

Final Report for the APHIS VS Response to the 2016–2017 New World Screwworm Outbreak in Florida *May 30, 2017*



USDA Animal and Plant Health Inspection Service (APHIS)
Veterinary Services (VS)
National Preparedness and Incident Coordination

Outline

- **Background & Overview**
- **Characteristics of the 2016–2017 Outbreak**
- **Incident Management**
- **Highlights of Response Activities**
- **Conclusion**



2017 Final Report

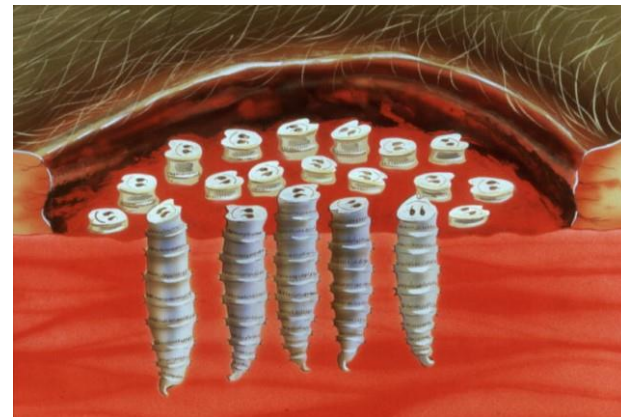


The Interdiction Station (animal checkpoint) in 2016 on Key Largo.

Background & Overview

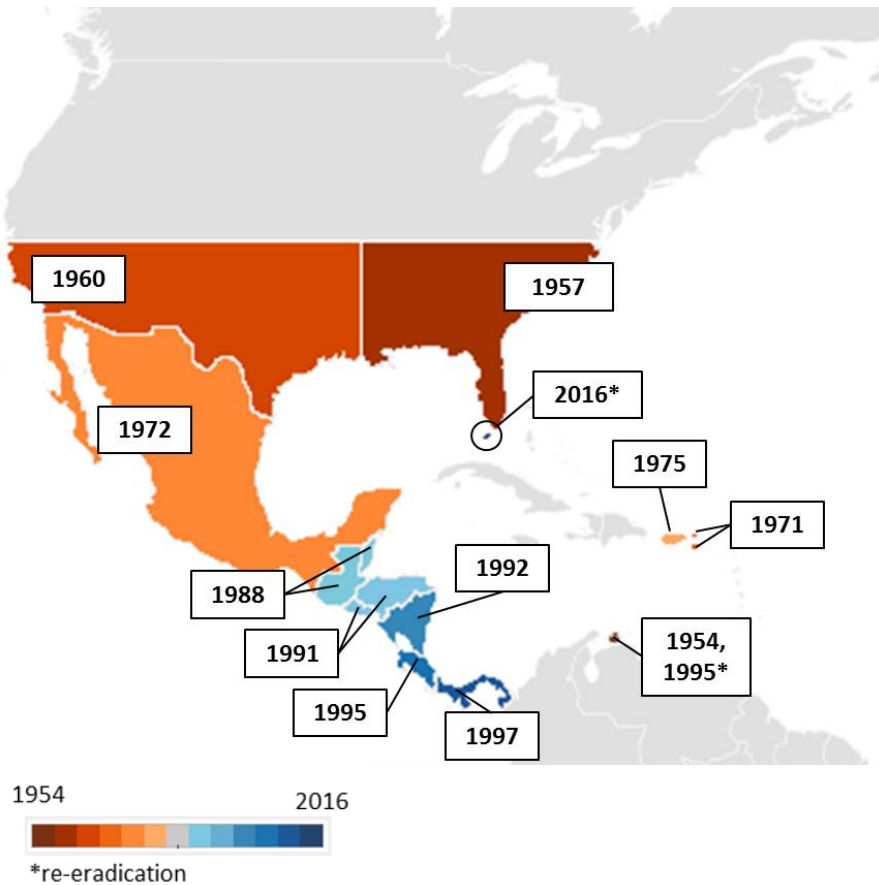
Nature of Disease

- New World screwworms (NWS) are larvae of the fly *Cochliomyia hominivorax*.
- Female flies lay eggs in wounds or on mucous membranes of warm-blooded animals.
- Once hatched, they burrow into the animal to feed, resulting in myiasis.
- Severe infestations are almost always fatal if untreated.



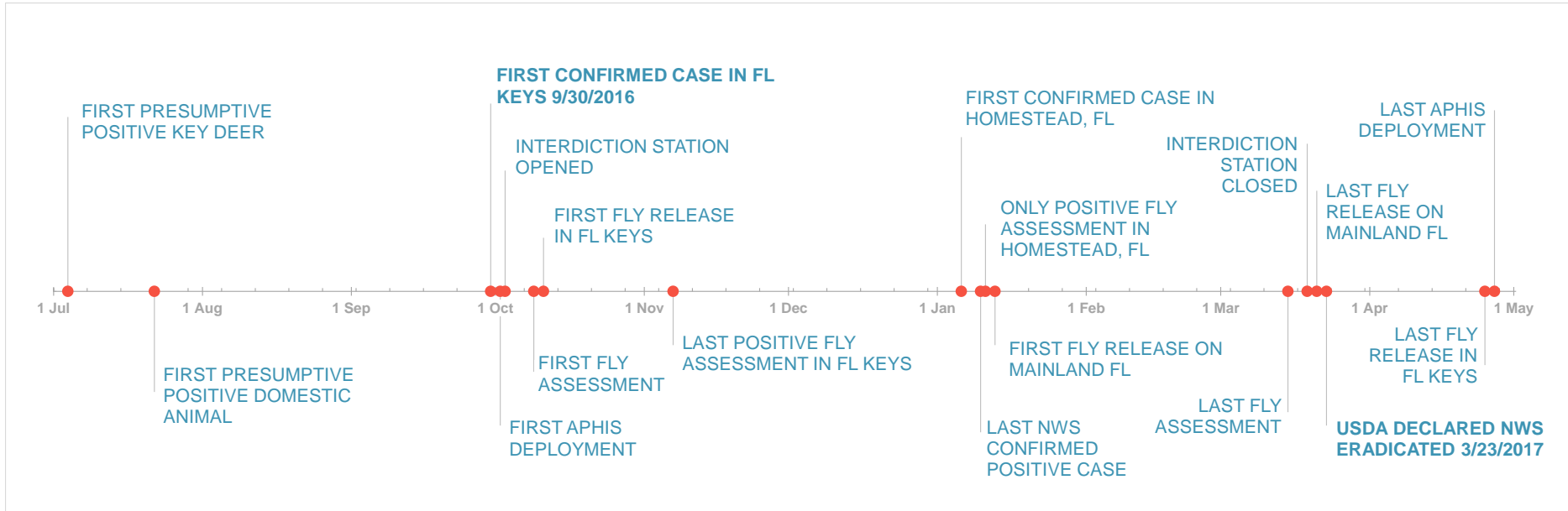
Prior Outbreaks

NWS Eradication Programs, by Start Date



- NWS present in the Southwest since the mid-1800s.
- Significant problem in the Southeast in the 1930s.
- Eradication declared in 1966 with the use of the Sterile Insect Technique (SIT).
- The United States & Mexico partnered and pushed pest to southern Mexico by 1986.
- To further prevent spread, the coalition was founded— Commission for the Eradication and Prevention of NWS (COPEG).

Incident Timeline



Significant Events

July 4, 2016	First presumptive positive animal
September 30, 2016	Confirmation of NWS in the Florida Keys by National Veterinary Services Laboratories (NVSL) in a Key deer
October 3, 2016	Interdiction Station opened in Key Largo, operated 24/7
October 11, 2016	First sterile fly release in the Keys
January 6, 2017	Confirmation of NWS on the Florida mainland in Homestead
January 11, 2017	Last positive fly assessment
January 13, 2017	First sterile fly release on mainland
March 23, 2017	USDA APHIS declared NWS eradicated
April 25, 2017	Last sterile fly release

Incident Overview

- In July 2016, severe flystrike wounds were observed in a Key deer (an endangered sub-species of deer).
- On September 29, 2016 the National Key Deer Refuge in Big Pine Key, Florida contacted the Florida Department of Agriculture and Consumer Services (FDACS), who then submitted a Foreign Animal Disease (FAD) investigation to NVSL—confirmed positive on September 30, 2016.
- There were confirmed animal infestations on 6 different islands in the Florida Keys.
- In total, there were 145 cases:
 - 128 presumptive positive cases and
 - 17 confirmed cases in the FL Keys, with the majority, or 135, of those positive cases observed in Key deer.
- No production livestock were ever affected in either location.

Summary of Response Activities

USDA APHIS International Services (IS), in partnership with Veterinary Services (VS), organized a unified Incident Command with FDACS and Monroe County, Florida.

Some response activities included:

- Collecting samples and diagnostic testing
- Establishment of an Incident Command Post (ICP)
- Implementation of the SIT on the Keys and Florida mainland
- Establishment of an Interdiction Station
- Safeguarding animal welfare during operations
- Planning and carrying out epidemiological investigations and tracing
- Managing information from the field to the national level
- Coordinating and communicating with States, local governments, and stakeholders, along with the public
- Providing documentation for regionalization for international trade.

2017 Final Report



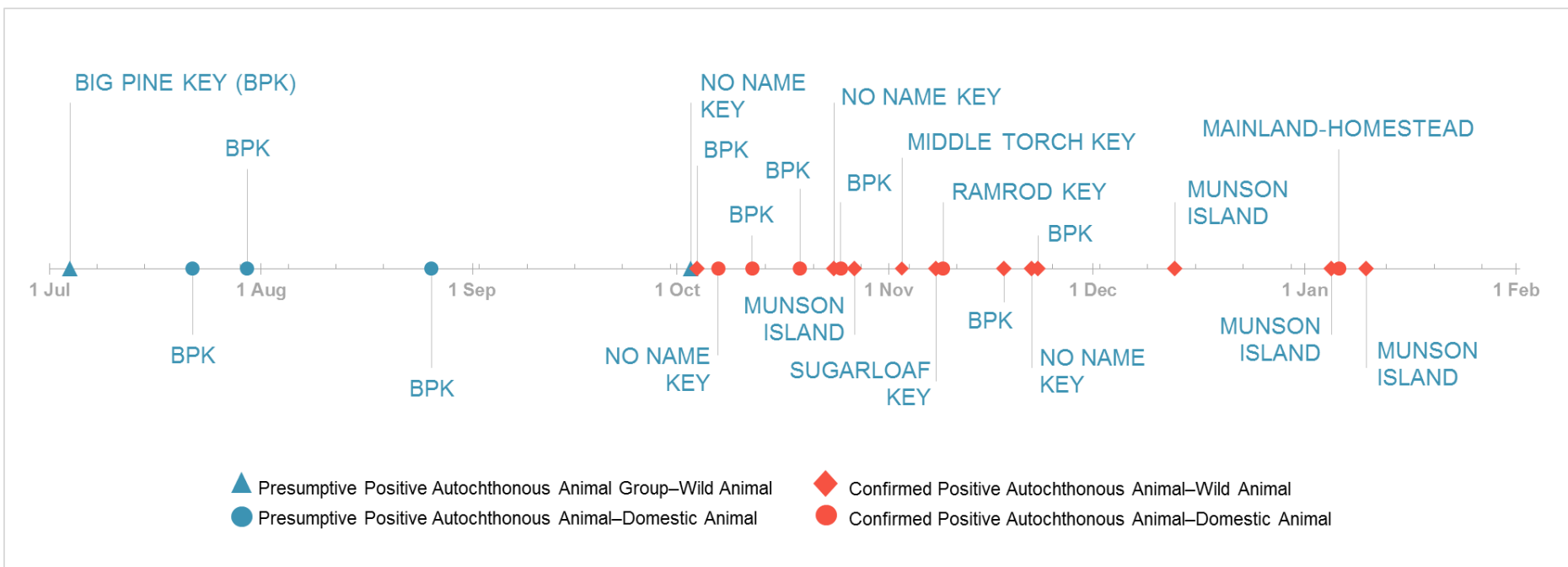
A pupae container delivered from the Panama COPEG facility for fly release in Florida.

Characteristics of the 2016–2017 Outbreak

Scope of the Outbreak

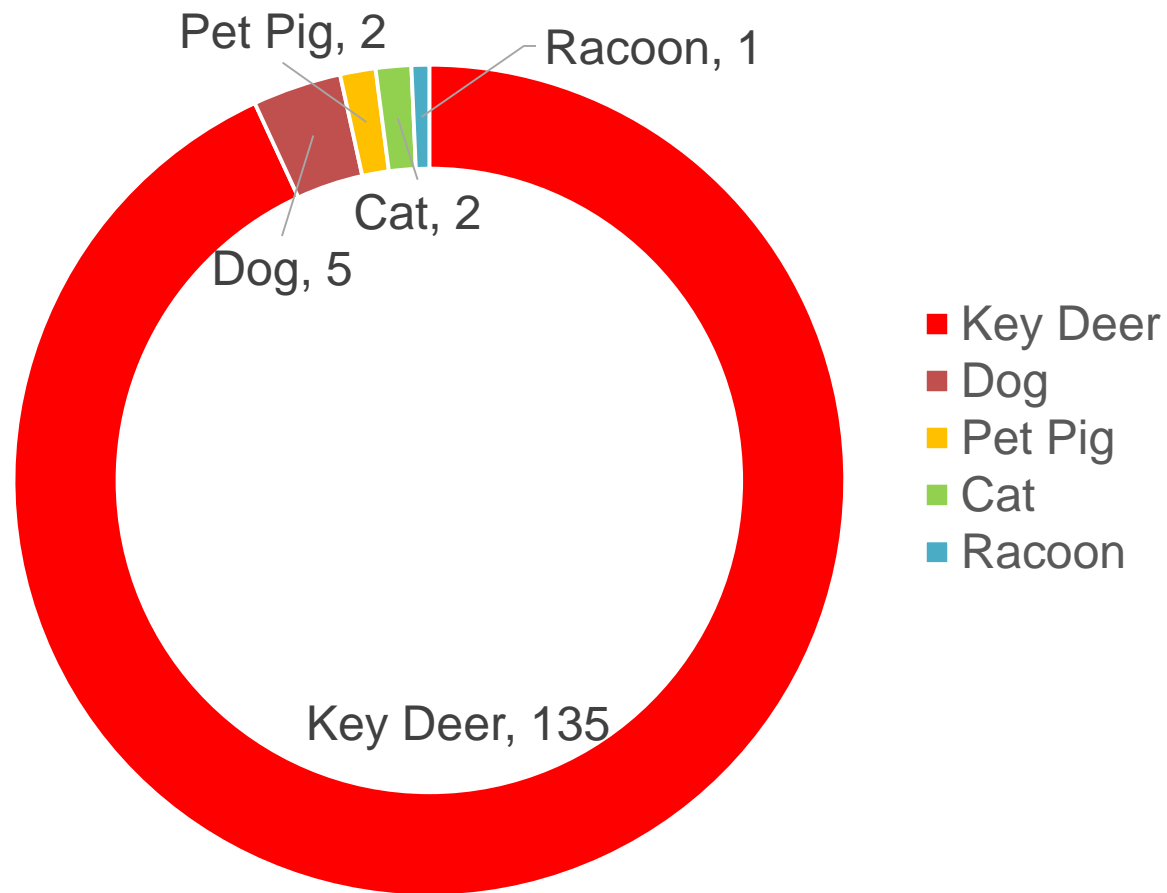
- For the majority of the outbreak, NWS was confined to the Florida Keys (Monroe County) in Key deer:
 - 10 confirmed and 125 presumptive positive.
- Only one case was detected on the Florida mainland in a domestic dog.
- In total:
 - Animal infestations were detected on 6 Keys, in addition to one case on the mainland.
 - Wild, fertile NWS flies were identified on 13 individual Keys.
- Additionally:
 - Other confirmed wild animal case: 1 raccoon
 - Confirmed domestic animal cases: 3 dogs, 2 cats, 1 pet pig
 - Presumptive domestic animal cases: 2 dogs, 1 pet pig.

Presumptive & Confirmed Autochthonous Detections*



* Timeline does not reflect the total number of animals affected (cases), only distinct presumptive and confirmed autochthonous detections in distinct rows. An “animal group” indicates a specific number of deer that were identified to meet the presumptive positive case definition. The total number of presumptive and confirmed cases is pictured in the following slide.

Presumptive & Confirmed Autochthonous Cases by Species



Disease Incidence & Epidemiology

- Index case was confirmed September 30, 2016; however, infestations of Key deer were anecdotally observed as early as July 4, 2016.
- By August, National Key Deer Refuge recorded double mortality rate compared to average.
- Interviews in September with local veterinarians revealed highly unusual myiasis observations in pets in July & August near the National Key Deer Refuge.
- Mortality rates in Key deer continued in October, rising to nearly 100 in that month alone.
- The last confirmed positive autochthonous case was confirmed January 10, 2017.

Disease Incidence & Epidemiology *continued*

- A domestic dog was confirmed by NVSL on January 6, 2017.
- Fly assessments resulted in one positive wild screwworm fly identified January 11, 2 miles from the mainland index site.
- Epidemiological investigation suggests:
 - Flies absent from the United States until Spring of 2016.
 - Delay in NWS identification complicated determination of pathway introduction—not yet determined.
 - Inconclusive genotyping due to lack of publicly available data on mitochondrial DNA.

2017 Final Report



Fly release chamber.

Incident Management

Regulatory Intervention

The State of Florida issued a Declaration of Agricultural Emergency in Monroe County, Florida on October 3, 2016.

- Included the establishment of an Interdiction Station, also known as the animal health check zone or checkpoint.



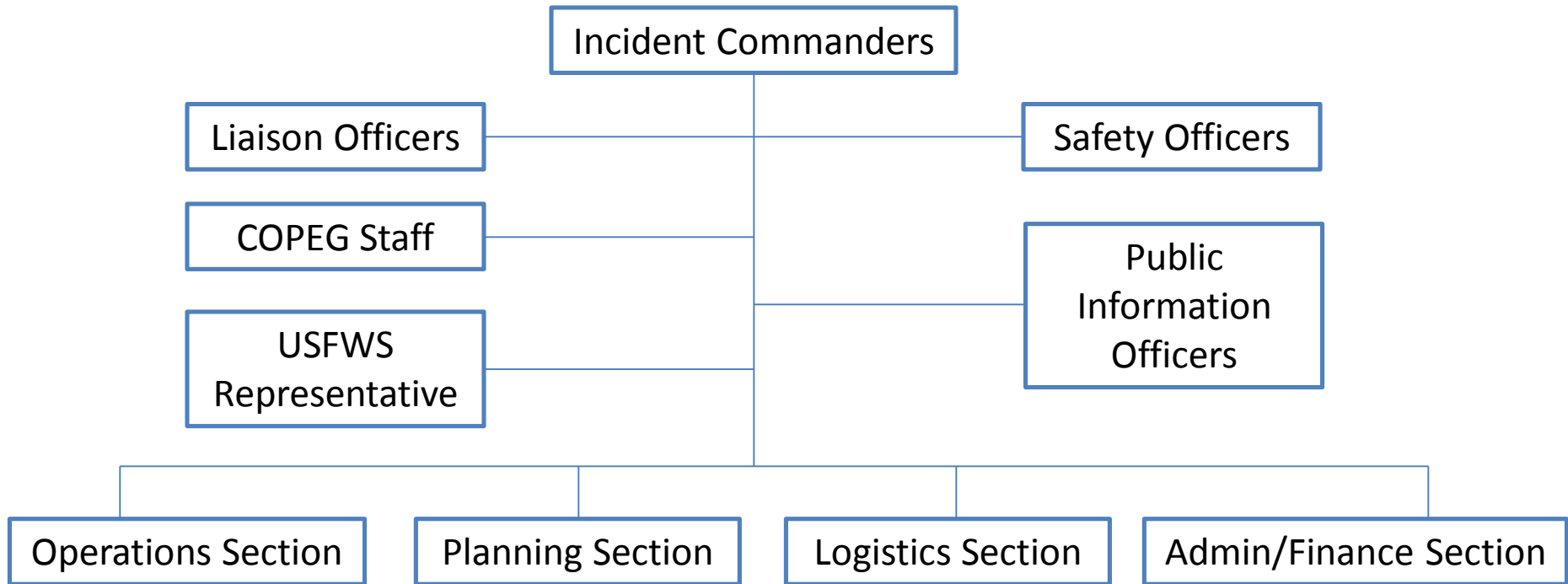
Incident Management Overview

- FDACS, Monroe County, Florida and USDA APHIS established a unified Incident Command (IC) and ICP in Marathon, Florida.
- VS District 2 personnel and other APHIS personnel were rotationally deployed to support unified IMT.
- APHIS National Incident Coordination Group (ICG) and Multiagency Coordination Group (MAC) provided further support.
- A unified Joint Information Center (JIC) was virtually established.

Unified Incident Command

- The unified IC was directed by subject matter experts from varying agencies.
 - Primarily staffed with Surveillance, Preparedness, and Response Services District 2 personnel.
- A forward Operational Base was established in Homestead, Florida, under the command and control of the existing unified IC to handle outreach, and response activities on the mainland.

Unified Incident Command Example



During the incident, each box would represent multiple individuals with the same position from differing agencies. For example, there were at least 2 Incident Commanders, one from USDA and another from FDACS. This organizational chart varied during the incident.

Incident Coordination & Multiagency Coordination

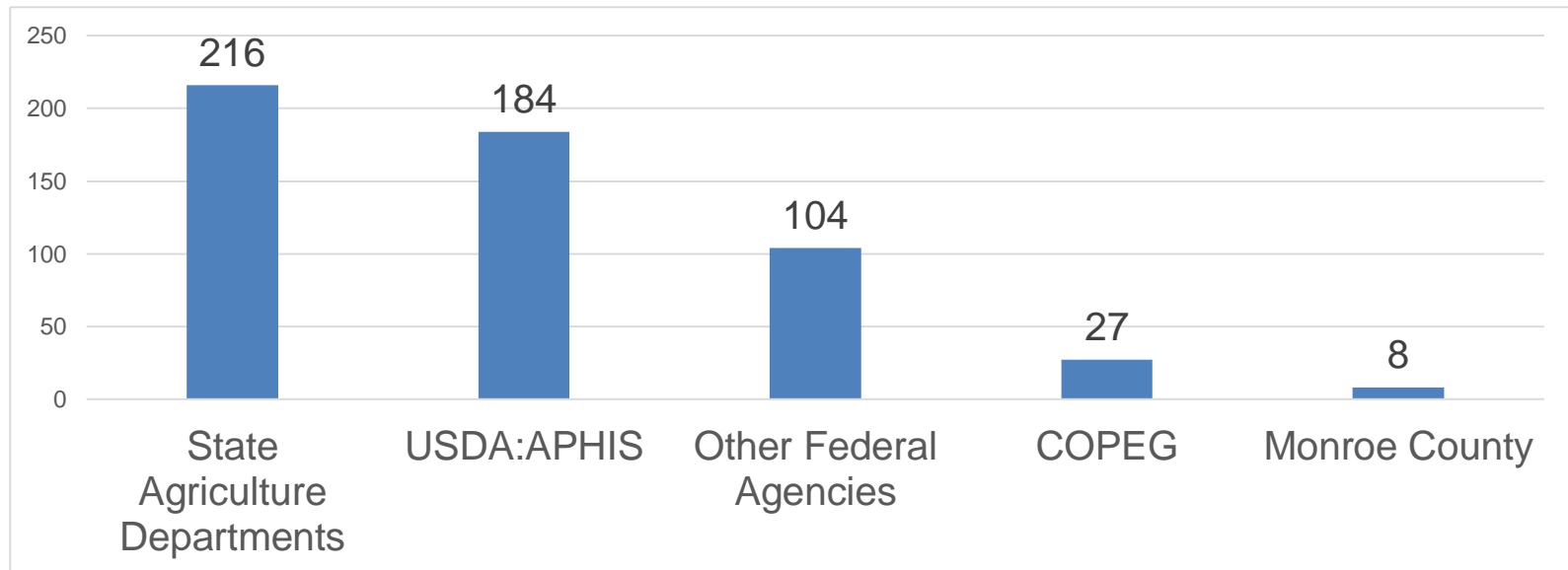
- The National ICG was lead by the National Incident Coordinator and a Deputy.
 - Height of response= 35 individuals
- The mini-MAC group met as needed to address any emerging issues, particularly resource requirements and priorities.
- Jointly the ICG, mini-MAC, and unified IC developed short- and long-term operational plans.

Personnel

- For the entire incident, there were 539 total deployments by 350 individual personnel; 95% were on-site Florida (remainder virtual).
- Personnel were deployed to either the Marathon ICP, the Interdiction Station, or the forward Operational Base near Homestead.
- FDACS rotations accounted for 40% of total deployments; APHIS rotations accounted for 35%.

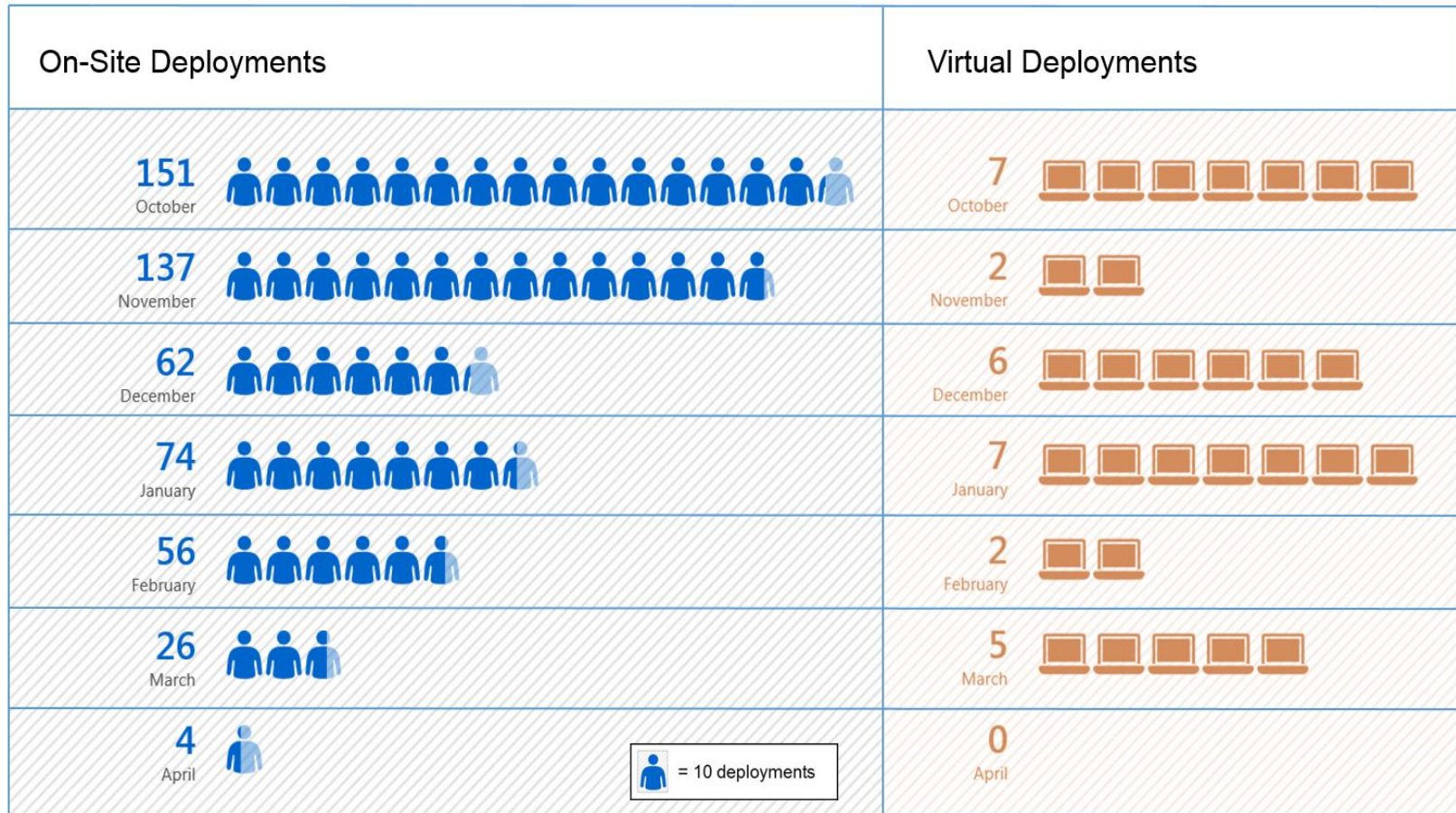
Total Deployments

The figure below represents the total deployments by organization for both virtual and on-site deployments.



Monthly Deployments

The figure below illustrates both virtual and on-site deployments from October 2016 (first deployment) to April 2017 (last deployment) for all organizations.



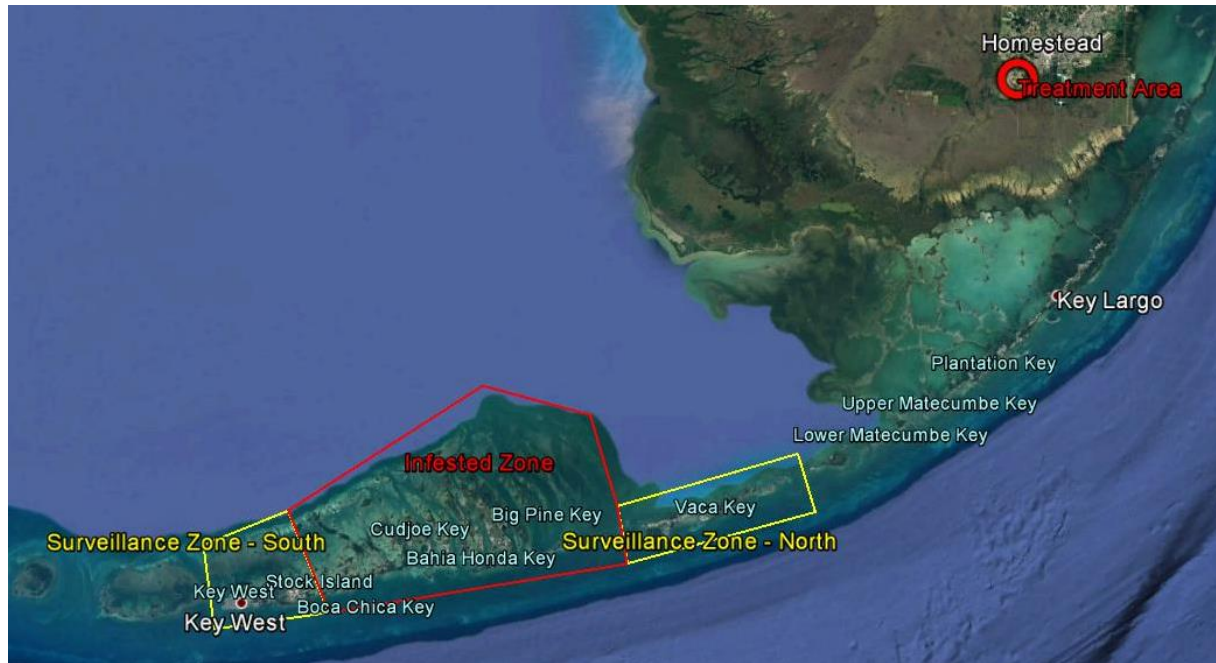
Zoning Area 10/24/16 to 1/4/17

In the Florida Keys the unified IC established Zones: Infested Zone, Barrier Zone, and Surveillance Zones.



Zoning Area 1/5/17 to 3/23/17

No wild flies were detected in the Barrier Zone, therefore eliminated, and Homestead area incorporated (Treatment Area)—zones were re-designated.



All zones were released on March 23, 2017, when USDA declared the eradication of NWS from the State of Florida.

International Commerce & Trade

- Minimal impact to commerce and trade—no countries banned exports from the United States.
 - No NWS infestations identified in production livestock.
- Temporary restrictions placed on movements of certain animals to selected countries.
 - Many removed restrictions after the United States provided evidence that NWS was limited to southern Florida.
- Minor impact to interstate trade.
 - Restrictions lifted as of April 26, 2017

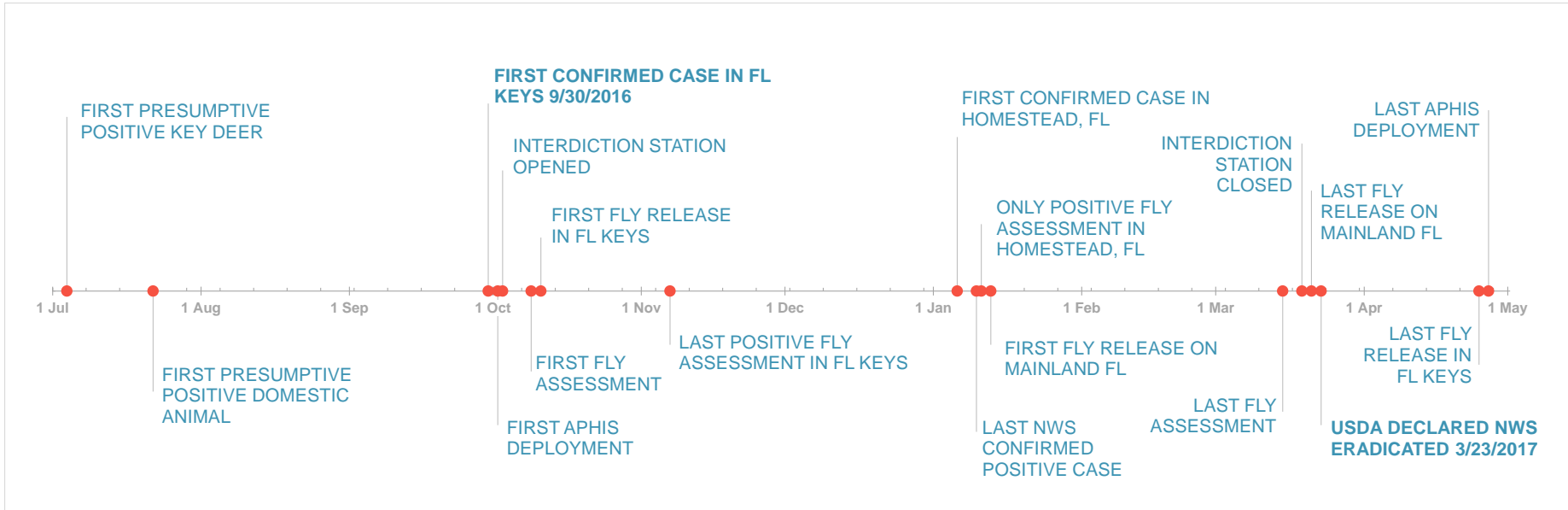
2017 Final Report



Larvae being collected from an infested deer.

Highlights of Response Activities

Overview of Response Effort



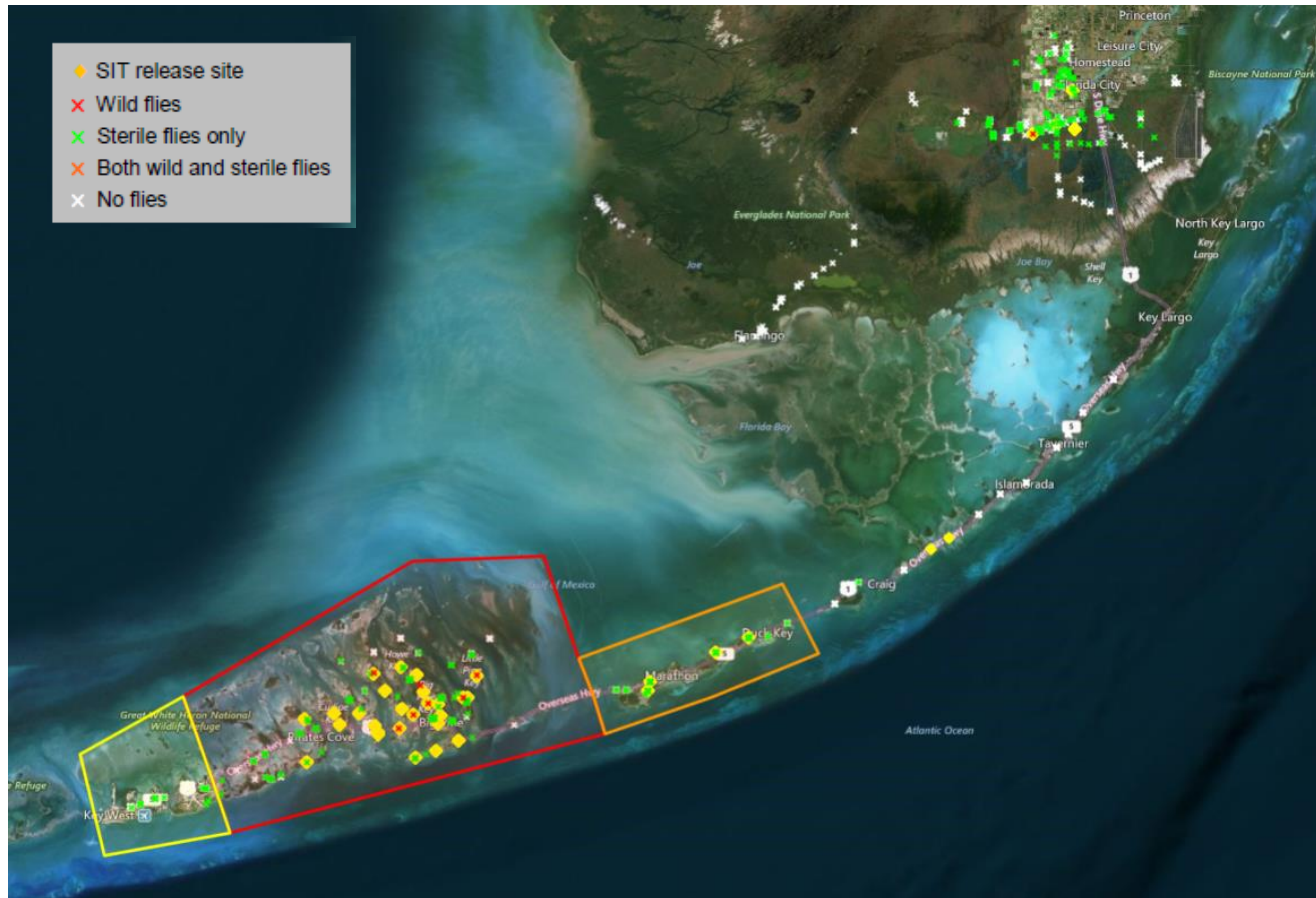
Surveillance & Diagnostics

Fly Site Assessments

- Fly site assessments were conducted to determine the extent of the NWS infestation—in the form of passive trapping (wind-oriented sticky trap) and observational surveillance by technical experts.
- In total,
 - assessments were conducted on approximately 45 islands, and on the mainland.
 - over 730 assessments were conducted.
- The last NWS fly were found on the Keys on November 7, 2016 and on the mainland on January 11, 2017.

Surveillance & Diagnostics

Location of Fly Site Assessments



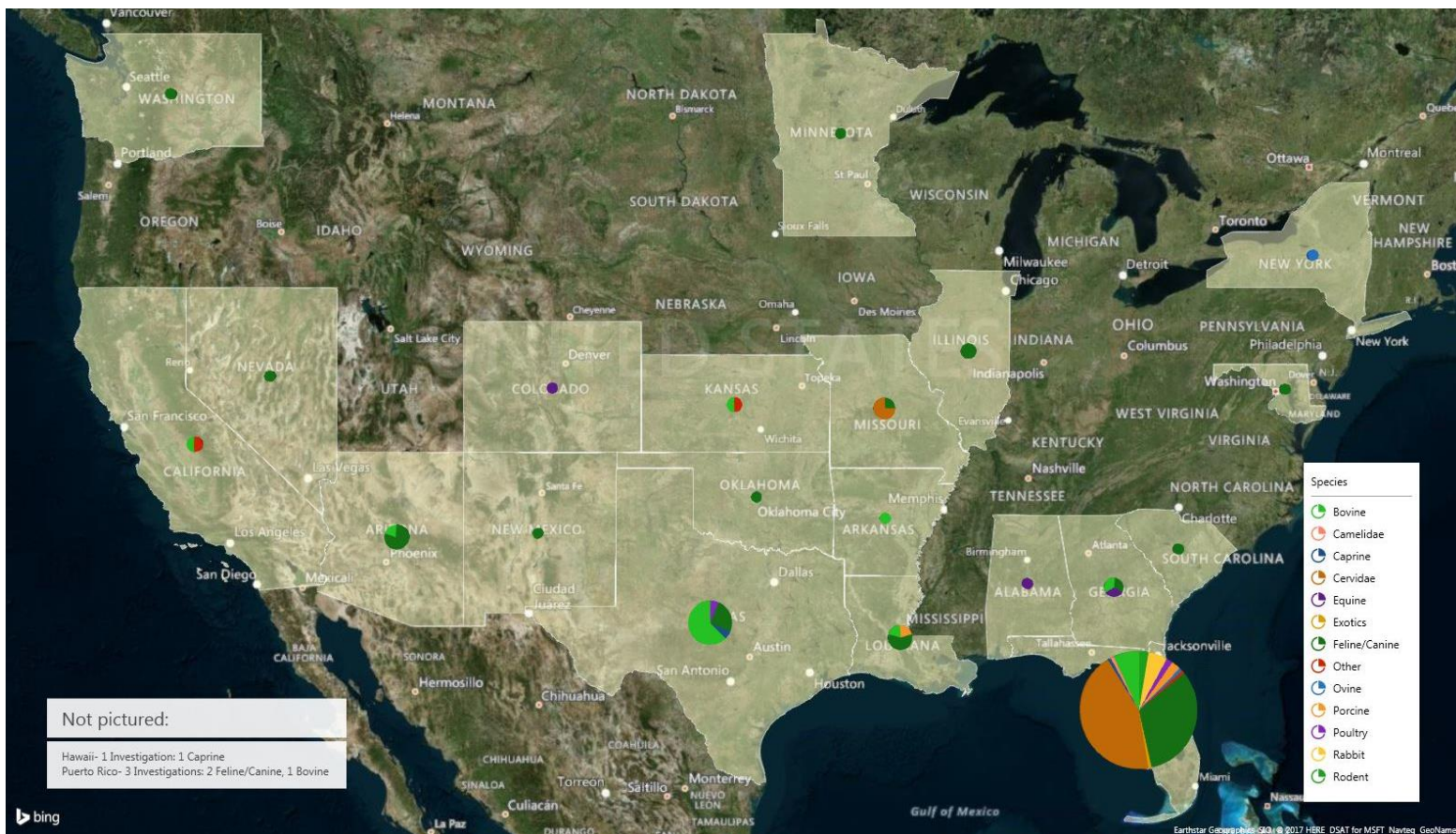
Surveillance & Diagnostics

Active & Passive Surveillance

- Sick animal calls were investigated by State and Federal personnel.
- In the Keys, all animal-related facilities were visited to identify additional infestations.
- On the mainland,
 - all animal related facilities were visited within a 10 mile radius of the dog.
 - door-to-door canvassing was conducted in a 3 miles radius of the dog.
- 30 Key deer does were fitted with radio collars by USFWS to enable closer monitoring.
- FAD Investigations for NWS occurred, in addition to an increase in fly or larvae submissions to NVSL.
 - 168 total investigations (1/1/2016–4/18/2017) submitted by 22 States & Territories.
 - Florida only State with confirmed positive results.

Surveillance & Diagnostics

FAD Investigations by Species per State

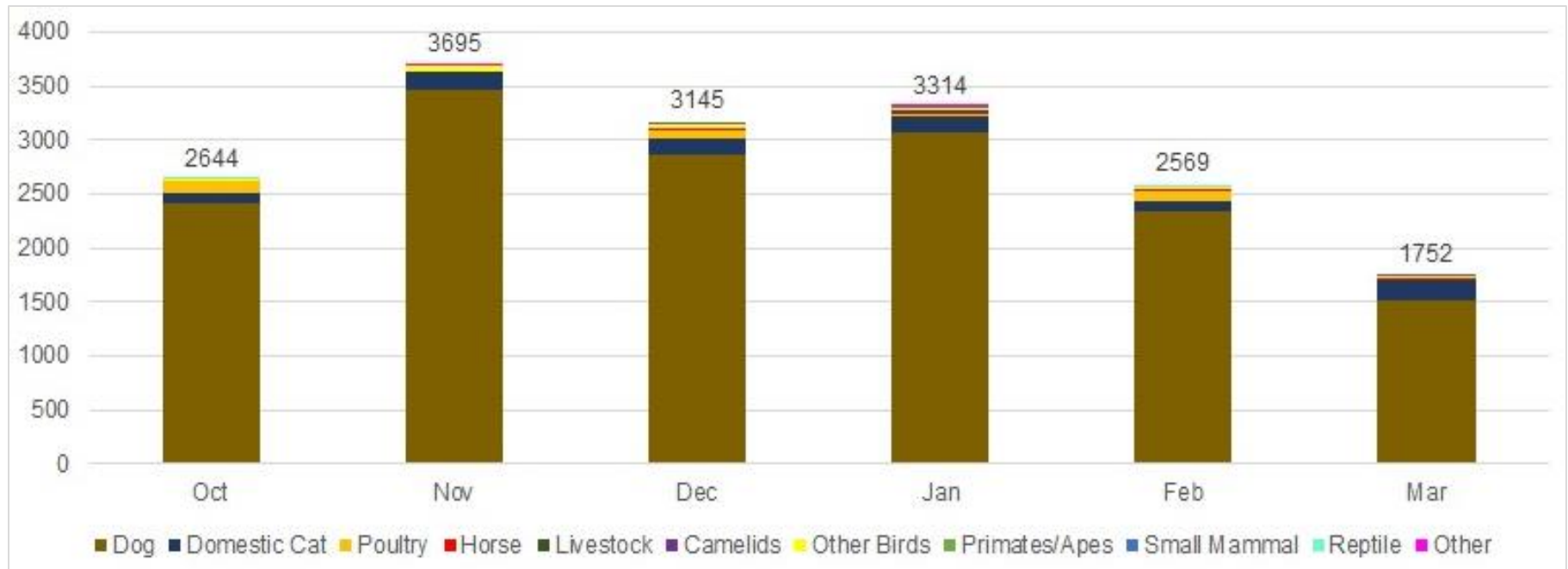


Quarantine & Movement Control

- The interdiction station served as a location to inspect animals entering and leaving the Florida Keys as well as providing visitors with animals valuable information on NWS.
- Operated 24 hours a day until March 19, 2017—a few days prior to the USDA eradication announcement.
- No animals were ever detected as NWS-infested at the interdiction station.
- Pets on ferries were also inspected or, briefly, banned.

Animals Inspected

Below shows the number of animals inspected at the interdiction station between October 2016 to March 2017.



Disease Control

- Control and eradication was accomplished by SIT.
- At the start of the outbreak, the Panama facility immediately increased its production of sterile screwworm pupae.
- In total there were 35 sterile fly release sites, 31 in the keys and 4 on the mainland.
- SIT activities went on until April 25, 2017 in the Infested Zone of the Florida Keys.
- Fly site assessments and trapping were used to determine the effectiveness of the SIT and distribution of sterile flies.

Euthanasia & Treatment

- Key deer with severe infestations were euthanized by captive bolt.
- An incinerator was brought in and set up on Cudjoe Key, by the landfill, to incinerate infested carcasses.
- National Veterinary Stockpile provided cooling trucks to store deer carcasses until incinerations could be conducted.
- By October 21, 2016, deer were being treated with Doramectin where possible.
- For deer who were not approachable or in remote areas, Doramectin was distributed through medication station feeders.
 - There were approximately 20 medication stations on 6 islands.
 - Over 15,000 treatments were applied to Key deer.

Information Management

- All data was tracked in the Emergency Management Response System 2.0 (EMRS2)—the system of record for all FAD incidents.
- The unified IC released situation reports daily, later decreasing the frequency over the course of the outbreak.
- Weekly National ICG reports were issued throughout the outbreak.
- Deployment reports were issued at routine intervals using rotation data in EMRS2 for all responders (State, APHIS, other Federal agencies, COPEG, and county).

Communications

- A virtual JIC was established.
- Public Information Officers within the unified IC worked together for consistent messaging.
- Stakeholder announcements were issued publicly by USDA.
- FDACS issued public statements and created a 24-7 hotline.
- Outreach materials were developed in multiple languages to inform the public about NWS.
- Public meetings were held in the Keys.
- Radio and newspaper interviews were conducted.



Examples of communication materials that were publicly available and distributed during the NWS incident.

2017 Final Report



Chartered plane from Panama delivering pupae to Florida.

Conclusion

Outbreak Overview

- The NWS response wrapped up throughout the month of April 2017.
- The Florida incident was limited in both area and its impact on animal health. Only 6 Florida Keys had confirmed or presumptive cases in wild or domestic animals, along with 1 case found on the Florida mainland.
- No production livestock were affected.
- After diligent and expansive uses of the SIT along with intensive surveillance, including in remote locations, APHIS declared NWS eradicated from the United States on March 23, 2017.

Conclusion

The success of the response is due in large part to:

- Effective collaboration of USDA APHIS Veterinary Services, International Services, Wildlife Services, Plant Protection and Quarantine, Legislative and Public Affairs, and multiple Federal partners, in addition to State and local personnel;
- Tremendous subject matter expertise in NWS and SIT; and
- Ability of COPEG Panama facility to rapidly ramp up production of sterile pupae and deliver them to Florida.

Conclusion *continued*

- USDA APHIS has identified strengths and areas for improvement during the response, which will be used as USDA APHIS continues to defend against NWS and other FADs.
- For more information on NWS, the epidemiology of this outbreak, and the response, please go to USDA APHIS' [NWS page](#) and the [FAD PReP NWS page](#).
- USDA APHIS VS would like to thank all responders and the State of Florida for the successful eradication of NWS to protect U.S. agriculture and the endangered, highly valued Key deer.
 - In particular, thanks to APHIS IS for their subject matter expertise in NWS—including their leadership and partnership with COPEG.

Abbreviations

APHIS	Animal and Plant Health Inspection Service
COPEG	Commission for the Eradication and Prevention of New World Screwworm
DNA	Deoxyribonucleic acid
EMRS2	Emergency Management Response System 2.0
FAD	Foreign Animal Disease
FAD PReP	Foreign Animal Disease Preparedness and Response Plan
FDACS	Florida Department of Agriculture and Consumer Services
IC	Incident Command
ICG	Incident Coordination Group
ICP	Incident Command Post
IS	International Services
JIC	Joint Information Center
LPA	Legislative and Public Affairs
MAC	Multiagency Coordination
NIMT	Incident Management Team
NVS	National Veterinary Stockpile
NVSL	National Veterinary Services Laboratories
NWS	New World Screwworm
PPQ	Plant Protection and Quarantine
SIT	Sterile Insect Technique
SPRS	Surveillance, Preparedness, and Response Services
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VS	Veterinary Services
WS	Wildlife Services

List of Appendices Available in Final Report

Appendix 1. NWS Investigations

Appendix 2. Site Assessment Maps

Appendix 3. Final ICG Report

Appendix 4. Final Deployment Report

Appendix 5. Abbreviations