

Final Report for the 2014–2015 Outbreak of Highly Pathogenic Avian Influenza (HPAI) in the United States

Revised August 11, 2016



USDA Animal and Plant Health Inspection Service
Veterinary Services
National Preparedness and Incident Coordination

Nature of Disease

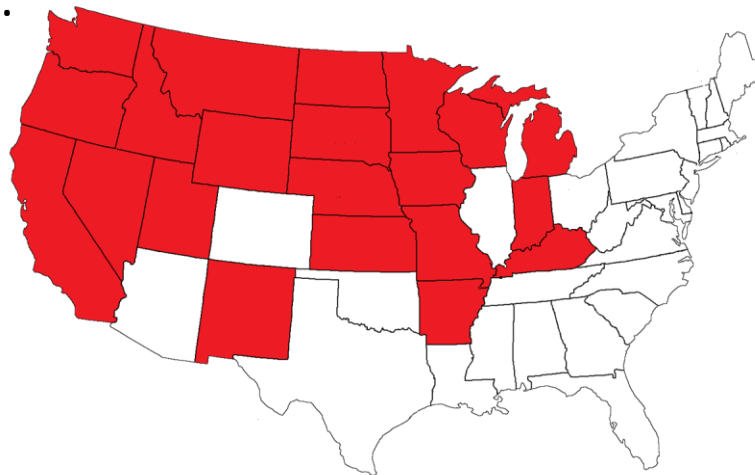
- Avian influenza (AI) is a viral respiratory disease that infects all avian species.
 - AI is a common disease, but it frequently changes.
- Based on the severity of illness, the disease is classified as either HPAI or low pathogenicity avian influenza (LPAI).
- AI viruses are named by two groups of proteins:
 - hemagglutinin ([HA] ranging from H1–H17), and
 - neuraminidase (ranging from N1–N9), e.g., H5N2 or H5N8.

Incident Overview

- **December 11, 2014–January 16, 2015:** USDA received a total of 7 reports of HPAI H5N2 or H5N8 in captive wild birds and backyard flocks from the northwestern United States.
 - First HPAI detection in 10 years.
 - Additional detections occurred in wild birds.
- **January 23, 2015:** 1st infected commercial flock identified in CA.
- **January–March 2015:** HPAI spread slowly to multiple states.
 - MN, MO, AR, and KS.
- **April:** Significant increase in HPAI H5N2 in turkey flocks occurred through early April in MN, followed by a rapid increase in IA in late April and May where large numbers of chicken layer flocks were affected.
- **June 16, 2015:** Last case of HPAI confirmed in the United States (commercial flock).

Numbers Overview

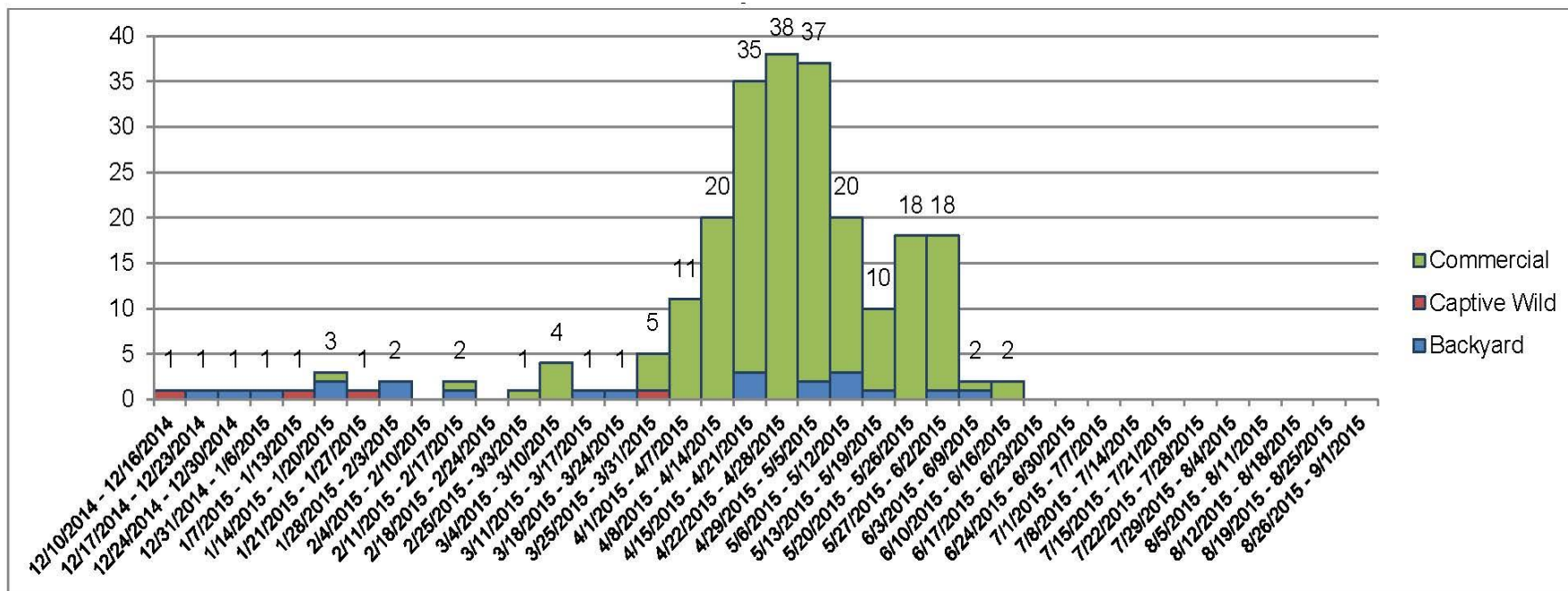
- **211** detections on commercial operations and **21** detections on backyard premises
 - Includes premises designated as a Dangerous Contact (DC) Premises.
- Approximately 7.4 million turkeys and 43 million egg-layers and pullet chickens were affected by HPAI and died from the disease or were depopulated.
- This outbreak was the largest HPAI outbreak ever recorded in the United States and arguably the most significant animal health event in U.S. history.
- HPAI was detected in 21 States (includes all HPAI detections in any bird type, including wild birds).



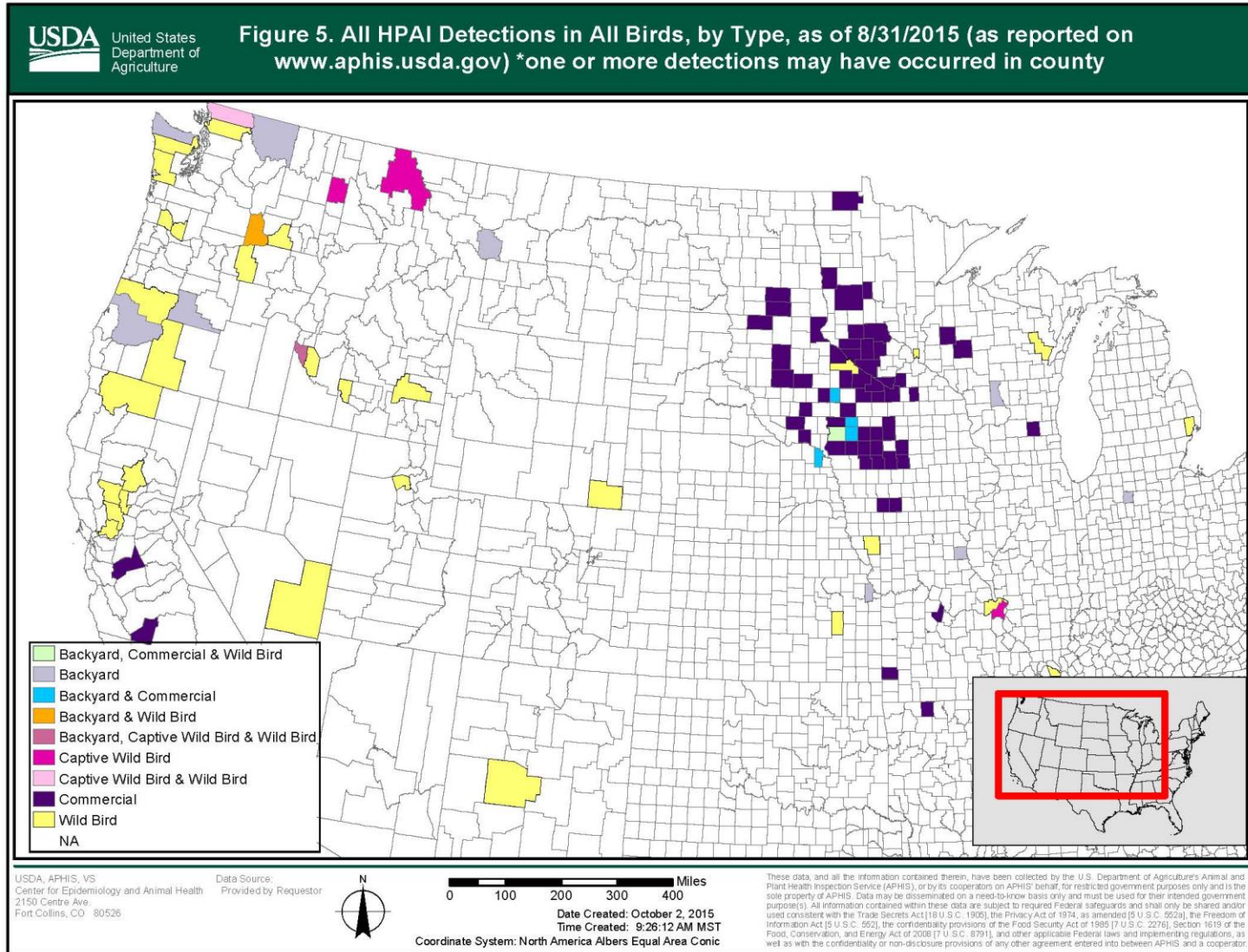
Summary of H5 Positive Detections by State

State	Total Commercial H5 Positive HPAI Premises	Species			Total Backyard H5 Positive HPAI Premises	Total by State
		Turkey	Chicken-Layer	Other		
Minnesota	109	104	5	0	1	110
Iowa	71	35	36	0	6	77
South Dakota	10	9	1	0	0	10
Wisconsin	9	6	3	0	1	10
Nebraska	5	0	5	0	1	6
California	2	1	0	1	0	2
Missouri	2	2	0	0	1	3
North Dakota	2	2	0	0	0	2
Arkansas	1	1	0	0	0	1
Kansas	0	0	0	0	1	1
Washington	0	0	0	0	5	5
Oregon	0	0	0	0	2	2
Montana	0	0	0	0	1	1
Idaho	0	0	0	0	1	1
Indiana	0	0	0	0	1	1
Total	211	160	50	1	21	232

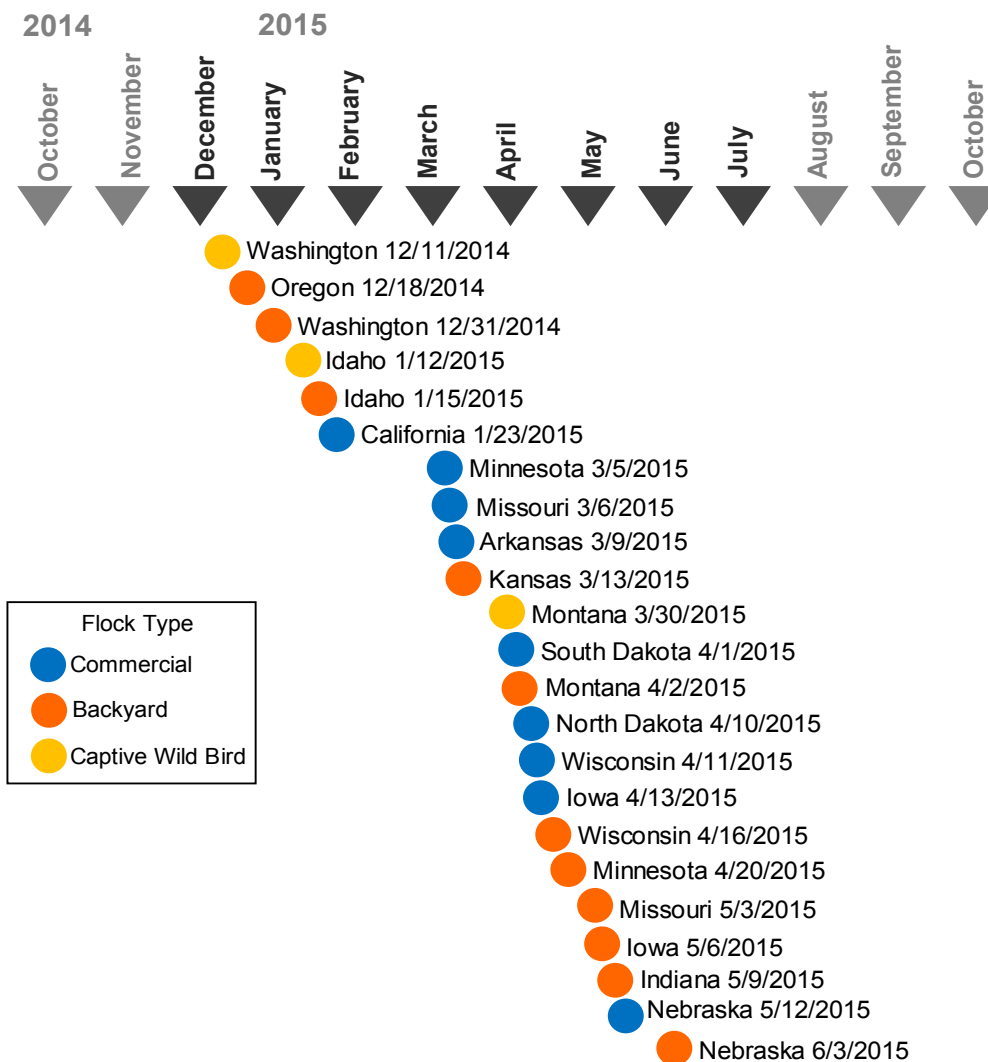
Total Incidence of HPAI in the United States by Week



HPAI Detections in the United States



First Detection by Flock Type in each State by National Veterinary Services Laboratories Confirmation Date



Approximate Percentage of U.S. Poultry Affected

The losses in commercial inventories for layer chickens, pullets, and turkeys were substantial. This was the most significant HPAI outbreak in U.S. history.

Flock Type ^a	Percent Losses
Layer Chickens ^b	10.01% avg. U.S. inventory
Pullet Chickens	6.33% avg. U.S. inventory
Broiler Chickens	<0.01% avg. U.S. inventory
Turkeys	3.16% annual production; 7.46% avg. U.S. inventory

^a Flocks identified as “mixed poultry” were not included in bird counts.

^b This includes flocks that were identified as “chickens” and or “layer breeder.”

Transmission

- Sharing equipment between farms, entry of wild birds into barns, and farm workers/visitors all likely contributed to virus spread.
 - Other possible pathways included short-distance aerosol spread, carcass disposal techniques, and other biosecurity breaches.
- Results indicated that HPAI can be aerosolized from infected flocks.
 - While possible that aerosol transmission was responsible for disease spread, the USDA APHIS Epidemiological Analysis was “not able to determine with certainty whether aerosol transmission was responsible for a farm becoming infected.”

USDA APHIS CEAH. (2015). *Epidemiologic and Other Analyses of HPAI-Affected Poultry Flocks: September 9, 2015* available at https://www.aphis.usda.gov/animal_health/animal_dis_spec/poultry/downloads/Epidemiologic-Analysis-Sept-2015.pdf.

Organizational Response

- **December 2014:** APHIS National Incident Coordination Group (ICG) was established and VS personnel deployed to the first HPAI case.
- **December 2014 to August 2015:** VS National Incident Management Teams (NIMTs) deployed.
 - Outbreak resulted in a new VS NIMT—Indigo.
- **April 2015:** The ICG was scaled up significantly to reflect the increasing number of detections and broadening response requirements.
- **June 2015:** An APHIS HPAI Multiagency Coordination (MAC) Group was formally established to coordinate resources across the agency.
- Over the course of the outbreak, there were over 1,200 deployments by APHIS personnel.
 - APHIS was on Mobility Level 2; VS initiated mandatory deployments.
 - The number of APHIS responders and contractors continued to increase as the outbreak grew.
 - There were deployments from all APHIS programs.

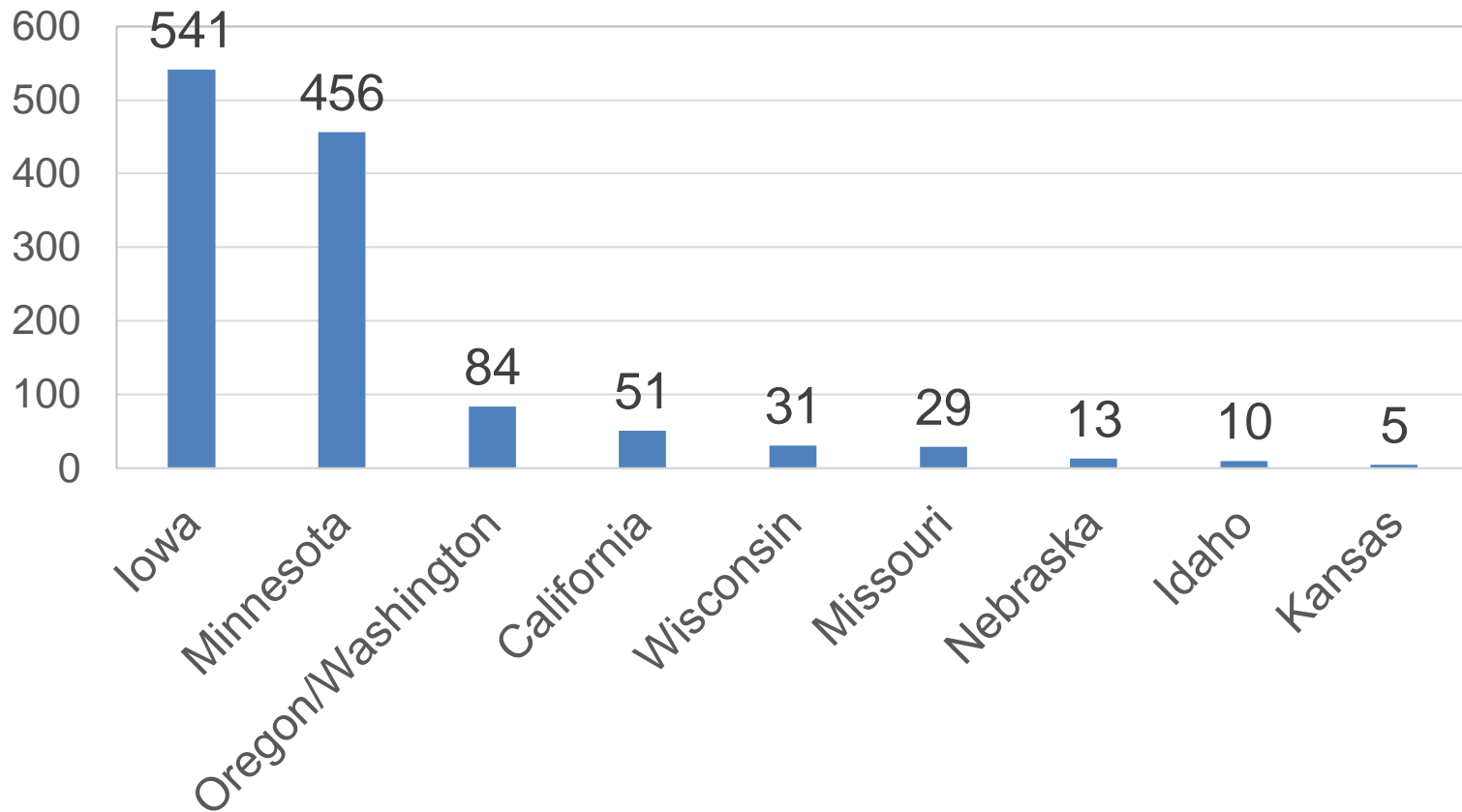
Incident Management Structures and Key Events during the 2014–2015 Outbreak

December 2014	January 2015	February 2015	March 2015	April 2015	May 2015	June 2015
<p>Dec 14 HPAI first detected in the United States</p> <p>Dec 19 - First backyard flock tests positive for HPAI - National ICG established</p> <p>Dec 24 First personnel deployed to the field</p>	<p><i>APHIS Leadership engaged for resource coordination</i></p> <p>Jan 23 HPAI confirmed in a commercial flock in California</p>		<p>March 5 First detection in Minnesota</p>	<p>Apr 13 First detection in Iowa</p> <p>Apr 22–28 Week with the most new cases (38)</p>	<p><i>Green IMT split into 2 teams</i></p>	<p><i>Blue IMT split into 2 teams</i></p> <p>Jun 17 Last HPAI-confirmed premises</p> <p>Jun 23 APHIS MAC Group formally established</p>

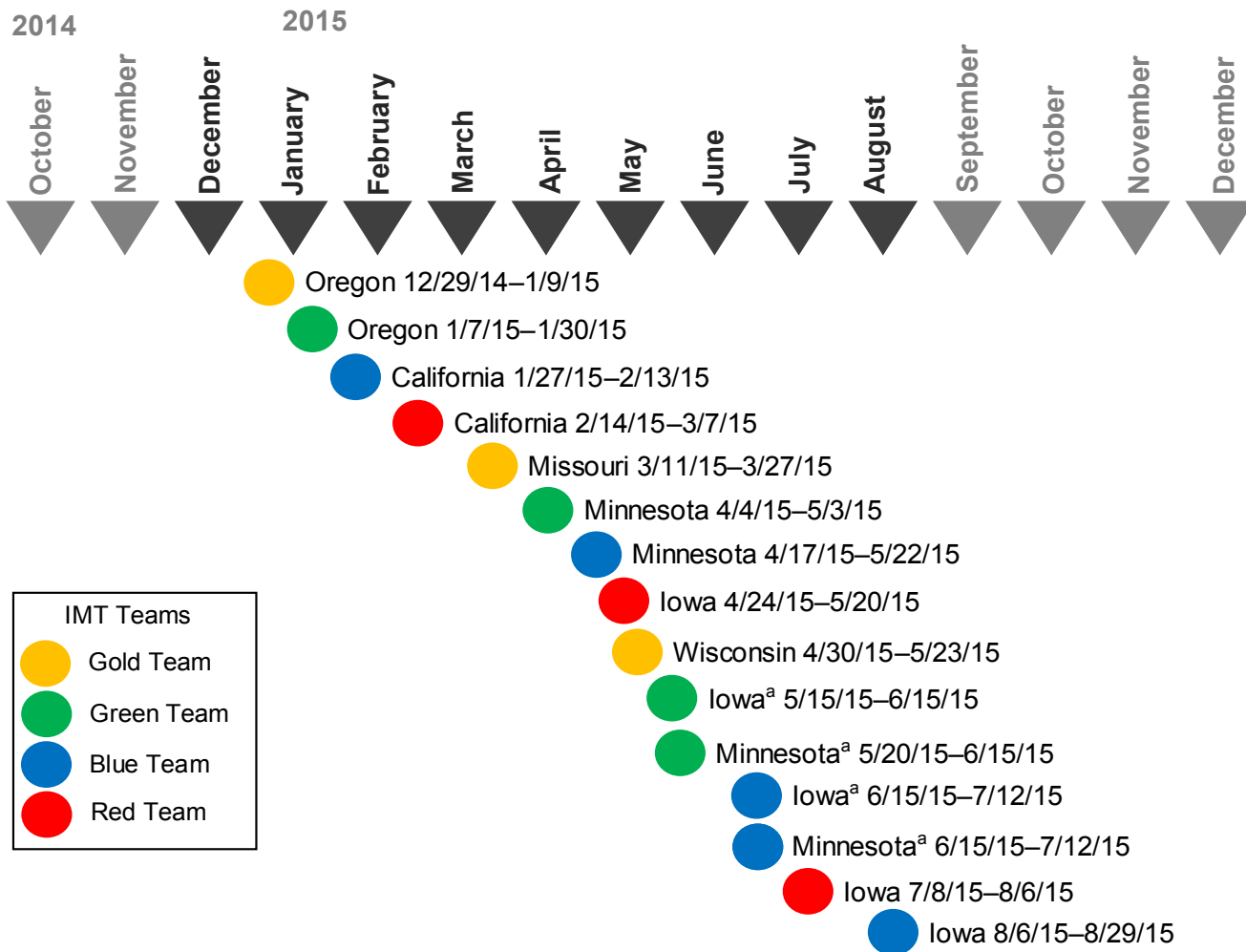
Personnel

- At the height of response operations in June 2015, more than 3,400 personnel were deployed:
 - About 250 APHIS personnel, 180 State responders, and over 3,000 support contractors.
- Over the course of the entire outbreak, there were 1,220 deployments by APHIS personnel, with 773 total individuals deployed.
 - After training, 69 National Animal Health Response Corps (NAHERC) members deployed during the outbreak.
- Many APHIS personnel deployed twice, and some deployed 3–4 times.
- ~300 additional employees worked virtually or at an APHIS headquarters location as part of the ICG.

Total Number of APHIS Personnel Deployed by State of Incident



APHIS VS National Incident Management Team Rotation



IMT Teams

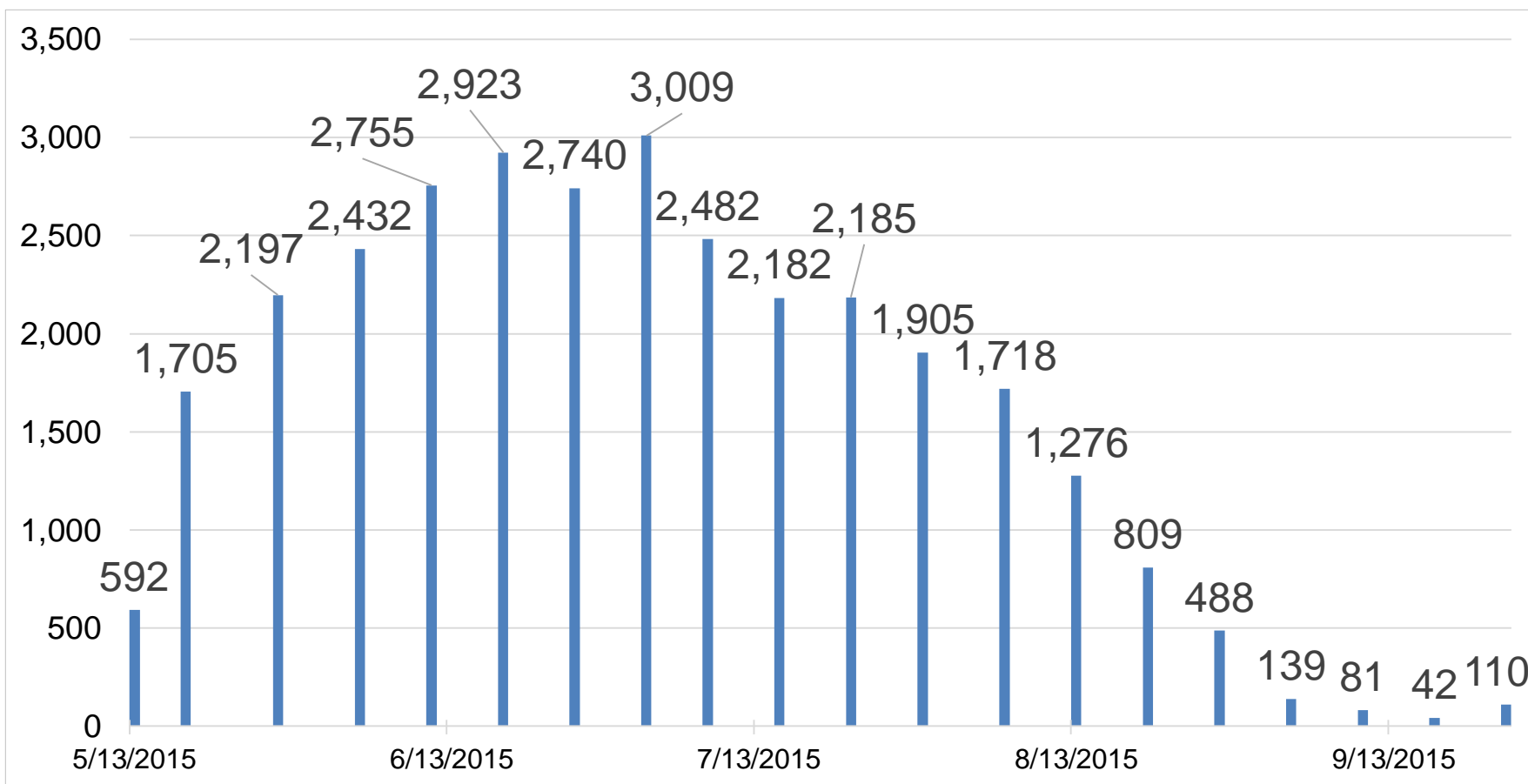
- Gold Team
- Green Team
- Blue Team
- Red Team

^a Teams split and augmented with contractors due to the scope of the incident.

Contractors

- The response to the outbreak quickly outpaced available resources once the outbreak accelerated in the Midwest, both at the ICG and NIMT levels.
- Contractors augmented both ICG and field responses.
 - USDA APHIS contracted with a number of companies, large and small, to effectively execute response operations.
 - Contractors worked in the field not only to provide services and materials related to depopulation, disposal, and disinfection, but to provide premises physical security services, credentialing assistance, and equipment rentals.
 - More than 90 companies, individuals, and organizations were contracted to complete response operations successfully.

Number of Contractors Deployed during Outbreak



Logistics Overview

- The SPRS Logistics Center and the NVS led logistics for the 2014–2015 HPAI outbreak at the ICG-level, and also deployed personnel to support the APHIS VS NIMTs as required by the incident.
- The SPRS Logistics Center and NVS were responsible for contracting support for response activities.
 - Contractor support peaked in June, when over 3,000 personnel in the field were responding to the incident.
- First activated on December 19, 2014, the NVS had over 2,700 requests for supplies through June 2015.
 - At a cost of over \$2.9 million.
 - Transportation costs, including for extraordinary rapid transit of diagnostic samples, totaled approximately \$350,000.

Overview of Response Activities

- Depopulation, disposal, and virus elimination activities all posed significant challenges due to the number of affected premises and birds.
 - Foaming was the most common method of depopulation for turkeys; CO2 in chicken layers.
 - Composting was the most common method of disposal.
 - Wet disinfectant was the most common mode of virus elimination.
- On average, it took commercial premises about 111 days from NVSL disease confirmation to get restock approval.
 - Average of 104 days from completion of depopulation to restock approval.



Surveillance and Diagnostics Summary

- In total, 16 National Animal Health Laboratory Network (NAHLN) laboratories, in addition to NVSL, were involved in testing to support HPAI response for either commercial, backyard, or wild bird surveillance.

Domestic Bird Testing (Commercial and Backyard)	Matrix PCR [polymerase chain reaction] Tested	H5 PCR Tested	H7 PCR Tested	Virus Isolation Tested	Total Tests
14 NAHLN Labs	72,314	2,772	2,675	1,366	79,127
NVSL	2,825	4,688	1,149	1,105	9,767
Total	75,139	7,460	3,824	2,471	88,894
Wild Bird Testing	Matrix PCR [polymerase chain reaction] Tested	H5 PCR Tested	H7 PCR Tested	Virus Isolation Tested	Total Tests
9 NAHLN Labs	42,259	6,234	6,138	0	54,631
NVSL	252	1,407	650	797	3,106
Total	42,511	7,641	6,788	797	57,737

Table courtesy of VS NAHLN Coordinator

Appraisal and Compensation Summary

- In total, 232 appraisals and 44 trace outs were completed, with approximately \$200 million paid for indemnity.
- Indemnity processes were cumbersome and led to delays.
 - New indemnity processes have been streamlined and simplified.
- Cooperative Compliance Agreements were used as the mechanism to compensate producers for work they performed on their premises—such as disposal and virus elimination procedures.
 - Lessons learned from this experience resulted in new appraisal and compensation processes, that eliminated the use of these agreements.

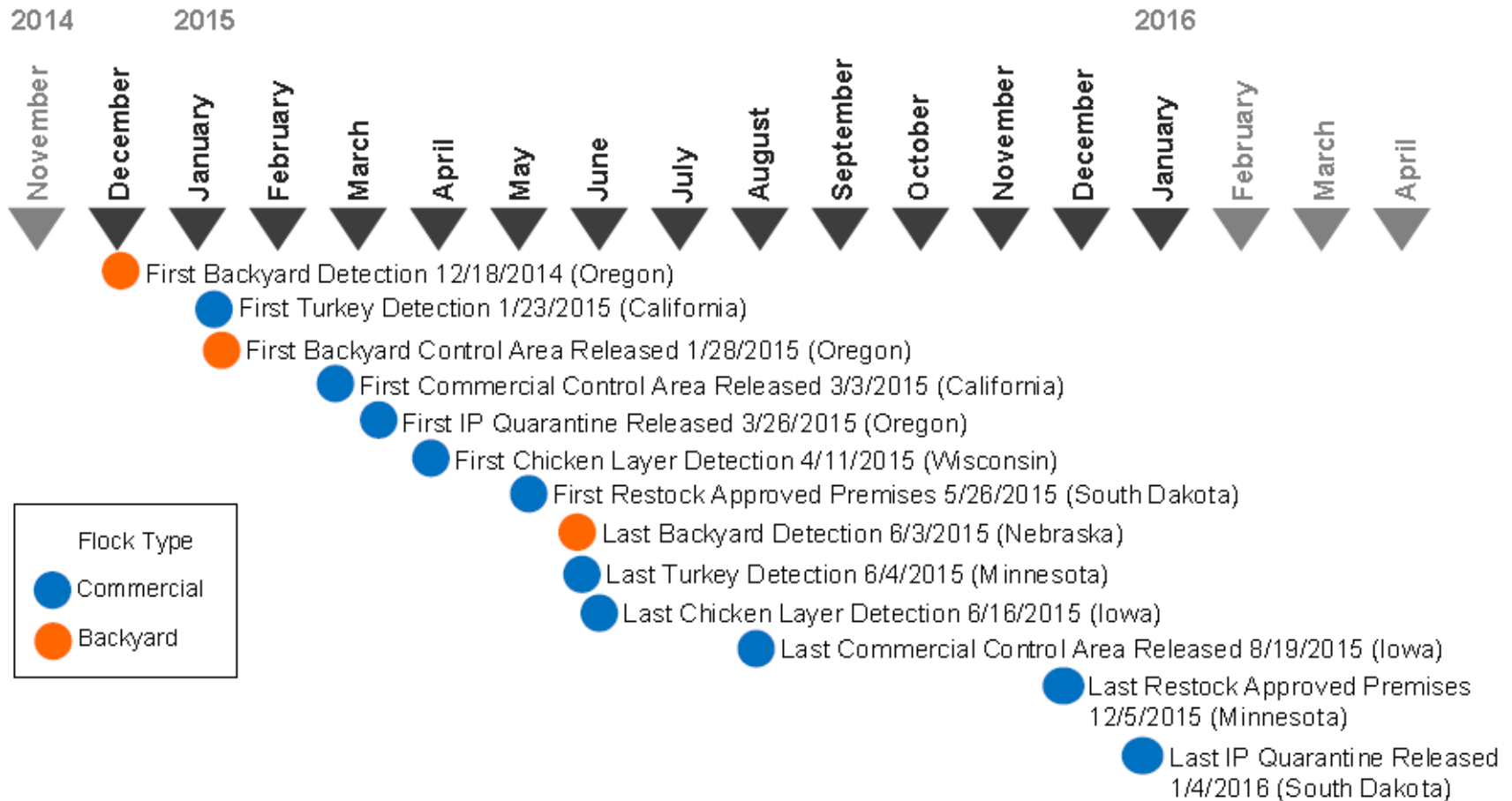
Permit and Movement Summary

- Permits issued for movements into, within, and out of regulatory Control Areas for many different items (e.g., eggs, feed, carcasses, etc.).
- Over 7,500 permits were issued (not including any revoked permits).
 - Most from Minnesota (36%) and Iowa (52%).
- Over 20,000 movements occurred.
 - Many were for continuity of business movements, based on the Secure Food Supply Plans.
- Required rapid permitting and data entry; National Permitting Unit was established to support permitting processes.
- EMRS was successfully used to issue and record these permits.

End of Outbreak and Cost

- Although the outbreak ended in mid-June 2015, many response operations (e.g., cleaning and disinfection, environmental sampling, and restocking) continued throughout the fall.
- As of November 18, 2015, the United States sent a final report to the World Organization for Animal Health (the OIE).
 - At that time, the 2014–2015 outbreak in the United States was considered closed.
- Extensive planning and preparation efforts continued for the possible reemergence of HPAI in the fall of 2015 and spring of 2016.
- APHIS obligated nearly \$850 million to respond to the 2014–2015 HPAI outbreak.
- Further funds were spent on preparedness activities.
- **It was the most expensive animal health incident recorded in U.S. history.**

Summary of Key Events during the 2014–2015 HPAI Outbreak



Economic and Trade Impact

- Estimates suggest the 2014–2015 HPAI incident resulted in approximately \$1.6 billion in direct losses from turkeys and egg-laying hens that had to be euthanized.
- When accounting for factors like restocking and lost future production, the impact to the U.S. economy is thought to be closer to \$3.3 billion.
- As a result, consumers experienced wholesale egg prices reaching nearly \$2.80 per dozen, more than doubling the previous 3-year average cost of large eggs.
 - Prices continually decreased throughout the remainder of 2015, but costs sustained above the 3-year average.

Key Lessons Learned

- Depopulation needed to occur more rapidly to stop the amplification of virus and ongoing HPAI transmission.
- Financial processes were cumbersome and time consuming.
- Biosecurity measures must be improved on premises to not only stop HPAI transmission during an outbreak, but prevent HPAI introductions into commercial poultry flocks.



Policy Updates

- Policy guidance documents on issues like ventilation shutdown, heat treatment for virus elimination, and financial processes were developed and released to address the issues that occurred during the response to the incident.
- New biosecurity guidance was developed collaboratively by the industry, State, and Federal officials for implementation by producers.
- These documents are available at www.aphis.usda.gov/fadprep.

List of Policies & Guidance

For example, the following policies and guidance were provided during the 2014–2015 HPAI outbreak (in alphabetical order):

- Control Area Release
- Financing the Response: State/Tribal Information
- General Resources and Information
- H5/H7 Avian Influenza Case Definition
- HPAI in the Live Bird Marketing System
- HPAI Response Goals
- HPAI Zones and Premises
- Indemnity Procedures
- Landfill Disposal Guidance—Recommended Waste Acceptance Practices for Landfills
- Mortality Composting Protocol for AI Infected Flocks
- New State Checklist
- Post C&D Environmental Sampling Guide
- PPE Recommendations for HPAI Responders
- Processing Indemnity Payments
- Restocking Criteria for Previously Infected Premises
- Stamping Out and Depopulation Policy
- Surveillance Activities around HPAI Infected Backyard Flocks
- Surveillance Sampling for Commercial Premises in Control Area
- Testing Requirements for Movement from the Control Area
- Timeline to Restocking and Environmental Sampling Procedures
- Use of the Antigen Capture Immunoassay
- Using Heat Treatment for Virus Elimination
- Ventilation Shutdown Evidence and Policy.