

# Psittacosis Infection from Feral Populations of Rosy Faced Love Birds, Maricopa County, Arizona, 2013



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## Acknowledgements

- ◆ Laura Adams – Centers for Disease Control & Prevention, USPHS

# Objectives

- ◆ Psittacosis in humans
- ◆ Chlamydiosis in birds
- ◆ Rosy Faced Love Birds overview
- ◆ Tracking an invasive avian species
- ◆ Bird die-off investigation
- ◆ Human case investigation
- ◆ Next Steps

# Background

- ◆ *Chlamydophila (Chlamydia) psittaci*
  - Gram negative, coccoid, obligate intracellular bacterium
  - Reservoir: birds
  - Avian Chlamydiosis in birds
  - A.k.a. 'Ornithosis' & 'Parrot Fever'
  - Zoonotic agent → human causes 'Psittacosis'
    - ◆ Infection is acquired by inhaling dried droppings or secretions from infected birds.
    - ◆ The incubation period is 5 to 19 days, up to 4 weeks
    - ◆ Pet birds and poultry are most frequently involved in transmission to humans
    - ◆ Avg  $\leq 50$  human cases/year in U.S.

# Psittacosis in Humans

## At risk are:

- ◆ Bird owners
- ◆ Pet shop employees
- ◆ Zoo staff
- ◆ Poultry workers
- ◆ Veterinarians
- ◆ Slaughterhouse workers

## More Susceptible are:

- ◆ Weakened immune system
- ◆ Elderly
- ◆ Organ transplant patients
- ◆ HIV/AIDS

# Psittacosis in Humans

## Common Symptoms

- ◆ Fever & chills
- ◆ Headache
- ◆ Dry cough
- ◆ Myalgia
- ◆ Weakness/Fatigue
- ◆ Rash
- ◆ Upper or lower respiratory illness
- ◆ N/V/D sometimes

## Lab Findings

- ◆ Thrombocytopenia
- ◆ Leukopenia
- ◆ Moderately elevated liver enzymes

# Psittacosis in Humans

- ◆ Psittacosis should be suspected in patients with compatible sx after exposure to birds and/or droppings
- ◆ Serologic testing is most commonly used. Note: serologic testing is cross reactive w/ other *Chlamydia*, including *C. pneumoniae* & *C. trachomatis*
- ◆ Chest X-ray may show pneumonia
- ◆ Treatment: tetracycline / doxycycline

# Prevention

- ◆ Most human infections are acquired from indoor pet birds
- ◆ Clean-up of droppings frequently to prevent accumulations
- ◆ Use wet disinfection methods
- ◆ Use PPE if aerosolization is unavoidable
- ◆ Take sick pet birds to DVM for dx & rx
- ◆ Don't kiss your parrot!
- ◆ For wild birds – do not concentrate birds around feeders. Disperse the seed to disperse the birds to minimize transmission, or, don't feed them.

# Avian Chlamydiosis

## Infections in birds:

- ◆ Chronic infection w/ intermittent shedding
- ◆ Infections can be subclinical
- ◆ Clinical disease may occur/increase during times of stress
- ◆ Sx: poor appetite, ruffled feathers, discharge from eyes & nose, diarrhea, death

*Chlamydia* infections in birds occur worldwide and infect a wide variety of species. Different serovars have been isolated from different bird groups. Different serovars show differences in virulence among different hosts.

Serovar	Bird Source
A	Parrot Order
B	Pigeons, Turkeys
C	Ducks, Swans, Geese
D	Turkeys, Egrets
E	Pigeons, Ratites, Turkeys
F	Parakeets
G	New Serovar ? Raptors
WC	Bovine (Mammal)
M56	Muskrat, Snowshoe Hare

# Rosy Faced Love Birds

- ◆ Species: *Agapornis rosiecollis*
- ◆ A.k.a. *Peach faced love birds*
- ◆ *Small colorful parrots native to southwestern Africa*
- ◆ *Popular in the pet trade*
- ◆ *U.S. birds captive bred*



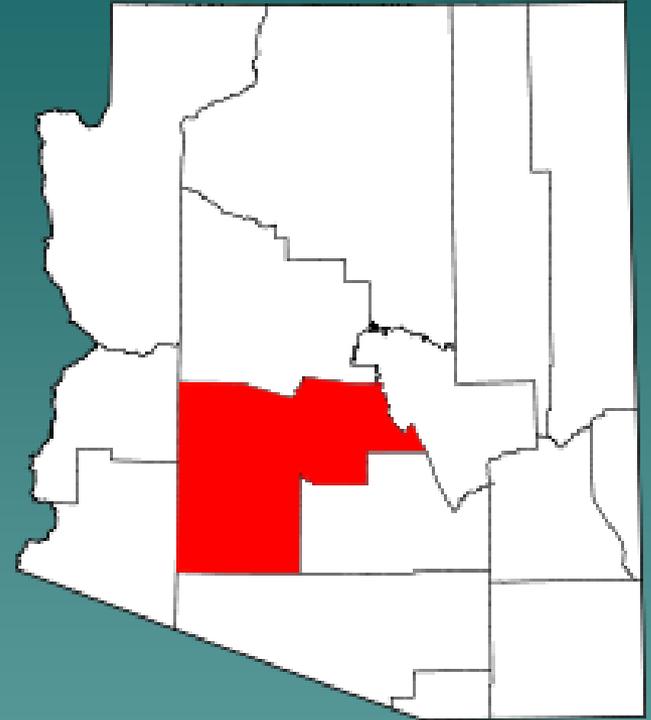
# *Rosy Faced Love Birds (RFLBs)*

- ◆ Adapted to drier climates
- ◆ Can rear up to three broods per year with 4-5 eggs per clutch
- ◆ Very social w/ large flocks
- ◆ Very noisy
- ◆ Life span – 15-25 years



# Maricopa County, AZ

- ◆ 9,224 square miles
- ◆ Phoenix Metro
- ◆ Pop 3.8 million
- ◆ 4<sup>th</sup> most populous county in the U.S.
- ◆ Desert climate w/ ~ 7 inches of rain per year
- ◆ Suburban landscape = subtropical



# RFLBs in Maricopa County

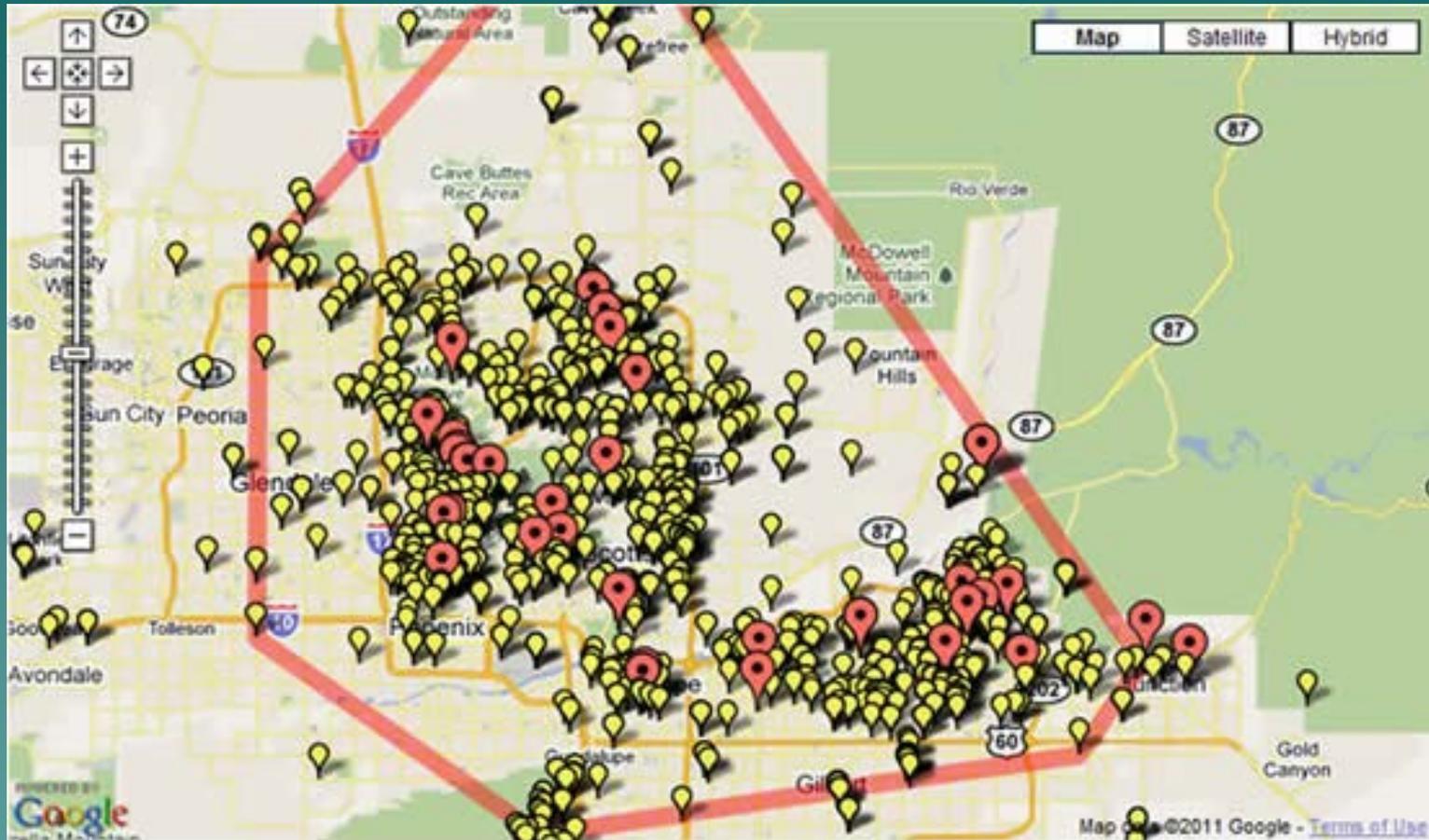
- ◆ Phoenix is the only known feral population of RFLBs in the U.S.
- ◆ Hypothesis: 1980's release of 15-20 pet birds from an aviary in the East Valley. First seen in East Mesa/AJ in 1987.
- ◆ For 20+ years RFLB populations have been multiplying & expanding
- ◆ MC RFLBs are descendants of domestic "pet shop" stock
- ◆ Rare sightings have been seen in Tucson but not believed to be established

# RFLBs in Maricopa County

- ◆ Nest in un-trimmed palm fronds (especially date palms) and hollow saguaro cavities
  - ◆ Mostly live in residential areas – especially older neighborhoods with tall trees
  - ◆ Food: backyard bird feeders, palm fruits, cactus fruits, mesquite & palo verde seeds, etc.
  - ◆ RFLBs have no natural predators in MC
- 



# Arizona Field Ornithologist Data



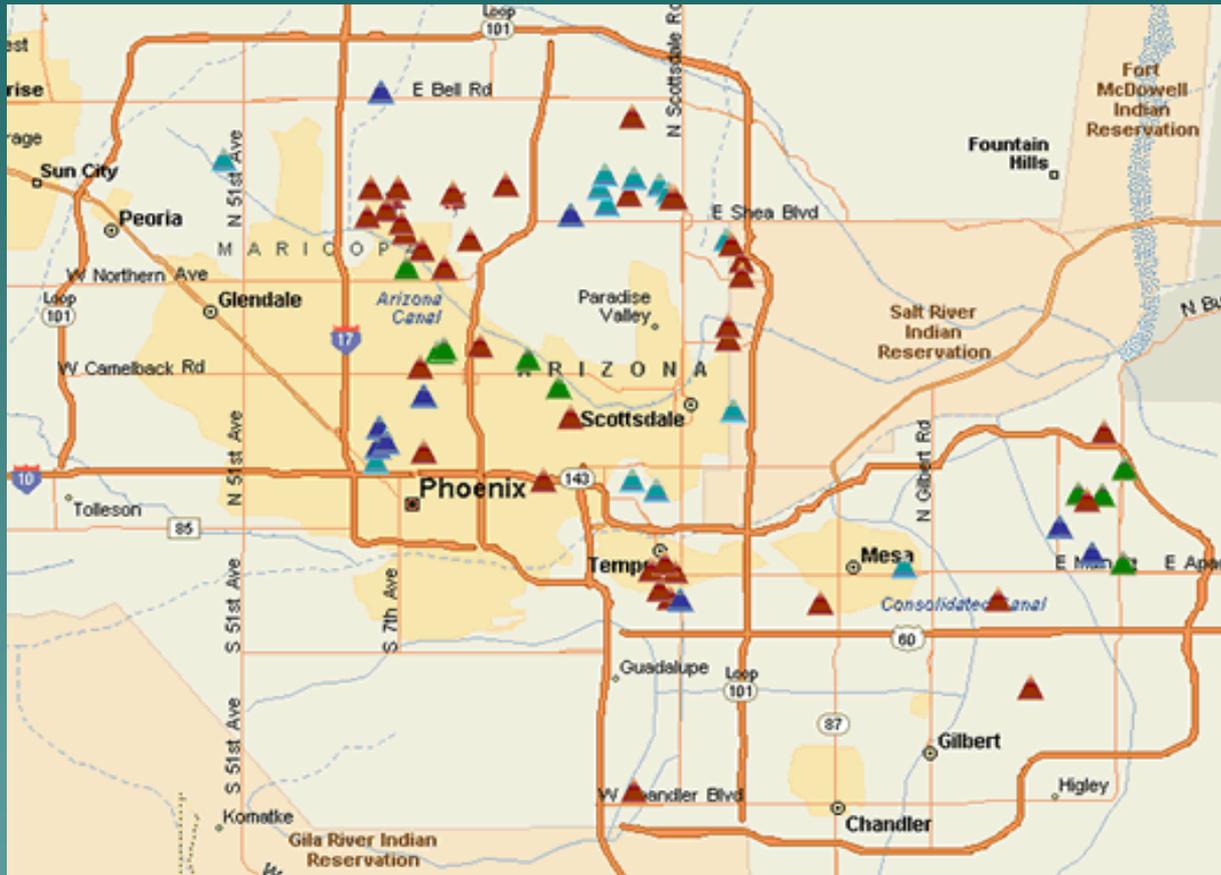
Greater Phoenix Area map (reproduced from Mirror-Pole website) of reported Rosy-faced Lovebird locations in 1999-2010. The red border shows the initial known boundary of the species

Source: [www.azfo.org/journal/Rosy-facedLovebird2011.html](http://www.azfo.org/journal/Rosy-facedLovebird2011.html)

# Arizona Field Ornithologist Census

- ◆ One half-day bird census in 2011
- ◆ 61 teams scouted for RFLBs in an area approximately 24 miles in diameter
- ◆ RFLB sightings were mapped
- ◆ 948 RFLBs were recorded w/in census area
- ◆ Taking into account areas with previous reports/sightings not covered in the census, AzFO estimates the RFLB numbers to be at least 2500 individuals

# AzFO 2011 Census Map



- ◆ *Figure 1: Census Data Points with Lovebird Detections (triangles): Light Blue = 1-5 birds, Red = 6-10 birds, Dark Blue = 11-20 birds, Green = 21-50 birds. Source: Az Field Ornithologist website.*

# Bird Die Off Investigation

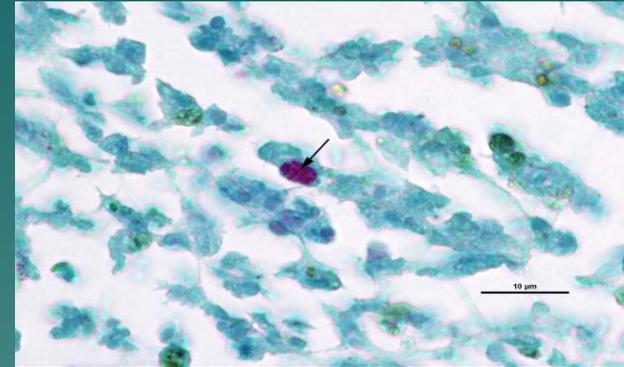
## Multi-Agency: 'One Health'

- ◆ Prior to 2013, there had been no known adverse impacts from RFLBs
- ◆ Late August 2013, Arizona Game and Fish Department (AZGFD) was notified of die-off of ~30 lovebirds in local community in the East Valley
- ◆ Other lovebirds in area showing signs of illness; no other species affected
- ◆ Bird carcasses sent to USGS National Wildlife Health Center (NWHC) for testing

# Necropsy Findings

Four RFLBs were necropsied at USGS–NWHC

- ◆ Hepatosplenomegaly
- ◆ Diffusely congested lungs
- ◆ Air sacs mildly thickened
- ◆ Nares w/ yellow discharge
- ◆ Histopathologic lesions in liver & spleen
- ◆ Liver: multifocal coalescing hepatocellular necrosis
- ◆ Spleens heavily infiltrated by macrophages & plasma cells
- ◆ Many macrophages contained small intracytoplasmic cocci which stained positively with PVK & Gimenez stains consistent w/ *C. psittaci*



# Laboratory Results: RFLBs

- ◆ RFLB liver, lung, spleen, brain tested positive for *Chlamydophila psittaci* by PCR
  - Negative for other pathogens, including avian influenza and paramyxoviruses. Salmonella cultures were negative. Nasal swab was negative for *Mycoplasma* sp.
- ◆ *C. psittaci* was isolated by culture from lung & brain at the NVSL in Ames, Iowa

# Human Case Investigation

- ◆ AZGFD was called by the same person (adult female) that reported the die-off - she had developed high fever and respiratory disease
- ◆ ~2 weeks after bird mortality event
- ◆ Public health was notified by AzGFD
- ◆ PH investigation: patient interview revealed that she cleaned-up bird droppings from porch w/ leaf blower

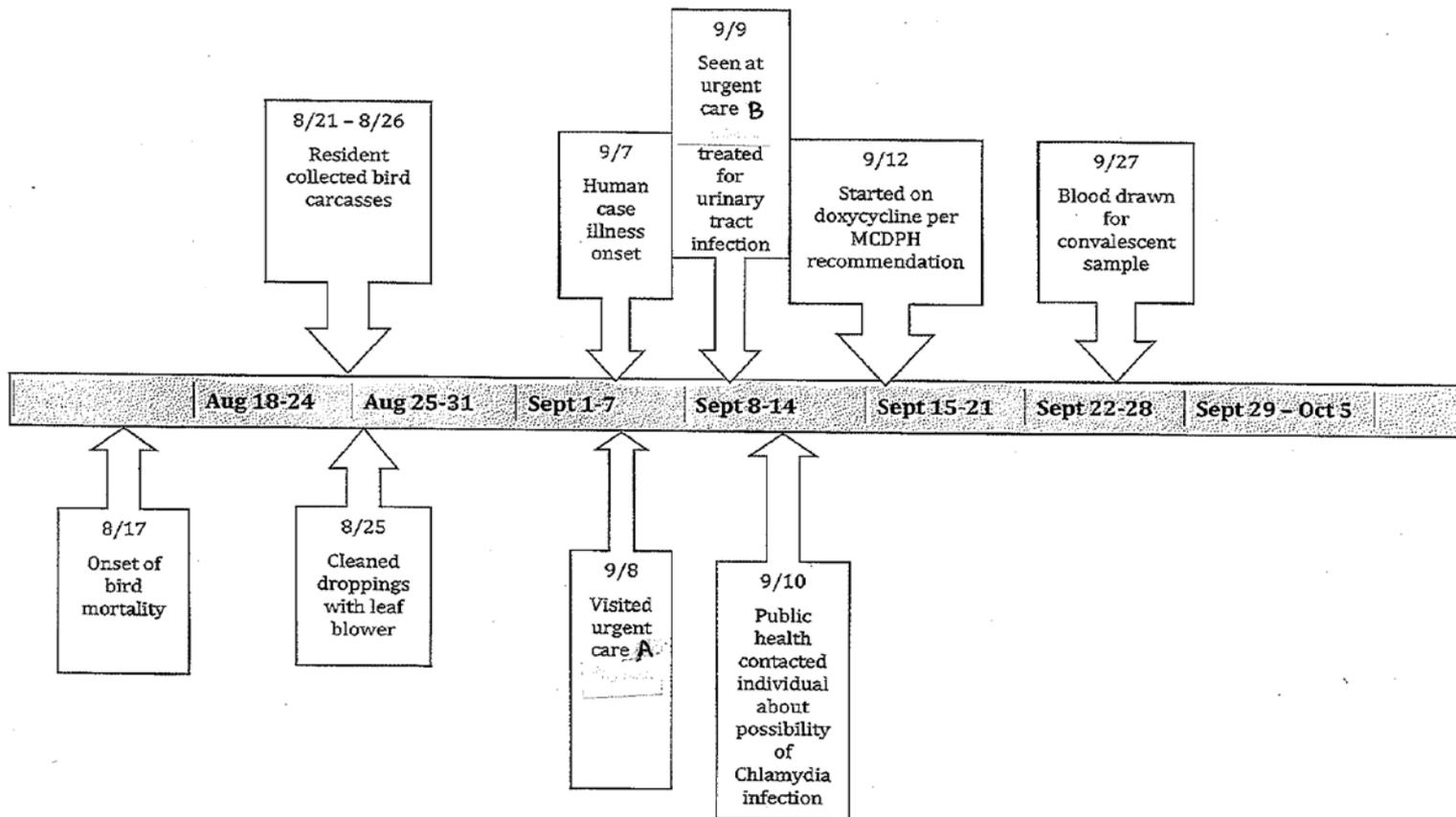
# Human Case Investigation

- ◆ Onset: September 7, 2013
- ◆ Sx: fever (104° F), chills, frontal headache, chest pain, cough, myalgias, sore throat, drenching sweats (nighttime), tinitis, fatigue
- ◆ Seen at 1<sup>st</sup> UC on 9/8
- ◆ Seen at 2<sup>nd</sup> UC on 9/9
- ◆ Chest was clear by auscultation
- ◆ Positive for leukocytes on UA
- ◆ Dx: UTI
- ◆ Rx: Amoxicillin & Augmentin
- ◆ At neither UC was blood drawn or x-ray done.

# Laboratory Results: Human Case

- ◆ Single convalescent blood sample was collected from the human case patient 20 days after initial clinical signs
- ◆ Results tested positive for *Chlamydia sp* IgG at two different laboratories

# Psittacosis Timeline



# Discussion

2013 investigation = strong case for psittacosis transmission from feral RFLBs

- ◆ *C. psittaci* confirmed as cause of RFLB mortality
- ◆ Human case had significant exposure to aerosolized bird droppings at the same site as bird die-off
- ◆ Human case had onset of psittacosis like sx within incubation period
- ◆ Human case tested positive w/ high IgG titers to *Chlamydia*

# Discussion

- ◆ Risk for psittacosis transmission to humans is highest for indoor pet birds due to more intimate exposures in confined spaces
- ◆ Risk is lower in outdoor open air environment
- ◆ 2013 investigation demonstrated that infected outdoor feral RFLBs do pose a disease risk to humans
- ◆ How likely is it that may occur again?

# Discussion

- ◆ LOTS!!! of people feed birds
- ◆ Bird feeders attract and concentrate lots of birds
- ◆ Congregating birds share pathogens
- ◆ RFLBs are very popular among people feeding birds
- ◆ Lots of birds = lots of droppings
- ◆ Sooner or later, someone has to clean-up the mess

# Limitations of the Investigation

- ◆ Acute blood samples were never collected for the case patient at either of two UCs
- ◆ Dx of psittacosis was based on a single convalescent blood
- ◆ Without paired sera, you cannot confirm that there was recent infection w/ psittacosis (case classified as 'probable')
- ◆ Serologic tests for psittacosis cross react with other *Chlamydia*, such as *C. pneumoniae* and *C. trachomatis*. The patient tested positive for all three.

# More RFLB Mortality

- ◆ June 17, 2014 – another die-off of RFLBs was reported in a new location
- ◆ Bird carcasses were collected. Lab testing is pending.
- ◆ # RFLBs in flock = 50+
- ◆ RFLBs co-mingling with at 7+ bird sp



# Next Steps

- ◆ Perform serovar testing of the dead RFLBs to see what direction the infection is coming from:  
RFLBs ← ? → wild bird species
- ◆ Do additional *Chlamydia* testing of RFLBs in new locations around MC to see how common & widespread
- ◆ Do outreach to the medical & veterinary medical community to increase awareness & enhance surveillance
- ◆ Do prevention outreach to the public ?

# Questions?

