USDA

United States Department of Agriculture

HPAI 2015 Fall Planning Map Book

September 17, 2015

Map Planning Products

Flyway Maps

Maps were developed showing poultry inventory and farms or operations at a county-scale level. In addition, maps developed show disposal resources of landfills, renderers, and incinerators (see **Map Book #1. Flyway disposal resource maps** at the end of this section).

The four major migratory flyways—divided into an upper and lower section—allow for easier interpretation of results. Three maps show National Agricultural Statistics Service (NASS) commodities and include layers, broilers, and turkeys (**Map Book #2. Flyway commodity maps**). Overview national-scale maps for each commodity were also developed (**Map Book #3. National commodity maps**).

A national-scale map showing simulated populations of backyard operations is also included. This category is defined as operations with < 1,000 birds (**Map Book #4. National backyard map**).

Hotspot Maps

Methods

Poultry population inventories and number of farms are two of many potential risk factors that can contribute to the spread of HPAI. Hotspot analyses and interpolation tools were used to identify geographic areas where statistically siginificant poultry populations are clustered.[1] Poultry population hotspots are helpful in focusing resources on areas that might be more significantly impacted by the introduction and spread of HPAI. Knowing where poultry populations are concentrated provides emergency planners with the ability to target geographic areas they may require a larger number of resources to reduce the spread of HPAI. In addition, this type of information allows for early intervention to minimize the spread of HPAI such as training or education of producers.

Simulated poultry farm locations were used for this analysis[2]. The analyses were performed on the top five poultry producing States for layer, broiler, and turkey commodities, as identified by

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[1] Reference: ArcGIS Optimized Hotspot Analysis Tool,
http://resources.arcgis.com/en/help/main/10.2/index.html#//005p00000058000000
[2] Reference: Farm Location and Animal Population Simulator, http://flaps.biology.colostate.edu/

NASS. These States, in order of rank, include; Georgia, Arkansas, Alabama, North Carolina, and Mississippi. (**Hot Spot Maps #1-12**)

There are other risk factors that are likely involved in the spread of HPAI such as biosecurity practices, management practices or other anthropogenic activities that contribute to mechanical transmission of the virus, diversity of wildbird populations, human demographics, and climate/terrain. The introduction and spread of HPAI within poultry populations is likely multi-faceted. An understanding of these key areas may assist States with planning for the fall in areas such as producer outreach, training, and allocation of resources.

Results

The hotspot analysis of the five top poultry producing States highlights geographic areas within States that may be at a higher risk of contributing to the overall spread of HPAI with a greater economic impact to the poultry industry both within a State and nationally. Geographic areas shaded red are "hotspots" where a cluster of higher poultry inventory may exist. Blue geographic areas are clusters with relatively lower concentrations of poultry inventories. The hotspot analysis focuses attention within the States where the industries are concentrated to help with planning. However, the maps also provide insight into the planning for the fall. For example, the layer map for Georgia shows that there are concentrations of layers in the mid-central and southeast parts of the State. In contrast, the broiler map indicates concentrations in the western part of the State. This lack of overlap may impact how the disease may behave in the State. This pattern is predominant in four of the five States. However in North Carolina there is extensive overlap of the hotspots for broilers and turkeys which may have implications for disease spread and ultimately for preparedness and response efforts.

The poultry distribution results, based on our hotspot analyses, are a very useful guide in focusing resources for Fall planning. Because the analyses used simulated data it would be best to compare these results against local or State knowledge of the poultry industry.

Additional hotspot analyses could be performed for other poultry producing States to assist in resource and emergency planning efforts.

Hot Spot Maps #1-12
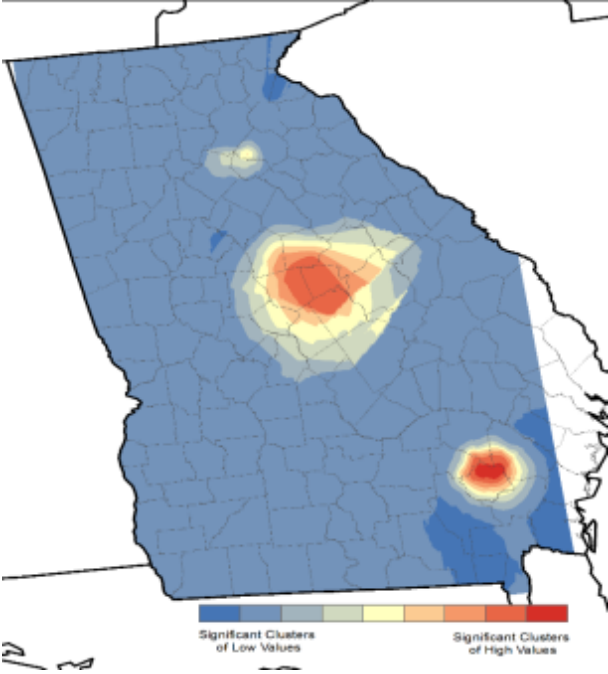
Map 1. Georgia Layer Inventory Hotspots
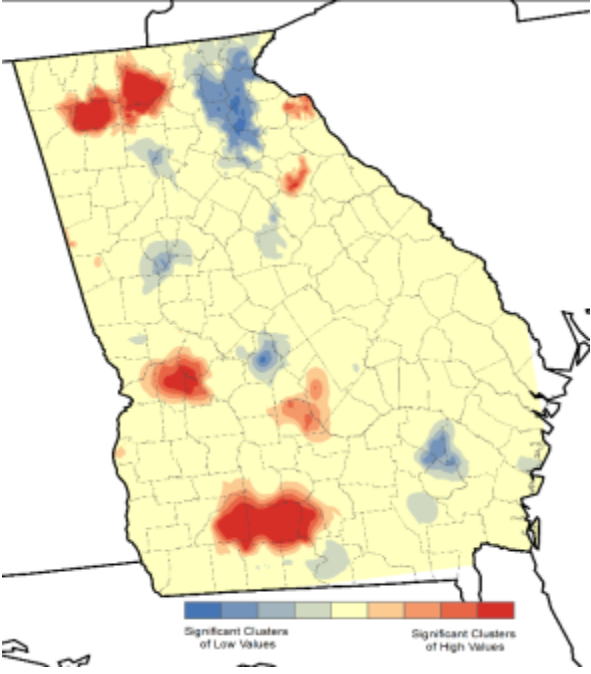
Map 2. Georgia Broiler Inventory Hotspots
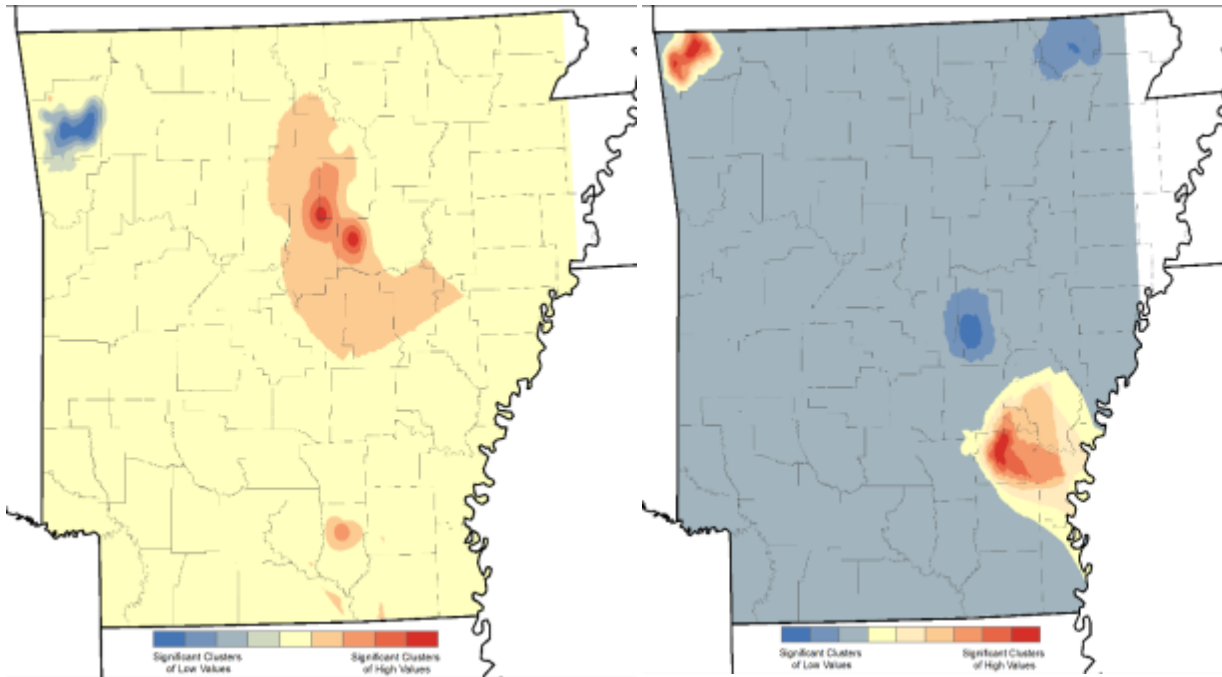
Map 3. Arkansas Layer Inventory Hotspots

Map 4. Arkansas Broiler Inventory Hotspots
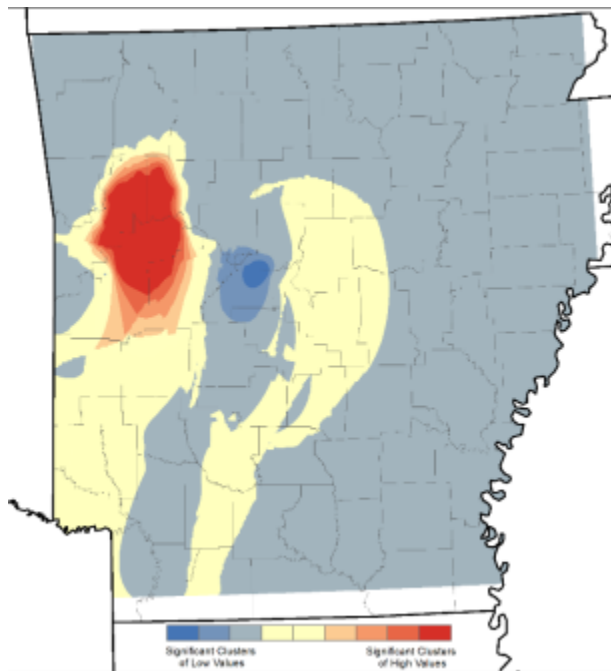
Map 5. Arkansas Turkey Inventory Hotspots
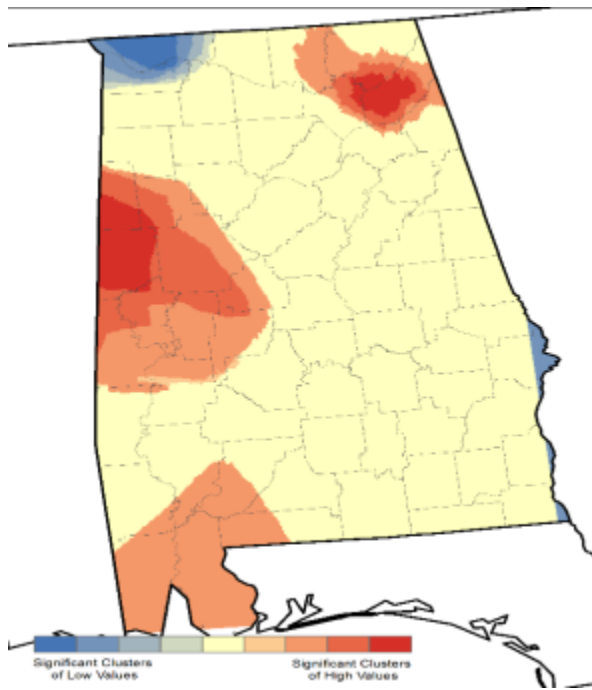
Map 6. Alabama Layer Inventory Hotspots
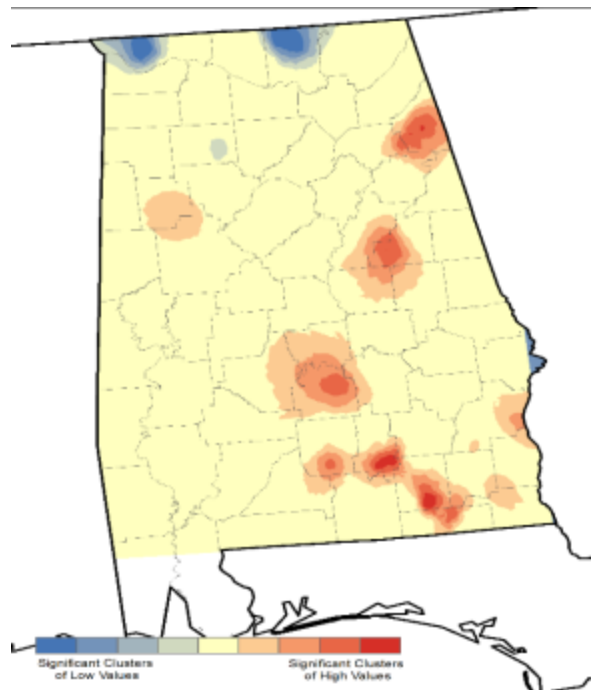
Map 7. Alabama Broiler Inventory Hotspots
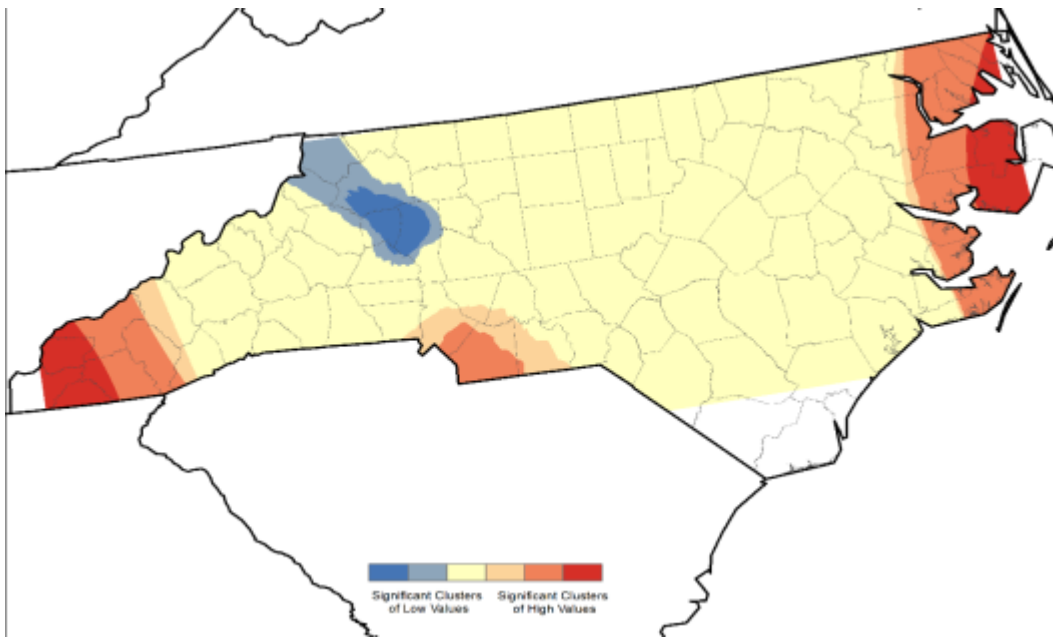
Map 8. North Carolina Layer Inventory Hotspots
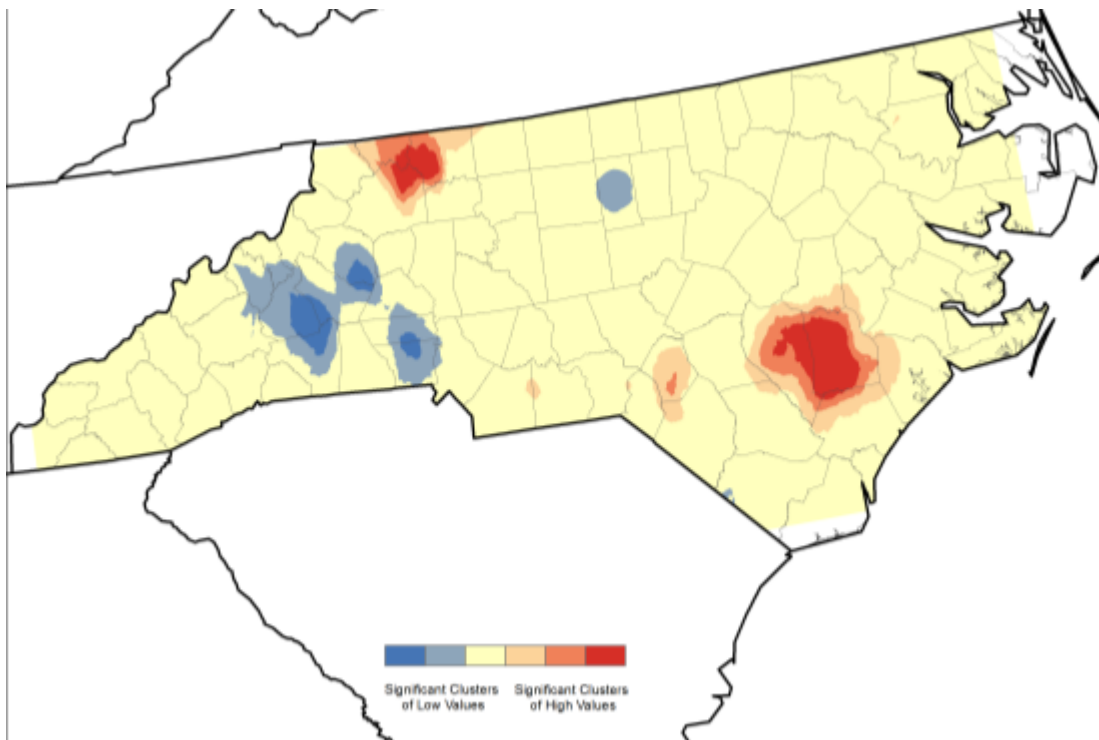
Map 9. North Carolina Broilers Inventory Hotspots
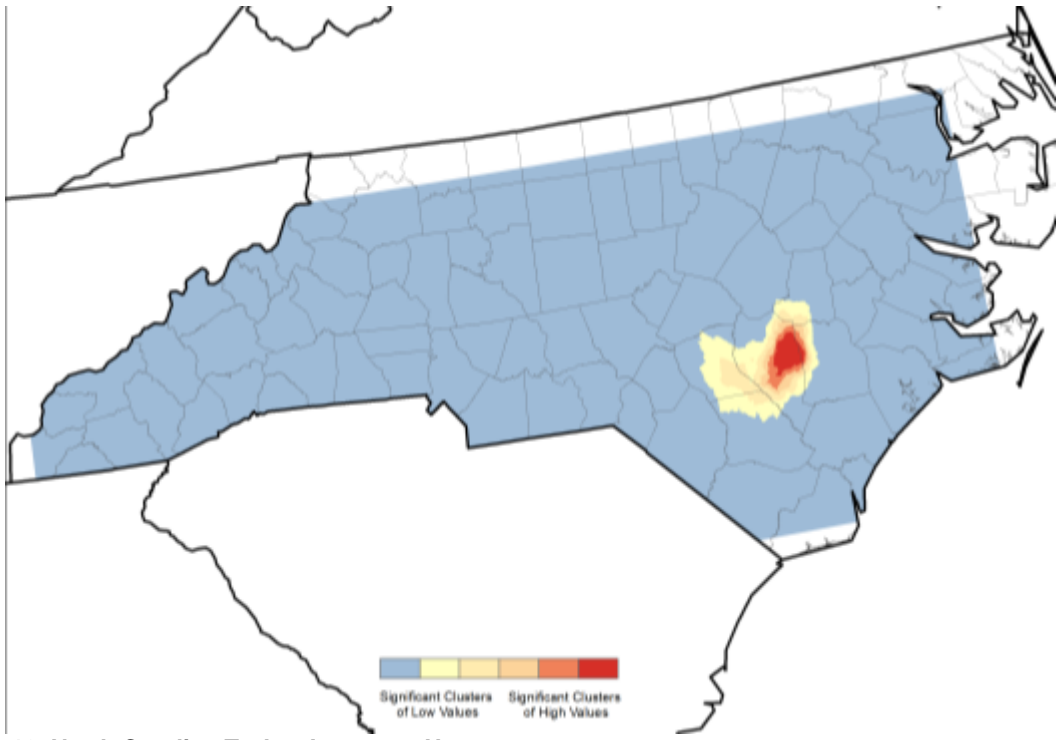
Map 10. North Carolina Turkey Inventory Hotspots
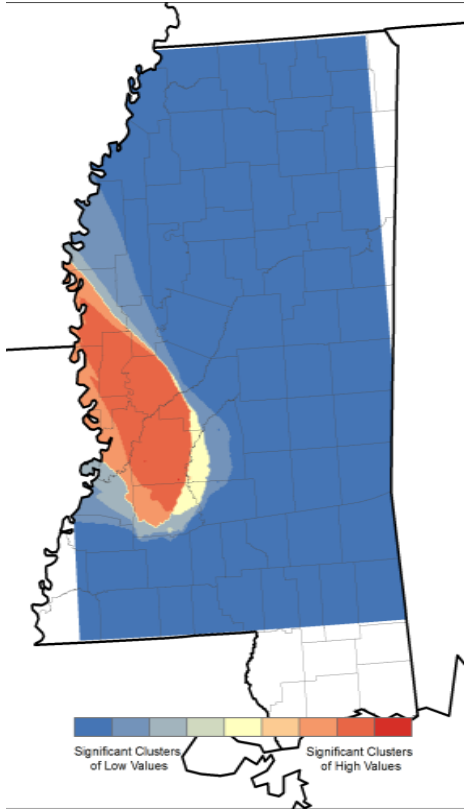
Map 11. Mississippi Layer Inventory Hotspots
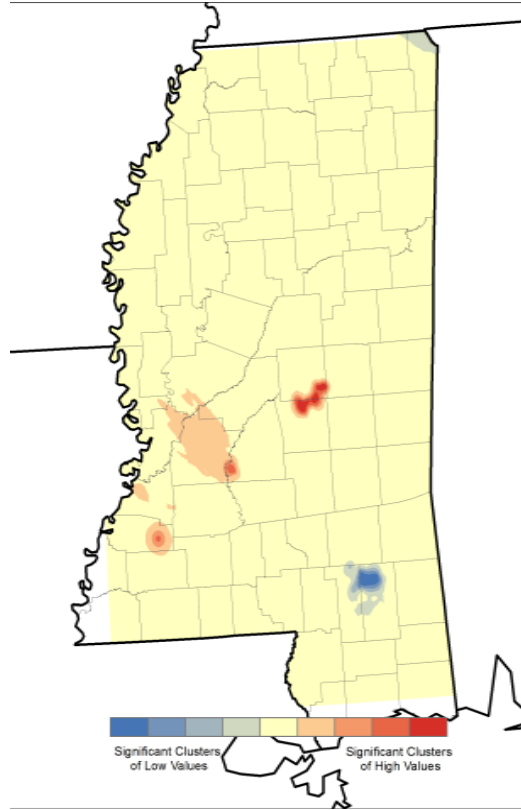
Map 12. Mississippi Broiler Inventory Hotspots

Significant Clusters of Low Values — Significant Clusters of High Values

Map Book #1. Flyway disposal resource maps
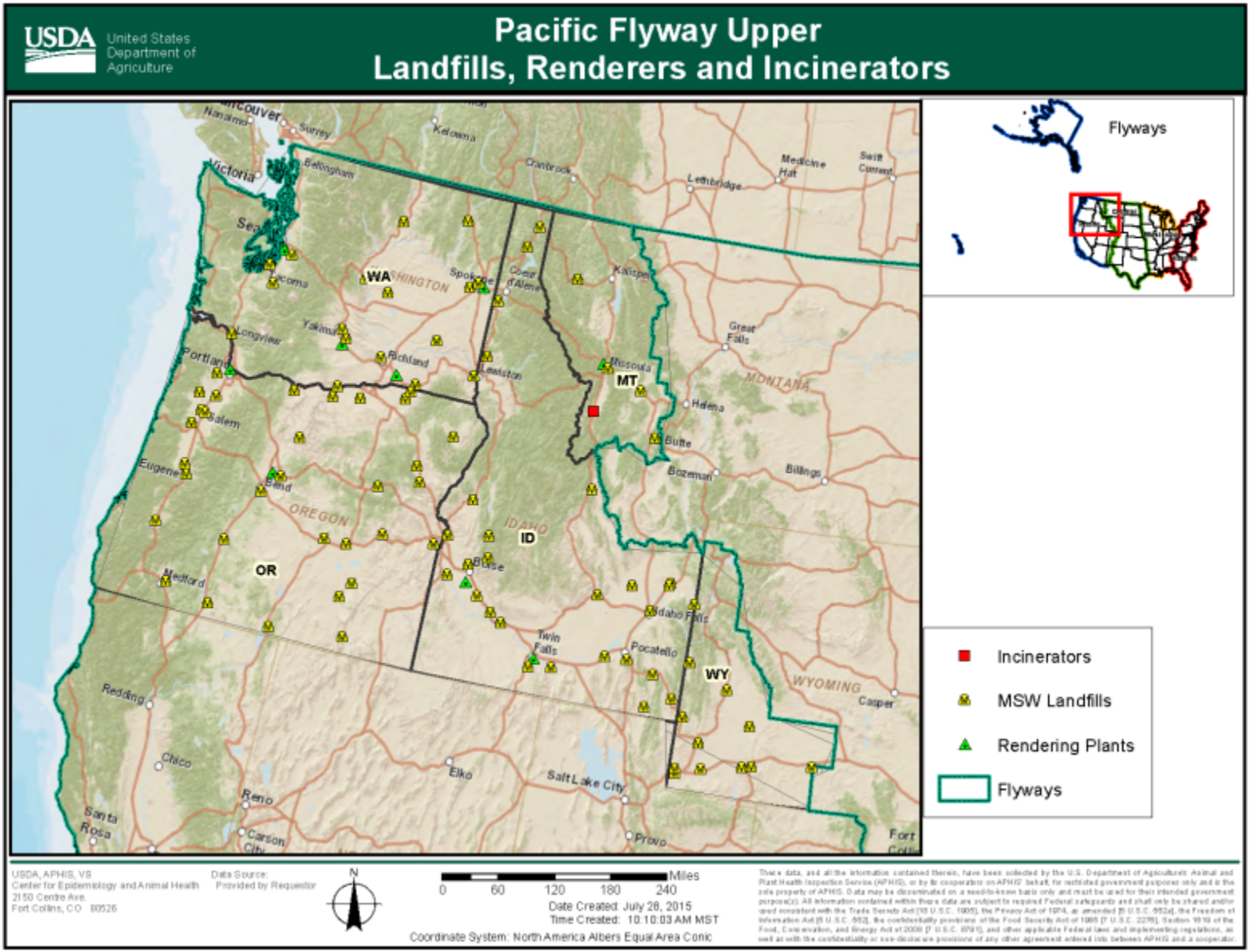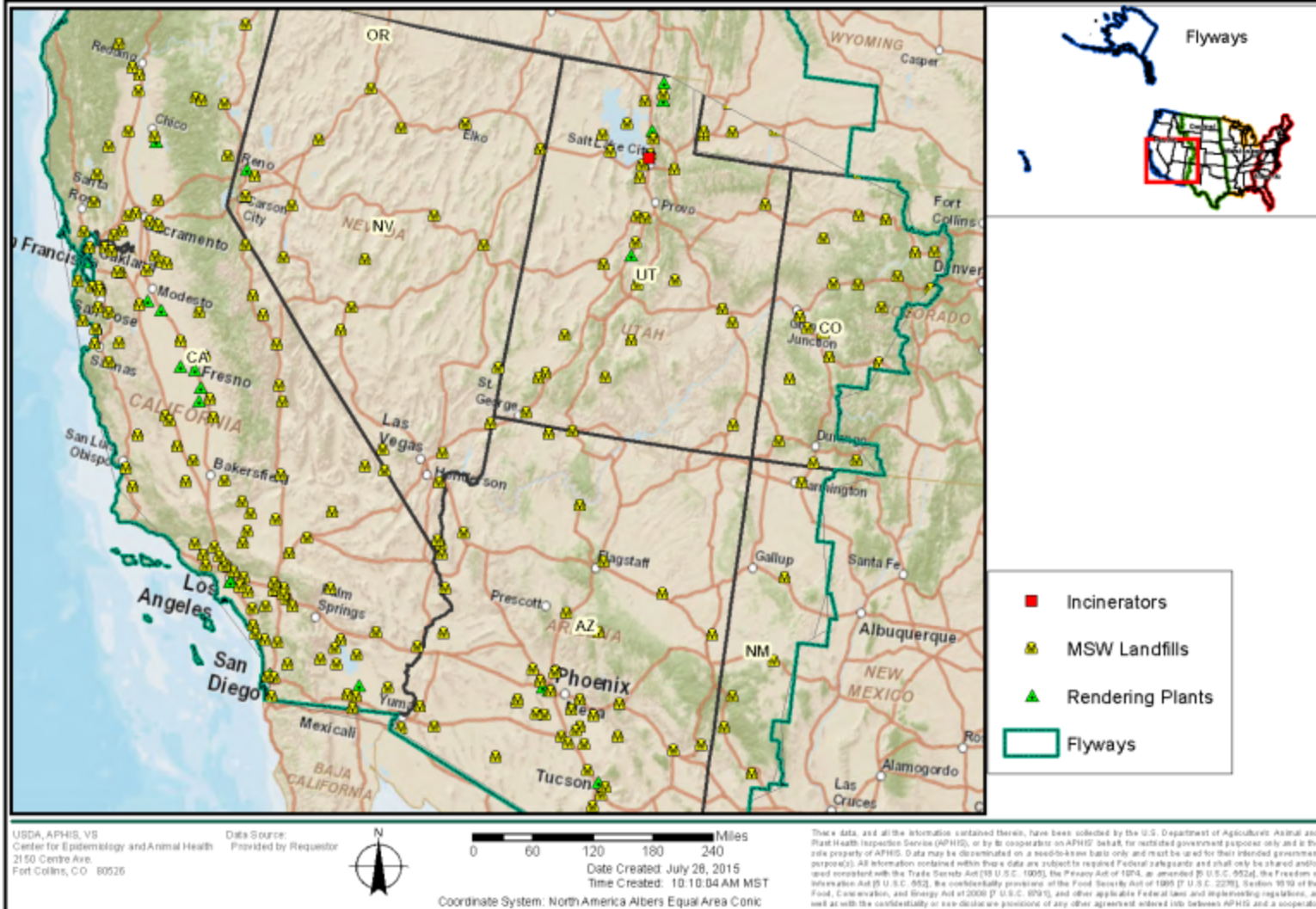
Pacific Flyway Lower
Landfills, Renderers and Incinerators

Central Flyway Upper
Landfills, Renderers and Incinerators

USDA United States Department of Agriculture

Flyways

Incinerators
MSW Landfills
Rendering Plants
Flyways

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

Data Source:
Provided by Requestor

Date Created: July 26, 2015
Time Created: 10:10:06 AM MST
Coordinate System: North America Albers Equal Area Conic

Miles
0   60   120   180   240

Central Flyway Lower
Landfills, Renderers and Incinerators

USDA — United States Department of Agriculture

Legend:
- Incinerators (red square)
- MSW Landfills (yellow marker)
- Rendering Plants (green triangle)
- Flyways

Mississippi Flyway Upper
Landfills, Renderers and Incinerators

Mississippi Flyway Lower
Landfills, Renderers and Incinerators

Legend:
- ■ Incinerators
- ⚠ MSW Landfills
- ▲ Rendering Plants
- ▢ Flyways

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

Data Source:
Provided by Requestor

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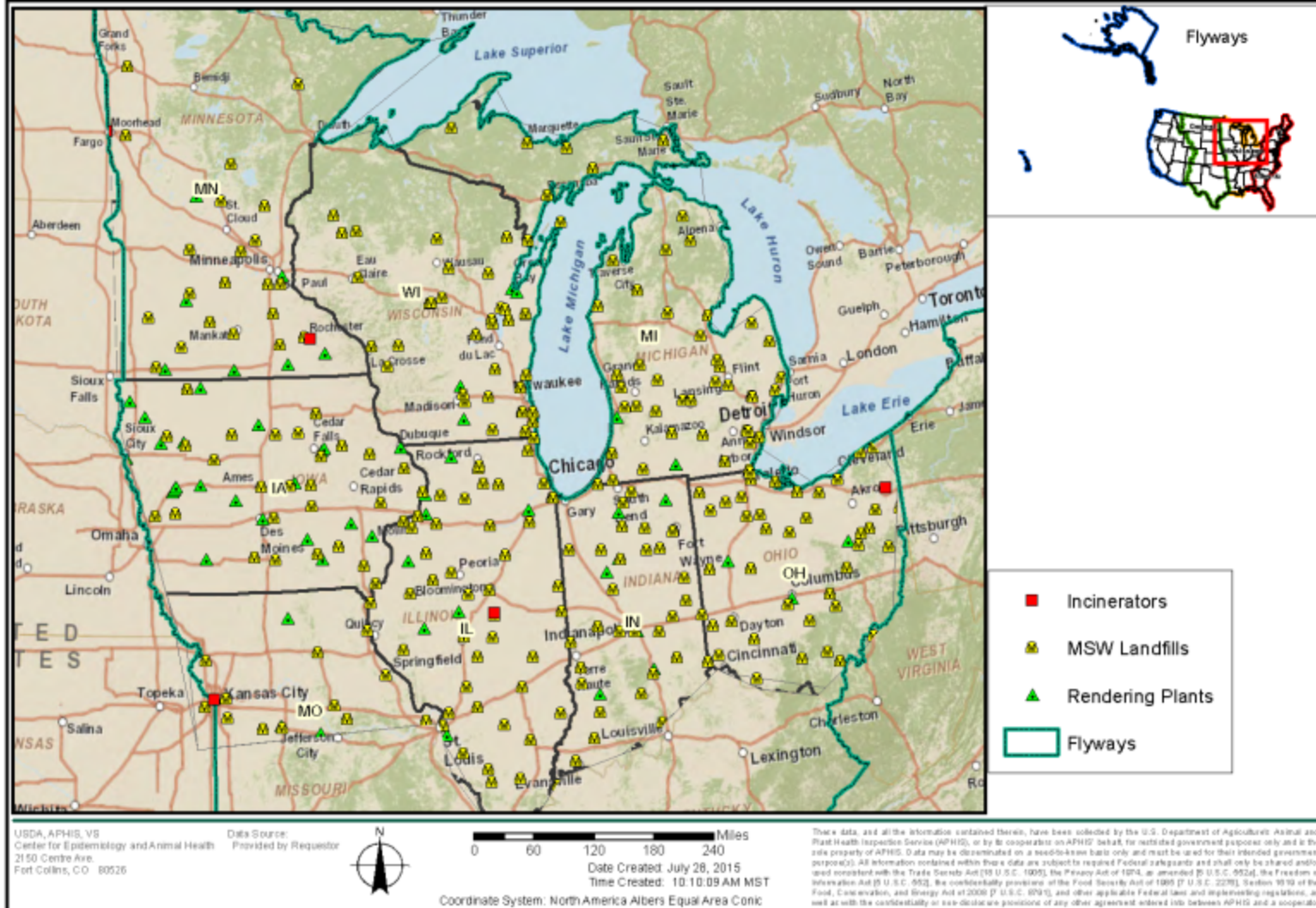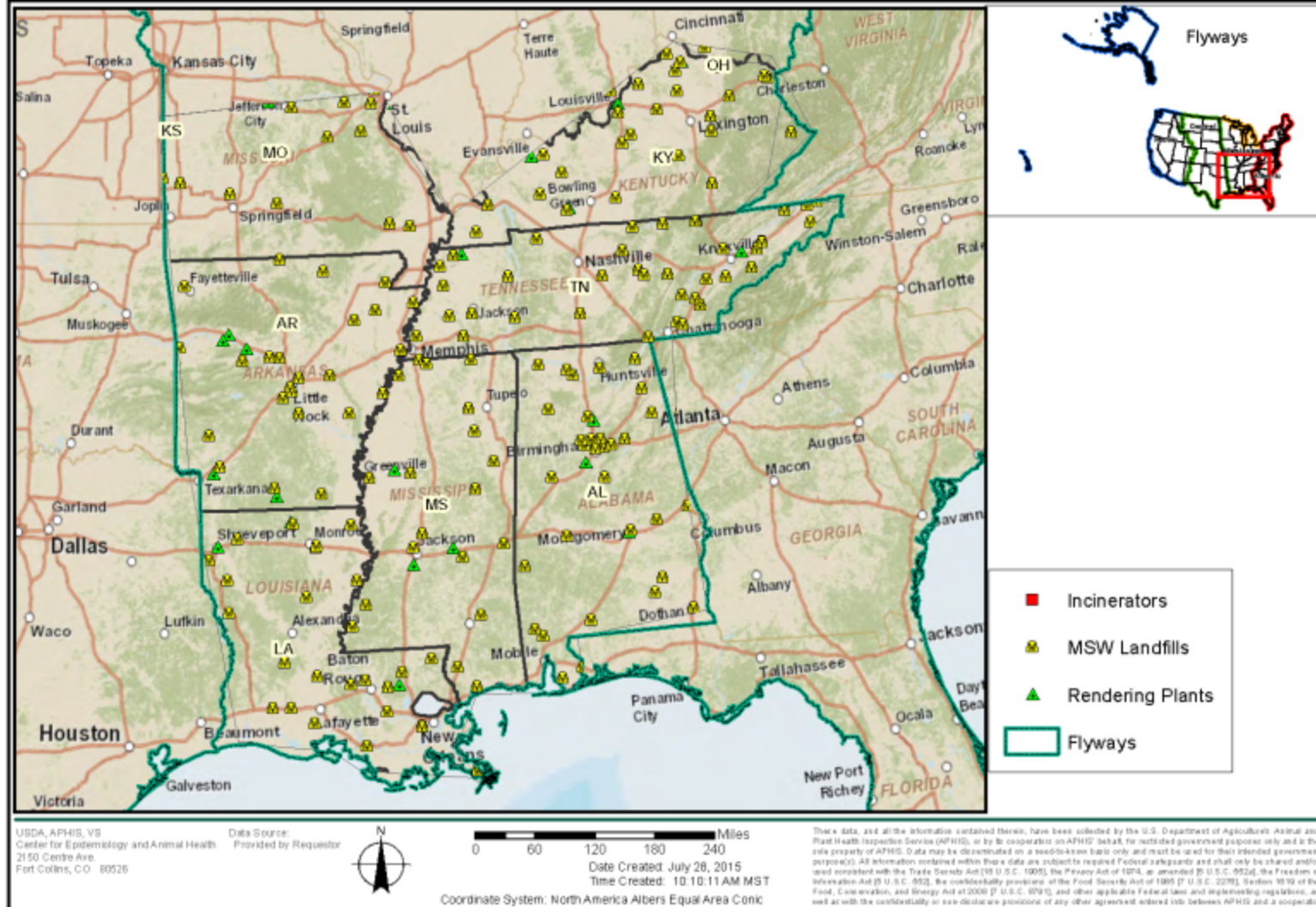
Atlantic Flyway Upper
Landfills, Renderers and Incinerators

Atlantic Flyway Lower
Landfills, Renderers and Incinerators

Legend:
- Incinerators (red square)
- MSW Landfills (yellow)
- Rendering Plants (green triangle)
- Flyways
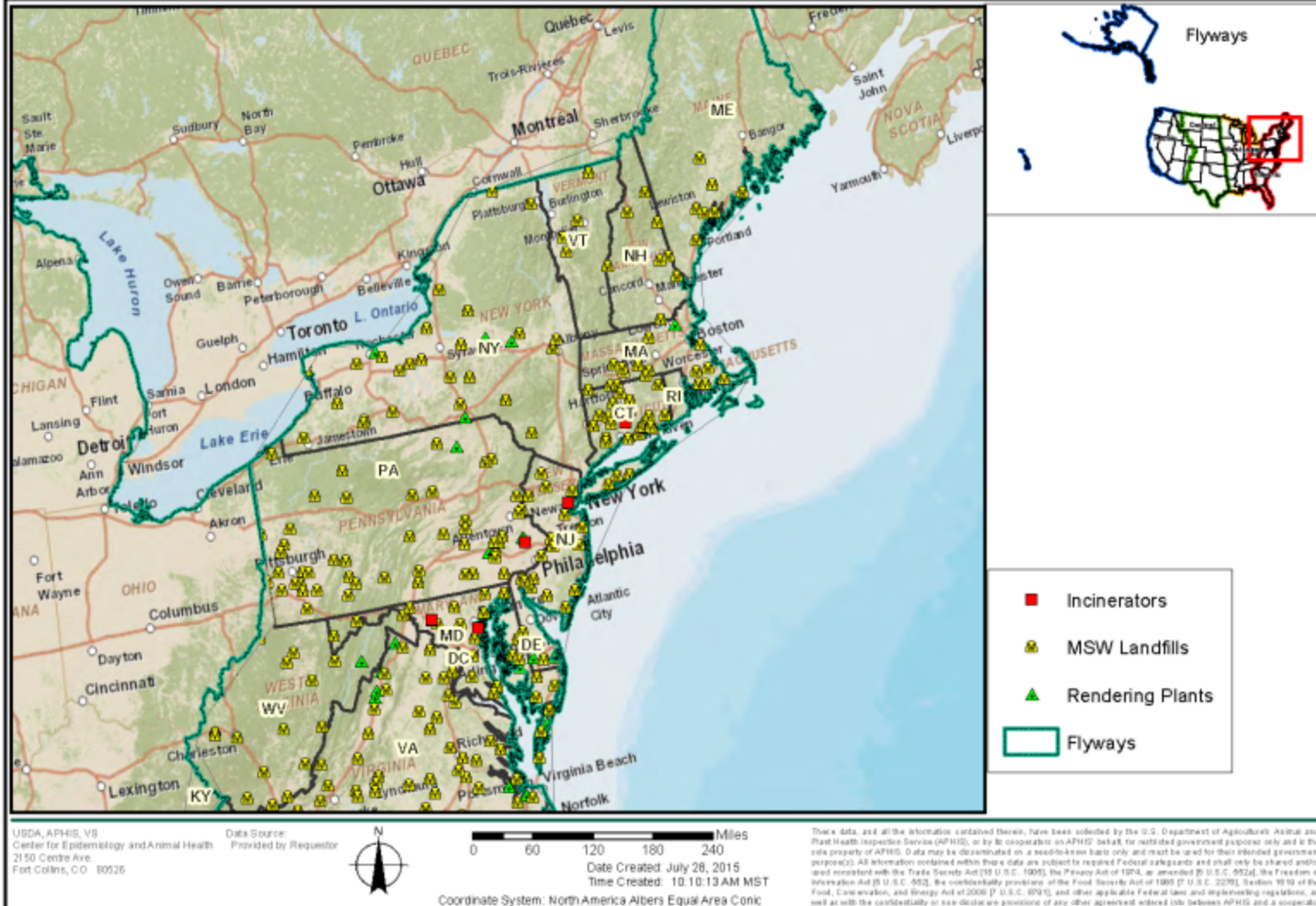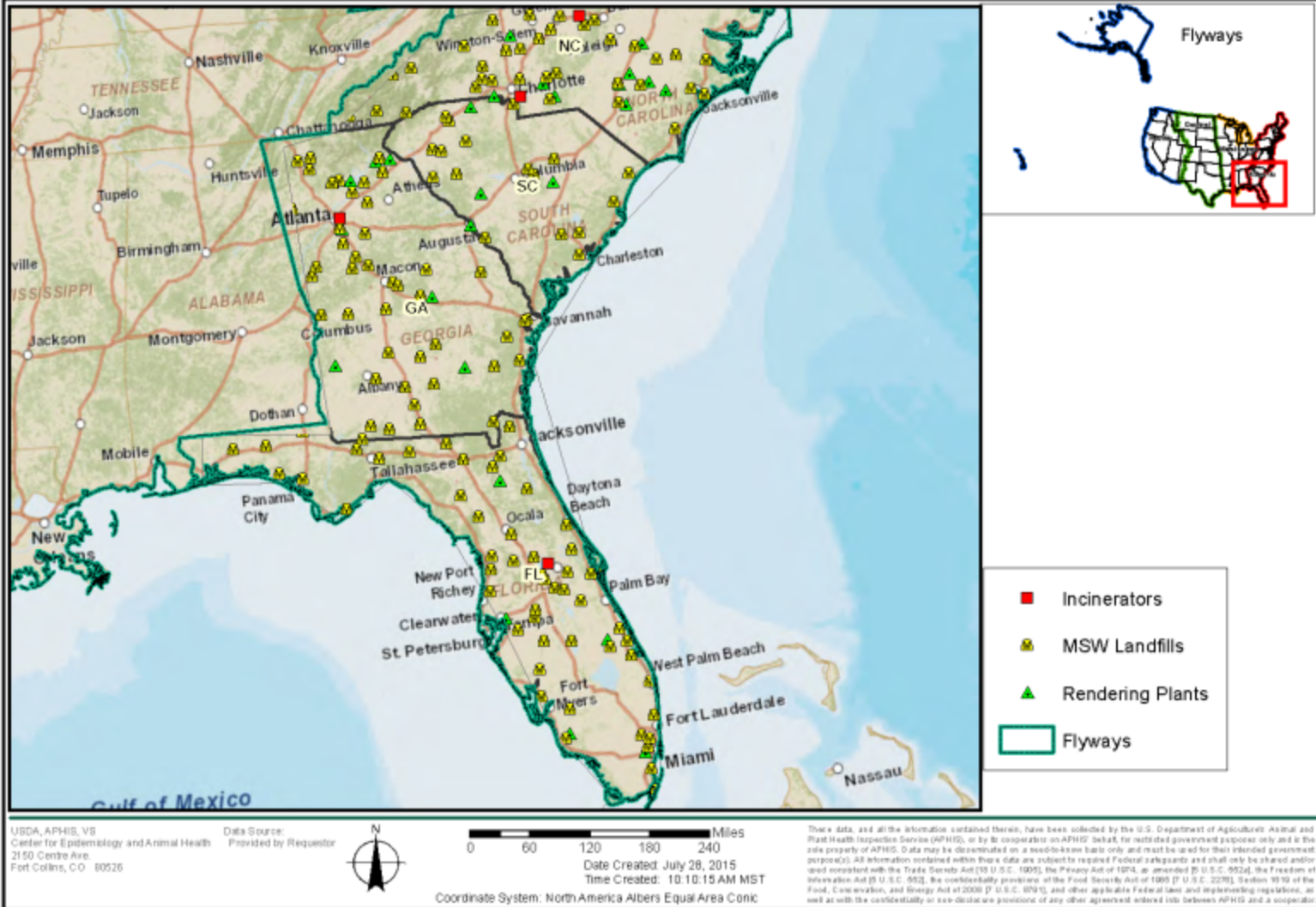
Pacific Flyway Upper Alaska
Landfills, Renderers and Incinerators

Pacific Flyway Lower Hawaii
Landfills, Renderers and Incinerators

USDA United States Department of Agriculture

Flyways

Incinerators
MSW Landfills
Rendering Plants
Flyways

HAWAII

Honolulu

HI

Hilo

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

Data Source:
Provided by Requestor

N

Miles
0   30   60   90   120

Date Created: July 28, 2015
Time Created: 10:10:19 AM MST
Coordinate System: North America Albers Equal Area Conic
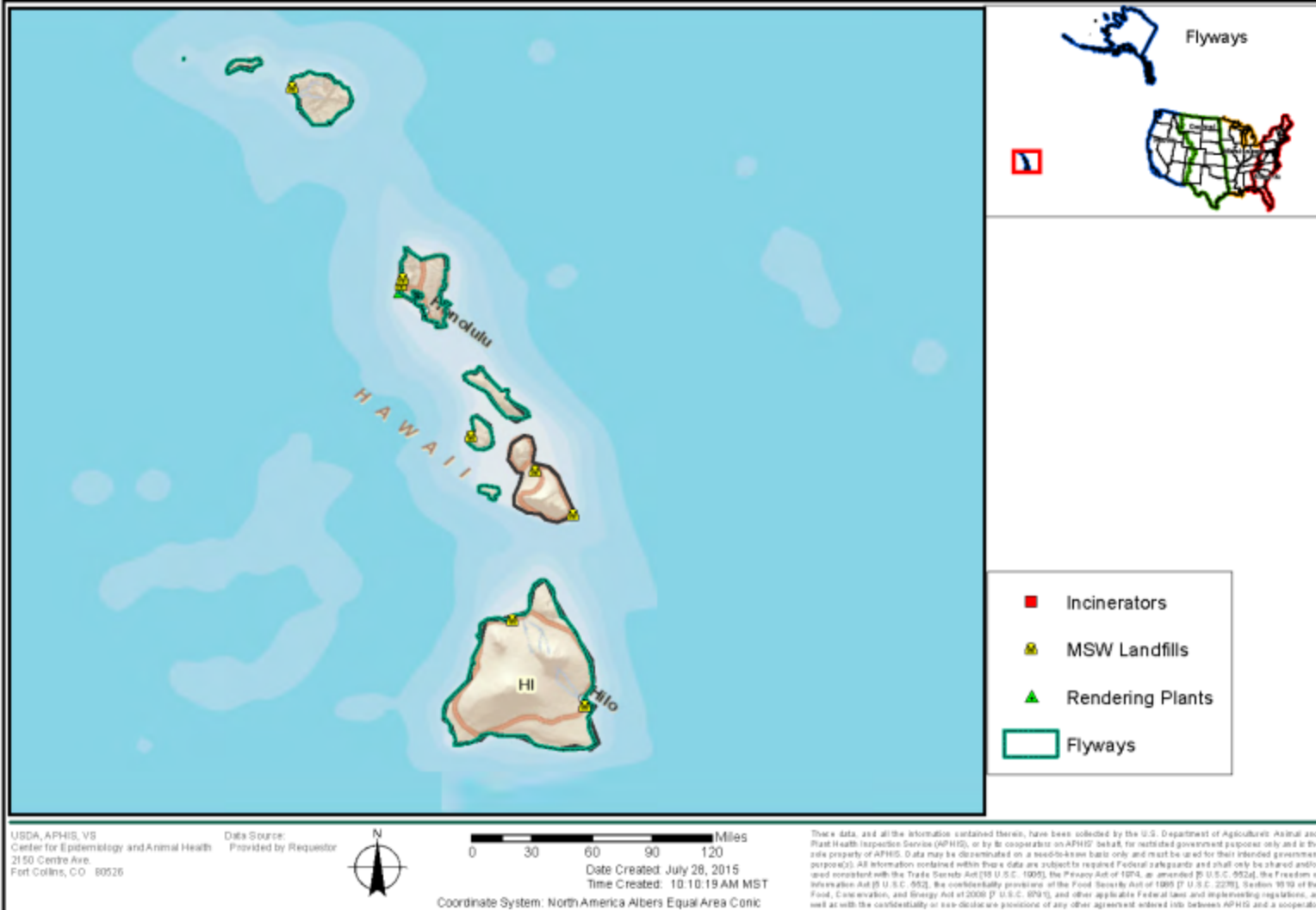
Map Book #2. Flyway commodity maps

Pacific Flyway Upper Turkeys

Flyways

Farm Density Contiguous US
- 1 Dot = 100 Poultry Farms

Farm Density Hawaii
- 1 Dot = 50 Poultry Farms

Flyways

Turkey Inventory
- 0 or Data Witheld
- 1 - 50,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

Date Created: July 31, 2015
Time Created: 4:51:06 PM MST

Coordinate System: North America Albers Equal Area Conic

Miles
0   60   120   180   240

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19

Pacific Flyway Upper
Broilers

Pacific Flyway Lower
Turkeys

Pacific Flyway Lower Layers

USDA United States Department of Agriculture

OR
ID
WY
NV
UT
CO
CA
AZ
NM

Flyways

Farm Density Contiguous US
- 1 Dot = 100 Poultry Farms

Farm Density Hawaii
- 1 Dot = 50 Poultry Farms

☐ Flyways

Layer Inventory
- ☐ 0
- ☐ 12 – 25,000
- ■ 1,000,001 – 10,700,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

N

Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:51:15 PM MST
Coordinate System: North America Albers Equal Area Conic

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23

Pacific Flyway Lower
Broilers

Central Flyway Upper
Turkeys

USDA United States Department of Agriculture

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms

Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

☐ Flyways

Turkey Inventory
☐ 0 or Data Witheld
☐ 1 - 50,000
☐ 50,001 - 250,000
☐ 250,001 - 500,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

Date Created: July 31, 2015
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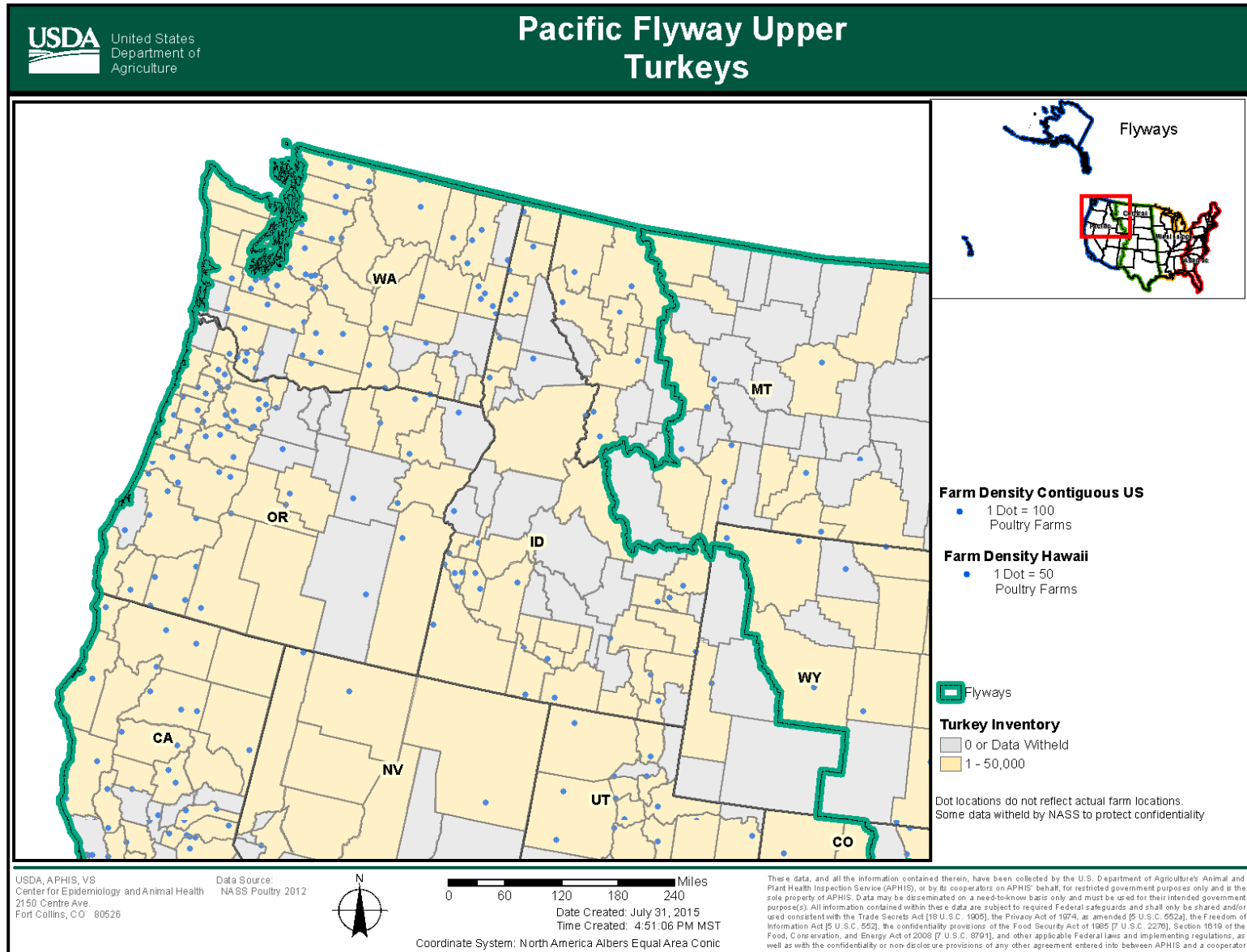
Miles
0 60 120 180 240

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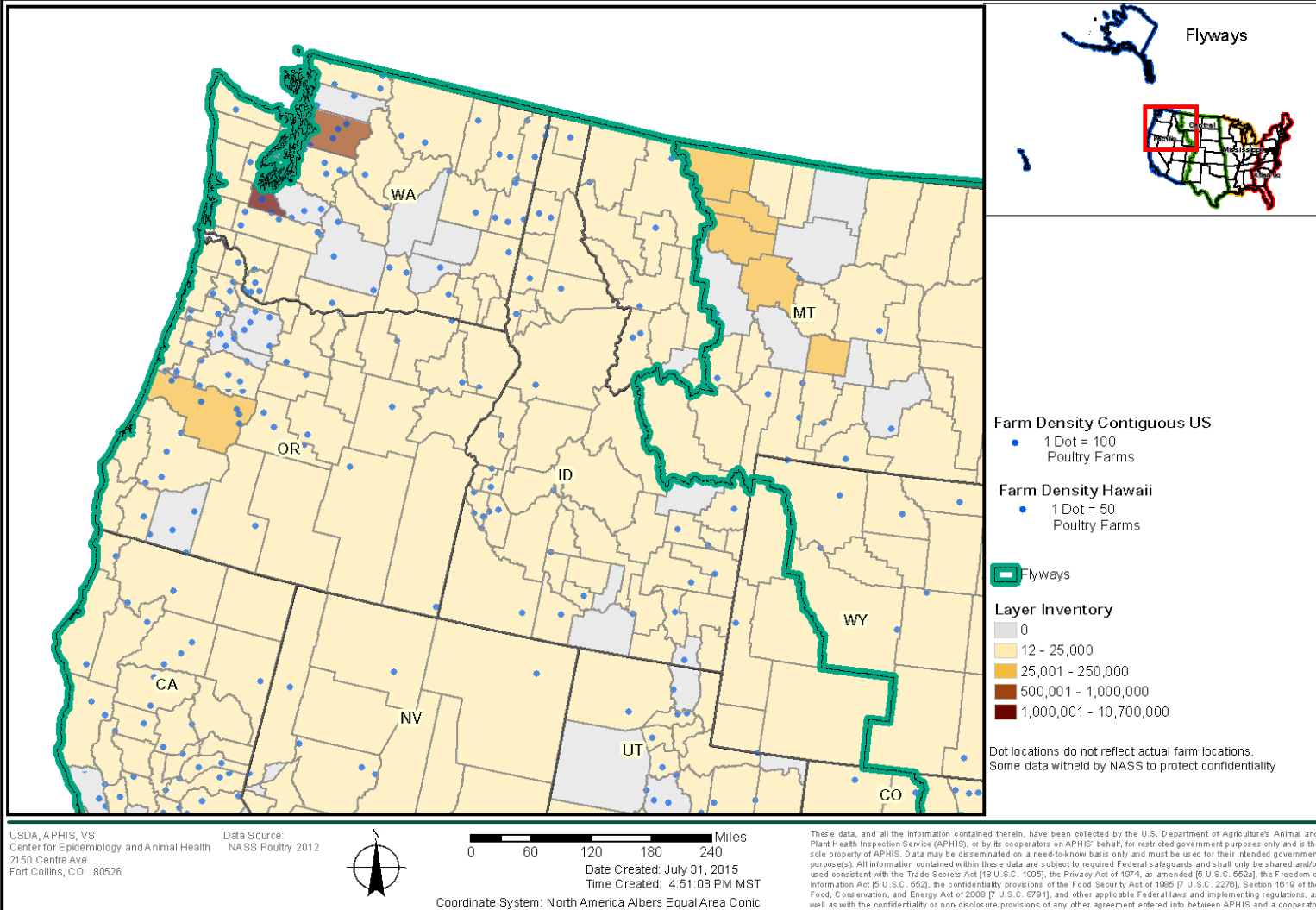
Central Flyway Upper Layers

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms

Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

▭ Flyways

Layer Inventory
0
12 - 25,000
25,001 - 250,000
500,001 - 1,000,000
1,000,001 - 10,700,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:51:20 PM MST
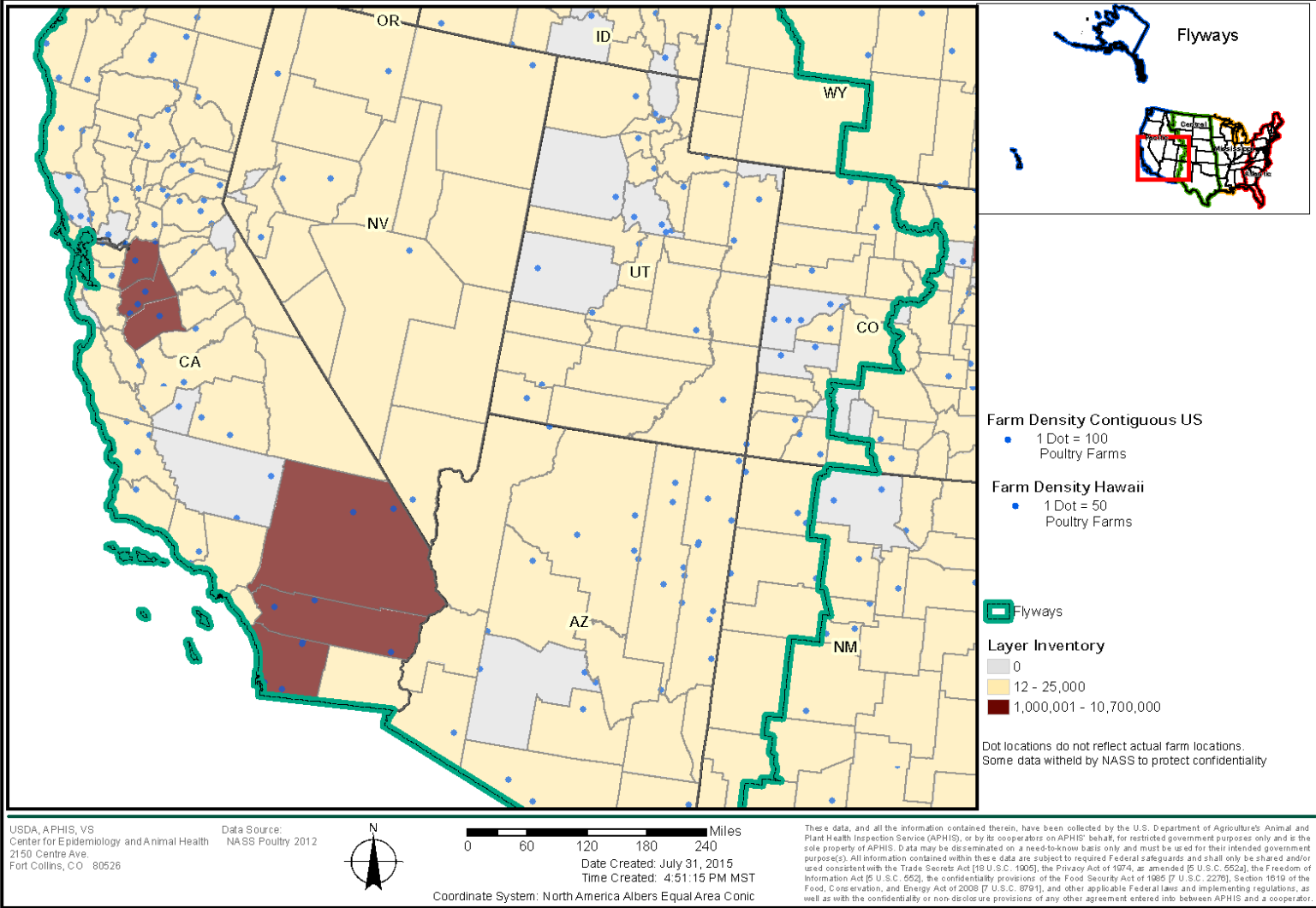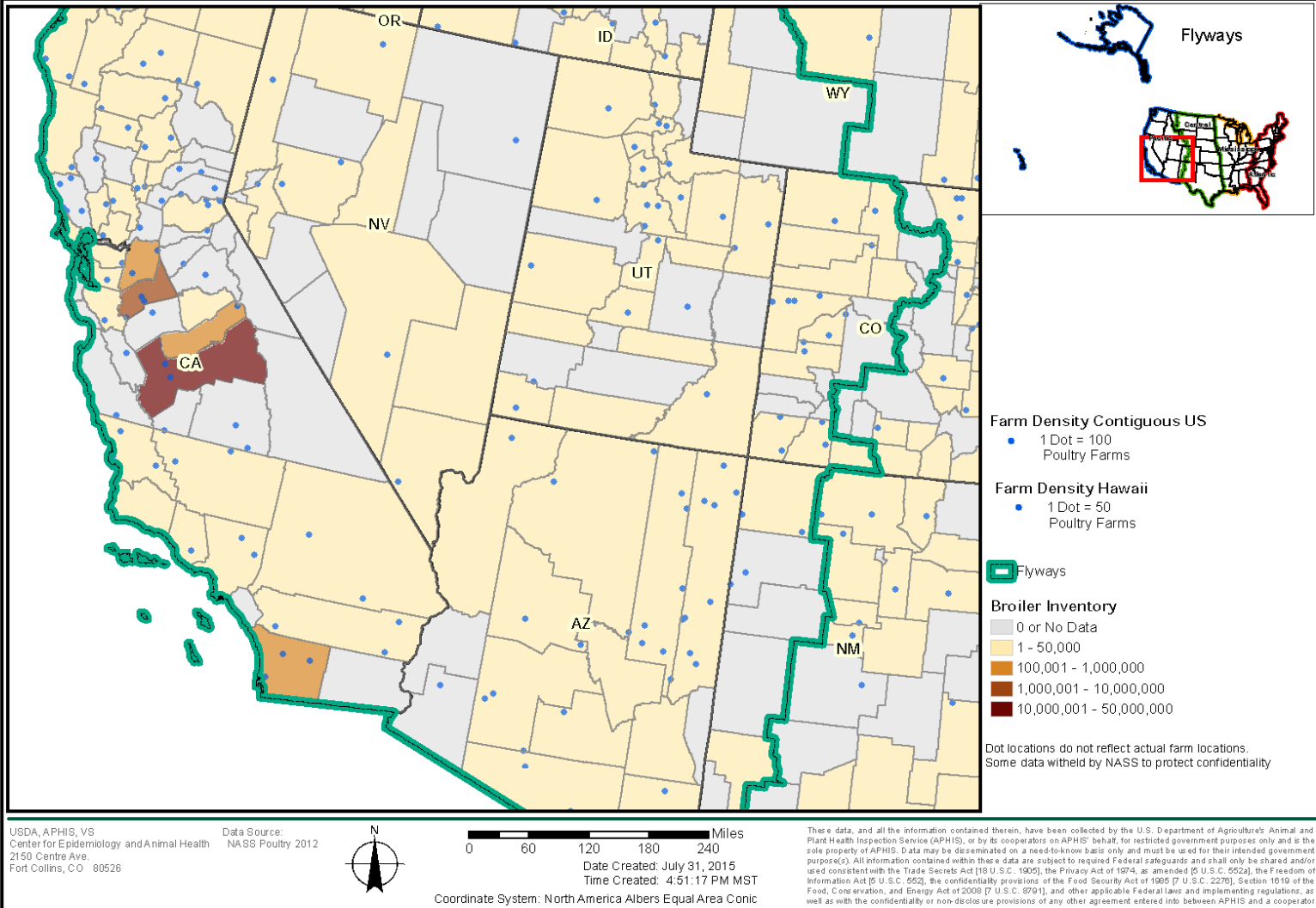Coordinate System: North America Albers Equal Area Conic

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26

Central Flyway Lower
Turkeys

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
- 1 Dot = 100 Poultry Farms

Farm Density Hawaii
- 1 Dot = 50 Poultry Farms

Flyways

Turkey Inventory
- 0 or Data Witheld
- 1 - 50,000
- 50,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

N

Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:51:25 PM MST

Coordinate System: North America Albers Equal Area Conic

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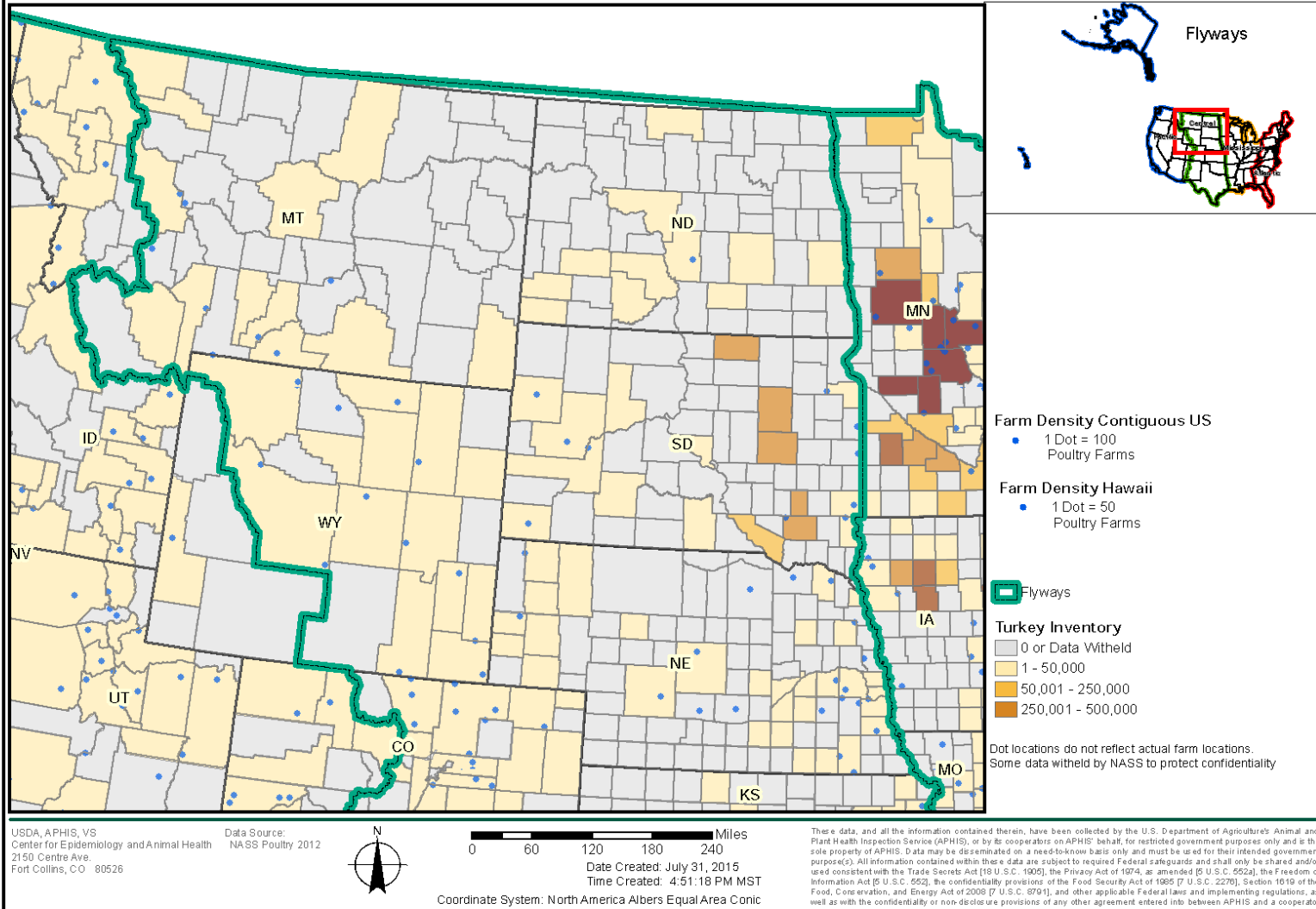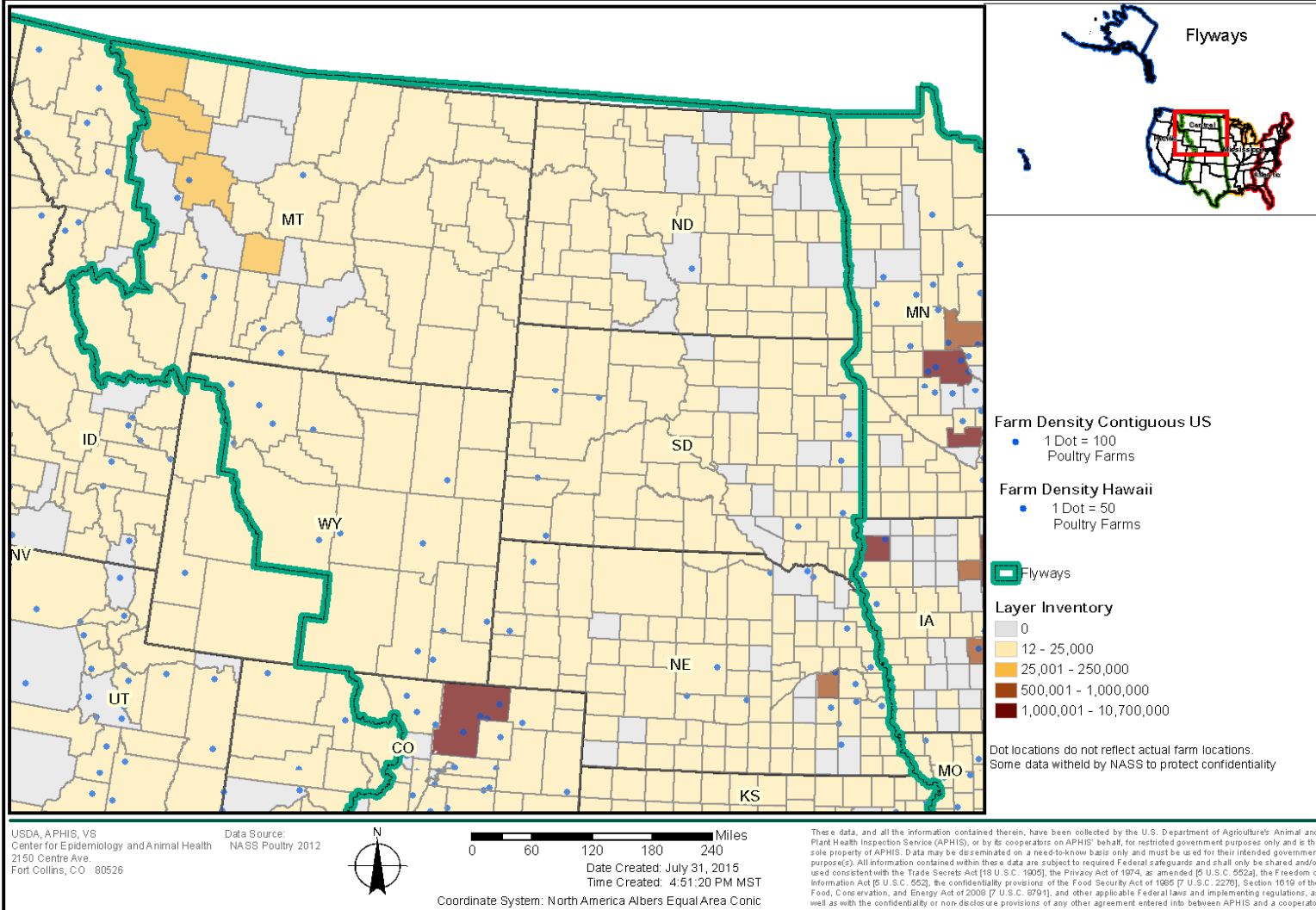
28

Central Flyway Lower Layers

USDA
United States
Department of
Agriculture

Flyways

Farm Density Contiguous US
- 1 Dot = 100 Poultry Farms

Farm Density Hawaii
- 1 Dot = 50 Poultry Farms

Flyways

Broiler Inventory
- 0 or No Data
- 1 - 50,000
- 100,001 - 1,000,000
- 1,000,001 - 10,000,000
- 10,000,001 - 50,000,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

N

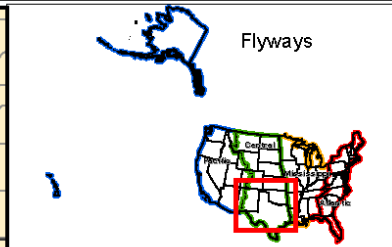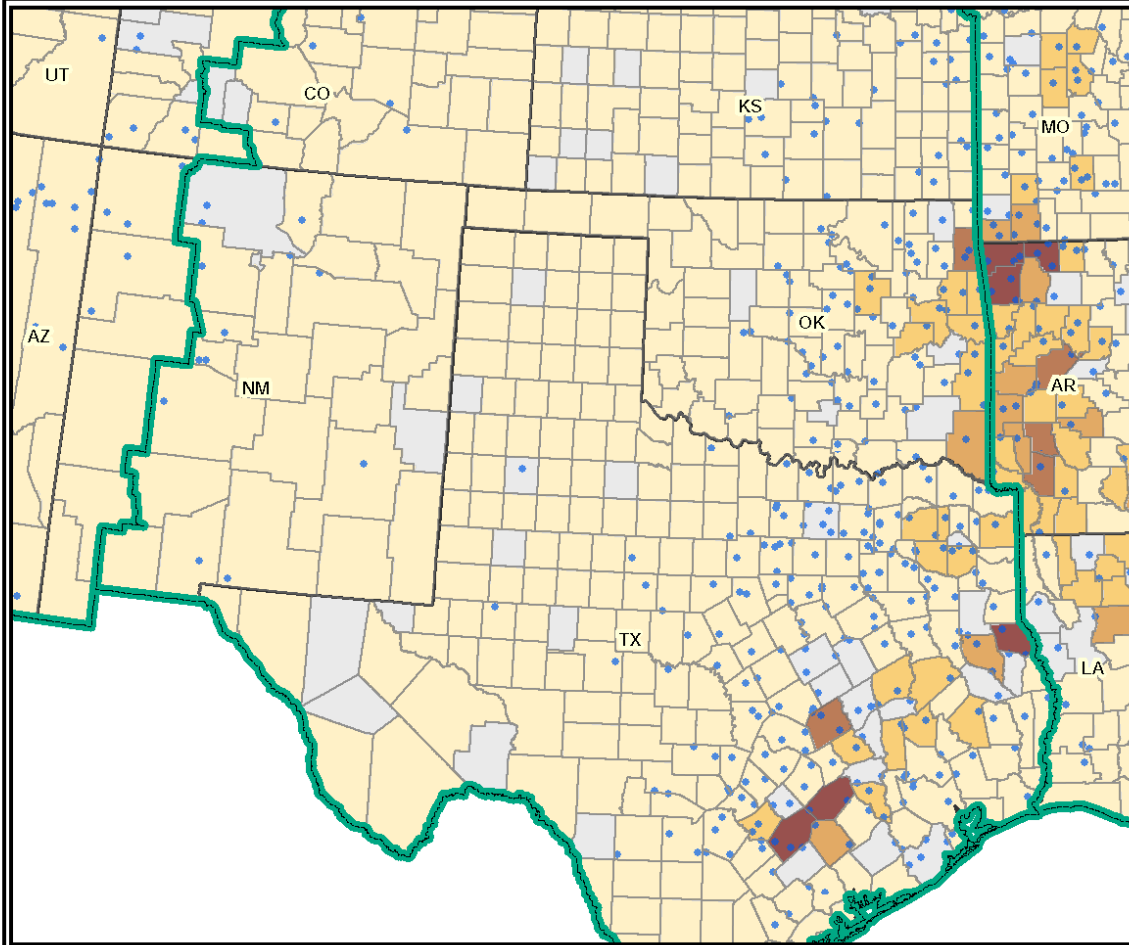Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:51:29 PM MST

Coordinate System: North America Albers Equal Area Conic

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Mississippi Flyway Upper
Turkeys

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms

Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

▭ Flyways

Turkey Inventory
■ 0 or Data Witheld
■ 1 - 50,000
■ 50,001 - 250,000
■ 250,001 - 500,000
■ 500,001 - 1,000,000
■ 1,000,001 - 4,800,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:51:32 PM MST

Coordinate System: North America Albers Equal Area Conic

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31

Mississippi Flyway Upper Layers

Mississippi Flyway Upper
Broilers

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms
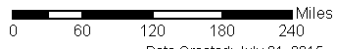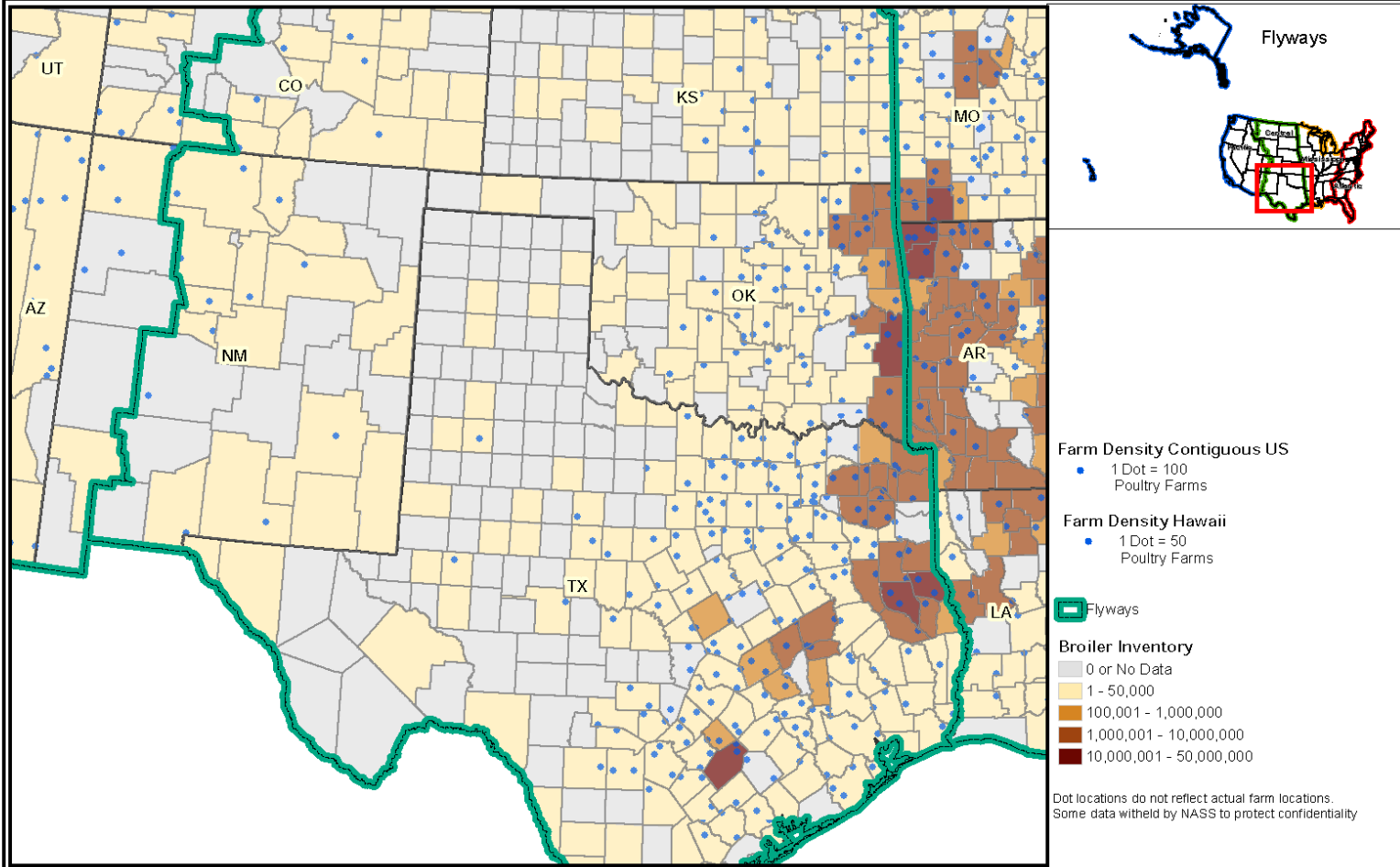
Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

Flyways

Broiler Inventory
0 or No Data
1 - 50,000
50,001 - 100,000
100,001 - 1,000,000
1,000,001 - 10,000,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

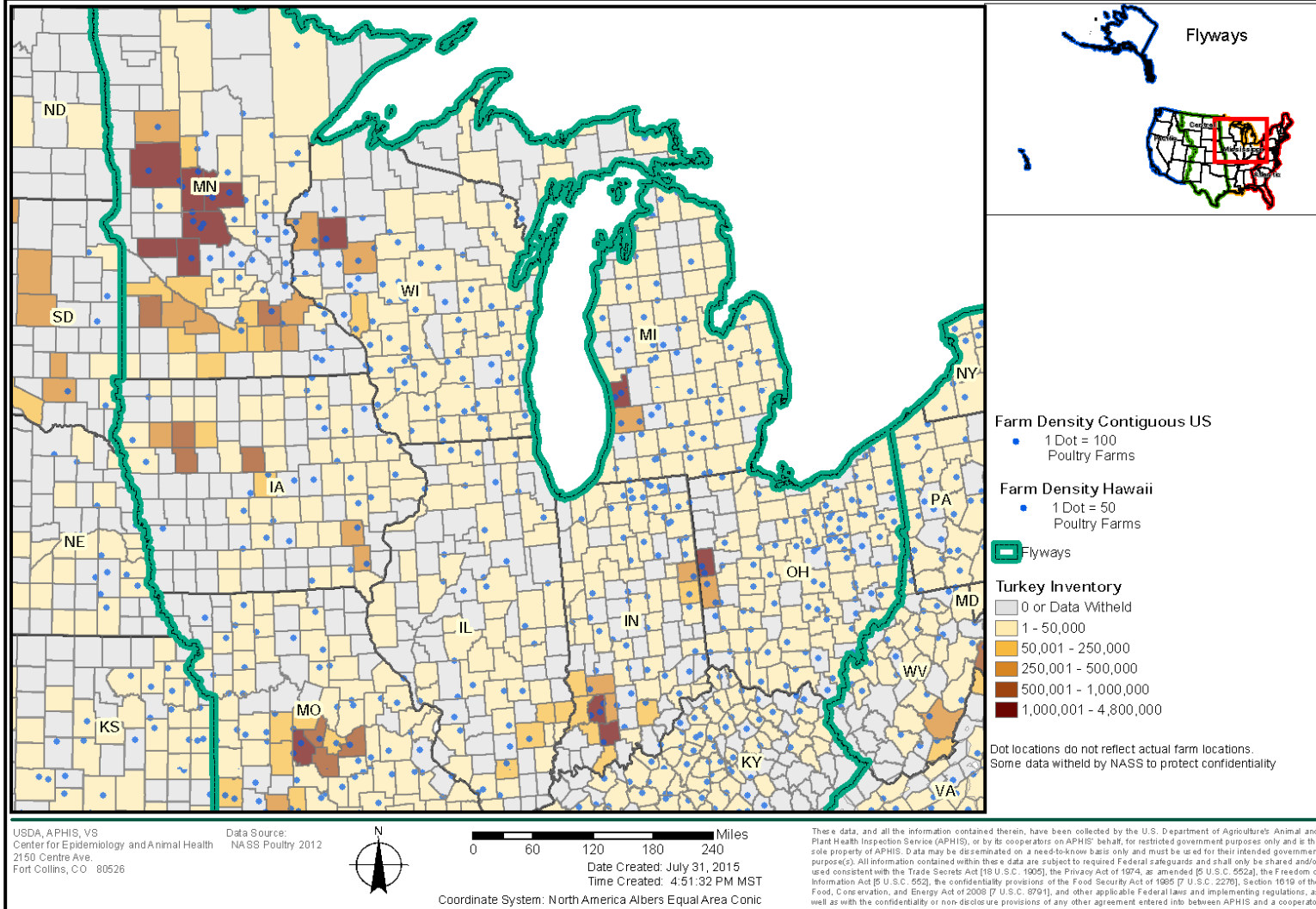Date Created: July 31, 2015
Time Created: 4:51:37 PM MST

Coordinate System: North America Albers Equal Area Conic

Miles
0   60   120   180   240

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33

Mississippi Flyway Lower
Turkeys

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms

Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

▭ Flyways

Turkey Inventory
- 0 or Data Witheld
- 1 - 50,000
- 50,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- 1,000,001 - 4,800,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

Miles
0   60   120   180   240

Date Created: July 31, 2015
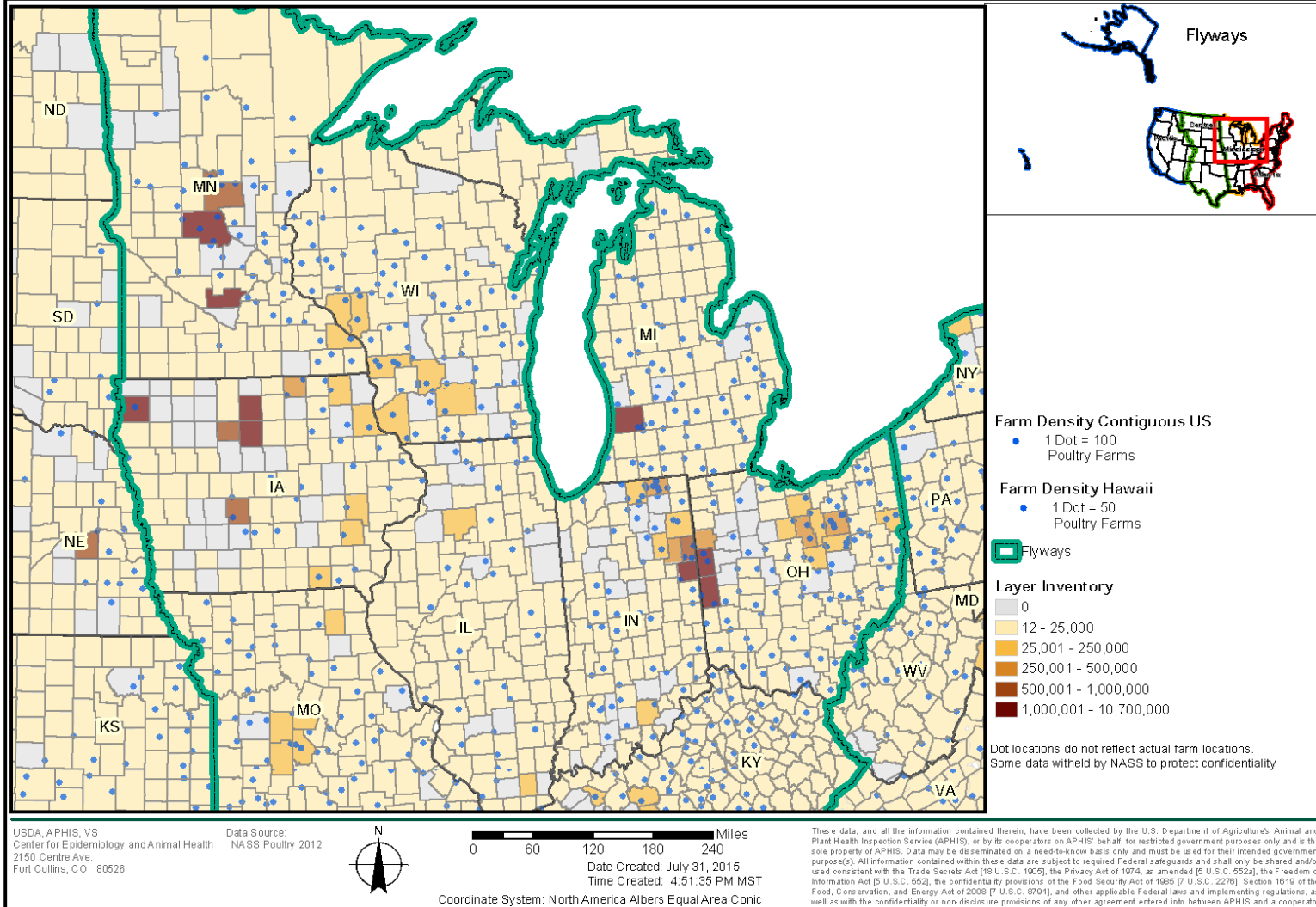Time Created: 4:51:41 PM MST

Coordinate System: North America Albers Equal Area Conic

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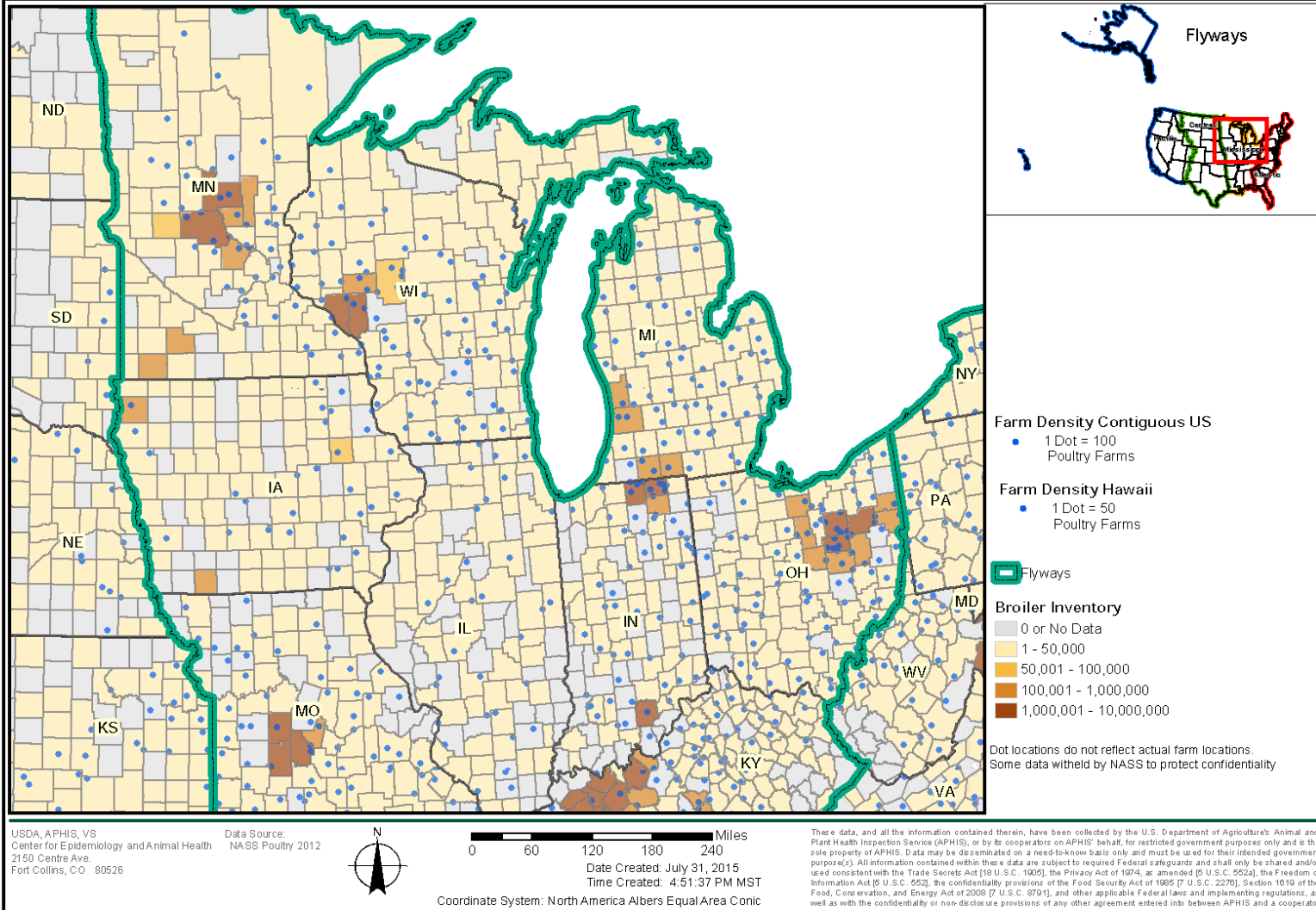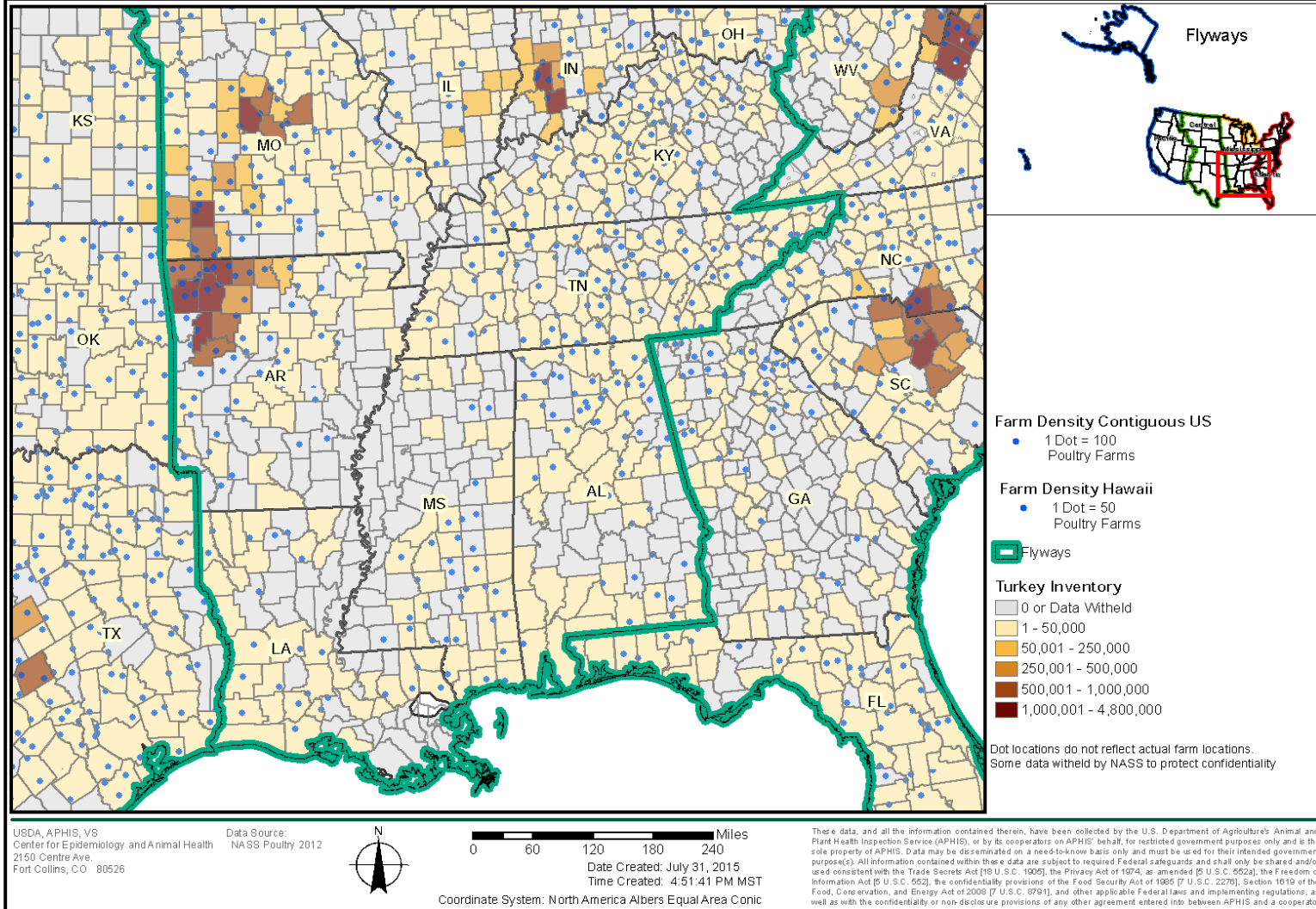
34

Mississippi Flyway Lower Layers

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
- 1 Dot = 100 Poultry Farms

Farm Density Hawaii
- 1 Dot = 50 Poultry Farms

Flyways

Layer Inventory
- 0
- 12 – 25,000
- 25,001 – 250,000
- 250,001 – 500,000
- 500,001 – 1,000,000
- 1,000,001 – 10,700,000

Dot locations do not reflect actual farm locations. Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

Miles
0 60 120 180 240

Date Created: July 31, 2015
Time Created: 4:51:45 PM MST
Coordinate System: North America Albers Equal Area Conic

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35

Mississippi Flyway Lower
Broilers

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms

Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

☐ Flyways

Broiler Inventory
- 0 or No Data
- 1 - 50,000
- 50,001 - 100,000
- 100,001 - 1,000,000
- 1,000,001 - 10,000,000
- 10,000,001 - 50,000,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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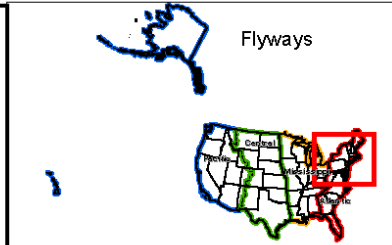Fort Collins, CO 80526

Data Source:
NASS Poultry 2012

Date Created: July 31, 2015
Time Created: 4:51:49 PM MST

Coordinate System: North America Albers Equal Area Conic

Miles
0   60   120   180   240

36

Atlantic Flyway Upper
Turkeys

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
- 1 Dot = 100 Poultry Farms

Farm Density Hawaii
- 1 Dot = 50 Poultry Farms

Flyways

Turkey Inventory
- 0 or Data Witheld
- 1 - 50,000
- 50,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- 1,000,001 - 4,800,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

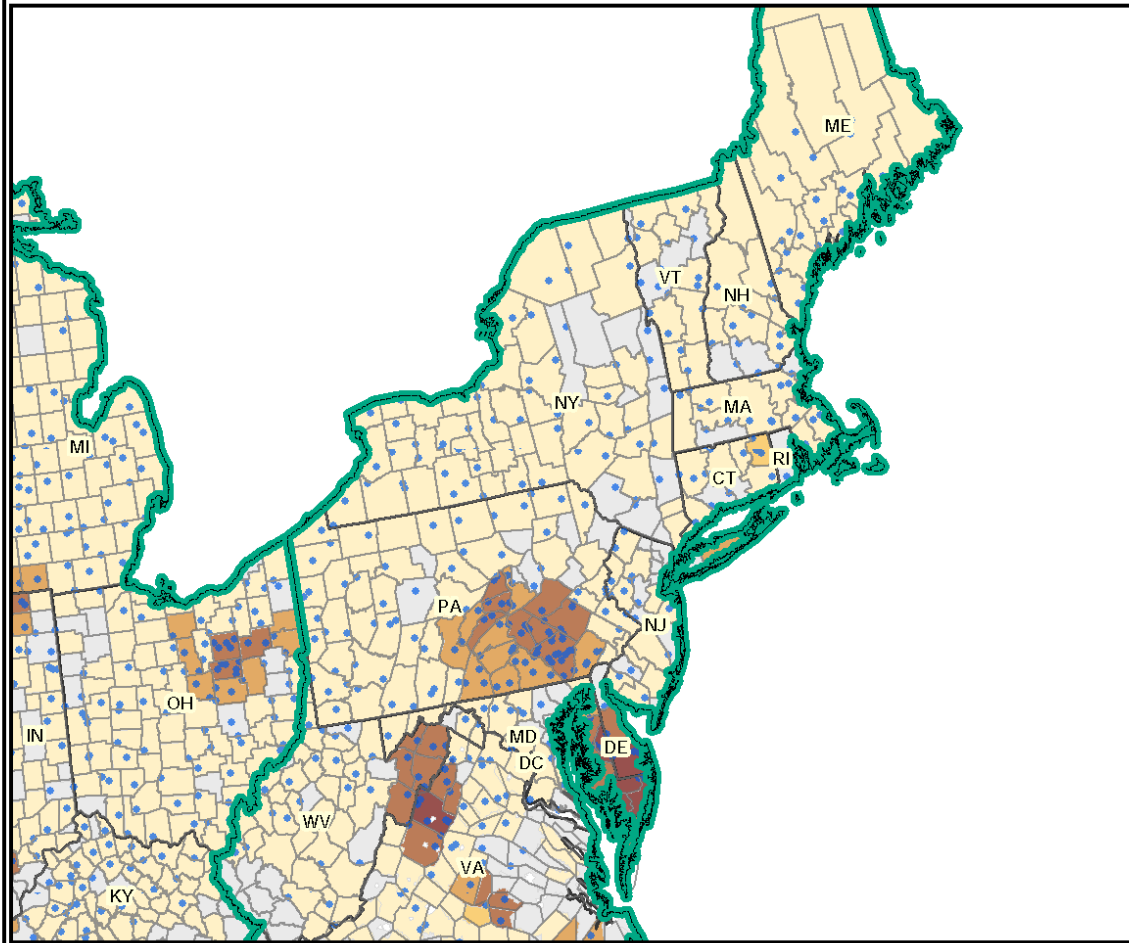Data Source:
NASS Poultry 2012

Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:51:54 PM MST

Coordinate System: North America Albers Equal Area Conic

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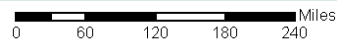
37

Atlantic Flyway Upper Layers

Atlantic Flyway Upper
Broilers

USDA United States Department of Agriculture

Flyways

ME

VT
NH

NY
MA

MI
RI
CT

PA
NJ

OH
IN
MD
DC
DE

WV

KY
VA

Farm Density Contiguous US
• 1 Dot = 100
Poultry Farms

Farm Density Hawaii
• 1 Dot = 50
Poultry Farms

☐ Flyways

Broiler Inventory
- ☐ 0 or No Data
- ☐ 1 - 50,000
- ☐ 50,001 - 100,000
- ☐ 100,001 - 1,000,000
- ☐ 1,000,001 - 10,000,000
- ☐ 10,000,001 - 50,000,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
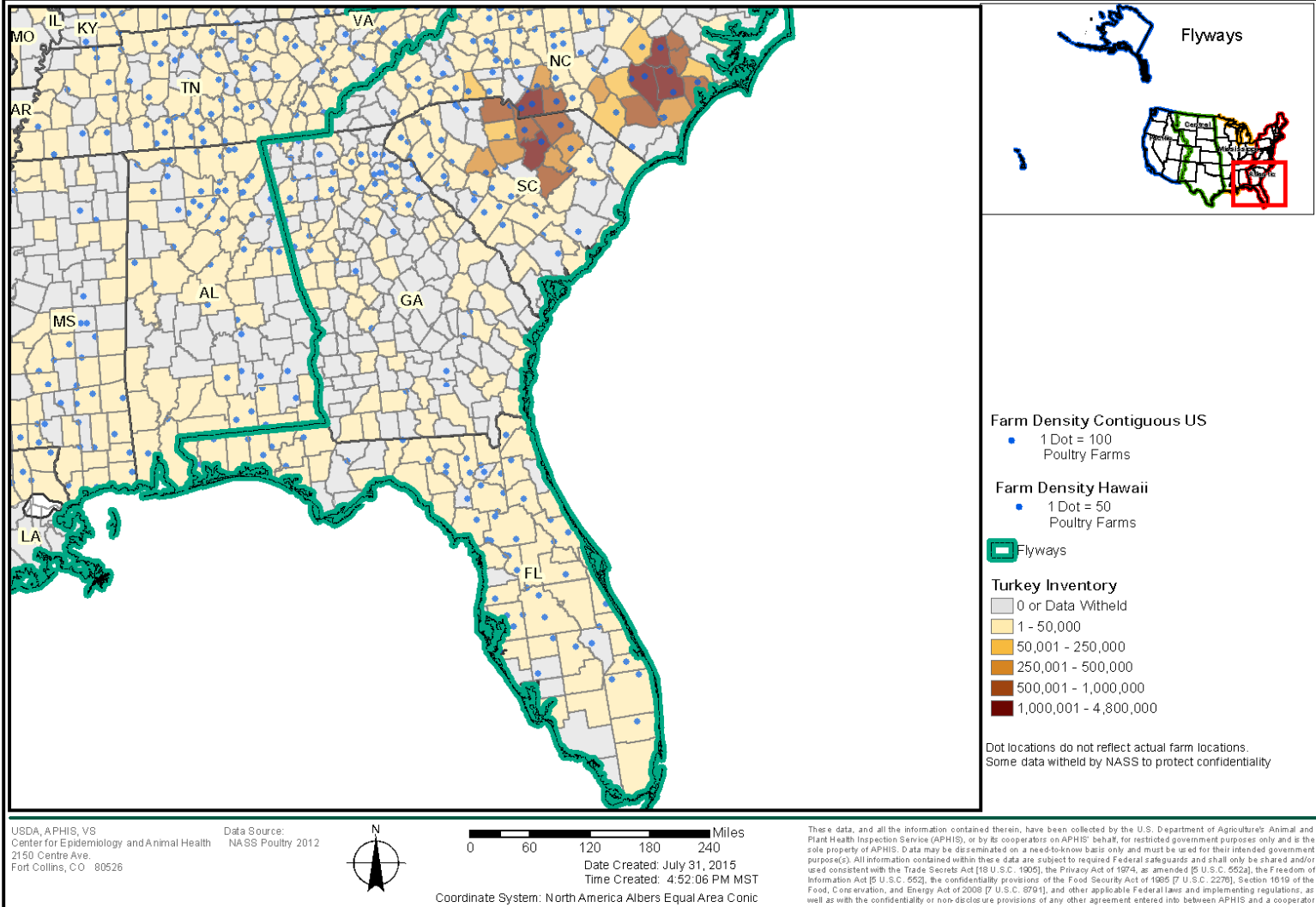NASS Poultry 2012

Miles
0   60   120   180   240

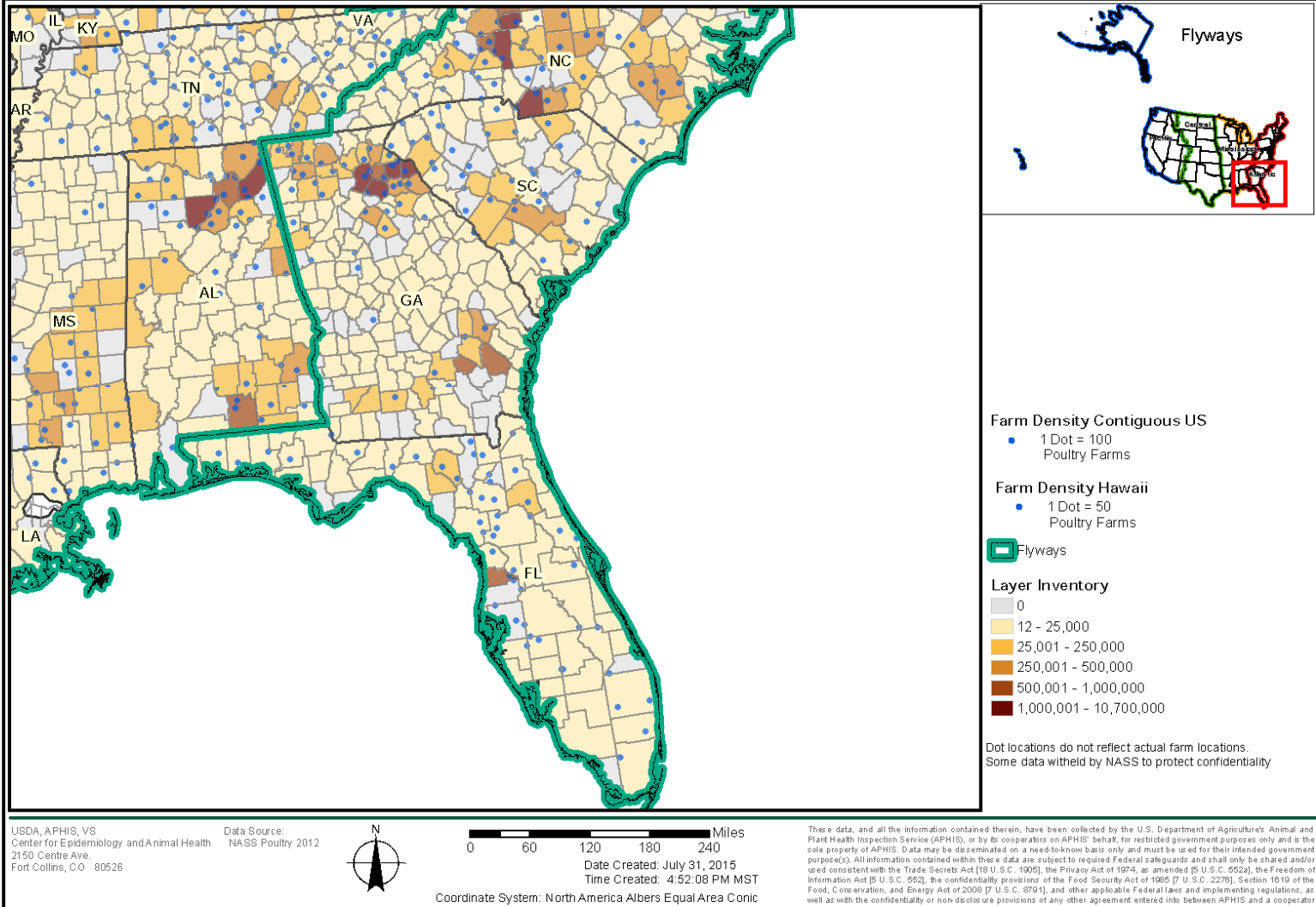Date Created: July 31, 2015
Time Created: 4:52:03 PM MST

Coordinate System: North America Albers Equal Area Conic

These data, and all the information contained therein, have been collected by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), or by its cooperators on APHIS' behalf, for restricted government purposes only and is the sole property of APHIS. Data may be disseminated on a need-to-know basis only and must be used for their intended government purpose(s). All information contained within these data are subject to required Federal safeguards and shall only be shared and/or used consistent with the Trade Secrets Act [18 U.S.C. 1905], the Privacy Act of 1974, as amended [5 U.S.C. 552a], the Freedom of Information Act [5 U.S.C. 552], the confidentiality provisions of the Food Security Act of 1985 [7 U.S.C. 2276], Section 1619 of the Food, Conservation, and Energy Act of 2008 [7 U.S.C. 8791], and other applicable Federal laws and implementing regulations, as well as with the confidentiality or non-disclosure provisions of any other agreement entered into between APHIS and a cooperator.
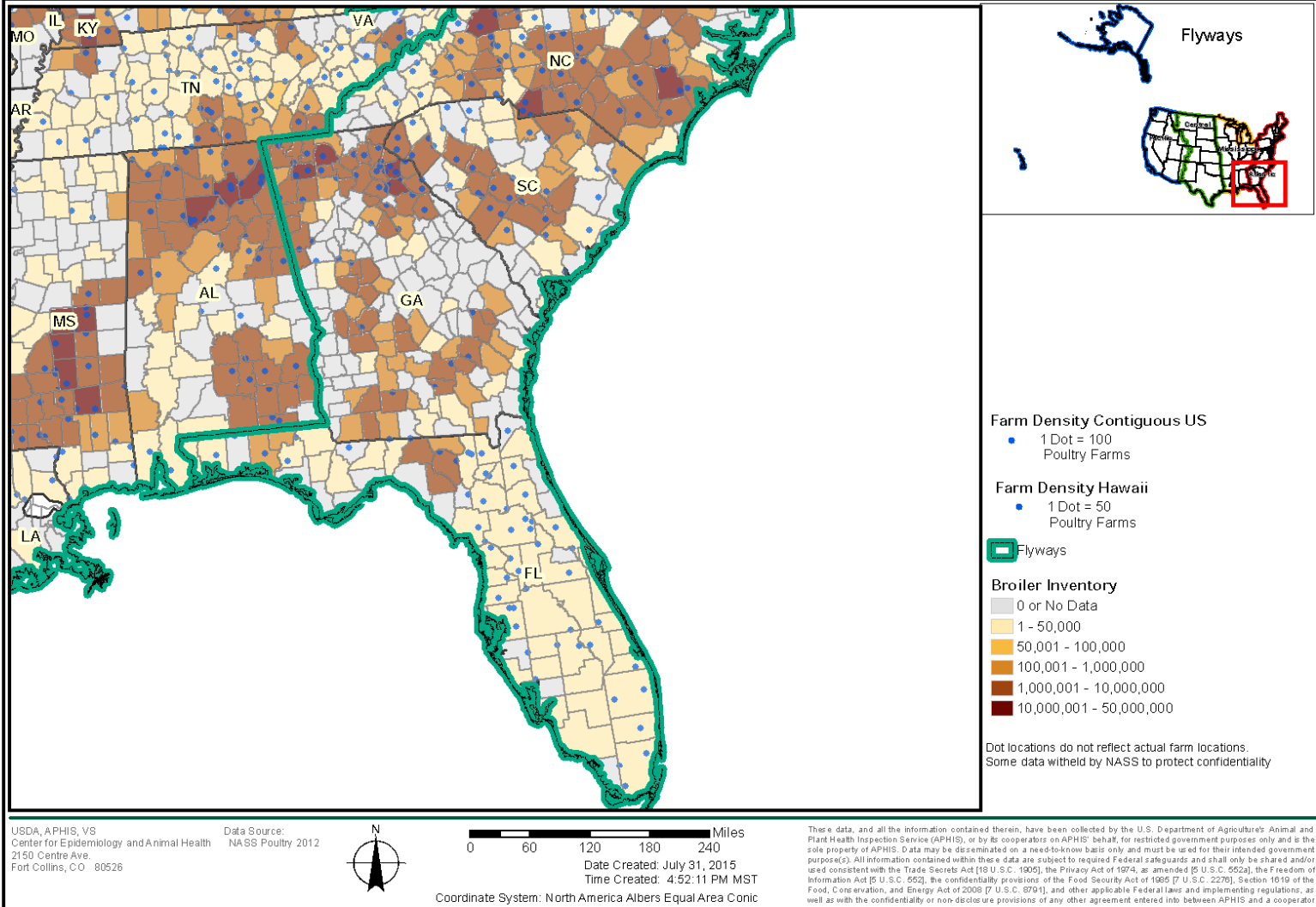
39

Atlantic Flyway Lower
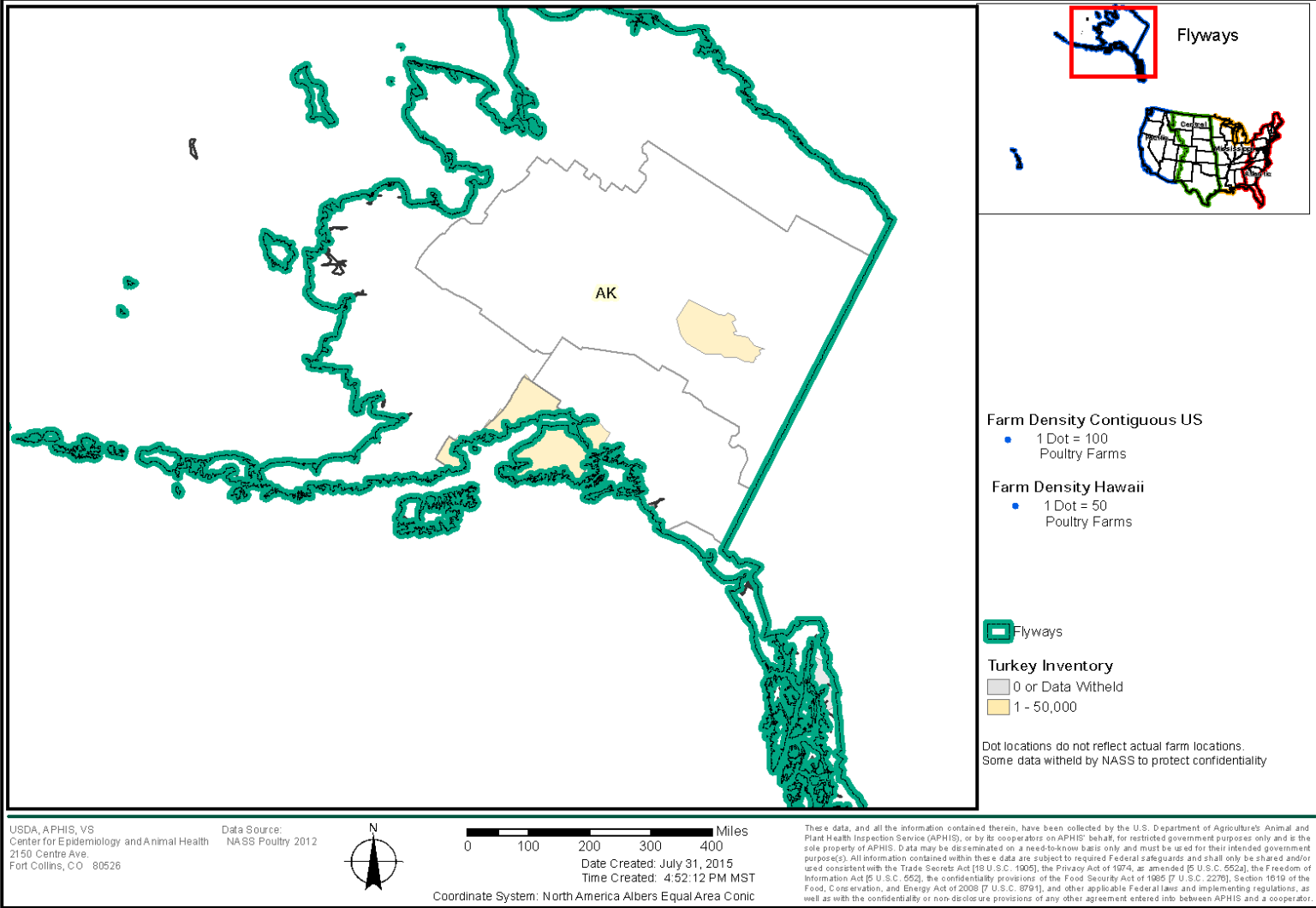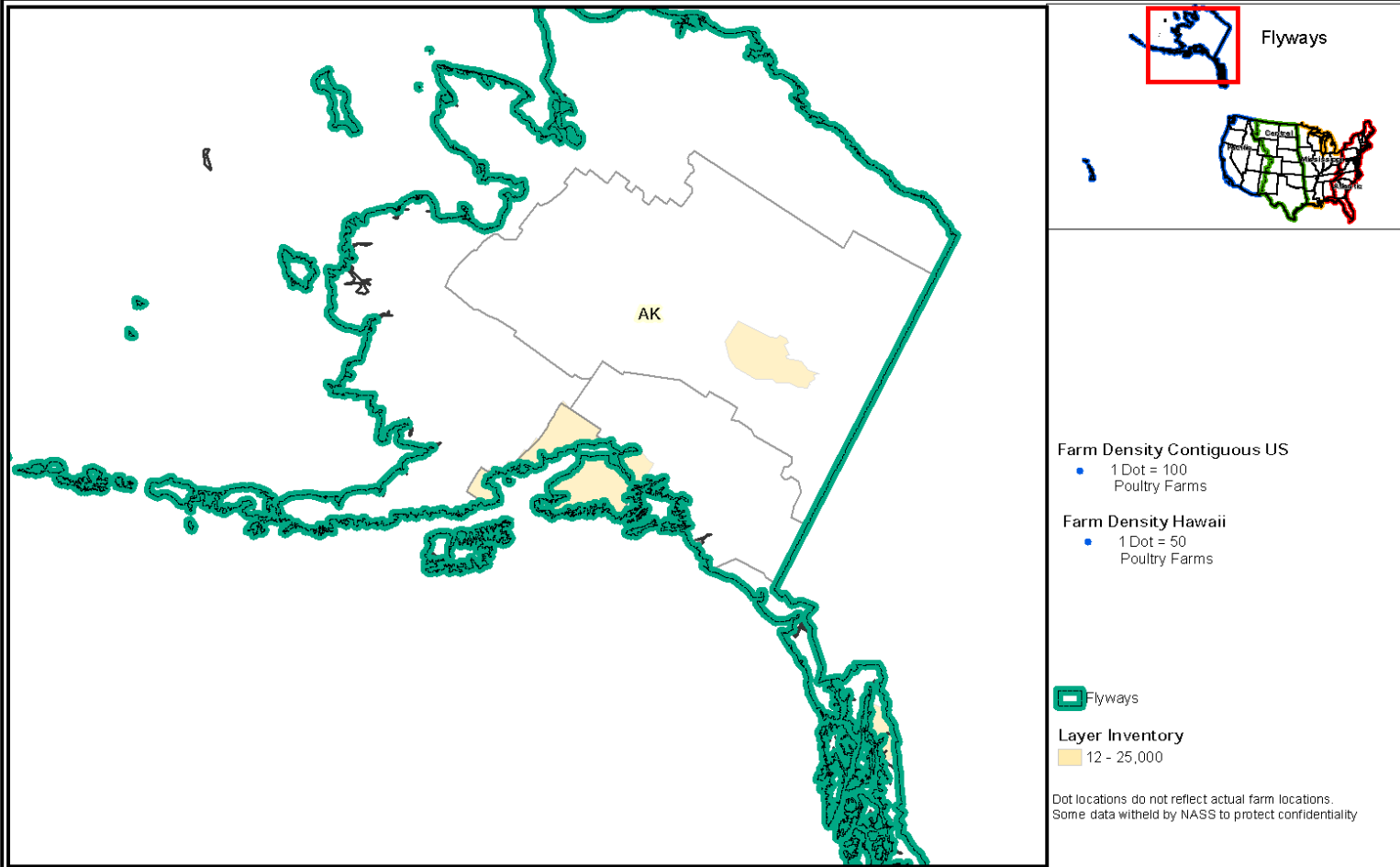Turkeys

Atlantic Flyway Lower
Layers

USDA
United States
Department of
Agriculture

Flyways

Farm Density Contiguous US
- 1 Dot = 100
  Poultry Farms

Farm Density Hawaii
- 1 Dot = 50
  Poultry Farms

Flyways

Layer Inventory
- 0
- 12 - 25,000
- 25,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- 1,000,001 - 10,700,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

N

Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:52:08 PM MST

Coordinate System: North America Albers Equal Area Conic

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41

Atlantic Flyway Lower
Broilers

USDA
United States
Department of
Agriculture

Flyways

Farm Density Contiguous US
- 1 Dot = 100
  Poultry Farms

Farm Density Hawaii
- 1 Dot = 50
  Poultry Farms

Flyways

Broiler Inventory
- 0 or No Data
- 1 - 50,000
- 50,001 - 100,000
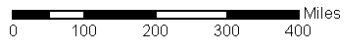- 100,001 - 1,000,000
- 1,000,001 - 10,000,000
- 10,000,001 - 50,000,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

USDA, APHIS, VS
Center for Epidemiology and Animal Health
2150 Centre Ave.
Fort Collins, CO 80526
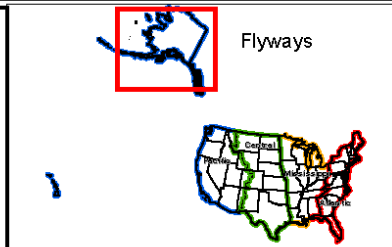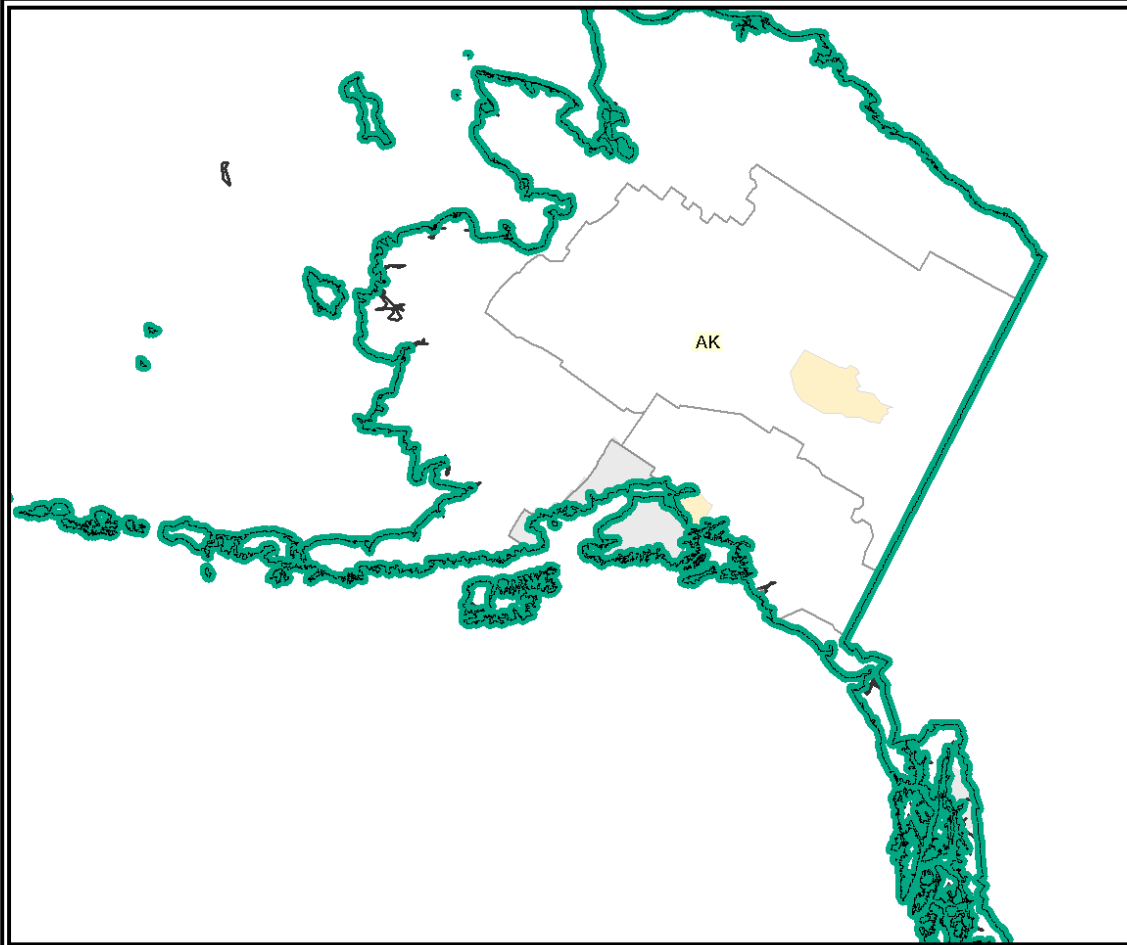
Data Source:
NASS Poultry 2012

N

Miles
0   60   120   180   240

Date Created: July 31, 2015
Time Created: 4:52:11 PM MST

Coordinate System: North America Albers Equal Area Conic

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42

Pacific Flyway Upper Alaska
Turkeys

USDA United States Department of Agriculture

Flyways

AK

Farm Density Contiguous US
• 1 Dot = 100
Poultry Farms

Farm Density Hawaii
• 1 Dot = 50
Poultry Farms

Flyways

Turkey Inventory
0 or Data Witheld
1 - 50,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

N

Miles
0 100 200 300 400

Date Created: July 31, 2015
Time Created: 4:52:12 PM MST

Coordinate System: North America Albers Equal Area Conic

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43

Pacific Flyway Upper Alaska Layers

USDA United States Department of Agriculture

AK

Flyways

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms

Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

Flyways
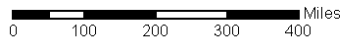
Layer Inventory
12 - 25,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
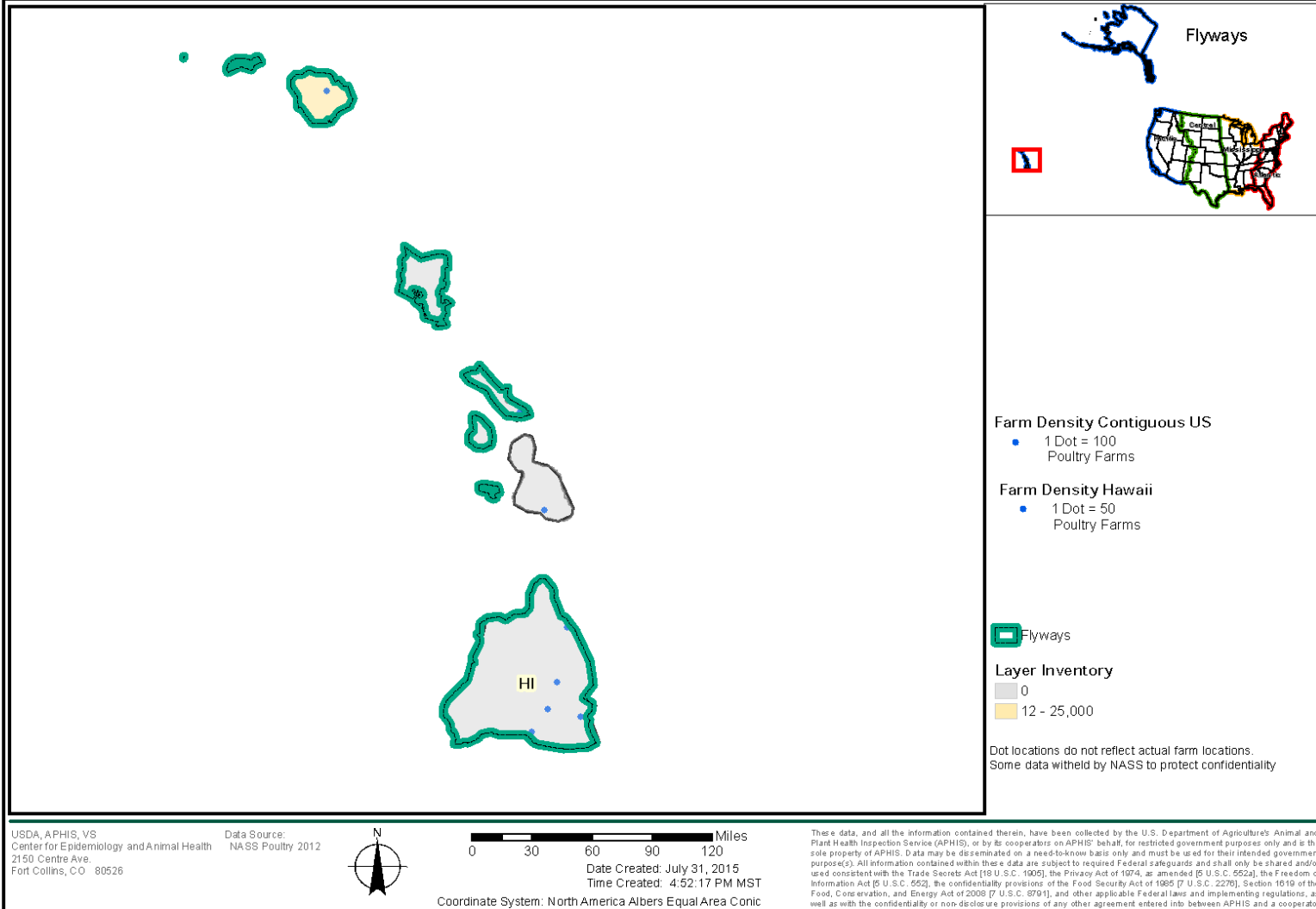NASS Poultry 2012

Miles
0   100   200   300   400

Date Created: July 31, 2015
Time Created: 4:52:13 PM MST

Coordinate System: North America Albers Equal Area Conic

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44

Pacific Flyway Upper Alaska
Broilers

Pacific Flyway Lower Hawaii
Turkeys

Flyways

Farm Density Contiguous US
- 1 Dot = 100 Poultry Farms

Farm Density Hawaii
- 1 Dot = 50 Poultry Farms

Flyways

Turkey Inventory
0 or Data Witheld

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

HI

N

Miles
0   30   60   90   120

Date Created: July 31, 2015
Time Created: 4:52:15 PM MST
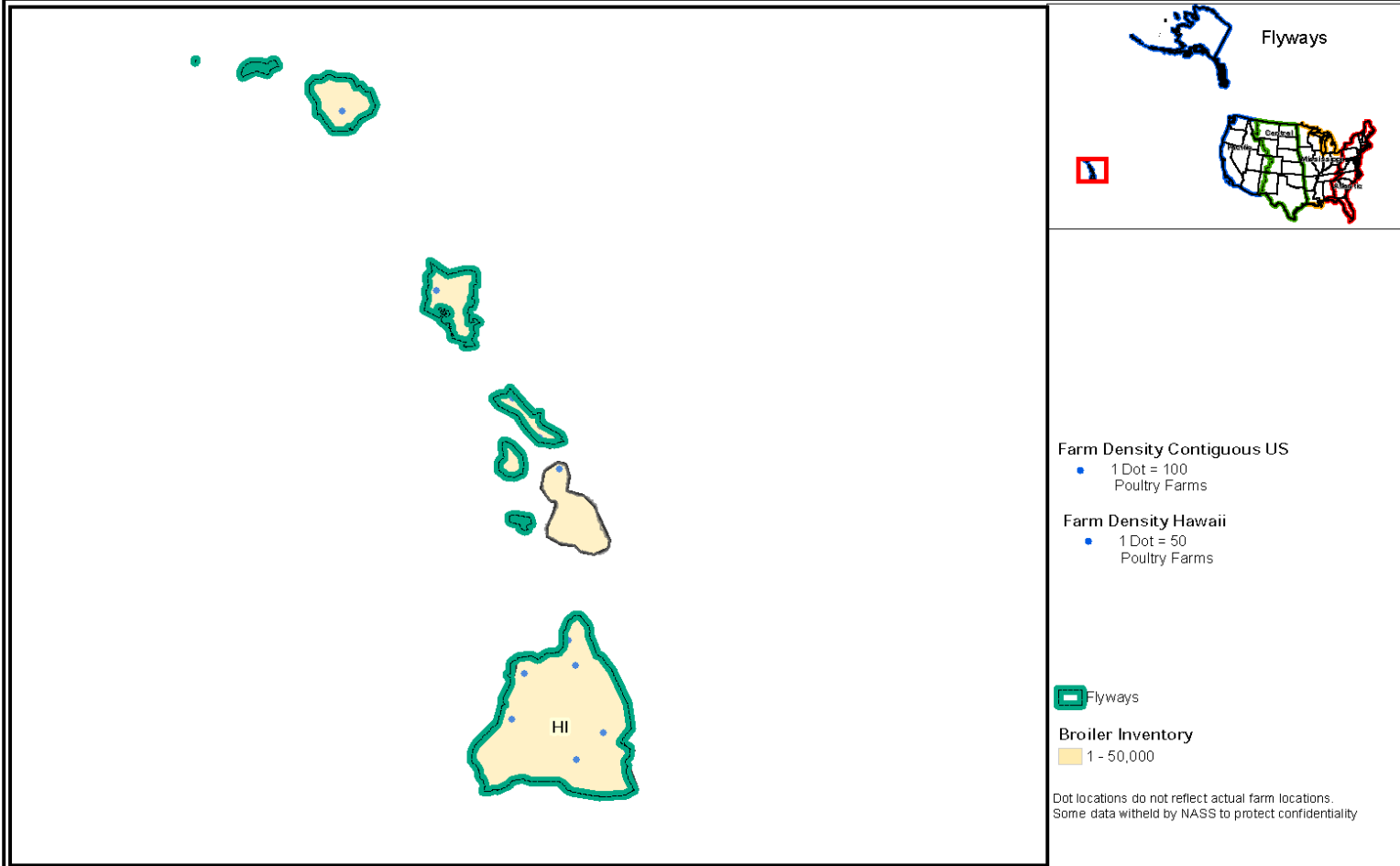Coordinate System: North America Albers Equal Area Conic

46

Pacific Flyway Lower Hawaii
Layers

USDA
United States
Department of
Agriculture

Flyways

Farm Density Contiguous US
- 1 Dot = 100
  Poultry Farms

Farm Density Hawaii
- 1 Dot = 50
  Poultry Farms

Flyways

Layer Inventory
0
12 - 25,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

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

Data Source:
NASS Poultry 2012

Miles
0   30   60   90   120

Date Created: July 31, 2015
Time Created: 4:52:17 PM MST

Coordinate System: North America Albers Equal Area Conic

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47

Pacific Flyway Lower Hawaii
Broilers

USDA United States Department of Agriculture

Flyways

Farm Density Contiguous US
• 1 Dot = 100 Poultry Farms

Farm Density Hawaii
• 1 Dot = 50 Poultry Farms

□ Flyways

Broiler Inventory
☐ 1 - 50,000

Dot locations do not reflect actual farm locations.
Some data witheld by NASS to protect confidentiality

HI

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

Data Source:
NASS Poultry 2012

N

Miles
0   30   60   90   120

Date Created: July 31, 2015
Time Created: 4:52:18 PM MST
Coordinate System: North America Albers Equal Area Conic

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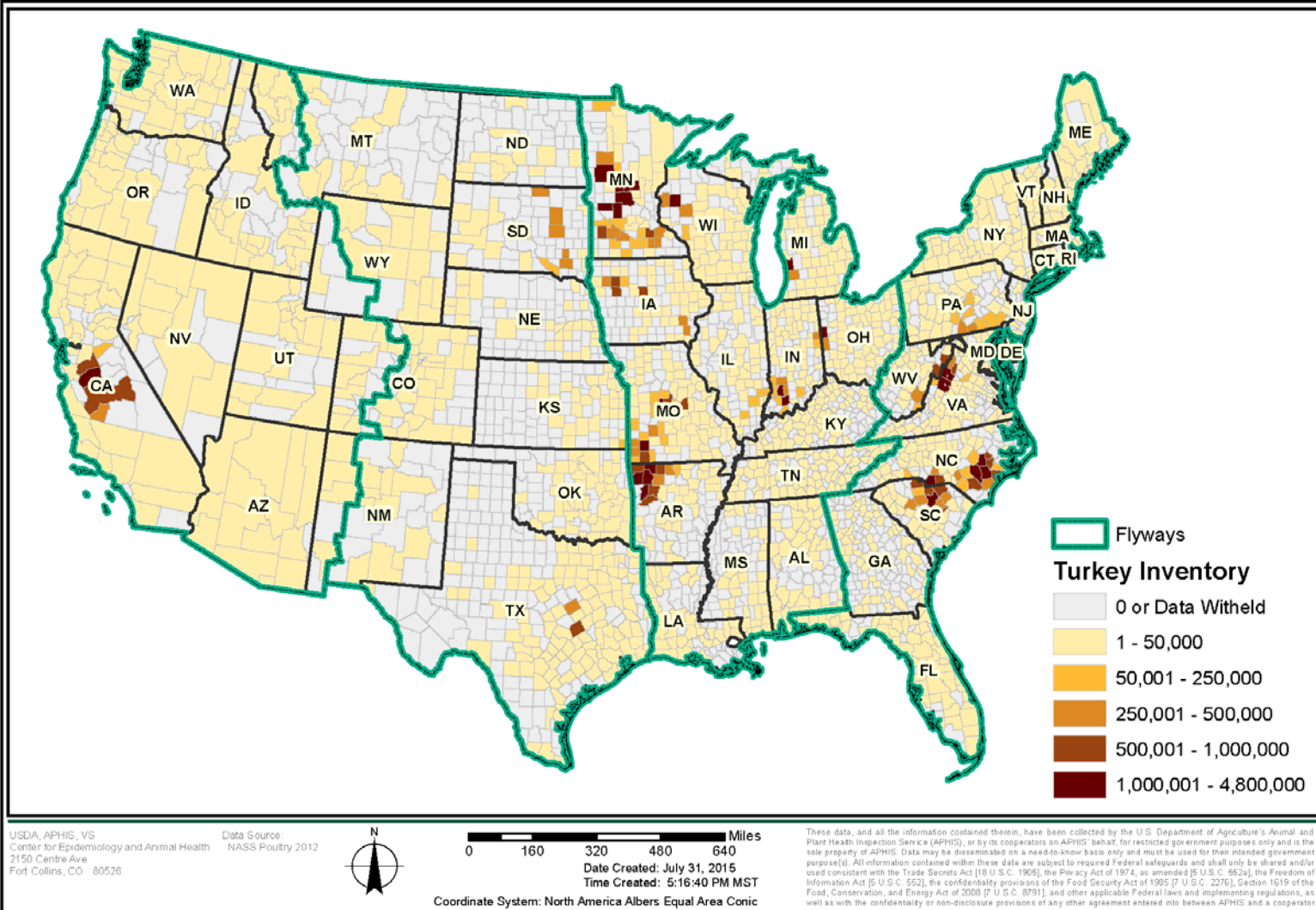
48

Map Book #3. National commodity maps
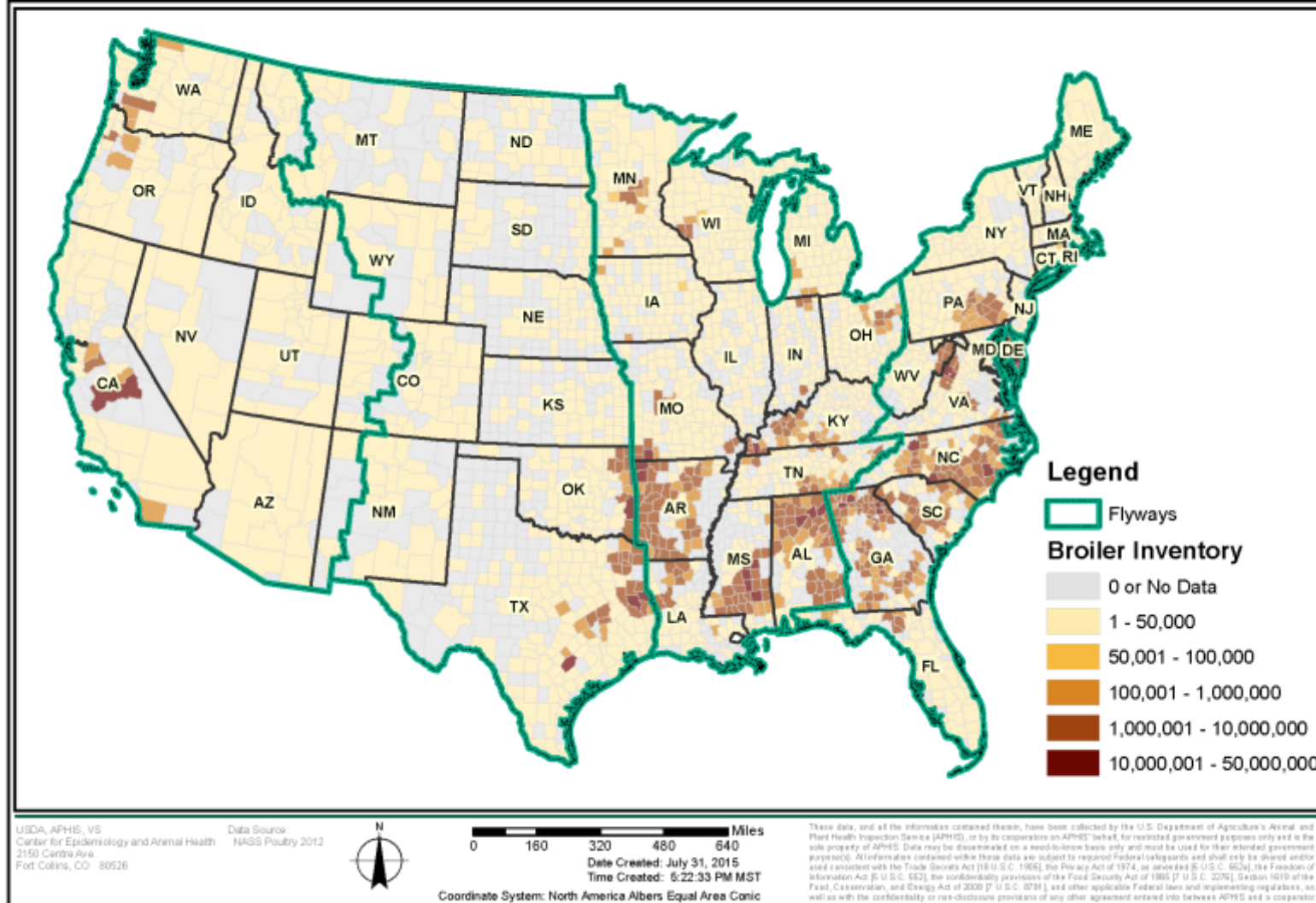
National Turkey Inventory

Map Book #4. National backyard map