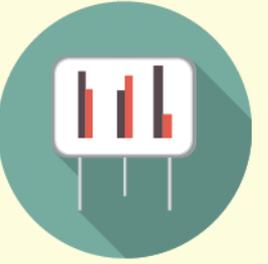


# Sections I, X, and Z: Foodborne, Mycotics, & Waterborne

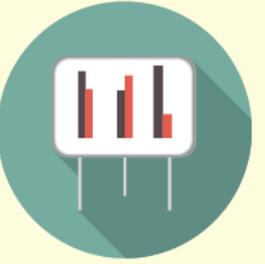


OutbreakNet/WASH Quarterly Webinar  
Slides from the Epidemiology and Laboratory Capacity (ELC) Annual Meeting  
April 2018

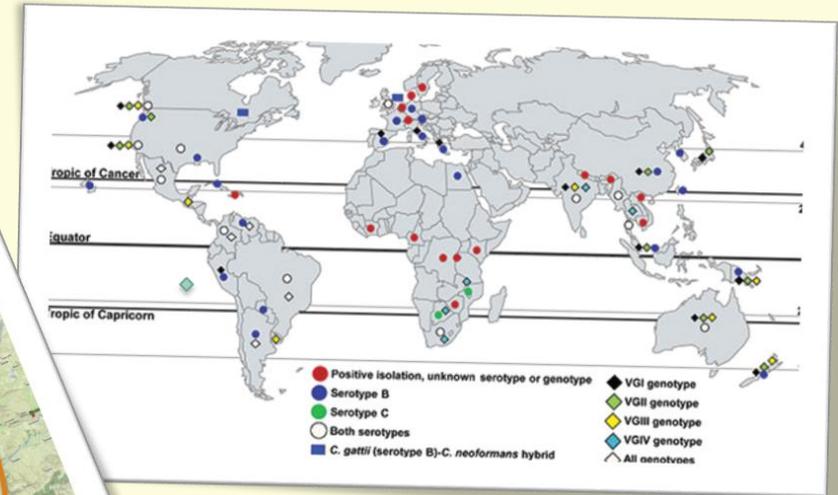
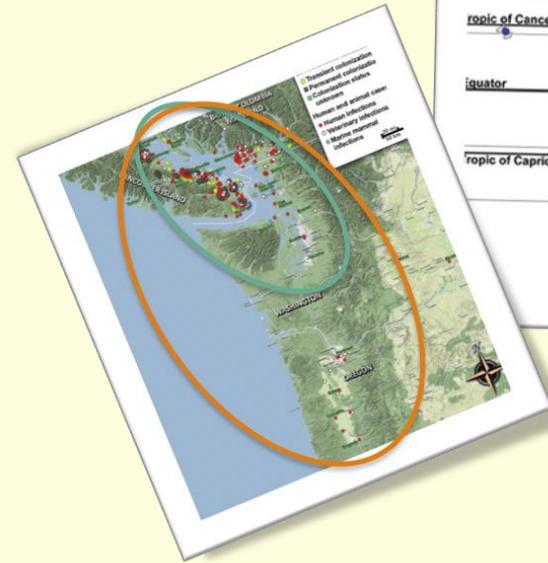


# Section X: Mycotics

## Detecting and Preventing Fungal Infections



Brendan Jackson, MD, MPH  
CDC Mycotic Diseases Branch  
[brjackson1@cdc.gov](mailto:brjackson1@cdc.gov) | 404-639-0536



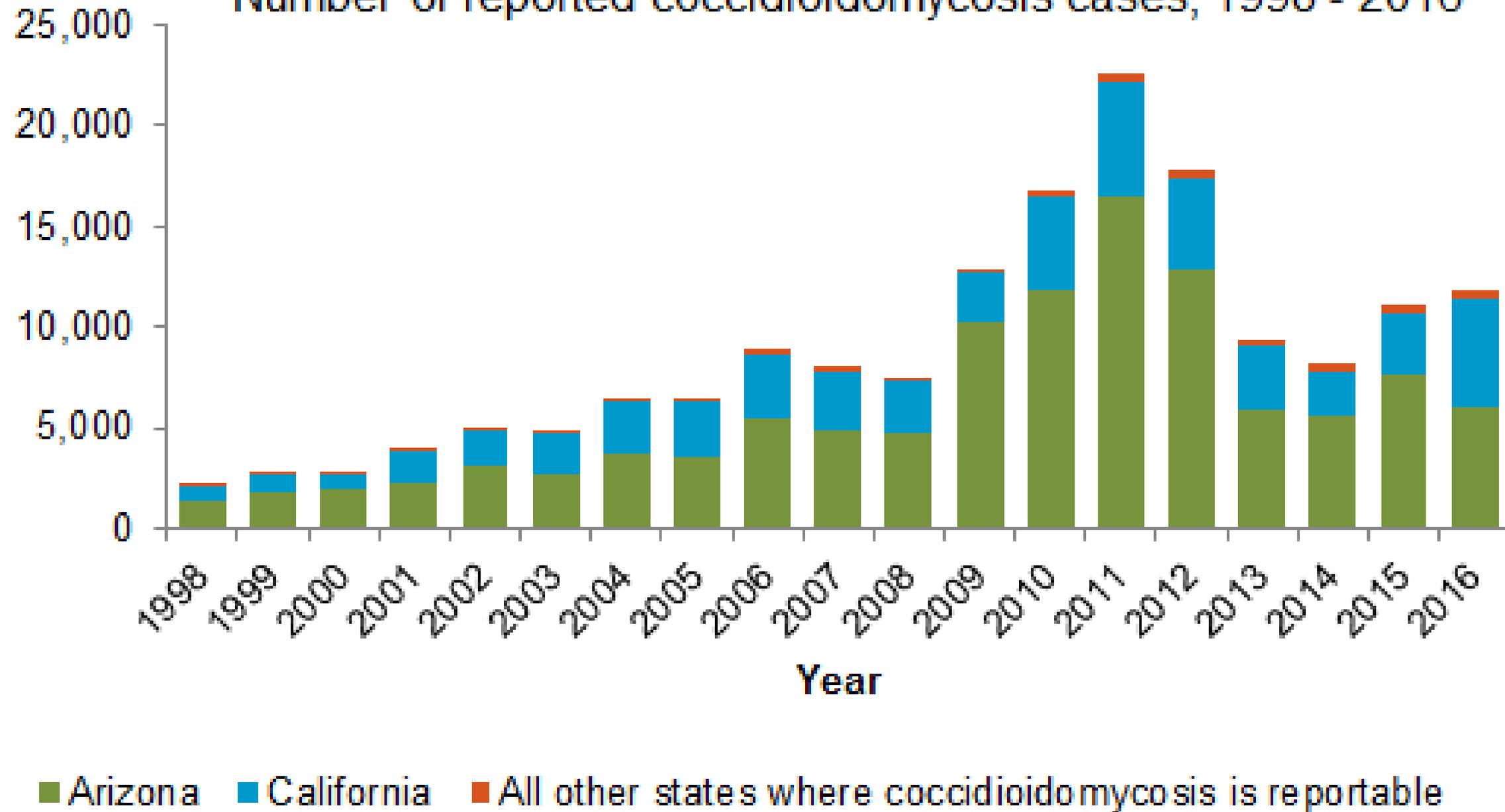
## Fungal Disease Priorities

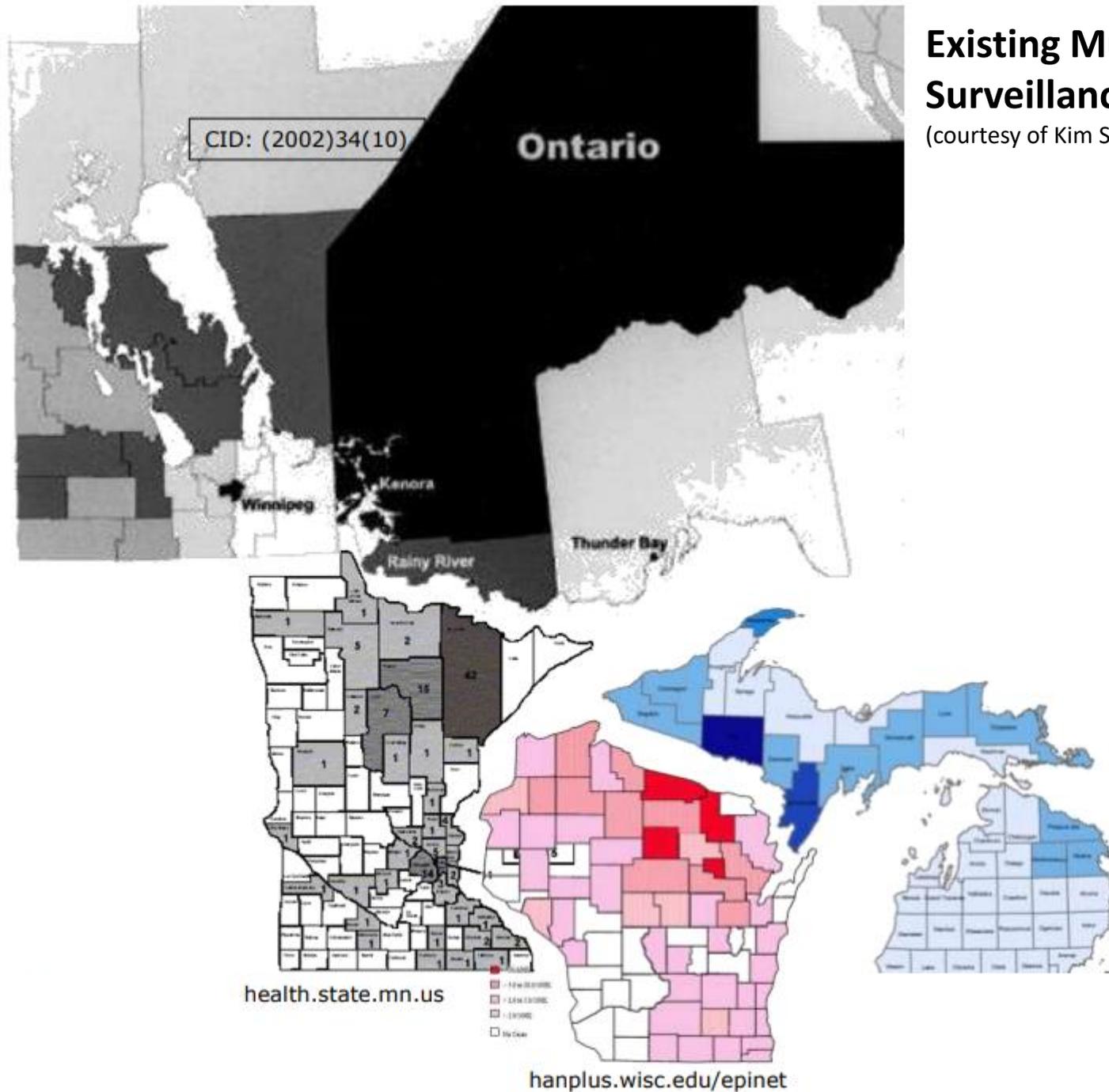
- Improve epidemiology of endemic mycoses
- Build public and clinician awareness
- Contain antifungal-resistant fungi
- Enhance public health lab fungal capacity





Number of reported coccidioidomycosis cases, 1998 - 2016





## Existing Multistate Blastomycosis Surveillance

(courtesy of Kim Signs, Michigan)



# FUNGAL DISEASE AWARENESS WEEK



OCTOBER 1-5, 2018

[www.cdc.gov/fungal](http://www.cdc.gov/fungal)



# Section Z: Capacity Building for Waterborne Disease Detection, Investigation, Reporting, and Prevention



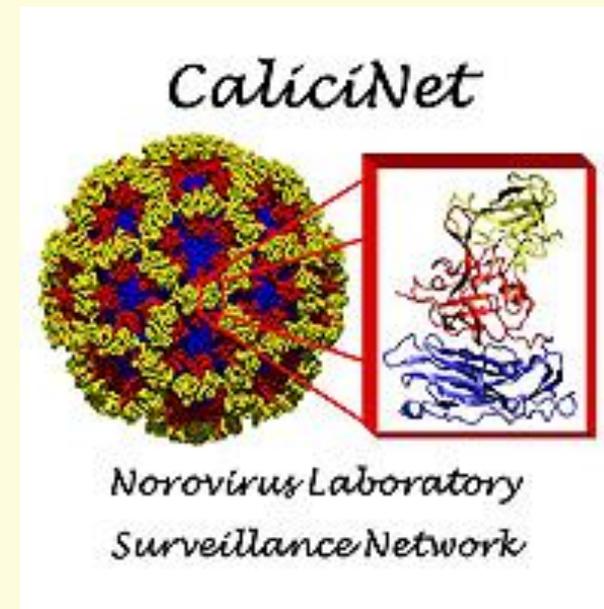
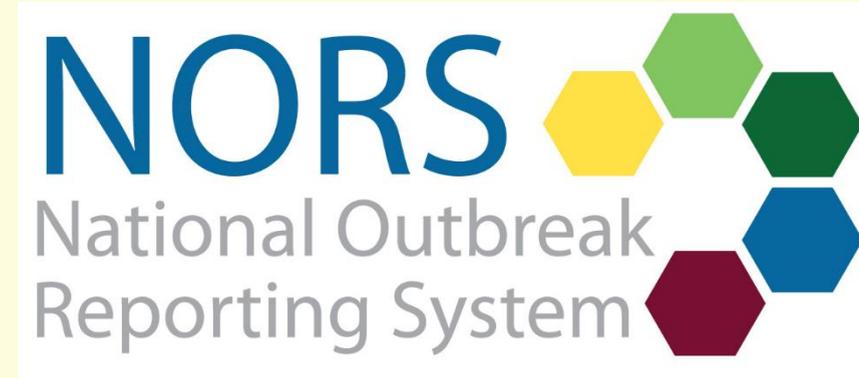
Katie Fullerton, MPH

Epidemiologist

[kgf9@cdc.gov](mailto:kgf9@cdc.gov)

## Section 15: NoroSTAT

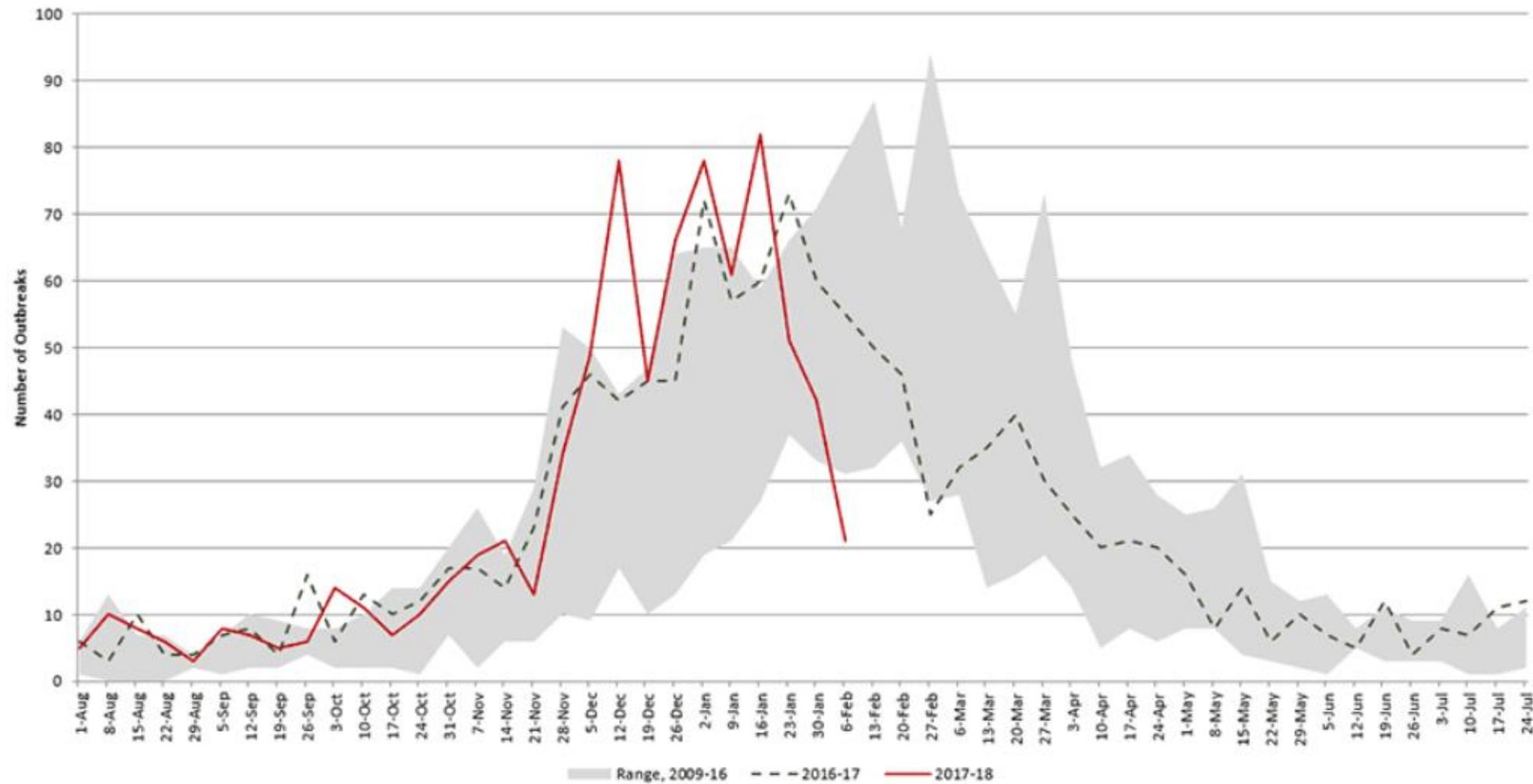
- Norovirus outbreaks of **all modes of transmission**
- Intended to improve timeliness and completeness of reporting
- Report epi data in NORS and laboratory-confirmed outbreaks in CaliciNet
- Initial reports in 7 business days



## NoroSTAT Data



Suspected and Confirmed Norovirus Outbreaks Reported by State Health Departments in Massachusetts, Michigan, Minnesota, Ohio, Oregon, South Carolina, Tennessee, Virginia, and Wisconsin to the [National Outbreak Reporting System \(NORS\)](#) by Week of Illness Onset, 2009-2018\* †.



[See data table for this chart.](#)

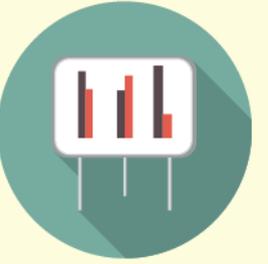




## Section 15: NoroSTAT

- No major changes from last year
- Funding intended for additional epi/lab personnel
  - To help states meet 7 day reporting requirement
- Can request travel or supplies if personnel not needed
  - Sequencing supplies and travel to CaliciNet user meeting should be requested under 16. CaliciNet
- Applicant must already be CaliciNet-certified

# Section I1: Enteric Disease Outbreak Response, Surveillance, and Reporting Capacity



(OutbreakNet, National Case Surveillance, NORIS, OutbreakNet Enhanced, and FoodCORE Programs)





# Enhance capacity for detection, investigation, control, and reporting of enteric disease cases and outbreaks



- Outcomes

- Improved enteric disease surveillance and outbreak detection and response
- Improved capacity to fully investigate and respond to enteric disease outbreaks
- Improved routine surveillance of enteric illness
- Improved timeliness of patient interviews
- Improved completeness of foodborne disease and animal contact outbreak reporting

- Recommended use of funds:

- Dedicated epidemiologist for enteric investigation and reporting
- Training of local and state public health staff
- Resources to electronically transmit routine surveillance data
- Supplies, computer equipment, and data entry personnel to maintain and enhance surveillance and outbreak reporting
- Dedicated personnel to support interviewing capacity for cases of enteric disease (For OutbreakNet Enhanced or FoodCORE)
- Attending the annual InFORM Conference or Joint PulseNet/OutbreakNet regional meeting

# Overall I1 Updates



- Multiple programs under Section I1
  - OutbreakNet
  - National Case Surveillance
  - National Outbreak Reporting System (NORS)
  - OutbreakNet Enhanced (OBNE)
  - Foodborne Centers for Outbreak Response Enhancement (FoodCORE)
- One budget
- Expanding to additional OutbreakNet Enhanced sites
- Must address OutbreakNet, National Case Surveillance, and NORS to apply for OBNE or FoodCORE

# National Case Surveillance Updates



- Collection and transmission of enteric pathogen surveillance data
  - Collect routine surveillance data using standard questionnaires or data elements
  - Transmit routine surveillance data through one of three mechanisms:
    - HL7 using core and condition-specific MMGs
    - Electronic tabular format
    - Standard questionnaires
- Potential use of funds for electronic transmission of data:
  - Building data entry screens
  - Creating data exports
  - Implementing HL7 data transmission

# NORS Updates



- Core funding requirements (Section I1, all parts)
  - Report all foodborne and animal contact outbreaks
  - Explore reporting environmental, person-to-person, and waterborne outbreaks
- Metrics
  - Foodborne outbreak reporting rate now 2 outbreaks per million people per year (up from 1)
  - NORS team will provide a summary of foodborne outbreak reporting to each site that describes and assesses site-specific performance

# Section I2: National Antimicrobial Resistance Monitoring System (NARMS) - Surveillance Activities



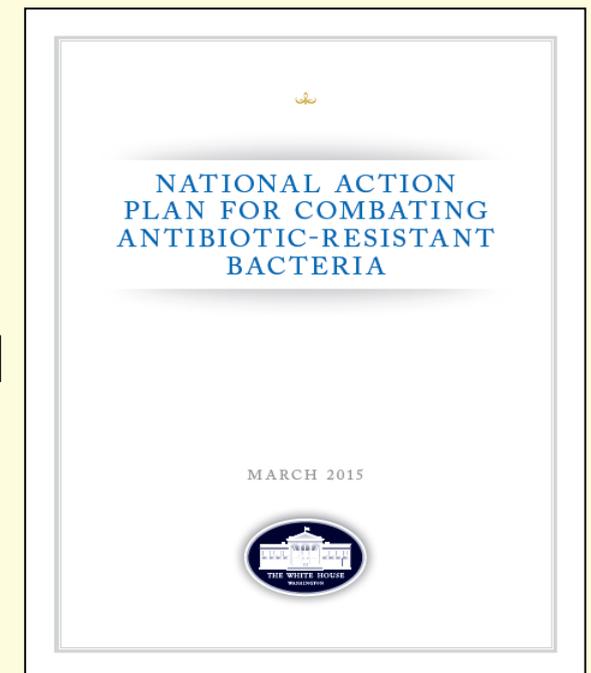
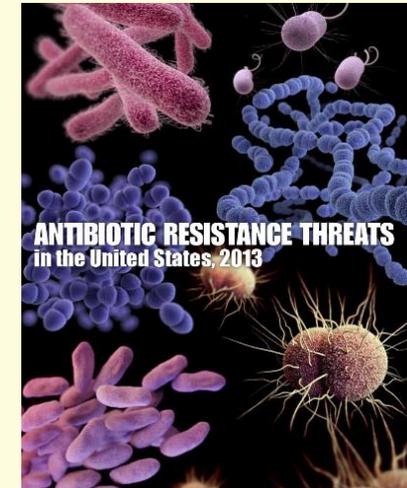
Jared Reynolds ([uvz6@cdc.gov](mailto:uvz6@cdc.gov)) & Jean Whichard ([zyr3@cdc.gov](mailto:zyr3@cdc.gov))

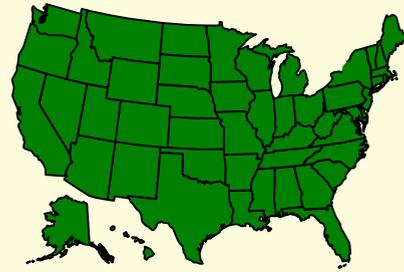
Enteric Diseases Epidemiology Branch & Enteric Diseases Laboratory Branch

# Combating Antibiotic Resistant Bacteria (CARB)



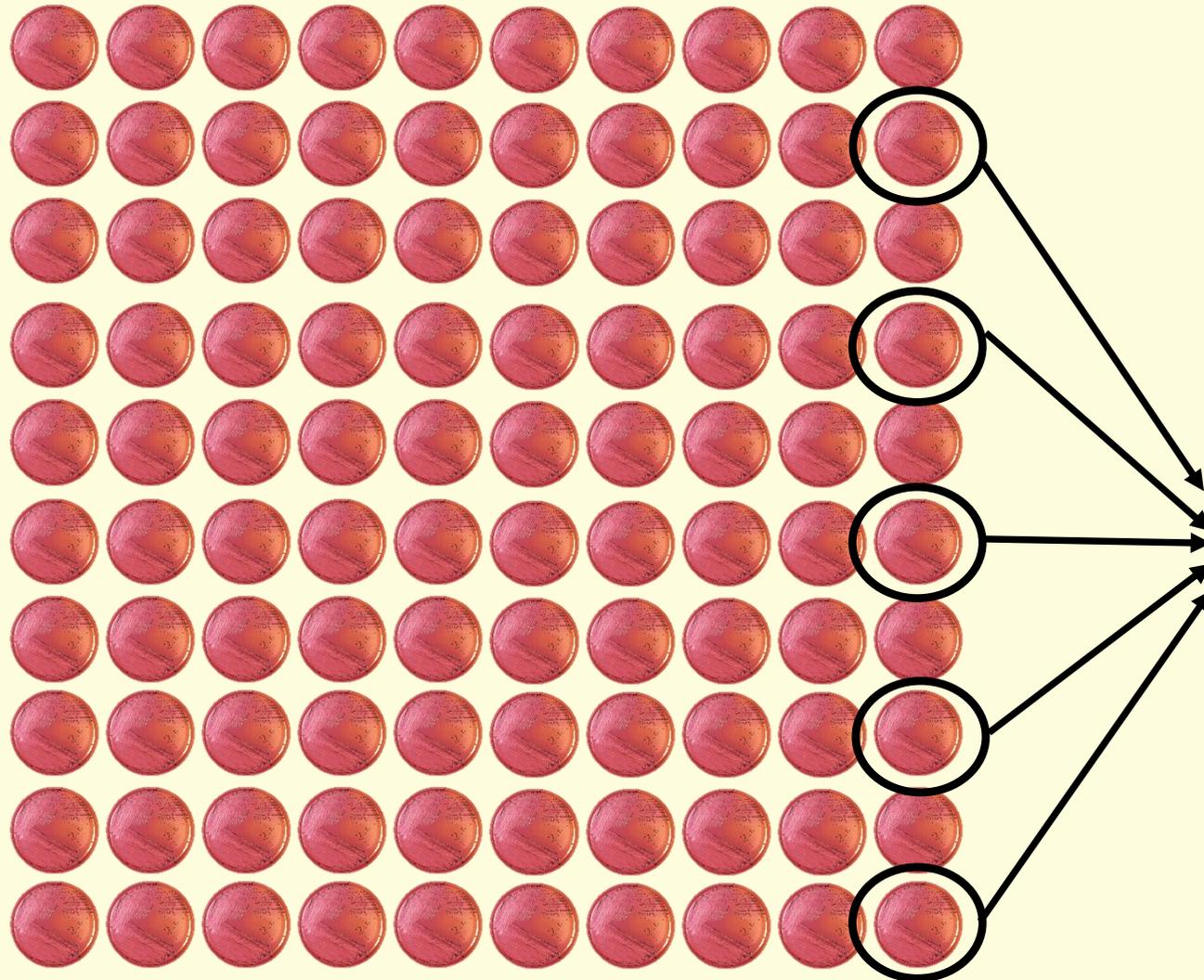
- **Antibiotic Resistance Threats in the United States 2013 Report** estimated that *Salmonella*, *Campylobacter*, and *Shigella* cause over 440 thousand resistant infections and 66-70 death annually
- **National Action Plan for CARB** called for a CDC response to detect and respond to resistant pathogens, prevent spread of resistant infections, and to encourage innovation for new strategies
  - A key objective is to enhance surveillance of antibiotic resistance in animal and zoonotic pathogens by strengthening NARMS
    - **Relevant 3-year Milestone: CDC will identify resistance patterns for all *Salmonella* isolates and an increased proportion of other enteric pathogens**





State Public Health Lab

### NARMS surveillance before CARB



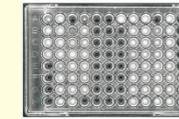
1 in 20 isolates shipped to CDC



NARMS



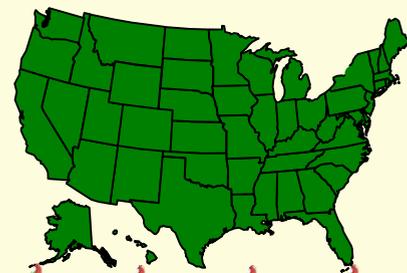
Isolates received by NARMS lab



AST performed



- 5% of isolates have phenotypic antimicrobial susceptibility data
- 95% of isolates have no susceptibility data



State Public Health Lab

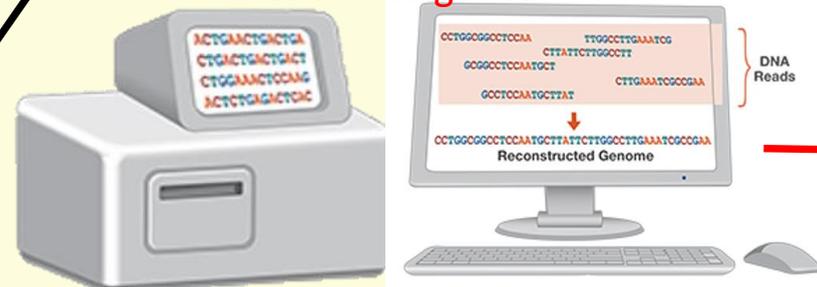
## Surveillance expansion through CARB/ELC funding



1 in 20 isolates shipped to CDC



100% of isolates undergo WGS and screened for resistance genes



NARMS



Isolates received by NARMS lab



AST performed



- 5% of isolates have phenotypic antimicrobial susceptibility data + **predicted resistance from genes**

- **95% of isolates have predicted resistance from genes**

# National Antimicrobial Resistance Monitoring System: Surveillance Activities



- Request under Attachment I2
- Funding Available for:
  - **Whole Genome Sequencing (WGS) activities using PulseNet methods**
    - Includes funds for sequencing supplies, workforce, and equipment & associated service agreements
  - **Continued submission of routine surveillance and outbreak isolates for traditional AST**
    - Includes funds for preparation and shipping of isolates from humans to CDC EDLB
  - **Collection and transmission of expanded exposure and outcome information associated with antimicrobial resistance**
    - Funds available for NARMS sites conducting active, population-based surveillance for *Salmonella*, *Campylobacter*, and *Shigella* as part of FoodNet
    - Funds will support data collection through enhanced case exposure ascertainment (eCEA)

# Goals of Funding



- **Increase coverage of current AR surveillance**
  - Sequence *Salmonella* isolates (ultimate target is 100%) and a representative number of *Campylobacter* and *Shigella* isolates (as funding allows) to allow for screening of resistance genes
  - Maintain shipping of routine surveillance and outbreak isolates to CDC for traditional testing to allow for continuity and detection of emerging resistance
- **Increase patient interviews to obtain expanded information on exposures and outcomes associated with antimicrobial resistance in FoodNet sites as part of enhanced CEA**
  - Prioritize interviewing of cases for which isolates are available and WGS is being performed
  - Prioritize the collection of information about foreign travel and antibiotics taken



# Supplemental Guidance



Item/Activity	AMD (D)	PulseNet (I4)	NARMS (I2)
Workforce development (personnel) ✓	Yes	Yes	Yes
Training ✓	Yes	Yes	Yes
Travel to meetings ✓	Yes	Yes	Yes
PFGE equipment ✗	No	Yes	No
PFGE supplies and reagents ✗	No	Yes	No
BioNumerics upgrades ✓	No	Yes	Yes
DNA sequencing supplies and reagents for <b>non-foodborne/enteric</b> bacterial diseases ✗	Yes	No	No
DNA sequencing supplies and reagents for <b>foodborne/enteric</b> bacterial diseases ✓	No	Yes	Yes
DNA sequencing equipment for <b>non-foodborne/enteric</b> diseases ✗	Yes	No	No
DNA sequencing equipment for <b>foodborne/enteric</b> bacterial diseases ✓	No	No	Yes
Isolation of bacteria from culture-independent diagnostic tests (CIDT) ✗	No	Yes	No
Network/cloud computing services* ✓	Yes	No	Yes*
Routine and outbreak submission of foodborne/enteric bacterial isolates for characterization of antibiotic resistance ✓	No	No	Yes

\*NARMS will fund network/cloud computing services for epi data transmission only

# ELC Activity 14: PulseNet



Kelley Hise ([kpb6@cdc.gov](mailto:kpb6@cdc.gov)) and Efrain Ribot ([eyr4@cdc.gov](mailto:eyr4@cdc.gov))

Enteric Diseases Laboratory Branch

# PulseNet ELC Application Highlights and Supplemental Guidance



## Request Under PulseNet (Attachment I4)

- PulseNet Core Activities (PFGE)
  - Reagents, supplies, personnel, equipment for PFGE
- STEC and *Salmonella* surveillance
  - Include commercial molecular serotyping kits
- CIDT culturing, isolating, and characterizing of resultant isolates
- WGS reagents/supplies (some funding by AMD)
  - Sequence routine isolates STEC, *Listeria*, others not sequenced as part of NARMS
- Travel to attend PFGE and/or BioNumerics training
- Travel to PulseNet Regional Meetings



# PulseNet ELC Application Highlights and Supplemental Guidance



Item	Cost
Benchtop Sequencer	~\$99,000
Ancillary NGS Equipment*	~\$45,000
BioNumerics Software Upgrade (to version 7.6)	~\$3,500
DNA Sequencing Supplies and reagents for foodborne/enteric bacterial diseases	~\$125.00/isolate (average cost)**
Service Agreements	\$16,000 (sequencer)

\*must provide details on the type of ancillary NGS equipment being requested

\*\*see cost analysis table for more details

Cost Analysis - \$ per sample	MiSeq V2 (300 cycle) 60Mb load		MiSeq V2 (500 cycle) 80Mb load		MiSeq V3 (600 cycle) 175 Mb load		MiniSeq (300 cycle) 80Mb load**	
	12 Isolates/run (5Mb)	20 Isolates/run (3Mb)	16 Isolates/Run (5Mb)	26 Isolates/Run (3Mb)	35 Isolates/Run (5Mb)	60 Isolates/Run (3Mb)	16 Isolates/Run (5Mb)	26 Isolates/Run (3Mb)
Sample Extraction & QC, Library Prep	\$578.65	\$964.42	\$771.53	\$1,253.43	\$1,687.73	\$2,893.25	\$771.53	\$1114.88
Sequencing - Kit cost	\$988.36		\$1,105.21		\$1,489.84		\$1,460.63	
Sequencing \$/Sample	\$82.36	\$49.42	\$69.08	\$42.51	\$42.57	\$24.83	\$91.29	\$56.18
Total cost/run (includes ancillary reagents, \$12/sample)	\$1,579.01	\$1,964.78	\$1,888.74	\$1,265.43	\$3597.57	\$2,905.25	\$2,244.16	\$1,265.43
Total cost/sample	\$131.58	\$98.24	\$118.05	\$102.70	\$102.78	\$85.05	\$151.51	\$116.06

Sample extraction & QC and Library prep cost is **\$48.22** per isolate. This is calculated using Qiagen DNAeasy Blood & Tissue Kit (250 reactions), Qubit 500 assay kits, and Illumina Sample Prep (96 sample) and Indexing Kits (96 sample).

**\*\* DNA Mb load for the MiniSeq kit is being evaluated. The price/isolate is anticipated to decrease as the DNA capacity of the kit is increased.**

# PulseNet ELC Application Highlights and Supplemental Guidance



- Base your estimates on historical data/information
  - Number of isolates received the previous year
- Be concise with project narratives
  - Respect the word limits indicated in the application form
- Remain engaged throughout the drafting process
- Ask for what your laboratory needs
  - Don't be shy. If you don't ask, you will surely not receive.
- Check for additional guidance from PulseNet
  - APHL, PulseNet SharePoint site, blast emails
    - Share info with your ELC PI
- Questions for PulseNet?
  - Email [PulseNet@cdc.gov](mailto:PulseNet@cdc.gov) with the subject line “ ELC funding”



# Supplemental Guidance: PulseNet I4



Item/Activity	AMD (D)	PulseNet (I4)	NARMS (I2)
Workforce development (personnel) ✓	Yes	Yes	Yes
Training ✓	Yes	Yes	Yes
Travel to meetings ✓	Yes	Yes	Yes
PFGE equipment ✓	No	Yes	No
PFGE supplies and reagents ✓	No	Yes	No
BioNumerics upgrades ✓	No	Yes	Yes
DNA sequencing supplies and reagents for <b>non-foodborne/enteric</b> bacterial diseases ✗	Yes	No	No
DNA sequencing supplies and reagents for <b>foodborne/enteric</b> bacterial diseases ✓	No	Yes	Yes
DNA sequencing equipment for <b>non-foodborne/enteric</b> diseases ✗	Yes	No	No
DNA sequencing equipment for <b>foodborne/enteric</b> bacterial diseases ✓	No	Yes (limited)	Yes
Isolation of bacteria from culture-independent diagnostic tests (CIDT) ✓	No	Yes	No
Network/cloud computing services* ✗	Yes	No	Yes*
Routine and outbreak submission of foodborne/enteric bacterial isolates for characterization of antibiotic resistance ✗	No	No	Yes

\*NARMS will fund network/cloud computing services for epi data transmission only

# ELC Activity 13: Integrated Food Safety Centers of Excellence (CoE)



Elizabeth Sillence

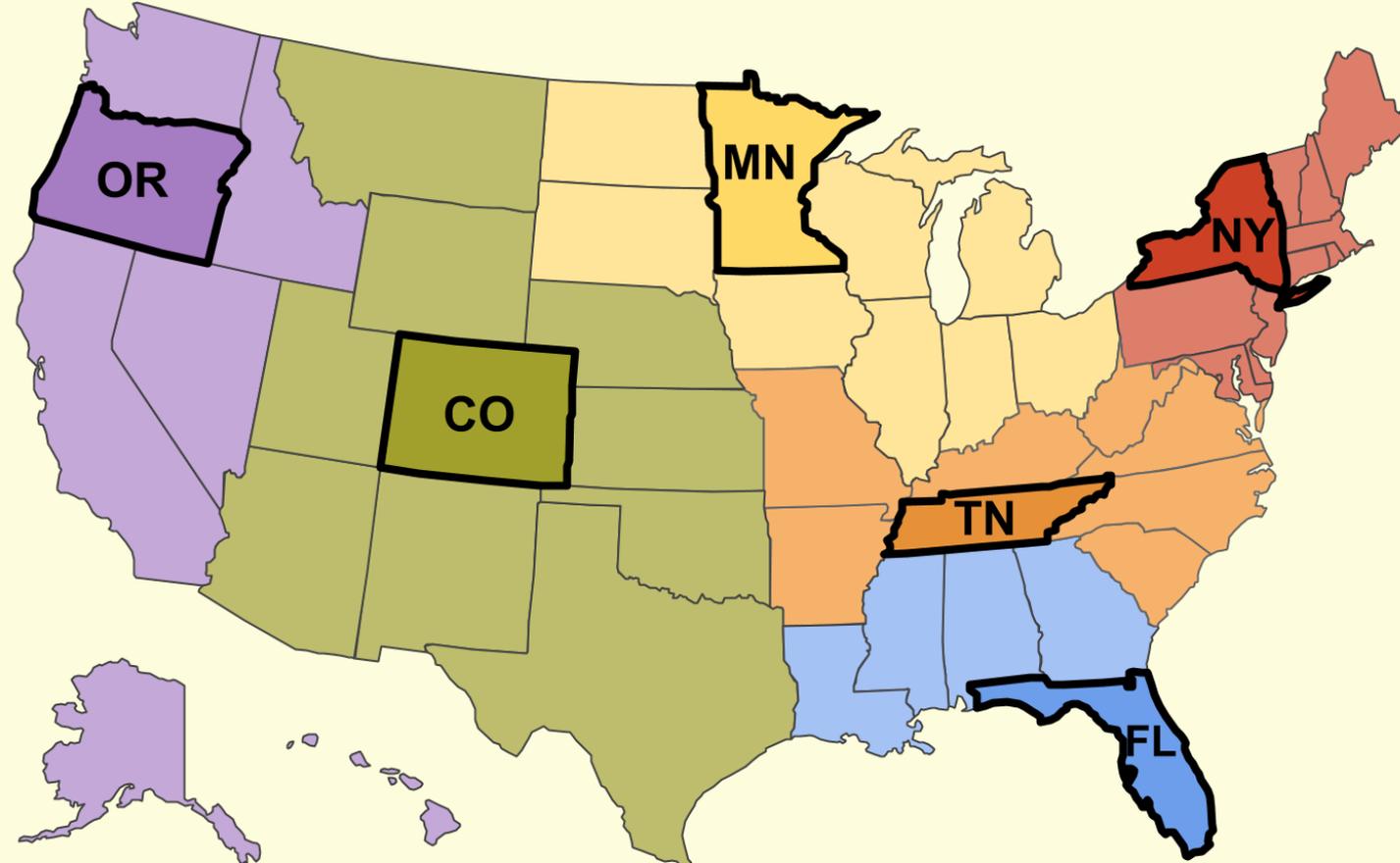
Food Safety Office, Division of Foodborne, Waterborne, and Environmental Diseases

[ysis9@cdc.gov](mailto:ysis9@cdc.gov)

**ELC**  
NATIONAL  
FUNDING  
STRATEGY



# Integrated Food Safety Centers of Excellence



**Main Points of Contact:**

**Colorado:** Rachel Jervis [Rachel.Jervis@state.co.us](mailto:Rachel.Jervis@state.co.us)

**Florida:** Chad Bailey [Chad.Bailey@flhealth.gov](mailto:Chad.Bailey@flhealth.gov)

**Minnesota:** Josh Rounds [Joshua.Rounds@state.mn.us](mailto:Joshua.Rounds@state.mn.us)

**New York:** Paula Huth [Paula.Pennell-Huth@health.ny.gov](mailto:Paula.Pennell-Huth@health.ny.gov)

**Oregon:** Hillary Booth [Hillary.Booth@state.or.us](mailto:Hillary.Booth@state.or.us)

**Tennessee:** Katie Garman [Katie.Garman@tn.gov](mailto:Katie.Garman@tn.gov)



# Points of Contact



Section X: Mycotics

Brendan Jackson

[brjackson1@cdc.gov](mailto:brjackson1@cdc.gov)

Section Z: Water

Katie Fullerton

[kgf9@cdc.gov](mailto:kgf9@cdc.gov)

Section I5: NoroSTAT

Mary Wikswa

[ezq1@cdc.gov](mailto:ezq1@cdc.gov)

Section I1: Capacity Programs

Gwen Biggerstaff  
Anna Newton

[fke8@cdc.gov](mailto:fke8@cdc.gov)  
[ivz9@cdc.gov](mailto:ivz9@cdc.gov)

Section I1: NORS

Sam Crowe

[yeo2@cdc.gov](mailto:yeo2@cdc.gov)

Section I1: National Case Surveillance

Erin Burdette

[ykt3@cdc.gov](mailto:ykt3@cdc.gov)

Section I2: NARMS

Jared Reynolds  
Jean Whichard

[uvz6@cdc.gov](mailto:uvz6@cdc.gov)  
[zyr3@cdc.gov](mailto:zyr3@cdc.gov)

Section I4: PulseNet

Kelley Hise  
Efrain Ribot

[Kpb6@cdc.gov](mailto:Kpb6@cdc.gov)  
[eyr4@cdc.gov](mailto:eyr4@cdc.gov)

Section I3: CoEs

Elizabeth Sillence

[esillence@cdc.gov](mailto:esillence@cdc.gov)

