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**Final Report for the APHIS  
Veterinary Services Response  
to the 2016–2017 Outbreak of  
New World Screwworm (NWS)  
in Florida**

***May 30, 2017***

**Public Version**

***Veterinary Services  
Surveillance, Preparedness, and Response Services  
Animal and Plant Health Inspection Service***



**United States  
Department of  
Agriculture**

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## ***Acknowledgments***

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## ***Executive Summary***

### **Incident Overview**

In July of 2016, severe flystrike wounds were observed in a Key deer (an endangered sub-species of deer) that was killed by a motor vehicle. As the summer progressed, several more Key deer were euthanized after being found with myiasis. A handful of domestic animals in the Florida Keys had also been seen with myiasis from July to September 2016. On September 29, 2016, the National Key Deer Refuge in Big Pine Key, Florida, contacted the Florida Department of Agriculture and Consumer Services (FDACS) regarding these cases of myiasis. FDACS in turn submitted larvae from an infested deer as a foreign animal disease (FAD) investigation. The National Veterinary Services Laboratories (NVSL) in Ames, IA confirmed New World screwworm (NWS) on September 30, 2016. The number of Key deer mortalities associated with NWS rose from 30 in September to nearly 100 in October, peaking around October 9, 2016, with 30 mortalities that week. There were confirmed animal infestations on 6 different islands in the Keys; NWS flies were detected on additional islands. As the situation in the Florida Keys appeared to be stabilizing, on January 6, 2017, NVSL confirmed that a stray domestic dog found in Homestead, Florida, on the Florida mainland, had NWS. This dog was the only confirmed case of NWS outside the Florida Keys. In total, there were 145 cases: 128 presumptive cases and 17 confirmed cases of NWS in the Florida Keys, with the majority, or 135, of those positive cases observed in Key deer. No production livestock was ever affected in either location.

### **Summary of Response Activities**

The United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) International Services, in partnership with USDA APHIS Veterinary Services, organized a unified Incident Command with FDACS and Monroe County, Florida. An Incident Command Post was set up in Marathon, Florida to respond to the outbreak and eradicate NWS. The unified Incident Command worked closely with the Agricultural Research Service (ARS), U.S. Fish and Wildlife Service (USFWS) personnel, particularly those from the National Key Deer Refuge, and the Screwworm Barrier Maintenance Program (Commission for Eradication and Prevention of NWS [COPEG]) in Panama, which operates the facility that produces sterile NWS pupae. The sterile insect technique (SIT) was implemented in the Keys on October 11, 2016, as quickly as NWS pupae could be flown in from the Panama facility, which ramped up its production of flies to support this response effort.

Many response activities began and occurred simultaneously throughout the duration of the outbreak. An interdiction station was established, so that people exiting the Florida Keys with animals could have those animals inspected for evidence of NWS infestation. Personnel and volunteers also began treating Key deer with Doramectin where possible. Epidemiologists and subject matter experts were engaged from APHIS and ARS to assess potential modes of introduction; APHIS IS immediately partnered with other personnel in the unified Incident Command to successfully conduct site assessments that evaluated the extent of the NWS infestation. The response also included significant communication activities through a unified Joint Information Center (JIC). The JIC organized and conducted intensive outreach throughout the Keys to identify any other affected animals and to educate the public and animal businesses about NWS.

In response to the detection in Homestead, the unified Incident Command also set up an outpost to repeat response and eradication activities in southern Miami-Dade County and in Everglades National Park, focusing on the area around where the stray dog had been picked up. SIT was initiated, thorough outreach was conducted, and site assessments were conducted to determine if there were additional NWS flies in the area.

Over the course of the response from October 2016 to April 2017, there were more than 530 rotations: 184 APHIS deployments, 104 other Federal deployments (from USFWS and ARS), 224 State and county deployments, and 27 COPEG deployments from Panama. Additionally, approximately 30 APHIS personnel supported the response virtually or from an APHIS hub location over the course of the outbreak.

### **Conclusion of Incident**

On March 23, 2017, USDA APHIS officially announced the eradication of NWS from Florida. By that time, operations were complete on the mainland, dramatically scaled down in the Keys, and the Interdiction Station had closed a few days prior. The last sterile fly release occurred in the Homestead area on March 21, 2017; in the Keys, the last sterile fly release occurred on April 25, 2017—approximately 7 months after NVSL confirmed the NWS infestation in Key deer. Passive surveillance continues to be conducted in Florida by APHIS District personnel and FDACS, who follow up on the reporting of suspicious cases by local veterinarians, USFWS Refuge staff, and the public.

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## **Section 1. Background**

### **Purpose**

This document provides an overview of the 2016–2017 outbreak of New World screwworm (NWS) in the State of Florida. It focuses on the development of the outbreak and the structure and activities of the response by the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS). It is not an After Action Report, nor does it identify corrective actions. In terms of strategy, the response to this infestation of NWS was largely based on the *New World Screwworm Myiasis Disease Response Strategy*<sup>1</sup> and the previous eradication efforts that took place on a large scale in the southern United States in the 1950s and 1960s.

### **Nature of Disease**

New World screwworms are larvae of the fly *Cochliomyia hominivorax* that infest the living tissue of warm-blooded animals; female flies lay their eggs in wounds or on mucous membranes, and, once hatched, the larvae burrow into the animal's tissue to feed. The resulting condition in the hosts is called myiasis. As the larvae grow, they deepen and damage the wound to the extent that severe infestations are almost always fatal to the host if left untreated.

### **Prior Outbreaks in the United States**

Screwworm was present in the Southwest since the mid-1800s, but it first became a significant problem in the southeastern United States in the 1930s. Persistent infestations continued into the 1950s, when the sterile insect technique (SIT) was demonstrated to be successful in Florida and then across the Southeast.<sup>2</sup> By the early 1960s, the SIT was also being employed in the Southwest. The eradication program was declared a success in 1966, but the presence of the fly in Mexico meant that outbreaks continued into the 1970s. The United States then joined with Mexico to push the pest to Mexico's southern borders by 1986. To prevent the spread of NWS north from infested countries in South America, USDA and the Commission for Eradication and Prevention of NWS (COPEG) (also known as the Screwworm Barrier Maintenance Program) now maintain a permanent barrier utilizing the SIT in Panama's Darien Gap region between Panama and Colombia.

## **Section 2. Characteristics of the 2016–2017 Florida Outbreak**

### **Scope of the Outbreak**

For the duration of 2016, and for the majority of the outbreak, NWS was confined to the Florida Keys (Monroe County). In early 2017, an additional case was detected on the mainland, outside Miami near the city of Homestead. In total, animal infestations (wild or domestic) were detected on six islands in the Keys, in addition to the one finding that occurred on the mainland (Miami-

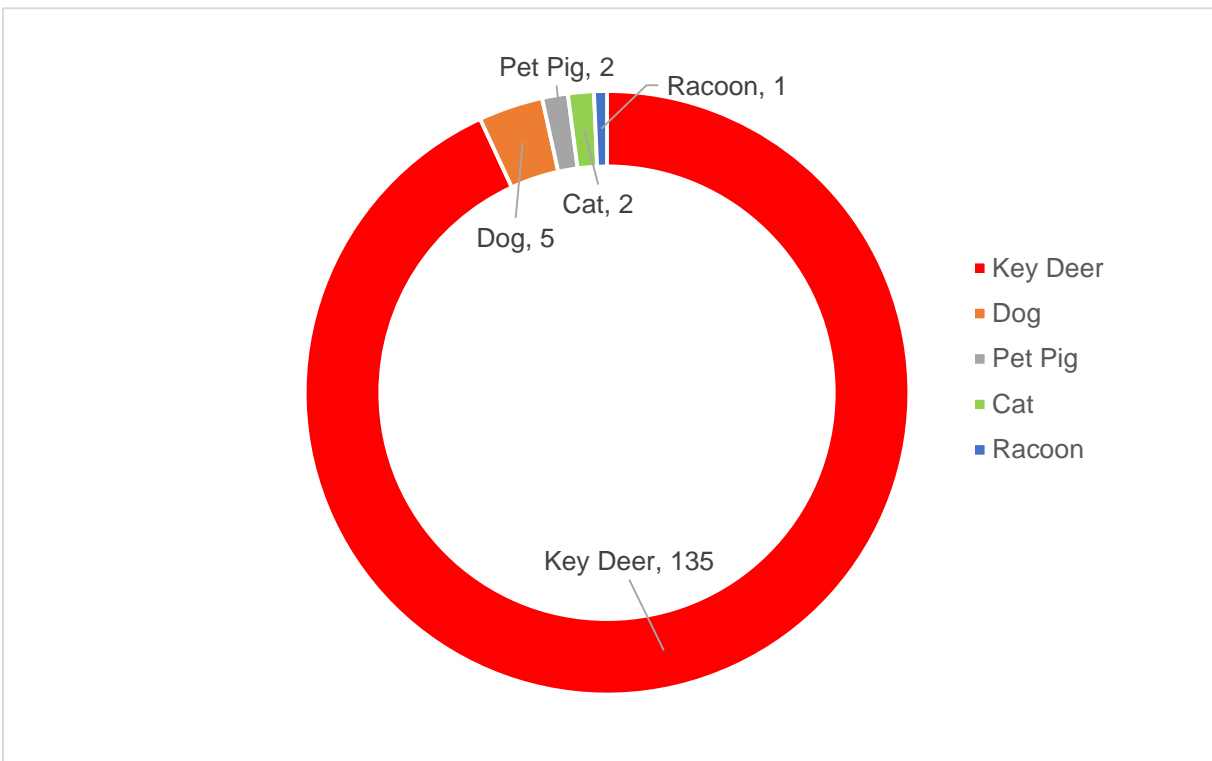
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<sup>1</sup> The NWS Disease Strategy can be located at [www.aphis.usda.gov/fadprep](http://www.aphis.usda.gov/fadprep).

<sup>2</sup> SIT is the process by which male NWS pupae are irradiated. Sterile pupae are released, though this is commonly called "sterile fly release" rather than "sterile pupae release." These sterile flies mate with wild female flies which then lay unfertilized eggs.



Figure 2. Presumptive and Confirmed Autochthonous Cases by Species



## Disease Incidence and Epidemiology

### Florida Keys

The USDA National Veterinary Services Laboratories (NVSL) in Ames, IA made the first confirmation of NWS in a Key deer on September 30, 2016; however, infestations of Key deer in Big Pine Key, Florida, were anecdotally observed as early as July 4, 2016. By August 2016, U.S. Fish and Wildlife (USFWS) staff at the National Key Deer Refuge were seeing an unusual increase in buck mortality, which reached a rate approximately twice what would normally be seen from road strikes and natural causes in September. Interviews with local veterinarians in September further revealed that highly unusual myiasis had also been observed a few pets in the Florida Keys in July and August 2016, near the National Key Deer Refuge.

After confirmation of NWS, high mortality rates continued in October, rising to nearly 100 in that month alone. NVSL continued to confirm cases of NWS submitted by unified Incident Command (IC) personnel; because of the high number of Key deer infested, on-site NWS subject matter experts also made the determination of presumptive positive autochthonous cases in some situations without further confirmation from NVSL. After November 20, all presumptive cases were submitted to NVSL for confirmation. As seen in Figure 1, cases continued to be detected until January 2017: the last confirmed positive autochthonous case was confirmed on January 10, 2017, after being identified as a presumptive positive autochthonous case in the field on January 6, 2017.

A domestic dog from the mainland was confirmed by NVSL to have an NWS infestation on January 6, 2017. This dog had been taken to a local rescue group by Miami-Dade animal services on December 19, 2016 and had severe wounds and myiasis. The rescue subsequently took the dog to a veterinarian who reported the case to Florida Department of Agriculture and Consumer Services (FDACS) the next day. The dog, who was treated and recovered, had previously been picked up from a rural residence in Homestead, Florida. Fly assessments were conducted in the area around where the dog was found and in Everglades National Park, with one wild screwworm fly identified on January 11 about 2 miles from the index site. After the detection, SIT was rapidly implemented in the area at 4 fly release sites beginning on January 13, 2017. No additional animal infestations were ever identified.

### *Introduction into the United States*

The epidemiological investigation into the introduction and spread of NWS suggests that the wild flies were absent from the United States until 2016 and were likely to have been introduced into Florida sometime in the spring. No specific pathway for the 2016 introduction of NWS has yet been identified. Identifying the initial pathway for introduction can be a difficult epidemiological endeavor, and the delay in detecting NWS in this incident adds to the complexity of this task. Genotyping work was completed by USDA’s Agricultural Research Service (ARS) in an attempt to identify the origin of the NWS flies in the Florida Keys; this work was inconclusive, due in part to lack of publicly available data on mitochondrial DNA. For more information on the epidemiological investigation, please see *Investigation into Introduction of New World Screwworm into Florida Keys*, available here:

<https://www.aphis.usda.gov/stakeholders/downloads/2017/nws-epi-report.pdf>.

## **Section 3. Management of the Incident**

### **Regulatory Intervention**

The State of Florida issued a Declaration of Agricultural Emergency in Monroe County, Florida as a result of the NWS detections in the Florida Keys on October 3, 2016.<sup>5</sup> Included in this declaration was the establishment of an Interdiction Station, also known as the “Animal Health Check Zone,” to prevent the movement of infested animals outside of the known infested zones.

### **Incident Management Structure**

#### *Incident Command*

The FDACS, Monroe County, FL, and USDA APHIS established a unified IC and Incident Command Post in Marathon, Florida. After the initial establishment of the unified IC, USDA APHIS VS rotated partial National Incident Management Teams (NIMT) to support the unified IC throughout the duration of the incident. The unified IC was primarily staffed with Surveillance, Preparedness, and Response Services District 2 personnel. This organizational structure included co-incident commanders from USDA APHIS VS, FDACS, and Monroe

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<sup>5</sup> This emergency declaration was extended in December; the announcement can be found here: <http://www.freshfromflorida.com/News-Events/Press-Releases/2016-Press-Releases/USDA-Confirms-New-World-Screwworm-Cases-in-Big-Pine-Key>.

County. The unified IC was directed by subject matter experts from APHIS International Services (IS), and included other personnel from APHIS Wildlife Services (WS), APHIS Plant Protection and Quarantine (PPQ), the USDA Agricultural Research Service (ARS), and USFWS staff, including those from the National Key Deer Refuge. When the additional NWS detection occurred on the Florida mainland, a forward Operational Base was established in Homestead, under the command and control of the existing unified IC, to handle outreach, investigations, fly site assessments, and sterile fly releases in the area. Miami-Dade County officials participated in these activities.

### *Incident Coordination & Multiagency Coordination*

An APHIS National Incident Coordination Group (ICG) and a Multiagency Coordination (MAC) Group provided further support for resource allocation and policy guidance. The ICG was led by a National Incident Coordinator and a Deputy, and included—at the height of the response—approximately 35 individuals in finance, logistics, plans, and operations. The ICG supported the unified IC as indicated through the response effort.

Because of the multiagency nature of the incident, a small MAC Group was also established, comprised of individuals from across APHIS. This mini-MAC Group met as needed to address any emerging issues, particularly regarding resource requirements (including personnel) and intra- and interagency decisions. Jointly, the mini-MAC Group, ICG, and unified IC worked to develop short- and long-term operational plans.

### *Joint Information Center*

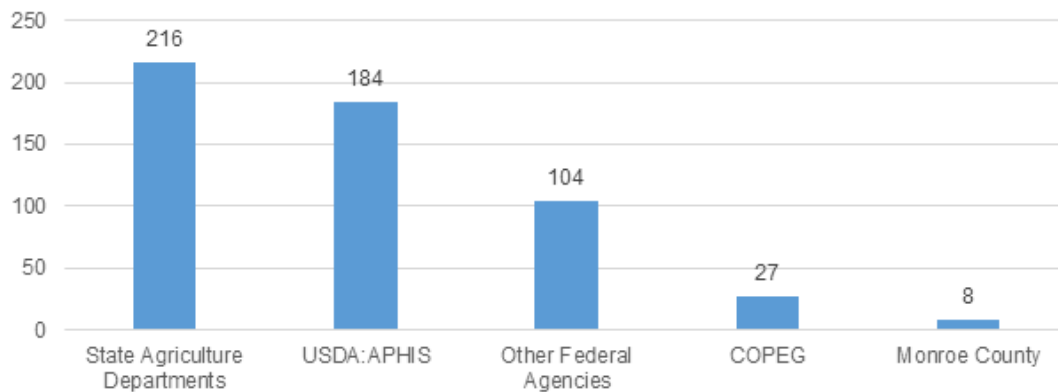
Immediately upon the NWS detection in Monroe County, a unified Joint Information Center (JIC) was virtually established. FDACS personnel led this unified JIC throughout the incident. It was guided by a communication plan developed by the Public Information Officers (PIO) from FDACS, USDA Legislative and Public Affairs (LPA), Monroe County, and USFWS. The JIC guided all information releases, public messaging, and outreach in multiple languages through the incident response.

## **Personnel Deployments**

Overall, there were 539 deployments by 350 individual personnel; 95 percent of these deployments were on-site in Florida (the remainder were virtual). Personnel in the field were either deployed to the Marathon Incident Command Post (ICP), the Interdiction Station, or the forward Operational Base near Homestead.

Out of the total deployments, FDACS rotations accounted for 40 percent; APHIS rotations accounted for 34 percent. Figure 3 illustrates the total deployments by organization for the duration of the response effort. A few members from the COPEG facility staff in Panama were present as long as SIT fly releases were happening, for a total of 27 deployments. Monroe County also contributed personnel to 8 deployments during the response effort.

Figure 3. Total Deployments by Organization (Virtual & On-Site)



At the height of the response, in the month of October, there were 158 total personnel deployed (virtually and on-site). Deployment numbers continued to decrease after October, as response operations were streamlined and, ultimately, as NWS infestations declined. In mid-December, the number of responders was significantly scaled back, but due to the detection on the Florida mainland, additional responders were deployed in January to commence operations there.

The forward Operational Base near Homestead was open from approximately January 10 to February 25, 2017; the ICP in Marathon was operational until March 25, 2017, after which the NIMT rotations were discontinued though a small number of personnel remained in the area to work with local and COPEG personnel to conclude SIT activities. The last response personnel demobilized on April 29, 2017, immediately after the final fly release in the Florida Keys. Figure 4 illustrates both virtual and on-site deployments from October 2016 (first deployment) to April 2017 (last deployment). For a complete overview, see Appendix 4 which provides the final deployment report.

Figure 4. On-Site & Virtual Deployments by Month

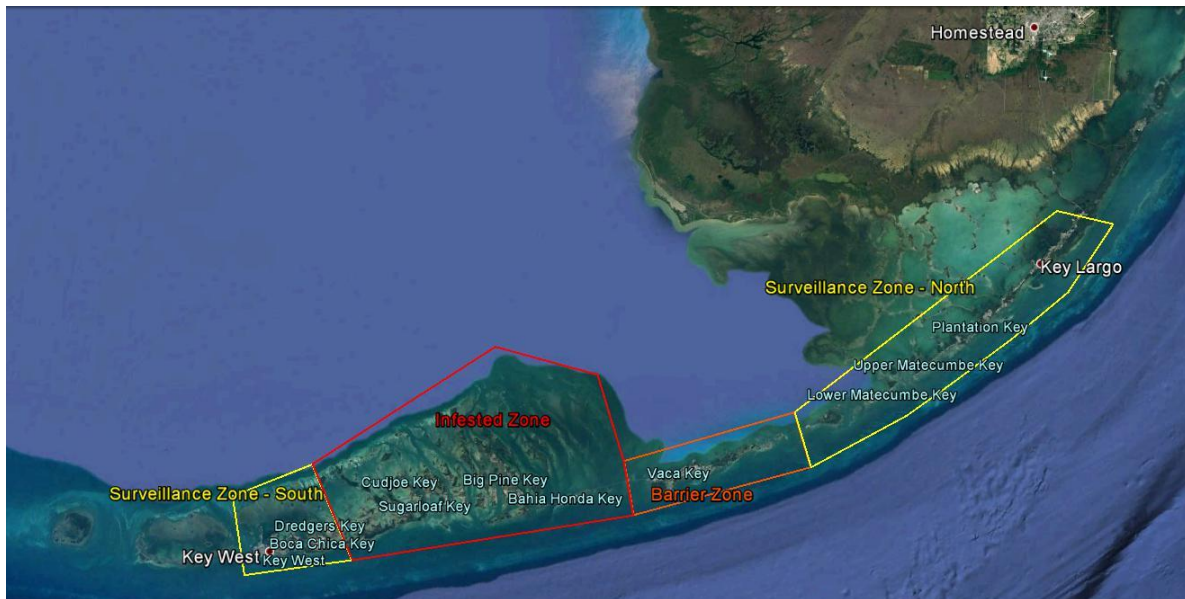
On-Site Deployments	Virtual Deployments
151 October 	7 October 
137 November 	2 November 
62 December 	6 December 
74 January 	7 January 
56 February 	2 February 
26 March 	5 March 
4 April 	0 April 

= 10 deployments

## Zoning

In the Florida Keys, the unified IC established Infested, Barrier, and North and South Surveillance Zones in late October 2016, as soon as initial fly site assessments had been conducted (Figure 5a). These response zones assisted in conducting response activities and communicating these activities internally and externally.

*Figure 5a. Infested, Barrier, and Surveillance Zones 10/24/16 to 1/4/17*



The Infested Zone designation covered the entire area where all infested animals had been identified *and* where wild screwworm flies had been detected during fly site assessments. The Barrier Zone indicated the area intended to be a “barrier” between the Infested Zone and the NWS-free Northern Surveillance Zone. In the southern Keys, there was an additional NWS-free Southern Surveillance Zone where fly assessments were conducted. In the Florida Keys, sterile fly releases occurred in the Infested and Barrier Zones only.

No wild NWS flies or infested animals were ever detected in the Barrier Zone; the last sterile fly release was conducted in the Barrier Zone on December 26, 2016. Thus, in early January 2017, the Barrier Zone was eliminated; the zone previously known as the Barrier Zone became the new Northern Surveillance Zone (Figure 5b), as no wild flies had been found in the area initially designated as the Northern Surveillance Zone (Figure 5a) after nearly 100 assessments there.



Figure 5b. Infested Zone, Surveillance Zones, and Treatment Area (1/5/17 to 3/23/17)



After the single detection of NWS in a dog and a positive fly assessment for a wild NWS fly on the mainland, a treatment area was demarcated around this site in Homestead, Florida (also seen in Figure 5b). There were no zone designations on the mainland, as there were never further detections of infested animals or wild NWS flies in 278 additional fly assessments in and around the Homestead Treatment Area.

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

### Financial Resources

Commodity Credit Corporation money was not requested for the NWS response. APHIS spending on this incident was approximately \$3.2 million.

### International Commerce & Interstate Trade

There was minimal impact to commerce and trade, as no countries banned exports from the United States as a result of the NWS detections. Additionally it is important to note that no NWS infestations were ever identified in production livestock. However, there were temporary restrictions placed on movements of certain animals to selected countries.<sup>6</sup>

Many of these countries removed restrictions after the United States provided evidence that NWS was limited to southern Florida. In addition to these international commerce implications, there were minor impacts on interstate trade. The State of Georgia required a Certificate of

<sup>6</sup> One country put restrictions on sheep and goats; 8 countries put restrictions on cattle (dairy and breeding); 1 country put restrictions on cats and dogs, and 4 countries implemented restrictions on horses.

Veterinary Inspection that all animals coming from Florida, later reduced to only those from the Keys, be free of NWS. Utah also first required a permit to move livestock and pets out of Florida and then reduced it to only out of Monroe County.

These trade restrictions had been lifted as of April 26, 2017.

## ***Section 4. Response Activities***

For an overview of the incident and associated response efforts, please see the timeline (Figure 8) at the end of this document.

### **Surveillance and Diagnostics**

#### *Fly Site Assessments*

Fly site assessments to determine the extent of the NWS infestation—in the form of passive trapping (wind-oriented sticky trap) and observational surveillance by technical experts—began as early as October 4, 2016. Approximately a week from the first detection, strategically planned and mapped site assessments were being conducted using primarily active trapping (rotten liver tissue as bait). In total, fly site assessments were conducted on approximately 45 separate islands in the Florida Keys, and later on the mainland around Homestead, Florida, and in Everglades National Park to observe, capture, and identify flies. Over 730 fly site assessments were conducted in total. Thirteen Keys were known to be infested with wild NWS flies: Big Pine Key, Big Torch Key, Cudjoe Key, Howe Key, Little Knock-em-Down Key, Little Pine Key, Little Torch Key, Middle Torch Key, Munson Island, No Name Key, Ramrod Key, Sugarloaf Key, and Summerland Key. The last wild screwworm flies were found in the Keys on November 7, 2016 and on the mainland on January 11, 2017. Active trapping took place from the beginning of the response, October 9, 2016 until March 15, 2017. For maps of fly site assessment locations, please see Appendix 2.

#### *Active & Passive Animal Surveillance*

Suspect cases (e.g., sick animal calls) were investigated by State and Federal personnel. In the Keys, all premises with animals, including veterinary practices, shelters, and livestock/animal businesses were visited to identify additional animal infestations; on the mainland, premises with animals or animal businesses within a 10 mile radius of where the infested dog was found were also contacted in person by unified IC personnel. Response personnel also completed door-to-door canvassing in a 3 mile radius around the index premises in Homestead. As there were a greater number of premises with livestock in rural Miami-Dade County, any premises with sheep or goats that had or were expecting newborn lambs or kids were kept under active surveillance to ensure that fresh navels did not get infested with NWS. In mid-January, 2017, 30 Key deer does were fitted with radio collars by USFWS to enable closer monitoring in preparation for the fawning season. No NWS myiasis has been observed in any Key deer fawns in 2017.

Foreign animal disease (FAD) investigations for NWS occurred, in addition to an increase in fly or larvae submissions to NVSL specifically to rule-out suspected NWS. From January 1, 2016, to the last investigation (which was associated with the response) on April 18, 2017, there were a total of 168 investigations for NWS in the United States. Twenty-two different States and

Territories submitted samples to NVSL during the screwworm outbreak, but only Florida had confirmed positive results. For more information on NWS investigations, please see Appendix 1.

### *Presumptive and Confirmed Cases*

Around the height of the infestation in Key deer in October through mid-November of 2016, presumptive NWS cases in Key deer were not sent on to NVSL for confirmation<sup>7</sup>; however, after November 20, 2016, all presumptive positive cases from Key deer were forwarded to NVSL to be confirmed. The number of confirmed positive cases at NVSL—17 in total—is not indicative of NWS prevalence or total number of NWS infestations in the Keys since so many presumptive positive Key deer cases were not submitted to NVSL. In total, there were infested animals (domestic or wild, see Figure 1 and Figure 2) detected on 6 Keys: Big Pine Key, Middle Torch Key, Munson Island, No Name Key, Ramrod Key and Sugarloaf Key; in addition, there was the one infested animal detected in Homestead.

### **Quarantine and Movement Control**

An Interdiction Station was set up in Key Largo, Florida, in the originally established Northern Surveillance Zone (Figure 5a). This Interdiction Station served as a location to inspect animals entering and leaving the Florida Keys (Figure 6) as well as providing visitors with animals valuable information on NWS. The Interdiction Station was staffed by FDACS Agricultural Law Enforcement personnel and veterinary support staff, along with APHIS Veterinary Medical Officers as needed. The station was operational 24 hours a day until March 19, 2017—a few days prior to the announcement that NWS had been eradicated from Florida. In total there were over 17,000 inspections, as illustrated in Figure 7. No animals were ever detected as NWS-infested at the Interdiction Station.

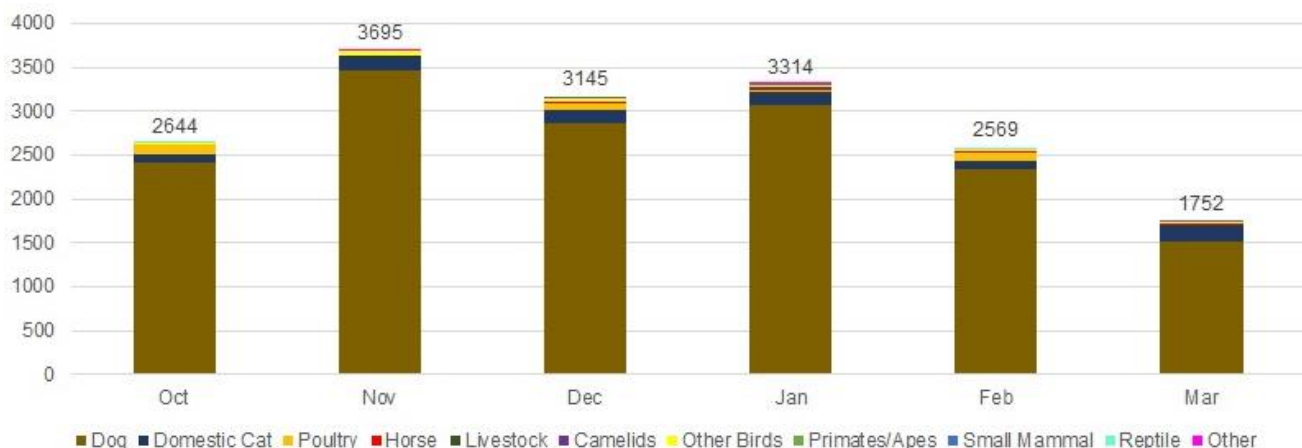
From late October until January 1, 2017, pets traveling on the ferry between Key West, Marco Island, and Fort Myers were also inspected, and the ferry operator placed a temporary ban on carrying pets out of Key West (with the exception of service animals). Figure 7 includes these inspections in addition to those at the Interdiction Station.

*Figure 6. Interdiction Station, Key Largo, FL*



<sup>7</sup> Presumptive positives were cases that met the NWS case definition based on subject matter expert identification in the field.

Figure 7. Animals Inspected at the Interdiction Station: October 2016 to March 2017



## Disease Control

Control and eradication of NWS was accomplished by use of the SIT. At the start of the outbreak, the Panama facility immediately increased its production of sterile screwworm pupae. Shipments of sterile pupae and release chambers arrived in the Keys on October 6, 2016, along with personnel from Panama and experts to assist with ground release of the flies. In total, there were approximately 35 different release sites used in the response effort, selected by subject matter experts and aerial surveillance: 31 in the Keys and 4 on the mainland around Homestead; it is estimated that over 188 million sterile flies were released in Florida during the response. On the mainland, sterile fly releases were concluded on March 21, 2017. 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 the sterile flies throughout the Florida Keys.

## Epidemiology

An epidemiological investigation was conducted by VS personnel from the Center for Epidemiology and Animal Health (CEAH). In addition, ARS genotyped screwworm samples in an attempt to gain insight into the origin and timeline of NWS re-entering the United States. In January, a team from Texas A&M University carried out a study of the Key deer population.<sup>8</sup>

## Euthanasia and Treatment

Key deer found with severe infestations were euthanized by the captive bolt method. Infested tissue from euthanized deer was frozen and retained to both retain genetic information and to serve as tissue for fly traps if necessary. An incinerator was brought in and set up on Cudjoe Key, by the landfill, to incinerate the deer carcasses. Cooling trucks and freezers were mobilized

<sup>8</sup> The VS CEAH epidemiological report is here: <https://www.aphis.usda.gov/stakeholders/downloads/2017/nws-epi-report.pdf>; more information on the population study is available here: <https://wfsc.tamu.edu/texas-am-institute-helping-find-key-to-preserving-endangered-florida-deer/>.

by the National Veterinary Stockpile to store deer carcasses, until the carcasses could be incinerated.

By October 21, 2016, deer were being treated with Doramectin where possible; many deer in the Florida Keys are accustomed to taking food from residents and visitors and would take the medication when given by hand. For deer who would not approach closely enough to take medication, treatment stations with feeders were set up to apply the Doramectin by October 28, 2016. Approximately 20 medication stations were used on 6 different islands over the course of the response, and over 15,000 treatments were applied to Key deer. In a few unique cases, Key deer identified with NWS infestations were successfully captured, treated, and released.

### **Information Management**

The unified Incident Command included individuals specializing in Emergency Management Response System 2.0 (EMRS2) data entry—the system of record for all FAD incidents, including this NWS incident and response. All data was tracked in EMRS2, from the fly site assessments and fly releases to animals inspected at the interdiction station and all positive (presumptive and confirmed) cases in domestic and wild animals.

In terms of reporting, the unified Incident Command released situation reports daily at first, with frequency decreasing over the course of the outbreak as the response settled into a rhythm. Weekly national ICG reports were also issued from October 7, 2016 through the end of March 2107, with one additional report released on May 1, 2017 at the conclusion of SIT releases when all personnel were demobilized. This final report is included as Appendix 3 to this document. The ICG also released deployment reports at routine intervals, using the rotation data in EMRS2 for all responders (State, APHIS, other Federal agencies, COPEG, and county). A final deployment report was released May 2, 2017 and is included in Appendix 4.

### **Communications**

The virtual JIC was established very early in the response, and USDA APHIS worked closely with public information officers from FDACS, Monroe County, and USFWS on consistent messaging. Stakeholder announcements were issued publicly on the USDA website shortly after NWS was confirmed and again later once screwworm was eradicated. FDACS also issued a public statement along with a call-in number for information; they hosted a 24-7 hotline throughout the incident.

Outreach materials, such as a poster and flyers in multiple languages, were developed to inform the local public about NWS and garner their help in reporting any suspicious fly strike wounds on deer, pets, and other animals. Public meetings were also held in the Keys to answer questions about NWS, address community concern, and to provide updates on the treatment and status of the endangered Key deer population. Additional outreach included radio and newspaper interviews, posting information and checking pets at local grocery stores, and proactively reaching out to nearby national parks and reserves. FDACS also implemented the ability for concerned citizens to submit pictures and information about suspected NWS cases directly on their NWS website for immediate review.

## **Section 5. Conclusion**

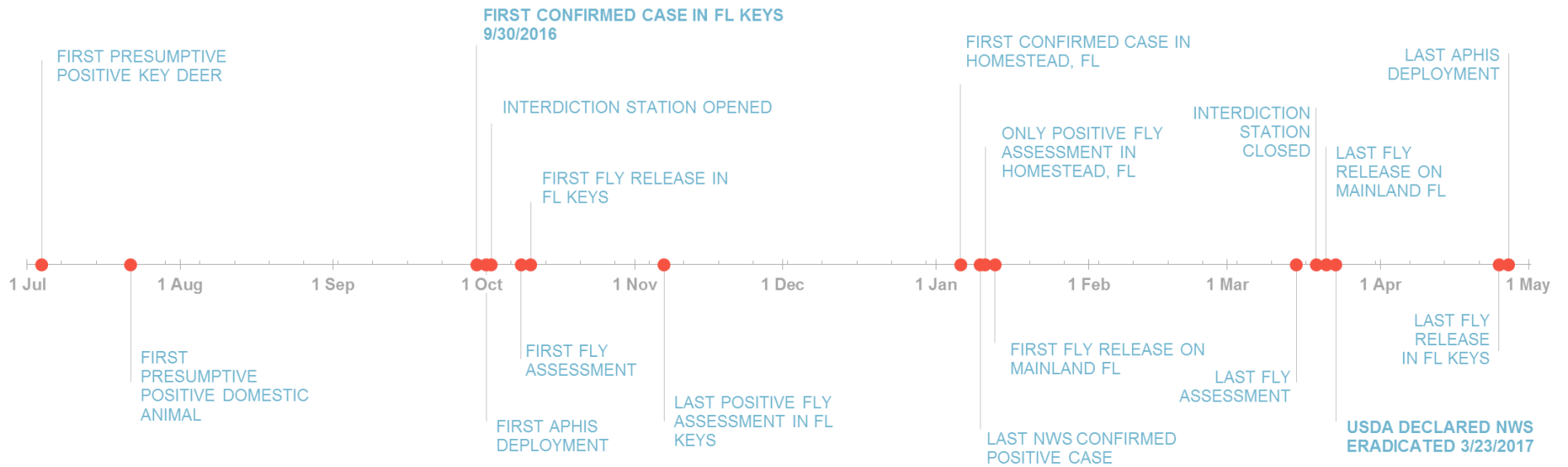
The NWS response wrapped up over the month of April 2017, as personnel and equipment were demobilized. The surveillance cameras, located at the former sites of medication stations, continue to be monitored for signs of myiasis in Key deer. The fawning season is well underway, and no fawns have been observed with evidence of NWS.

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

The success of this response is due in large part to effective collaboration of USDA APHIS VS, IS, WS, PPQ, LPA, multiple Federal partners, in addition to State and local personnel as well as tremendous subject matter expertise in NWS and SIT. It also relied heavily on the ability of the COPEG Panama facility to quickly ramp up production of sterile pupae and deliver them regularly to the site of the outbreak. Figure 8 shows the key milestones in this coordinated response effort.

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](#).

Figure 8. Timeline of Key Milestones in NWS Infestation & Eradication in Florida



## *Appendix 1*

# *New World Screwworm Investigations*

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There were 168 total investigations into New World Screwworm (NWS) from January 1, 2016 counting up to late April 2017 (the last investigation entered as of this report date). These investigations were captured in the Emergency Management Response System 2.0 (EMRS2), the official system of record for foreign animal disease and pest incidents and investigations.

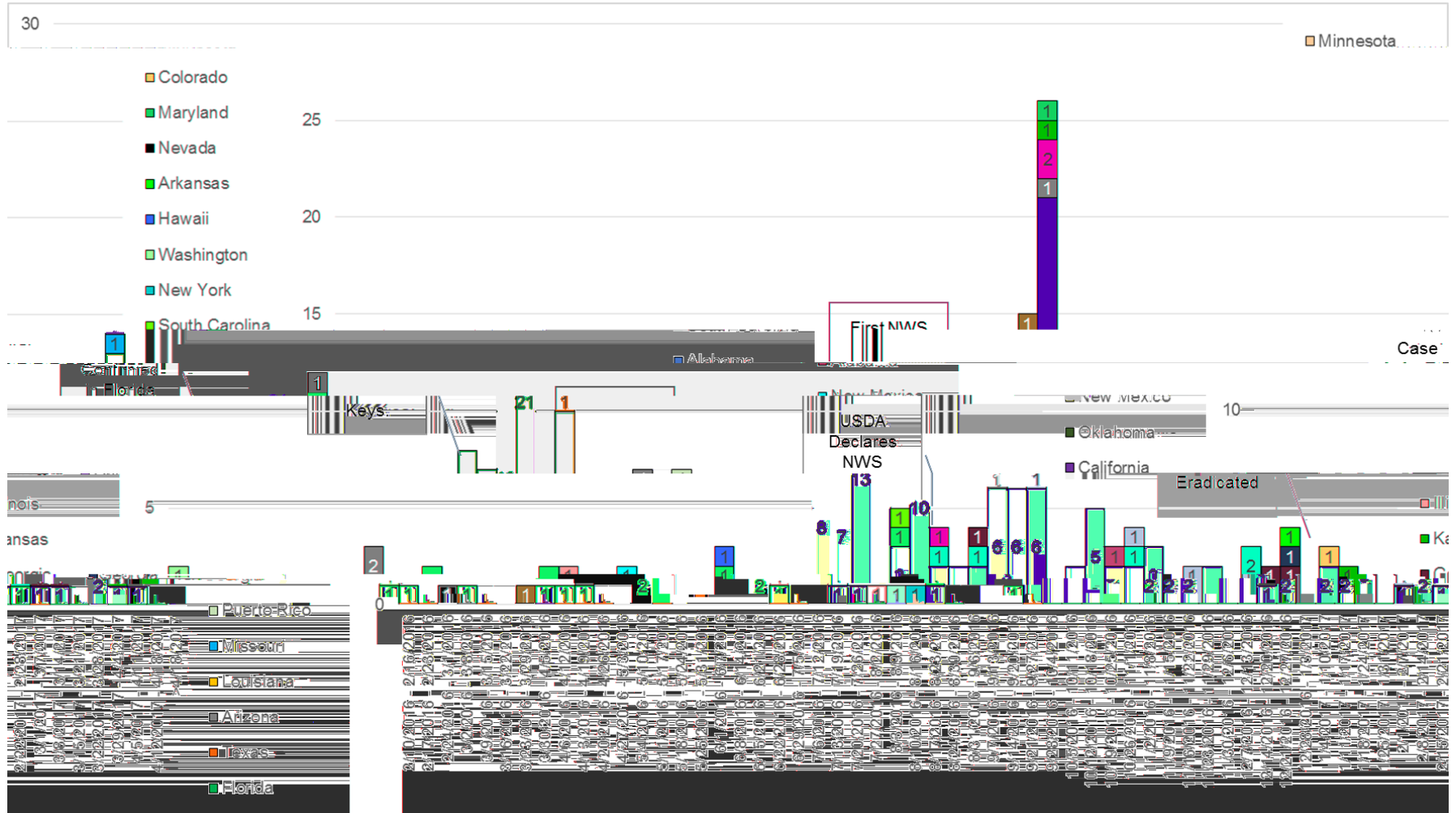
This total includes investigations from three sources: 1) foreign animal disease (FAD) investigations of potential cases of NWS across the United States that were investigated as potential FADs, 2) all investigations of NWS related to the discovery of the pest in Big Pine Key, Florida, and subsequent surveillance efforts to detect more infestations, and 3) samples submitted to the National Veterinary Services Laboratory (NVSL) for pest identification. The number of investigations does not reflect NWS flies found by observational surveillance or fly trapping during the incident; these detections are reflected in site assessment maps found in Appendix 2.

Investigations of potential NWS were submitted at a normal level until late September, when NWS was first confirmed. Investigations peaked in the second half of October 2016 during the NWS Incident, tapering off into 2017 but remaining elevated through late April (Figure 1-1).

Given the location of the NWS outbreak, the majority of investigations came from Florida with 114 investigations, followed by Texas with 16. However, 21 States and Puerto Rico submitted NWS investigations during this time period. Again, no infestations were ever found outside Florida.

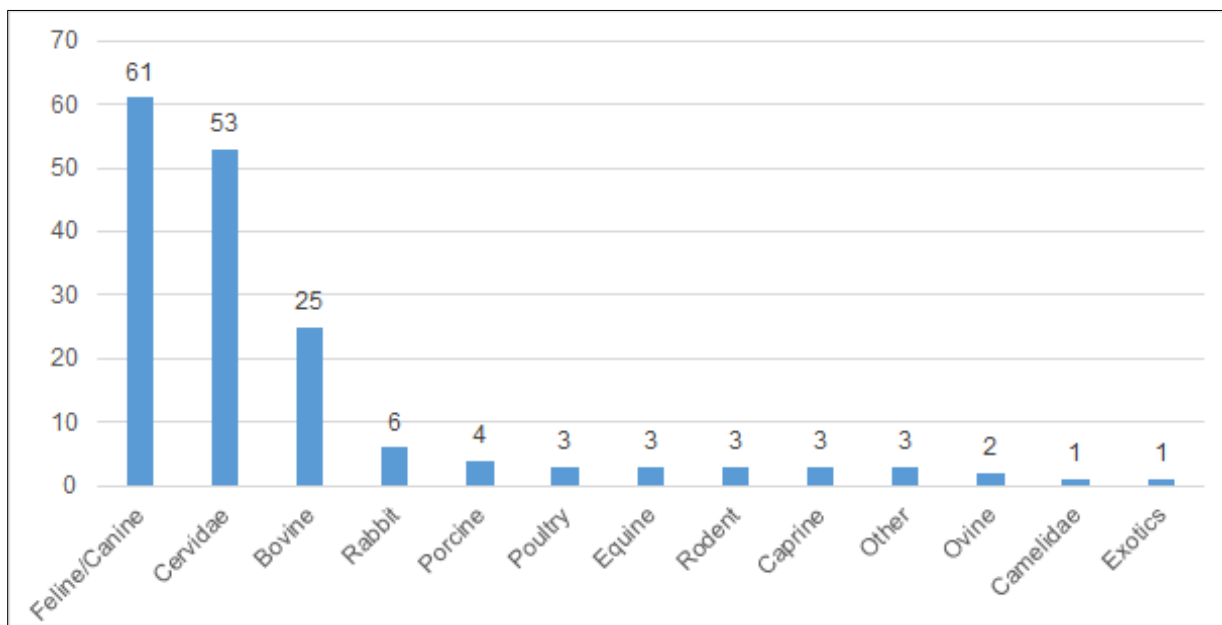


Figure 1-1. NWS Investigations by Week and State



In terms of species investigated, the greatest number of NWS investigations were in cats and dogs at 61, with cervid samples (including all Key deer samples) totaling 53 (Figures 1-2). Other species that were the subject of NWS investigations include cows, rabbits, pigs, horses, goats, and other.

*Figure 1-2. NWS Investigations by Species*



Although a few investigations relating to the NWS incident in the Florida Keys were submitted to NVSL from Miami-Dade County, Figure 1-3 depicts Monroe County, as it was the area of focus for determining the extent to which NWS had spread. In Florida, 66 of the investigations were in Monroe County (58 percent).

Due to the outbreak mostly affecting wild Key deer, and the unique nature of the Keys ecosystem, most of the investigations in Monroe County were in wildlife. This was specific to Monroe County, as most investigations from other counties in Florida were from domestic animals and livestock (Figure 1-3). This was also true for investigations from around the rest of the United States: most investigations were conducted in domestic animals and livestock (Figure 1-4).

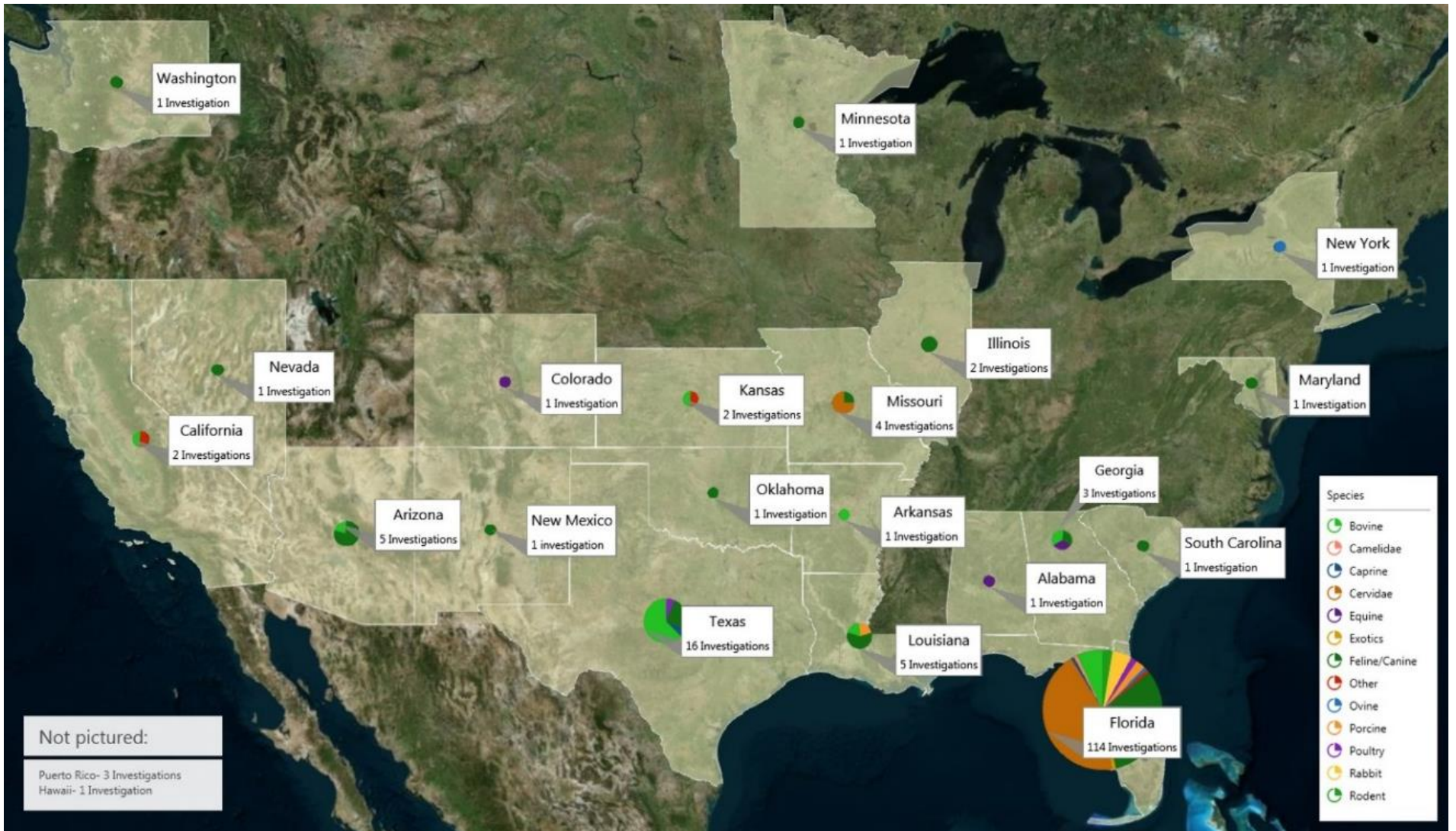
These investigations show the importance of active and passive surveillance—at all times—for NWS in the United States, as well as the awareness and vigilance of veterinarians and others in identifying potential cases of NWS to protect U.S. animal health.

Figure 1-3. Wildlife and Domestic Animal NWS Investigations in Monroe County, FL\*



\*Location of pie chart does not reflect geographic location of investigations.

Figure 1-4. NWS Investigations Map with Species



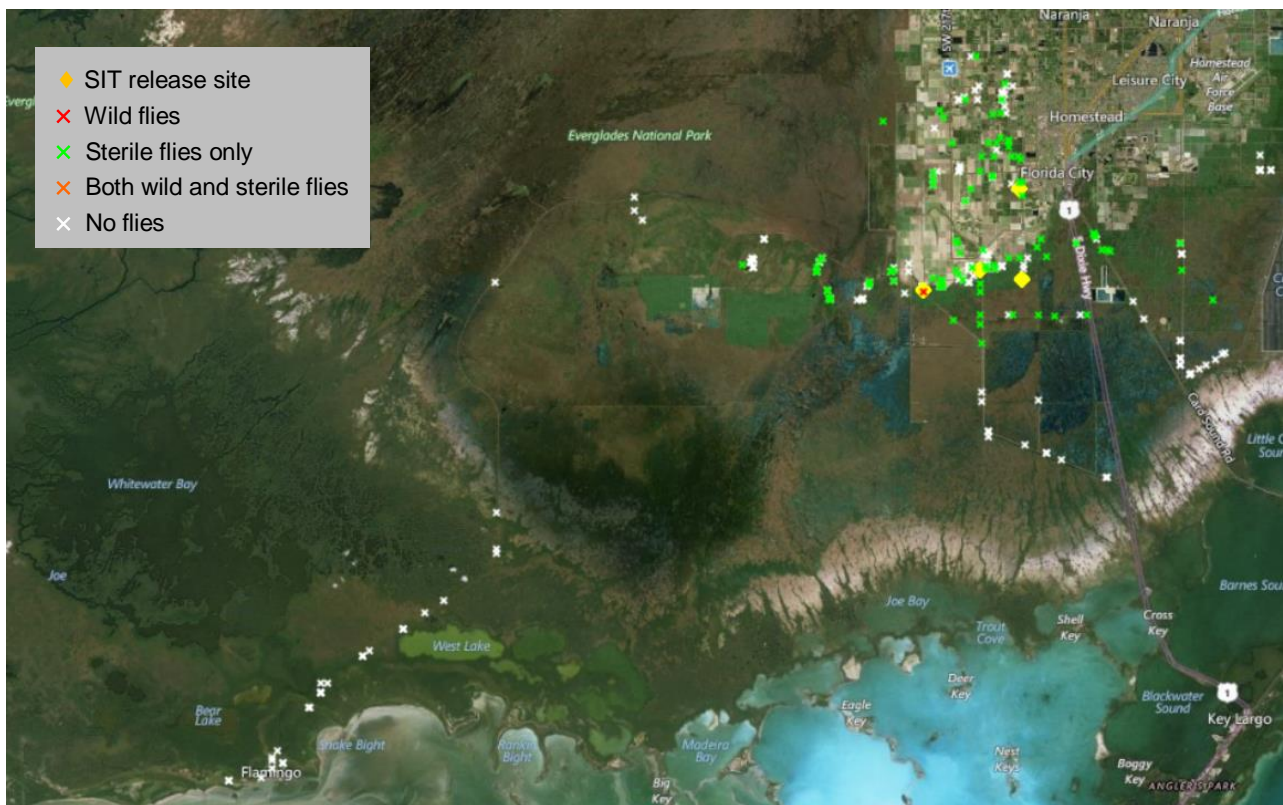


Figures 2-2 and 2-3 are insets of the full map, zoomed in to better see the distribution of site assessments and SIT release locations. These figures clearly show the tremendous amount of work that was completed during the NWS response to successfully eradicate NWS from Florida.

*Figure 2-2. Locations of NWS Fly Site Assessments in the Florida Keys*



*Figure 2-3. Locations of NWS Fly Site Assessments on the Florida Mainland*



## *Appendix 3*

# *Final Incident Coordination Group Weekly Situation Report*

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This appendix contains the Incident Coordination Group *New World Screwworm (NWS) Outbreak Weekly Situation Report*. The particular report included is the final report that was produced on May 1, 2017. It serves as an example of the type of weekly situation report that was created during the NWS outbreak in Florida.

This report was For Official Use Only, and intended for government officials. It is not included in the publicly available version of this report.

## *Appendix 4*

# *Final EMRS2 Summary Deployment Report*

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During the Florida New World Screwworm (NWS) outbreak, the Emergency Management Response System 2.0 (EMRS2) was used to track deployments. This includes those agencies responding outside of APHIS. The data was extracted from EMRS2 to create a *Summary Deployment Report*. This appendix contains the final *NWS Summary Deployment Report* that was produced May 2, 2017. It serves as an example of reports that were created during the NWS outbreak in the Florida.



# EMRS SUMMARY DEPLOYMENT REPORT

## *New World Screwworm (NWS)*



**DATE TRANSMITTED:** Tuesday May 2, 2017 (data reported as of May 1, 2017 3:00pm ET)

**PREPARED BY:** Veterinary Services (VS) Screwworm Incident Coordination Group

*Please note: This report is based on data/mobilization information for all responders in the Emergency Management Response System 2.0 (EMRS2) for personnel deployed to field location(s) or virtually deployed to an Incident Management Team for screwworm response. This data may change as source data is updated and corrections are made.*

*This is the final ICG deployment report for this incident. The response to NWS infestation in the United States has ended.*

### A. Current Deployments

- 0 Current Deployments

### B. Total Number of Deployments

- 539 total deployments
- 350 total individuals deployed
  - Number of individuals deployed 1 time: 229
  - Number of individuals deployed 2 times: 73
  - Number of individuals deployed 3 times: 37
  - Number of individuals deployed 4 times: 5
  - Number of individuals deployed 5 times: 4
  - Number of individuals deployed 6 times: 1
  - Number of individuals deployed 7 times: 1

*Figure 1. Total Deployments by Incident State*

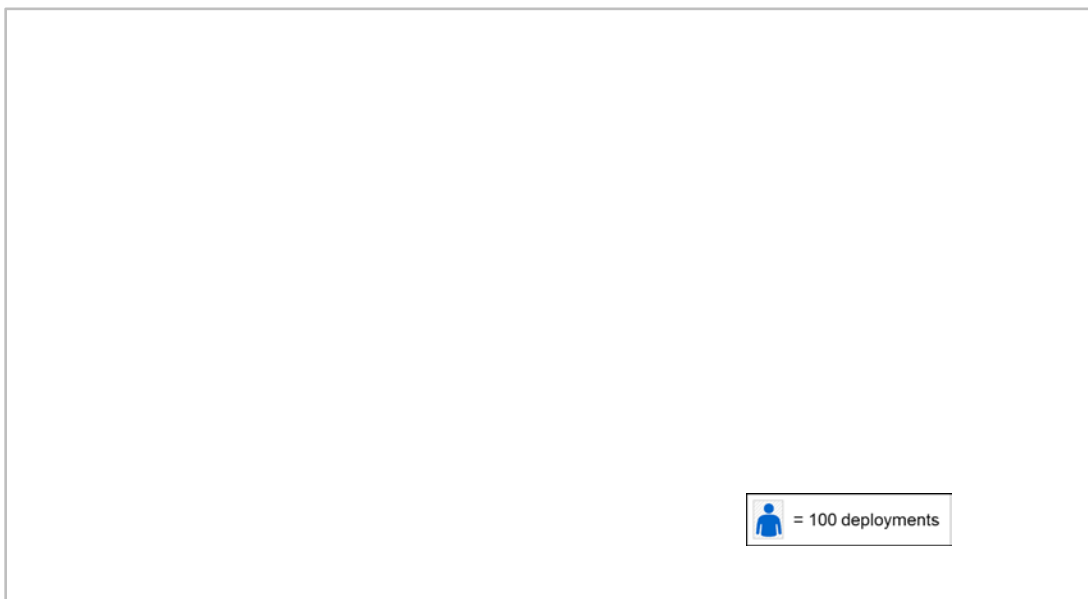


Figure 2. Total Deployments by Rotation Type

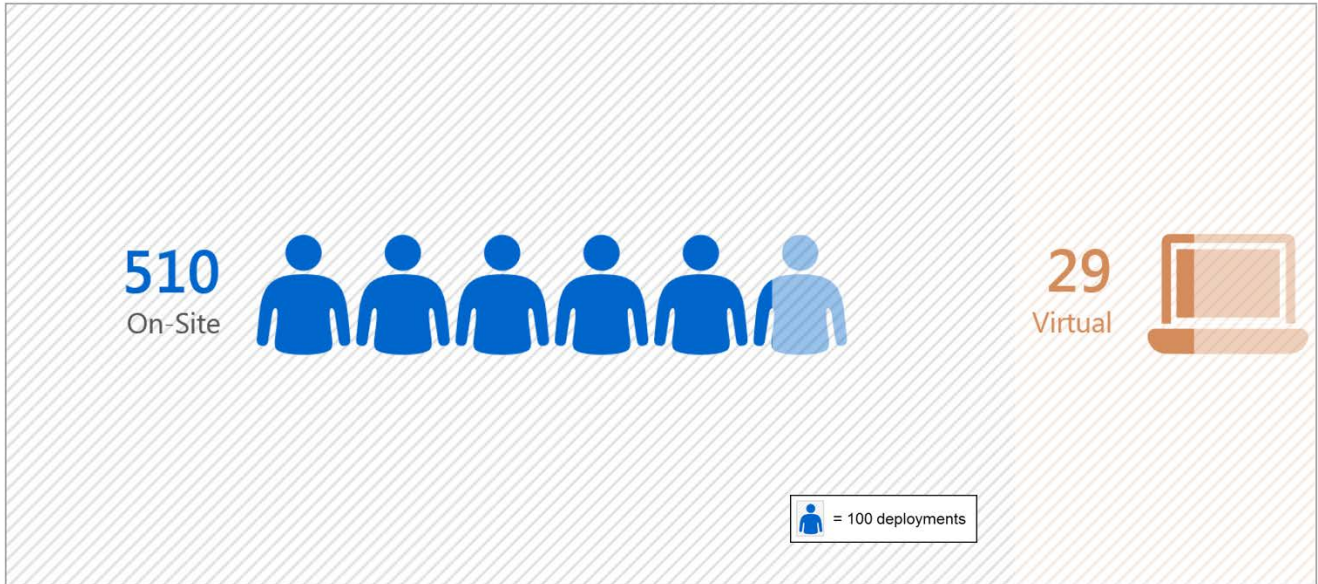


Figure 3. Total Deployments by Position Assigned

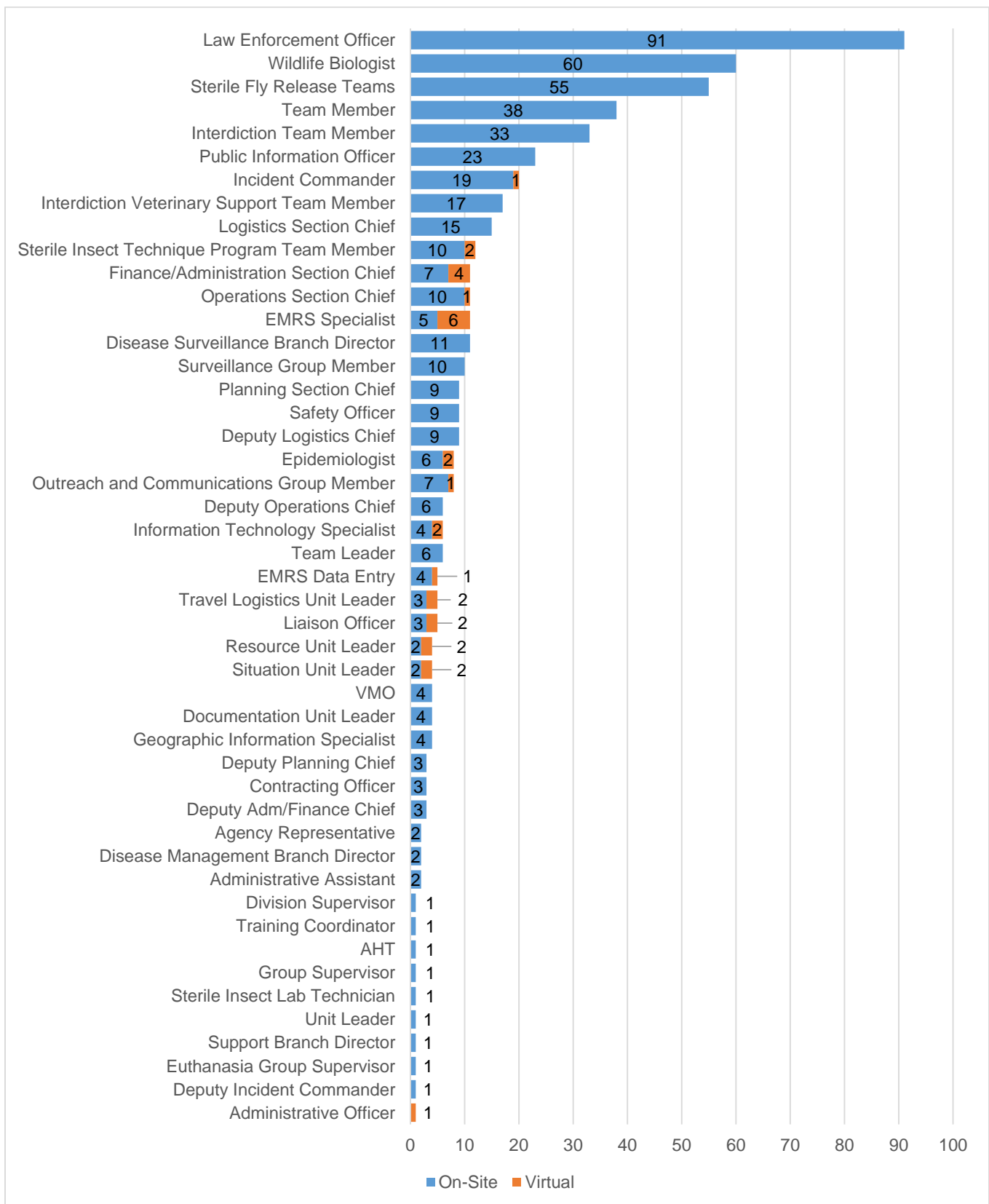
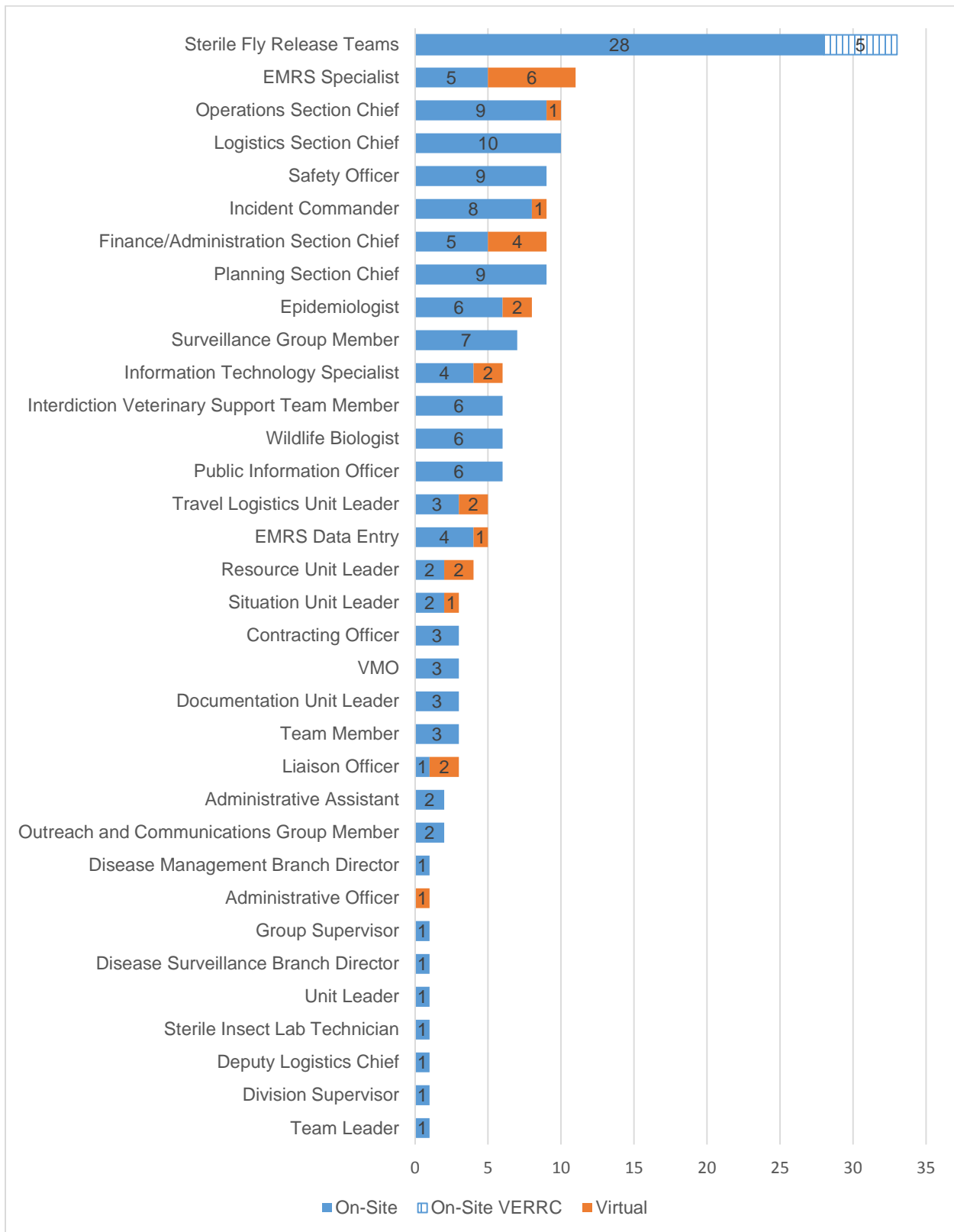


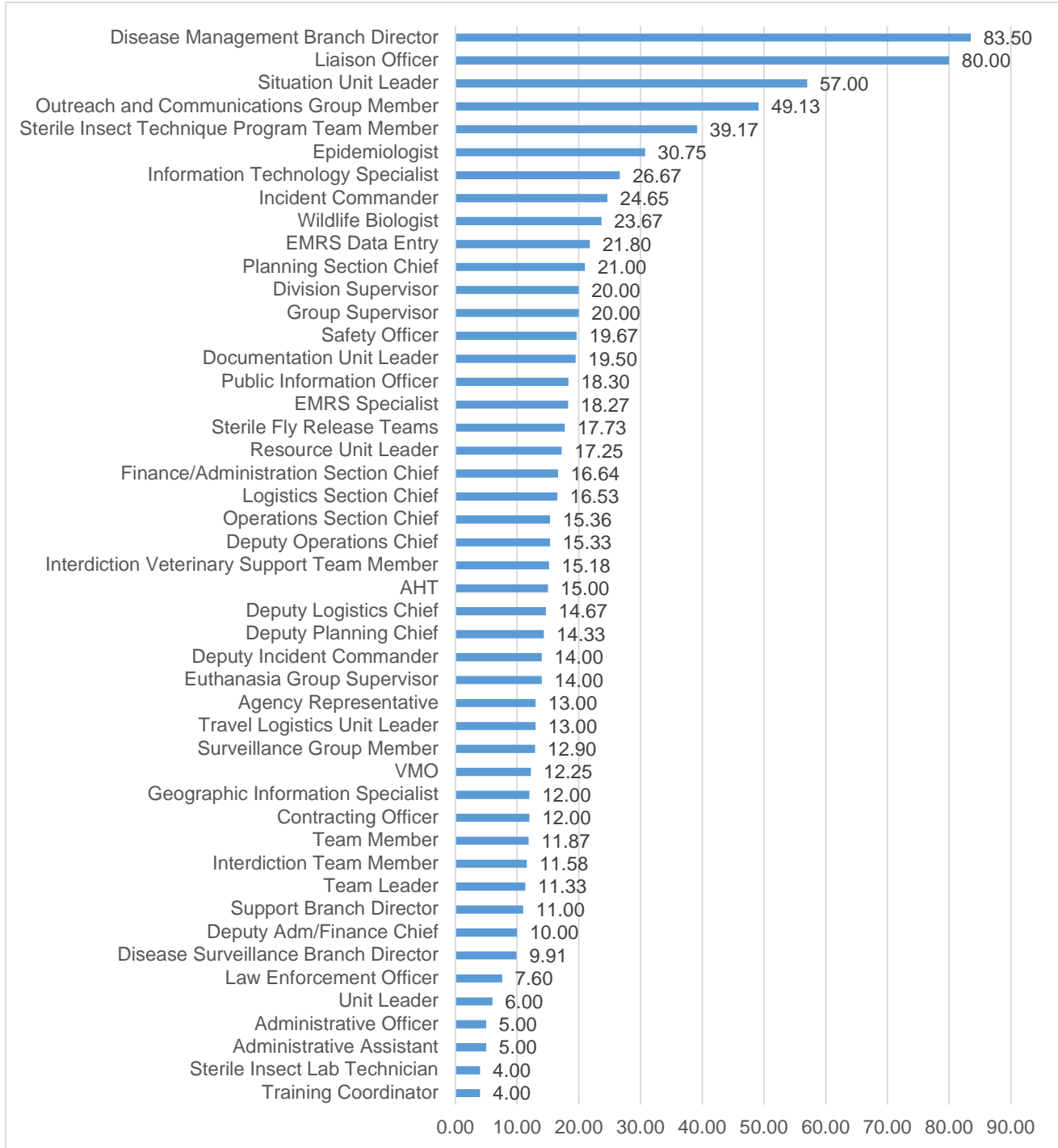
Figure 4. Total APHIS Deployments by Position Assigned



### C. Length of Deployment

- Range: 1–177 days
- Average: 17.68 days
- Median: 14.00 days

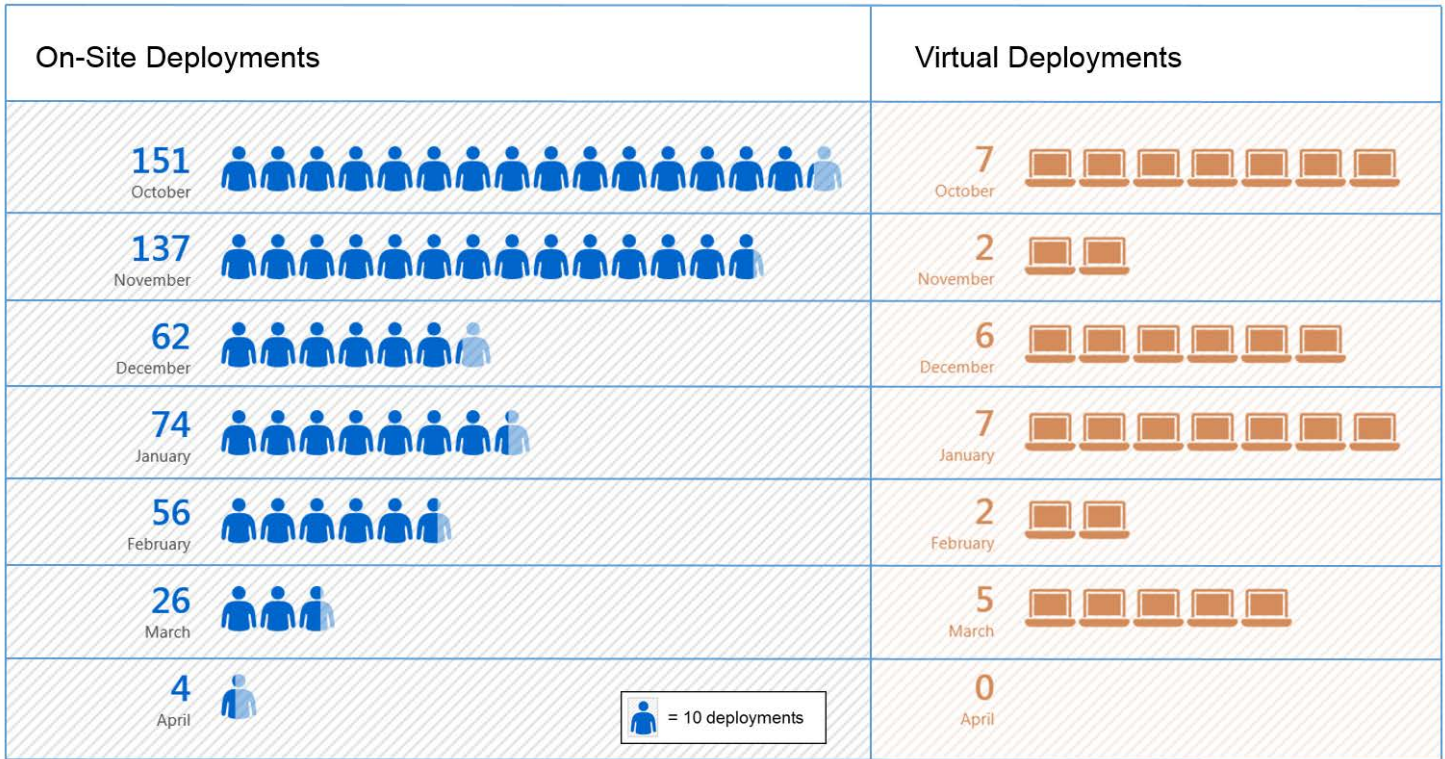
Figure 5. Average Deployment by Position Assigned in Days (Not Including Currently Deployed)



### D. Number of Deployments by Month

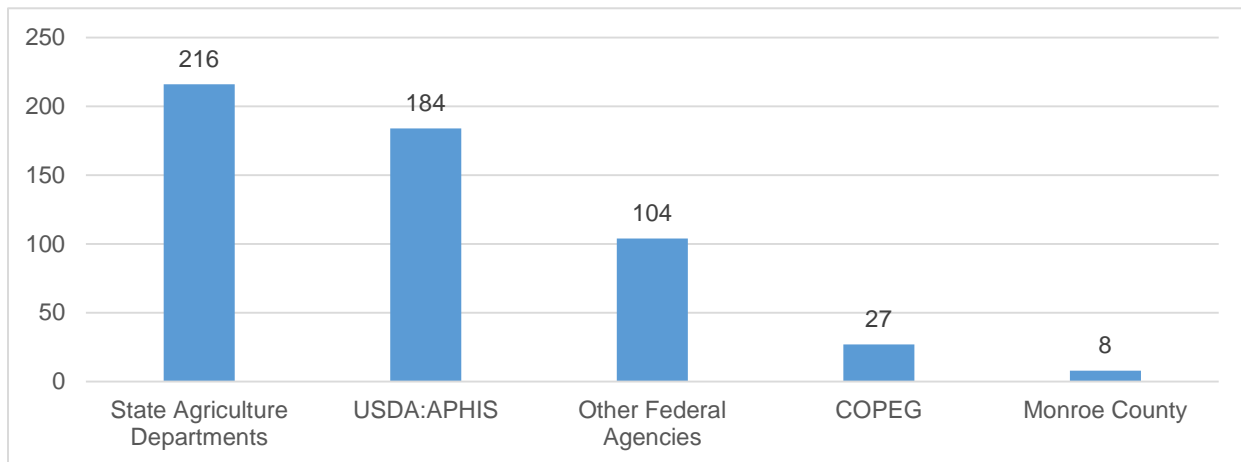
- Earliest Deployment: October 2, 2016
- Last Deployment: April 27, 2017

Figure 6. Total Deployments by Month by Rotation Type



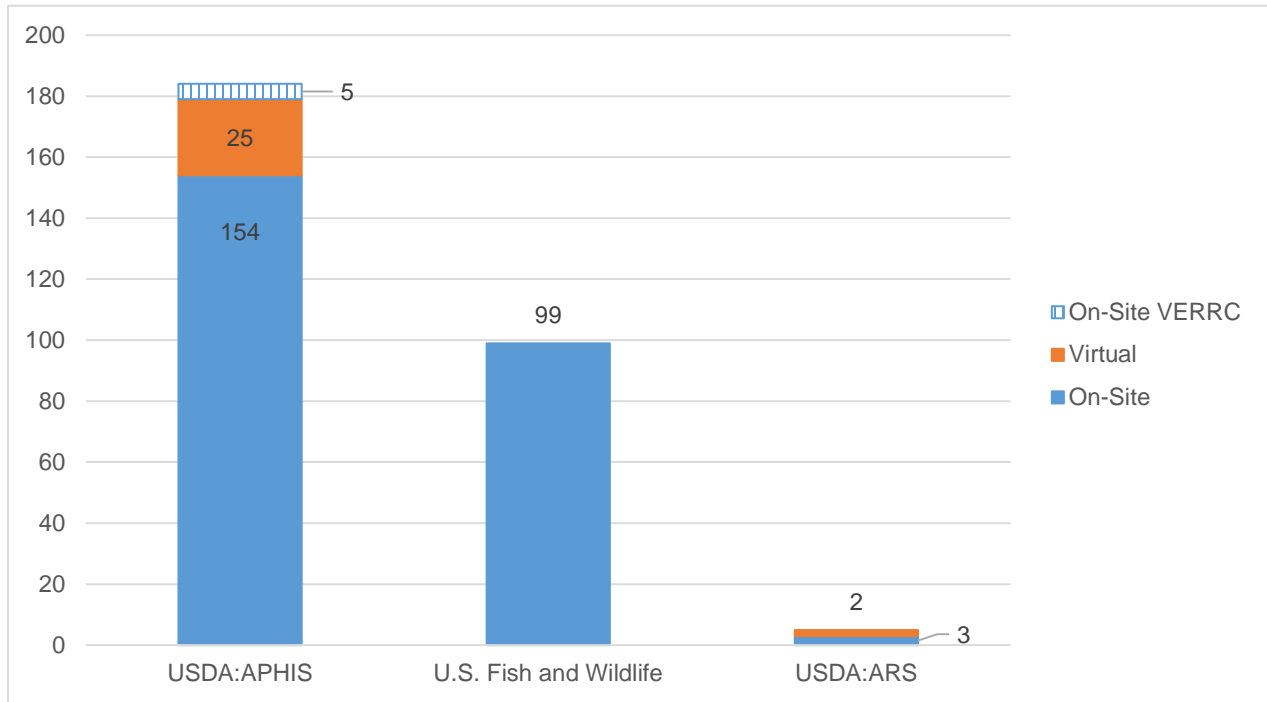
### E. Total Organizational Deployments

Figure 7. Total Deployments by Organization



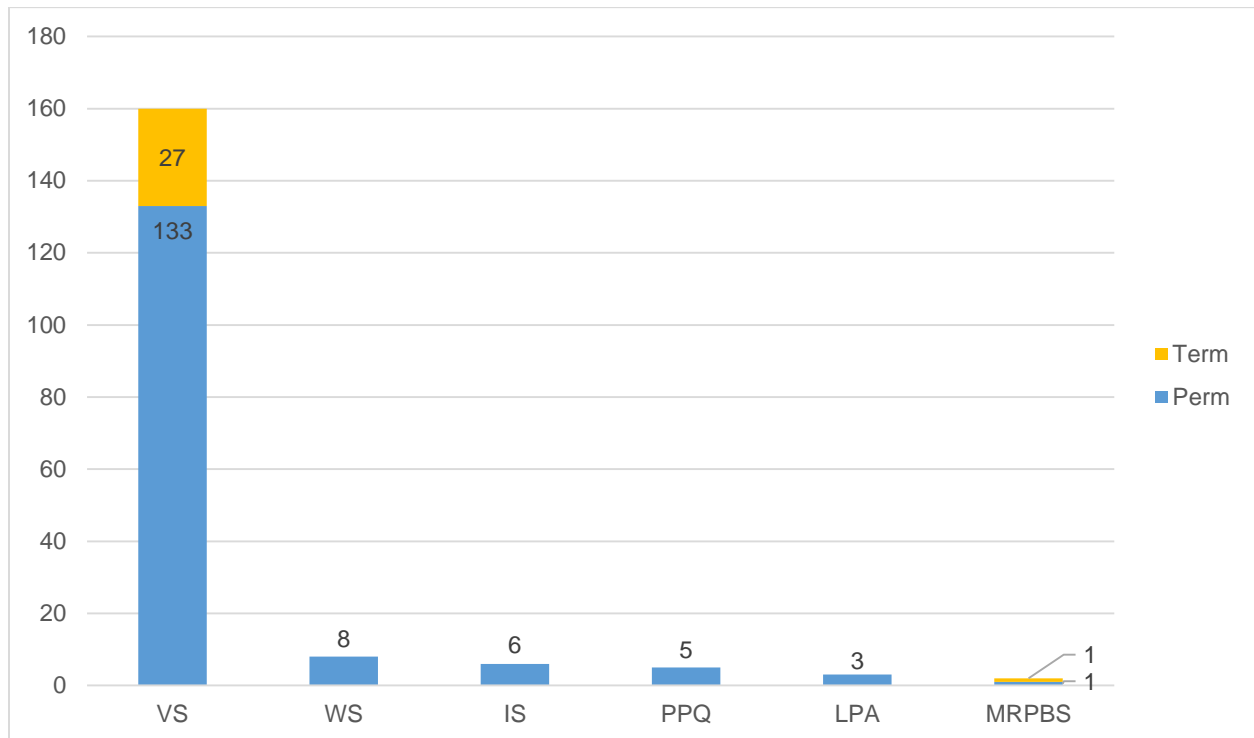
Note: COPEG= Commission for the Eradication and Prevention of NWS

Figure 8. Total Federal Agency Deployments by Rotation Type



Note: ARS= Agricultural Research Service

Figure 9. Total APHIS Deployments by Appointment Type



Note: WS= Wildlife Services, IS= International Services, PPQ= Plant Protection and Quarantine, MRPBS= Marketing and Regulatory Programs Business Services, LPA= Legislative and Public Affairs

Figure 10. Total APHIS Deployments by Rotation Type

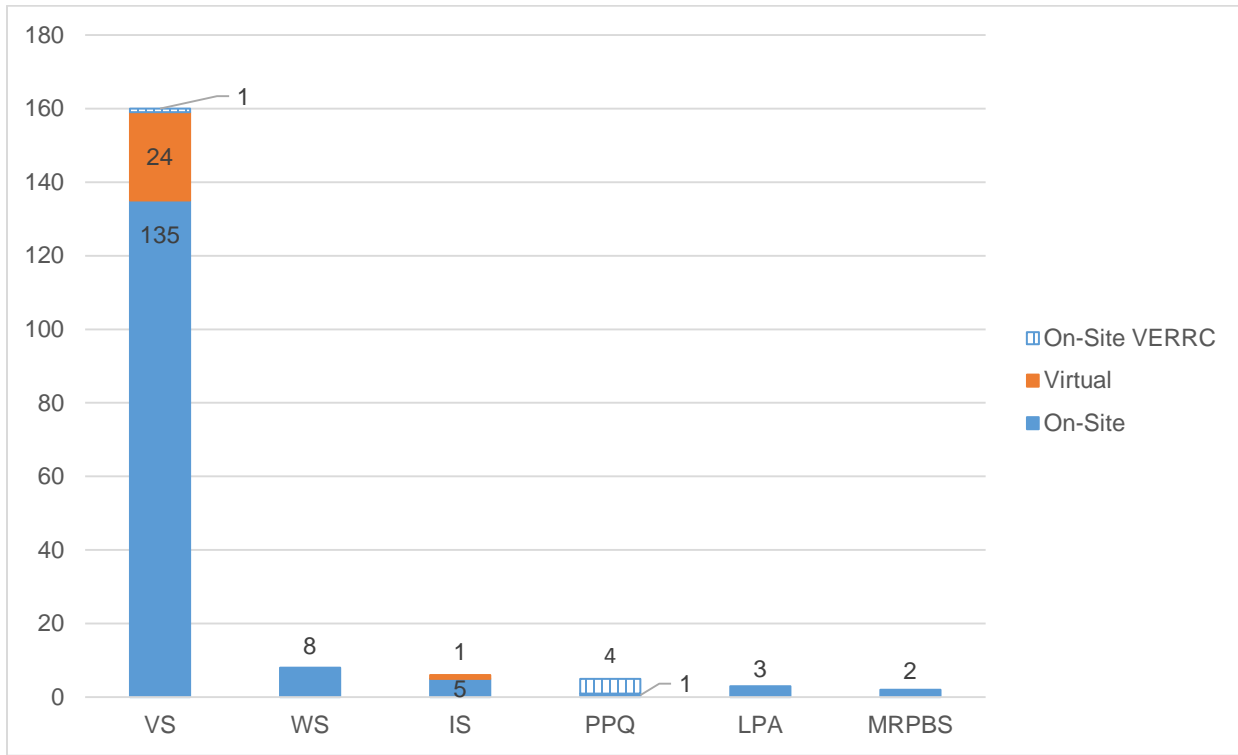
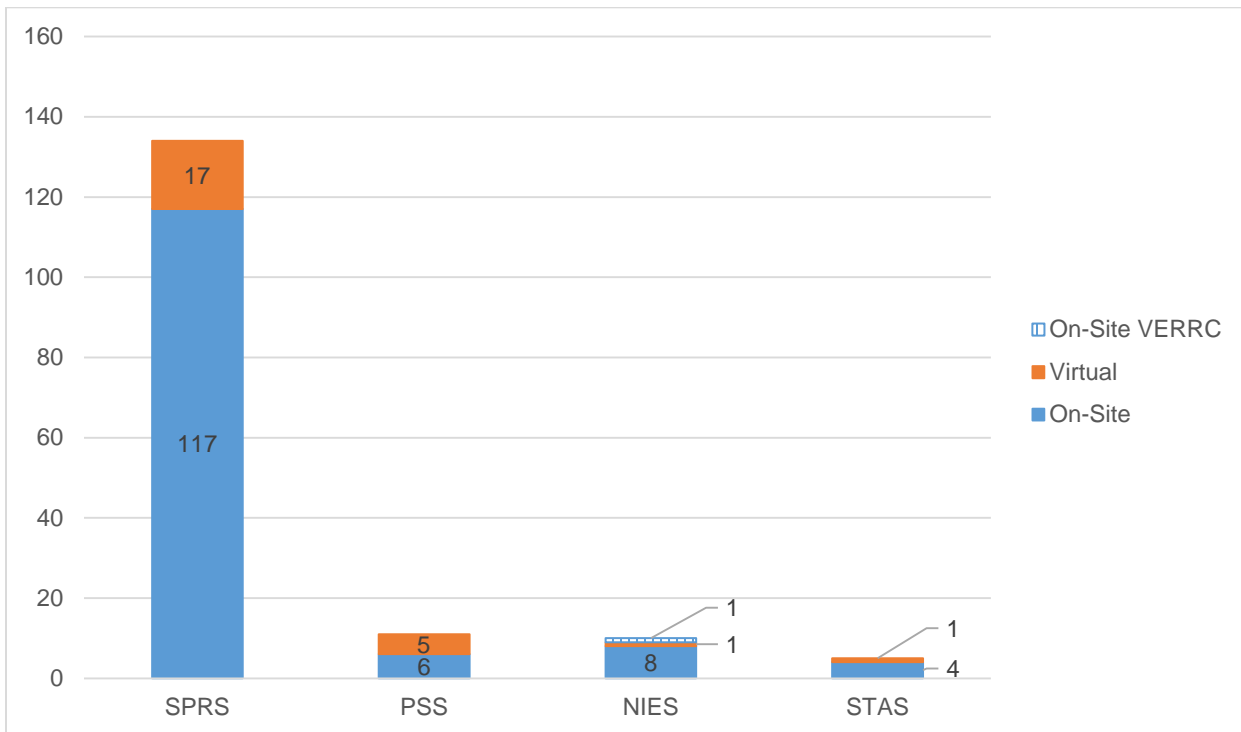


Figure 11. Total VS Deployments by Rotation Type



Note: SPRS= Surveillance, Preparedness, and Response Services, PSS= Program Support Services, NIES= National Import and Export Services, STAS= Science, Technology, and Analysis Services



Figure 12. Total SPRS District/Unit Deployments by Rotation Type

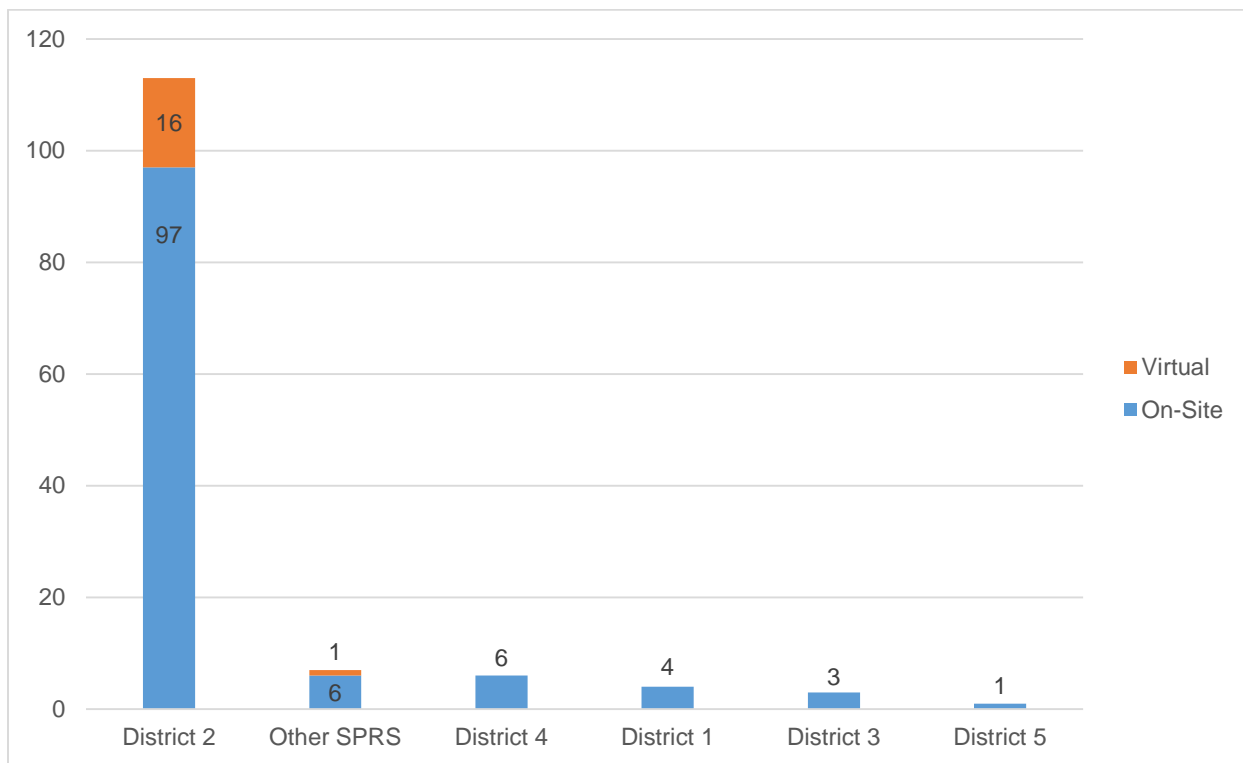
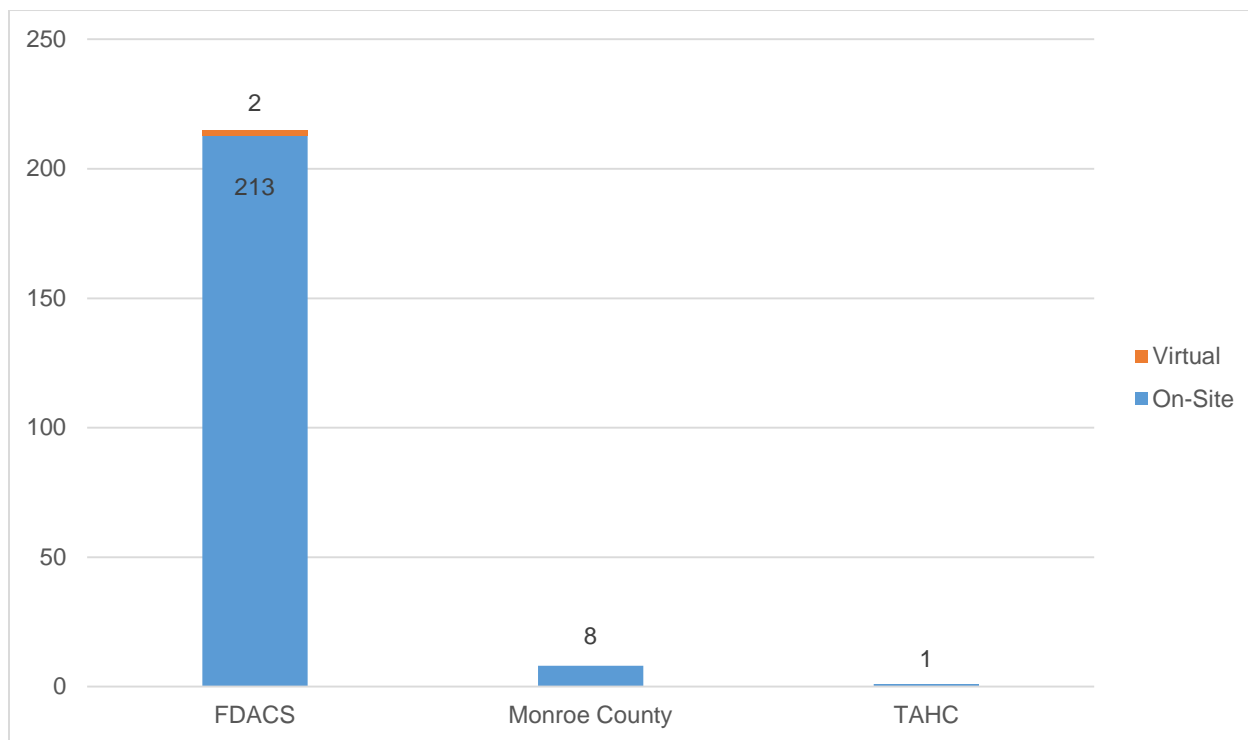


Figure 13. Total State and County Deployments by Rotation Type



Note: FDACS= Florida Department of Agriculture and Consumer Services, TAHC= Texas Animal Health Commission

## *Appendix 5*

# *Abbreviations*

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APHIS	Animal and Plant Health Inspection Service
ARS	Agricultural Research Service
CEAH	Center for Epidemiology and Animal Health
COPEG	Commission for Eradication and Prevention of NWS
EMRS2	Emergency Management Response System 2.0
FAD	foreign animal disease
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
MAC	Multiagency Coordination
NIMT	National Incident Management Team
NVSL	National Veterinary Services Laboratories
NWS	New World screwworm
PPQ	Plant Protection and Quarantine
SIT	sterile insect technique
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VS	Veterinary Services
WS	Wildlife Services