

**Epidemiology and Genetic  
Analysis of  
Lymphoproliferative  
Disease Virus (LPDV) of  
Wild Turkeys (*Meleagris  
gallopavo*) in New York**

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## Lymphoproliferative Disease Virus (LPDV)

- Rarest of three oncogenic avian retroviruses
- In domestic flocks, rapid clinical course with few signs prior to death and high flock mortality
- Signs of disease in wild birds:
  - External tumors on head, neck, and feet, similar to pox
  - Internal lesions on spleen, liver, thymus, and other organs
- Many birds appear asymptomatic (lack gross lesions)

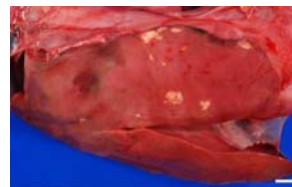
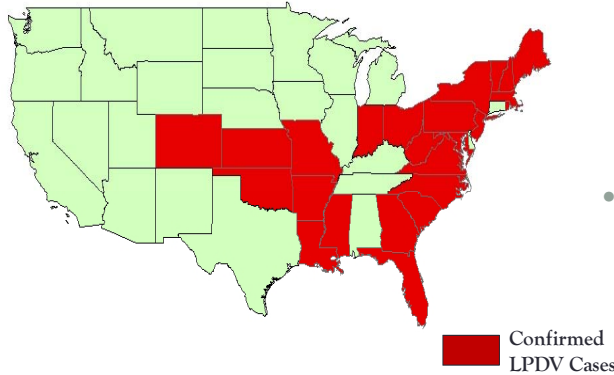


Photo credit: Allison, et. al (2014) - Virology, 450-451, 2-12

## LPDV in Wild Turkeys

- First detection in wild turkeys by Southeastern Cooperative Wildlife Disease Study (SCWDS) in 2009

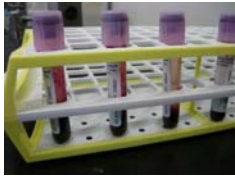


- Widespread - estimated prevalence for states ranges from 25-85%
- Virus appears endemic in United States

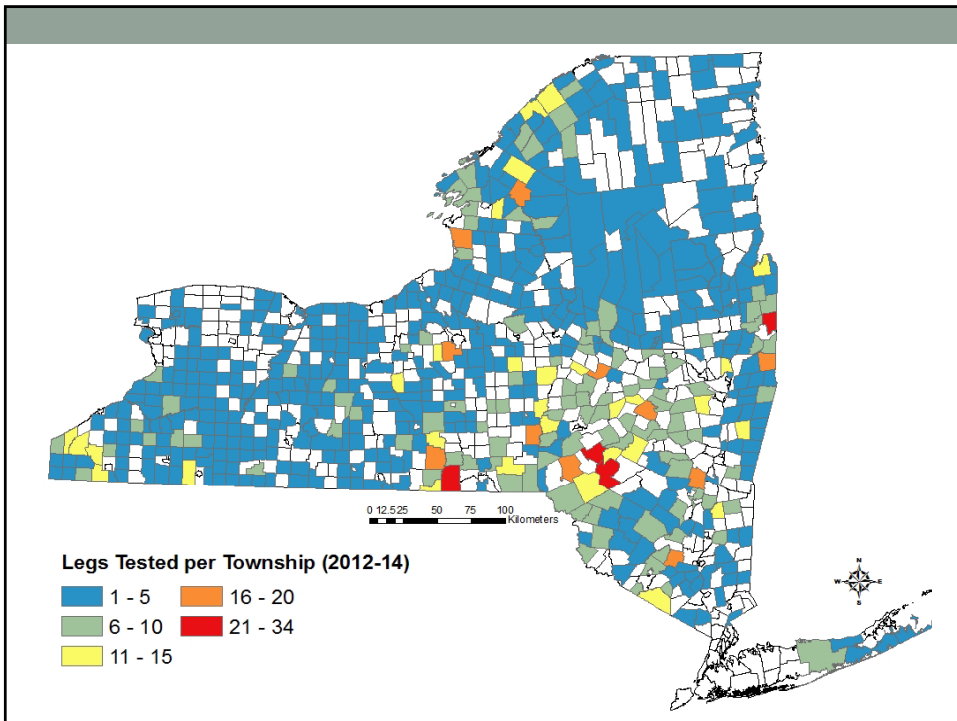
Map courtesy of Justin Brown, DVM (PA Game Commission)  
 Thomas, et. al (2015) - PLOSOne DOI:10.1371/journal.pone.0122644; Allison, et. al (2014) - Virology, 450-451, 2-12

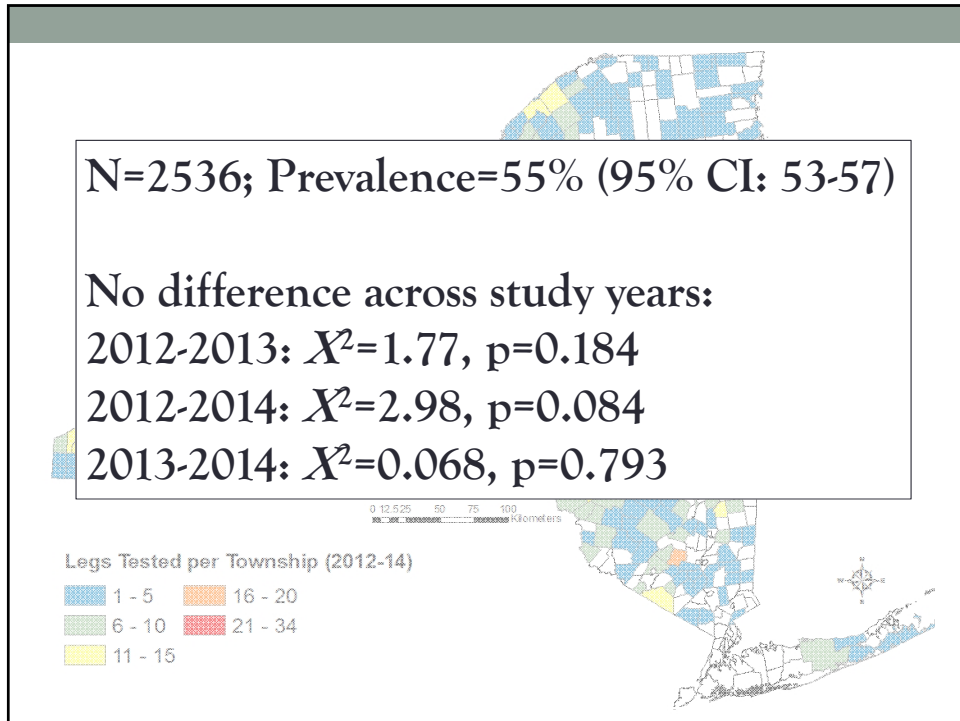
## Objectives

1. Develop a simple, reliable method for diagnosing LPDV in living birds using PCR of whole blood and blood clots; track disease progress in living birds via telemetry data/band returns
2. Determine prevalence of LPDV in wild turkeys in New York State; investigate potential demographic, environmental, and anthropogenic risk factors for infection
3. Analyze spatial distribution of LPDV infection in New York by looking for clusters of higher or lower than expected prevalence; create a risk surface map displaying pattern of estimated prevalence throughout state



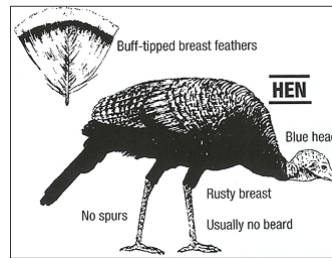
|                     | Whole Blood vs. Buffy Coat |           | Whole Blood vs. Bone Marrow |           |
|---------------------|----------------------------|-----------|-----------------------------|-----------|
|                     | Result                     | 95% CI    | Result                      | 95% CI    |
| Apparent prevalence | 81%                        | 73-87%    | 75%                         | 57-89%    |
| True prevalence     | 83%                        | 76-89%    | 72%                         | 53-86%    |
| Sensitivity         | 97%                        | 93-99%    | 100%                        | 79-100%   |
| Specificity         | 100%                       | 79-100%   | 89%                         | 52-100%   |
| Cohen's kappa       | 0.93                       | 0.84-1.00 | 0.92                        | 0.77-1.07 |
| P-value             | <0.0001                    |           | <0.0001                     |           |





### Risk Factors

- Odds of testing positive for LPDV were:
  - Adult > Juvenile
  - Female > Male
  - Counties with steady fall harvest estimates < Counties with decline in 2012-2014 fall harvest



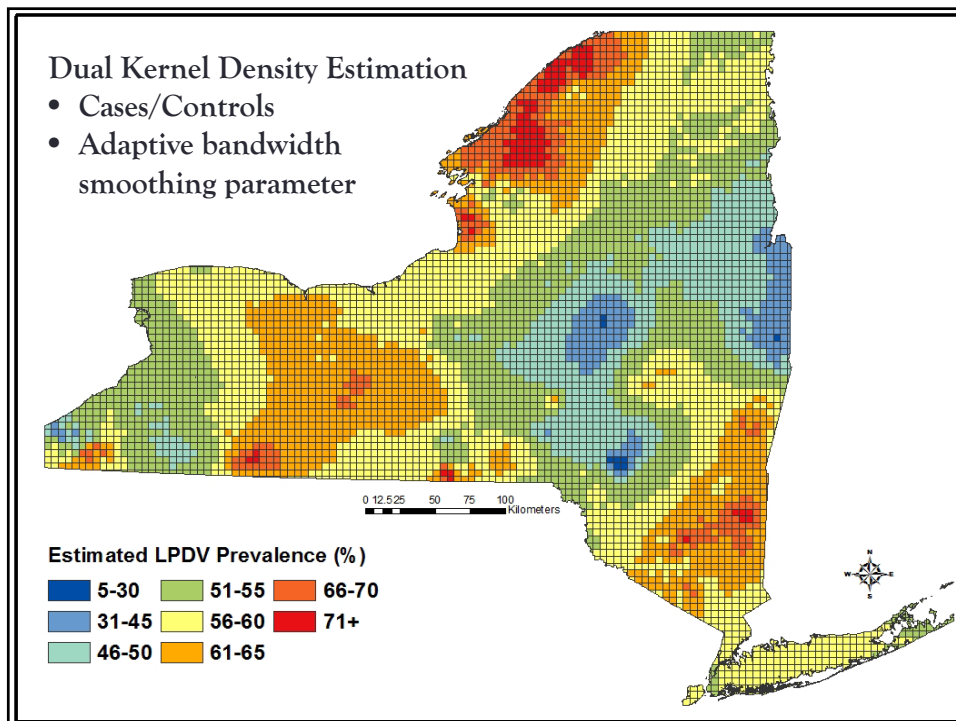
<http://www.gameandfishmag.com/forecasts/oklahoma-turkey-forecast-2015/>

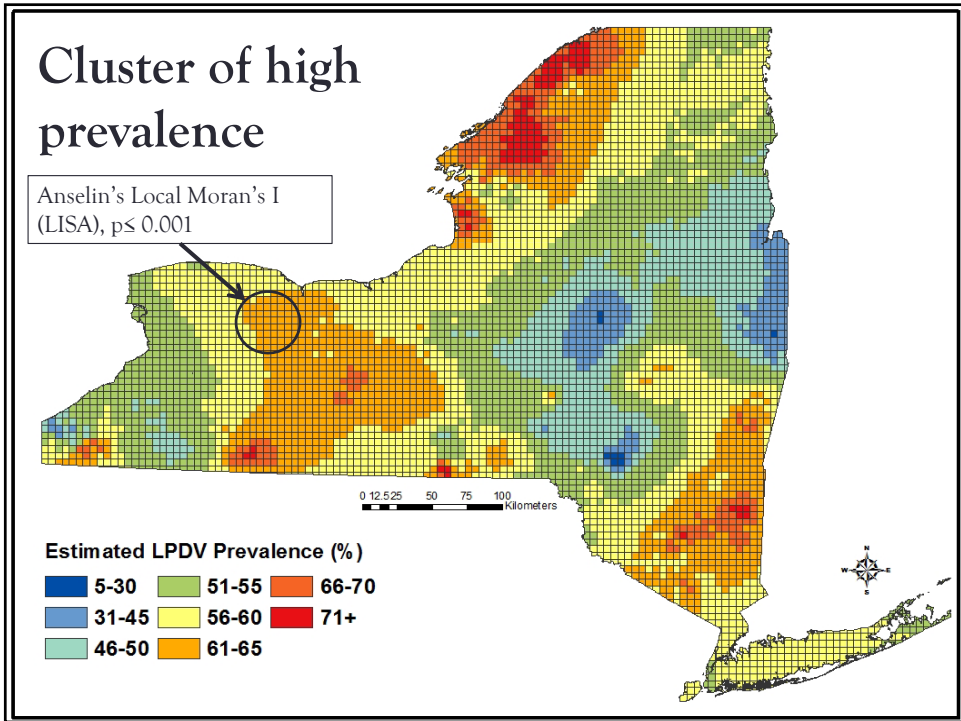
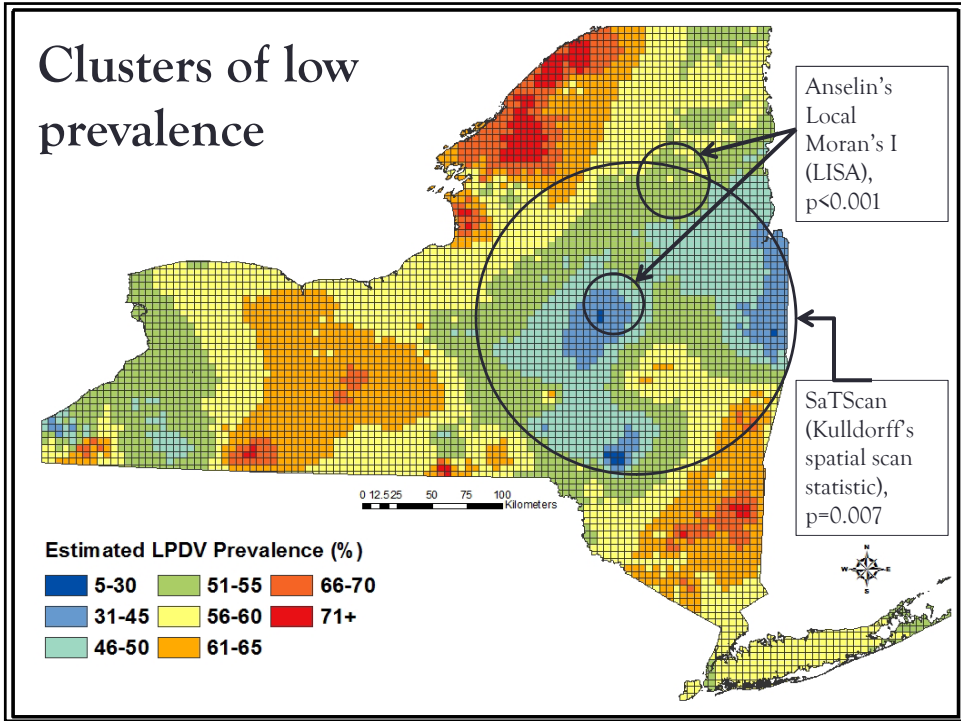
## Possible Explanations

- Juveniles falling below detection threshold
- LPDV – related poult mortality being masked?
- Social dynamics of turkey flocks (age and sex segregation)

### So what?

- Females drive population via production
- Importance of subclinical infections
- Transmission implications – multiple routes?

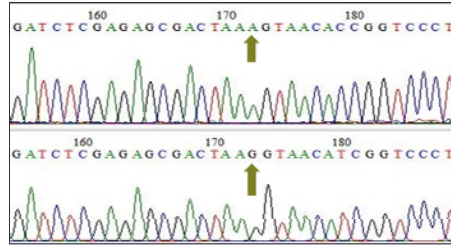




## Sequencing

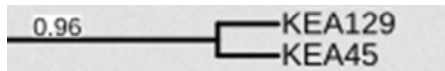


- 138 unique sequences
- 56 samples from GenBank (Allison et al. 2014 & Thomas et al. 2015)

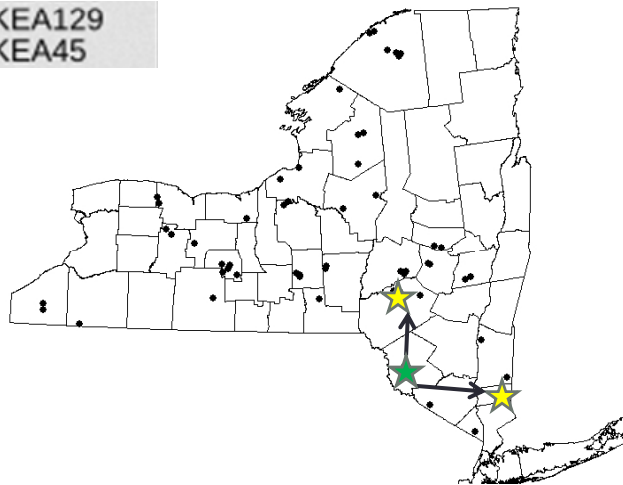


- 18 additional New York samples
- 5 from Clade 1 (Israel and South Carolina)
- 33 samples from other New England states that received translocated turkeys from New York

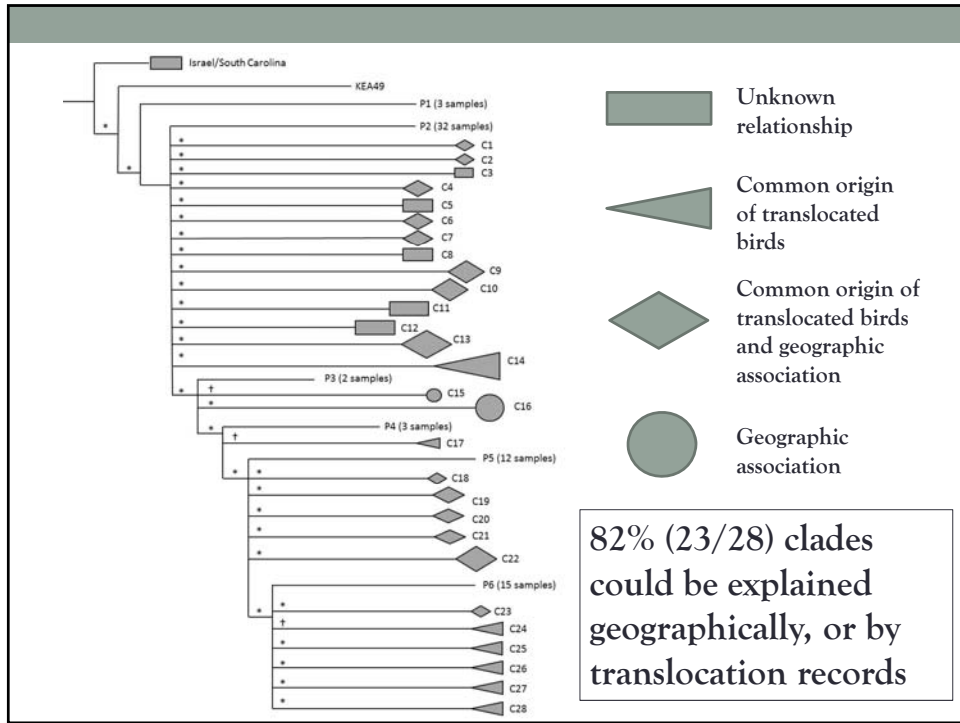
## Clades often shared common translocation origin



Birds translocated from Sullivan County







## Future directions

1. Track progression of disease in living birds
2. Investigate potential reproductive or immunological impacts of LPDV (i.e. decreased production, or increased susceptibility to co-infections)
3. Continue monitoring relationship between LPDV and harvest decline

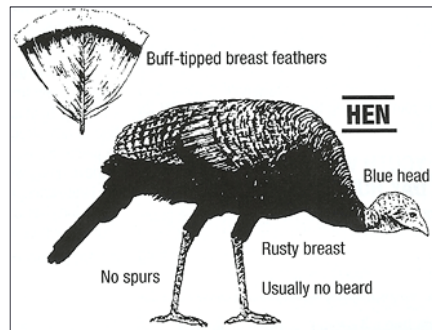


Photo by: Rick Taylor



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**Questions?**



<http://funny-pics-fun.com/funny-compilations/thanksgiving-day-turkey>