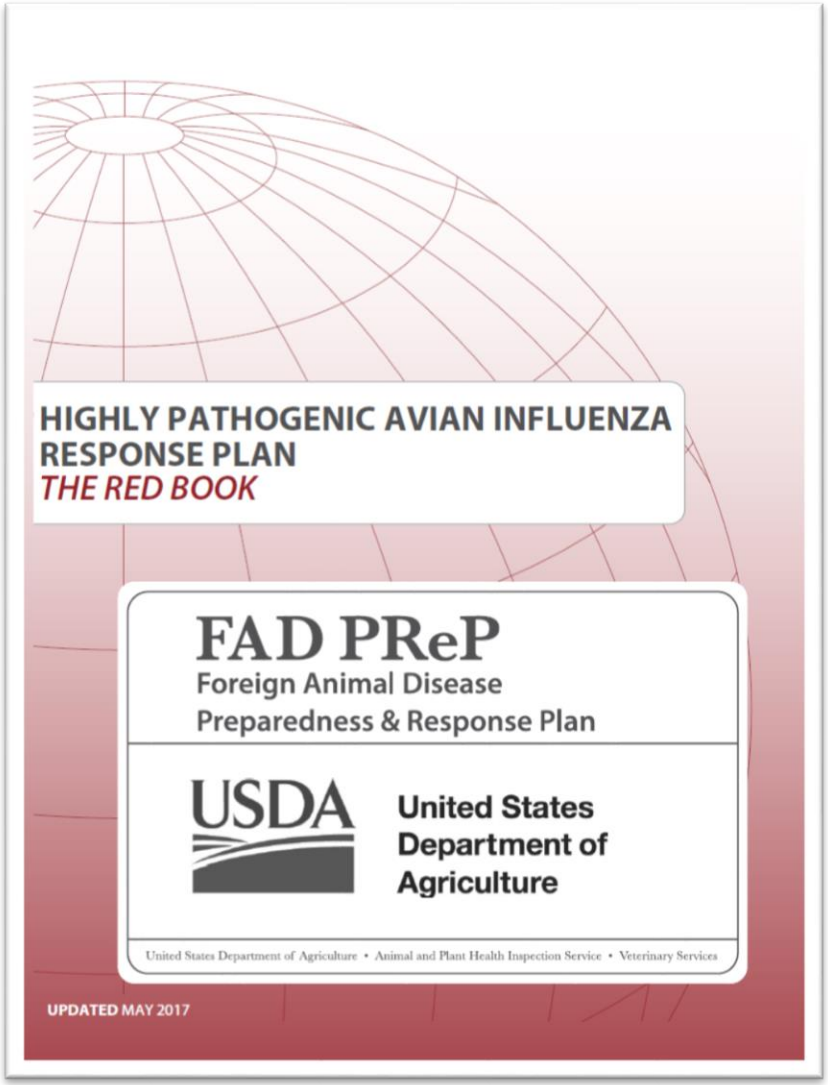
HIGHLY PATHOGENIC AVIAN INFLUENZA RESPONSE PLAN

THE RED BOOK

Updated May 2017



This plan does not replace existing regional, State, Tribal, local, or industry preparedness and response plans relating to HPAI. Regional, State, Tribal, local, and industry plans should be aimed at more specific issues in an HPAI response.

- States should develop response plans focused on the specific characteristics of the State and its poultry industry.
- Industry should develop response plans focused on the specific characteristics of their commercial operations and business practices.

Update Information

This version of the *USDA APHIS HPAI Response Plan: The Red Book* (Updated May 2017) reflects knowledge and lessons learned during the following outbreaks:

- 2014–2015, HPAI—largest outbreak in U.S. history
- 2016, HPAI/LPAI in Indiana
- 2017, HPAI/LPAI in Tennessee, Alabama, Kentucky, and Georgia

What Changed

Revisions made include the following:

- Reflection of policy changes made after release of last response plan.
- Reflection of New National Response Framework (June 2016).
- Inclusion of revised World Organization for Animal Health (OIE) *Terrestrial Animal Code* (2016).
- Replacement of surveillance sections, revised by the Center for Epidemiology and Animal Health.
- Incorporation of new permitted movement guidance.
- Inclusion of additional guidance on restocking activities.

Additional Updates

Revisions made also include the following:

- Correction of any errors identified in the prior version.
- Addition of changes made in response to comments on the DRAFT August 2015 version.
- Reflection of the updated *Secure Poultry Supply Plan*, which is working to harmonize and integrate existing Secure Food Supply Plans for eggs, turkeys, and broilers.

Supplemental Policy Information

- The National Incident Coordination Group developed additional policy guidance as a result of the recent avian influenza outbreaks, available here: www.aphis.usda.gov/fadprep.
- The HPAI Red Book provides strategic guidance whereas additional policy guidance provides information on how to operationalize activities, particularly for the unified Incident Command.
  - These policy guidance documents are consistent with the HPAI Red Book and should be utilized in any future outbreak.
  - Check these documents frequently as they do change.

Outline

- Introduction and Information
- Framework for Preparedness and Response
- Preparedness and Response
- Response Goals and Strategy
- Specific Response Critical Activities and Tools
- Recovery after an Outbreak

HPAI RESPONSE PLAN

Introduction and Information

Purpose of Plan

Provides animal health emergency responders, Federal, State, local, and Tribal governments, and all other stakeholders with:

- A guiding APHIS policy document to use during an HPAI outbreak in domestic poultry.
- Current strategic guidance for control and eradication of HPAI in domestic poultry during an outbreak.

Objectives of this Plan

- Identify the capabilities needed to respond to an HPAI outbreak in poultry.
- Identify critical activities that are involved in responding to that outbreak and the time frames for these activities.

In an outbreak situation, critical activities are under the authority of an Incident Command (IC) per the National Incident Management System (NIMS).

Scope of the Response Plan

Avian influenza (AI) is primarily an infection of birds. While other species are susceptible, this plan focuses on poultry.

- However, if susceptible animals other than poultry become significant to the response effort, the case and laboratory definitions will be adapted by the IC to fit the prevailing epidemiological findings during an outbreak.

The plan does not address control and eradication of low pathogenicity avian influenza (LPAI) in poultry. However, LPAI *is* addressed comprehensively in the USDA-APHIS *National Poultry Improvement Plan (NPIP)*: www.aphis.usda.gov/animal_health/animal_dis_spec/poultry/.

Key Components of the Plan

- HPAI Information
- Framework of USDA & APHIS Response
- Response Goals
- Response Strategy
- Critical Activities and Tools
- Restocking and Recovery

Etiology

Highly pathogenic avian influenza is also known as fowl plague and *grippe aviaire*.

- It is caused by influenza virus A.
- Influenza virus A is further classified on the basis of the surface glycoproteins, hemagglutinin (HA or H) and neuraminidase (NA or N).

Influenza A Virus Subtypes

- There are 16 different H antigens (H1 to H16) and nine different N antigens (N1 to N9) for influenza A affecting birds.
- Some influenza A subtypes can cause LPAI; H5 and H7 subtypes include both HPAI and LPAI strains.
- HPAI viruses generally cause severe clinical signs and results in high mortality in domestic poultry.
- LPAI viruses typically result in few clinical signs in domestic poultry.

History

- AI was first reported in Italy and described as a serious disease of poultry in 1878.
- The worldwide prevalence of AI viruses is influenced by the distribution of both domestic and wild avian species, locality of poultry production, migratory routes, and season.

Observed Circulating HPAI Viruses

- H5N1: Africa, France, India, the Middle East, Southeast Asia
- H5N2: France, Taiwan
- H5N5: Europe
- H5N6: China, Korea, Japan, Vietnam
- H5N8: Africa, China, Europe, Middle East, Russia
- H7N3: Mexico
- H7N9: China, United States

List is not exhaustive. Based on 2016 and 2017 reports to the OIE.

Zoonotic Potential

- Under certain circumstances, specific strains of HPAI have been demonstrated to infect and be fatal to humans.
- As of February 2017:
  - 856 cases and 452 deaths from laboratory-confirmed HPAI H5N1 were reported to the World Health Organization (WHO).
  - HPAI H5N6, H7N7, H7N9 viruses have also infected humans.
- There have been no human cases in any of the recent U.S. outbreaks of HPAI.

Susceptible Species

- Many avian species are susceptible to infection with HPAI viruses, including:
  - chickens,
  - turkeys,
  - ducks,
  - geese,
  - guinea fowl, and
  - a wide variety of other birds, including migratory waterfowl and shorebirds.

Reservoir

- AI viruses usually infect migratory waterfowl, particularly Anseriformes (ducks and geese) and Charadriiformes (gulls and shorebirds) that can carry LPAI viruses—and potentially certain HPAI viruses—without showing illness.
  - Other aquatic avian species may also be maintenance hosts.
- The wild-bird reservoir of LPAI viruses is a major potential source of infection for domestic birds, particularly free- and open-range poultry.
  - Following transmission from wild to commercial birds, the virus can mutate or reassort in gallinaceous (e.g., chickens) poultry flocks, resulting in an HPAI virus.

Transmission of AI in Poultry

- Animal to animal contact
- Fomites
- Wildlife
- Aerosol

Persistence in the Environment and Animal Products

- AI viruses are easily inactivated by heat.
- At colder temperatures, virus survival has been documented in feces from less than 4 days to at least 30–40 days.
- AI viruses can also be isolated from animal products, including eggs.

Diagnosis in Avian Species

- Incubation period for HPAI viruses in naturally infected chickens ranges from 3–14 days.
  - World Organization for Animal Health (OIE) *Terrestrial Animal Health Code (2016)* gives the incubation period for AI infection as 21 days.
- AI may have longer incubation periods in some species than in others.
  - Each HPAI virus—even those of the same subtype—may have a slightly different incubation period.

Clinical Signs in Poultry

- Marked depression with ruffled feathers
- Droopiness
- Soft-shelled eggs
- Sudden drop in egg production
- Loss of appetite
- Excessive thirst
- Swollen wattles and combs
- Diarrhea
- Incoordination
- Respiratory distress
- Increased daily mortality

Clinical Signs in Ducks and Geese

- Usually do not show clinical signs with infection of LPAI.
- Some species of these birds may also carry specific HPAI viruses sub-clinically.
- HPAI viruses can also present with the following signs:
  - sudden death,
  - nervous signs (lack of coordination and inability to stand and walk),
  - dyspnea,
  - depression, and
  - diarrhea.

Clinical Signs in Other Birds

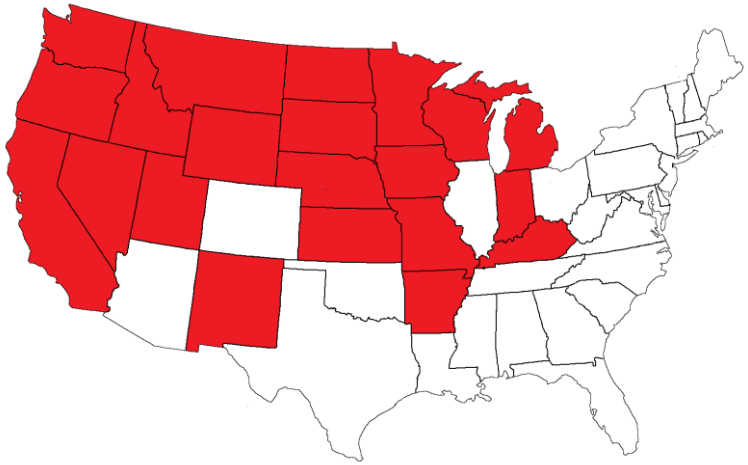
- Birds from other orders may also become affected with HPAI:
  - Gyrfalcons
  - Great-horned Owls
- These animals can die suddenly but may also experience symptoms such as:
  - depression,
  - diarrhea, and
  - decreased food consumption.
- They may recover from the virus.

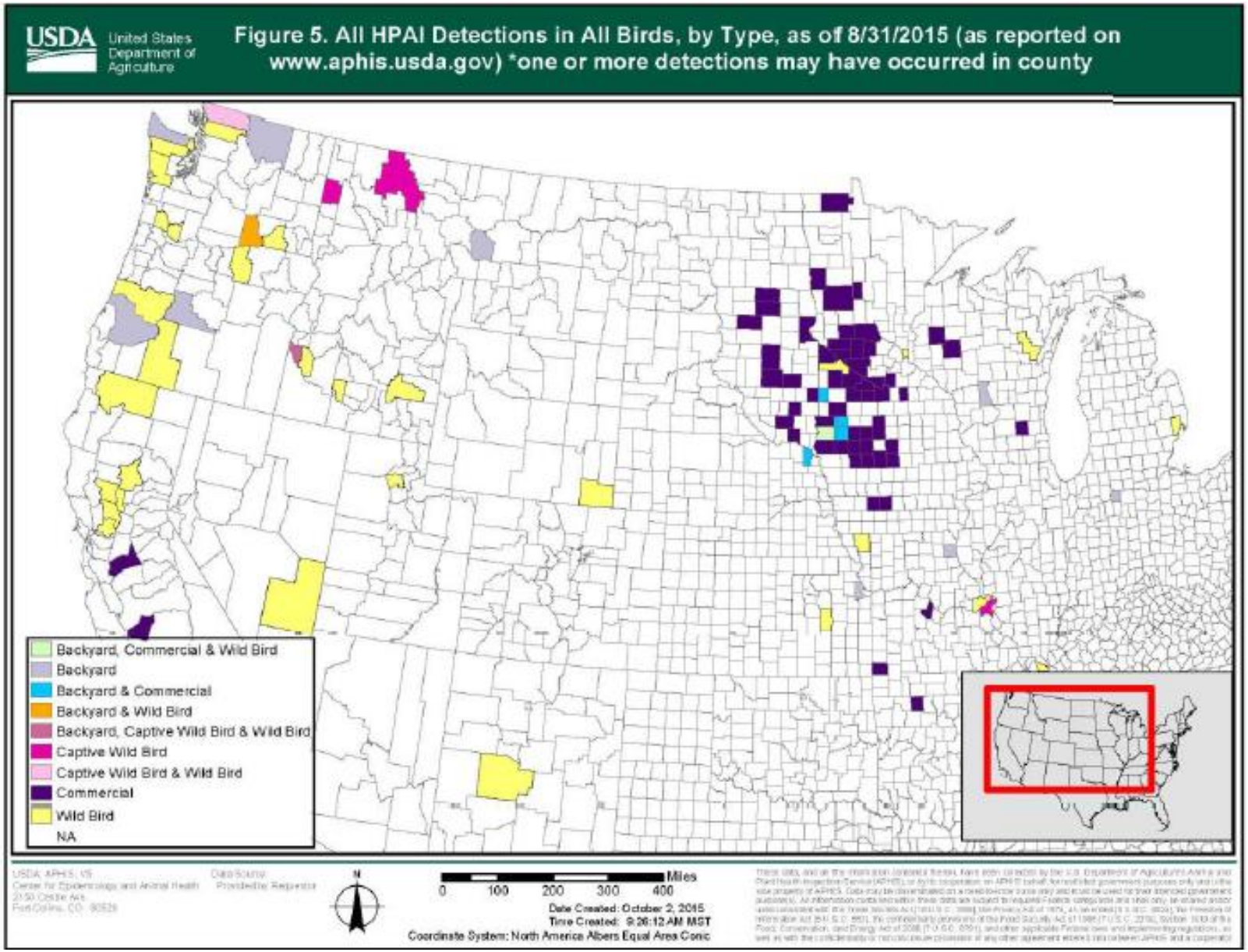
2014–2015 U.S. Outbreak

- H5N2 was the most common subtype of HPAI followed by H5N8 in the 2014–2015 U.S. Outbreak.
- Approximately 50.5 million commercial birds were depopulated or succumbed to the virus (primarily layers and turkeys).
- There is strong evidence that the 2014–2015 outbreak in the United States was introduced from wild birds to poultry flocks.
- Neither of these strains was detected in humans, including those responding to the incident.

2014–2015 U.S. Outbreak
Infected States

- The hardest hit states were Minnesota (over 100 affected premises) and Iowa (over 70 affected premises); South Dakota, Wisconsin, Nebraska, California, Missouri, North Dakota, and Arkansas also had one or more detections of HPAI in commercial flocks.
  - In total, 21 States have had HPAI detections in commercial premises, backyard flocks, captive wild birds and/or wild birds.




USDA United States Department of Agriculture
Figure 5. All HPAI Detections in All Birds, by Type, as of 8/31/2015 (as reported on www.aphis.usda.gov) *one or more detections may have occurred in county
Backyard, Commercial & Wild Bird
Backyard
Backyard & Commercial
Backyard & Wild Bird
Backyard, Captive Wild Bird & Wild Bird
Captive Wild Bird
Captive Wild Bird & Wild Bird
Commercial
Wild Bird
NA
N
0 100 200 300 400 Miles
Date Created: October 2, 2015
Time Created: 9:26:12 AM MST
Coordinate System: North America Albers Equal Area Conic

2014–2015 U.S. Outbreak Economic Impact

- Over $950 million was obligated for response to the outbreak and continued preparedness for HPAI.
- The retail price of eggs jumped nearly 30 percent.
- While some countries placed bans only on a specific region, county, or State, other countries did ban poultry and poultry products from the entire United States.
- In total, the total economic impact has been assessed at about $3.3 billion.

2016 Indiana HPAI/LPAI Outbreak

- HPAI H7N8 detected in a single commercial flock in Indiana.
- LPAI H7N8 virus had mutated to HPAI.
- LPAI H7N8 was confirmed on eight additional premises; there were 2 dangerous contact flocks.
- In all, 400,000 commercial birds were affected.

USDA United States Department of Agriculture

Figure 8. All H7 Detections in all Birds, as of 3/29/2016

USDA, APHIS, VS
Center for Epidemiology and Animal Health
2150 Centre Ave.
Fort Collins, CO 80526

Data Source:
Provided by Requestor

N

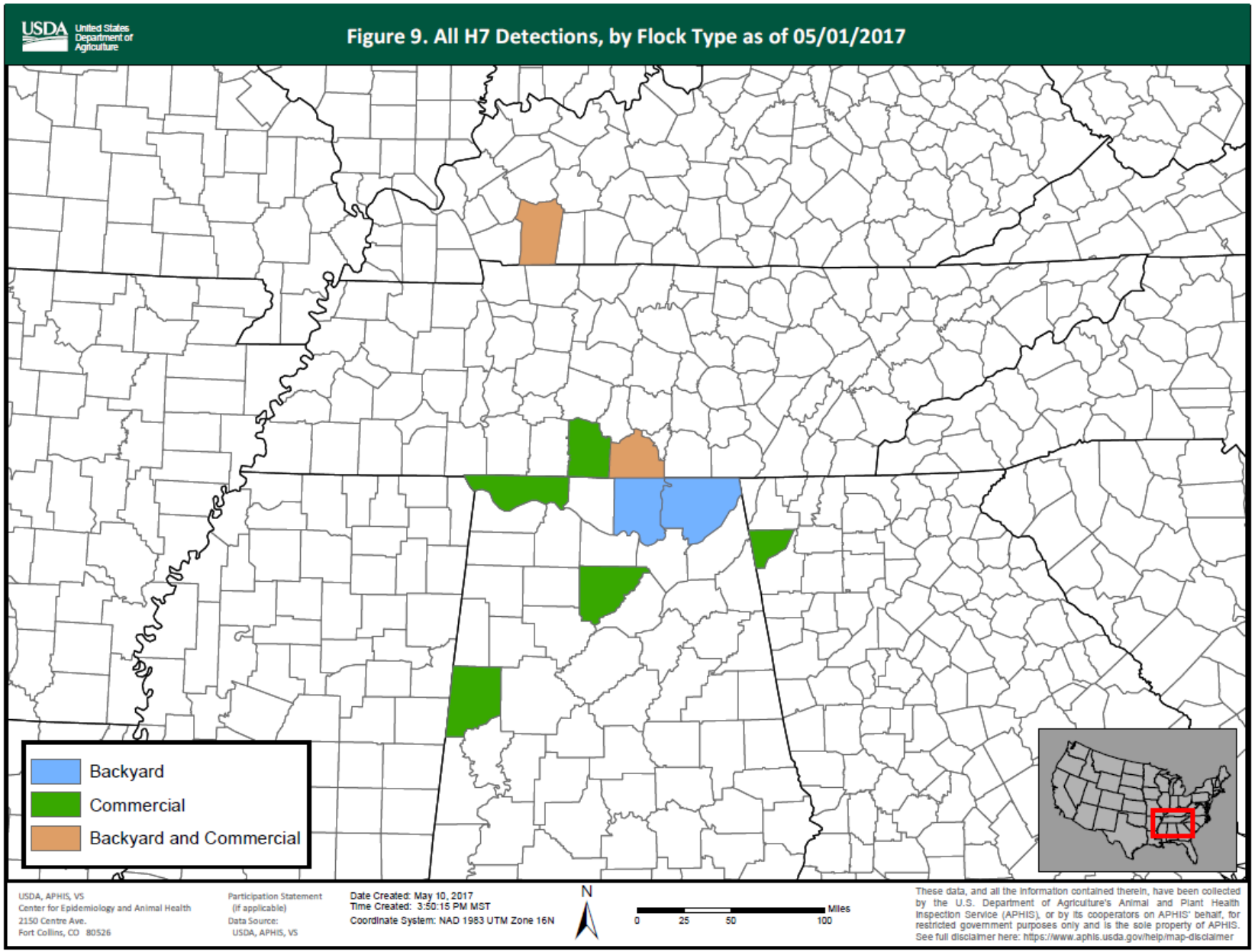
0 40 80 120 160 Miles

Date Created: March 29, 2016
Time Created: 4:03:26 PM MST

Coordinate System: North America Albers Equal Area Conic

2017 Southeastern United States HPAI/LPAI Outbreak

- HPAI H7N9 (North American wild bird lineage) detected in Tennessee in commercial broiler breeder.
- 12 additional presumptive or confirmed LPAI H7N9 premises in Tennessee (3), Alabama (6), Kentucky (2), and Georgia (1).
- A second HPAI H7N9 detection in the same Tennessee county.
- In all, 14 affected premises: 8 commercial, 6 backyard.
- LPAI and HPAI viruses were closely related.


USDA United States Department of Agriculture
Figure 9. All H7 Detections, by Flock Type as of 05/01/2017
Backyard
Commercial
Backyard and Commercial
USDA, APHIS, VS
Center for Epidemiology and Animal Health
2150 Centre Ave.
Fort Collins, CO 80526
Participation Statement (If applicable)
Data Source: USDA, APHIS, VS
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HPAI RESPONSE PLAN

Framework for Preparedness and Response

Foundation of Preparedness and Response

- Successful emergency preparedness for and response to HPAI is based on the principles found in the National Response Framework (NRF) and National Incident Management System (NIMS).
- APHIS Veterinary Services (VS) established FAD PReP to provide guidance for preparing and responding to a foreign animal disease (FAD) emergency.

National Response Framework

- The NRF is a guide to how the Nation conducts all-hazards response, through a whole community approach.
- It describes core capabilities for response, defines specific authorities, and establishes a comprehensive approach for responding to domestic incidents that range from serious but purely local events to large-scale terrorist attacks or catastrophic natural disasters.
- The NRF is available at www.fema.gov/national-response-framework.

National Incident Management System

- NIMS is a companion document to the NRF.
- It provides a systematic, nationwide, proactive approach guiding departments and agencies at all levels of government, the private sector, and non-governmental organizations.
- Its goal is to help these organizations work seamlessly to prepare for, prevent, respond to, recover from, and mitigate the effects of incidents, "…regardless of cause, size, location, or complexity—in order to reduce the loss of life, liberty, property, and harm to the environment."
- NIMS information is available at www.fema.gov/national-incident-management-system.

NIMS Key Components

- Preparedness
- Communications and information management
- Resource management
- Command and management
- Ongoing management and maintenance

FAD PReP

- The precursor to FAD PReP was the National Animal Health Emergency Management System (NAHEMS), which offered a functional veterinary framework for responding to FADs like HPAI.
- Now incorporated into FAD PReP, the NAHEMS Guidelines join strategic concept of operations documents, disease response plans (such as the HPAI-specific plan), SOPs, and other materials to create a comprehensive approach to FADs that is consistent with NRF and NIMS.

FAD PReP offers…

- competent veterinary guidance on cleaning and disinfection, disposal, mass depopulation, and other activities;
- information on disease control and eradication strategies and principles;
- guidance on health, safety, and personal protective equipment issues;
- biosecurity information and site-specific management strategies; and
- training and educational resources.

USDA Roles and Responsibilities

As the primary Federal agency for incident management during an FAD event of livestock or poultry, USDA APHIS

- deploys National Incident Management Teams (NIMTs),
- coordinates the incident response,
- manages public messages, and
- takes measures to control and eradicate HPAI.

Measures to Control and Eradicate HPAI

- Surveillance and diagnostics
- Quarantine and movement control
- Biosecurity measures
- Epidemiological investigations
- Appraisal and compensation
- Depopulation (euthanasia) of affected poultry
- Carcass disposal
- Cleaning and disinfection (virus elimination)
- Emergency vaccination (if appropriate)

Requesting Support

- During the course of an HPAI outbreak response, USDA may request support as necessary from other Federal agencies.
- If the President declares an emergency or major disaster, or if the Secretary of Agriculture requests the Department of Homeland Security (DHS) lead coordination, the Secretary of Homeland Security and DHS assume the lead for coordinating Federal resources.
- USDA maintains the lead of overall incident management.

HPAI RESPONSE PLAN

Preparedness and Response

Domestic Activities

USDA has a variety of ongoing preparedness and response activities with respect to HPAI, many of which have been significantly ramped up in response to recent events.

The following list details a selection of ongoing USDA activities:

- Poultry surveillance and diagnostics
- National Import Export Services (NIES)
- Wildlife surveillance
- Smuggling Interdiction and Trade Compliance (SITC)
- Emergency veterinary assistance
- Public health
- Animal care
- Modeling
- Education.

USDA APHIS Organizational Strategy

- APHIS employs NIMS and the Incident Command System (ICS) organizational structures to manage response to an HPAI outbreak.
- ICS is designed to enable efficient and effective domestic incident management by integrating facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

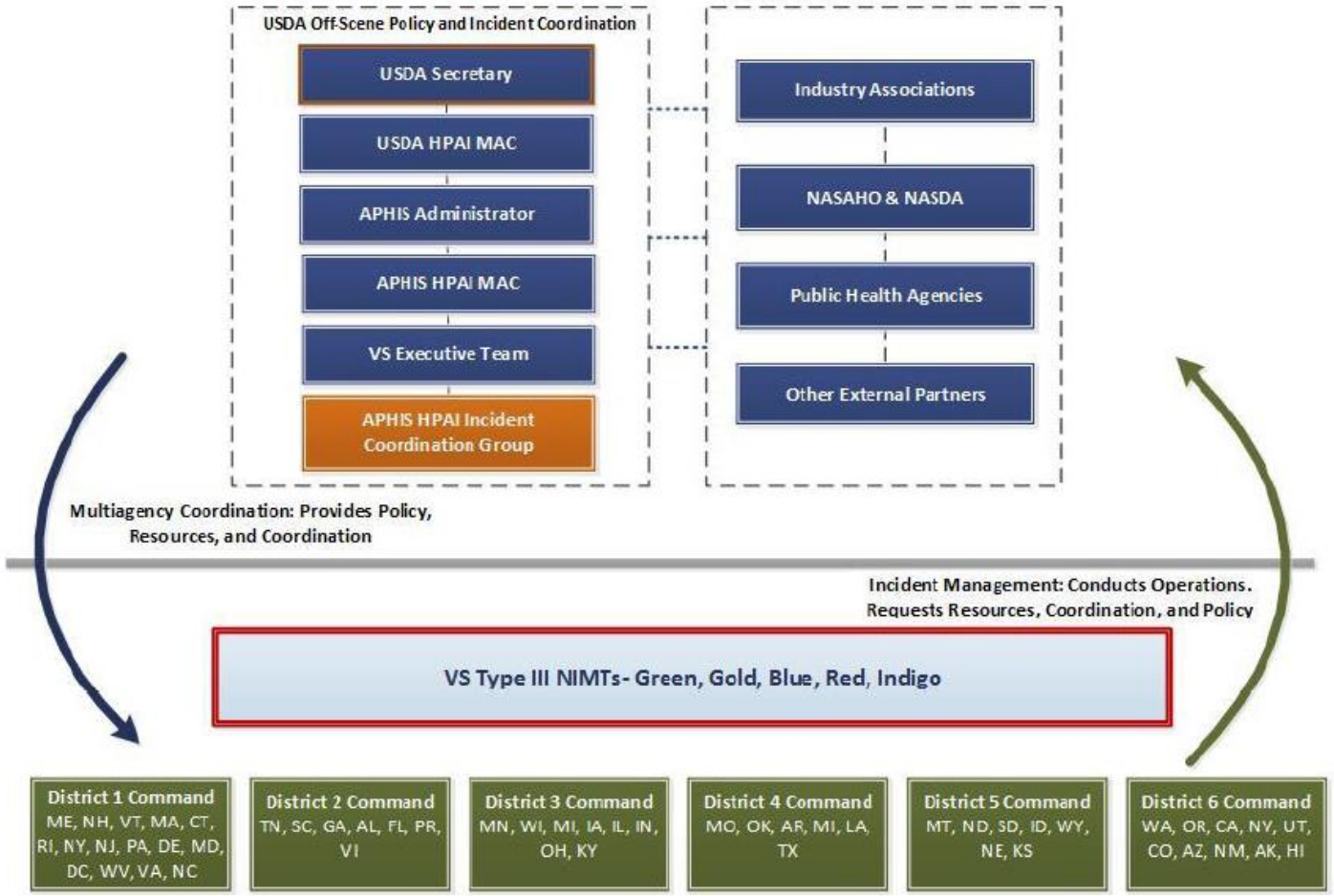
APHIS Incident Management Structure

- The APHIS Administrator is the Federal executive responsible for implementing APHIS policy during an HPAI outbreak.
  - The Administrator is supported by the APHIS Management Team (AMT).
- Depending on the size of the outbreak, the APHIS Administrator and AMT may establish an APHIS-level Multiagency Coordination (MAC) Group to coordinate resources.
  - Many MAC functions may be delegated to the VS Deputy Administrator, who is the Chief Veterinary Officer of the United States.
- The VS Deputy Administrator is supported by the VS Executive Team (VSET) to coordinate policy.

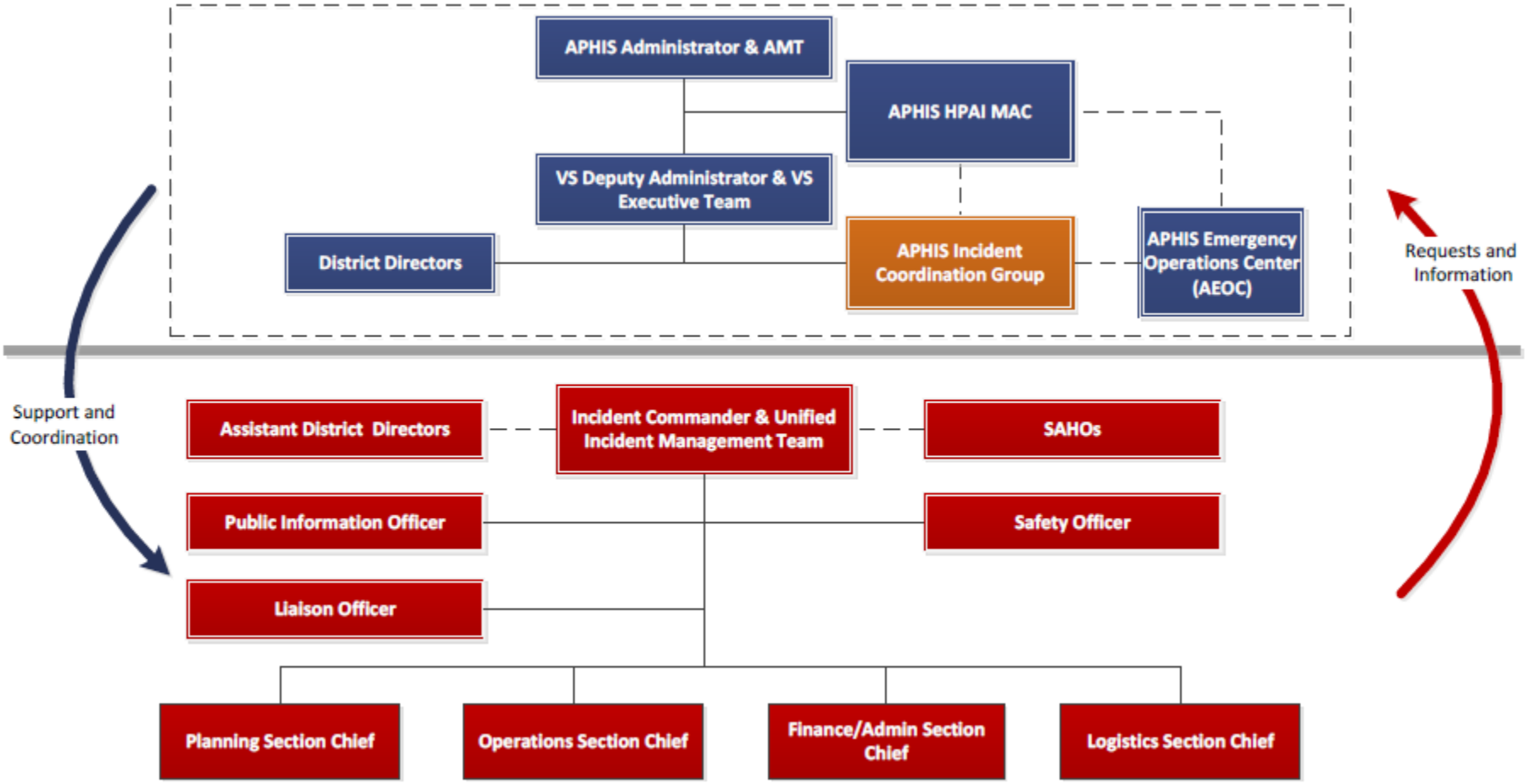
APHIS Incident Management Structure, continued

- An APHIS National Incident Coordination Group (ICG), with an Incident Coordinator, is immediately established to oversee the response activities associated with the incident.
  - This ICG is flexible and scalable to the size and scope of the incident and works closely with IC personnel in the field in one or more NIMTs.
- The ICG also coordinates with any MAC Group that is established at the APHIS or USDA level, based on the specific incident.

Overview of USDA APHIS Multiagency Coordination, Incident Coordination Group, Field Personnel (Incident Management Teams and Districts), and Stakeholder Relationships for an HPAI Incident



Details of USDA APHIS Multiagency Coordination, Incident Coordination Group, and Incident Management Teams for an HPAI Incident



Multiagency Coordination

- MAC functions are executed at various levels, and typically include:
  - the coordination of policy,
  - incident priorities,
  - resource allocation and acquisition, and
  - resolution of issues common to all parties.
- The size and scope of the HPAI incident dictates what levels and types of MAC Groups and MAC functions are required.

APHIS Incident Coordination Group

- APHIS ICG responsibilities in an HPAI outbreak include:
  - providing policy guidance for response activities,
  - providing information and coordination with health and safety personnel,
  - to ensure responder and public health and safety,
  - supporting NIMTs and their requirements,
  - assisting in coordinating resources and integrating other organizations into the ICS, and
  - providing information to the Joint Information Center (JIC) for use in media and stakeholder briefings.

Diagnostic Resources and Laboratory Support

National Veterinary Services Laboratories

- The National Veterinary Services Laboratories (NVSL) is the official reference laboratory for FAD diagnostic testing and study in the United States.
  - The NVSL provides *all* confirmatory testing for HPAI on all specimens, including those found presumptively positive at a National Animal Health Laboratory Network (NAHLN) laboratory or other USDA-approved laboratory.
  - The NVSL has two locations for FAD diagnostic testing:
    - Ames, IA (NVSL-Ames).
    - Foreign Animal Disease Diagnostic Laboratory (FADDL), Plum Island, NY (NVSL-FADDL).

Diagnostic Resources and Laboratory Support

National Animal Health Laboratory Network (NAHLN)

- NAHLN consists of more than 60 laboratories and coordinates the veterinary diagnostic laboratory capacity of State animal health laboratories and their extensive infrastructure, including facilities, equipment, and professional expertise.
- Of these laboratories, over 55 are currently approved to perform AI testing diagnostics.
  - The NAHLN provides a means for early detection of AI, rapid response through surge capacity to test outbreak samples, and recovery by the capability to test large numbers of samples to show freedom from AI.

Surge Capacity

- Surge capacity may be needed in an HPAI outbreak. Additional resources, such as personnel and materials, will be needed for sample collection.
  - Additional capacity may also be required for laboratory sample testing.
- Surge capacity can help facilitate a rapid response and continuity of business for non-infected premises.
- In the event that the affected State(s) NAHLN lab(s) and NVSL-Ames are overwhelmed by the diagnostic testing requirements, NAHLN laboratories from across the country may provide surge capacity for diagnostic testing.

HPAI RESPONSE PLAN

Response Goals and Strategy

Response Goals

- Detect, control, and contain HPAI in domestic poultry as quickly as possible.
- Eradicate HPAI using strategies that seek to protect public health and the environment, and stabilize animal agriculture, the food supply, and the economy.
- Provide science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated animal products.

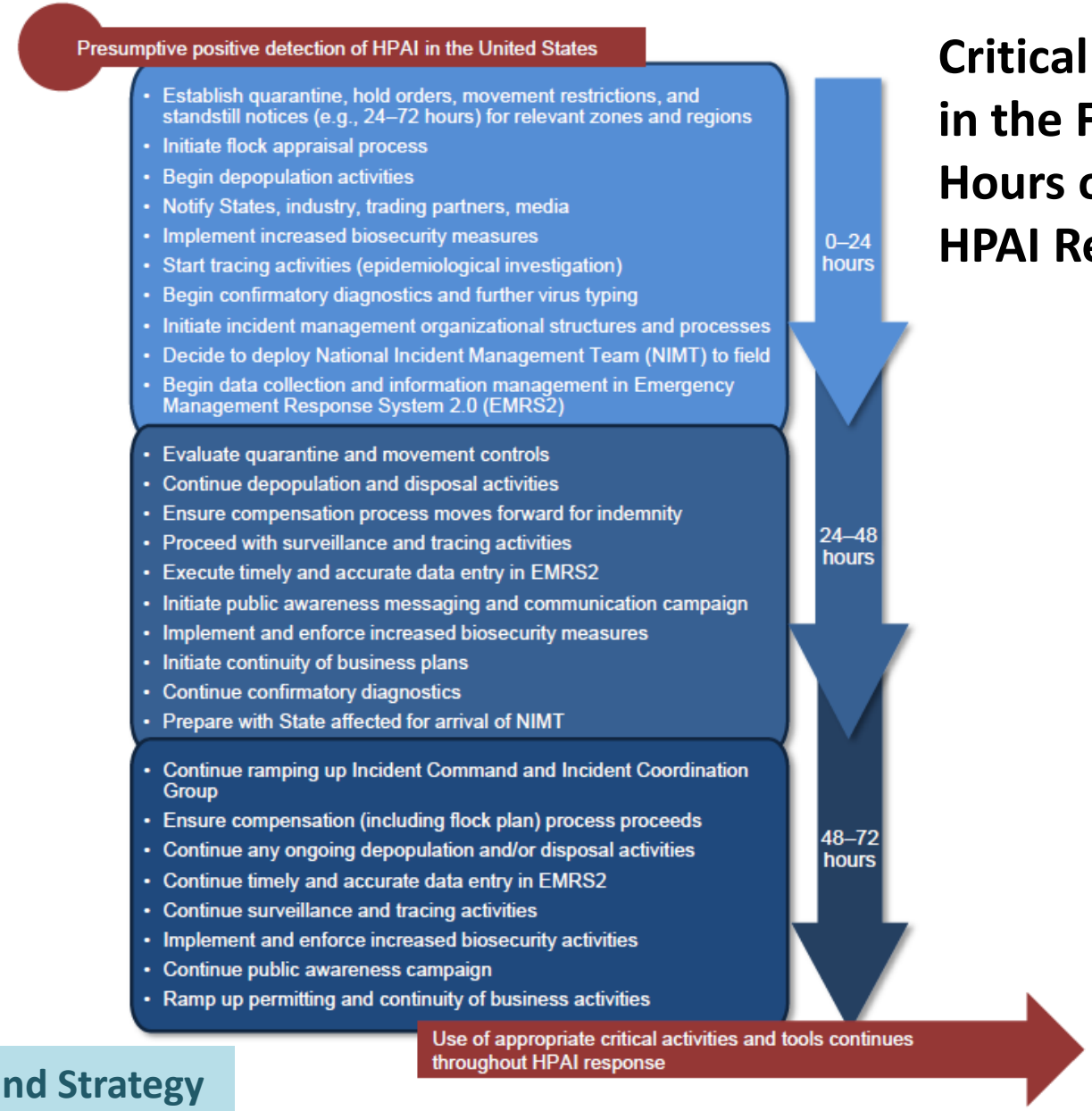
Critical Activities

- Public communication and messaging campaign
- Swift imposition of effective quarantine and movement controls
- Stringent and effective biosecurity measures
- Rapid diagnosis and reporting
- Epidemiological investigation and tracing
- Increased surveillance
- Continuity of business measures for non-infected premises and non-contaminated animal products
  - Secure Poultry Supply Plan
- Rapid mass depopulation and euthanasia, potentially including preemptive depopulation
- Effective and appropriate disposal procedures
- Cleaning and disinfection measures
- Emergency vaccination (as the response strategy indicates)

Epidemiological Principles

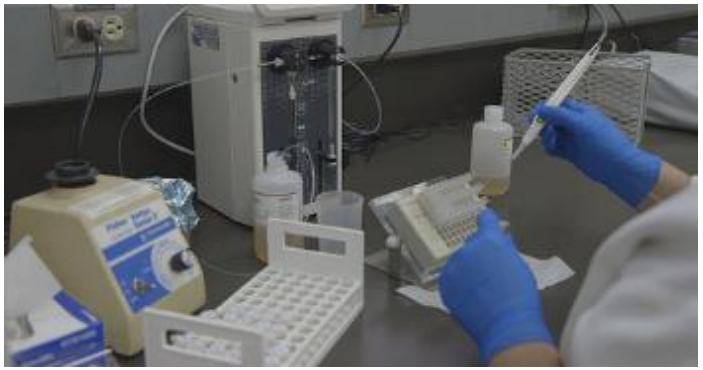
- Three basic epidemiological principles form the foundation to contain, control, and eradicate HPAI in the U.S. poultry population:
  - Prevent contact between the HPAI virus and susceptible poultry.
  - Stop the production of HPAI virus by infected or exposed animals.
  - Increase the disease resistance of susceptible poultry to the HPAI virus or reduce the shedding of HPAI in infected poultry.

Critical Activities in the First 72 Hours of U.S. HPAI Response



Response Strategy for Control and Eradiation of HPAI in Poultry

- The United States' primary control and eradication strategy for HPAI in poultry is stamping-out.
- If the spread of HPAI outpaces the resources for stamping-out, or if other factors direct the response away from a stamping-out strategy alone, emergency vaccination strategies might be considered.



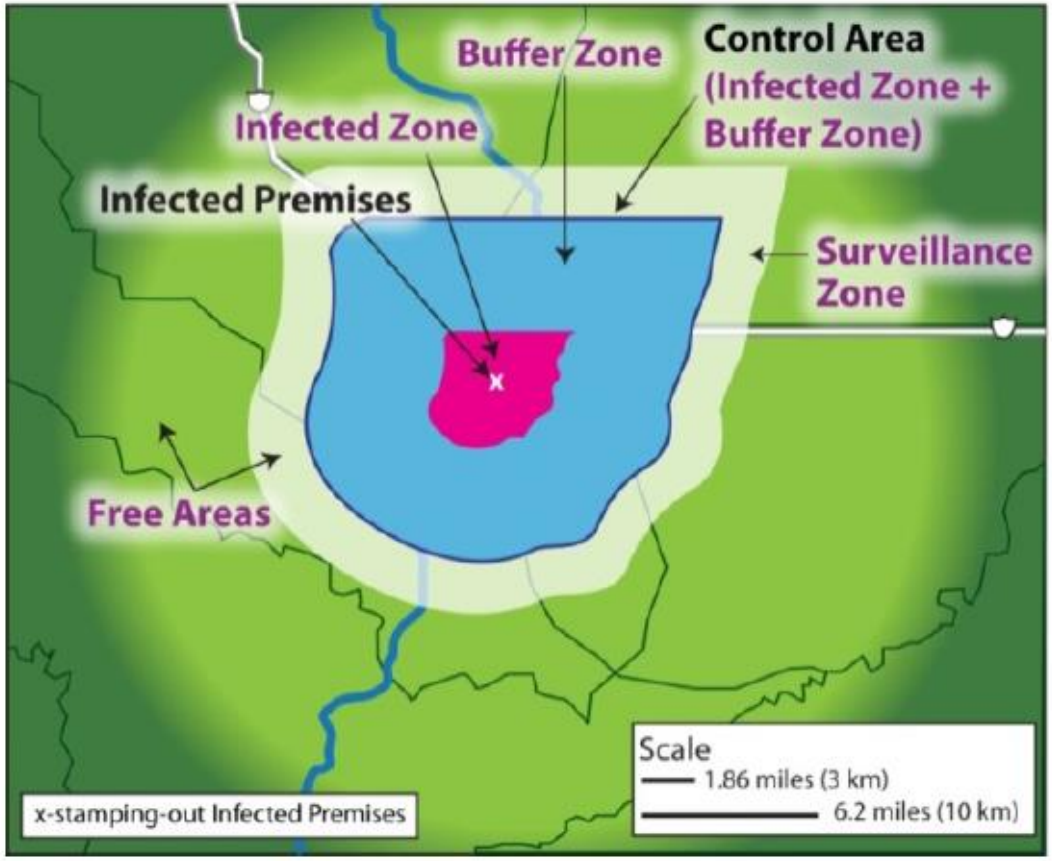
OIE Definition of Stamping-Out

- "Stamping-out" is defined in the OIE *Terrestrial Animal Health Code* as the "killing of animals which are affected and those suspected of being affected in the herd and, where appropriate, those in other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact with the causal pathogen…"
- The OIE also prescribes that disposal and cleaning and disinfection must be conducted by procedures defined in Chapters 4.12 and 4.13.

Stamping-Out: APHIS Critical Goals

- The goal is that, within 24 hours of (or as soon as possible after) a presumptive positive classification, infected poultry are depopulated in the quickest, safest, and most humane way possible.
- Where resources are limited, premises are prioritized so that those with the highest potential for active HPAI spread are 'stamped-out' first.
- Public concerns about stamping-out require a well-planned and proactive public relations and liaison campaign (stakeholders, the public, and the international community must be involved).

Zones and Areas in Relation to Stamping-Out



Assessing a Possible Outbreak

- During the investigation of premises suspected of having HPAI, animal health responders use clinical signs, history, and professional judgment to determine the likelihood that HPAI exists on the premises. This assessment includes:
  - a history of clinical and epidemiological findings,
  - results of physical examinations,
  - necropsy findings,
  - specimen collection and submission to an approved laboratory, and
  - reporting/situational information.

Authorization for Response and Associated Activities

When the criteria for a presumptive positive HPAI case have been met, the APHIS Administrator or VS Deputy Administrator (Chief Veterinary Officer [CVO] of the United States) can authorize APHIS personnel—in conjunction with State, Tribal, and IC personnel—to initiate depopulation, cleaning and disinfection procedures of the index case (IP), and investigation of Contact Premises (CP).

Management of Incident

- The outbreak response effort should be implemented through ICS with an appropriate span of control and delegation of authority.
- As soon as possible, an Incident Coordinator and Incident Commander should be identified, an NIMT may be deployed, and a unified State-Federal ICP established.
- In-State resources (whether Federal, State, Tribal, local, or privately owned) should be used to manage the response.
- If the response requires, out-of-State resources may be used to support the State impacted by the outbreak.

Control and Eradication Strategy for Other Species

- Captive Wild Birds
  - Detections in captive wild birds (e.g., falcons or gyrfalcons used in falconry) are managed individually.
- Other Animals
  - Susceptible animals, in this response plan, are limited to poultry unless otherwise specified in the case definition used during the outbreak.
  - Additional susceptible animals or species may be determined, as needed, by the current knowledge of the epidemiology of the event.

Factors Influencing Response

- Consequences of the outbreak
- Acceptance
- Scale of the outbreak
- Rate of outbreak spread
- Veterinary countermeasures available
- Resources available to implement response strategies

AI-Free Status

The criteria needed for AI-free status:

- It has been shown that infection with HPAI viruses in poultry has not been present in the country, zone, or compartment for the past 12 months; or
- When based on surveillance in accordance with Articles 10.4.27 to 10.4.33, it does not meet the criteria for freedom from avian influenza but any virus detected has not been HPAI virus.

These determinations are described in the OIE *Terrestrial Animal Health Code (2016)* in Articles 10.4.2, 10.4.3, and 10.4.4.

HPAI RESPONSE PLAN

Critical Activities and Tools

Laboratory Criteria

- Subclinical infections identified through active laboratory surveillance or clinical cases with compatible clinical signs and pathologic lesions in a susceptible species are evaluated using laboratory criteria for HPAI and LPAI H5/H7 defined by one or more of the following diagnostic strategies:
  - Serological tests
  - Antigen tests
  - Virus isolation and identification
  - Strain virulence evaluation.

Suspect Case
Definition

- Illness compatible with H5/H7 AI infection; OR
- Detection of antibodies to influenza A as determined by AGID or ELISA serological test with or without the presence of compatible illness; OR
- Detection by influenza A antigen using a commercially available influenza A antigen test kit (ACIA, approved by USDA) with the presence of compatible illness.

Presumptive Positive Case

Definition

- A suspect positive case as defined above with detection of antibodies to influenza A as determined by AGID serological test that cannot be explained by vaccination (USDA permission required for use in the United States), and subtyping by HI and NI as H5/H7 with any NA subtype; OR
- Domestic poultry with identification of influenza A ribonucleic acid (RNA) by real time reverse transcription-polymerase chain reaction (rRT-PCR) with or without the presence of compatible illness.

Confirmed Positive Case

Definition

Domestic poultry with antigen detection (virologic or molecular detection methods) AND the confirmation of the H5/H7 subtype WITH subsequent determination of pathogenicity by NVSL as described in Section 2.2 of the OIE Manual of *Diagnostic Tests and Vaccines for Terrestrial Animals* (HPAI or H5/H7 LPAI).

Surveillance

The following are goals in response to an HPAI outbreak:

- Implement surveillance plans within 48 hours of the confirmation of an outbreak.
- Implement a surveillance plan that will (1) define the present extent of HPAI and (2) detect unknown IP quickly.
- Consider susceptible wildlife population in the surveillance plan; coordinate with APHIS, DOI, State wildlife agencies, and State agriculture departments to perform appropriate surveillance in wildlife populations.
- Provide complete surveillance data summaries and analyses at intervals specified by the unified IC.

Surveillance Plan Objectives

- Detect HPAI IP quickly.
- Determine the size and extent of an HPAI outbreak.
- Supply information to assess and modify outbreak response activities.
- Provide information for animal and product movement within the CA.
- Provide information for animal and product movement out of the CA.
- Provide evidence to demonstrate HPAI absence on a premises, or demonstrate HPAI absence in an area during or after eradication of the outbreak.

Surveillance Objectives by Time Period

- *The initial 72 hours post-HPAI outbreak declaration.*
  - Detect existing infected flocks and premises as quickly as possible.
- *The control period (from initial 72-hour period until last case is detected and depopulated).*
  - Continue CA surveillance
  - Provide evidence that premises are free of HPAI, thereby facilitating permitted movement within and out of the CA.
  - Conduct surveillance in the SZ.
  - Gather information about the outbreak virus strain.
  - Determine the role of backyard poultry.
  - Prioritize ongoing control and surveillance activities based on information.
- *Eradication to freedom.*
  - Provide evidence that the CA and Free Area are free of disease.

General Active Surveillance Parameters

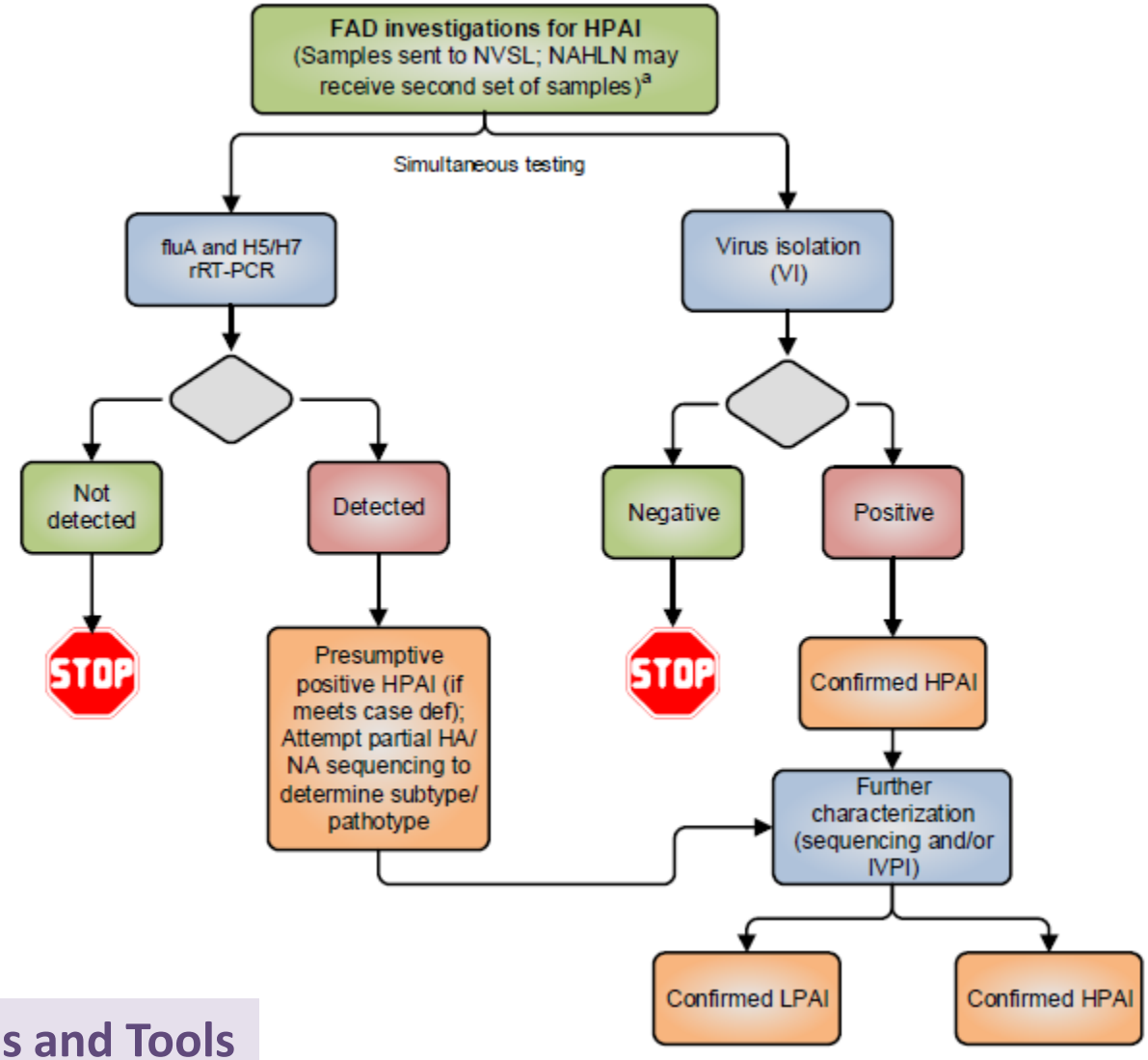
- A surveillance plan indicates the frequency, number, and distribution of animals and premises to be sampled. Parameters are set for the following:
  - design (threshold) prevalence,
  - confidence level,
  - risk-based sampling,
  - types of tests,
  - sampling frequency, and
  - sampling size.

- Common default parameters are listed in the Red Book.

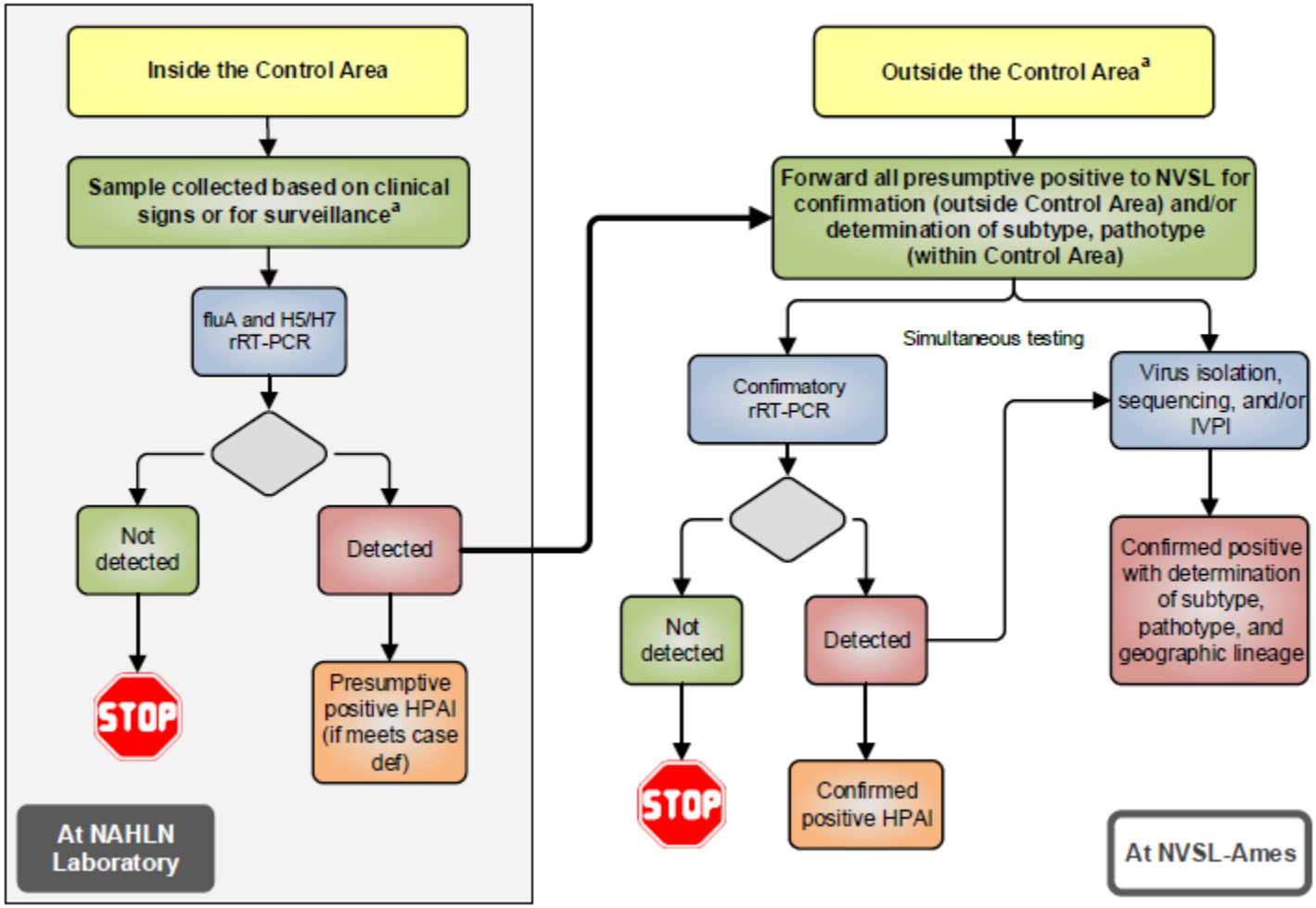
Diagnostics

- During a suspected or actual HPAI outbreak, the key goals are to
  - provide clear direction to responders on sample collection and processing procedures, if modification from routine standards is required,
  - meet the surge requirements for diagnostic testing at specific intervals, starting at time zero and at 24-hour intervals as the response escalates, and
  - report all diagnostic test results to appropriate personnel and information management systems (EMRS2) as soon as possible and within 4 hours of test completion.
- The *FAD Investigation Manual* (FAD PReP Manual 4-0) offers detailed information on diagnostic sample collection, diagnostic testing, and reporting.

Diagnostic Flow for FAD Investigations of Suspected HPAI



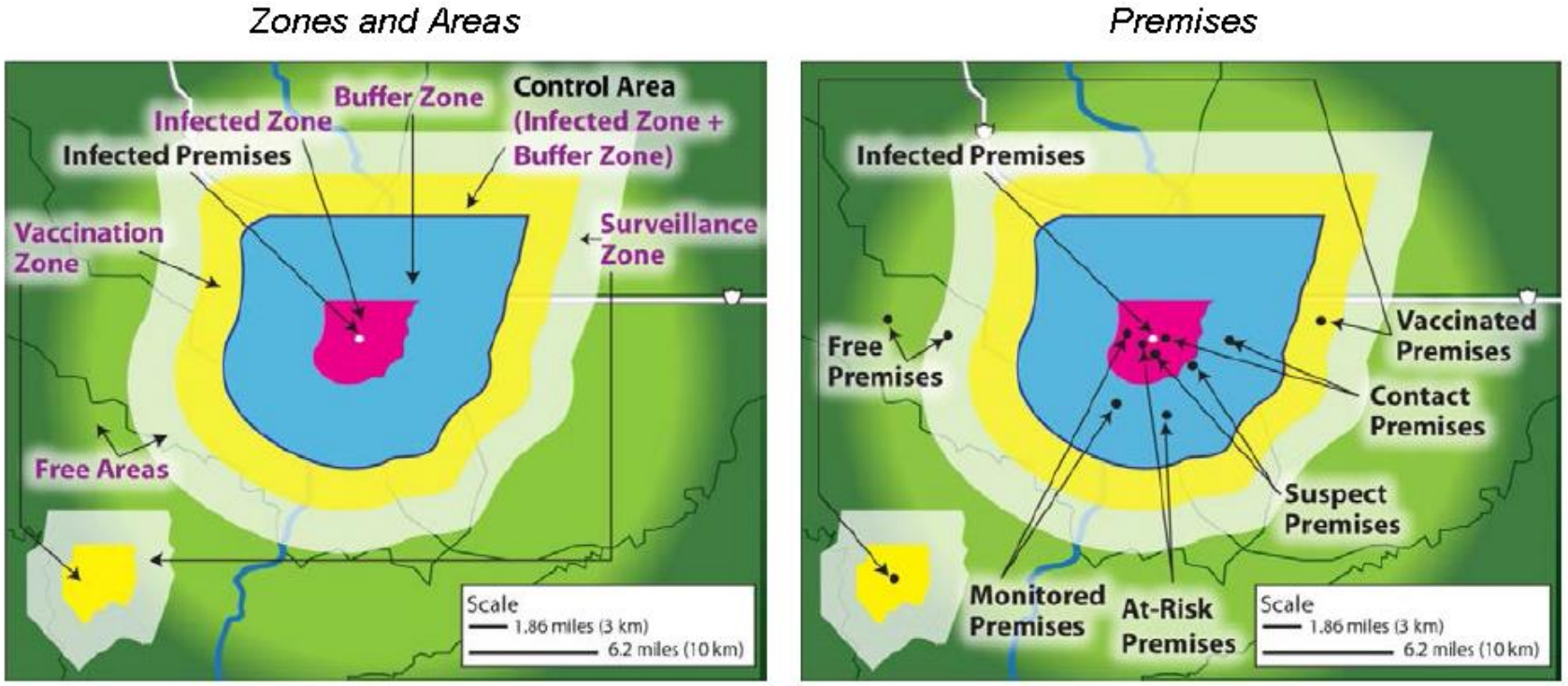
Diagnostic Flow During an HPAI Outbreak



Reporting and Notification

- Cases considered a presumptive positive for HPAI, based on the current case definition, are reported to the affected States, other States, Tribal nations, industry, other Federal agencies, trading partners, and the OIE.
  - This includes breeder and commercial poultry flocks, domestic waterfowl and upland game birds, backyard flocks, and the Live-Bird Marketing System (LBMS).
  - Appropriate Federal-State-Tribal-industry response and containment measures are initiated during HPAI investigations.

Example of Zones, Areas, and Premises in HPAI Outbreak Response



Note: The Vaccination Zone can be either a Protection Vaccination Zone or Containment Vaccination Zone. Stamping-out is not pictured in these figures. The Surveillance Zone is part of the Free Area.

Infected Zone | Buffer Zone | Vaccination Zone | Surveillance Zone

Epidemiological Investigation

- Epidemiological investigation and movement tracing during an outbreak are critical in controlling and eradicating HPAI in poultry.
- In an HPAI outbreak, the goals include
  - assign a premises designation within 6 hours for potential IP or CP.
  - identify all CP within 24 hours.
  - enter tracing information in EMRS2 in 24-hour intervals or less.

Tracing

- One of the most important activities during an HPAI outbreak is to rapidly and diligently trace-back and trace-forward movements from an IP.
- Tracing aids in the control of the spread of HPAI virus and limits the impact of the outbreak.
- Tracing should cover all movements from the premises, including susceptible poultry and livestock, non-susceptible species, animal products, vehicles, crops and grains, and people.
- Tracing also includes consideration of all potential modes of transmission and possible contact with wild birds.

Information Management

- Information management and reporting is critical during an HPAI incident or outbreak.
- EMRS2 is the official system of record.
- EMRS2 data entry processes should be performed in 12-hour or shorter intervals.
- Data is used for internal and external reports produced on a daily and weekly basis.
- It is imperative that information management, data quality, and data integrity is a priority.

Communication

- Establish a network of stakeholders and systems for communication prior to an incident or outbreak.
- Brief the media, public, industry, Congress, trading partners, and others on the HPAI outbreak status and the actions being taken to control and eradicate the disease.
- Coordinate with Federal, State, and local agencies, Tribal entities, producer groups, and Land Grant University-based Cooperative Extension.

Communication Objectives

- All HPAI communications must:
  - furnish accurate, timely, and consistent information;
  - maintain credibility and instill public confidence in the government's ability to respond to an outbreak;
  - minimize public panic and fear; and
  - address rumors, inaccuracies, and misperceptions as quickly as possible.

Key Communication Messages

- Four key messages are conveyed to the public:
  - This detection does not signal the start of a human flu pandemic.
  - We are responding quickly and decisively to eradicate the virus.
  - Properly prepared eggs and poultry are safe to eat.
  - We are safeguarding the food supply.
- An additional key message is conveyed to producers:
  - Protect your flocks with good biosecurity practices and be vigilant in reporting signs of illness.

Health and Safety and Personal Protective Equipment

- During an HPAI outbreak, responders are exposed to many hazards.
- There have been no documented human infections with the field strain of the three recent HPAI outbreaks; all strains of HPAI should be treated as potentially zoonotic.
- Personal protective equipment (PPE) is fundamental in ensuring personnel are protected from HPAI, as well as other hazards.

Biosecurity

- An HPAI outbreak will have a serious impact on the agricultural industry and could also impact public health.
- Strict biosecurity measures need to be implemented immediately (and ideally before an outbreak) to prevent or slow the spread of HPAI.
- Biosecurity procedures should be implemented within 24 hours of the identification of an index HPAI case.
- In the 2014–2015 HPAI outbreak in the United States, biosecurity breaches and inadequately implemented biosecurity measures were cited as one of multiple potential reasons for widespread HPAI transmission in the Midwest.
- Biosecurity is of utmost importance in controlling and containing the virus.

Biosecurity

Hazards and Risk Mitigations

Biosecurity Hazards	Biosecurity Measures to Mitigate Risk
• Movement of poultry, other livestock, vehicles, equipment, and people. • Contaminated feed and water. • Contact with poultry and other HPAI-susceptible animals.	• Clean and disinfect premises, vehicles, and equipment, and dispose of materials that cannot be disinfected in an appropriate manner. • Account for the movement of all poultry, livestock, and equipment for accurate records. • Provide a location for all individuals to carry out appropriate cleaning and disinfection procedures and insist these measures be followed. • Ensure that housed poultry remain housed and that entry of rodents, ground water, and wild birds is prevented. • Prevent close or direct contact between poultry and other species reared outside.

Biosecurity
Closed Flocks

- To the fullest extent possible, close the flock or herd to the introduction of new poultry and other livestock (with population increases occurring only from offspring).
- If closing a flock is not possible, isolate newly introduced poultry (from the healthiest possible sources) and those returning from existing flocks or herds for 30 days or more.
- Vaccination status of introduced poultry should be known and well-documented.

Quarantine and Movement Control

- By restricting the movement of infected animals, animal products, and contaminated fomites, quarantine and movement control can be a powerful tool in controlling and eradicating an HPAI outbreak.
- Movement control is accomplished through a permit system that allows entities to make necessary movements without creating an unacceptable risk of disease spread.
  - EMRS2 is the system of record for permitted movements into, within, and out of a Control Area.

Quarantine and Movement Control

- The document *Permitted Movement* (FAD PReP Manual 6-0) provides comprehensive information on permits, permitted movements, roles and responsibilities for permitted movement with regard to a Control Area.
- It also provides information about EMRS2, in relation to permitting, and a detailed review of the permitting process.

Inactivation of AI in Eggs, Egg Products, and Meat

Inactivation in Eggs & Egg Products*

	Temperature (°C)	Time
Whole egg	60.0	188 seconds
Whole egg blends	60.0	188 seconds
Whole egg blends	61.1	94 seconds
Liquid egg white	55.6	870 seconds
Liquid egg white	56.7	232 seconds
10% salted yolk	62.2	138 seconds
Dried egg white	67.0	20 hours
Dried egg white	54.4	513 hours

Inactivation in Meat*

	Temperature (°C)	Time
Poultry meat	60.0	507 seconds
	65.0	42 seconds
	70.0	3.5 seconds
	73.9	0.51 seconds

- The listed temperatures are indicative of a range that achieves a 7-log kill. Where scientifically documented, variances from these times and temperatures may also be suitable when they achieve inactivation of the virus.

*Source: *OIE Terrestrial Animal Health Code*, 2016.

Continuity of Business

- Secure Food Supply Plan recommendations facilitate specific types of movement during an outbreak.
- Typically, depending on the movement, 2 negative rRT-PCR tests may be required, with one within 24 hours of movement.
- EMRS2 is used to document these permits and permitted movements.
- Continuity of business requires collaboration between States (both sending and receiving product), the Unified Incident Command, and APHIS.

Mass Depopulation and Euthanasia

- Due to the risk of virus amplification in infected poultry, authorized depopulation activities should be completed as quickly as possible; the goal is within 24 hours.
  - Infected poultry shed large amounts of HPAI virus, making control and eradication of HPAI more difficult and increasing the potential for environmental contamination.
- Carbon dioxide and water-based foam concentrate have most commonly been used to depopulate poultry flocks.
  - However, to meet the goal of depopulation within 24 hours and halt virus production, alternative methods may also be considered by State and APHIS officials.

Disposal

- Appropriate disposal of animal carcasses and materials is a critical component of a successful HPAI response.
- Disposal must occur in a biosecure way that does not allow HPAI to spread and minimizes environmental impact.
- All applicable regulations (Federal, State, local) must be observed or memorandums of understanding must be obtained.
- Composting and disposal by managed landfill are two methods that address the need to minimize negative environmental impact while also mitigating virus spread.

Gary Flory

Cleaning and Disinfection

- Cleaning and disinfection practices during an outbreak should **focus on virus elimination in a cost effective manner**.
- While traditionally wet cleaning and disinfection have been performed in many incidents, dry cleaning and subsequent heating of the affected facility may be another cost effective method to ensure elimination of the virus.

J. Zurn

Vaccination

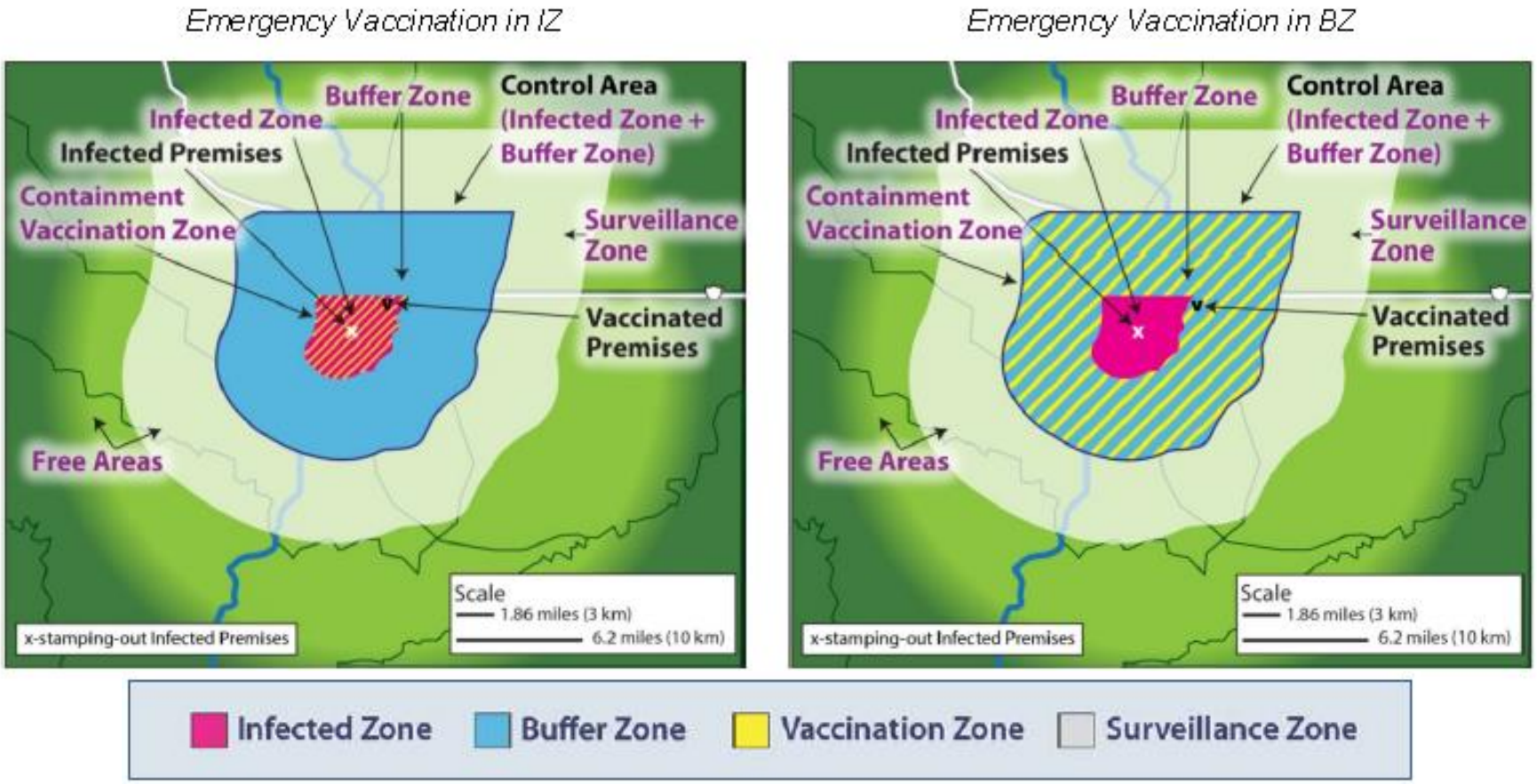
- Although stamping-out is the preferred and primary strategy for controlling and eradicating HPAI in the event of an outbreak, emergency vaccination may be considered in specific circumstances.
- There are two distinct purposes of emergency vaccination:
  - Emergency vaccination to kill.
  - Emergency vaccination to live.

Deciding to Vaccinate for HPAI

The decision for emergency vaccination will be based on:

- Probability that the disease can or cannot be rapidly contained;
- Proximity of high-value genetic birds to the rapidly spreading disease focal point;
- Risk of infection of valuable, rare, or endangered nondomestic species;
- Poultry density in an area;
- Impact on international trade;
- Increased risk of introduction due to the presence of HPAI in neighboring countries;
- Availability of physical and human resources;
- The extent to which disease is found in waterfowl, other wild birds, backyard flocks, or in live bird markets;
- Sociopolitical factors (public confidence in commercial poultry products);
- Acceptance of industry stakeholders;
- Potential risk of zoonotic infection of the public from exhibition birds; and
- Economic consequences of failure to control the disease.

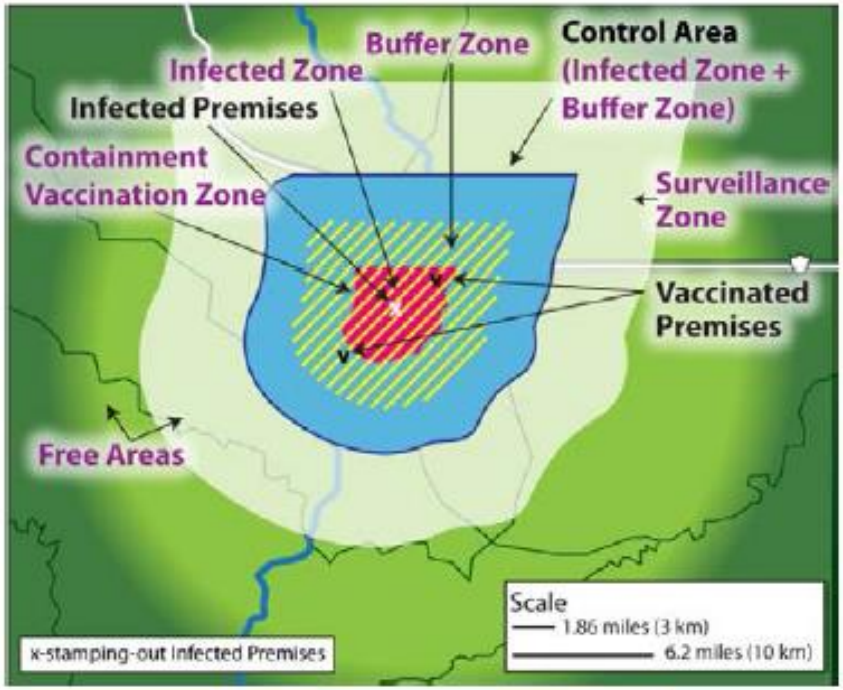
Examples of Containment Vaccination Zones



Examples of Containment Vaccination Zones, continued

Emergency Vaccination in CA

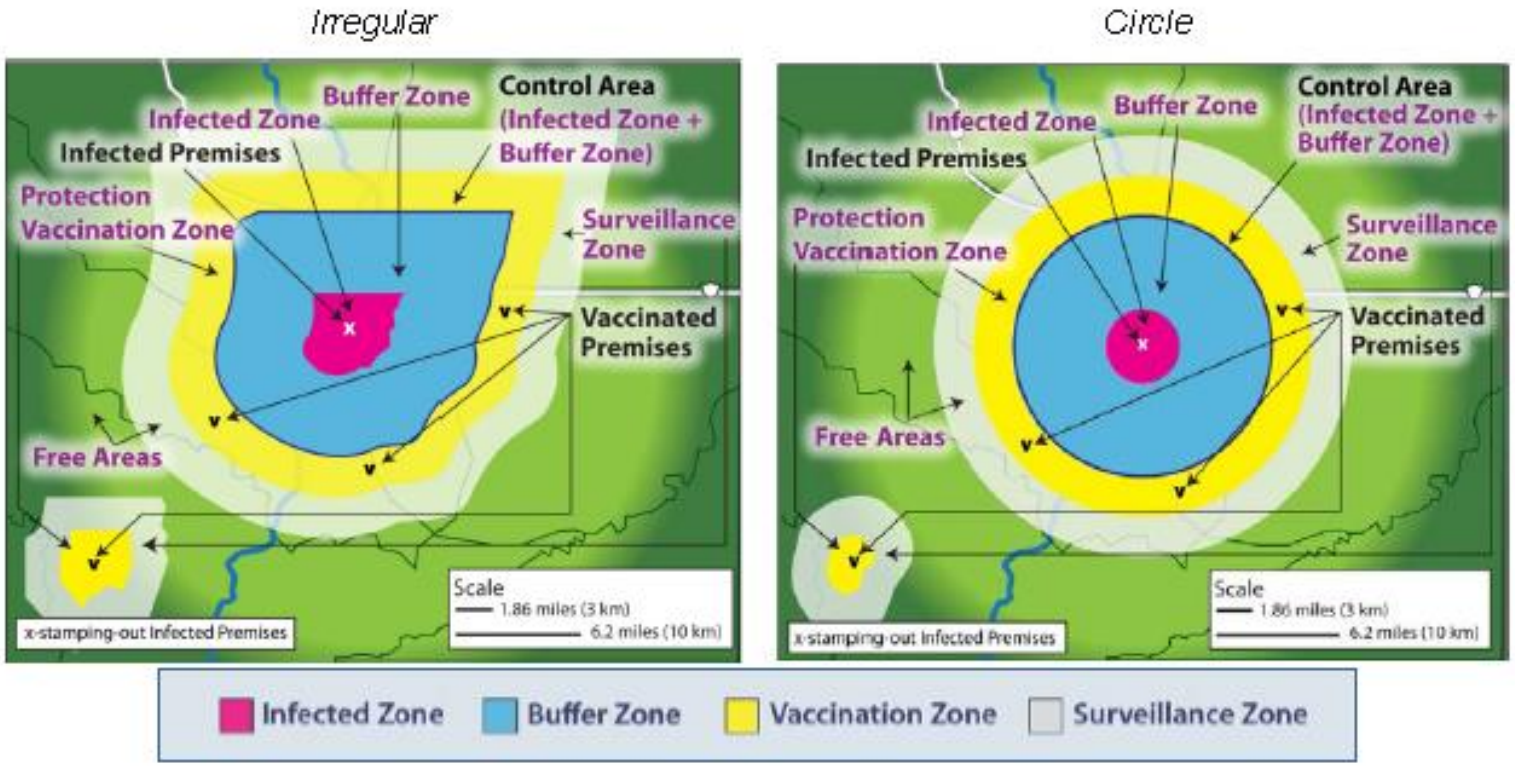
Emergency Vaccination in IZ and Partial BZ



Infected Zone | Buffer Zone | Vaccination Zone | Surveillance Zone

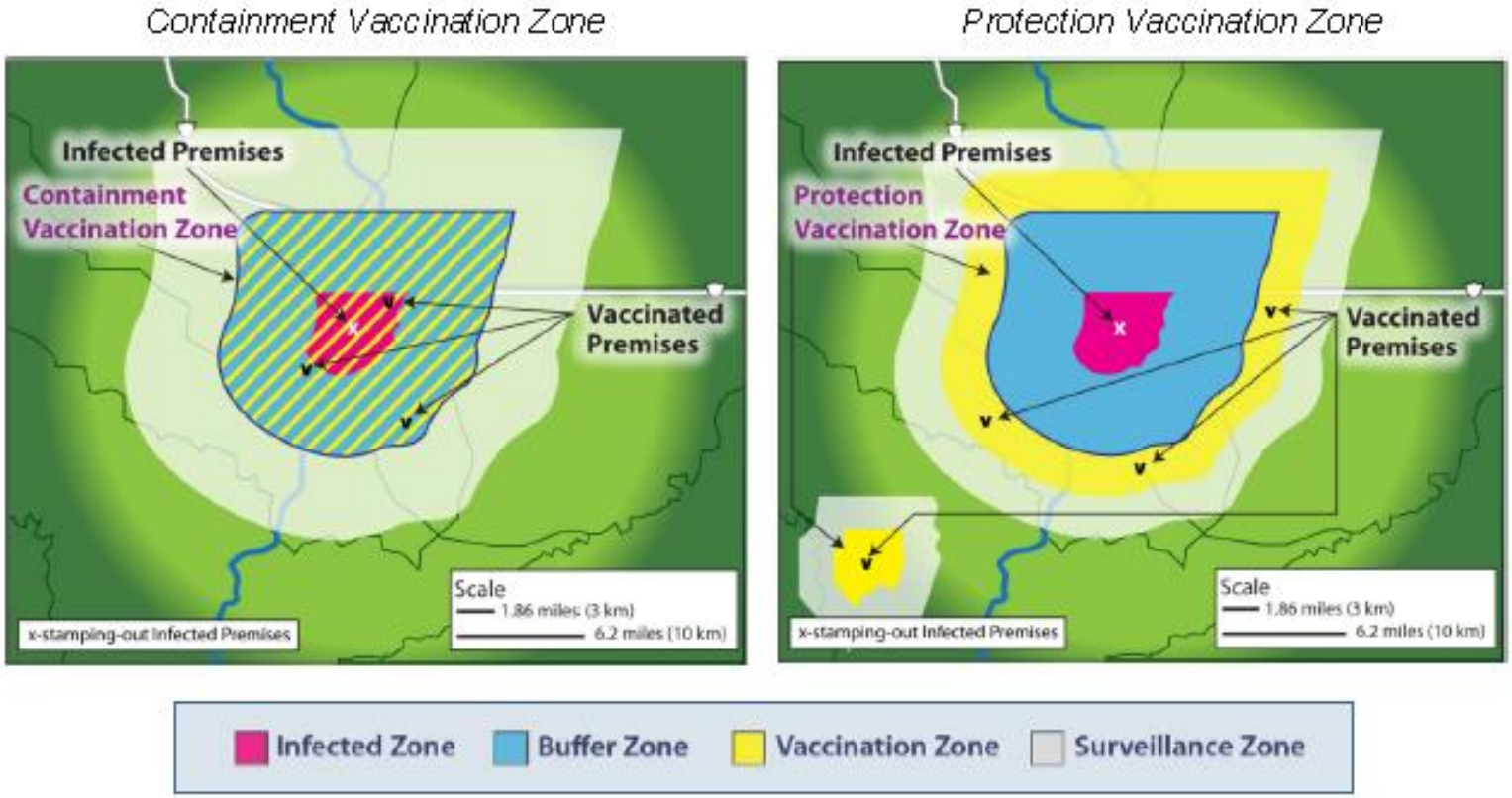
Examples of Protection Vaccination Zones

The PVZ is an emergency vaccination zone outside the CA. Typically, a PVZ is observed with stamping-out modified with emergency vaccination to live.



Examples of Vaccinated Premises

VP is typically a secondary designation to another premises designation and is only used if vaccination is employed in an outbreak.



Logistics

- Getting resources and personnel where and when they are needed is a critical activity that grows in complexity based on the size and scope of the HPAI response operation.
- The Surveillance, Preparedness and Response Services (SPRS) Logistics Center (which includes the NVS) works with the NIMTs through the ICG to coordinate APHIS resources and resources contracted by APHIS (both personnel and equipment) for field operations.
- Personnel can be on-site in 24 hours and ramped up quickly. However, in a widespread outbreak, personnel shortages can still occur.

Wildlife Management and Vector Control

- Wildlife surveillance and management must be conducted by persons trained and proficient in wildlife health, capture, collection, biosecurity, and restraint.
- HPAI can be transmitted mechanically by mice, vultures, and other vectors.
- Appropriate biosecurity measures should be in place during an HPAI outbreak to ensure that mechanical vectors do not have contact with infected flocks or other infected material.

Appraisal and Compensation

- The best practices to contain and eradicate HPAI virus by "stamping-out" within 24 hours of detection will require rapid depopulation, appraisal, and indemnity procedures.
- State and APHIS officials must approve depopulation prior to the depopulation of any birds and eggs. This will require rapid communication between producer, company, State officials, APHIS, and laboratory officials.
- These appraisal and indemnity procedures apply to both the first detection of HPAI in a State and subsequent HPAI detections in a State.

Finance

- During an HPAI outbreak, funding may be rapidly required. For responding to specific emergency situations, VS has access to a variety of sources for funding. The two most common sources are the APHIS Contingency Fund (CF) and the Commodity Credit Corporation (CCC).
- For funds in excess of $1 million, CCC funding is typically requested. During an emergency, the Secretary is authorized to transfer funds from the CCC.

HPAI RESPONSE PLAN

Recovery after an Outbreak

Surveillance for Recognition of Disease Freedom (DF)

- Surveillance is fundamental in proving DF to regain disease-free status after an HPAI outbreak.
- According to the OIE, a country re-declaring for country, zone, or compartment freedom from HPAI virus should show evidence of an active surveillance program, considering the epidemiological circumstances of the outbreak to demonstrate absence from infection.

Release of Quarantine and Movement Control

- The specifics of CA release will be indicated by the epidemiology of the outbreak, however, the following conditions must be met:
  - The last IP in the CA has been depopulated.
  - Disposal has been completed (in the case of composting, the compost pile must be set).
  - Surveillance tests indicate no HPAI infection in the CA.
  - Surveillance requirements for international or bilateral trade are being conducted and will continue to be conducted (based on the density of poultry, epidemiological information, species, and commodity).

Restocking

- The total time in which it takes a premises to go from an IP with sick birds to a restocked premises will vary based on the type of premises, epidemiology of the outbreak, location of other HPAI IP, evidence provided to State and APHIS officials, and method of disposal.
- Restocking can take place before the end of the outbreak, under conditions established by the IC.

Environmental Sampling

- Environmental sampling will be required of the premises prior to restocking activities.
- It typically occurs during the 21 day fallow (vacant) period.
- Personnel taking environment samples should continue to follow biosecurity and PPE procedures as indicated by the IC.
  - In the event that houses are left vacant for an extended period (60 day or more), the IC may decide environmental sampling is not necessary, depending on ambient temperature, outbreak epidemiology, and other factors.

Approved Sources of Poultry

- Source flocks for all introduced poultry must test negative through rRT-PCR and other diagnostics, as determined by IC:
  - Usually 2 negative rRT-PCR tests are required at least 24 hours apart, with one test within 24 hours of movement.
- A 24-hour pre-movement clinical inspection is also required.
- Birds placed into previously infected houses or premises may be subjected to further diagnostic testing at the discretion of State and/or APHIS officials.

Supplementary Information

Lessons Learned from Past Outbreaks

- Achieving rapid FAD detection and tracing.
- Providing processes for emergency planning that respect local knowledge.
- Integrating State-Federal-Tribal-industry planning processes.
- Ensuring that there are clearly defined, obtainable, and unified goals for response.
- Having a Unified Incident Command with a proper delegation of authority that is able to act with speed and certainty.
- Employing science- and risk-based management approaches to FAD response.
- Ensuring that all guidelines, strategies, and procedures are communicated effectively to responders and stakeholders.
- Identifying resources and trained personnel required for an effective incident response.

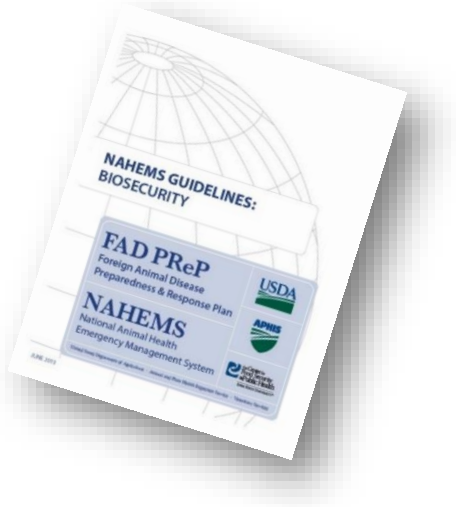
Supporting FAD PReP Materials

Strategic Plans-Concept of Operations Documents

- *APHIS Foreign Animal Disease Framework: Roles and Coordination* (FAD PReP Manual 1-0)
- *APHIS Foreign Animal Disease Framework: Response Strategies* (FAD PReP Manual 2-0)
- *APHIS FAD Investigation Manual* (FAD PReP Manual 4-0)
- *Permitted Movement* (FAD PReP Manual 6-0)

Other FAD PReP Supporting Materials

- National Animal Health Emergency Management System (NAHEMS) Guidelines
- Industry Manuals
- Disease Response Plans
- Standard Operating Procedures (SOPs) for Critical Activities
- Continuity of Business Plans
- Ready Reference Guides



Websites

- APHIS FAD PReP website
  http://www.aphis.usda.gov/fadprep
- FAD PReP HPAI Page (Response and Policy Information)
  https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/emergency-management/fadprep-hpai
- Secure Poultry Supply Plan
  www.securepoultrysupply.com

Key Abbreviations

AI	avian influenza
FAD	foreign animal disease
FAD PReP	Foreign Animal Disease Preparedness and Response Plan
H or HA	hemagglutinin
HPAI	highly pathogenic avian influenza
LPAI	low pathogenic avian influenza
N or NA	neuraminidase
NIMS	National Incident Management System
NRF	National Response Framework
NVS	National Veterinary Stockpile
NVSL	National Veterinary Services Laboratories
OIE	World Organization for Animal Health
PPE	personal protective equipment
VS	Veterinary Services
WHO	World Health Organization