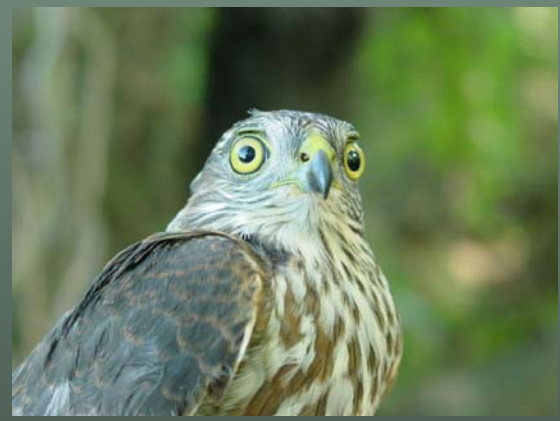
USGS
science for a changing world



Predictive Value of Ecological Surveillance Tools

Stephen C. Guptill

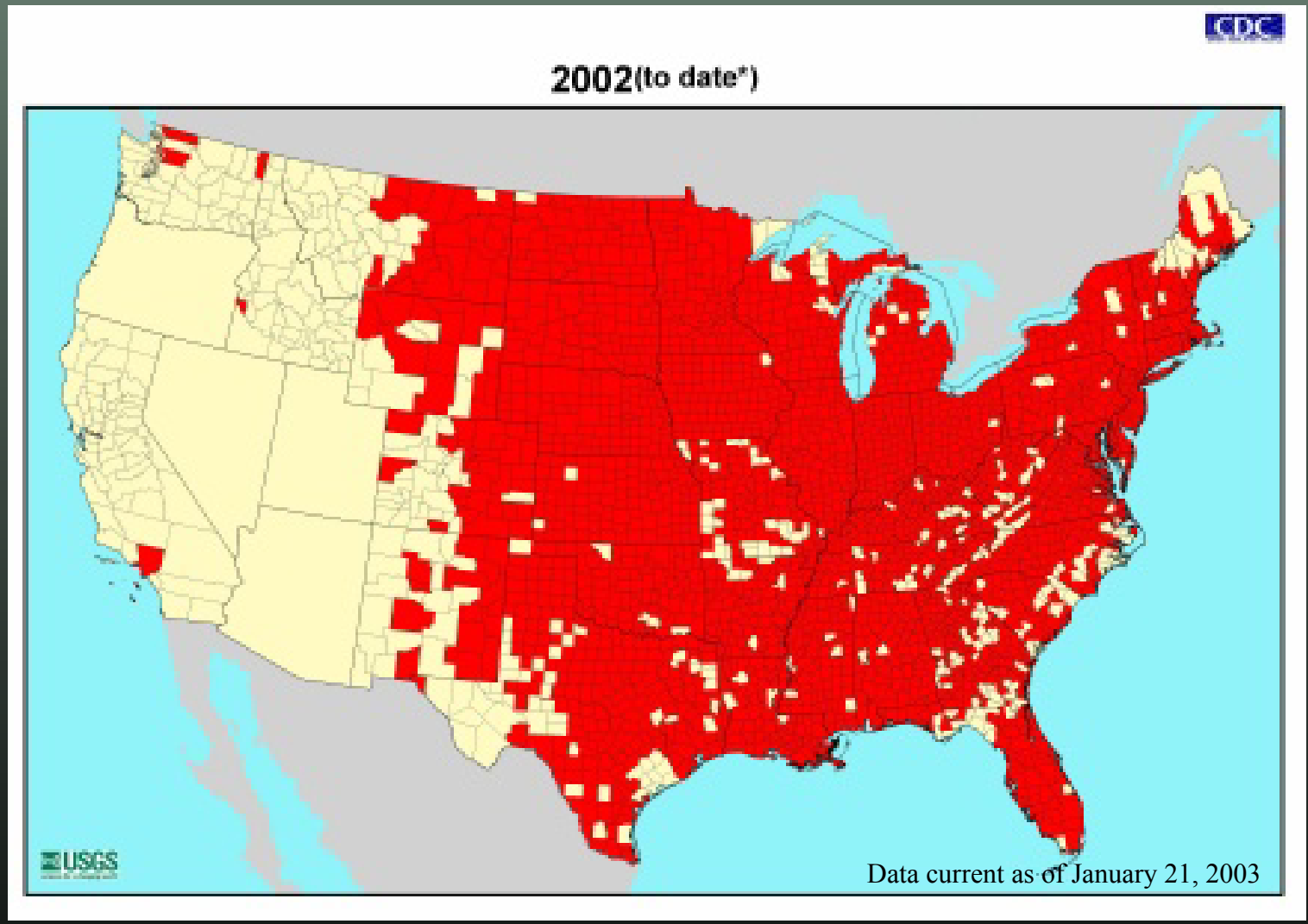
U.S. Department of the Interior
U.S. Geological Survey

Acknowledgements

- USGS Colleagues
  - Susan Price, Jeff Dietterle, Lesley Milheim, Lee De Cola, Michelle Coffey, Bob Dusek
- Division of Vector-Borne Diseases, CDC

USGS

West Nile Virus 2002 – The Movie



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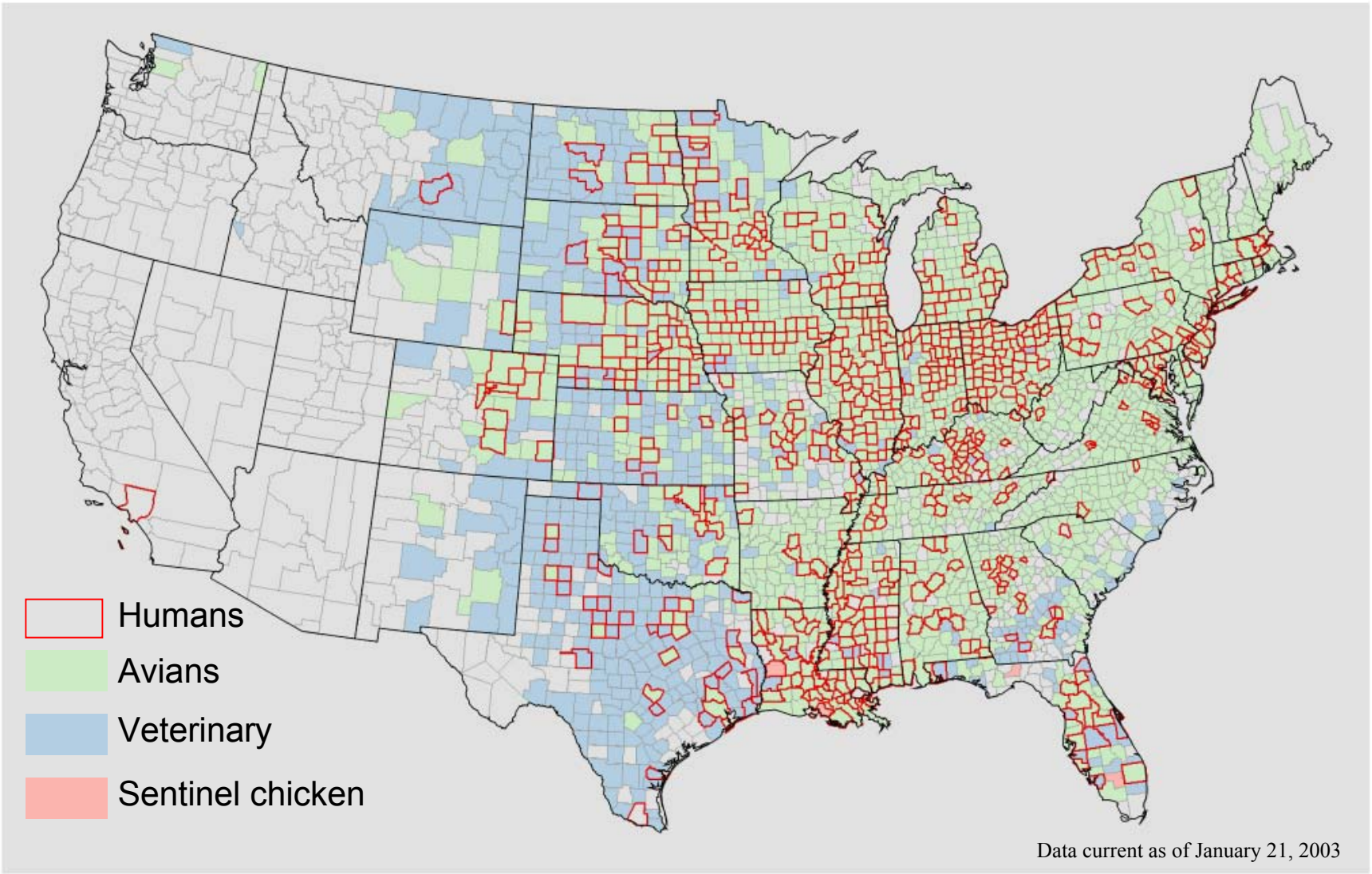
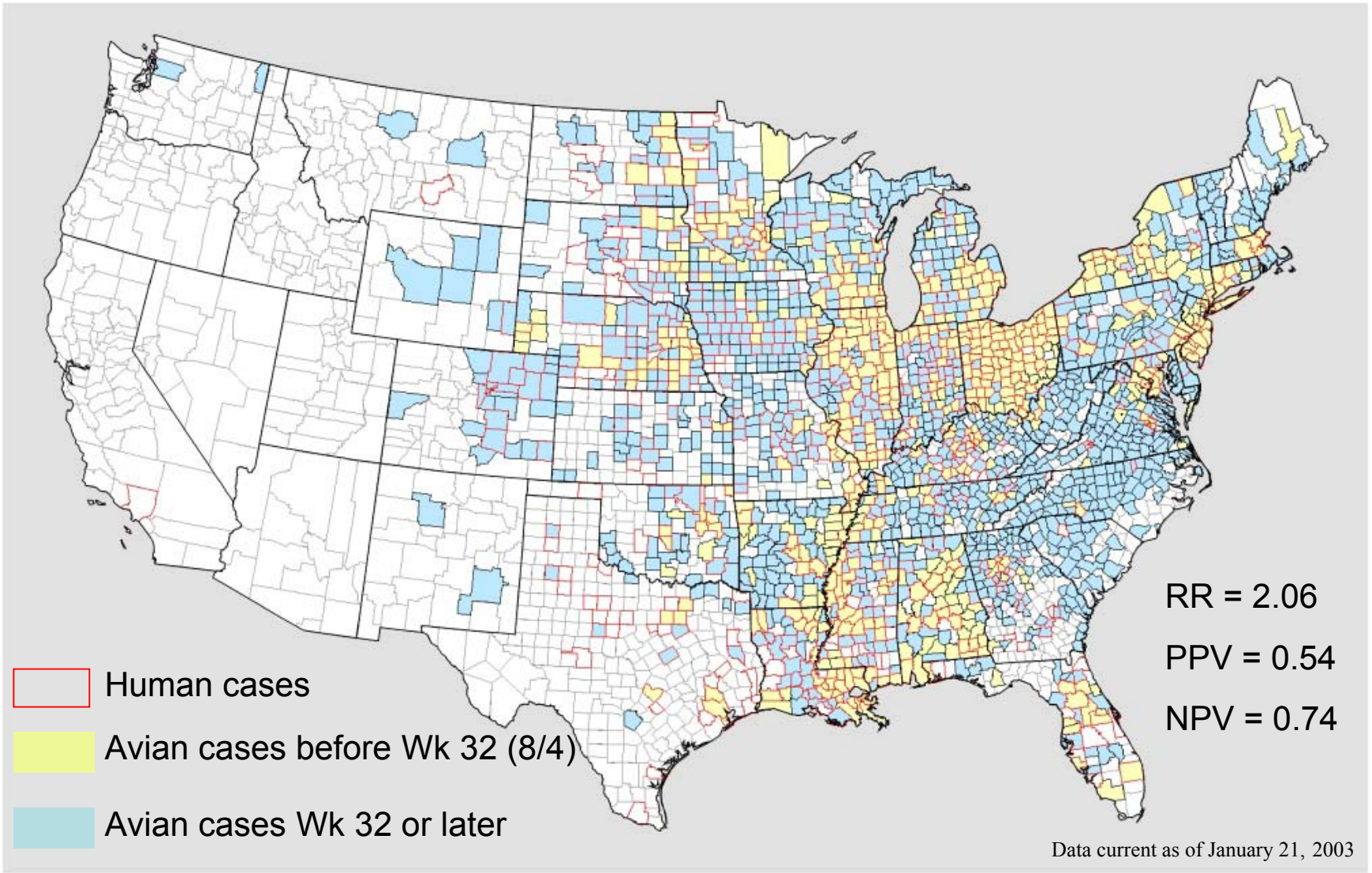
WNV – Humans and Sentinels



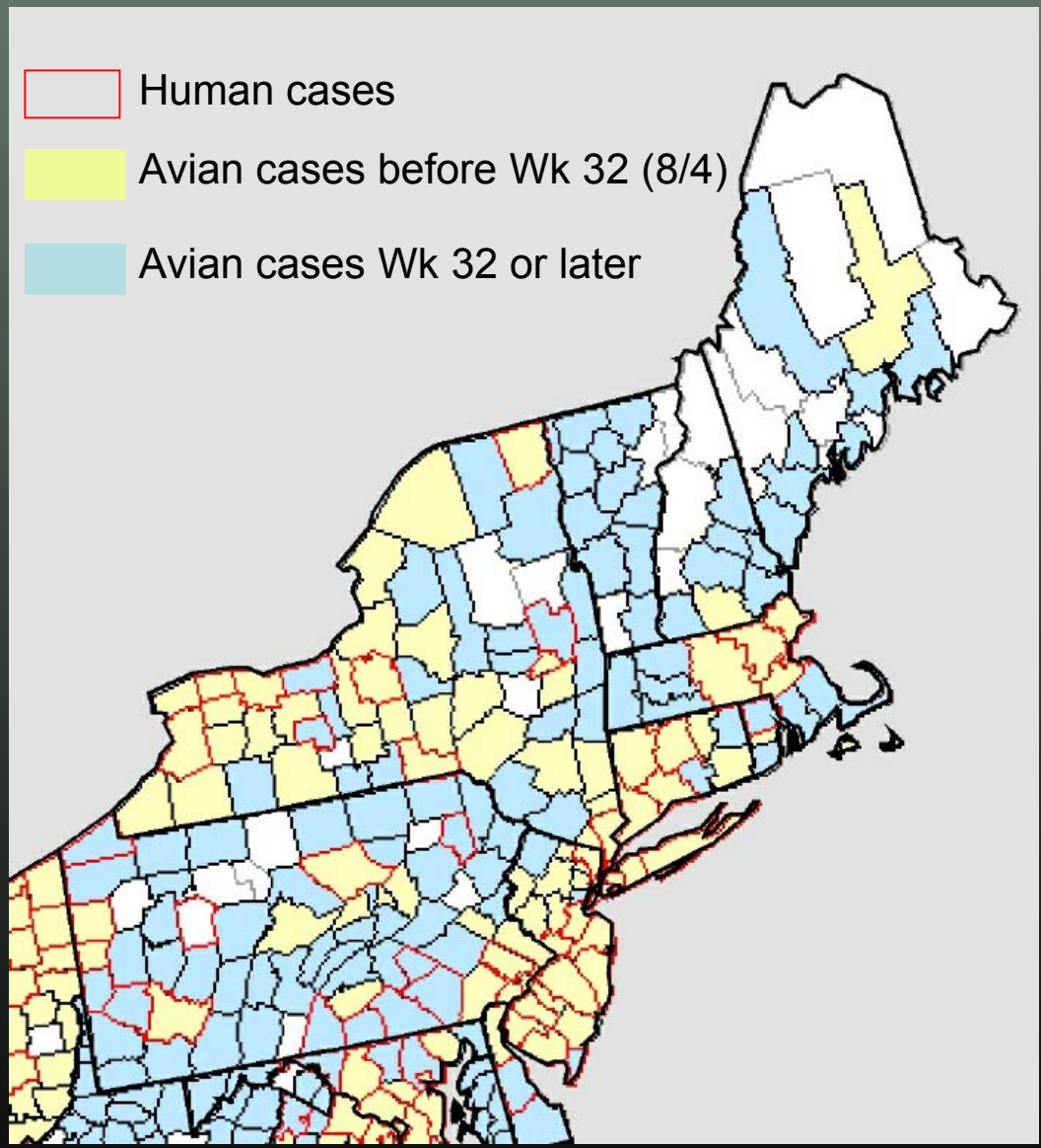
USGS

Early Avian Deaths Predict Human Illness



USGS

Early Avian Deaths Predict Human Illness



North East

RR = 2.87

PPV = 0.45

NPV = 0.84

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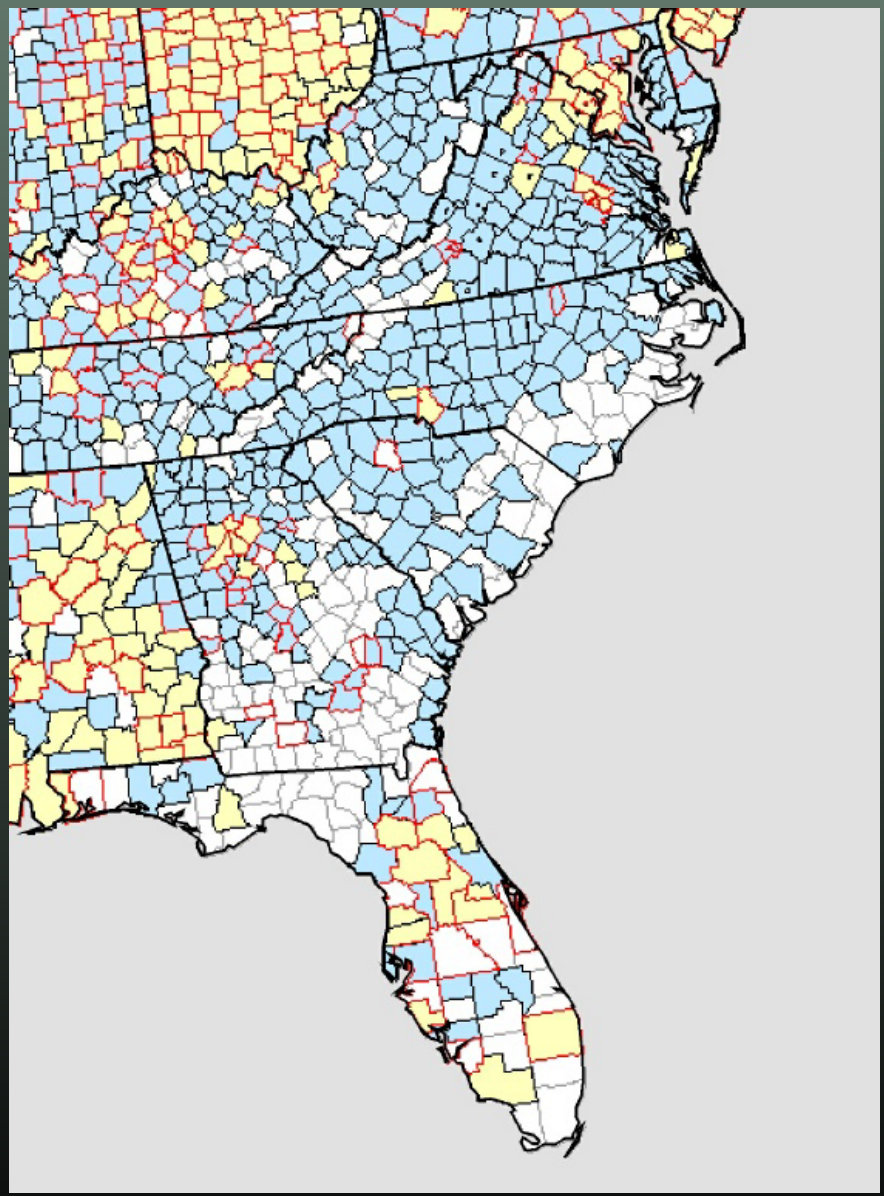
Early Avian Deaths Predict Human Illness



South Atlantic

RR = 4.24

PPV = 0.44

NPV = 0.90

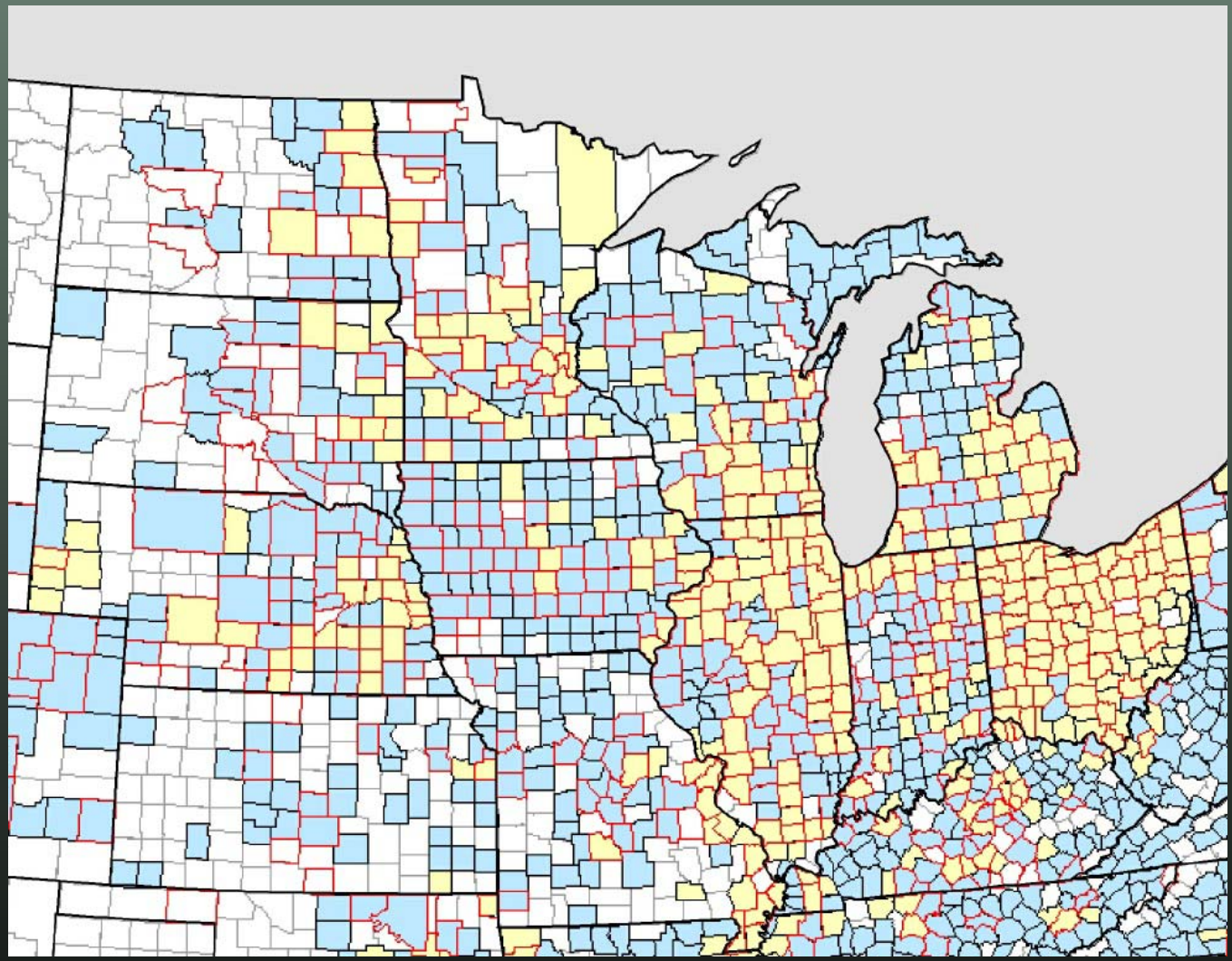
Human cases

Avian cases before Wk 32 (8/4)

Avian cases Wk 32 or later

USGS

Early Avian Deaths Predict Human Illness



North Central

RR = 1.77

PPV = 0.60

NPV = 0.66

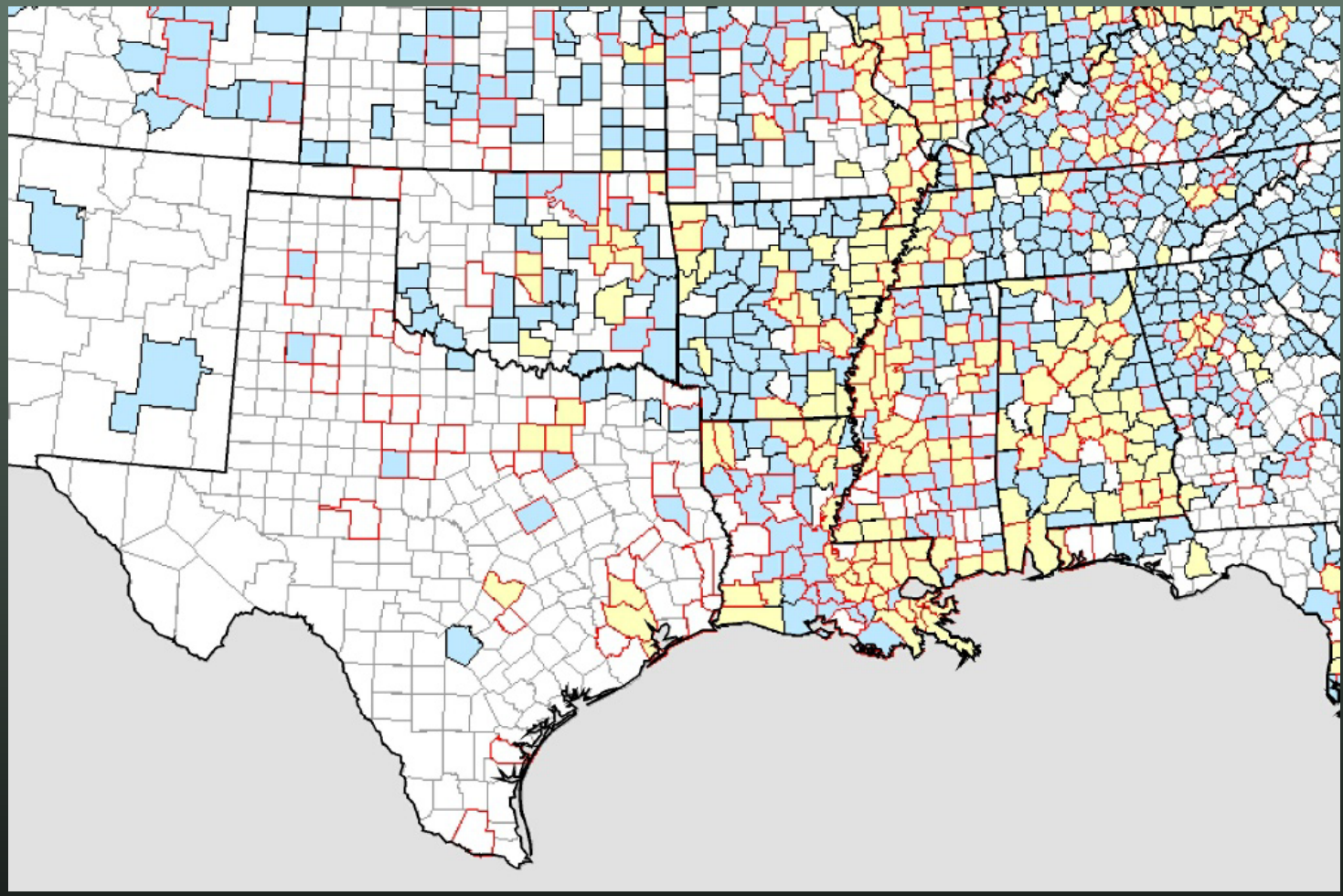
Human cases

Avian cases before Wk 32 (8/4)

Avian cases Wk 32 or later

USGS

Early Avian Deaths Predict Human Illness



South Central

RR = 1.52

PPV = 0.51

NPV = 0.66

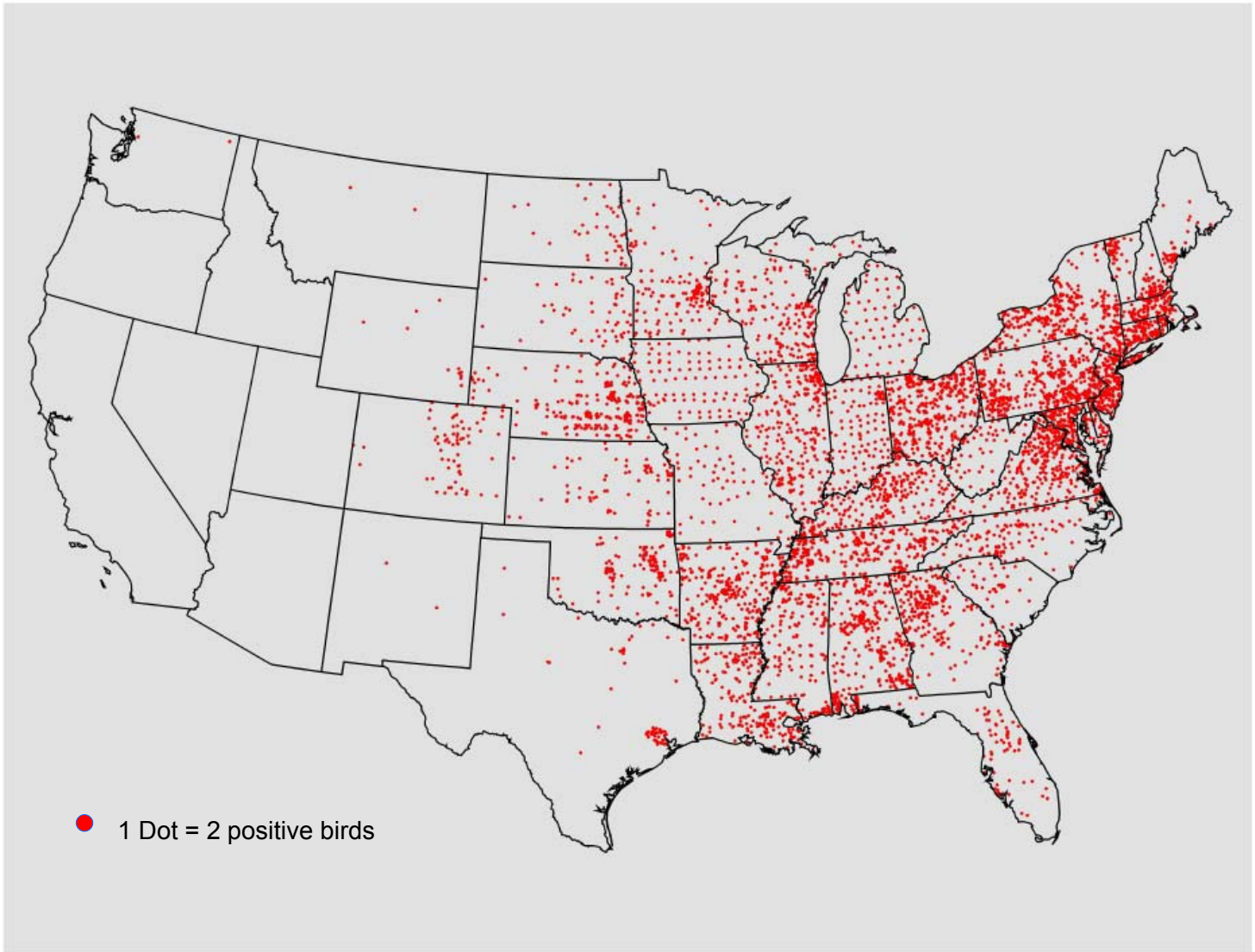
Human cases

Avian cases before Wk 32 (8/4)

Avian cases Wk 32 or later

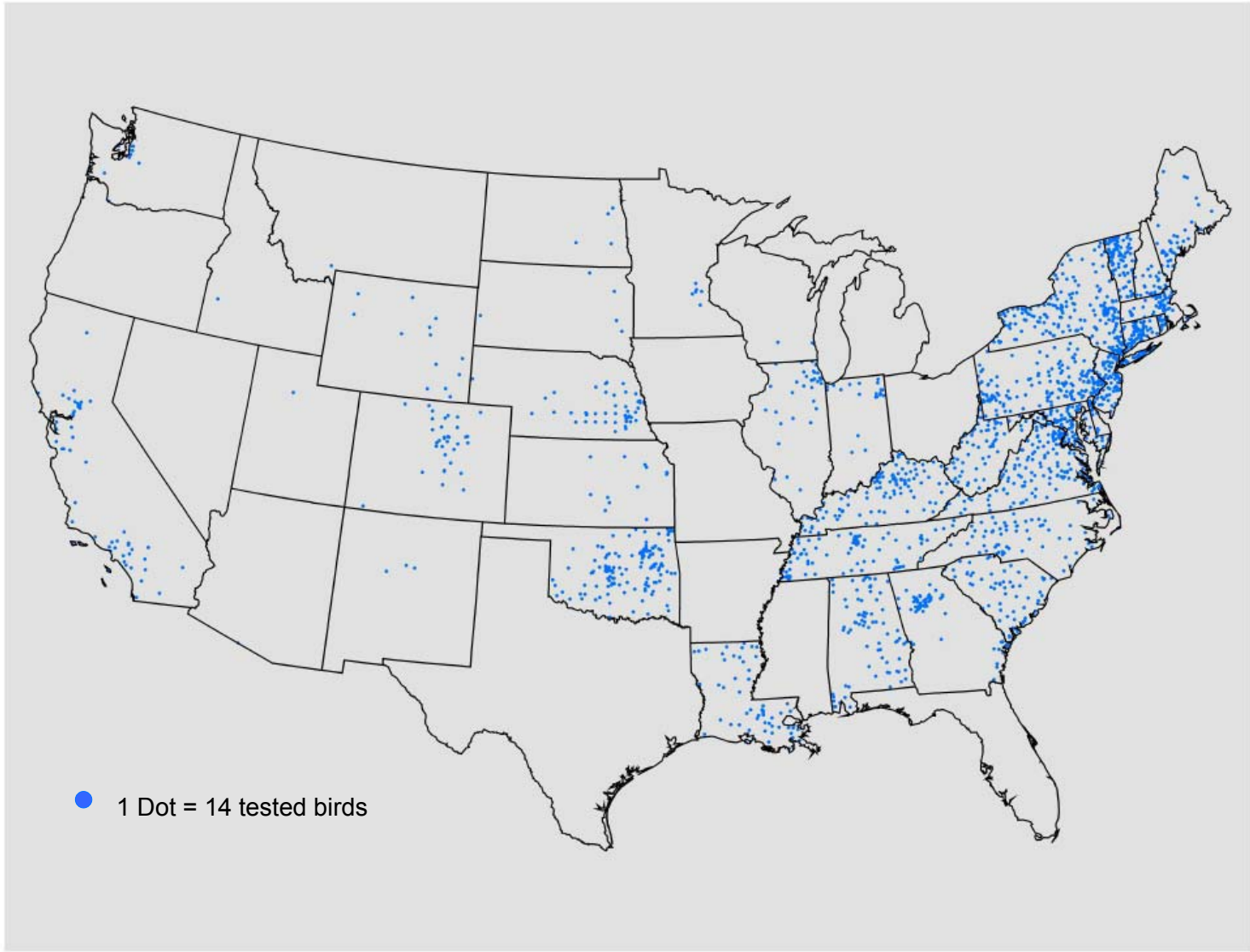
USGS

Where are the birds?



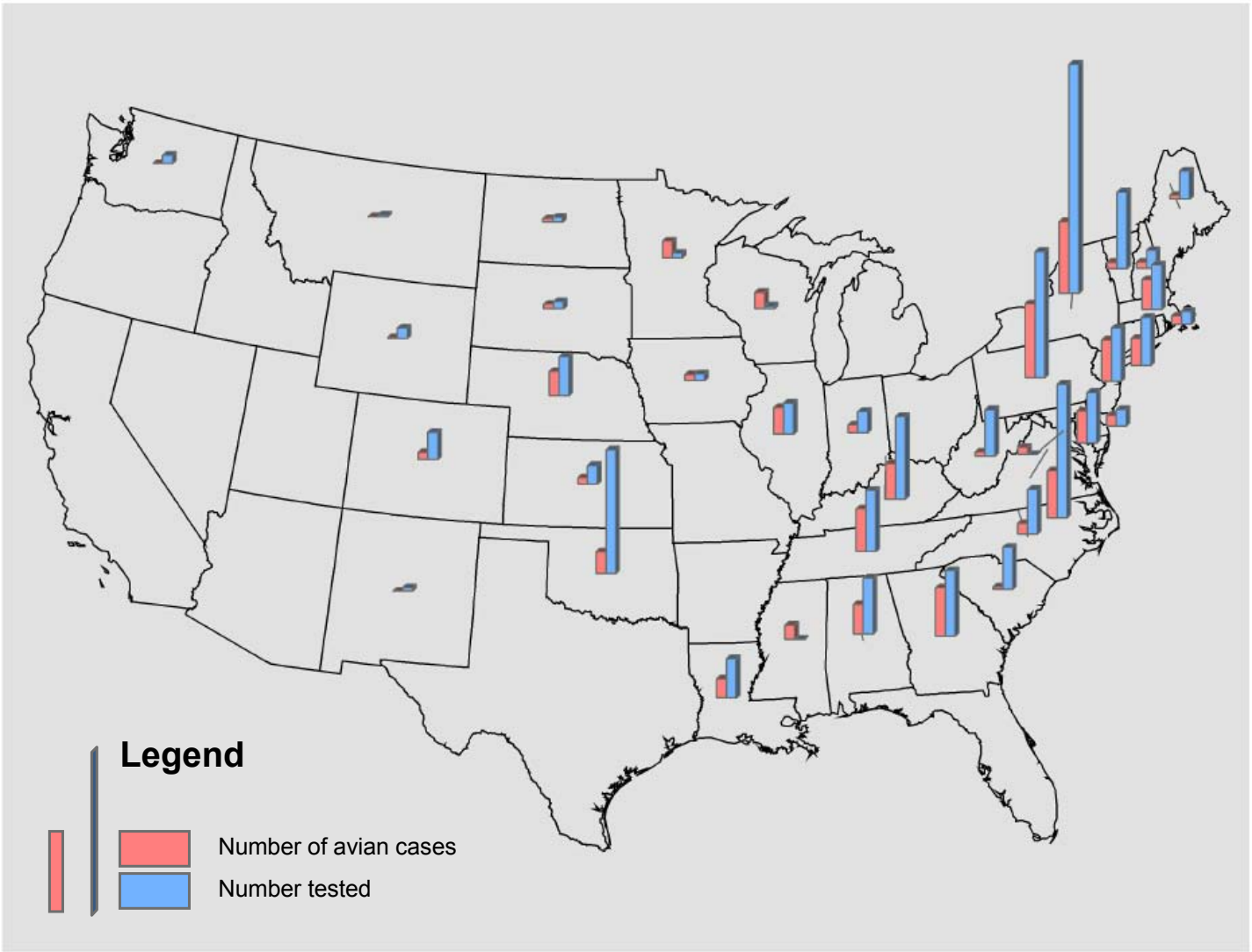
USGS

Where are the birds?



USGS

Where are the birds?



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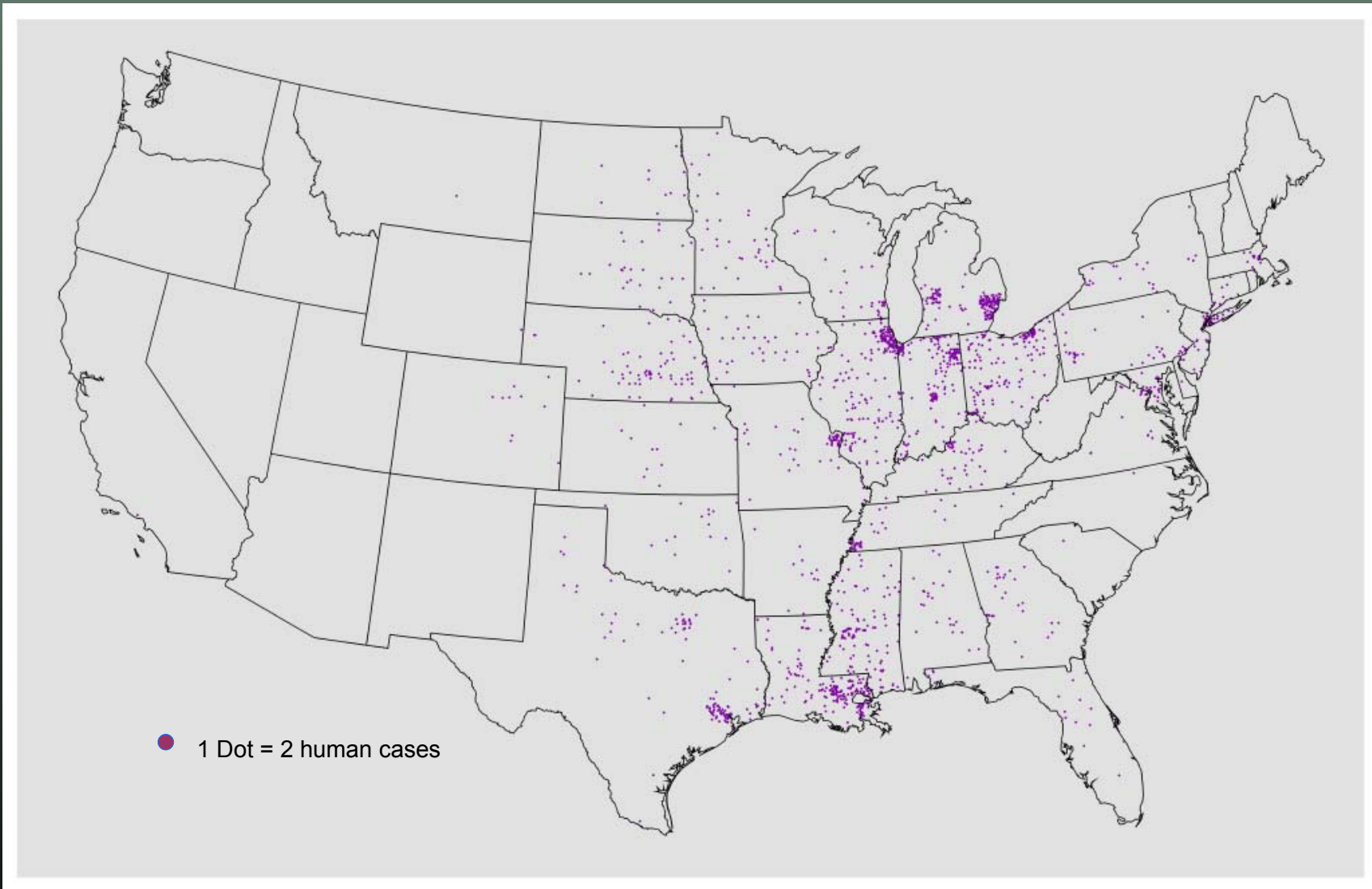
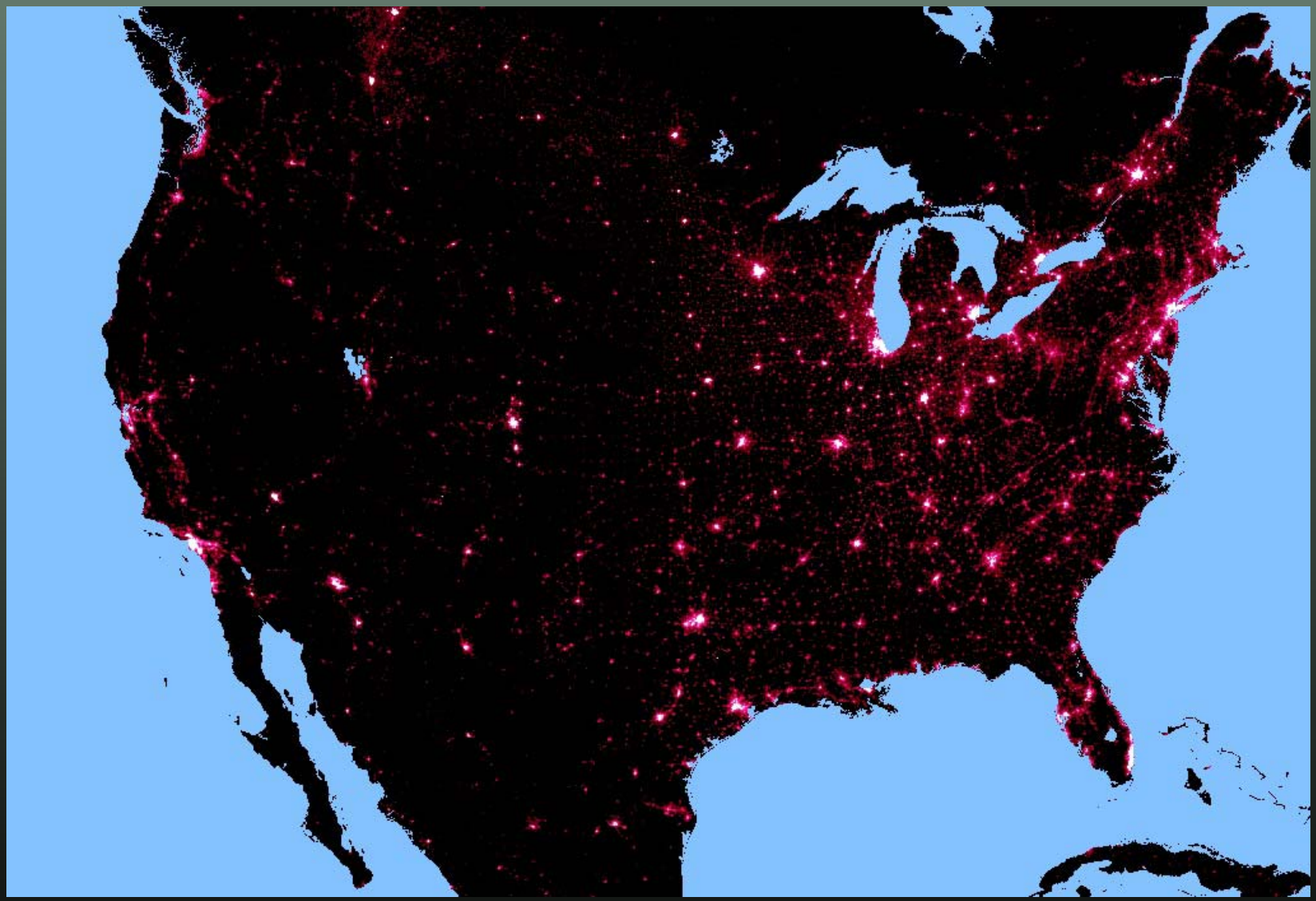
Where are the people?



USGS

Where are the people?



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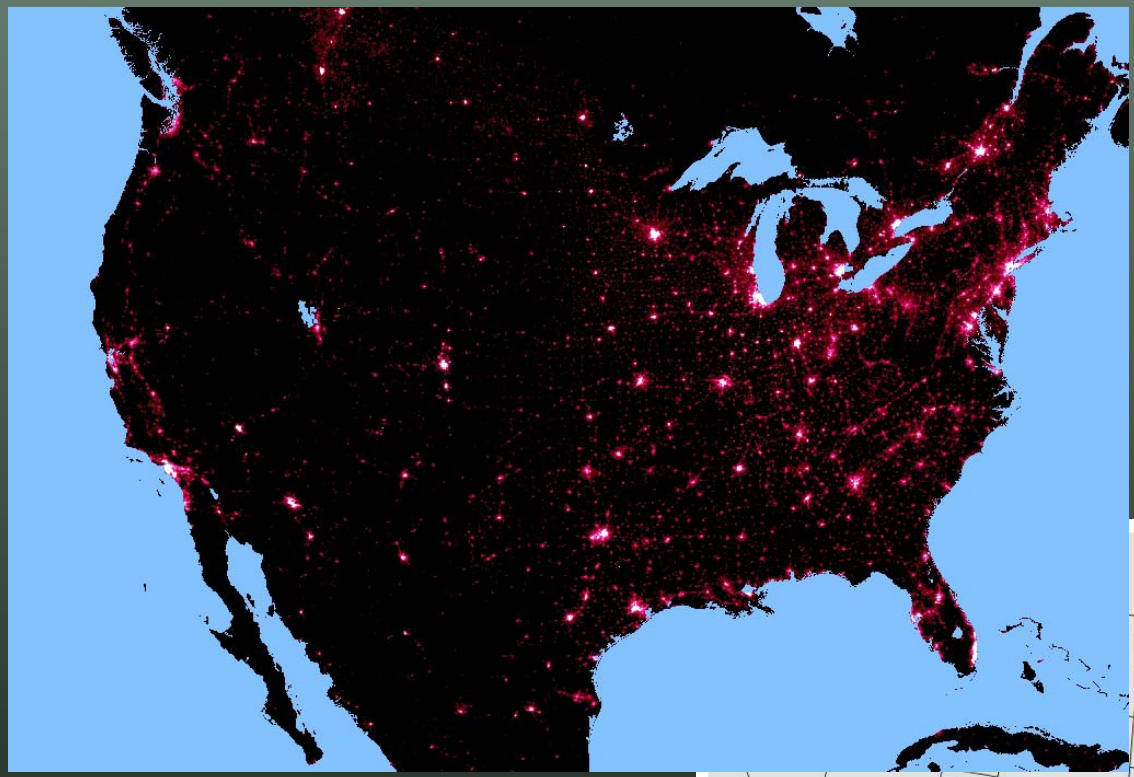
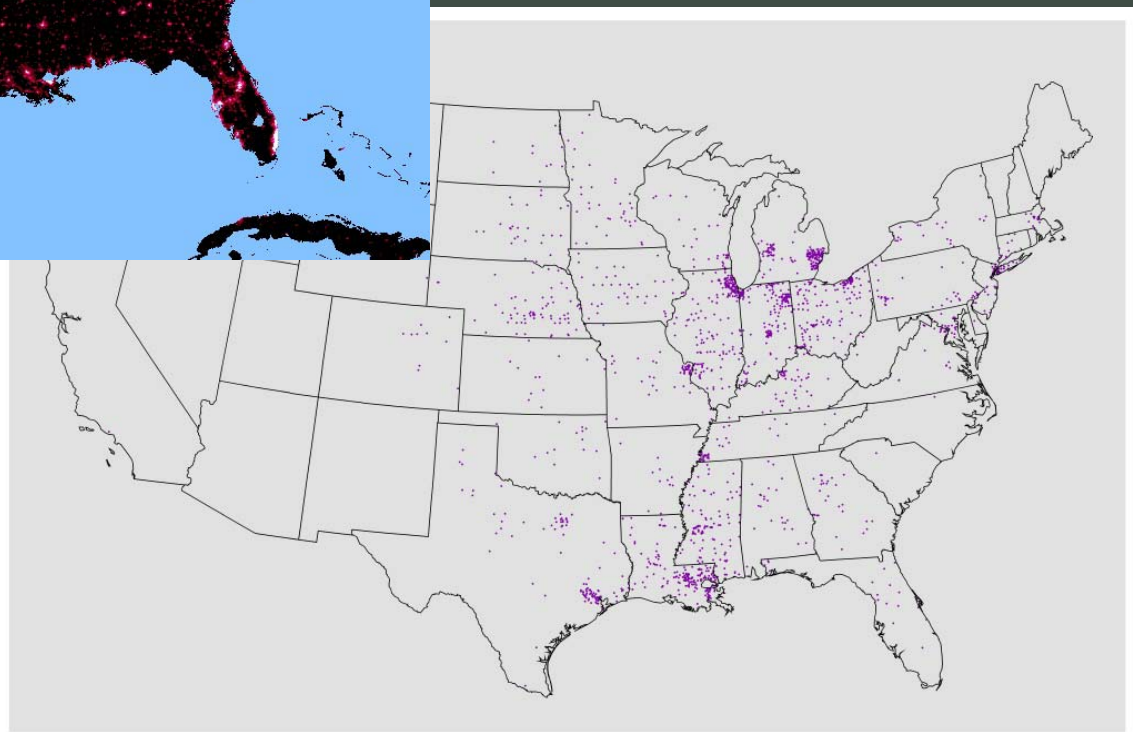
Human cases and “City Lights”





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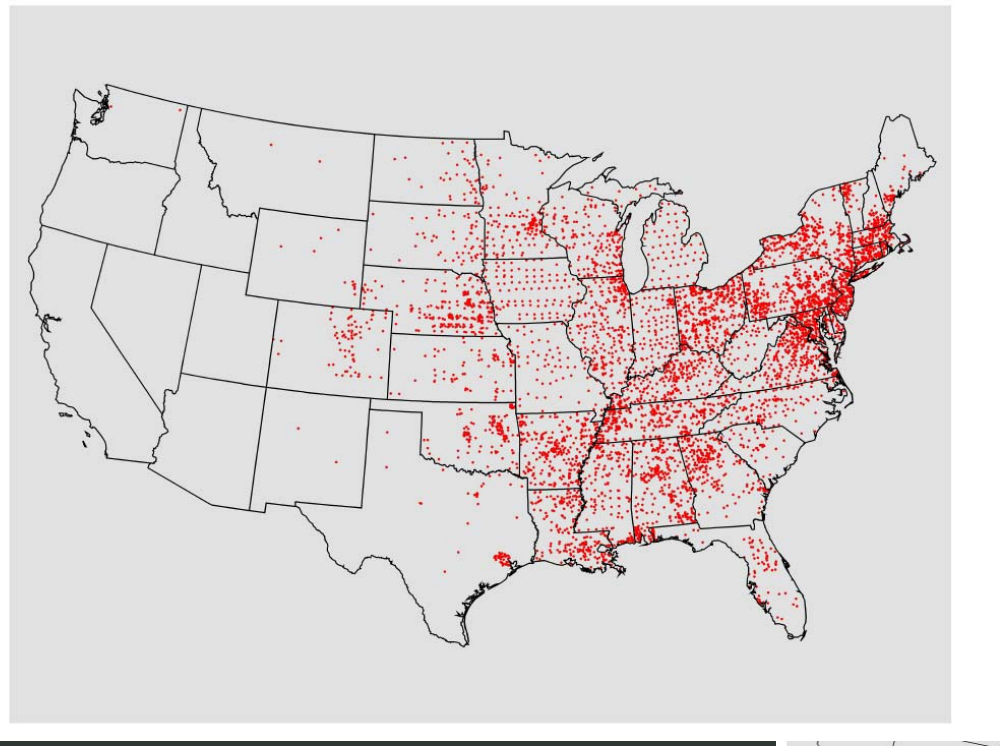
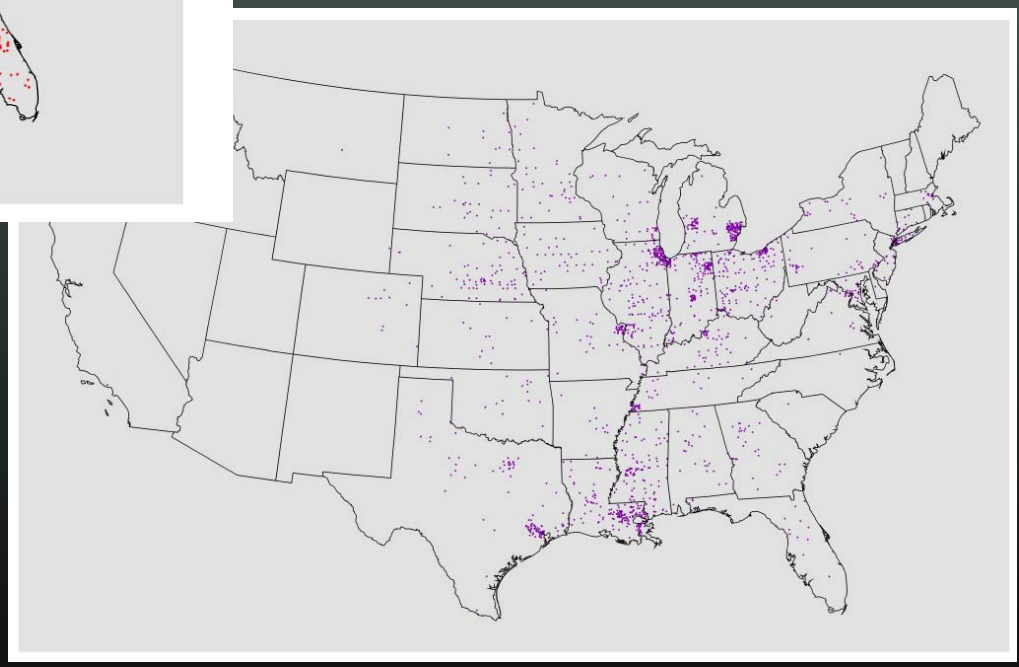
Avian positives and human cases





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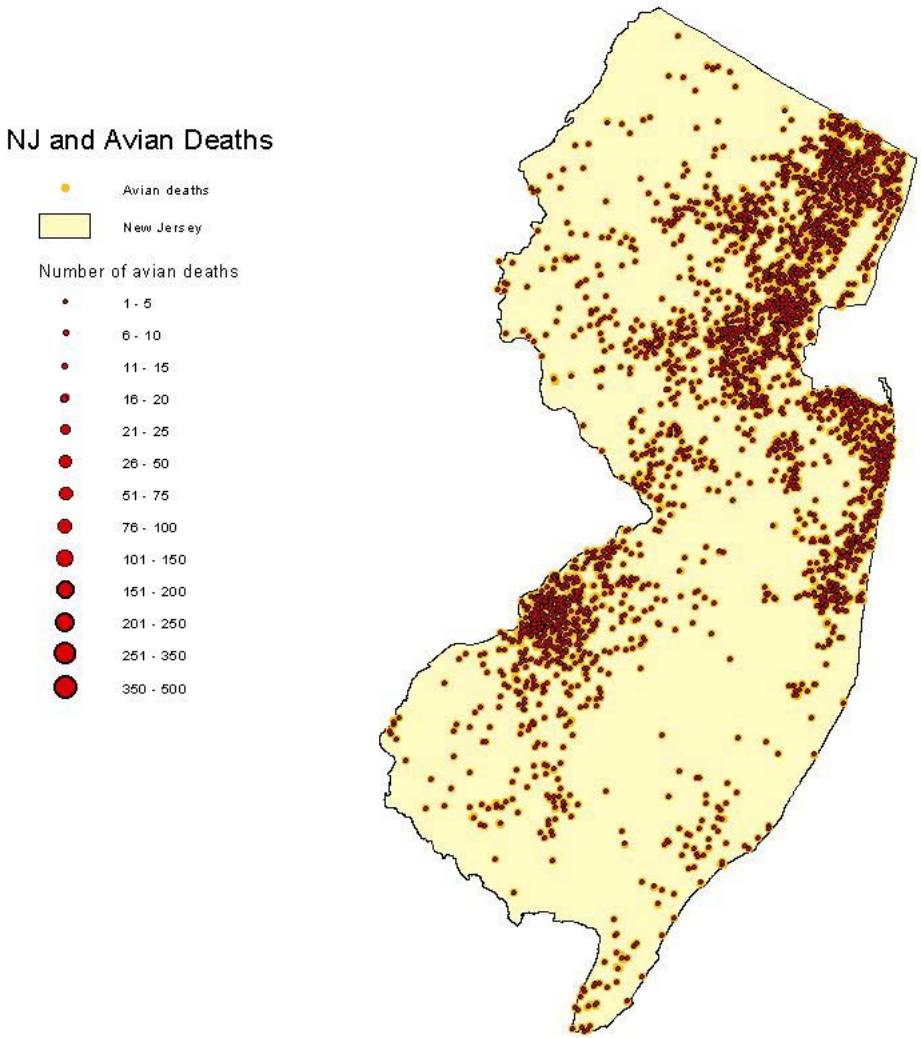
New Jersey Avian Deaths 2001
Aggregated by Square Kilometer



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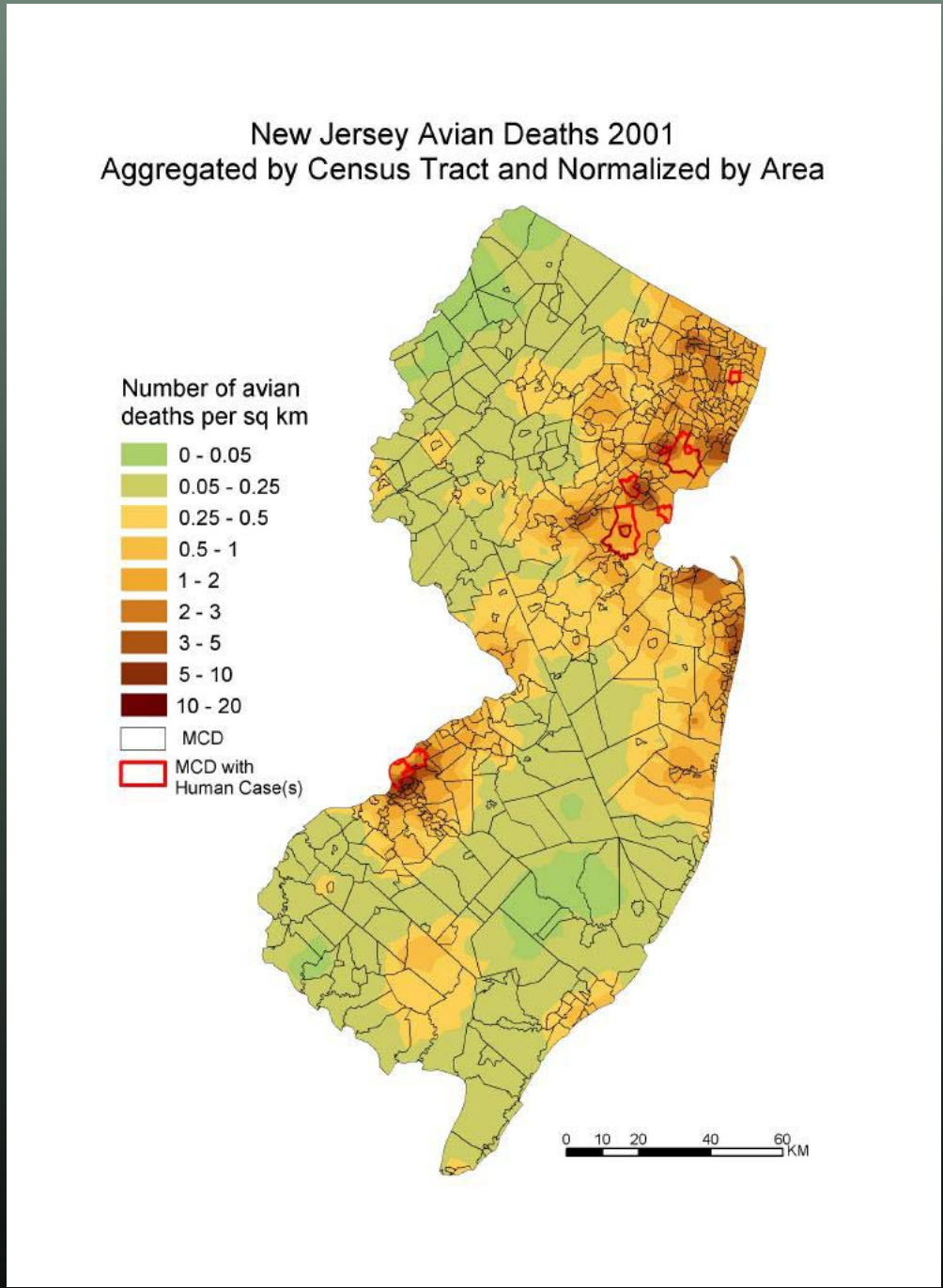
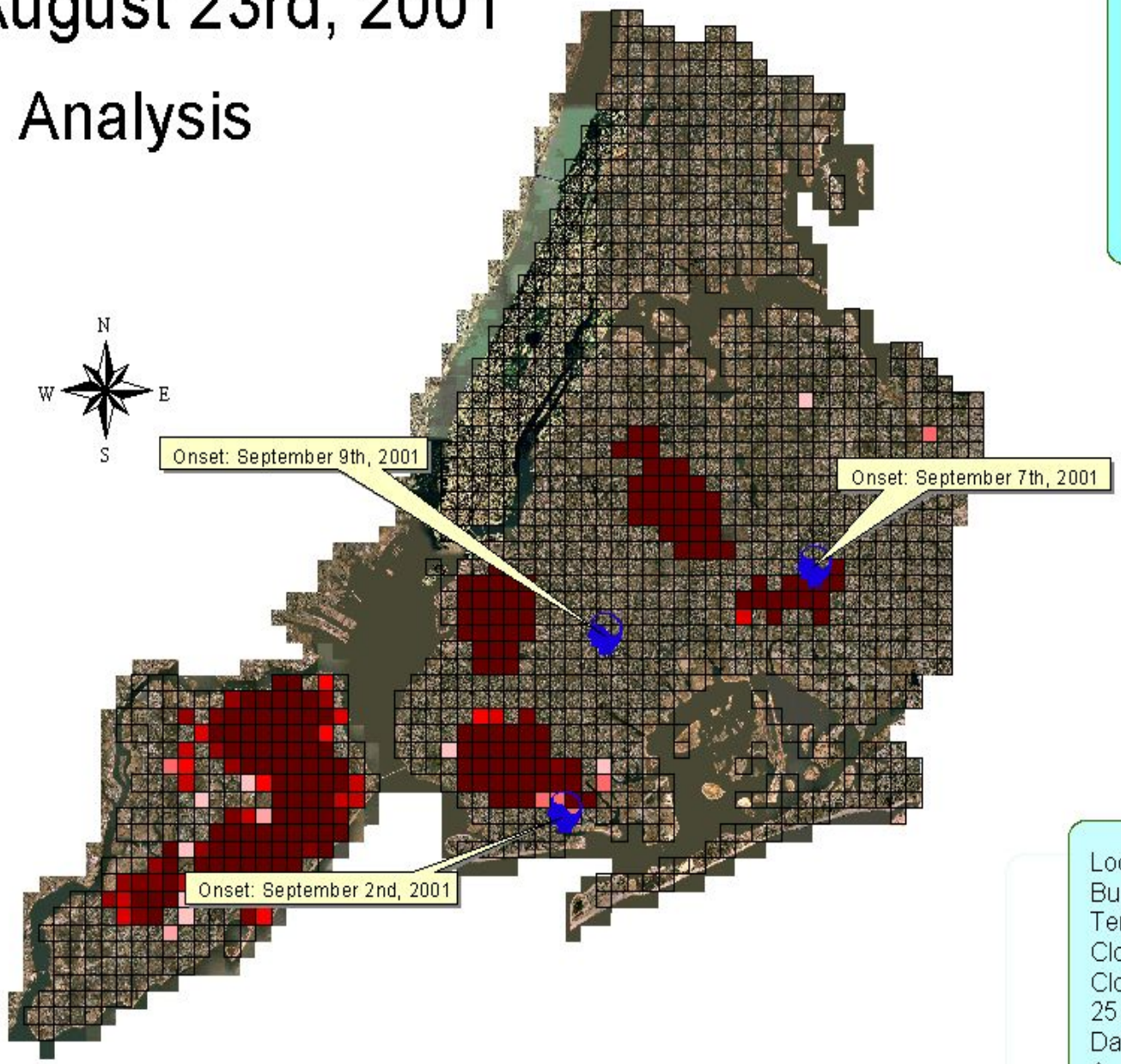

New Jersey Avian Deaths 2001
Aggregated by Census Tract and Normalized by Area
Number of avian deaths per sq km
0 - 0.05
0.05 - 0.25
0.25 - 0.5
0.5 - 1
1 - 2
2 - 3
3 - 5
5 - 10
10 - 20
MCD
MCD with Human Case(s)
0 10 20 40 60 KM

USGS

August 23rd, 2001

Analysis



CENTER FOR ADVANCED RESEARCH OF SPATIAL INFORMATION

Probability of random space-time interaction

- 0.001 - 0.02
- 0.02 - 0.03
- 0.03 - 0.04
- 0.04 - 0.05
- 0.05 - 0.06
- 0.06 - 0.07
- 0.07 - 0.08
- 0.08-0.09
- 0.09 - 0.1
- 0.1 - 1

Localized Knox Test Analysis
Buffer 1.5 miles
Temporal Window 21 days
Close in Space 0.25 miles
Close in Time 3 days
25 Birds Threshold
Data Source: NYC DOH and NYCMAP
Analysis: CARSI Lab. Hunter College

WNV Data Reporting Lag

West Nile Virus Map - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://cindi.usgs.gov/hazard/event/west_nile/west_nile.html

Links Customize Links Free Hotmail Windows Media Windows RealOne Player

USGS science for a changing world

West Nile Virus Maps - 2002

Background
Links
Year 2000 Cumulative Reports
2002 Surveillance Activity
2001 West Nile Maps

National and State Maps

These maps reflect information that has been submitted and ve the week of November 30, 2002. These are the final USGS West season.

Note: For Information regarding the West Nile Virus, please contact the Centers for Disea the website, please contact the webmaster.

Bird	Human	Mosquito	Sentinel

Coming soon:
westnilemaps.usgs.gov

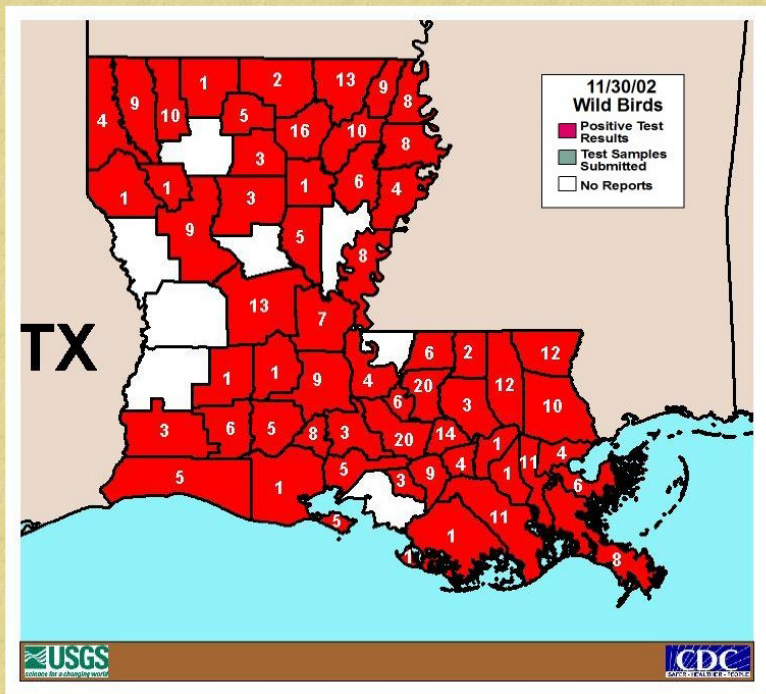
Louisiana West Nile Virus Map - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://cindi.usgs.gov/hazard/event/west_nile/louisiana/la_avian_nov_30.html

Links Customize Links Free Hotmail Windows Media Windows RealOne Player



Cumulative positive cases:

Acadia Parish	5
Allen Parish	1

Internet

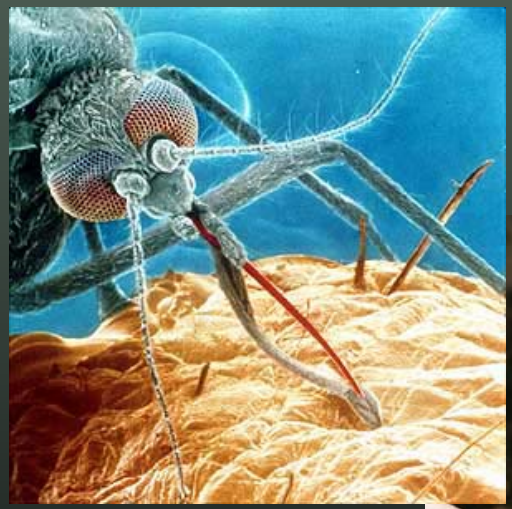
USGS

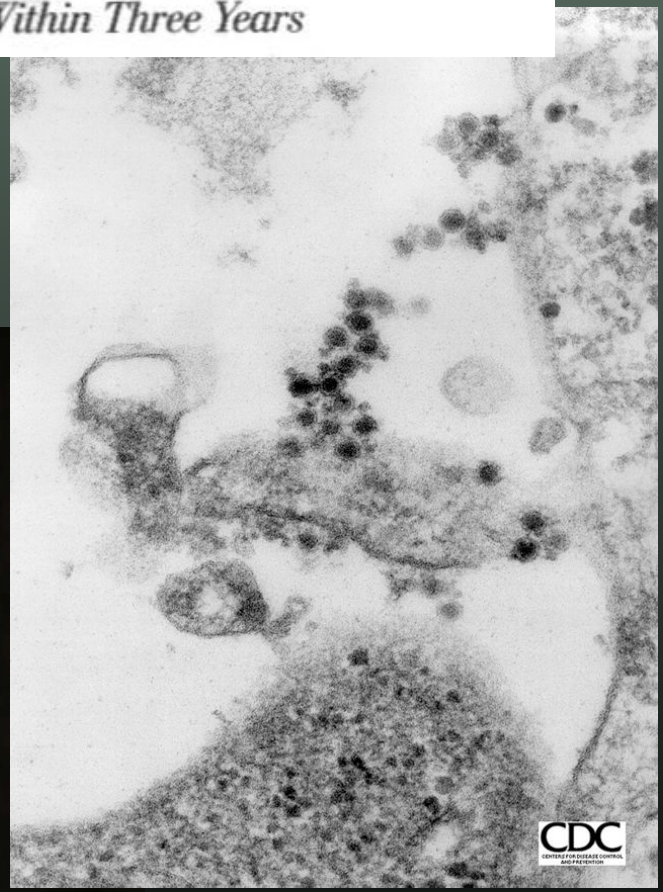
The Washington Post

SATURDAY, OCTOBER 7, 2000

West Nile Virus Is 'Here to Stay'

Illness Predicted to Spread Across Country Within Three Years





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Research on avian and mosquito ecology

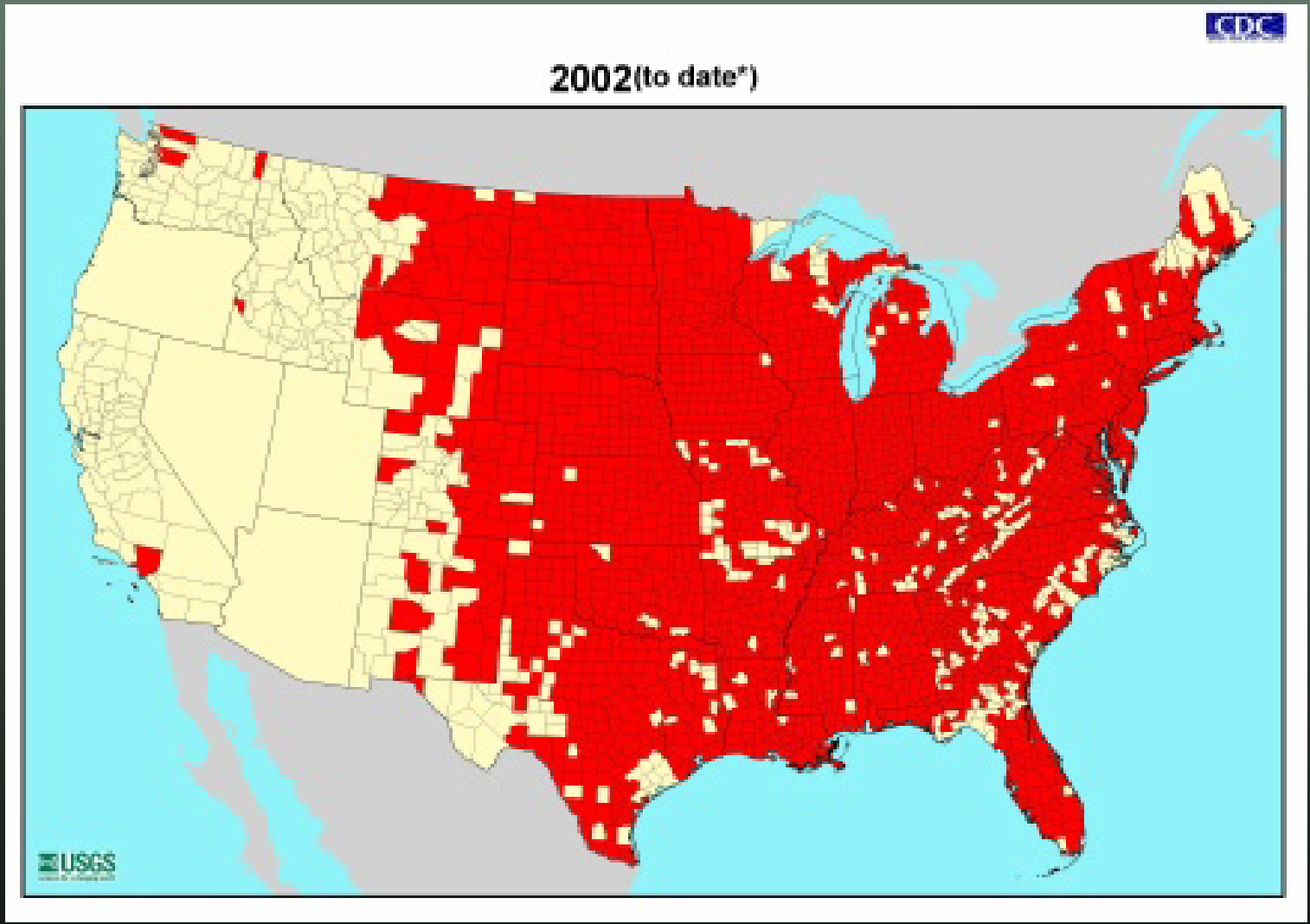
USGS

Conclusions

- A rapid WNV reporting system using GIS/GPS data entry and VecTest of oral/clocal swabs could provide excellent surveillance data.
- With such surveillance data, risk of human illness from WNV can be geographically and temporally predicted.
- Geographic methods will be enhanced by a better understanding of the ecological and biological processes of WNV.
- Interdisciplinary collaboration among scientists is the key to gaining this understanding.

USGS

West Nile Virus 2002 – The Movie



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