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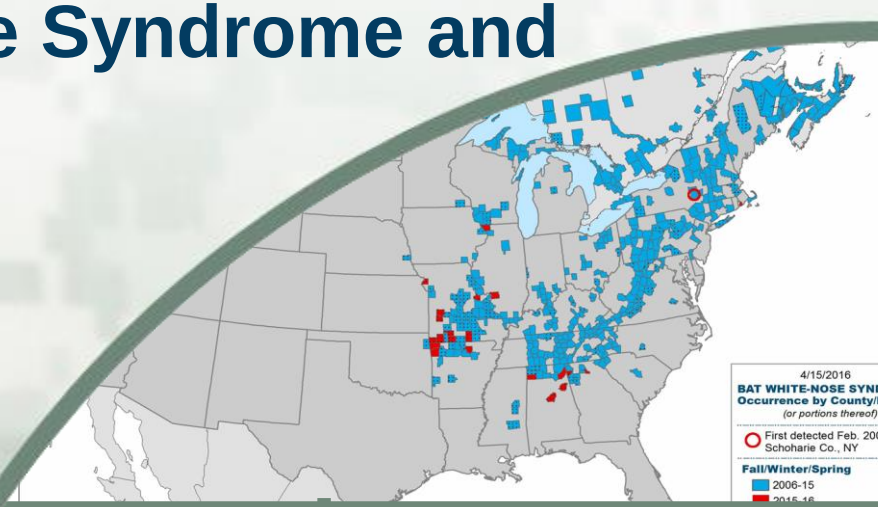
# Current Status of White-Nose Syndrome and Potential impacts to DoD




**Eric Britzke**

Research Wildlife Biologist

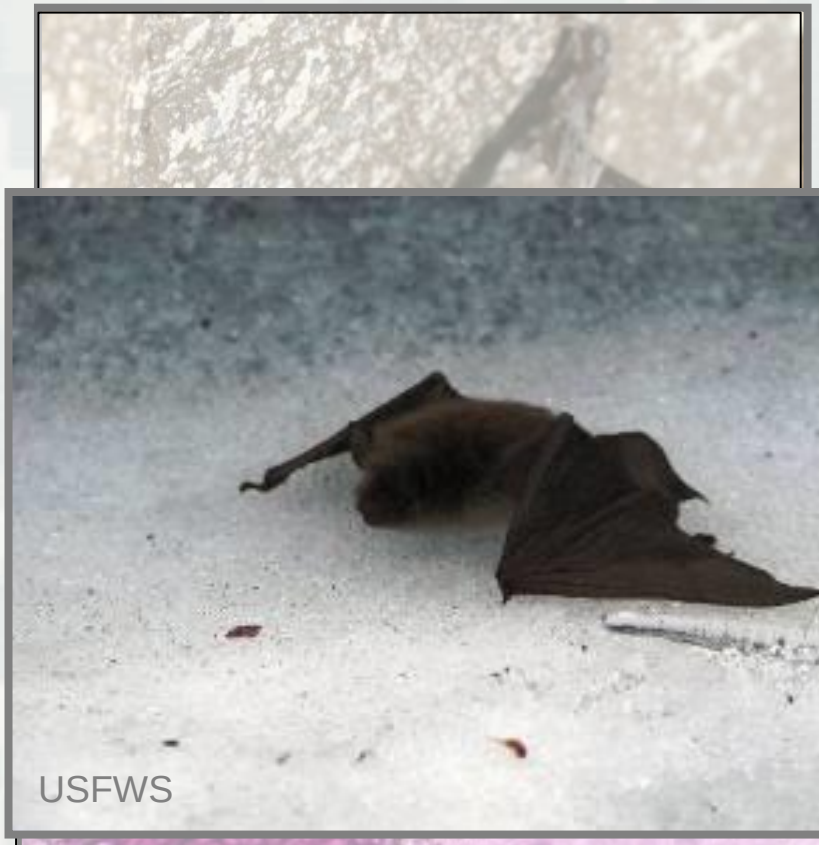
Environmental Lab

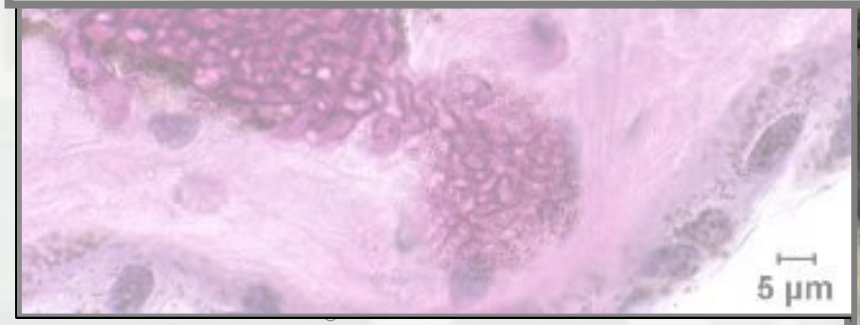
6 May 2016

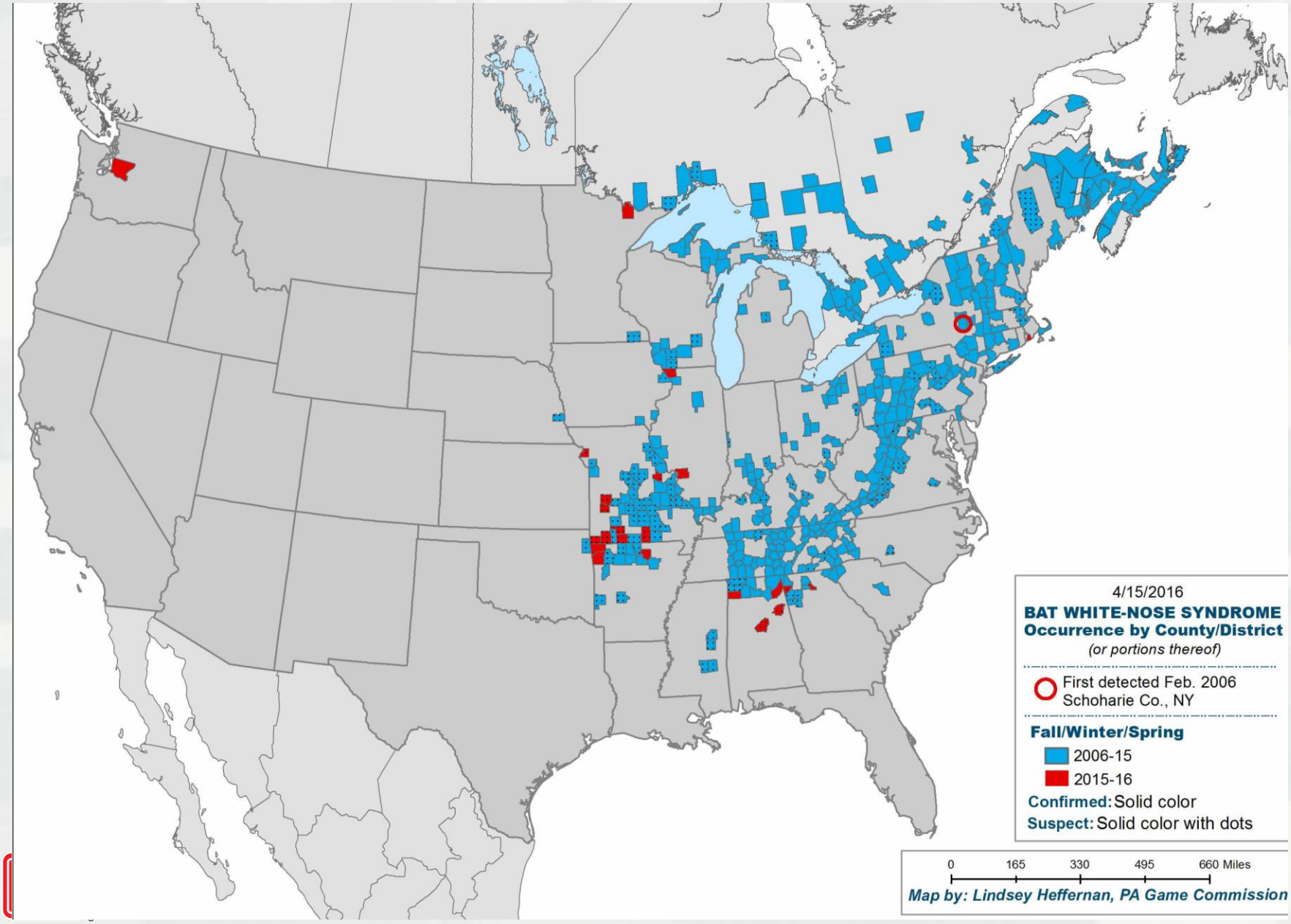
# Emerging Fungal Diseases of Wildlife

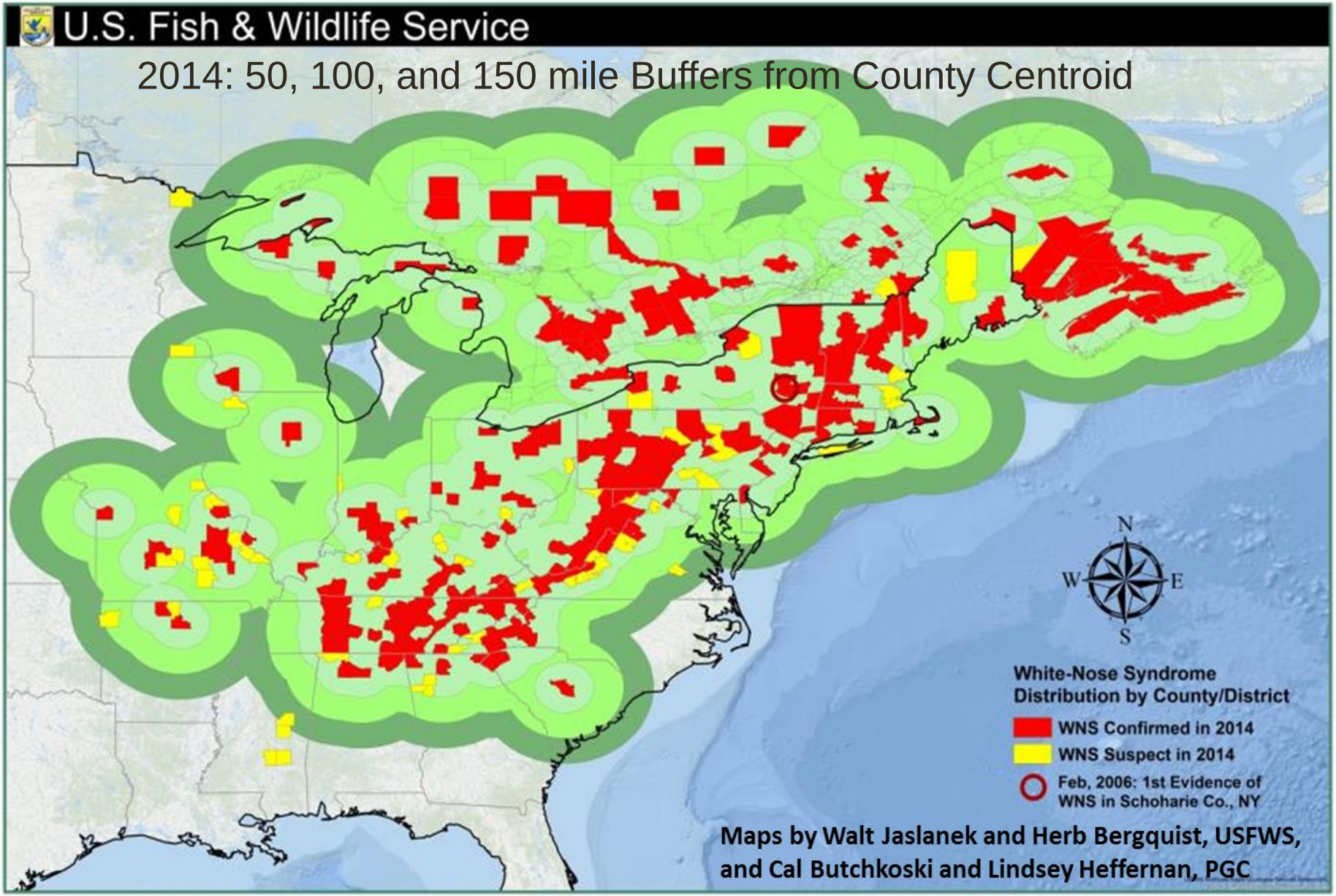
- Chytridiomycosis
  - *Batrachochytrium dendrobatidis* (Bd)
  - *Batrachochytrium salamandrivorans* (Bsal)
- Snake Fungal Disease (SFD)
  - *Ophidiomyces ophiodiicola*
- White-nose Syndrome (WNS)
  - *Pseudogymnoascus destructans*

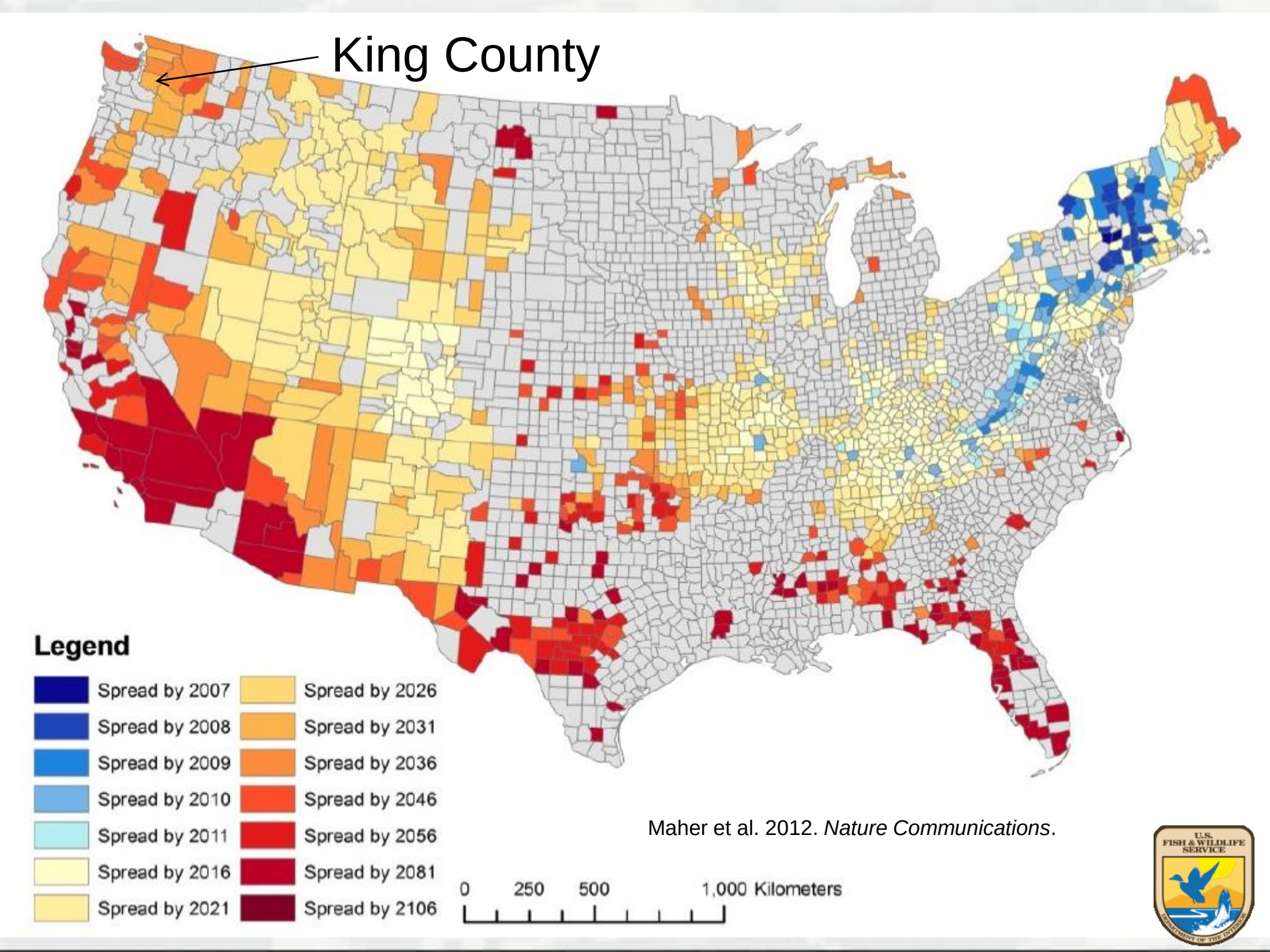
# White-Nose Syndrome?





4/15/2016
BAT WHITE-NOSE SYNDROME
Occurrence by County/District
(or portions thereof)
First detected Feb. 2006
Schoharie Co., NY
Fall/Winter/Spring
2006-15
2015-16
Confirmed: Solid color
Suspect: Solid color with dots
0
165
330
495
660 Miles
Map by: Lindsey Heffernan, PA Game Commission


U.S. Fish & Wildlife Service
2014: 50, 100, and 150 mile Buffers from County Centroid
N
W
E
S
White-Nose Syndrome
Distribution by County/District
WNS Confirmed in 2014
WNS Suspect in 2014
Feb, 2006: 1st Evidence of
WNS in Schoharie Co., NY
Maps by Walt Jaslanek and Herb Bergquist, USFWS,
and Cal Butchkoski and Lindsey Heffernan, PGC




Maher et al. 2012. *Nature Communications*.

# WNS in Europe

- Pd has been detected on bats and substrate
- 13 species are now confirmed with Pd/WNS

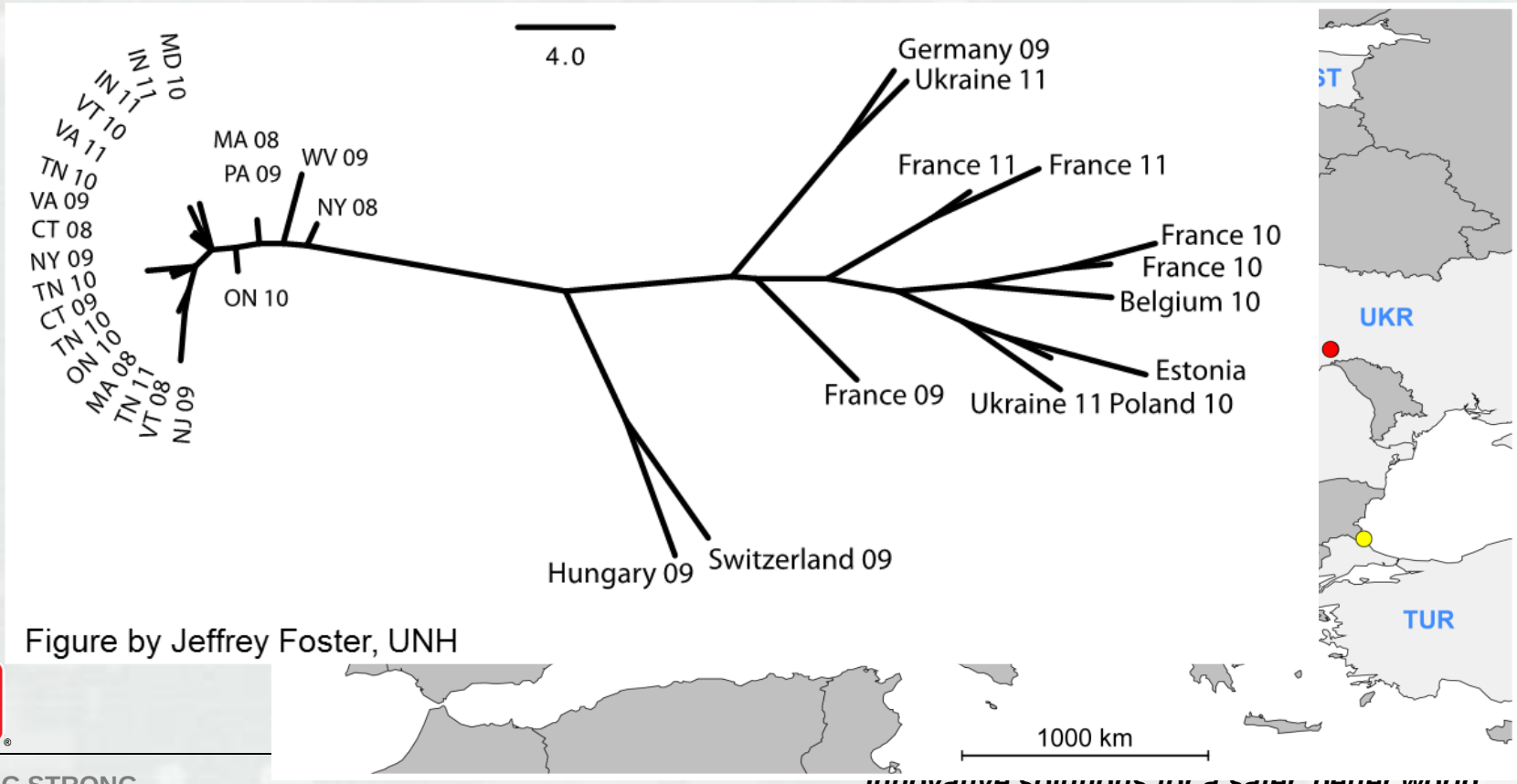



Figure by Jeffrey Foster, UNH

Puechmaille et al. 2012. PLoSOne.

# WNS in Asia

- Pd has been detected on bats and substrate
  - 6 bat species
  - 9 locations


Hoyt et al. 2015. *Emerging Infectious Diseases*.

# 7 Species Confirmed With WNS in N.A.

Little brown bat
(*Myotis lucifugus*)

Northern long-eared bat *
(*Myotis septentrionalis*)

Tri-colored bat
(*Perimyotis subflavus*)

Indiana bat *
(*Myotis sodalis*)

Eastern small-footed bat
(*Myotis leibii*)

Big brown bat
(*Eptesicus fuscus*)

Gray bat *
(*Myotis grisescens*)

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ERDC

*Innovative solutions for a safer, better world*

Photos: Merlin Tuttle, Bat Conservation International

# Additional Pd Positive Species

- **Southeastern bat**
  *(Myotis austroriparius)*
- **Virginia big-eared bat**
  *(Corynorhinus townsendii virginianus)*
- **Rafinesque's big-eared bat**
  *(Corynorhinus rafinesquii)*
- **Silver-haired bat**
  *(Lasionycteris noctivagans)*
- **Eastern red bat**
  *(Lasiurus borealis)*


WV DNR


Merlin Tuttle, BCI

# Bat Population Declines in 2014

## NY, PA, VT, VA, WV, CT, MA, MD, NC, NH, NJ, QC

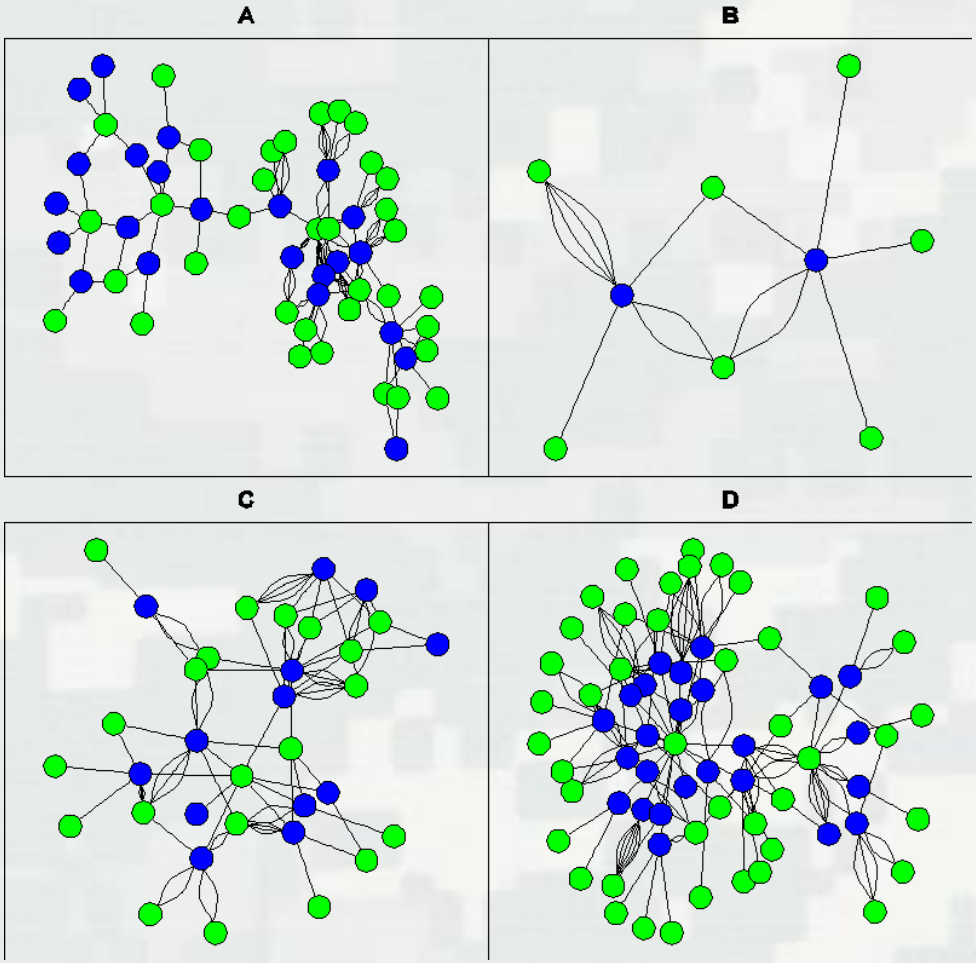
from 149 hibernacula w/ 2+ yrs of mortality/WNS

| Species | Sum Pre-WNS | Sum Post-WNS | Total change 2014 |
|---|---|---|---|
| Little brown | 600,595 | 76,968 | **-87%** |
| Northern | 4,412 | 196 | **-96%** |
| Tri-colored | 16,826 | 4,224 | **-75%** |
| Indiana | 51,744 | 34,951 | **-32%** |
| Big brown | 5,012 | 3,745 | **-25%** |

# Why is WNS so Detrimental?

- Bat congregate during fall swarming and winter migration
- During hibernation, bats are unable to mount an immune response to invading pathogens
- Recovery will be difficult due to the low reproductive rate

# Bat Maternity Colony Networks



# Geographic Limitations of WNS Impact

- Differences in hibernacula temperatures
- Differences in hibernation duration
- Possibility of increased bat activity during the winter (e.g., foraging?)
- Eastern sites have large # of known hibernacula
- Eastern sites have larger hibernating colonies of bats

# Bat Species in the U.S. & Canada

**MIGRANTS OR SPECIES NOT KNOWN TO HIBERNATE**

| | Species name | Common name |
|---|---|---|
| 1 | *Mormoops megalophylla* | Ghost-faced bat |
| 2 | *Choeronycteris mexicana* | Mexican long-tongued bat |
| 3 | *Leptonycteris nivalis* | Greater long-nosed bat |
| 4 | *Leptonycteris yerbabuenae* | Lesser long-nosed bat |
| 5 | *Macrotus californicus* | California leaf-nosed bat |
| 6 | *Lasionycteris noctivagans* | Silver-haired bat |
| 7 | *Lasiurus blossevillii* | Western red bat |
| 8 | *Lasiurus borealis* | Eastern red bat |
| 9 | *Lasiurus cinereus* | Hoary bat |
| 10 | *Lasiurus ega* | Southern yellow bat |
| 11 | *Lasiurus intermedius* | Northern yellow bat |
| 12 | *Lasiurus seminolus* | Seminole bat |
| 13 | *Lasiurus xanthinus* | Western yellow bat |
| 14 | *Eumops floridanus* | Florida bonneted bat |
| 15 | *Eumops perotis* | Greater mastiff bat |
| 16 | *Eumops underwoodi* | Underwood's mastiff bat |
| 17 | *Molossus molossus* | Pallas' mastiff bat |
| 18 | *Nyctinomops femorosaccus* | Pocketed free-tailed bat |
| 19 | *Nyctinomops macrotis* | Big free-tailed bat |
| 20 | *Tadarida brasiliensis* | Brazilian free-tailed bat |

**SPECIES THAT HIBERNATE**

| | Species name | Common name |
|---|---|---|
| 1 | *Myotis auriculus* | Mexican long-eared bat |
| 2 | *Myotis austroriparius* | Southeastern bat |
| 3 | *Myotis californicus* | California bat |
| 4 | *Myotis ciliolabrum* | Western small-footed bat |
| 5 | *Myotis evotis* | Western long-eared bat |
| 6 | *Myotis grisescens* | Gray bat |
| 7 | *Myotis keenii* | Keen's bat |
| 8 | ***Myotis leibii*** | **Eastern small-footed bat** |
| 9 | ***Myotis lucifugus*** | **Little brown bat** |
| 10 | *Myotis occultus* | Occult bat |
| 11 | ***Myotis septentrionalis*** | **Northern long-eared bat** |
| 12 | ***Myotis sodalis*** | **Indiana bat** |
| 13 | *Myotis thysanodes* | Fringed bat |
| 14 | *Myotis velifer* | Cave bat |
| 15 | *Myotis volans* | Long-legged bat |
| 16 | *Myotis yumanensis* | Yuma bat |
| 17 | *Nycticeius humeralis* | Evening bat |
| 18 | *Parastrellus hesperus* | Canyon bat |
| 19 | ***Perimyotis subflavus*** | **Tricolored bat** |
| 20 | *Corynorhinus townsendii* | Townsend's big-eared bat |
| 21 | *Corynorhinus rafinesquii* | Rafinesque's big-eared bat |
| 22 | ***Eptesicus fuscus*** | **Big brown bat** |
| 23 | *Antrozous pallidus* | Pallid bat |
| 24 | *Euderma maculatum* | Spotted bat |
| 25 | *Idionycteris phyllotis* | Allen's big-eared bat |

Source: Paul Cryan, USGS

# A Glimmer of Hope?

Bat Banding effort in NE

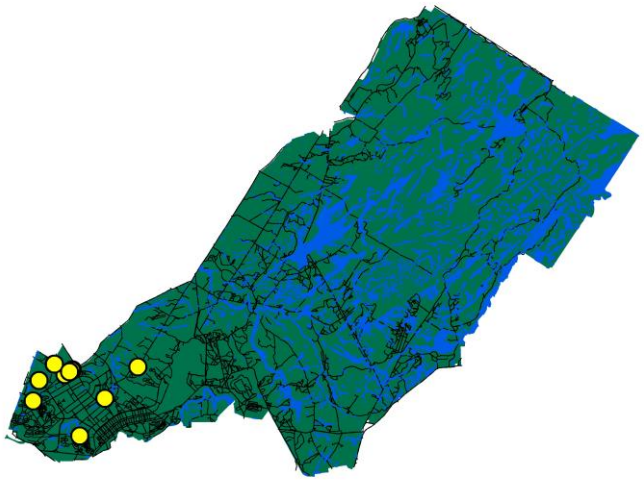
1. Adult recaptures across years
2. Successful reproduction

# WNS Species Impacts

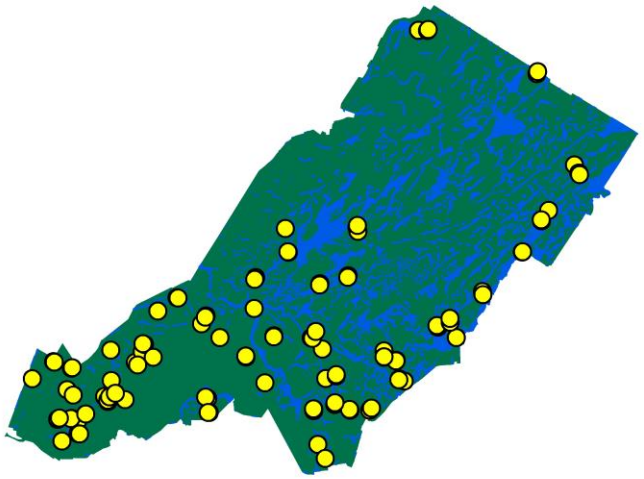
- Northern long-eared bat
  - ▶ Listed as threatened with 4d rule in April 2015
- Little brown bat
  - ▶ FWS is currently conducting a status review
- Tri-colored bat
  - FWS is currently conducting a status review

# Recent Capture Locations at Fort Drum, NY

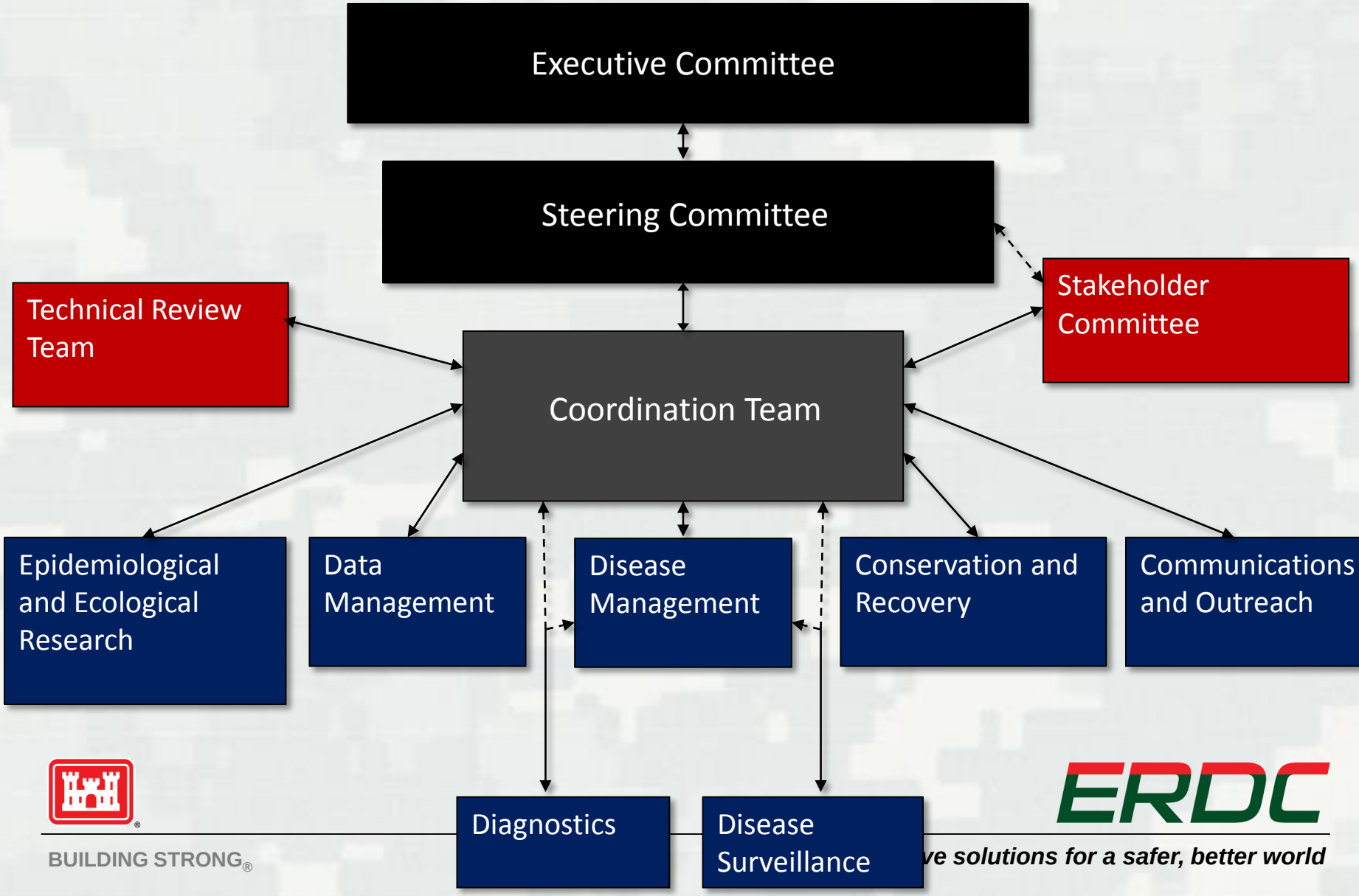
Indiana bat



Northern long-eared bat



# US WNS Organization Structure



# Implementation: WNS Executive Committee

| | |
|---|---|
| **Wendi Weber** | **USFWS** |
| Anne Kinsinger | USGS |
| Peter Boice | DoD |
| Elaine Leslie | NPS |
| Ruth Welch | BLM |
| Tom DeLiberto | APHIS |
| Leslie Weldon | USFS |
| | |
| **Karen Waldrop** | **AFWA - Kentucky** |
| Bob Duncan | (SE) Virginia |
| Mark Reiter | (MW ) Indiana |
| TBD | (W ) |
| Patricia Riexinger | (NE) New York |
| | |
| Mike Lavoie | Eastern Band Cherokee Indians |
| Trudy Ecoffey | Oglala Sioux |
| Adam Ringia | Pueblo of Laguna |

# Implementation: WNS Steering Committee

| | |
|---|---|
| **Paul Phifer** | **USFWS** |
| Jonathan Sleeman | USGS |
| Eric Britzke | DoD |
| Margaret Wild | NPS |
| Brian Novosak | BLM |
| Tom DeLiberto | APHIS |
| Colleen Madrid | USFS |
| | |
| **Sunni Carr** | **AFWA - Kentucky** |
| Megan Kirchgessner | (SE) Virginia |
| Owen Boyle | (MW ) Wisconsin |
| Angie McIntire | (W ) Arizona |
| Scott Darling | (NE) Vermont |
| | |
| Jordi Segers | Canadian Wildlife Health Cooperative |

# US Working Groups

1. Communications and Outreach - Catherine Hibbard, USFWS
2. Data and Technical Information Management – TBD
3. Diagnostics – Anne Ballmann, USGS
4. Disease Surveillance – Eric Britzke, DoD
5. Disease Management – Jonathan Reichard, USFWS
6. Etiological and Epidemiological Research – Sybill Amelon, USFS
7. Conservation and Recovery – Robyn Niver, USFWS

# Latest Developments

- Revised National Cave Advisory – March 2016
- Decontamination Protocol – Spring 2016
- Disease management & treatment research
  - ► Workshop 2015

# Revision: Recommendations for Managing Access to Subterranean Bat Roosts to Reduce the Impacts of WNS in Bats

**Recommendations**

- Where feasible, prevent unrestricted access to subterranean bat roosts, especially while bats are present.
- Dedicate gear to sites;  do not move equipment around
- Decontaminate after every site visit.
- Coordinate and combine, when possible, scientific and management activities, especially while bats are likely present.
- Designate “no entry” restriction for subterranean bat roosts when wintering bats are present unless access is to conduct agency-sanctioned or permitted activities.
- Partner with individuals and organizations to best conserve underground environments, and their fauna and flora.
- Work to educate visitors and local communities about WNS and conservation of bats, caves, and other subterranean habitats.

# Disease Management Workshop
## July 2015 - 50 experts, Grand Rapids, MI

Vision: Ensure the persistence of all bat species on the continent against the threat of WNS through effective disease treatment and management.

Meeting Objectives:

1. To assess the current status of treatment research
2. Identify and establish pathways for compliance with regulatory agencies
3. Discuss next steps of treatment development
4. Prepare a strategy for field testing and implementation

# Management and Conservation

**Treatments and tools under investigation:**

- Probiotics
- Microbially derived anti-fungal compounds
- Vaccine
- Mycovirus
- Other fungicides
- Other

**Additional Guidance:**

- NWCO, Rehab, Forest Management practices
- Transportation agency guidance (bridges)
- Captive management report
- Long-term hibernaculum microclimate monitoring

# National Decontamination Protocol 04.12.2016

- **Purpose:**
  - Provide the best available scientific information known to effectively clean and treat clothing, footwear, and/or gear that may have been exposed to Pd.
    - Know the closures, advisories, or regulations in your state
    - Develop a plan to follow recommendations for your visit
    - Do NOT transport equipment into or out of USA

- **Product Use:**
  - **First priority is SAFETY**
  - Understand & use equipment labels, product registration labels, SDS sheets.

- **Trip Planning/Organization:**
  - Consult agency or land management specific addendums
  - Prepare a strategy to remove, clean, treat, rinse, & tidy up!

# What can you do now?

# Get to Know Your Bat Community

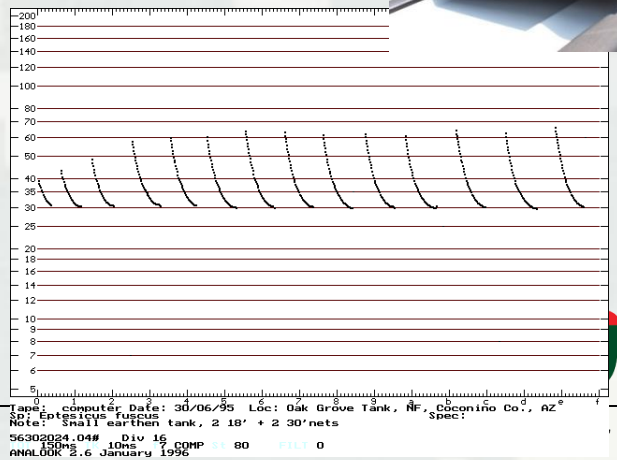
- Capture techniques
- Colony counts
- Acoustics
  - Fixed point
  - Mobile transects

# NABat

***Coordinated bat monitoring to support multi-scale inferences about trends in bat populations & abundances***

- Continent-wide sampling grid
- Acoustic Surveys - Vehicular transects & stationary points
- Colony Counts – Hibernacula & maternity
- Data Management – Bat Population Data Project (USGS)
- NABat implementation:

  Baseline in non-WNS areas, trends in WNS areas

# Reasons for conducting surveillance

- Determine information on the movements of WNS
  - ► Does the discovery in a new place represent a “jump scenario” or gradual movement?
- Allow identification of sites early in the disease progression for sites to be used in research
  - ► Disease management and epidemiology groups

# Surveillance efforts are hibernacula-centric

- Season when the disease manifests itself
- Provides the most efficient method to sample large numbers of bats

# Additional Steps

- Utilize decontamination procedures for all bat/cave work
- Become engaged in WNS research / planning efforts with stakeholders