Psittacosis Infection from Feral Populations of Rosy-faced Love Birds — Maricopa County, Arizona

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  - Maricopa County Department of Public Health

Notification: August 2013

- Arizona Game and Fish Department (AZGFD) 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

Human Illness

- The individual that reported the lovebird die-off called back to report fever and non-response to antibiotic treatment
- Launched psittacosis investigation

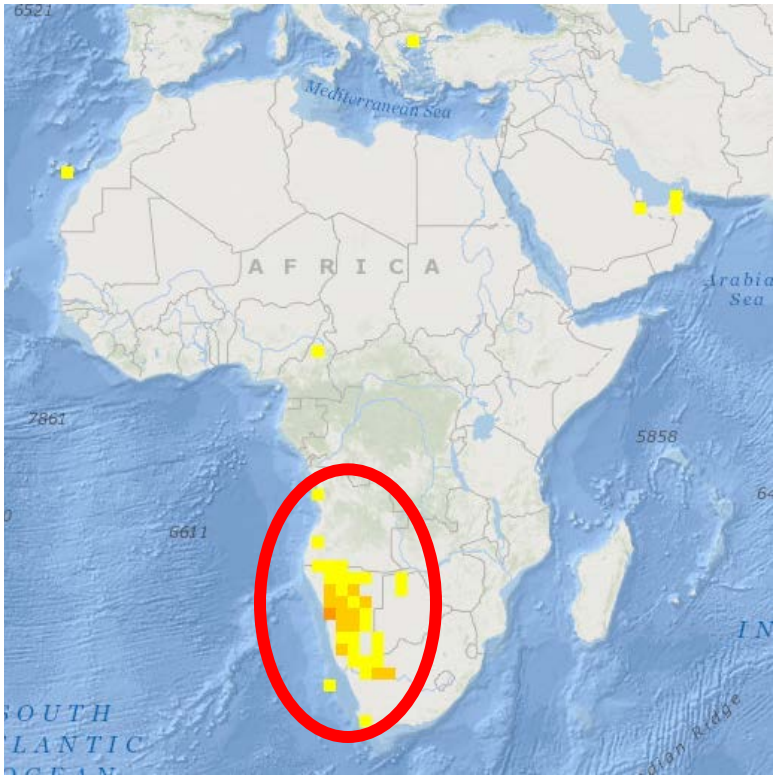
Overview

- Lovebird case investigation
- Human case investigation
- Updates and the big picture
- Next steps

Lovebird Case Investigation

Rosy-faced Lovebirds

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



Rosy-faced Lovebirds

- 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

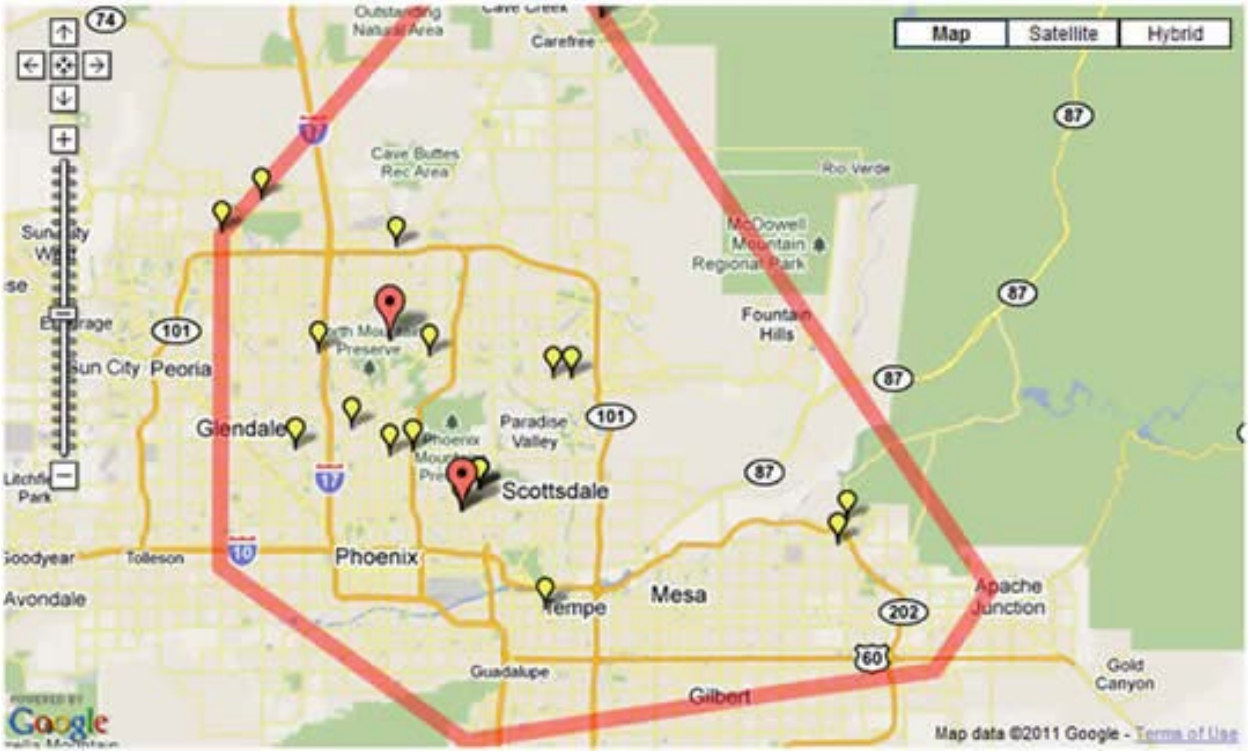
Lovebirds in Maricopa County

- Hypothesis: 1980's release of 15–20 pet birds from an aviary in the East Valley.
- First seen in East Mesa in 1987.
- For 20+ years lovebird populations have been multiplying & expanding
- Rare sightings have been seen in Tucson but not believed to be established

Lovebirds 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.
- No natural predators in MC

Rosy-faced Lovebird Sightings: 1999-2005



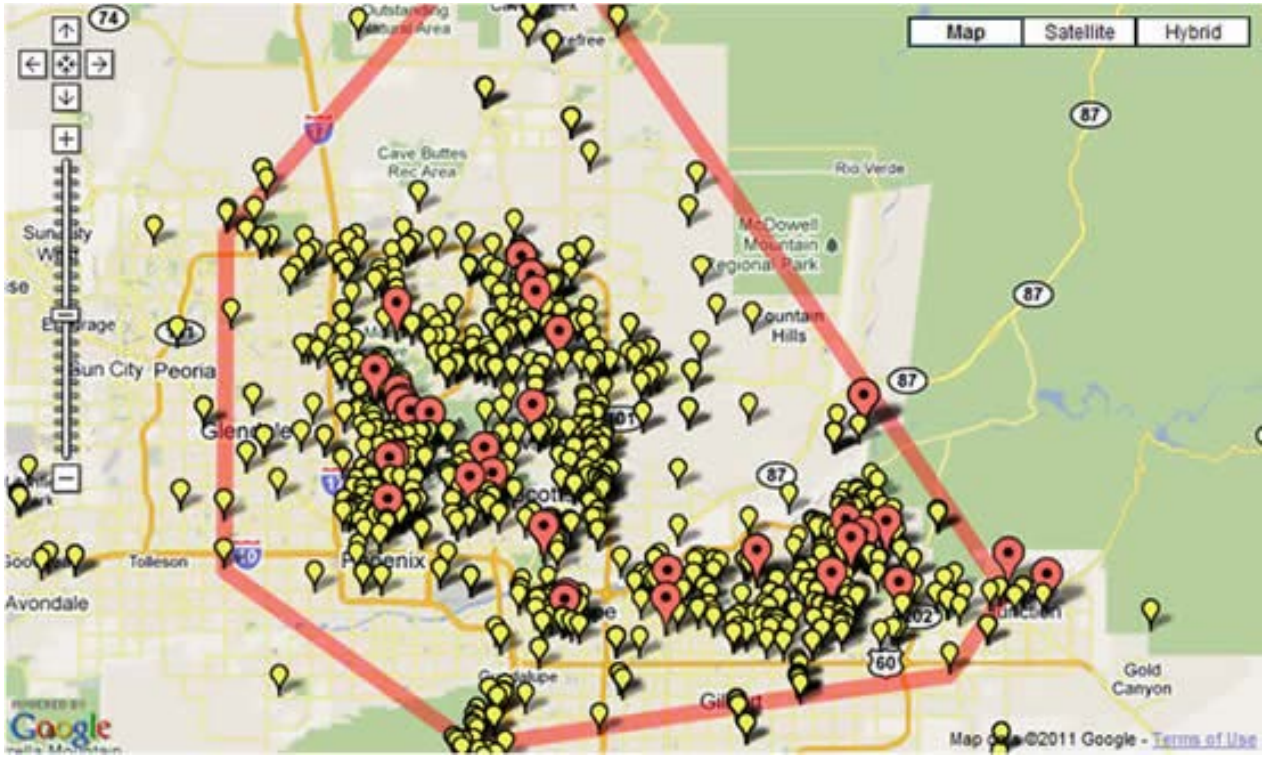
Arizona Field Ornithologist Data:
Greater Phoenix Area Maps

Yellow balloons indicate sightings of 1-10 individuals and red balloons = flocks of >10 individuals.

The red border shows the initial known boundary of the species

Source: www.azfo.org/journal/Rosy-facedLovebird2011.html

Rosy-faced Lovebird Sightings: 1999-2010



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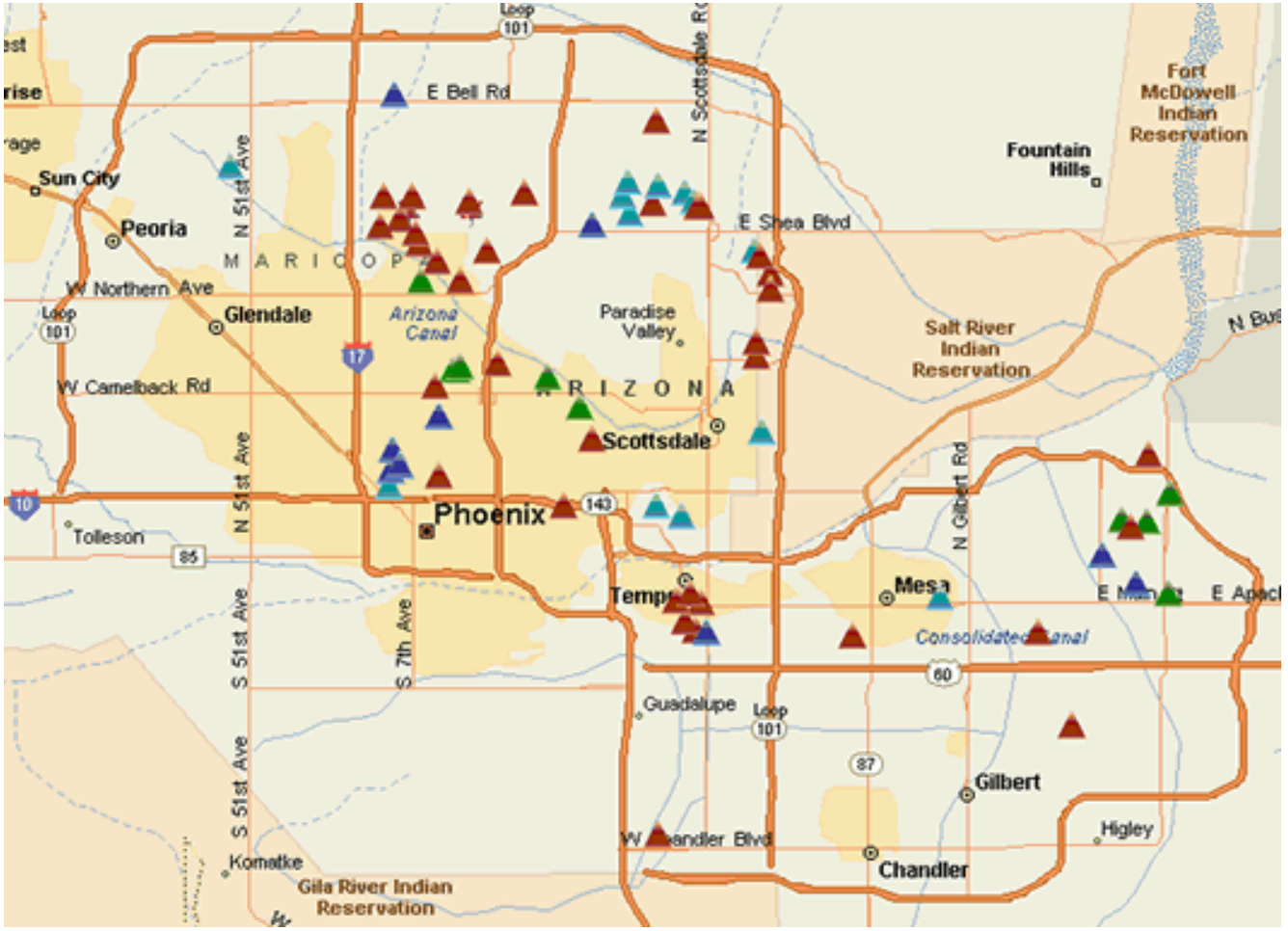
Arizona Field Ornithologist Census

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

Arizona Field Ornithologist 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.

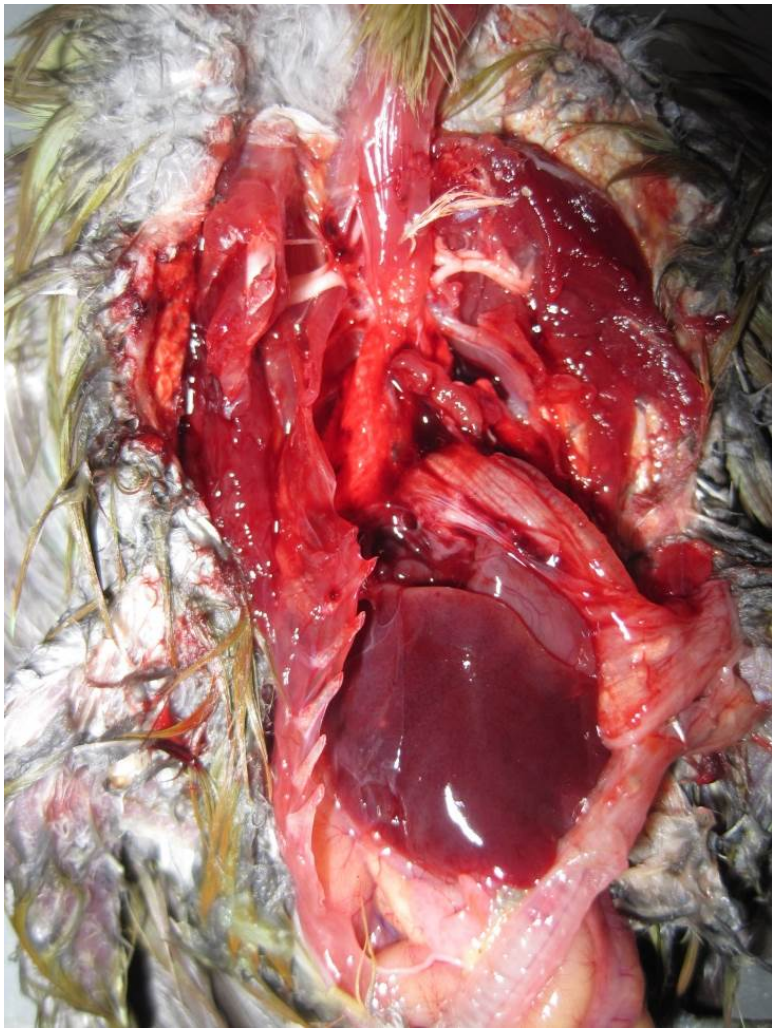
Lovebird Clinical Findings

Necropsy Findings

- 2 juveniles and 2 adults
- Thin to emaciated
- 2 had yellow nasal discharge

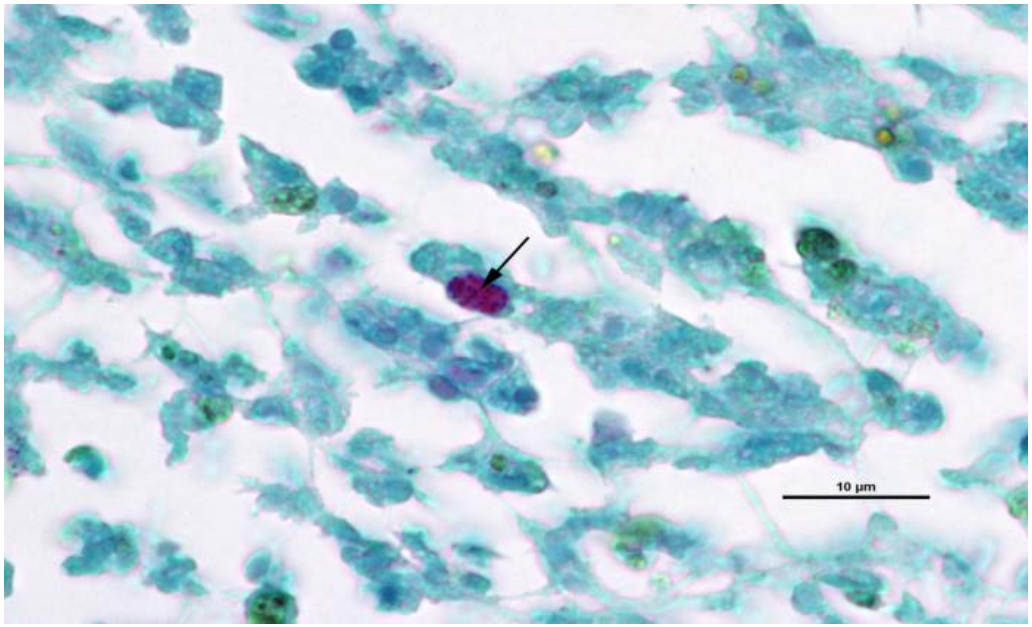
Necropsy Findings

- Four RFLBs were necropsied at USGS–NWHC
- Diffusely congested lungs
- Air sacs mildly thickened
- Enlarged liver and spleen (hepatosplenomegaly)



Necropsy Findings

- Histopathologic lesions in liver & spleen
  - Multifocal coalescing hepatocellular necrosis
  - Spleens heavily infiltrated by macrophages & plasma cells



Macrophages contain small intracytoplasmic cocci staining positive with PVK & Gimenez stains (consistent with *Chlamydophila psittaci)*

Lovebird Laboratory Results

- Liver, lung, spleen, brain tested positive for *Chlamydophila psittaci* by PCR
- *C. psittaci* was isolated by culture from lung & brain at the National Veterinary Services Laboratory (NVSL) in Ames, Iowa
  - Genotype A identified
- Negative for other pathogens on differential
  - Avian influenza
  - Paramyxoviruses
  - West Nile virus
  - *Salmonella*
  - *Mycoplasma* spp.

Human Case Investigation

Craig Levy

Notification

- 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
- Symptoms:
  - Fever (104° F) & chills
  - Frontal headache
  - Chest pain
  - Cough
  - Myalgia
  - Sore throat
  - Drenching sweats (nighttime)
  - Tinitis
  - Fatigue

Human Case Investigation

- Visited 2 urgent care centers
- Urgent care A: no information available
- Urgent care B:
  - Chest was clear by auscultation
  - Diagnosis: urinary tract infection
    - Positive for leukocytes on urinalysis
  - Prescribed amoxicillin
- At neither urgent care was blood drawn or x-ray done

Follow-up

- No response to antibiotic therapy
- Contacted AZGFD/public health about lovebirds and illness

- Due to suspicion of psittacosis, doxycyline was recommended

- Clinical improvement and complete recovery after doxycycline started

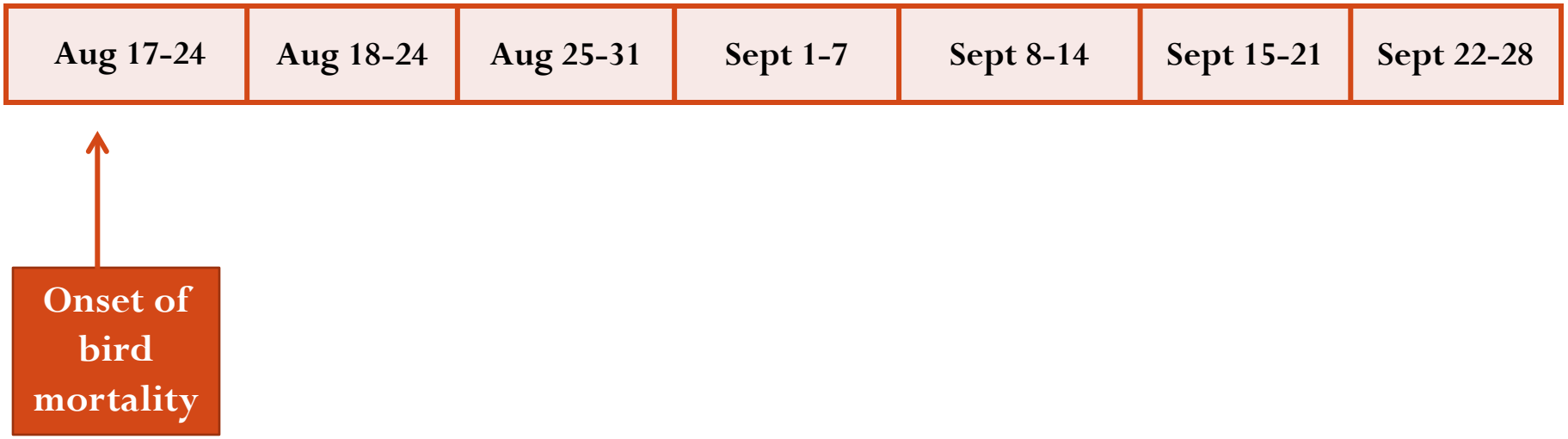
Laboratory Results: Human Case

- 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

Timeline

Aug 17-24	Aug 18-24	Aug 25-31	Sept 1-7	Sept 8-14	Sept 15-21	Sept 22-28

Timeline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Onset of bird mortality

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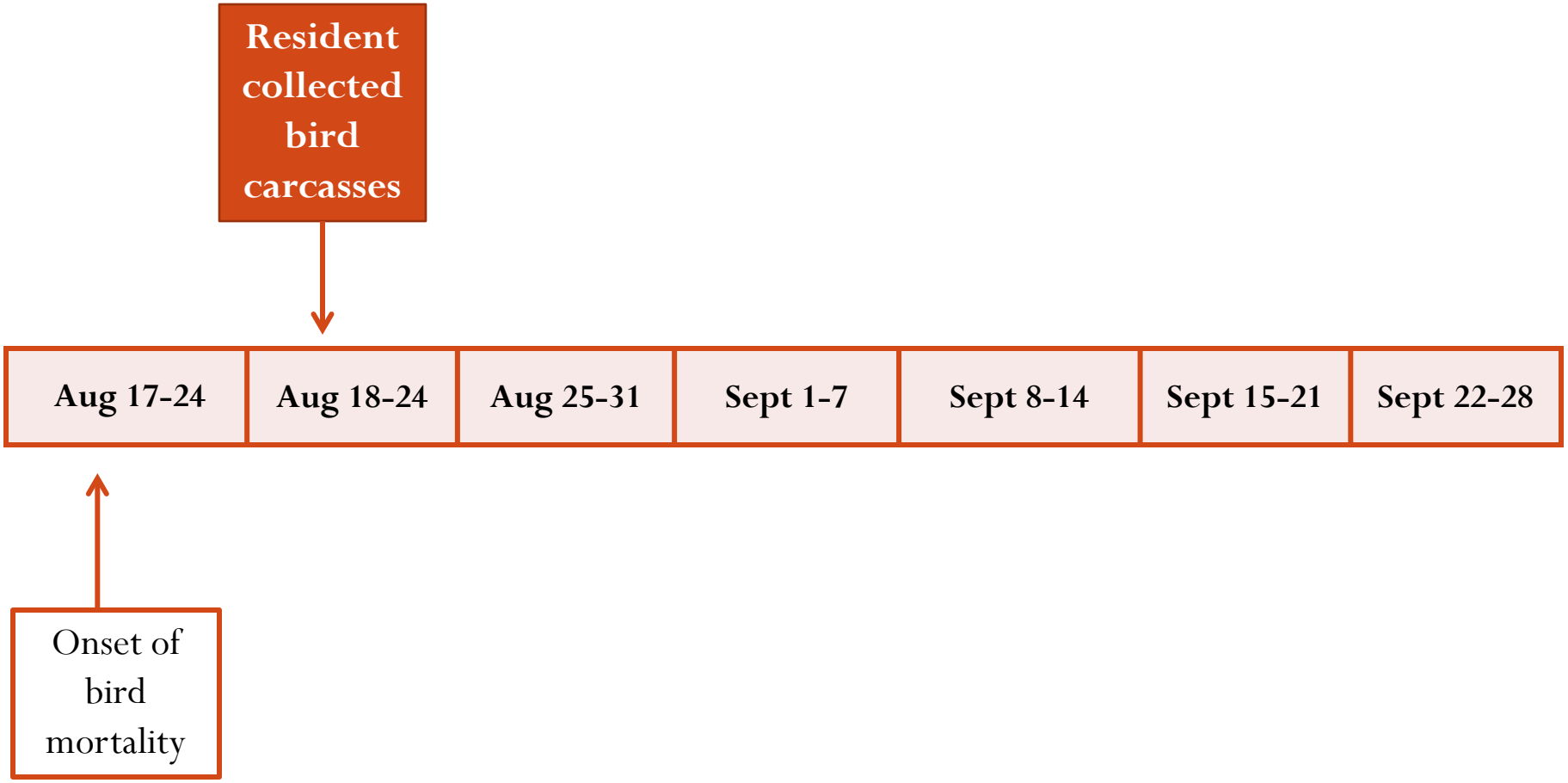
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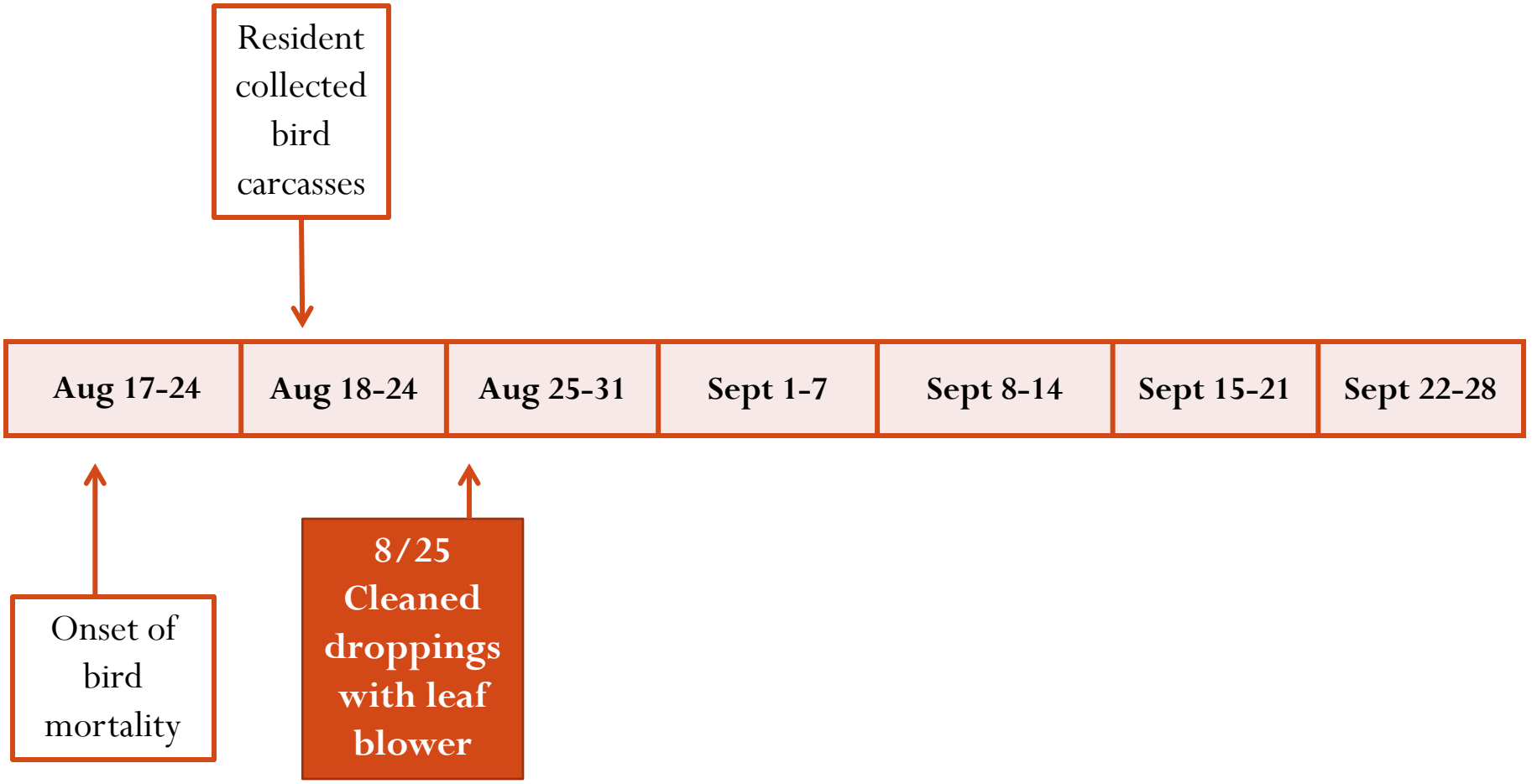
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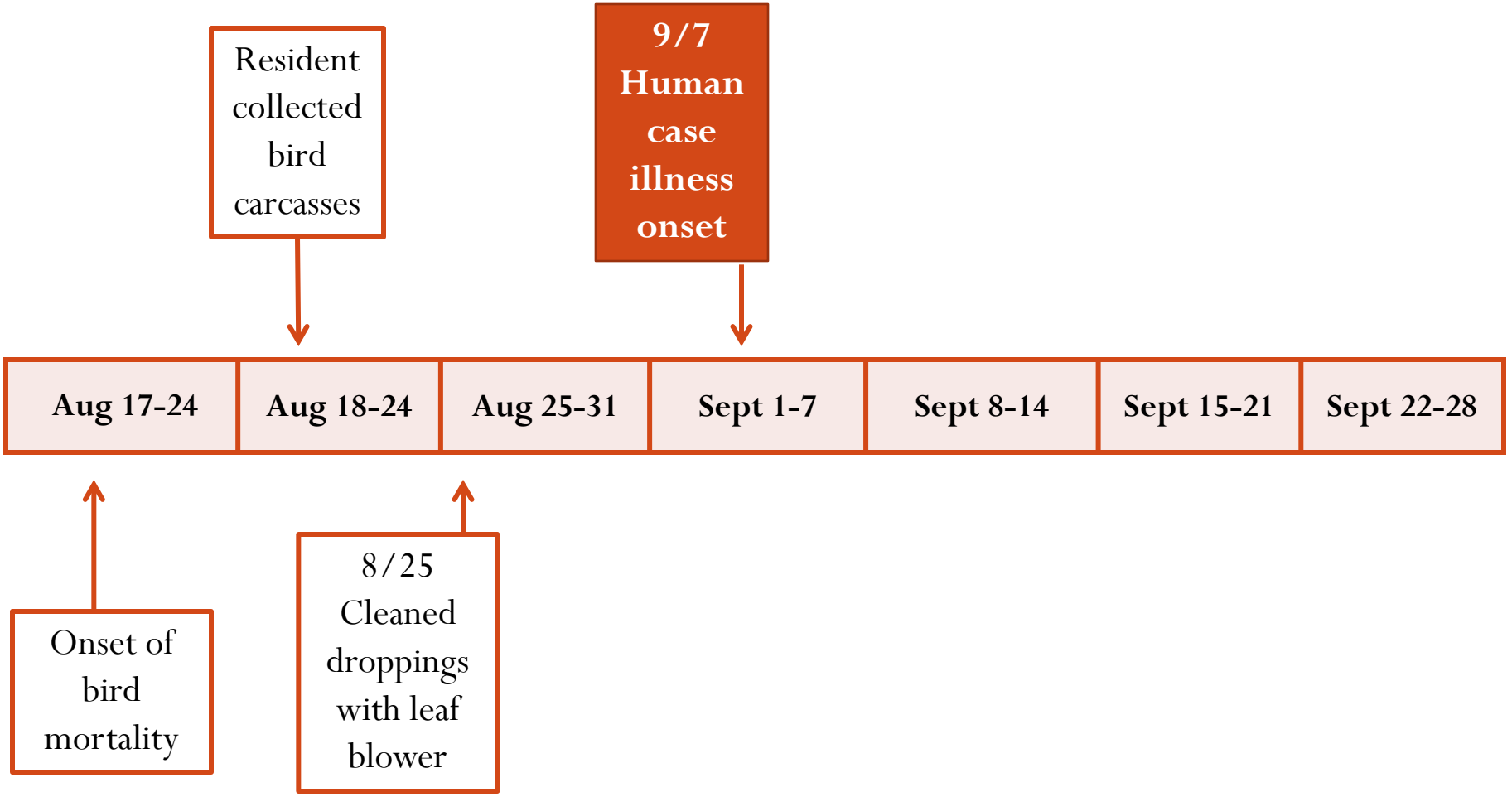
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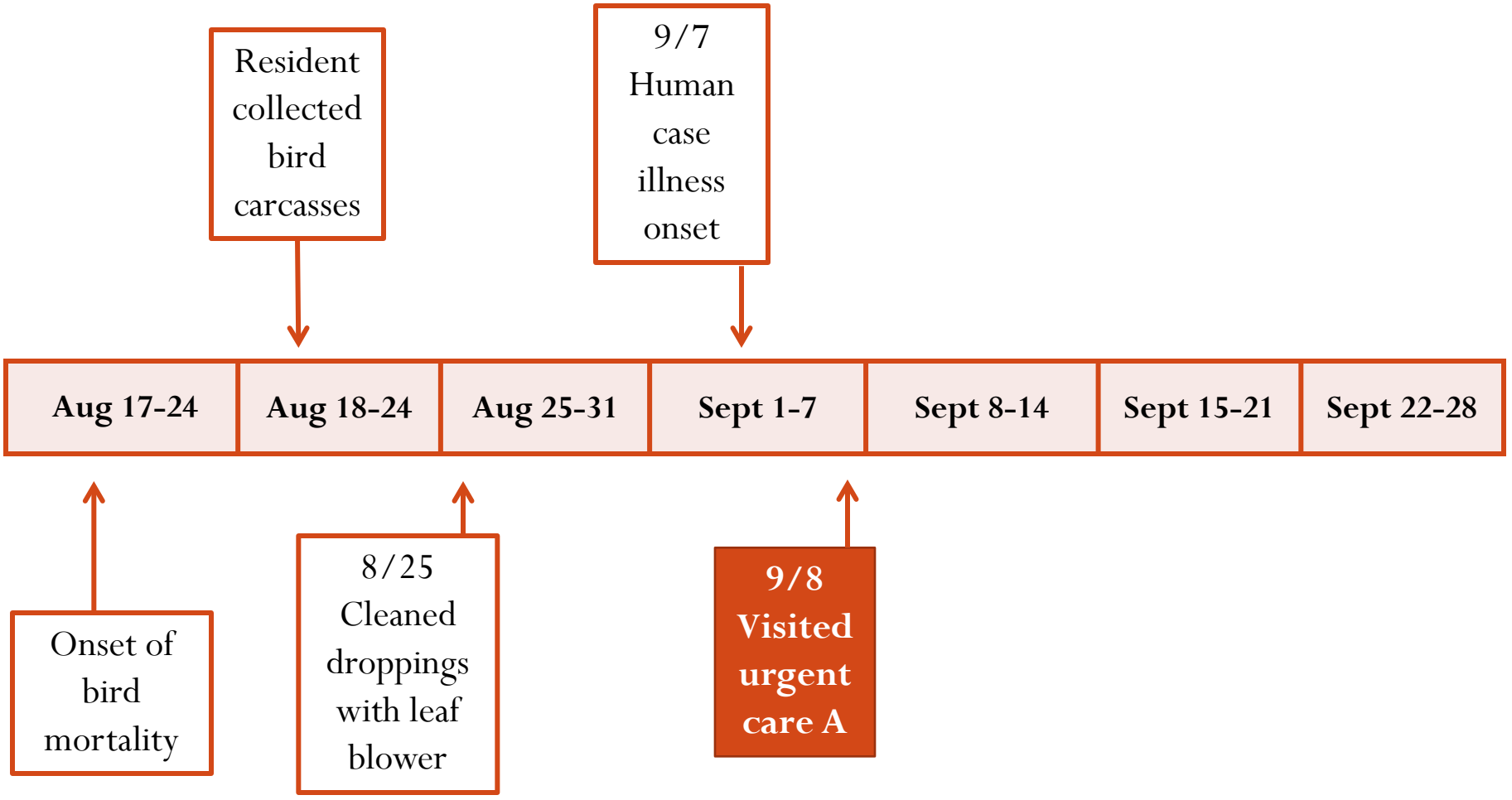
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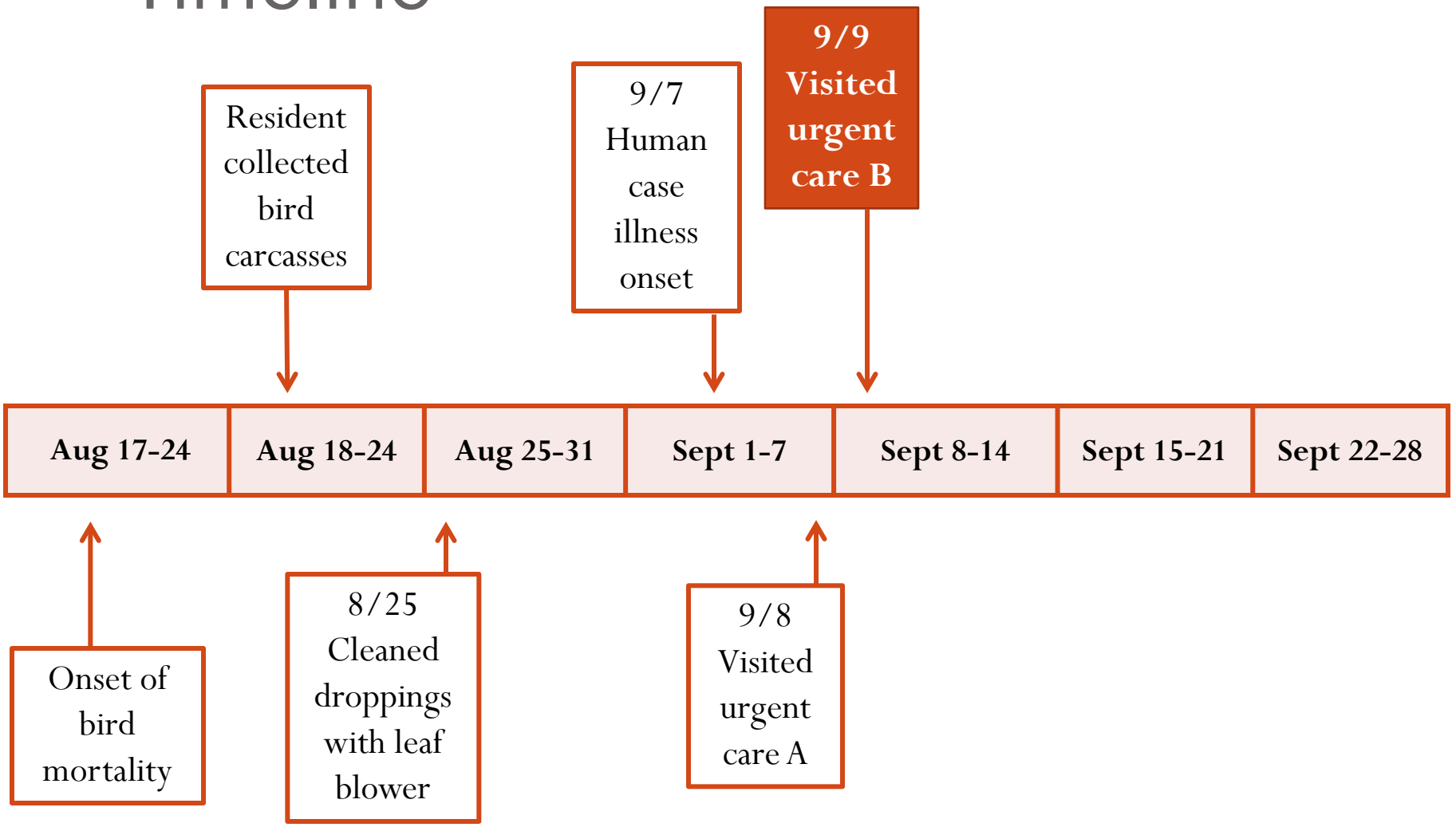
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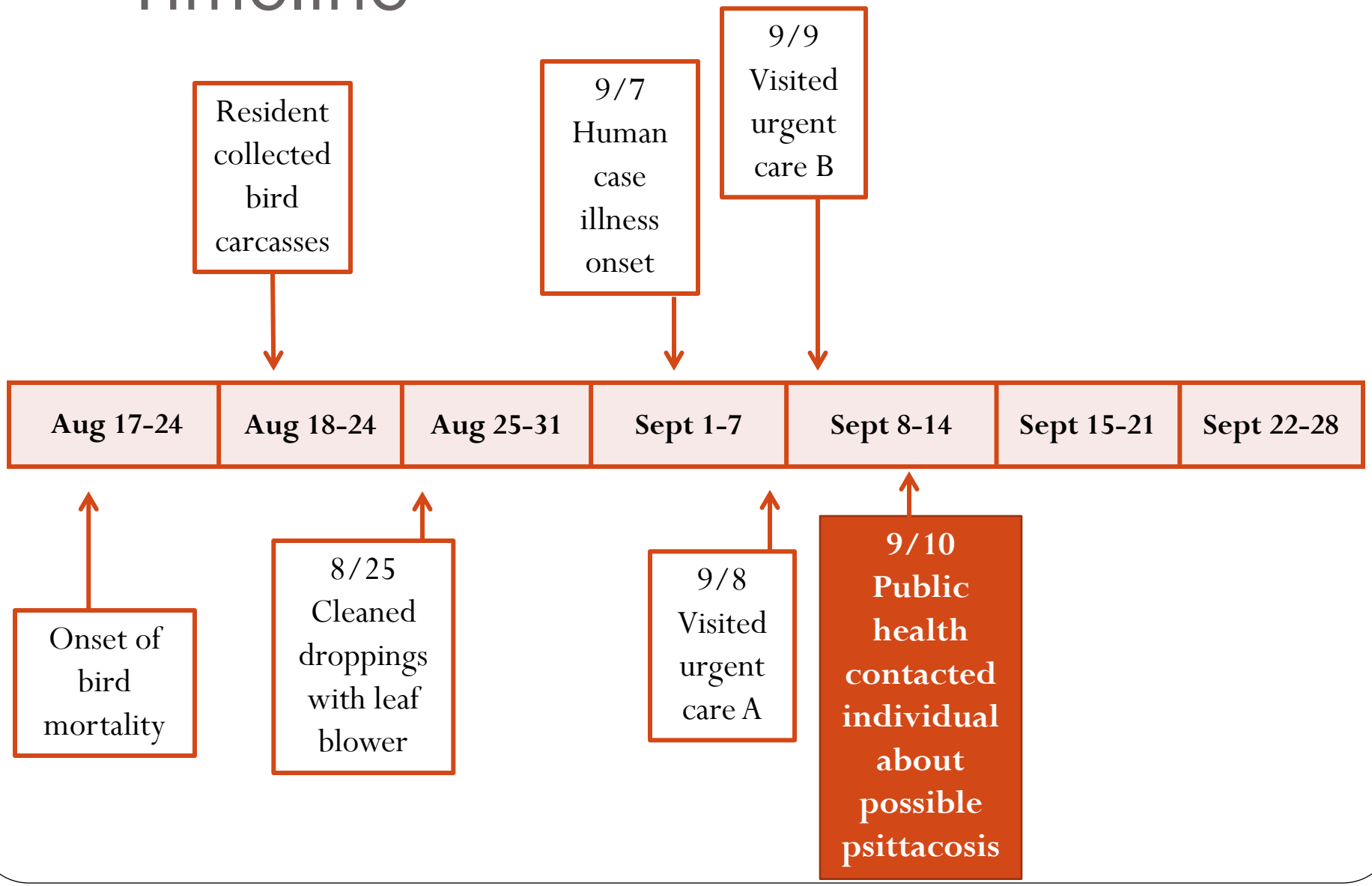
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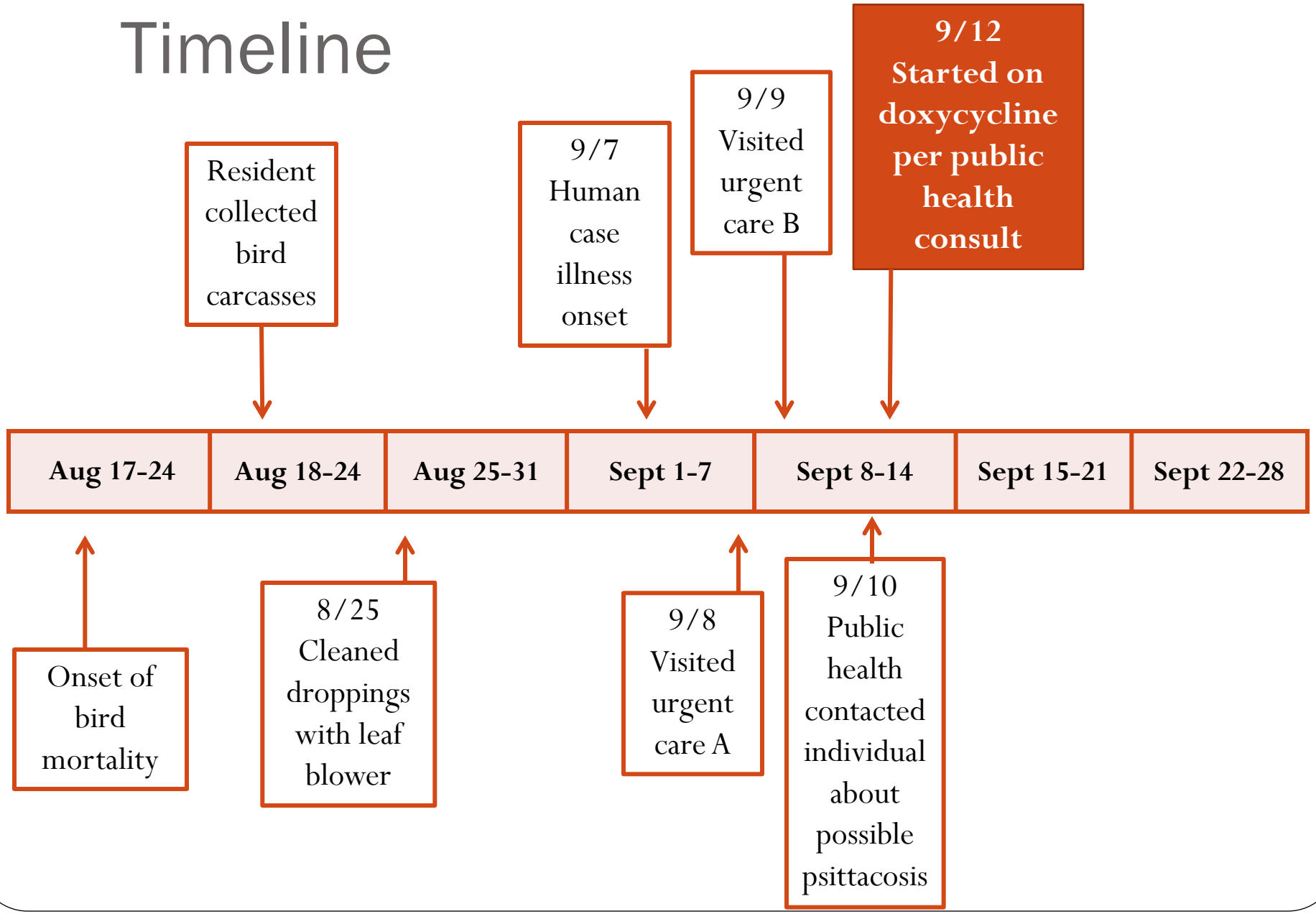
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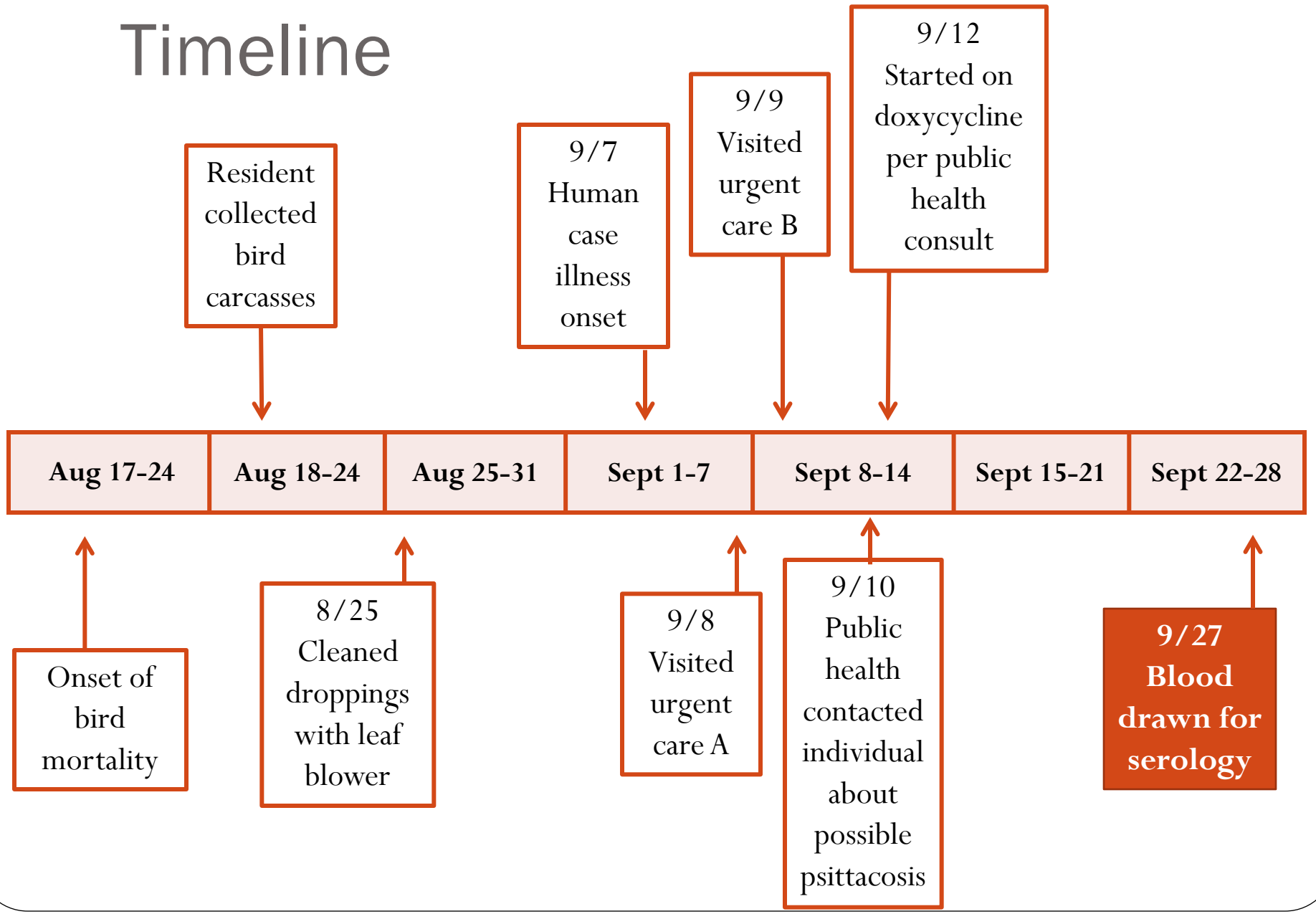
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9/27 Blood drawn for serology

Background: *Chlamydophila psittaci*

- Gram negative, coccoid, obligate intracellular bacterium
- Reservoir: birds
- "Avian chlamydiosis" in birds
- A.k.a. 'Ornithosis' & ' Parrot Fever'
- Most commonly identified among birds in the parrot family (psittacine birds)

Psittacosis

- *C. psittaci* in humans = psittacosis
- Zoonotic disease acquired by inhaling dried droppings or secretions from infected birds.
- Incubation period 5–19 days; can be up to 4 weeks
- Pet birds and poultry are most frequently involved in transmission to humans
- Avg ≤50 human cases/year in U.S.

Psittacosis in Humans

At risk :

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

More Susceptible:

- 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
- Nausea/vomiting/diarrhea sometimes

Lab Findings

- Thrombocytopenia
- Leukopenia
- Moderately elevated liver enzymes

Psittacosis in Humans

- Psittacosis should be suspected in patients with compatible symptoms after exposure to birds and/or droppings
- Serologic testing most commonly used
- Chest X-ray may show pneumonia
- Treatment: tetracycline / doxycycline

Limitations

- Acute blood samples were never collected for the case patient at either of two urgent care centers
- Diagnosis 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

Discussion

2013 investigation = strong case for psittacosis transmission from feral lovebirds

- *C. psittaci* confirmed as cause of lovebird 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 symptoms 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
- Investigation demonstrated that infected outdoor feral lovebirds do pose a disease risk to humans
- How likely is it to occur again?

Updates & Next Steps

Laura Adams

June 17, 2014

- Homeowner in Scottsdale called AZGFD to report die-off of rosy-faced lovebirds
  - Lovebirds mingling with 7+ bird spp
  - Lovebird flock ~ 50 birds
- ~20 lovebird deaths reported
- Birds tested positive for *C. psittaci*

C. psittaci Among Wild Birds

- Little known
- First reported cases of *C. psittaci* among feral parrots in the U.S.
- Few reports of *C. psittaci* among any wild birds in US since 1950
  - Doves (1960)
  - Gulls (1986, 2002)
  - Mallards (1999)
  - Hawks (2012)

Psittacine Birds (Parrot Family)

- Psittacine birds are more likely to carry *C. psittaci* than other bird families
  - Psittacine birds —> psittacosis
- Most human cases associated with psittacine birds
  - More common as pet birds
  - Pathogenicity highly variable among strains

C. psittaci Transmission Among Birds

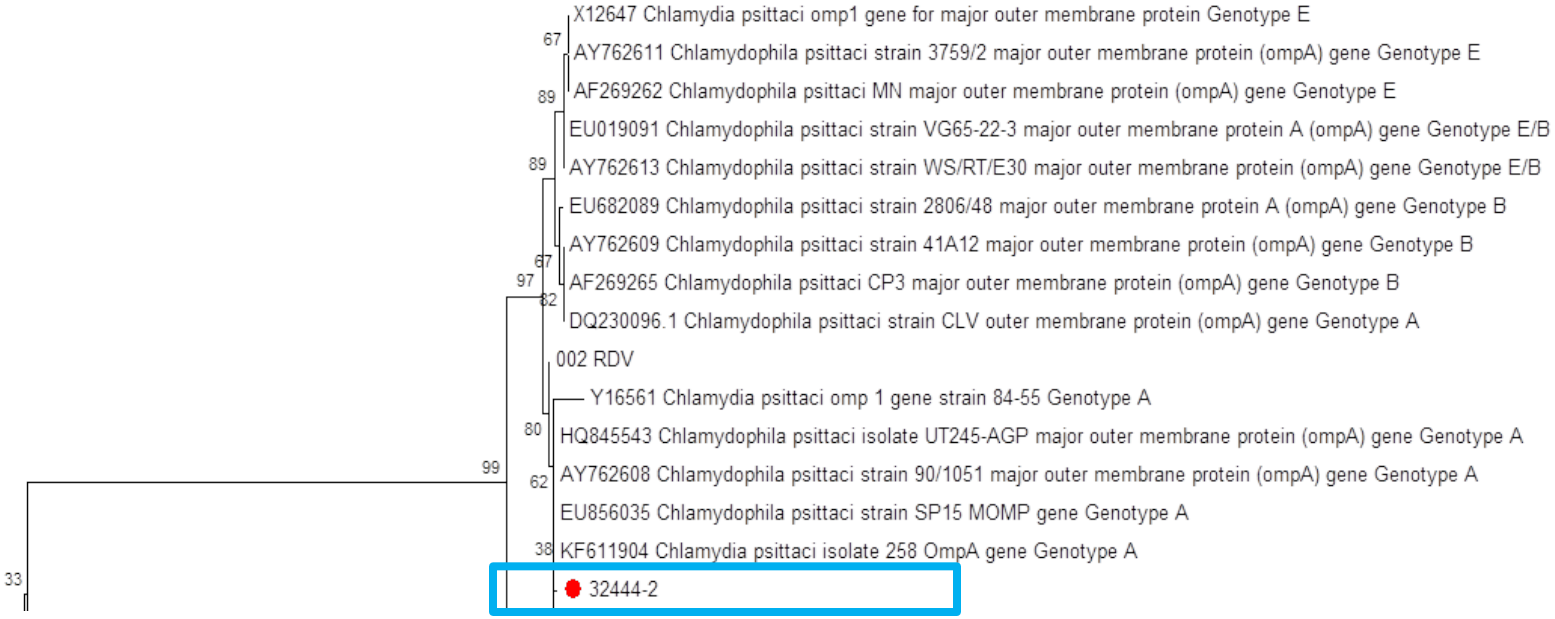
- **Feces and nasal discharge**
- Contaminated water
- Dust inhalation
- Infected carcasses
- Bites or wounds
- Parent → young
  - Feeding, contamination of nesting site
  - Vertical (low frequency)
- Ectoparasites
  - Lice, mites, flies

Avian Chlamydiosis

- Chronic infection with intermittent shedding
- Infections can be subclinical
- Clinical disease may occur/increase during times of stress
- Symptoms
  - Poor appetite
  - Ruffled feathers
  - Discharge from eyes & nose
  - Diarrhea
  - Death

Is this disease NEW to wild birds in AZ?

- ???
- **Genotype A** was identified from the birds in the August outbreak
- Genotypes fairly species-specific



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

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

Potential Implications

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

Is there a risk for community-associated psittacosis outbreaks?

Australia 1995: Community outbreak of psittacosis in a rural Australian town (Williams et al, The Lancet)

- Detected as increase in atypical pneumonia
- Identified 16 cases of psittacosis
  - Many wild parrots in adjacent forest
- NOT linked to keeping, handling, or feeding birds
- Risk factors from case-control study
  - Gardening
  - Mowing lawns
- Seroprevalence in high-risk streets: 40%

Australia 2002: Probable Psittacosis Outbreak Linked to Wild Birds (Telfer et al, EID)

- Detected as increase in severe community-acquired pneumonia
- 59 human cases
- Increased numbers of dead birds (parrots) seen in yards
- Risk factors from case-control study
  - Geography
  - Any contact (direct or indirect) with wild birds
  - Mowing lawn without a grass catcher
- Increased pneumonia rates seen among residents of high-risk area during autumn of previous years

Sweden 2013: Unusual increase of psittacosis in southern Sweden linked to wild bird exposure, January to April 2013 (Rehn et al, Eurosurveillance)

- 25 human cases
- Risk factors identified from case-control study:
  - Cleaning wild bird feeders
  - Exposure to bird droppings
  - Geographic variation

Prevention & Control

Minimize Risk of Transmission

- Raise awareness of increased risk among concentrated bird populations (i.e. bird feeders)
  - Don't feed birds
  - Disperse seed to disperse birds
  - Feed less bird seed

Personal Protection

- Use wet disinfection methods (detergent + water) to clean bird droppings
- Use protective clothing (gloves, eyewear, mask) if aerosolization is unavoidable OR if cleaning large amounts of droppings
- Don't handle dead birds (use shovel or gloves if necessary)

Risk from Pet Birds

- Most human infections are acquired from indoor pet birds
  - Ensure birds are negative for *C. psittaci* before purchase
  - Take sick birds to veterinarian for diagnosis and treatment

Next Steps

- Educate healthcare providers about risk of psittacosis even if no pet bird contact reported
  - Occupational risks (trimming palm trees?)
- Perform additional surveillance in bird populations
  - Lovebirds
  - Native bird species
- Use findings to guide outreach and prevention messaging to the public

Questions?