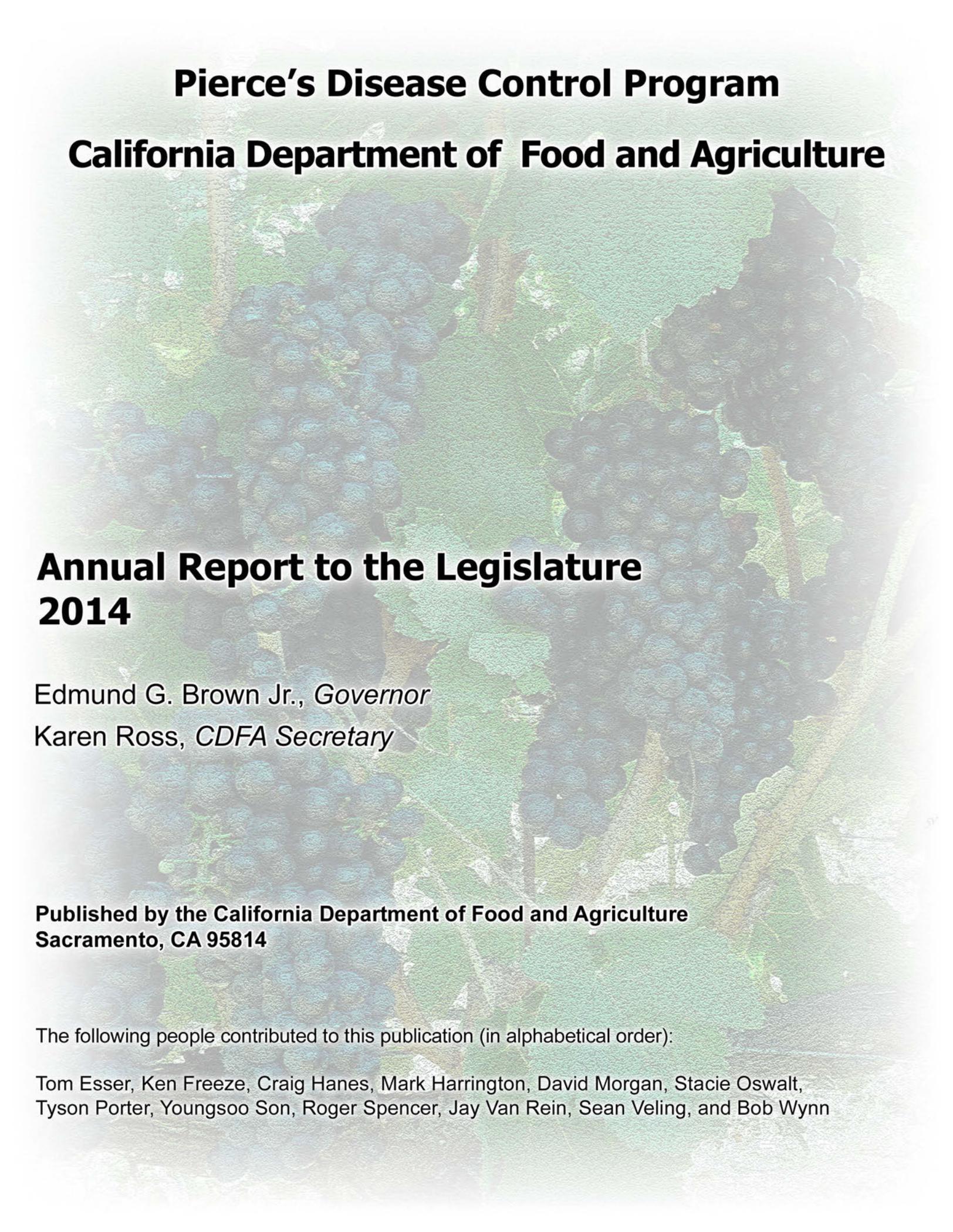


PIERCE'S DISEASE CONTROL PROGRAM

2014
ANNUAL REPORT TO THE LEGISLATURE



CALIFORNIA DEPARTMENT OF
FOOD & AGRICULTURE



Pierce's Disease Control Program

California Department of Food and Agriculture

Annual Report to the Legislature

2014

Edmund G. Brown Jr., *Governor*

Karen Ross, *CDFA Secretary*

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Statement of the Secretary

Today, there are Pierce's disease-resistant vines growing in California soil, thriving in a place once beset by this disease. A decade and a half ago, as apprehension swirled around the discovery of glassy-winged sharpshooters in our fields; it was hard to find many observers willing to believe a solution would be forthcoming. The headline in a popular wine publication used the term "apocalypse" back then, and the mood among grape growers reflected that same level of concern. But now here we are at the close of 2014, with a bona fide solution to Pierce's disease having run the gamut of theoretical and practical proofs and made its way into test plots and even into tasting rooms, with nods of approval all around. Plans are already being laid for the coming commercialization of these vines. We have other promising approaches still in the pipeline as well, in keeping with the program's original intention to provide not just a solution but a range of choices for our growers. The research effort is by no means at an end, but it is certainly arriving at a particular point of achievement – an achievement that should be proudly shared by the dozens of scientists who have lent their expertise to this problem over the years.

The California Department of Food and Agriculture's Pierce's Disease Control Program has thrived and succeeded for well over a decade, melding elements from public information and pest control to inspection and enforcement, layering them into an effective means of holding the pest at bay and "buying time for research." It is important to remember that none of this would have been possible without the leadership and determination of the Pierce's Disease and Glassy-winged Sharpshooter Board, which has ably guided the research efforts. From its inception as an eager and highly motivated industry group, the board has evolved into a truly science-driven, cooperative, results-oriented organization that serves as an example that many other research programs now seek to emulate.

We have taken so many important steps in this program over the years, and those steps have now brought us to this important milestone. I look forward to the efforts and achievements that remain ahead.

Karen Ross, Secretary
California Department of Food and Agriculture

Executive Summary

When the glassy-winged sharpshooter (GWSS) arrived in California it had few natural enemies; left unchecked, its populations built-up rapidly. Unfortunately, this insect was found to be an aggressive vector of Pierce's disease (PD). Before much was understood about the GWSS, acres of grapevines began dying in southern California due to the combination of PD and its new vector, the GWSS.

With the future of the wine grape industry in the balance, The California Department of Food and Agriculture (CDFA) responded in the year 2000 to the threat of PD and GWSS with the creation of the Pierce's Disease Control Program (PDCP). The five major components of the program (contain the spread; statewide survey and detection; rapid response; outreach; and research) were so effective that eventually the PDCP became the model for subsequent pest prevention and response programs. The PDCP also developed a biological control program that provides tens of thousands of natural enemies each year that help reduce glassy-winged sharpshooter populations.

The PDCP relies upon federal assistance and wine grape assessments that fund operations and research. The Pierce's Disease and Glassy-Winged Sharpshooter Board (PD\GWSS Board) advises and directs the use of assessment funds and has been instrumental in funding scientific research that will provide lasting solutions to Pierce's disease and its vectors. The PDCP also relies upon the network of state, federal, and county agencies along with private entities and stakeholders that together have built a viable and successful pest prevention program.

Background

The Threat

PD is a fatal bacterial disease of grapevines that is spread by certain types of insects, such as 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 under grape production. This situation changed dramatically with the arrival of the glassy-winged sharpshooter (GWSS), an aggressive insect vector of Pierce’s disease. Because of this insect, viticulture in traditionally safe growing regions is now at risk from the disease. Considering only grapes, the disease now threatens a crop production value of \$4.45 billion and associated economic activity within California in excess of \$61.5 billion. Other crop and ornamental plant resources such as almonds (\$4.35 billion) and susceptible types of citrus (\$765 million), stone fruits (\$739 million), and shade trees are also at risk, either from the Pierce’s disease strain of the bacterium or from related strains found elsewhere in the world. To counter this threat, the PDCP was established within the 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 clogging their water-conducting vessels (xylem) and 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.¹ There is currently no known cure for PD.



Vines and leaves showing symptoms of Pierce's disease

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

The Glassy-winged Sharpshooter

The 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 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.

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



An egg mass, nymph, and adult female glassy-winged sharpshooter

Pierce's Disease and Glassy-winged Sharpshooter in California



February 19 2014

Program Description

The PDCP works to minimize the impact of PD in California. The strategy is to slow or stop the spread of the 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.

2. Statewide Survey and Detection

Find and monitor GWSS infestations and populations through trapping and visual survey.

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.

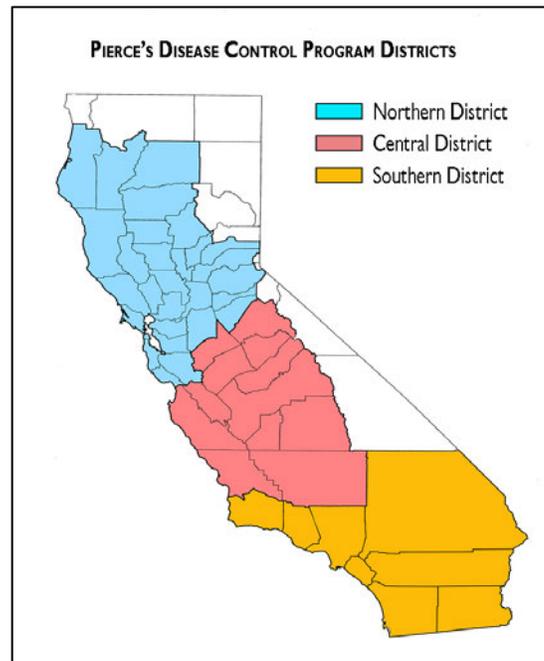
5. Research

Develop solutions to PD and its vectors.

Organization

The PDCP is a partnership that includes the California Department of Food and Agriculture (CDFA), County Agricultural Commissioners, United States Department of Agriculture (USDA), University of California (UC), 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 the 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 the County Agricultural Commissioners to ensure that 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 in the CDFA laboratory facility in Arvin. Researchers throughout the state and elsewhere conduct research geared towards finding solutions to PD.



County Workplans

The County Agricultural Commissioners are responsible for conducting local Pierce's Disease Control Program activities. These activities are guided by workplans developed by the County Agricultural Commissioners and submitted to the California Department of Food and Agriculture for approval. As stated in the law (California Food and Agricultural Code Section 6046), county workplans must include the following elements:

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

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

Advisory Groups

Several groups advise the PDCP. These include the following:

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. It provides recommendations to the Secretary on the use of funds collected under the PD/GWSS winegrape assessment, a statewide value-based assessment which has raised approximately \$46 million over the last 13 years. The Board is advised by subcommittees established to focus on specific areas and issues.

Pierce's Disease Advisory Task Force

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

Pierce's Disease Research Scientific Advisory Panel

The Pierce's Disease Research Scientific Advisory Panel is composed of university scientists with expertise in research areas directly applicable to Pierce's disease and its vectors. It provides input and expertise on the research effort.

Pierce's Disease Research Symposium Planning Group

The Pierce's Disease Research Symposium Planning Group is composed of representatives from the USDA, UC, industry and the CDFA. This group assists with planning the annual 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 regularly to discuss issues of statewide and regional concern and to promote program consistency and good communication among state and county cooperators.

Contain the Spread

The Contain the Spread element of the Program is designed to prevent the spread of the GWSS to uninfested 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 sharpshooters in bulk citrus shipments. Permanent program regulations were adopted in July 2003.

Nursery

Nursery stock is a high-risk commodity for spreading the GWSS. Approximately 60% of California's 12,000 licensed nurseries are located in sharpshooter-infested counties. Many of these nurseries ship to the non-infested areas of the state. Activities to mitigate the risk of moving the GWSS on nursery stock include:

1. Inspection of nursery stock in infested areas prior to shipping to non-infested areas;
2. Treatment of nursery stock when necessary;
3. Certification of shipments;
4. Inspection of nursery stock at receiving nurseries prior to sale; and
5. Trapping in and near nurseries shipping to non-infested areas.

Inspection Results

In 2014, there were 44,000 shipments of nursery stock from infested areas to non-infested areas. Viable life stages of GWSS were discovered on only twelve of these shipments.

Over 90% of all rejections between 2001 and 2014 have been for GWSS egg masses. The table on the right presents the results of the ongoing nursery inspection and shipment certification program.

YEAR	NUMBER OF SHIPMENTS	GWSS FOUND	% FREE OF GWSS
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%

Regulated nursery shipment results

Enforcement Actions

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

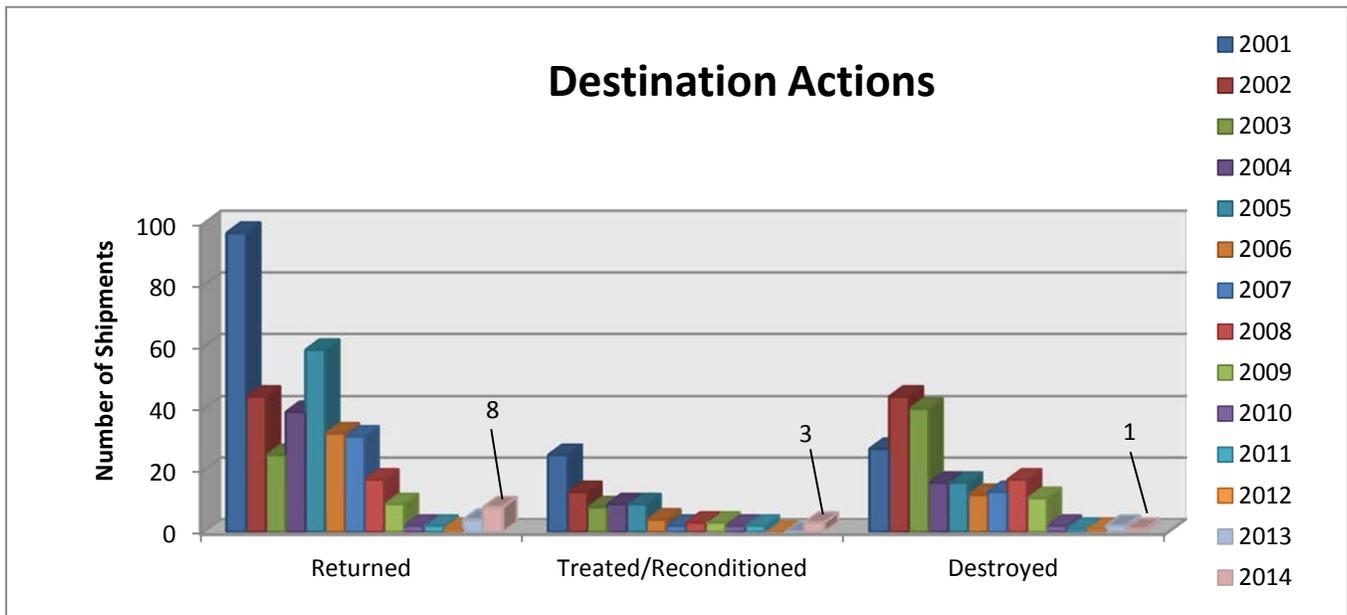
Actions that can be taken at the origin of nursery shipments consist of the following:

- **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.
- **Revocation:** 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 destination of nursery shipments consist of the following:

- **Treatment:** The nursery shipment must be treated with an effective material.
- **Return:** The shipment must be returned to origin.
- **Destruction:** The shipment must be destroyed.

Shippers and receivers who violate nursery stock regulations are subject to fines. In 2014, administrative penalties were levied against two companies, totaling \$11,500.



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 emerging GWSS nymphs.

In 2014 there were seven participating nurseries that shipped approximately 2.72 million plants in 11,761 shipments. There were a total of 28 yards associated with these seven nurseries. Thirty-nine counties received plant material from ATP nurseries, with no viable GWSS detected in any shipments.

Trapping is conducted in ATP nurseries to ensure pest free standards are met. Yard 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' radius will be held for a minimum of two weeks from the time the treatment is made. All trapping is conducted by county or PDCP staff. Results from the 2014 trapping efforts are as follows:

Number of Yards	Number of Acres	Number of Traps	Number of Traps >10 GWSS
28	1,373	2,913	369

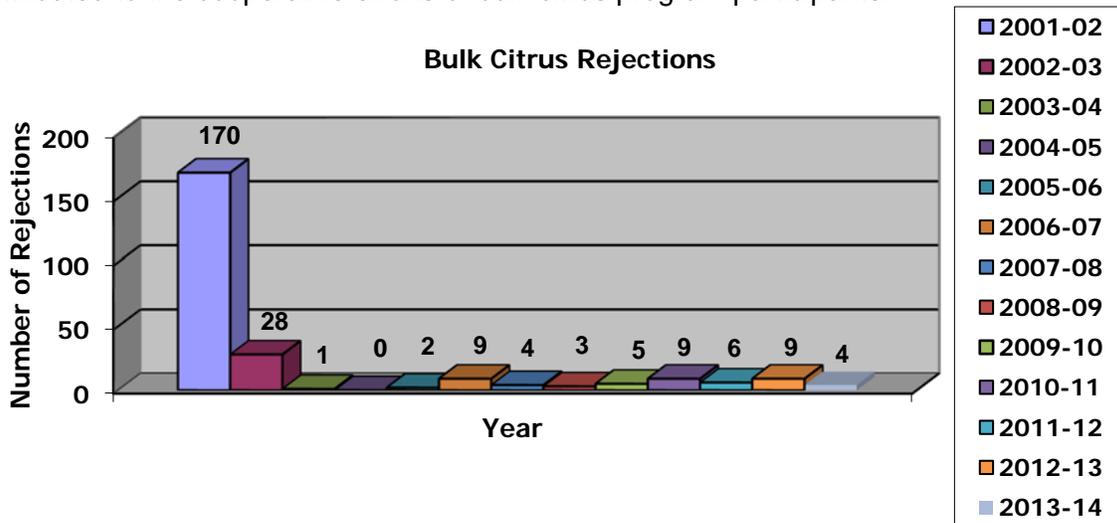
Nursery stock being shipped under this program must be treated with carbaryl or fenprothrin. All treatments are witnessed by licensed county inspectors. Additional monitoring of treatments includes quality control checks by PDCP staff using water-sensitive paper. Sheets of water-sensitive paper are placed within the nursery stock shipment at various heights and locations. After treatment, the sheets are checked to see if they were hit by the spray. In 2014, PDCP staff placed water-sensitive paper at each participating nursery a minimum of once a month. Out of 292 water-sensitive papers inspected only 10 indicated the need for partial 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 2014, a total of six egg masses from four ATP yards were monitored by destination counties with no viable GWSS emergence.

Bulk Citrus

Citrus trees are primary hosts for the GWSS throughout the year. When the weather is warm, the insects are active and will flee 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 2013 through September 2014), live GWSS were found in only four out of approximately 35,000 certified shipments of bulk citrus. This shipping season achieved a success rate of 99.99%. This success is attributed to the cooperative efforts of bulk citrus program participants.



Citrus harvest and inspections

Statewide Survey and Detection

The Statewide Survey and Detection element of the Program is designed to locate new GWSS infestations quickly and ensure that non-infested areas remain free of infestation.

The activities of this element focus on systematically trapping urban and residential areas and nurseries to determine if GWSS are present. The program maintains an internet map server to quickly map and display discoveries of GWSS.

GWSS are detected by using yellow panel traps that are deployed in 43 counties that are not infested or are only partially infested with GWSS. The GWSS are attracted to the trap's bright yellow color and will stick to 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. Survey protocols were updated and distributed to each county participant in the spring of 2014.



Yellow panel trap in crape myrtle



Survey/detection and nursery training for County personnel

During 2014, Program staff provided detection training to 473 employees from 43 counties, CDFA, ATP participating nurseries, and citrus packing houses. PDCA staff assisted county personnel with field surveys and also conducted quality control inspections of County trapping programs. These inspections are done to ensure that target insect recognition, trap placement, host selection, servicing schedules, and record keeping are being performed at the desired levels.

Rapid Response

The Rapid Response element of the Program involves responding quickly to new GWSS detections in partially-infested or non-infested counties. When one or more GWSS are found in a new area, a delimitation survey is conducted by county biologists, often with PDCP assistance, to determine if an infestation is present and, if so, to identify the boundaries of the infestation. Treatments in urban and residential areas are applied under the supervision of the County Agricultural Commissioner and funded by the PDCP, using winegrape assessment funds. In agricultural settings, treatments are the responsibility of the grower and must be conducted in a manner approved and supervised by the County Agricultural Commissioner.

In 2014, one new GWSS infestation was found in the partially infested county of Tulare. It was in the city of Visalia. In total, GWSS were found on approximately 460 residential properties in the partially-infested counties of Fresno, Madera, Santa Clara, and Tulare. In response, approximately 5,775 properties (infested plus adjacents) were treated.

Pre-Treatment Communication with Stakeholders

Specific steps are taken before an infested area is treated to ensure residents are properly advised and environmental concerns are addressed. A public meeting or other outreach efforts for community members precedes treatment in urban and residential areas. This provides residents 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 sources 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. A database of threatened and endangered species is consulted to determine if any listed species are present in the treatment area. The U.S. Fish and Wildlife Service, the California Department of Fish and Wildlife, the California Department of Pesticide Regulation, the California Department of Health Services, and other agencies are notified prior to treatment.



Visual surveys are conducted in response to new glassy-winged sharpshooter finds

Treatment

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

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

The Environmental Monitoring Branch of the California Department of Pesticide Regulation has monitored pesticide treatments to determine resulting residue levels. This information is used by the PDCP to assess application rates and coverage. Sampling results and related monitoring reports are available on the Department of Pesticide Regulation's web site at <http://www.cdpr.ca.gov/docs/emon/epests/gwss/>.



Foliar treatment of a tree in a glassy-winged sharpshooter infested area by a pest control operator

Outreach

The Outreach element of the Program is designed to raise awareness about PD and its vectors while responding to the concerns of growers and the general public. There are two outreach efforts, one conducted by the PDCP and the County Agriculture Commissioners for the benefit of regulated and affected commodity groups and the general public, and the other by the PD/GWSS Board to keep winegrape growers in California informed of research and program activities.

Web Site

In March 2000, the CDFA activated a highly successful web site focused on PD and the 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 web site provides an interactive interface that allows direct activity reporting by local entities. This web site is located on the Internet at: www.cdfa.ca.gov/pdcp and in 2014 continued to be used as an effective tool for providing current and reliable information to interested parties.



Pierce's Disease Control Programs webpage

Local County Outreach

In 2014, 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, and members of the community. Industry trade publications, cooperative extension newsletters, and media interviews also proved to be successful methods of outreach. Many counties participated in continuing education seminars and conducted training for landscapers, pest control operators, nursery employees, and nursery association members.

Media Coverage

In 2014, articles and reports about PD and the GWSS continued to appear in print media and on internet websites along with some television and radio coverage. While the coverage mainly focused on newly discovered infestations, there was also coverage on new research and the PD-resistant winegrape vines. Each time a new infestation was reported; it helped to keep the threat of PD on the minds of stakeholders and underlined the fact that PD/GWSS was still a very real threat. Coverage of the european grapevine moth (EGVM) tapered off considerably due to the fact only one small area of infestation remains. Meanwhile the Board's newly designated disease, red blotch, gained major attention, as did the other newly designated pests, brown marmorated stink bug and vine mealybug.

PD/GWSS Board's Outreach Program

The PD/GWSS Board initiated its outreach and education program in 2004 and has since maintained a communications effort to keep winegrape growers informed about activities that are funded by the winegrape grower assessment as well as other program-related sources. These efforts continued in 2014 with outreach focused in part on informing growers about field trials currently being conducted to test possible solutions to PD and successes in the efforts to eradicate the EGVM. In 2014 a new brochure, a trade show display, and additional video presentations featuring researchers and field trials were produced. A brochure entitled "Pierce's Disease: 15 Years of Success" was developed featuring an infographic timeline highlighting some of the major successes of the program over the last 15 years. Plans call for this brochure to be sent to all the winegrape growers and other stakeholders in the first quarter of 2015.



Information booth

In 2014 winegrape growers were again invited to taste wines made from PD-resistant winegrapes developed at UC Davis. Some were also invited to tour the vineyards at UC Davis where some of the PD resistant grapevines are being grown. During these tastings and visits, growers and winemakers were given the opportunity to provide input on what winegrapes to release to the Foundation Plant Services, the first step in making these grapes available to winegrape growers.

During the year, the monthly e-newsletter was sent out containing current information about PD, GWSS, and EGVM, as well as the newly designated pests brown marmorated stink bug and vine mealybug, and the disease, red blotch. This e-newsletter is sent to over 1,000 stakeholders, with over 600 of those being California winegrape growers. It has proven useful for getting program information out in a timely manner to all stakeholders. Information from the e-newsletter was often reprinted verbatim in some of the wine trade publications. In addition to the monthly e-newsletter, a quarterly newsletter

was produced and mailed directly to California's 7,000+ winegrape growers, as well as other stakeholders.

The following materials were prepared or updated in 2014:

- Newsletters (quarterly)
- Website message board
- Facebook page
- LinkedIn group
- YouTube video channel
- "Pierce's Disease: 15 Years of Success" brochure
- Stock photography
- Large trade show display/exhibit
- Videotaped researcher interviews
- Monthly e-newsletter
- Fact Sheets on newly designated pests and diseases

Research

Research continues to be an integral part of the PDCP. In 2014 the flurry of research activity that began at the start of the program continued, with approximately 45 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 area-wide projects in major agricultural areas. The information generated provided valuable insight into the biology, ecology, and behavior of Pierce's disease and its vectors.

The extensive and sustained research effort on Pierce's disease has yielded discoveries and approaches that show good potential for leading to solutions to this serious disease problem. These include using conventional plant-breeding methods to develop disease-resistant grapevines, using non-virulent strains of *Xylella fastidiosa* to displace and outcompete 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 Pierce's disease using traditional methods have been field tested and provided to Foundation Plant Services at UC Davis for possible commercialization. Small lots of wine have been produced from some of these and have tested well in wine tastings. Field testing of grapevine plant material developed using transgenic approaches began in 2010 and continued through 2014. 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 properly managed. Looking back, it is clear that solutions are getting very close relative to where we were 15 years ago.

Research Symposium

In 2014, as in prior years, the PDCP organized a Pierce's Disease Research Symposium to facilitate communication and information sharing among scientists and stakeholders on the latest research progress and findings on Pierce's disease. The 2014 Symposium was held in mid-December in Sacramento. Approximately 80 people from California, other states, and other countries attended this important event to learn more about this serious disease. A compendium of research progress reports, known as the Proceedings, was prepared and distributed at the Symposium. It can be accessed electronically on the program's website at <http://www.cdfa.ca.gov/pdcp/Research.html>. Research progress reports and other research-related information are also available on the following website: <http://www.piercesdisease.org/>.



The 2014 Symposium Proceedings contains 47 research progress reports

Research Proposal Solicitation and Review

In 2014, the PDCP partnered with the Unified Grant Management for Viticulture and Enology Program at UC Davis to conduct its research proposal solicitation and review process. A total of 16 proposals were received and reviewed, with 11 research projects totaling \$2.5 million selected for funding by the CDFA using winegrape assessment funds. In addition, four ongoing projects were approved to continue for another fiscal year.

Area-wide Management Programs

The area-wide management programs coordinate GWSS management efforts in large, agriculturally diverse grape production areas.

Fresno County

Fresno County implemented area-wide trapping for GWSS in citrus groves in 2003 and in 2011 traps were added to grapes near the infested area and the San Joaquin River. In 2014, there were 41 trap finds in citrus and grapes, compared to 13 trap finds in 2013. About 970 acres of citrus were treated in 2014, compared to 270 acres in 2013.

Kern County

In 2014, the boundaries of the Kern County infested area remained the same as in 2013. The infested area includes agricultural lands as well as the city of Bakersfield and several smaller Kern County communities. In 2014, there were 16,045 acres of citrus treated, compared to 15,900 acres treated in 2013.

Madera County

In 2014 there was one GWSS found in a Citrus Program trap, compared to three found in PDCP area-wide traps in 2013. About 120 acres of citrus were treated in 2014, compared to 580 acres in 2013.

Riverside County

Due to budgetary constraints, the area-wide management programs in Riverside County were reduced to monitoring-only activities.

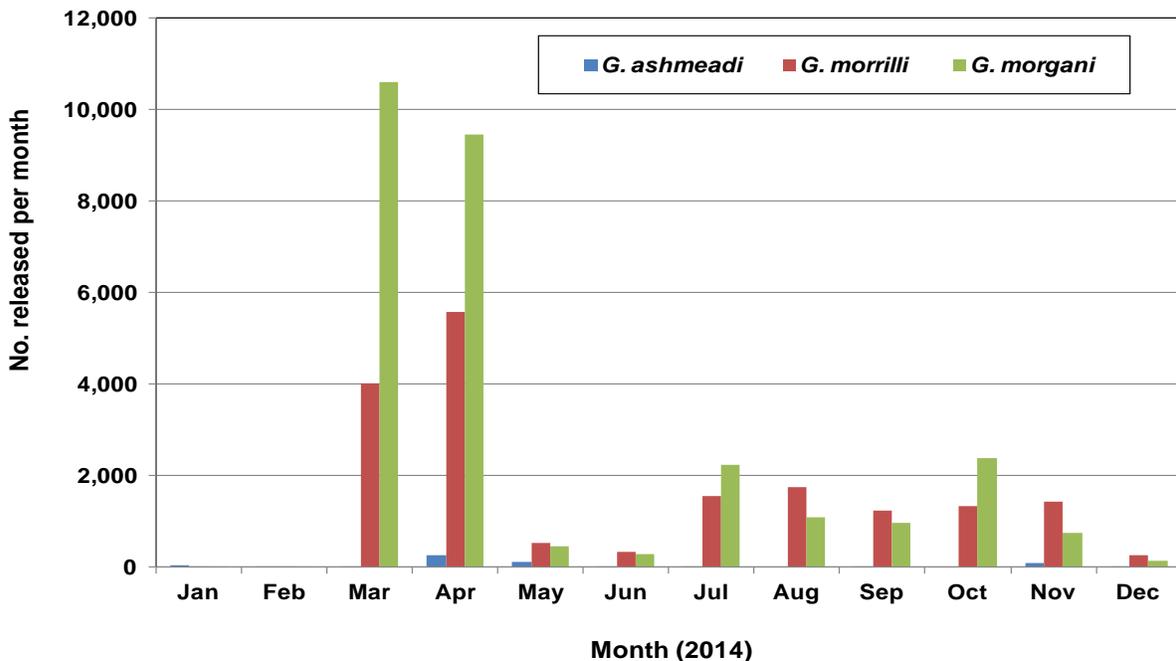
Tulare County

The infested area in Tulare County has not expanded since 2004. In 2014, the number of GWSS trapped was higher than in the prior year. There were about 2,725 acres of citrus treated in 2014 compared to about 5,855 in 2013. While there were more GWSS trapped in 2014 than 2013, the acres treated are lower. The main reason for this increase in GWSS found and reduced treatments is about 70% of the GWSS found were on a small number of properties. The program is working with these growers to control their GWSS infestations in 2015.

Biological Control

Biological control is a method of controlling target pests using other living organisms. Biological control agents used for controlling insect pests include predators, parasitoids, and pathogens. Biological control is often used to suppress infestations of target pests in areas where other control methods are not cost effective or not feasible. Since 2001, the PDCP has been using biological control as an important component of its Integrated Pest Management approach to controlling the glassy-winged sharpshooter (GWSS). The biological control agents of GWSS are stingless parasitic wasps. The female wasps lay their eggs inside GWSS eggs. The emerging wasp larvae develop by feeding on the GWSS eggs, eventually killing them. Upon completion of development, adult wasp emerges from the GWSS egg and repeats the cycle. Life cycles of the wasps are much shorter than that of GWSS, which allows for the rapid population growth of the wasps compared to GWSS.

In 2014, four *Gonatocerus* species of GWSS biological control agents were released or detected during the post-release survey by the PDCP: *Gonatocerus ashmeadi*, *G. morgani*, *G. morrilli* and *G. triguttatus*. Among these, *G. ashmeadi* and *G. morgani* are considered native to California (different geographical range in California), whereas *G. morrilli* and *G. triguttatus* were introduced from the southeastern region of North America by UC Riverside and CDFA. All the biological control agents are very host-specific, solitary egg parasitoids.



The number of biological control agents released per month in 2014.

The Biological Control group produced 60,116 wasps, including *G. morgani* (34,921), *G. morrilli* (24,601), *G. ashmeadi* (585) and *G. triguttatus* (9) in 2014. Among these species, *G. triguttatus* was no longer in the mass-rearing due to poor performance consistently observed in post-release survey. Total of 46,991 biological control agents in three species were released at 55 field sites in five Counties (Fresno, Kern, Madera, Tulare and Ventura) of central and southern California. The field-release was conducted year-round but more

agents were released in spring when the GWSS eggs are abundant in field due to high ovipositional activity of overwintered GWSS adults. Such field-release timing of the parasitic wasps, synchronized with host eggs, would increase chance of population build-up for the agents. At the field sites, post-release surveys were also conducted to monitor efficacy of a particular species. Since the start of the Program, a total of 2.48 million biological control agents have been released in California.

In addition to field-release, the Program continued to supply GWSS specimen to scientists in academia and other government agencies for use in research projects and provided with the biological control agents to County Agricultural Departments for GWSS control.

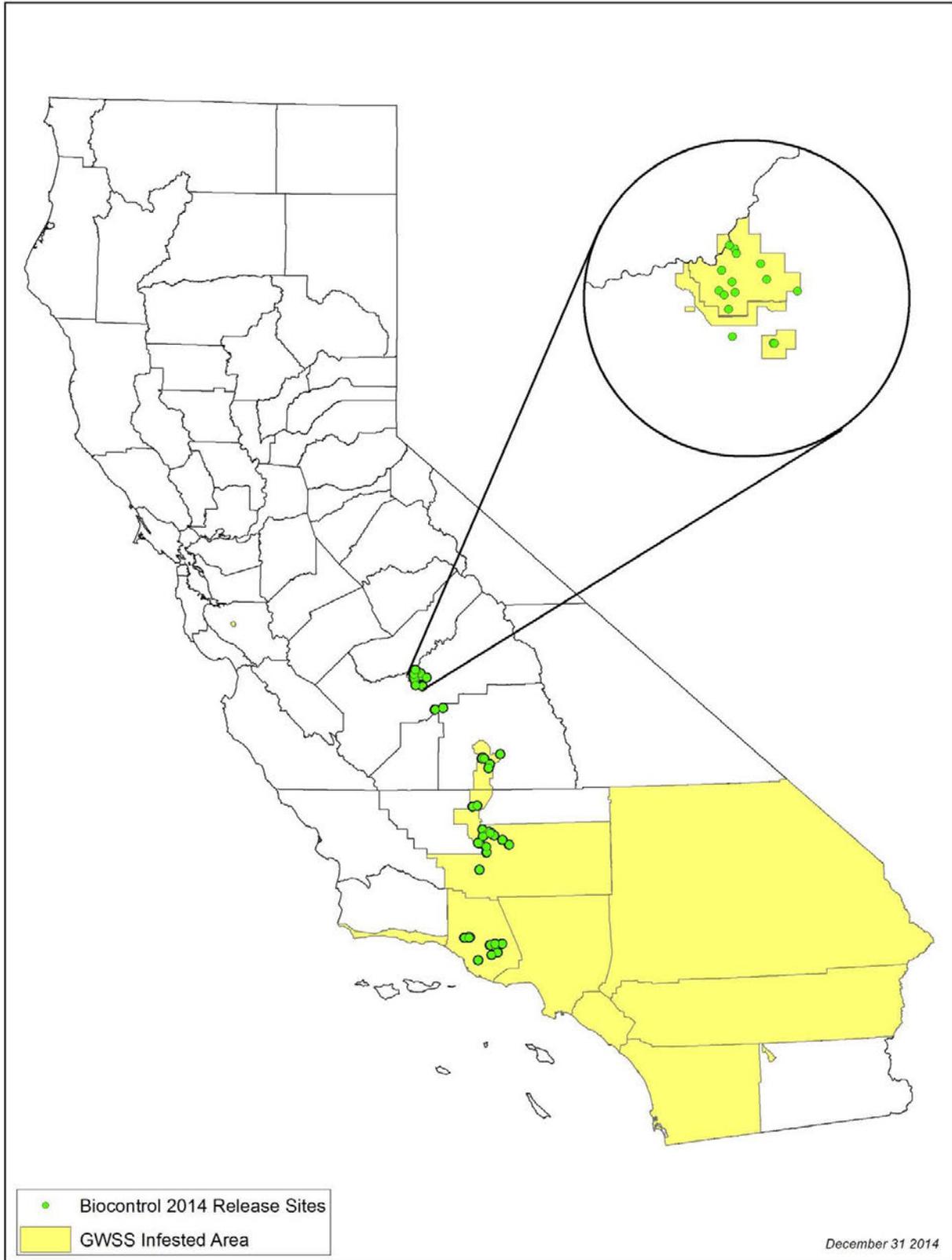
The number of biological control agents released in 2014

County	No. Sites	Species				Total
		<i>G. ashmeadi</i>	<i>G. morgani</i>	<i>G. morrilli</i>	<i>G. triguttatus</i>	
Fresno	16	104	3,550	3,243	0	6,897
Kern	16	190	4,721	4,850	0	9,761
Madera	2	0	370	330	0	700
Tulare	8	84	2,489	1,227	0	3,800
Ventura	13	207	17,256	8,370	0	25,833
Total (2014)	55	585	28,386	18,020	0	46,991

The number of biological control agents recovered during post-release survey in 2014

County	No. Sites	Species				Total
		<i>G. ashmeadi</i>	<i>G. morgani</i>	<i>G. morrilli</i>	<i>G. triguttatus</i>	
Fresno	16	2,224	0	2	0	2,226
Kern	16	3,708	58	25	0	3,791
Madera	2	0	0	0	0	0
Tulare	8	1,061	15	0	0	1,076
Ventura	13	1,228	202	1,260	1	2,691
Total (2014)*	55	8,221	275	1,287	1	9,784

Biological Control Release Sites



Environmental Compliance

In 2014, the CDFA continued its efforts to ensure that the PDCP is conducted in an environmentally responsible manner. These efforts included 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 pesticide laws and regulations. In addition, the PDCP continued posting notifications of program-related pesticide applications on a CDFA web page in compliance with a permit obtained to meet the requirements of the National Pollutant Discharge Elimination System.

A statewide programmatic environmental impact report was released for the PDCP in mid-2003. A legal challenge was filed against the environmental impact report shortly thereafter. Although a trial court found the environmental impact report to be adequate, the State Appeals Court later reversed the trial court's ruling. In 2010, the 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 the Department's statewide plant health and pest prevention program. This work continued through 2014 and in late December the final EIR for the CDFA statewide plant pest prevention program, including the PDCP, was released. The full document can be found at <http://www.cdfa.ca.gov/plant/peir/index.html>

Financial Statement

PIERCE'S DISEASE CONTROL PROGRAM

	FY 2013-14 (Actual)	FY 2014-15 (Budgeted)
REVENUE		
Federal (United States Department of Agriculture)	\$13,914,077	\$17,165,227
Industry (PD\GWSS Board winegrape assessment)	\$890,090	\$1,665,270
Total Revenue	\$14,804,167	\$18,830,497
	FY 2012-13 (Actual)	FY 2013-14 (Budgeted)
EXPENDITURES		
Personal Services	\$2,334,466	\$2,500,000
Operating Expenses	\$2,003,901	\$1,800,000
Total County Payments	\$10,465,800	\$13,103,314
Total Expenditures	\$14,804,167	\$17,403,314

Abbreviations and Acronyms

ATP	Nursery Stock Approved Treatment Program
CACASA	California Agricultural Commissioners and Sealers Association
CDFA	California Department of Food & Agriculture
EGVM	European Grapevine Moth
GWSS	Glassy-winged Sharpshooter
PD	Pierce's Disease
PD/GWSS Board	Pierce's Disease and Glassy-winged Sharpshooter Board
PDACP	Pierce's Disease Control Program
UC	University of California
USDA	United States Department of Agriculture