



**Pierce's Disease Control Program**

# **REPORT TO THE LEGISLATURE**

*for calendar year 2019*



CALIFORNIA DEPARTMENT OF  
FOOD & AGRICULTURE

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# STATEMENT OF THE SECRETARY

It's hard to fathom, but here we are in 2020, looking back at more than two decades of growing grapes under a heightened threat of Pierce's disease in California vineyards. The key words in that sentence, of course, are "growing grapes." That wasn't exactly a given in 2000, right after we had just gathered the first rounds of trap counts for the glassy-winged sharpshooter in Temecula. Growers across this state were bracing themselves. Reporters were predicting a "vineyard apocalypse" and wondering aloud what crop could ever replace grapes in the Napa Valley and the Central Coast and elsewhere.

It was a crisis, plain and simple. But somehow, as unsure as we all felt at the time, California's current experience with COVID-19 tends to put things in perspective. And our experience with the Pierce's disease response, based squarely on science, is a prime example of how such a public-private partnership can succeed.

Our Pierce's Disease Control Program has helped a great industry survive and thrive, and we've done it cooperatively, with science and research. With lab tests and inspections and field trials. Science will provide the answers to our COVID-19 crisis, too. As it has with our Pierce's disease response for 20 years now, science guides our state's response to this pandemic. These parallels are no surprise; in both cases, as in so many of our projects and programs at CDFA, following the science is the prudent, proper approach for a government agency working with public partners for the greater good.

Please consider this report not just as an annual snapshot, but also as the result of sustained dedication on the part of growers who see the value in this work, and the cumulative benefits that come from such exemplary cooperation and commitment.

Karen Ross, Secretary  
California Department of Food and Agriculture





# EXECUTIVE SUMMARY

Pierce's disease (PD) is a lethal disease of grapevines. It is a serious threat to grapevines throughout the southern United States, and is particularly threatening to California, where a thriving winegrape industry exists. The bacterial pathogen which causes PD, *Xylella fastidiosa* (*Xf*), has been present in California for more than a century. While many insects can vector *Xf*, the establishment and spread of the glassy-winged sharpshooter (GWSS) in California in the 1980s and 1990s created a new and serious threat of significant statewide damage. At risk is California's grape and wine industry, which generates annual economic activity of \$57.6 billion within the state and \$114 billion nationally. The Pierce's Disease Control Program (PDCP) works to halt the spread of GWSS until research finds solutions to PD.

PDCP's operational approach relies on five major components: contain the spread, statewide survey and detection, rapid response, outreach, and research. Since the inception of PDCP in 2000, these components have proven to be an effective means for slowing the spread of GWSS and minimizing the statewide impact of PD.

PDCP implements its statewide strategy through the collaboration of several agencies and cooperators. The United States Department of Agriculture (USDA), the California County Agricultural Commissioners, the University of California, the PD/GWSS Board, and the PD Advisory Task Force all contribute to the success of the program.

Funding for PDCP comes from three primary sources: the USDA's Animal and Plant Health Inspection Service, California's winegrape growers, and occasionally the State General Fund.

During the program's 20 years of progress, research has relentlessly closed the gap on commercial solutions. Through these years the PD/GWSS Board has authorized \$34.3 million to fund 225 research grants. Researchers have developed PD-resistant grape scions and rootstocks, which are nearing commercial release.

Research remains targeted on PD and GWSS, but research on other designated pests of winegrapes including brown marmorated stink bug, European grapevine moth, mealybugs, fanleaf virus, leafroll virus, and red blotch virus is also underway.

Among the many major accomplishments over the life of the program are the detection and eradication of 18 incipient infestations of GWSS. The continuing strength and vitality of grape production in California bears testimony to the effectiveness and success of the statewide cooperative PDCP.

# BACKGROUND

## The Threat

Pierce's disease (PD) is a fatal bacterial disease of grapevines that is spread by certain types of insects, including leafhoppers. It has been present in California for more than 100 years and in the past has caused sizable losses to viticulture in localized "hotspot" areas of the state. Until recently, it did not pose a severe threat to the majority of areas currently under grape production. This situation changed dramatically with the arrival of the glassy-winged sharpshooter (GWSS), an aggressive insect vector of PD. Because of this insect, viticulture in traditionally safe growing regions is now at risk of the disease. Considering only grapes, the disease now threatens a crop production value of \$6.25 billion and associated economic activity within California of approximately \$57.6 billion. Other crop and ornamental plant resources such as almonds (\$5.47 billion) and susceptible types of citrus (\$1.12 billion), stone fruits (\$885 million), and shade trees are also at risk, either from the PD strain of the bacterium, or from related strains found elsewhere in the world. To counter this threat, the Pierce's Disease Control Program (PDCP) was established within the California Department of Food Agriculture (CDFA) to minimize the statewide impact of PD.

## Pierce's Disease

PD in grapevines was first noted in California near Anaheim around 1884. The disease is caused by a strain of the bacterium *Xylella fastidiosa* that kills grapevines by triggering cell death in the plant. Several strains of this bacterium exist, attacking and causing damage to different host plants including grapes, citrus, stone fruits, almonds, oleander, and certain shade trees such as oaks, elms, maples, and sycamores. The University of California (UC) reported that the disease destroyed over 1,000 acres of grapevines in Northern California between 1994 and 2000, causing \$30 million in damages.<sup>1</sup> There is currently no known cure for PD.



*Vines showing symptoms of Pierce's disease.*

<sup>1</sup> Report of the Pierce's Disease Research and Emergency Response Task Force. April 2000.

## The Glassy-winged Sharpshooter

GWSS was first reported in California in 1994 but probably arrived in the state in the late 1980s. It is native to the southeastern United States and northeastern Mexico. It feeds on the xylem fluid of a large number of plants. This sharpshooter builds up large populations on a diverse array of host plants and is a strong flyer, traveling greater distances than native sharpshooters.

California's first indication of the severe threat posed by this new disease and vector combination occurred in the City of Temecula, Riverside County, in August of 1999, when over 300 acres of grapevines infested with GWSS were destroyed by PD. Losses continued to mount in Temecula and other infested areas in following years, eventually exceeding 1,100 acres statewide by 2002.



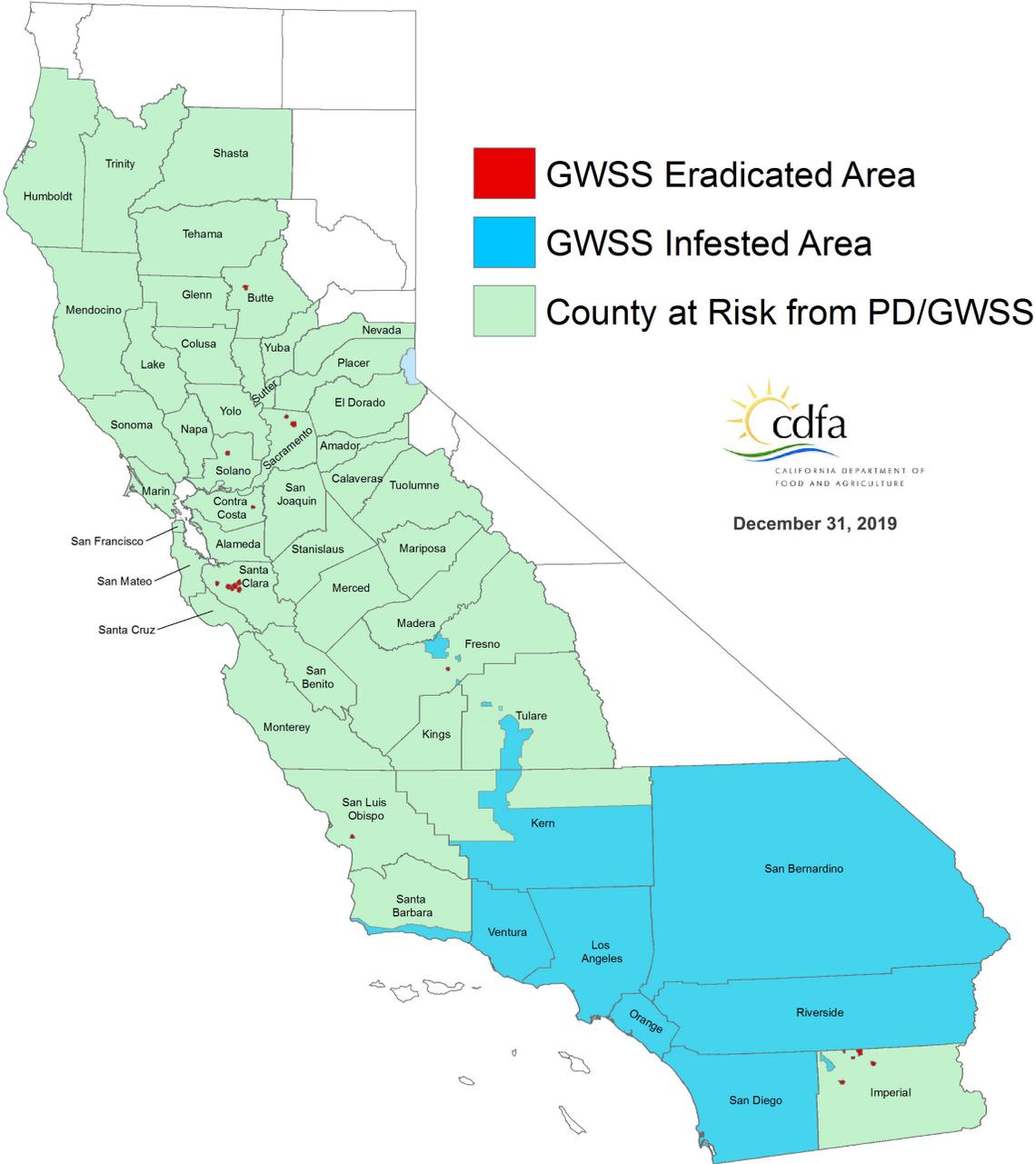
*Adult glassy-winged sharpshooter.*

GWSS clearly has the potential to increase both the incidence and severity of PD in California. As observed in the Temecula infestation, the sharpshooter:

- » Builds to high populations that substantially increase the number of insects vectoring the destructive *Xylella fastidiosa* bacteria to crops;
- » Travels longer distances in a shorter time than other sharpshooters;
- » Makes use of more breeding habitats and plant hosts than native vectors; and
- » Transmits the bacteria from vine to vine, resulting in an exponential increase in disease incidence in vineyards.

The combination of PD and GWSS constitutes an unprecedented threat to California's multi-billion-dollar grape and wine industry, as well as to almonds, and other crop and ornamental plants.

# Pierce's Disease and Glassy-winged Sharpshooter in California





# PROGRAM DESCRIPTION

The Pierce's Disease Control Program (PDCP) works to minimize the impact of Pierce's disease (PD) in California. The strategy is to slow or stop the spread of the glassy-winged sharpshooter (GWSS) while short- and long-term solutions to PD are developed. This strategy relies upon the following five elements:

## **1. CONTAIN THE SPREAD:**

Prevent the spread of the GWSS to new areas of the state by regulating shipments of host plants and other host material to prevent artificial spread and suppressing populations to prevent natural spread.

## **2. STATEWIDE SURVEY AND DETECTION:**

Find new GWSS infestations quickly and confirm that non-infested areas remain free of infestation by conducting systematic trapping in non-infested, at-risk areas.

## **3. RAPID RESPONSE:**

Respond quickly to detections of GWSS in new areas by intensively surveying the area and applying treatments if necessary.

## **4. OUTREACH:**

Raise awareness about PD and its vectors while responding to the concerns of growers and the public by conducting outreach and education activities.

## **5. RESEARCH:**

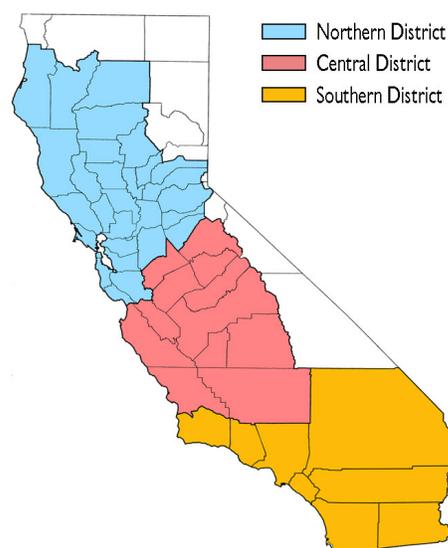
Develop long-term, sustainable solutions to PD and its vectors by sponsoring and facilitating research and development.

## Organization

PDCP is a partnership that includes the California Department of Food and Agriculture (CDFA), county agricultural commissioners (CAC), the United States Department of Agriculture (USDA), the University of California (UC), and other state and local agencies, industry, and agricultural organizations throughout the state.

A statewide coordinator directs the program in accordance with the policies and priorities established by the Secretary of CDFA. Program staff are located throughout the state and are responsible for coordinating and implementing the elements of the program. This includes working closely with CAC to ensure program activities are conducted in accordance with all statutory and regulatory requirements. Scientists at CDFA's Plant Pest Diagnostics Center provide pest identification services. Biological control agents are produced at a facility in Arvin, California and are released where needed. Researchers throughout the state and elsewhere conduct research geared towards finding solutions to PD.

PIERCE'S DISEASE CONTROL PROGRAM DISTRICTS



## County Workplans

County agricultural commissioners (CAC) are responsible for conducting local PDCP activities. These activities are guided by workplans developed by CAC and submitted to CDFA for approval. As stated in statute California Food and Agricultural Code Section 6046, county workplans must include the following elements:

- » Outreach presentations and training in local communities that respond to local concerns;
- » Ongoing training of employees in the biology, survey, and treatment of PD and its vectors;
- » Identification of a local coordinator;
- » Proposed response to the discovery of the disease and its vectors (including delimitation and treatment); and
- » A system to track and report new infestations.

Program activities are conducted year-round. CAC submit activity reports electronically to the CDFA each month. Audits are conducted of one or more counties each year to verify the accuracy and appropriateness of charges and expenditures.



## Advisory Groups

Several groups advise the PDCP, including:

### **Pierce's Disease and Glassy-winged Sharpshooter Board**

The Pierce's Disease and Glassy-winged Sharpshooter (PD/GWSS) Board is composed of 14 representatives from the winegrape industry, plus one member from the public. The Board provides recommendations to the CDFA Secretary on the use of funds collected under the PD/GWSS winegrape assessment, a statewide value-based assessment which has raised approximately \$67 million over the last 18 years. The Board is advised by subcommittees which focus on specific areas and issues.

### **Pierce's Disease Advisory Task Force**

The Pierce's Disease Advisory Task Force is composed of CAC, scientists, agricultural representatives, and other experts. The Task Force reviews program progress and develops recommendations for the CDFA Secretary. Similar to the PD/GWSS Board, the Task Force is advised by subcommittees which focus on specific areas and issues.

### **Pierce's Disease Research Symposium Planning Group**

The Pierce's Disease Research Symposium Planning Group is composed of representatives from USDA, UC, and CDFA. This group assists with planning the Pierce's Disease Research Symposium by providing input on the format, content, and schedule of the event.

### **California Agricultural Commissioners and Sealers Association Glassy-winged Sharpshooter Advisory Group**

The California Agricultural Commissioners and Sealers Association (CACASA) GWSS Advisory Group is composed of agricultural commissioner representatives from each of the five CACASA area groups in the state. This group meets periodically to discuss issues of statewide and regional concern and to promote program consistency and good communication among state and county cooperators.

# CONTAIN THE SPREAD

Contain the Spread is designed to prevent the spread of the glassy-winged sharpshooter (GWSS) to non-infested areas of the state on articles and commodities shipped from infested areas. Emergency regulations governing the movement of nursery stock and bulk grapes were first adopted in July 2000. Regulations on bulk citrus were added later, following finds of live GWSS in bulk citrus shipments. Permanent program regulations were adopted in July 2003. In GWSS-infested agricultural areas, area-wide management programs were established to suppress GWSS populations and to reduce their damage and spread.



*Nursery employees inspecting a tree.*

## Nursery

Nursery stock is a high-risk commodity for spreading GWSS. Approximately 50% of California's 14,600 licensed nurseries are located in GWSS-infested counties. Many of these nurseries ship to non-infested areas of the state. Activities to mitigate the risk of moving GWSS on nursery stock include:

- » Inspection of nursery stock in infested areas prior to shipping to non-infested areas;
- » Treatment of nursery stock when necessary;
- » Certification of shipments;
- » Inspection of nursery stock at receiving nurseries prior to sale;
- » Trapping in and near nurseries shipping to non-infested areas; and
- » Trapping in and near nurseries receiving shipments from infested areas.



*Inspector checking for glassy-winged sharpshooter egg masses.*

## Inspection Results

- » In 2019, there were 43,300 shipments of nursery stock from infested areas to non-infested areas.
- » Six viable life stages of GWSS were discovered at destination.
- » Origin county inspectors stopped 140 egg masses, three nymphs, and eight adults from moving in nursery stock shipments.

## Regulated Nursery Shipment Results

- » Over 90% of all rejections between 2001 and 2019 have been for viable GWSS egg masses. The table below presents the results of the ongoing nursery inspection and shipment certification program.

YEAR	NUMBER OF SHIPMENTS	GWSS FOUND AT DESTINATION	% FREE OF GWSS AT DESTINATION
2001	57,600	149	99.74%
2002	65,800	77	99.88%
2003	65,000	40	99.94%
2004	76,700	64	99.92%
2005	72,600	84	99.88%
2006	69,000	47	99.93%
2007	73,100	46	99.94%
2008	62,600	37	99.94%
2009	53,700	23	99.96%
2010	50,600	6	99.99%
2011	44,500	4	99.99%
2012	44,600	2	99.99%
2013	45,800	6	99.99%
2014	44,000	12	99.97%
2015	38,000	6	99.98%
2016	36,000	9	99.97%
2017	36,700	6	99.98%
2018	34,400	0	100%
2019	43,300	6	99.99%

## Enforcement Actions

Enforcement actions are taken against nurseries and shipments that are in violation of regulations. Actions can be taken at origin or destination.

Actions that can be taken at the origin of nursery shipments:

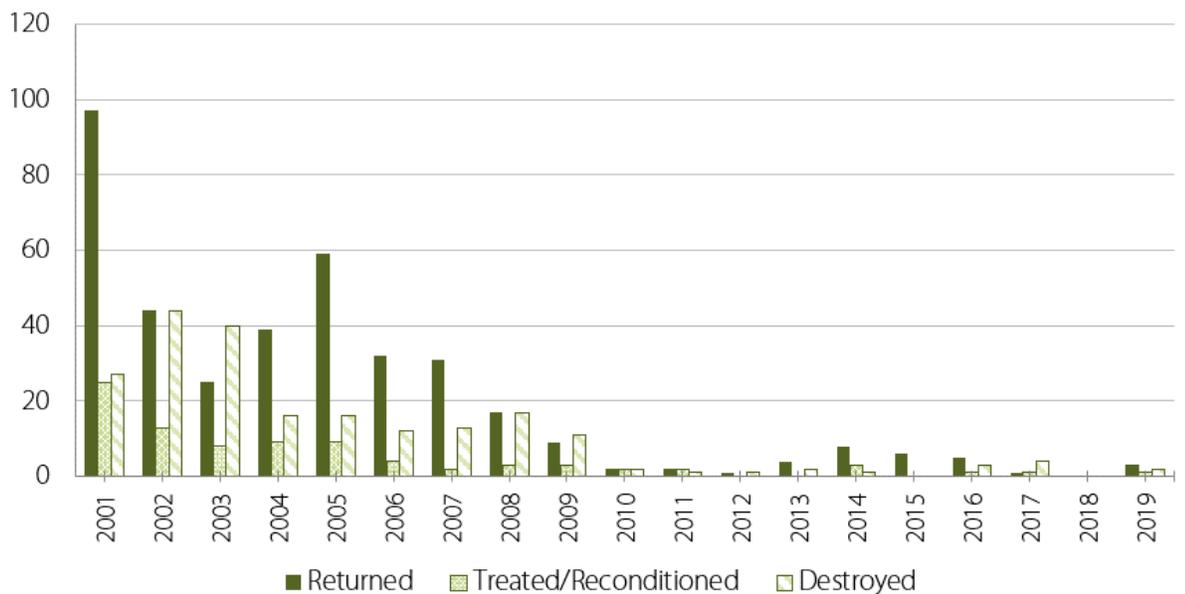
- » **RESTRICTION:** The nursery is restricted from shipping certain species of host material out of the infested area for a period of time.
- » **SUSPENSION:** The nursery is suspended from shipping all host material out of the infested area until the pest risk is mitigated.
- » **REVOCAION:** The nursery's compliance agreement is revoked and it cannot ship any host material out of the infested area for an established period of time.

Actions that can be taken at the destination of nursery shipments:

- » **TREATMENT:** The nursery shipment is treated with an effective material.
- » **RETURN:** The shipment is returned to origin.
- » **DESTRUCTION:** The shipment is destroyed.

Shippers and receivers who violate nursery stock regulations are subject to fines. In 2019, one administrative penalty was levied against a company totaling \$1,000.

### Nursery Shipment Destination Actions



## Nursery Stock Approved Treatment Program

The Nursery Stock Approved Treatment Program (ATP) began in June 2008. This program was implemented following the successful three-year Nursery Treatment Pilot Program. With the ATP, qualified nurseries are allowed to ship nursery stock, treated with specified materials, to non-infested areas without an origin inspection. These materials are 100% efficacious at killing GWSS.

In 2019, there were eight nurseries that shipped under ATP protocols. Approximately 2.8 million plants, in 10,786 shipments from 26 yards, were shipped. Forty-six counties received plant material from ATP nurseries throughout the year, with no viable GWSS found in any shipments.

Trapping is conducted in ATP nurseries to ensure pest thresholds are not exceeded. Traps are maintained at two traps per acre in all ATP nurseries. If a trap exceeds the threshold of 10 GWSS within a two-week period, then all host plant material within a 100-foot radius is placed on hold and must be treated within five days. If a hold treatment is not conducted within five days, plants within the 100-foot radius are held for a minimum of two weeks from the time the next treatment is applied.

All trapping at ATP nurseries is conducted by county or Pierce's Disease Control Program (PDCP) staff. Results from the 2019 trapping efforts are as follows.

NUMBER OF NURSERY YARDS	NUMBER OF NURSERY ACRES	NUMBER OF TRAPS DEPLOYED	NUMBER OF TRAPS WITH > 10 GWSS
26	1,360	2,869	130

Nursery stock being shipped under this program must be treated with carbaryl or fenprothrin. All treatments are witnessed by licensed county inspectors. Additional monitoring of treatments includes quality control checks by PDCP staff using water-sensitive paper. Yellow sheets of water-sensitive paper are placed within the nursery stock shipment at various heights and locations. When the pesticide droplets make contact with the paper, it turns from yellow to blue. After treatment, the sheets are checked to see if they were hit by the spray. In 2019, PDCP staff placed water-sensitive paper in shipments at each participating nursery a minimum of once a month. Out of 298 water-sensitive papers inspected, only four indicated the need for retreatment of the shipment.

Under the ATP program, county inspectors may choose to monitor GWSS egg masses found at destination on treated shipments of nursery stock. In 2019, a total of seven egg masses from one ATP yard were monitored in insect rearing sleeves by destination counties. There was no viable GWSS emergence.

## Bulk Citrus

Citrus trees are primary hosts for GWSS throughout the year. When the weather is warm, the insects are active and will flee from the disturbances associated with harvest.

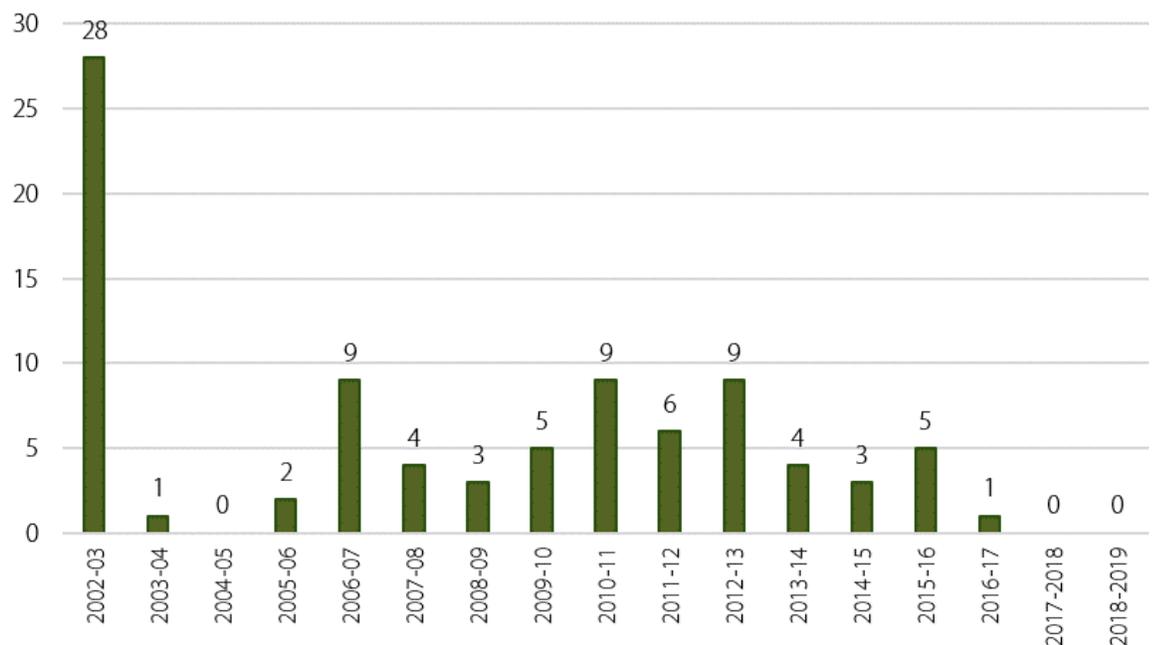
However, once the weather turns cold, the sharpshooters are relatively inactive and can end up in picking bags with harvested fruit, ultimately turning up at processing facilities in other parts of the state.

During the most recent citrus-shipping season (October 2018 – September 2019), live GWSS were found in zero out of approximately 15,786 certified destination inspections of bulk citrus. For the second consecutive season, PDCP achieved a success rate of 100%. This success is attributed to the cooperative efforts of bulk citrus program participants.



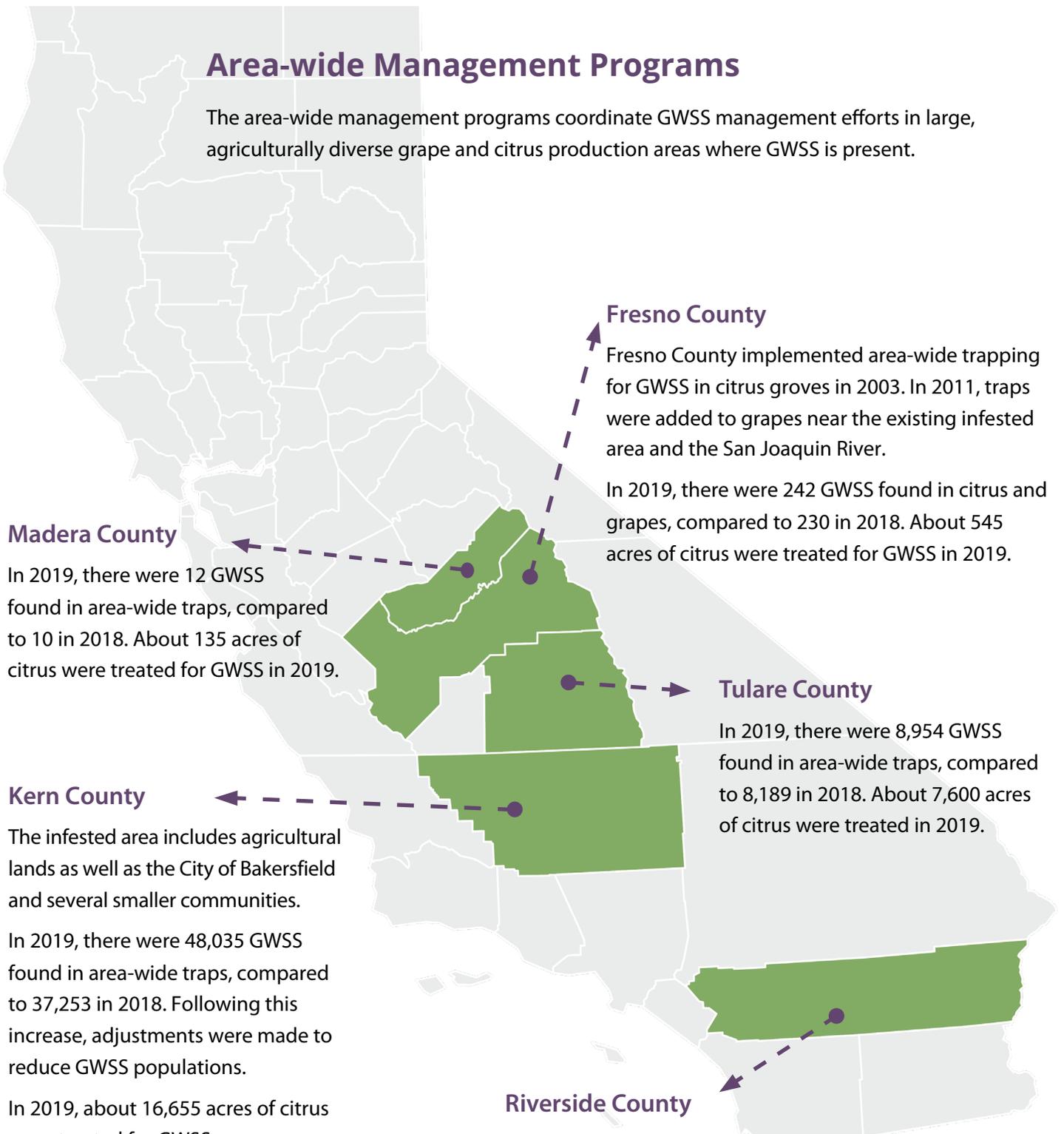
*Citrus harvest and inspections.*

### Number of Bulk Citrus Rejections



## Area-wide Management Programs

The area-wide management programs coordinate GWSS management efforts in large, agriculturally diverse grape and citrus production areas where GWSS is present.



### Riverside County

In 2019, the overall GWSS catch in the Temecula Valley was at a typical level for the area. In 2019, there were 1,524 GWSS found in area-wide traps, compared to 1,240 in 2018.

Monitoring occurred in citrus groves and in vineyards adjacent to GWSS hot spots in citrus. Additionally, monitoring in citrus and nearby table grapes resumed in Coachella Valley in July 2019. No GWSS catches were reported from Coachella Valley this year.

## Biological Control

The Pierce's Disease Control Program has been implementing biological control as an important component of its integrated pest management approach to reduce GWSS populations since 2001. GWSS biological control agents are tiny wasps specifically parasitizing GWSS eggs (egg parasitoids). Upon adult emergence and mating, the female wasp lays its eggs inside GWSS eggs and the immature wasp completes its development by feeding on the GWSS egg. The parasitic wasps kill GWSS eggs and contribute to suppression of GWSS populations.

Three egg parasitoid species, *Cosmocomoidea*, *C. ashmeadi*, *C. morgani*, and *C. morrilli*, were under mass production at the CDFA-PDCP Arvin Biological Control facility in Kern County in 2019. A total of 42,235 biological control agents were released at 102 field sites in six counties (Fresno, Kern, Madera, San Diego, Tulare, and Ventura). Since the start of the program, nearly 2.7 million biological control agents have been released at agricultural, riparian, and urban sites in 16 California counties.



*Biocontrol agents laying eggs inside glassy-winged sharpshooter eggs.*



*Biocontrol agent emerging from glassy-winged sharpshooter eggs.*



*C. ashmeadi*



*C. morgani*



*C. morrilli*

Post-release field surveys were conducted to determine the activity of the biological control agents in the field. In 2019, combined data showed that 62% of the eggs were parasitized in the field, which was similar with previous years. Seasonally, parasitism rates started low early in the season (January – April), but stayed above 50% afterwards. In late season (October – December), fewer GWSS egg samples were collected and most eggs had already been parasitized in the field, which may explain the scarcity of nymphs over winter, in addition to reproductive inactivity of overwintering GWSS adults.



Field-release of biological control agents.

**Number of Biological Control Agents Released in 2019**

COUNTY	NUMBER OF SITES	BIOLOGICAL CONTROL AGENTS				TOTAL
		<i>C. ashmeadi</i>	<i>C. morgani</i>	<i>C. morrilli</i>	<i>Ufens spp.</i>	
Fresno	13	4,383	985	628	13	<b>6,009</b>
Kern	34	6,988	2,051	3,186	30	<b>12,255</b>
Madera	3	842	473	360	1	<b>1,676</b>
San Diego	5	1,085	155	364	0	<b>1,604</b>
Tulare	24	5,565	1,475	1,352	7	<b>8,399</b>
Ventura	23	5,939	2,798	3,548	7	<b>12,292</b>
<b>Total</b>	<b>102</b>	<b>24,802</b>	<b>7,937</b>	<b>9,438</b>	<b>58</b>	<b>42,235</b>

Biological Control staff continued to monitor GWSS life stages in Kern County to support the area-wide management program. Using visual survey and beat-net methods, field populations of GWSS were monitored weekly at multiple sites in Kern County. In 2019, GWSS adults and egg masses (including parasitized or old eggs) were detected year-round, while nymphs were observed only April – October. Fresh egg masses were first detected in late March. Seasonal occurrences of eggs and nymphs showed two distinctive peaks in April and July. Field-collected GWSS adults in late October – December did not lay eggs promptly under greenhouse condition, which indicates that the GWSS adults may have become reproductively inactive.

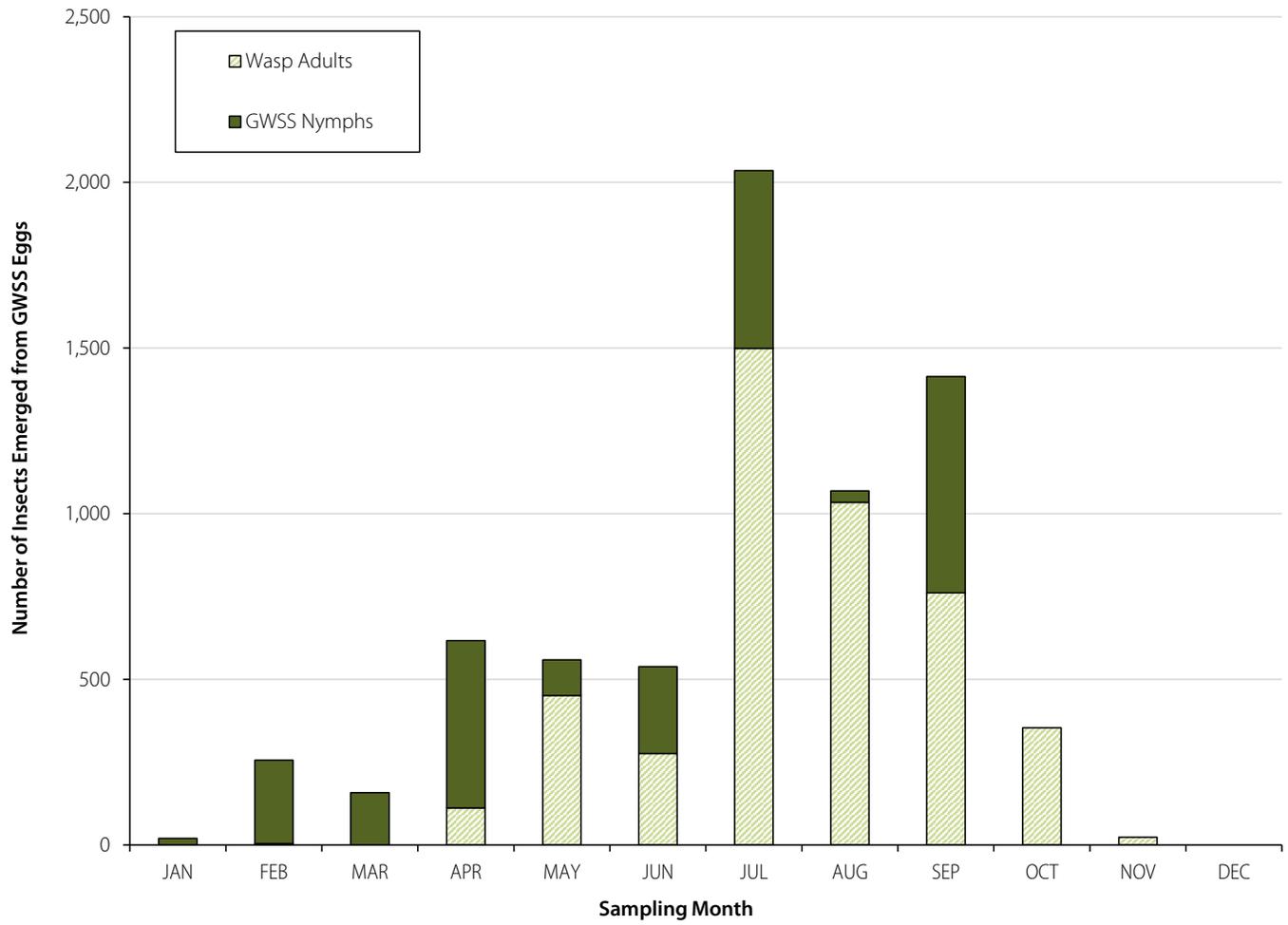


Production of GWSS host plant, GWSS and biological control agents.

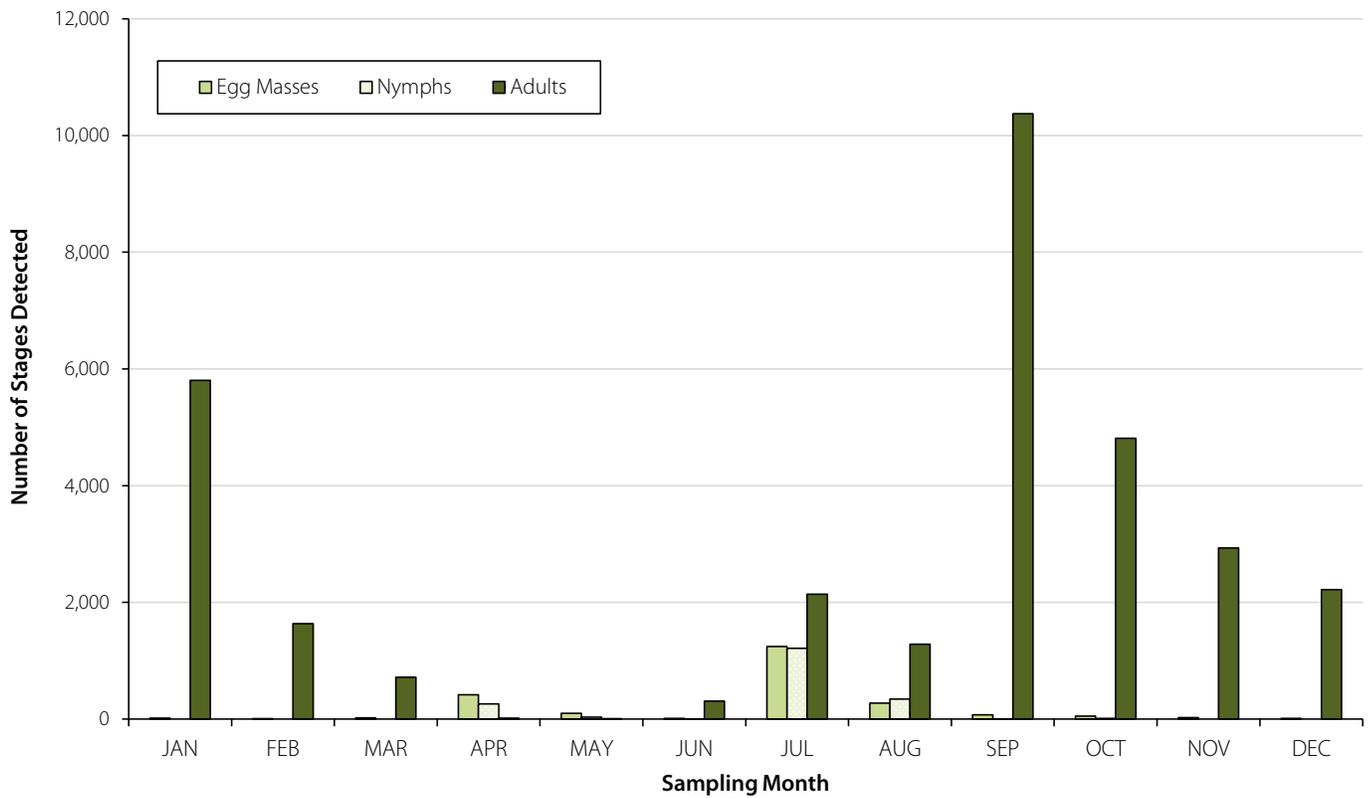
#### Number of Biological Control Agents Emerged from Field-Collected GWSS Egg Samples in 2019

COUNTY	NUMBER OF SITES	BIOLOGICAL CONTROL AGENTS							TOTAL
		<i>C. ashmeadi</i>	<i>C. morgani</i>	<i>C. morrilli</i>	<i>C. novifasciata</i>	<i>C. walkerjonesi</i>	<i>C. incompta</i>	<i>Ufens spp.</i>	
Fresno	13	352	0	0	0	0	0	549	<b>901</b>
Kern	34	1,264	0	0	0	0	0	326	<b>1,590</b>
Madera	3	21	0	0	0	0	0	0	<b>21</b>
San Diego	5	343	0	33	0	129	6	0	<b>511</b>
Tulare	24	311	1	0	0	0	0	404	<b>716</b>
Ventura	23	531	4	23	102	54	0	46	<b>760</b>
<b>TOTAL</b>	<b>102</b>	<b>2,822</b>	<b>5</b>	<b>56</b>	<b>102</b>	<b>183</b>	<b>6</b>	<b>1,325</b>	<b>4,499</b>

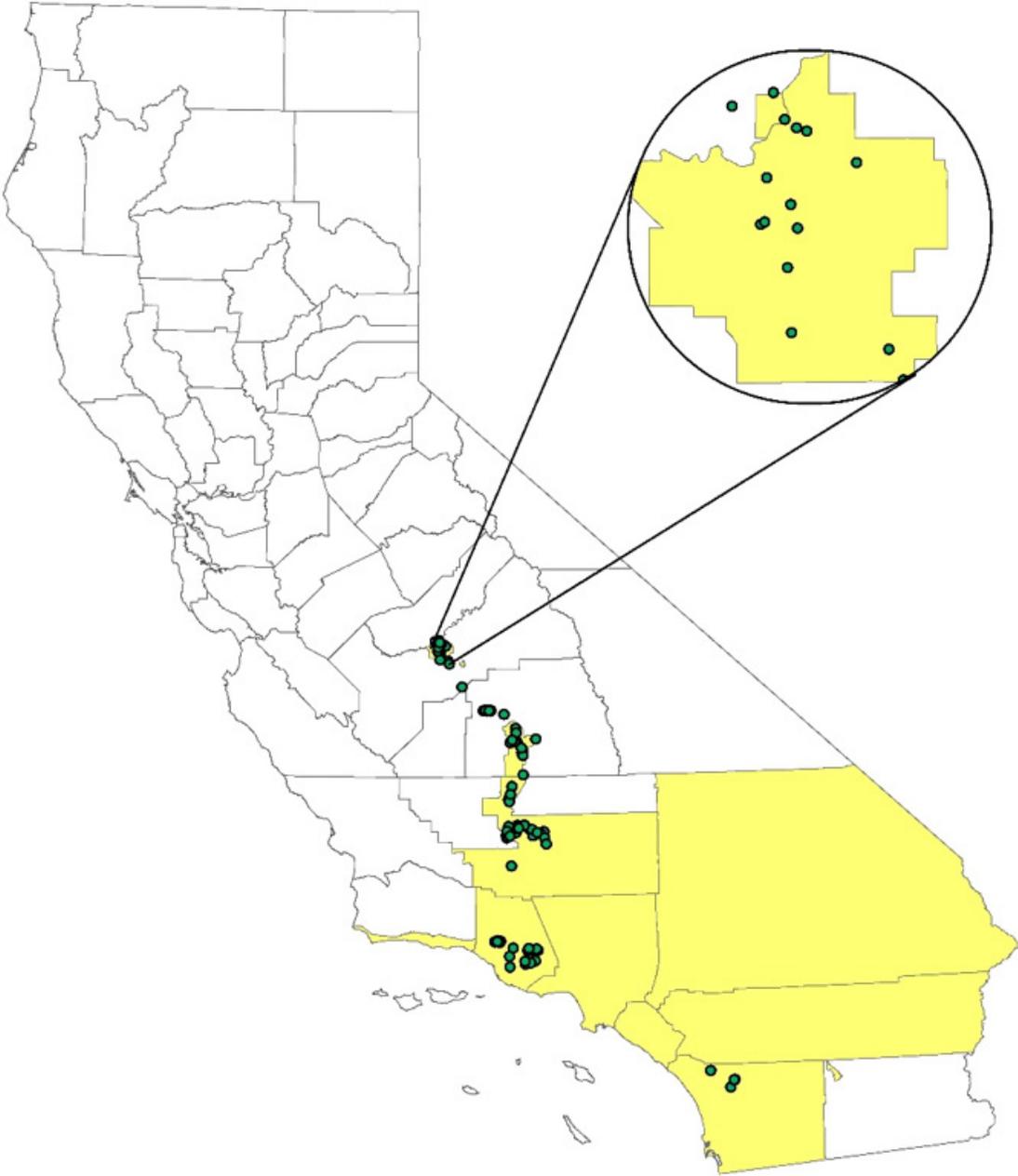
### Seasonal Pattern of Insect Emergence from Field Collected GWSS Eggs in 2019



## Seasonal Occurrence of GWSS Life Stages in Kern County in 2019



2019 Biological Control Sites



● 2019 Release/Survey Sites  
■ GWSS Infested Area

0 55 110 220 Miles

December 31 2019

# STATEWIDE SURVEY AND DETECTION

Statewide Survey and Detection is designed to locate new glassy-winged sharpshooter (GWSS) infestations quickly and confirm that non-infested areas remain free from infestation.

The activities of this element focus on systematically trapping urban and residential areas and nurseries to determine if GWSS are present.



*Glassy-winged sharpshooter inspectors.*

GWSS are detected by using yellow panel traps. The traps are deployed in 43 counties that are either non-infested, or are only partially-infested with GWSS. GWSS are attracted to the trap's bright yellow color and become stuck on the adhesive surface.

County and state personnel service traps on a regular basis during the trapping season. Each trap is checked every second or third week and moved to a new location every six weeks. New traps are used as needed. Detection and delimitation protocols were updated and distributed to each county participant in 2019. During the peak of the trapping season, approximately 33,000 traps were deployed and serviced statewide for GWSS detection and survey.



*Yellow panel trap.*

During 2019, PDCP staff provided detection training to 566 employees from 39 counties, Approved Treatment Program participating nurseries, and citrus packing houses. Staff assisted county personnel with field surveys and conducted quality control inspections of county trapping programs. These inspections are done to ensure that proper identification of target insects, trap placement, host selection, servicing schedules, and record-keeping are being performed correctly and at the desired levels.

# RAPID RESPONSE

Rapid Response involves responding quickly to detections of glassy-winged sharpshooters (GWSS) in new areas. When one or more GWSS are found in a new area, a delimitation survey is conducted by county biologists, sometimes with Pierce's Disease Control Program (PDCP) assistance, to determine if an infestation is present and, if so, to identify the boundaries. Delimitation surveys consist of high density trapping and visual inspections of preferred host plants in the area. If an infestation is present and treatment is necessary, residents of the area are notified. Treatments in urban and residential areas are applied under the supervision of the CAC and funded by the PDCP. In agricultural settings, treatments are the responsibility of the grower and must be conducted in a manner approved by the county agricultural commissioner.



*Pest management technicians treat around a home in an area infested with glassy-winged sharpshooters.*

In 2019, one new GWSS infestation was found and several existing infested areas expanded. An infestation in the City of Dinuba in Tulare County was found in 2019. Also, the existing infested area in the City of Visalia in Tulare County expanded, as well as parts of existing infested areas in the Cities of Fresno and Clovis in Fresno County. This was in addition to existing areas of Fresno, Madera, and Tulare counties, which were already undergoing eradication or suppression efforts. Statewide, GWSS were found on approximately 1,045 properties in these partially-infested counties. In response, approximately 6,485 properties (infested plus adjacents) were treated.

## Pre-Treatment Communication with Residents of Treatment Areas

Extensive public outreach and communication activities are conducted to ensure residents in affected areas are kept well informed of program and treatment activities.

A public meeting or other outreach activity for community members precedes treatment in urban and residential areas. This provides residents with the opportunity to learn about and discuss the treatment process with program and environmental health specialists. Door-to-door contacts, direct mail, and/or local media are used to inform residents of public meetings. Occupants of all properties scheduled for treatment are provided advance notification of the treatment date and time, information on the material to be used, and a phone number to call for more information.



*Soil injection treatment of a tree in a glassy-winged sharpshooter infested area by a pest control operator.*

To help protect area wildlife, a database of threatened and endangered species is consulted to determine if any listed species are present in the treatment area. All appropriate federal and state agencies are notified prior to treatment.

## Treatment

Public safety is the California Department of Food and Agriculture's number one concern whenever treatments are applied. PDCP staff and cooperators ensure that only registered materials are applied, in strict compliance with label and other restrictions.

Imidacloprid has proven very effective against GWSS. It is used in treatment programs in urban and residential settings and can be used for both foliage and soil treatment applications.

## Treatment Monitoring

The Environmental Monitoring Branch of the California Department of Pesticide Regulation has previously monitored pesticide treatments to determine resulting residue levels. PDCP uses this information to assess application rates and coverage. Sampling results and related monitoring reports are available on the Department of Pesticide Regulation's website at <https://www.cdpr.ca.gov/docs/emon/epests/gwss/reports.htm>.



# OUTREACH

## Website

In March 2000, the CDFA launched a website focused on PD and GWSS. It features information on program activities, survey guidelines, regulatory guidelines, announcements of upcoming meetings and events, the GWSS host list, and other information.

In addition, the website provides an interactive interface that allows direct activity reporting by local entities. This website is located at <http://www.cdfa.ca.gov/pdcp/> and in 2019 continued to be used as an effective tool for providing current and reliable information to interested parties.



*Screenshot of the Pierce's Disease Control Program website.*

## County Agricultural Commissioner Outreach Activities

In 2019, local county agricultural staff and industry members played key roles in maintaining program visibility and stakeholder awareness. County public outreach and education efforts included the distribution of PD and GWSS informational material to local retail, production, and shipping nurseries, landscape companies, members of the grape growing community, and others. Industry trade publications, cooperative extension newsletters, and media interviews also proved to be successful methods of outreach. Some counties also participated in continuing education seminars and conducted training for landscapers, pest control operators, nursery employees, and nursery association members.

## Pierce's Disease and Glassy-winged Sharpshooter Board's Outreach and Education Program

Winegrape growers are independent entrepreneurs with different priorities, issues and concerns based on geography, size, and operation. The PD/GWSS Board initiated its outreach and education program in 2004 to keep winegrape growers and stakeholders informed of PD/GWSS Board activities, emerging issues, and research advancements.

To mark the PD/GWSS Board's 20th anniversary, a new brochure was created to highlight the progress made in the past two decades against pests and diseases threatening California's vineyards. The brochure features an overview of the program, grower testimonials, and infographics highlighting progress and successes. It was mailed to winegrape growers and stakeholders in early 2020. The infographics were adapted for pull-up banners and displayed at grower trade shows throughout the state. Objectives met in 2019 for the outreach and education program included:

- » Keeping winegrape growers aware of all Board actions and the impact Board decisions are having on the success of the individual grower and the industry.
- » Reminding growers that the Board is ready to act swiftly to address new threats to California's wine industry.
- » Ensuring growers are aware that GWSS remains a threat to their vineyards and of the efforts being made to limit infested areas.
- » Updating growers on research activities and developments.



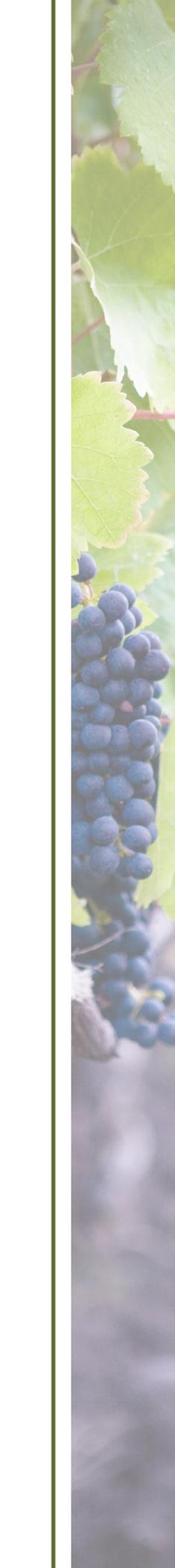
*Cover of the PD/GWSS Board's 20-year anniversary brochure.*

The following communications activities were used to connect with growers in 2019:

- » **QUARTERLY NEWSLETTER:** Highlighted PD/GWSS Board actions and research advances and was mailed to over 7,000 winegrape growers and industry stakeholders.
- » **MONTHLY E-NEWSLETTER:** Shared PD/GWSS Board activities, Pierce's Disease Control Program reports on containment and treatments, and relevant media coverage, and was sent to over 1,200 winegrape growers and industry stakeholders.
- » **WEBSITE:** Provided comprehensive information on the PD/GWSS Board, PD/GWSS winegrape assessment, pests and diseases designated by the PD/GWSS Board, and research projects funded by the PD/GWSS Board.
- » **GROWER MEETINGS AND TRADE SHOWS:** Shared the latest research advancements and applications with growers at six meetings and trade shows throughout the state.
- » **SOCIAL MEDIA:** Shared PD/GWSS Board news, research advancements and applications, and relevant media coverage through Facebook and YouTube. The PD/GWSS Board Facebook page has over 260 followers.
- » **VIDEO:** Offered a quick and on-demand way for growers and stakeholders to learn more about complex and evolving research. A new video created in 2019 showcased Dr. Steven Lindow at UC Berkeley introducing a new approach for protecting grapevines from PD. The collection of 19 videos housed on the PD/GWSS Board's YouTube channel have been viewed over 8,300 times since 2011.
- » **20-YEAR BROCHURE:** Focused on the progress made in the past two decades against pests and diseases threatening California's vineyards. The brochure was shared at grower meetings and trade shows in fall 2019 and was mailed to growers and stakeholders in early 2020.
- » **20-YEAR BANNERS:** Used at grower meetings and trade shows, the pull-up banners feature infographics from the 20-year brochure.
- » **MEDIA OUTREACH:** Maintained regular relations with key wine and agricultural media to keep them apprised of story opportunities, research successes, and PD/GWSS Board activities; provided background information and images to assist media in properly reporting PD/GWSS Board news and research; and developed and distributed press releases.



*Trade show display with 20-year banners.*



## Other Designated Pests and Diseases

Besides PD and GWSS, the Board has designated other pests and diseases that are a threat to California's winegrape industry. The list now includes the European grapevine moth (eradicated from California in 2016), brown marmorated stink bug, mealybug pests of winegrapes, and red blotch, grapevine leafroll, and fanleaf virus. As part of the outreach and education effort, information regarding these threats was communicated to winegrape growers around the state through monthly e-newsletters, quarterly newsletters, brochures, a trade show display, videos, speaking engagements, website, and special fact sheets. A new pop-up display was developed with an infographic featuring the steps for designating a new pest or disease by the PD/GWSS Board.

## Media Coverage

News articles and reports about PD and GWSS continued to appear in print and online media in 2019, with some television and radio coverage. The coverage was a mixture of how growers were coping with PD, the increases of PD in some regions in California and Europe, and the ongoing progress on the research front. Other news coverage included reports on research of other designated pests and diseases.

# RESEARCH

Research continues to be an integral part of the Pierce's Disease Control Program (PDCP). In 2019, the flurry of research activity that began at the start of the program continued, with approximately 20 projects being worked on by some of the nation's top plant health researchers. Projects ranged from lab-based investigations at the molecular and genomic levels to field trials in experimental and commercial vineyards. The information being generated is providing valuable insight into the biology, ecology, and behavior of Pierce's disease (PD) and its vectors. Additionally, 17 projects on other pests and diseases of winegrapes were in progress in 2019, increasing the knowledge base available for developing management solutions to these pests and diseases.

This extensive and sustained research effort has yielded discoveries and approaches that show good potential for leading to solutions. These include using conventional plant-breeding methods to develop grapevines resistant to PD, using non-virulent strains of *Xylella fastidiosa* to displace and out-compete pathogenic strains, identifying the mechanisms and processes leading to bacterial infection and spread, and elucidating the biochemical pathways which result in disease symptoms and death.

Scientists have developed plant metabolites that block damage-causing pathways and processes, and are experimenting with ways to introduce them into the plants via specially-developed rootstocks, topical applications, and other means. Several grapevine scions and rootstocks bred for resistance to PD using traditional methods have been field tested and provided to Foundation Plant Services at UC Davis for possible commercialization, and in November 2019, UC Davis announced it had applied for plant patents for five cultivars. Small lots of wine have been produced from some of these new disease-resistant cultivars and have tested well in wine tastings.

Field testing of grapevine plant material developed using transgenic approaches began in 2010 and continued through 2019. In 2013, a technology facilitator was brought in to advise on developing and commercializing these promising discoveries, and in 2014 the services of a viticulture consultant were obtained to ensure the field trial test vineyards were managed similar to commercial vineyards. Looking back, it is clear that solutions to PD are getting very close relative to where we were 20 years ago.



*Camminare noir, one of five PD-resistant grape varieties released by UC Davis.*



## Research Symposium

PDCP has organized 15 research symposia since 2001 to foster communication and information sharing among scientists and stakeholders on the latest research progress and findings on PD. Although a symposium was not held in 2019, a compilation of progress reports on current research and outreach projects on PD, the glassy-winged sharpshooter, and other winegrape pests and diseases was prepared. This document can be viewed online at <http://www.cdfa.ca.gov/pdcp/Documents/Proceedings/2019ResearchProgressReports.pdf>.

Additional research progress reports are available at <http://piercesdisease.cdfa.ca.gov/>.

## Research Proposal Solicitation and Review

In 2019, PDCP partnered with the Unified Grant Management for Viticulture and Enology Program at UC Davis to conduct its research and outreach proposal solicitation and review process. The call for proposals included PD, GWSS, and six additional designated pests and diseases of winegrapes. A total of 23 proposals were received and reviewed, with 16 projects totaling \$3.3 million selected for funding using PD/GWSS winegrape assessment funds. In addition, 12 ongoing projects were approved to continue for another fiscal year. Later in the year, one additional project was funded for \$443,000.



# ENVIRONMENTAL COMPLIANCE

In 2019, the Pierce's Disease Control Program (PDCP) continued its efforts to ensure activities were conducted in an environmentally responsible manner. These efforts included holding public meetings in advance of treatment activities, adhering to a special notification and consultation process with federal and state environmental stewardship agencies prior to treatment, and ensuring that pesticide applications are performed by licensed pest control professionals in strict accordance with California pesticide laws and regulations.

A statewide programmatic environmental impact report (EIR) was released for PDCP in mid-2003. A legal challenge was filed against the EIR shortly thereafter. Although a trial court found the EIR to be adequate, the State Appeals Court later reversed the trial court's ruling. In 2010, CDFA contracted with an environmental consulting firm and began preparing the environmental analyses, documents, and risk assessments called for by the Appeals Court. In 2012, it was decided to combine the efforts of this project with a similar one being conducted for CDFA's statewide plant health and pest prevention program. The final EIR for the CDFA statewide plant pest prevention program, including the PDCP, was certified by the secretary in December 2014. The full document can be found at <http://www.cdfa.ca.gov/plant/peir/>.

Following the December 2014 final EIR completion, a legal challenge was filed. In early 2018, the trial court ruled in favor of the plaintiffs and issued an injunction to PDCP and CDFA to stop all urban treatment activities. CDFA is appealing the decision of the trial court, and in May 2018 a stay to the treatment injunction was granted. The appeal process continued in 2019.

# FINANCIAL STATEMENT

REVENUE	FY 2018-19 (ACTUAL)	FY 2019-20 (BUDGETED)
Federal (United States Department of Agriculture)	\$15,328,537	\$15,681,044
CDFA (General Fund) *	\$1,727,336	\$1,881,255
CDFA (Reserve)	\$95,467	\$90,000
Industry (PD/GWSS Board winegrape assessment)	\$3,023,827	\$4,315,000
<b>TOTAL REVENUE</b>	<b>\$20,175,167</b>	<b>\$21,967,299</b>

\* FY 2018-19 amount was encumbered in FY 2017-18

EXPENDITURES	FY 2018-19 (ACTUAL)	FY 2019-20 (BUDGETED)
Personal Services	\$3,654,812	\$3,391,600
Operating Expenses	\$5,222,868	\$6,430,529
Total County Payments	\$11,297,487	\$12,145,170
<b>TOTAL EXPENDITURES</b>	<b>\$20,175,167</b>	<b>\$21,967,299</b>

## ABBREVIATIONS AND ACRONYMS

<b>ATP</b>	Approved Treatment Program
<b>CACASA</b>	California Agricultural Commissioners and Sealers Association
<b>CDFA</b>	California Department of Food and Agriculture
<b>GWSS</b>	Glassy-winged sharpshooter
<b>PD</b>	Pierce's disease
<b>PD/GWSS BOARD</b>	Pierce's Disease and Glassy-winged Sharpshooter Board
<b>PDCP</b>	Pierce's Disease Control Program
<b>UC</b>	University of California
<b>USDA</b>	United States Department of Agriculture