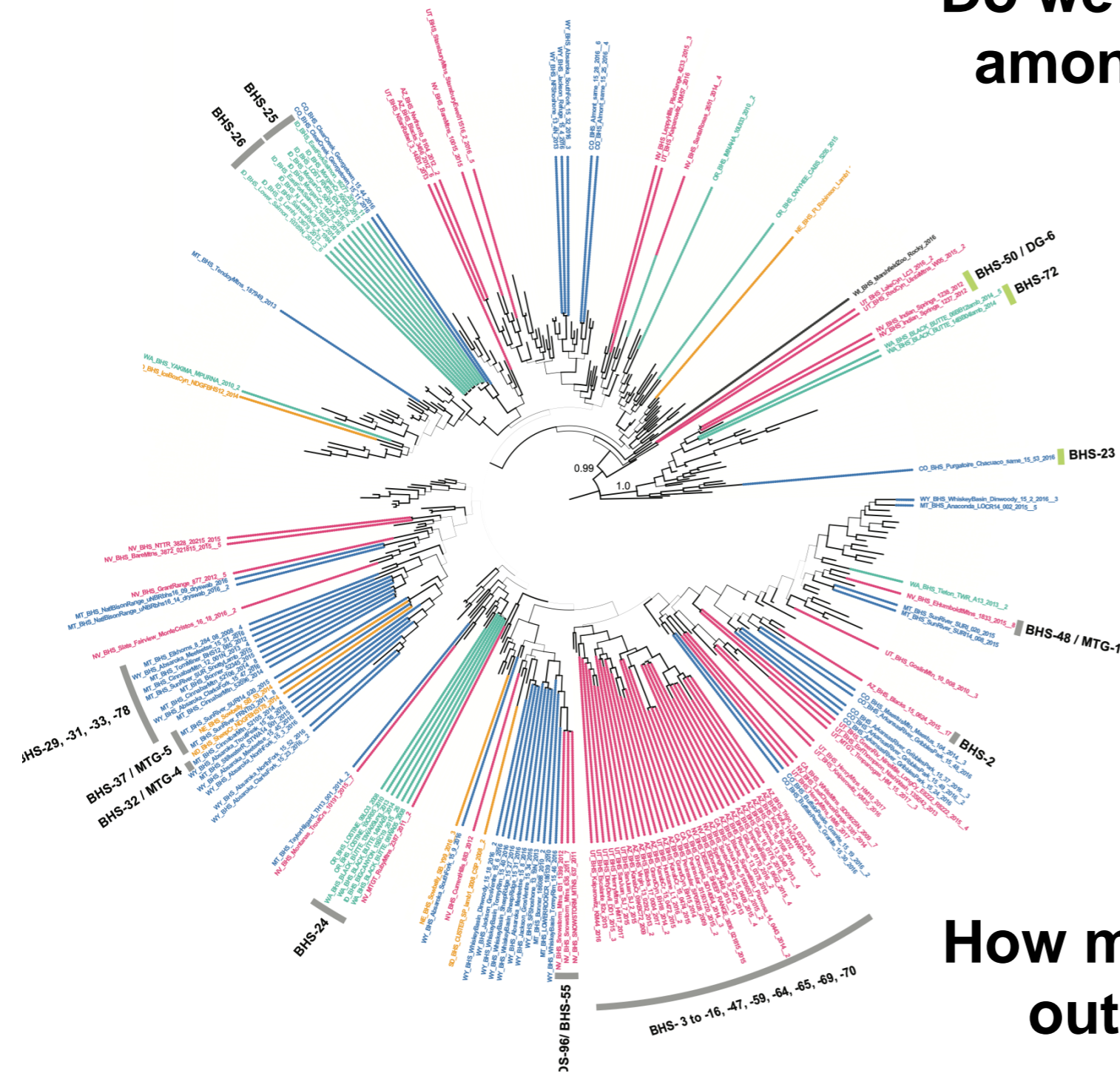


# M. ovi phylogeny

Do we get cross-strain protection among closely-related strains?

Are strains from some parts of tree consistently “worse” for bighorn than strains from other parts?

How much of the variation in disease outcomes is due to differences between strains?





# Approach

**“Virulence”  
measurements**

# Approach

## “Virulence” measurements

Disease\_Event\_All States Field Revisions 12\_1\_19

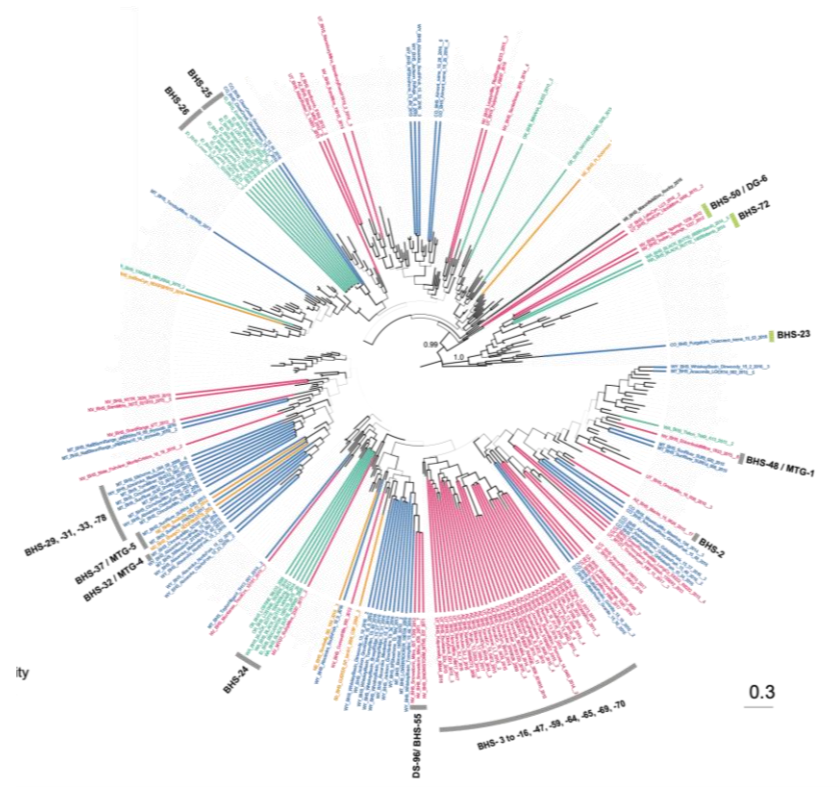
|   | A              | B           | C          | D       | E                  | F          | G                      | H                      | I                    |
|---|----------------|-------------|------------|---------|--------------------|------------|------------------------|------------------------|----------------------|
| 1 | State/Province | Begin Month | Begin Year | Herd_No | Location/Herd Name | Subspecies | Native or Reintroduced | Pop Trend Before Event | Pop Est Before Event |
| 2 | Alberta        | September   | 1978       |         | Sheep River        | Rocky Mtn  | Native                 |                        | 13                   |
| 3 | Alberta        | October     | 2000       | 94      | Sheep River        | Rocky Mtn  | Native                 |                        | 10                   |
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| 5 | Alberta        | November    | 1985/86    |         | Sheep River        | Rocky Mtn  | Native                 |                        | 17                   |

# Approach

“Virulence” measurements ~ Strain’s location in *M. ovi* tree

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# Approach



“Virulence”  
measurements ~

Strain’s location in  
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Disease\_Event\_All States Field Revisions 12\_1\_19

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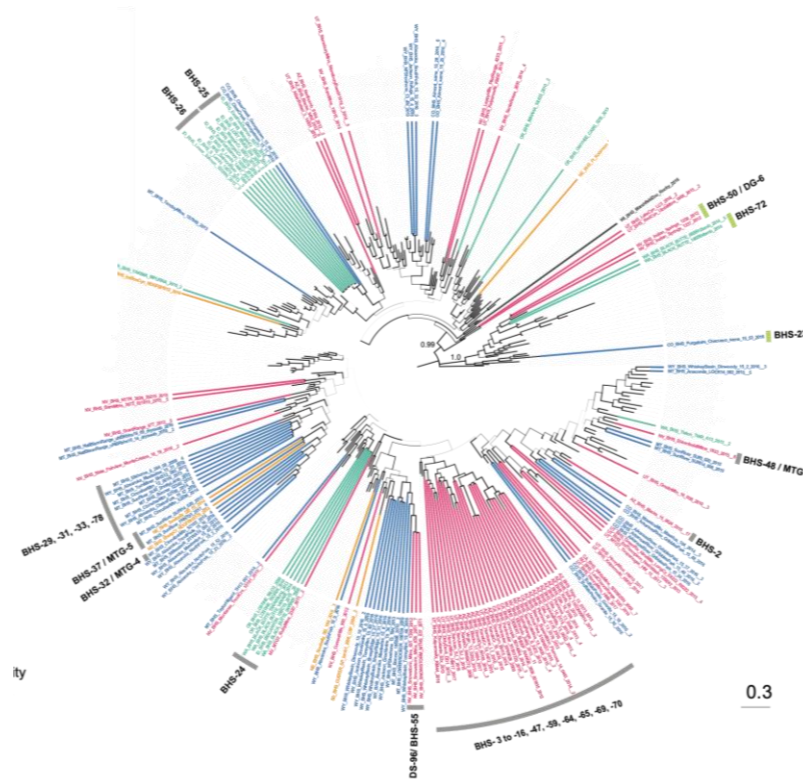
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fx State/Province

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+ Disease Events Herds with Lamb Recovery H Explore

# Approach



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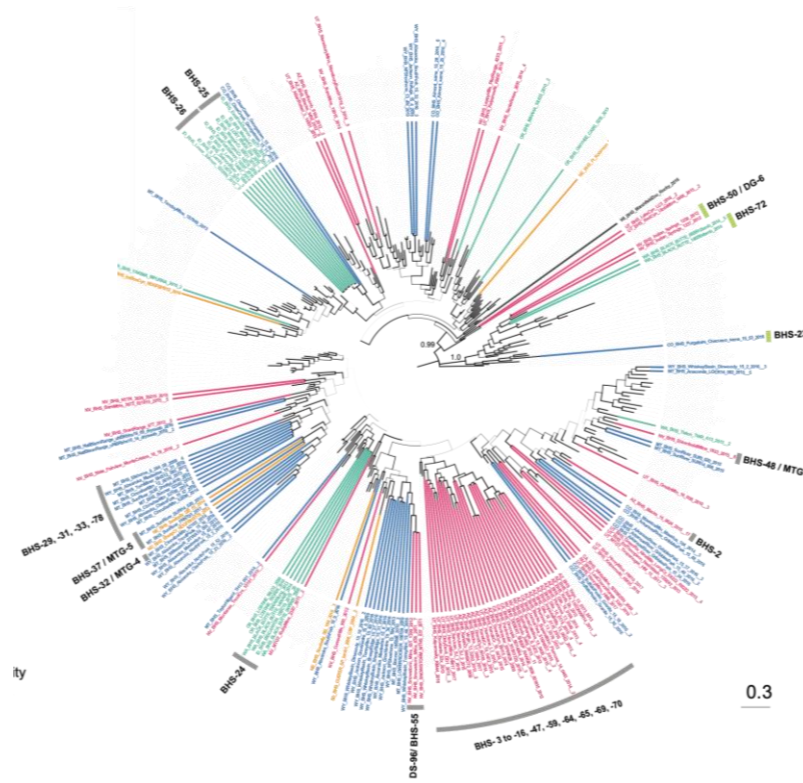
+

Everything  
else we can fit  
in

Disease\_Event\_All States Field Revisions 12\_1\_19

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- Subspecies
- Heterozygosity/other
- Translocation history Other pathogens
- Sinus tumors —little data
- Drought/other environment

# Resources

**WSF funding to support data aggregation and initial modeling**

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**Two big tasks:**

- 1) Help folks who need it to compile west-wide disease data**



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  - If you've got a good person who could do this, please contact me
  - Happy to set up data sharing agreements with any jurisdictions that need them

# Immediate goals

- Map *M. ovi* strains by herd
- Compare demographic responses for well-studied herds to describe the relationship between strain type and:
  - Die-off size
  - Post-die-off population growth
- Build document that describes current knowledge / knowledge gaps around *M. ovi* virulence

# Questions for the group

- Ideas on how to measure strain severity/virulence?
  - % decline in die-off
  - Years of poor recruitment
  - ???
- Thoughts re: additional key determinants of disease “severity” that should be included?
- What else have we forgotten?

Goal:

# Set up methods/data to address the following

- Determine whether / how often novel *M. ovi* strain introductions pose big threats to already infected herds
- Describe current distribution of *M. ovipneumoniae* strain types and demographic responses for bighorn herds west-wide.
  - Estimated die-off size,
  - Lamb:ewe ratio in the five years following a die-off
  - Duration of persistence
- How much of the demographic response can be explained by variation in *M. ovi* strain virulence?

Other ideas??