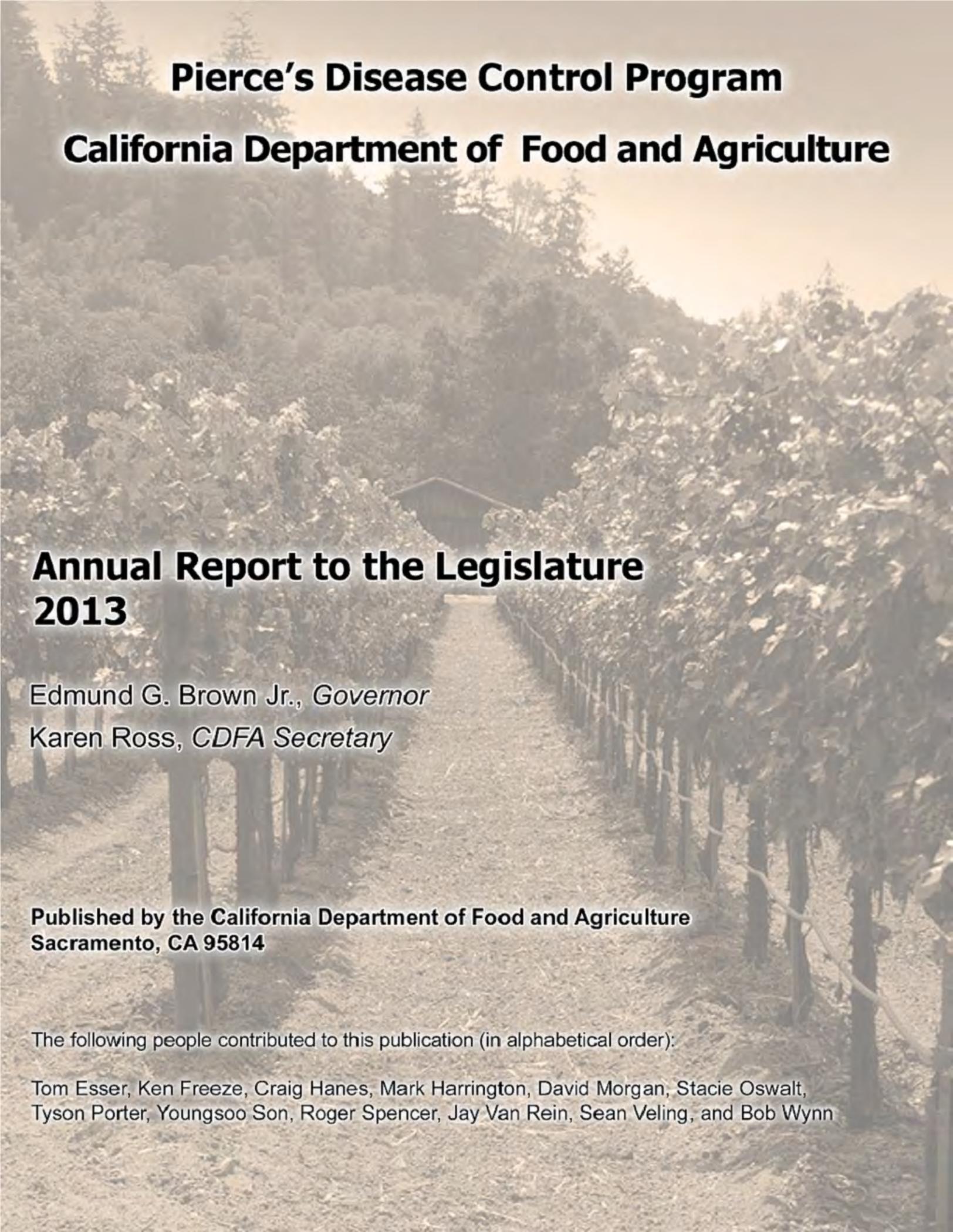


Pierce's Disease Control Program



2013
Annual Report to the Legislature



Pierce's Disease Control Program
California Department of Food and Agriculture

Annual Report to the Legislature
2013

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Statement of the Secretary

Over the years, the Pierce's Disease Control Program has seen its share of milestones – the identification of the glassy-winged sharpshooter as a new and unprecedented vector of Pierce's disease in California grapevines being the first. A lot of decisions, discoveries, and developments have occurred since then, as the program continues its dual role of finding ways to provide both short-term and long-term protection of California's grapevines. Along the way, the larger California agricultural community has gained an example of a model program upon which to base many other efforts to deal with pests and diseases that threaten our crops. Recent invasive pest response programs conducted against European grapevine moth and Asian citrus psyllid which vectors Huanglongbing have all benefited from the example of the Pierce's Disease Control Program

When this program began, few outside California were convinced it would succeed. More than a decade later, that includes 17 glassy-winged sharpshooter eradications, through the cooperative efforts of state, federal, and county agricultural officials, growers, researchers, and many others, this program has developed into a success story. However, its final chapter - a long-term, sustainable solution to Pierce's disease- is still being written. The Program has accomplished much through its efforts to suppress and control sharpshooter populations, and through ongoing research. This report covers the most recent year's work on these interrelated efforts.

I am proud of all that the Program has accomplished, and I look forward to fulfilling the larger commitment of finding a long-term solution to Pierce's disease.

Karen Ross, Secretary
California Department of Food and Agriculture

Executive Summary

In 2013, the Program endured the recent federal government shutdown with the backing of the Pierce's Disease/Glassy-winged sharpshooter Board, funded by wine grape assessments. Although Pierce's disease/glassy-winged sharpshooter funds were not necessary once the Federal Government resumed service, the program did not let its guard down during a period of uncertainty. The nursery stock approved treatment program continued to provide 100% protection to Northern California counties as there has not been a live glassy-winged sharpshooter survive the trip from Southern California since its inception. Glassy-winged sharpshooter was eradicated in San Luis Obispo County, marking the 17th eradication in the program's history.

While the program continued to halt the spread of the glassy-winged sharpshooter, researchers are conducting field trials with an eye toward finding long-term, sustainable solutions to Pierce's disease. The Pierce's Disease/Glassy-winged Sharpshooter Board hired a viticulturalist to oversee the vines undergoing research trials. The viticulturalist will assure uniformity and keep vines growing at their ultimate. A specialist in technology transfer was also hired to advise and assist with the commercialization of promising technologies now being developed.

It is our belief that the following pages will help you understand how the Pierce's Disease Control Program has been able to stop the spread of the glassy-winged sharpshooter while research is turning the corner on developing solutions to Pierce's disease.

Background

The Threat

Pierce's disease (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 PD. 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 \$3.86 billion and associated economic activity within California in excess of \$61.5 billion. Other crop and ornamental plant resources such as almonds (\$3.87 billion) and susceptible species of citrus (\$656 million), stone fruits (\$710 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 and 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 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 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 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.

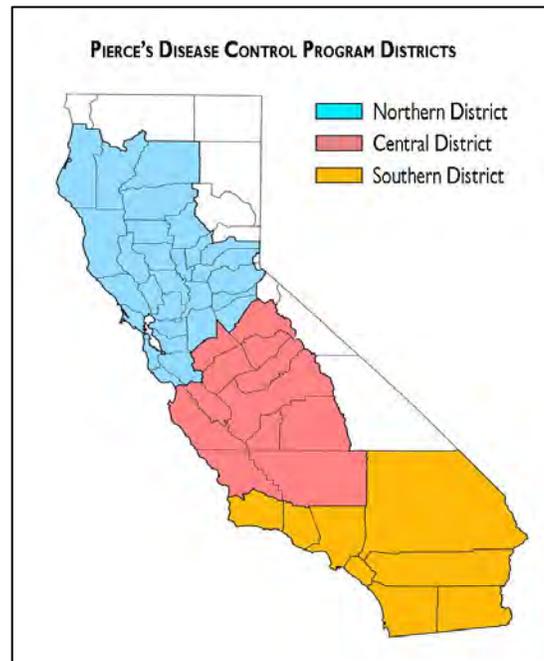
5. Research

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 CDFA. Program staff is located throughout the state and are responsible for coordinating and implementing the elements of the program, as well as communicating with program stakeholders. 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 PD/CP. 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 \$43 million over the last 12 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 and Glassy-winged Sharpshooter Science Advisory Panel

The PD/GWSS Science Advisory Panel is composed of university scientists who are experts on PD and its vectors. The Panel provides input and expertise on scientific issues associated with the program.

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 PD 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, 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 uninfested 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 infested areas.

Inspection Results

In 2013, there were 45,800 shipments of nursery stock from infested areas to uninfested areas. Viable life stages of GWSS were discovered on only six of these shipments.

Over 90% of all rejections between 2001 and 2013 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% |

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.

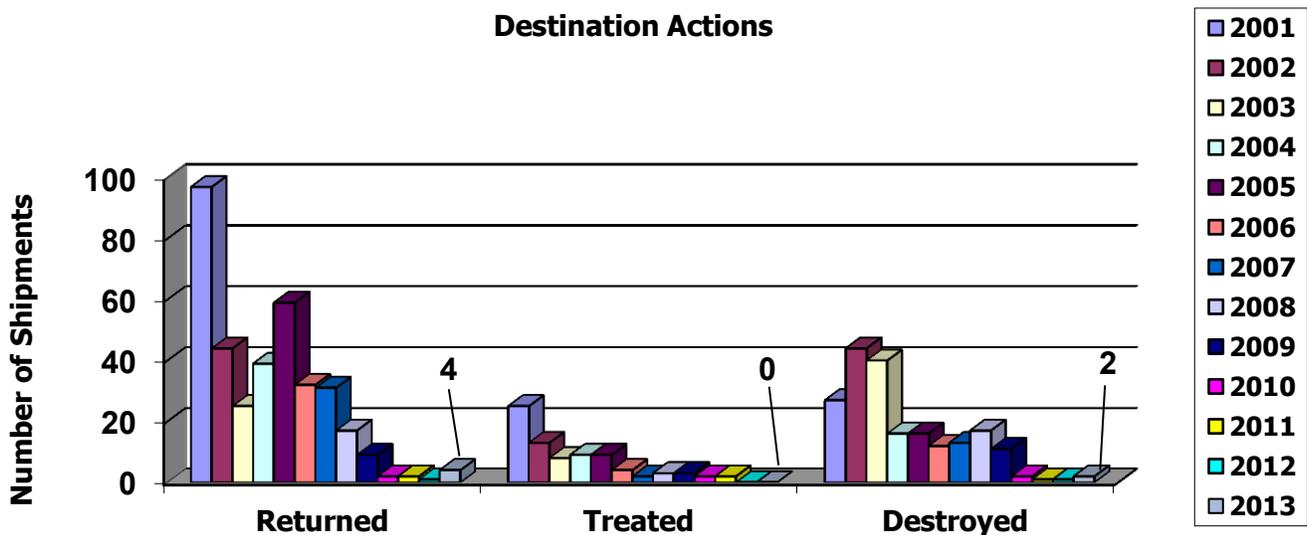
Actions that can be taken at the origin of nursery shipments consist of the following:

- **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 the final 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 2013, administrative penalties were levied against two companies, totaling \$800.



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 selected materials, to non-infested areas without an origin inspection. These materials are 100% efficacious at killing emerging GWSS nymphs.

In 2013 there were seven participating nurseries that shipped approximately 2.65 million plants in 10,902 shipments. There were a total of 27 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 must be treated and placed on hold for a minimum of two weeks. All trapping is conducted by the County Agricultural Commissioner's staff. Results from the 2013 trapping efforts are as follows:

| Number of Yards | Number of Acres | Number of Traps | Number of Traps >10 GWSS |
|------------------------|------------------------|------------------------|------------------------------------|
| 27* | 1,353 | 2,856 | 251 |

* One ATP yard closed in May 2013, totaling 14 acres (30 traps removed)

Nurseries that are near citrus may opt to wait two or three trap cycles (4 or 6 weeks) before applying a treatment to the hold area if citrus harvesting or other activities will lead to re-infestation. No plant material is allowed to move from areas under hold.

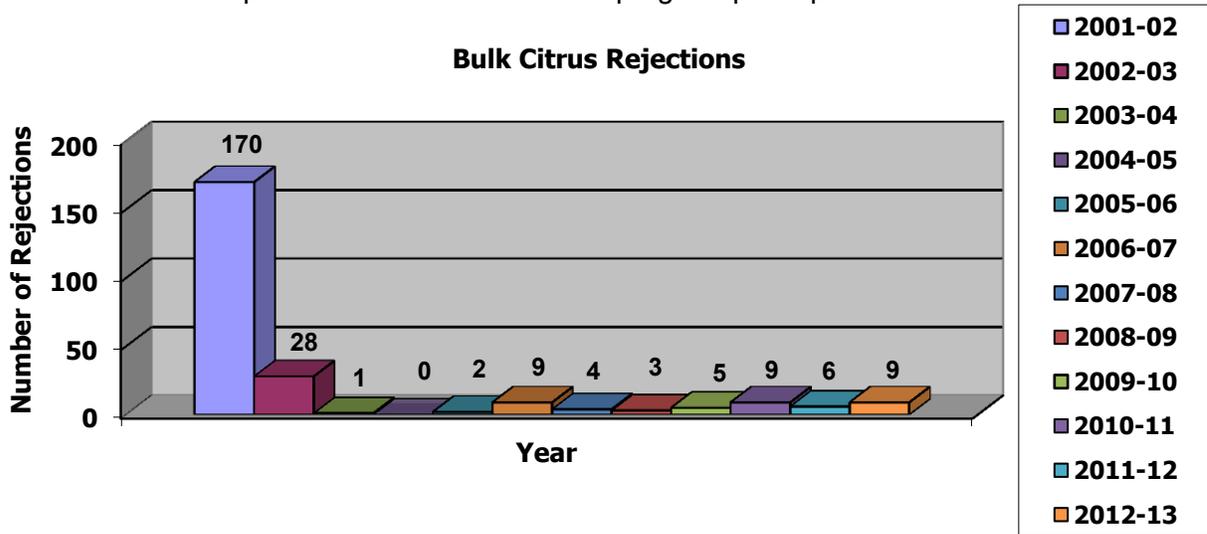
Nursery stock being shipped under this program must be treated with carbaryl or fenprothrin. All treatments are witnessed by licensed county inspectors. Additional monitoring of treatments includes quality control checks by PDCP staff using water-sensitive paper. Sheets of water-sensitive paper are placed 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 2013, PDCP staff placed water-sensitive paper at each participating nursery a minimum of once a month. Out of 257 water-sensitive papers inspected only eight 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 2013, a total of five egg masses from two 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 2012 through September 2013), live GWSS were found in only nine out of approximately 35,000 certified shipments of bulk citrus. This shipping season achieved a success rate of 99.97%. 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 is 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 2013.



Yellow panel trap in crape myrtle



Survey/detection and nursery training for County personnel

During 2013, Program staff provided detection training to 370 employees from 40 counties, CDFA, and ATP participating nurseries. PDCP 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 the county biologists and PDCP staff 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 Commissioner.

In 2013, no new GWSS infestations were found in the state. In total, GWSS were found on approximately 180 residential properties in the partially-infested counties of Fresno, Madera, Santa Clara, and Tulare. In response, approximately 4,678 properties (infested plus adjacent) were treated.

One GWSS infestation was declared eradicated in 2013. The infestation in the Arbors area of San Luis Obispo was declared eradicated in December. The last GWSS find in this area was in August 2011. This makes a total of 17 incipient infestations eradicated statewide since the program's inception.



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

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.

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 2013 continued to be used as an effective tool for providing current and reliable information to interested parties.



Local County Outreach

In 2013, 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 2013, articles and reports about PD and the GWSS continued to appear in print media, television, radio, and internet web sites. While the coverage mainly focused on newly discovered infestations, there was also coverage on new research and the development of Pierce's disease-resistant grapevines. News of ongoing infestations helped to keep the threat of PD on the minds of stakeholders and underline the fact that PD and GWSS was still a very real threat.

PD/GWSS Board's Outreach Program

The PD/GWSS Board initiated an outreach and education effort in 2004 and has since maintained this effort to keep winegrape growers informed about activities that are funded by the winegrape grower assessment. These efforts continued in 2013 with outreach focused in part on informing growers about field trials currently being conducted to test possible solutions to PD. A new brochure, a trade show display, and additional video presentations featuring researchers and field trials were produced and continued to be used. Two new videos were also produced and added to the [Outreach Program's web site](#).

Winegrape growers were invited to taste wines made from Pierce's disease-resistant winegrapes developed at UC Davis. Nearly 200 growers at five different events sampled several different wines and were given a preview of what was to come and how they might work these winegrapes into their growing program in the near future.

In 2013, the monthly e-newsletter, with current information about PD and GWSS continued to be sent to a list of over 1,000 interested stakeholders, with over 600 of those being California winegrape growers. Information from it was often reprinted in many of the wine trade publications verbatim. In addition, 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:

- Newsletters (quarterly)
- Web site message board
- Facebook page
- LinkedIn group
- YouTube videos
- Stock photography
- Large trade show display/exhibit
- Researcher interviews
- Monthly e-newsletter
- Stat Sheet for wine tastings



Information booth

Research

Research continues to be an integral part of the PDCP. In 2013, the flurry of research activity that began at the start of the program continued with approximately 35 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 PD and its vectors.

The extensive and sustained research effort on PD 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 nonvirulent 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. Field testing of these new technologies began in 2010. Looking back, it is clear that solutions are getting very close relative to where we were 14 years ago.

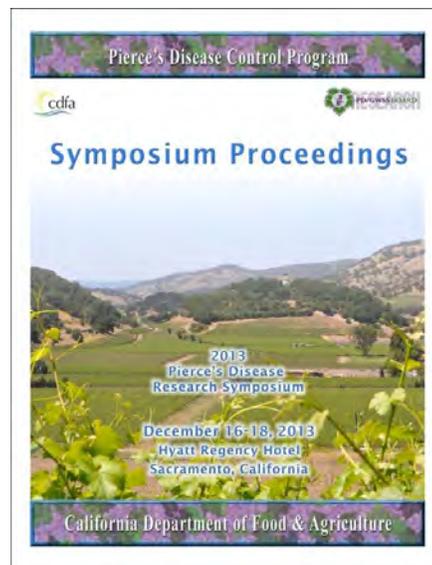
Research Symposium

In 2013, 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 PD. The 2013 Symposium was held in mid-December in Sacramento.

Approximately 85 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 2013 Symposium Proceedings contains 35 research progress reports

Research Proposal Solicitation and Review

In 2013, 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 seven proposals were received and reviewed, with five research projects totaling \$620,685 selected for funding by the CDFA using winegrape assessment funds. In addition, seven ongoing projects were approved to receive continued funding in the coming 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 2013, there were 13 trap finds in citrus and grapes, compared to 125 in 2012. About 270 acres of citrus were treated in 2013, compared to 1,130 acres in 2012.

Kern County

In 2013, the boundaries of the Kern County infested area remained the same as in 2012. The infested area includes agricultural lands as well as the city of Bakersfield and several smaller Kern County communities. In 2013, there were 15,900 acres of citrus treated, compared to 17,465 acres treated in 2012

Madera County

In 2013 there were 3 GWSS finds in citrus and grapes, compared to five in 2012. About 580 acres of citrus were treated in 2013, compared to 1,365 acres in 2012.

Riverside County

Due to budgetary constraints, the 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 2013, the number of GWSS trapped was slightly lower than in the prior year. Consequently, there were 5855 acres of citrus treated in 2013 compared to 6,707 in 2012.

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 cost-ineffective 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 GWSS. The biological control agents of GWSS are tiny parasitic wasps. The female adults lay their eggs inside glassy-winged sharpshooter eggs. The emerging wasp larvae develop by feeding on the GWSS eggs, eventually killing them. Upon completion of development, the adult wasp emerges from the GWSS egg and repeats the cycle.

In 2013 four species of GWSS biological control agents were reared and released by the PDCP: *Gonatocerus ashmeadi*, *G. morgani*, *G. triguttatus*, and *G. morrilli*. Among these, *G. ashmeadi* and *G. morgani* are considered native to California, whereas *G. morrilli* and *G. triguttatus* were introduced from the southeastern region of North America by UC Riverside and CDFA. All the species are solitary egg parasitoids and highly host-specific. The 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.

Over the past year, the Biological Control Group has monitored 77 sites in 11 counties (Fresno, Imperial, Kern, Los Angeles, Madera, Orange, Riverside, San Bernardino, San Diego, Tulare, and Ventura) throughout southern and central California. At each site, release of biological control agents and post-release surveys were conducted. The following table presents the number of wasps released in 2013. Since the start of the Program a total of 2.43 million wasps have been released.

In addition to field-release of biological control agents, the Program also provided live specimens to scientists for use in research projects.

The number of biological control agents released in 2013

| County | Species | | | | TOTAL |
|----------------------|--------------------|--------------------|-----------------------|-------------------|---------------|
| | <i>G. ashmeadi</i> | <i>G. morrilli</i> | <i>G. triguttatus</i> | <i>G. morgani</i> | |
| Fresno | 285 | 5,559 | 2,683 | 2,896 | 11,423 |
| Kern | 229 | 7,356 | 6,054 | 4,514 | 18,153 |
| Madera | 0 | 235 | 347 | 0 | 582 |
| Tulare | 172 | 2,911 | 2,358 | 2,715 | 8,156 |
| Ventura | 50 | 9,247 | 6,687 | 12,506 | 28,490 |
| Total (2013*) | 736 | 25,083 | 17,977 | 22,511 | 66,307 |

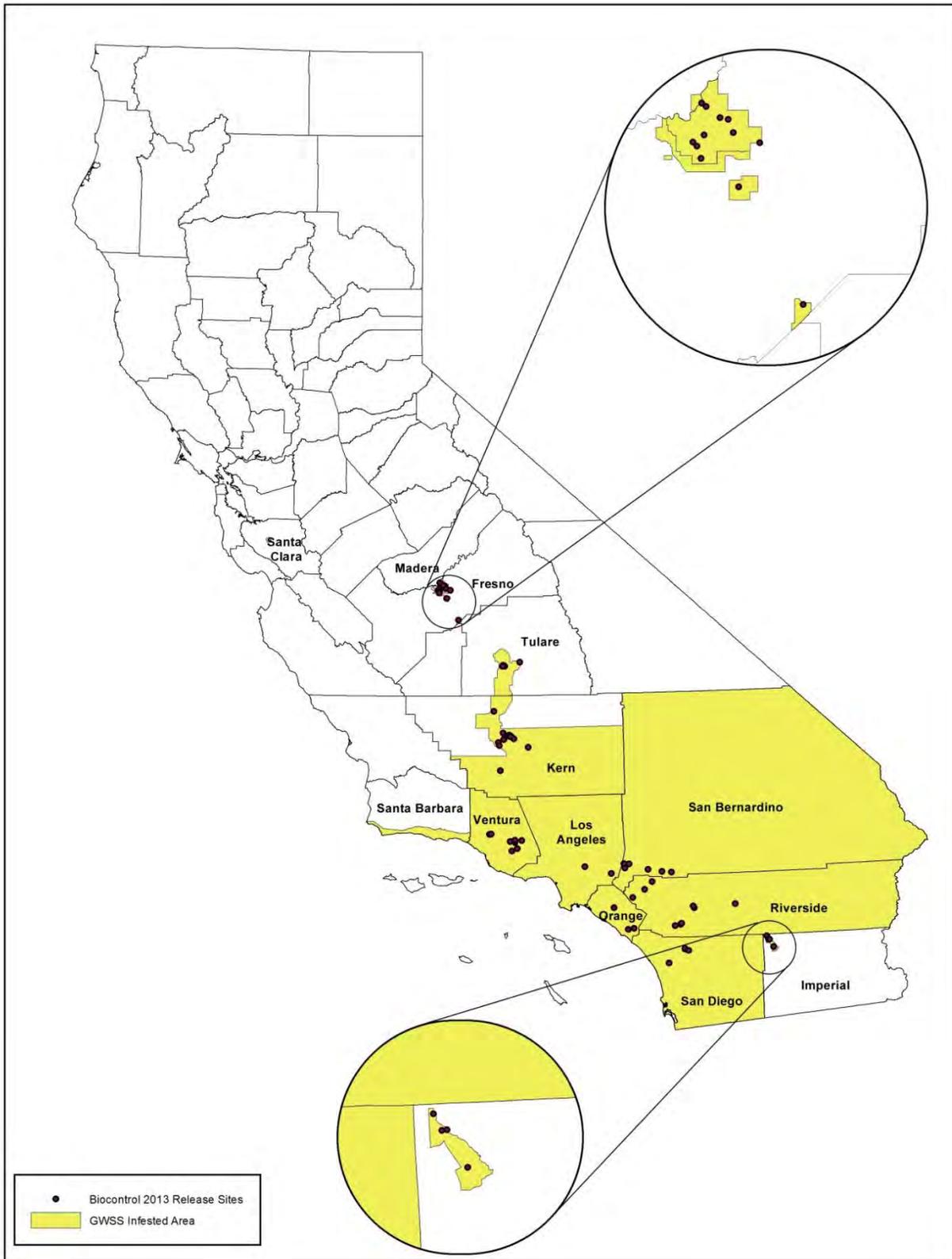
Note: data from 1 January through 25 October, 2013

The number of biological control agents recovered in 2013 in post-release surveys

| County | Species | | | | TOTAL |
|----------------------|--------------------|--------------------|-----------------------|-------------------|--------------|
| | <i>G. ashmeadi</i> | <i>G. morrilli</i> | <i>G. triguttatus</i> | <i>G. morgani</i> | |
| Fresno | 1,281 | 0 | 1 | 0 | 1,282 |
| Kern | 2,563 | 0 | 0 | 264 | 2,827 |
| Madera | 0 | 0 | 0 | 0 | 0 |
| Tulare | 881 | 0 | 1 | 0 | 882 |
| Ventura | 800 | 519 | 1 | 42 | 1,362 |
| Total (2013*) | 5,525 | 519 | 3 | 306 | 6,353 |

Note: data from 1 January through 25 October, 2013

Biological Control Release Sites



Environmental Compliance

In 2013, the CDFA continued its efforts to ensure that the PDCP is conducted in an environmentally responsible manner. These efforts include 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. Efforts on this project continued in 2011 and in 2012, it was decided to combine this effort with a similar one being conducted for the Department's statewide plant health and pest prevention program. The combined environmental analysis documents were worked on throughout 2013 and will continue in 2014.

Financial Statement

PIERCE'S DISEASE CONTROL PROGRAM

| | FY 2012-13 | FY 2013-14 |
|--|--------------------|-------------------|
| | (Actual) | (Budgeted) |
| REVENUE | | |
| Federal (United States Department of Agriculture) | \$13,309,413 | \$15,788,512 |
| PD\GWSS Board | \$855,042 | \$1,667,000 |
| Total Revenue | <hr/> \$14,164,455 | \$17,455,512 |
| | | |
| | FY 2012-13 | FY 2013-14 |
| | (Actual) | (Budgeted) |
| EXPENDITURES | | |
| Personal Services | \$2,395,101 | \$2,500,000 |
| Operating Expenses | \$1,623,360 | \$1,800,000 |
| Total County Payments | \$10,145,994 | \$13,155,512 |
| Total Expenditures | <hr/> \$14,164,455 | \$17,455,512 |

Abbreviations and Acronyms

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