

# Pierce's Disease Control Program 2008 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**

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A.G. Kawamura, *Secretary*

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## Statement of the Secretary

The discovery of Pierce's disease and the glassy-winged sharpshooter in California back in August 1999 seems a long time ago. When it comes to the Pierce's Disease Control Program, though, perhaps it's better to think of it in terms of all of the successful grape harvests we have had since then in places like Temecula-harvests that almost no one expected to see back in 1999.

This annual report is a technical document and a useful tool, but it is also a chapter in an ongoing success story. Amongst all the explanations of trapping protocols and treatment regimens, the simplest summary of this program is that it is working. Just ask the growers in Temecula who were beset just a few years ago with what seemed a "perfect storm," a combination of conditions that many predicted would put them out of business within a few seasons.

In the years since then, the tremendous investment of resources combined with the will, resolve, tenacity and creativity of our agricultural community has created remarkable results. Together, growers, researchers and agricultural officials have controlled the spread of the pest while our research efforts explore long-term solutions. The ongoing cooperation of so many commodity groups in California is a testament to the entire industry.

Our commitment now is to stay the course, to sustain and build upon the success of this innovative and exemplary program.

A.G. Kawamura, Secretary  
California Department of Food and Agriculture

## Executive Summary

In these difficult economic times, the Pierce's Disease Control Program (PDCP) has never been more important to both California winegrapes and the State of California. Winegrape production in California is valued at \$4 billion with an associated economic value of about \$52 billion.

Winegrapes provide Californians with jobs, tourism, and trade, each of which fully deserves this program's protections from harmful diseases and insect vectors.

Since its inception in the year 2000, the PDCP first developed and then improved upon a model program to minimize the impact of Pierce's disease and its vectors statewide. The PDCP is a multi-faceted program combining research, biocontrol, statewide pest surveys, regulations, and industry cooperation. This year, an approved treatment for nursery stock was initiated after years of research and real-world trials. This achievement is both a relief to nursery growers and a reassuring development for uninfested communities. Urban infestations of glassy-winged sharpshooters in northern California have been reduced or eradicated in some areas.

Vineyards are thriving again in Temecula, California, where two-thirds of the crop was decimated by Pierce's disease in 2000, as growers have learned through research how to manage Pierce's disease and the glassy-winged sharpshooter. We are not resting on that success though. The long-term goal of more universal solutions remains. The following pages will detail how government, universities, and industry have collaborated toward successful battles against Pierce's disease and its vectors, especially the glassy-winged sharpshooter.



# Background

## The Threat

Pierce's disease has been present in California for more than 100 years. The disease has caused sizable losses in California viticulture in the past, but the damage occurred primarily in traditional "hotspot" areas. Until recently, it was not severe enough to completely prevent grape production in areas where the pathogen was present. This situation changed dramatically with the arrival of the glassy-winged sharpshooter. 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 billion and associated economic activity within California in excess of \$52 billion. Other crop and ornamental plant resources such as almonds (\$2.8 billion) and susceptible species of citrus (\$1.1 billion), stone fruits (\$1 billion), 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 Pierce's Disease Control Program was established within the California Department of Food and Agriculture (CDFA) to minimize the statewide impact of Pierce's disease and the glassy-winged sharpshooter.

## Pierce's Disease

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*. It kills grapevines by clogging their water-conducting vessels (xylem). 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. Since its discovery, Pierce's disease has been reported and is known to exist in 28 counties. 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 Pierce's disease.



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

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 an aggressive 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 the glassy-winged sharpshooter were destroyed by Pierce's disease. Losses continued to mount in Temecula and other infested areas in following years, eventually exceeding 1,100 acres statewide by 2002.

Scientists believe that the glassy-winged sharpshooter has the potential to increase both the incidence and severity of Pierce's disease 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 Pierce's disease and the glassy-winged sharpshooter 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 life stage of the glassy-winged sharpshooter

# Program Description

The Pierce's Disease Control Program works to minimize the statewide impact of Pierce's disease and the glassy-winged sharpshooter. The strategy is to slow or stop the spread of the glassy-winged sharpshooter while short- and long-term solutions to Pierce's disease 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 Pierce's disease and its vectors while responding to the concerns of growers and the general public.

5. Research

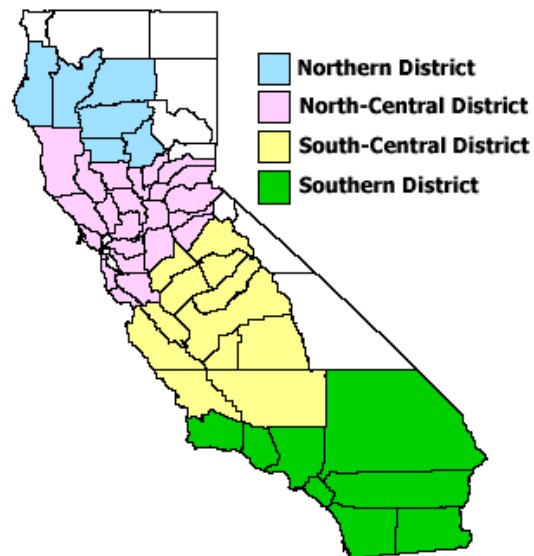
Develop solutions to Pierce's disease and its vectors.

## Organization

The PDCP is a partnership that includes the CDFA, the county agricultural commissioners, the United States Department of Agriculture (USDA), the University of California and the California State Universities, 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 various 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. Natural enemies of GWSS are

**Pierce's Disease Control Program Districts**





produced in CDFA laboratory facilities in Riverside and Arvin. Researchers throughout the state and elsewhere are under contract with CDFA, UC, USDA, and other funding organizations. Local task forces help develop action plans, mobilize local resources, and share information with stakeholders and affected parties.

## County Workplans

The agricultural commissioner of each county is responsible for conducting local PDCP activities. These activities are guided by annual workplans developed by the county agricultural commissioners and submitted to CDFA for approval. As stated in 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 Pierce's disease 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 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 PD/GWSS Board is composed of representatives from the winegrape industry. 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 \$32 million over the last seven 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 meets regularly to review program progress and develop 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/Glassy-winged Sharpshooter Science Advisory Panel

The PD/GWSS Science Advisory Panel is composed of university scientists who are experts on Pierce's disease 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 Pierce's disease and its vectors. It provides input and expertise on the PD and GWSS 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, CDFA, and industry. This group assists the PDCP with the planning of the annual research symposium by providing input on the symposium's format, content, and schedule.

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

The California Agricultural Commissioners and Sealers Association (CACASA)/ Glassy-winged Sharpshooter 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 statewide 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 glassy-winged sharpshooter 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 glassy-winged sharpshooter. California has approximately 11,500 licensed nurseries, 72% of which 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 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; and
4. Inspection of nursery stock at receiving nurseries prior to sale.

### Inspection Results

In 2008, there were 62,600 shipments of nursery stock from infested areas to uninfested areas. Viable life stages of GWSS were discovered on only 37 of these shipments. Compared to 2001, the total number of shipments has increased by 5% while the total number of loads with viable life stages has decreased by 70%.

Over 90% of all rejections between 2001 and 2008 have been for egg masses. The table on the right reflects 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%

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 origin consist of the following:

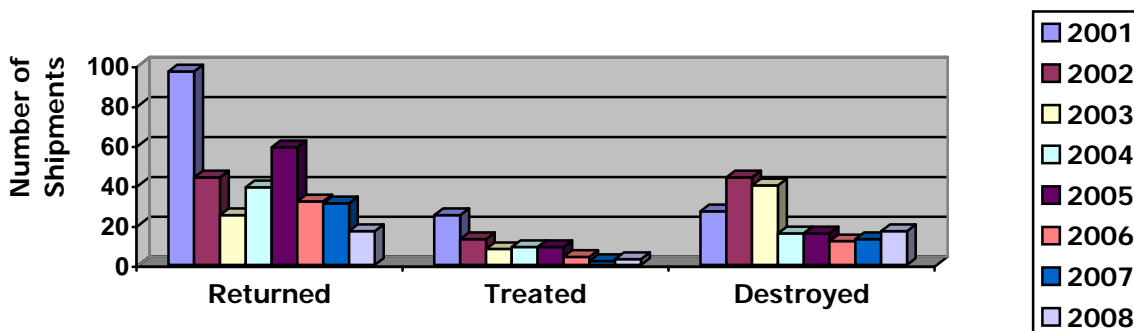
- **Restriction:** The nursery is restricted from shipping certain species of host material out of the infested area for a period of time.
- **Suspension:** The nursery is suspended from shipping all host material out of the infested area until the pest risk is mitigated.
- **Revocation:** The nursery's 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 include 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 2008, administrative penalties were levied against four companies, totaling \$3,500.

### Destination Actions



### Nursery Stock Approved Treatment Program (ATP)

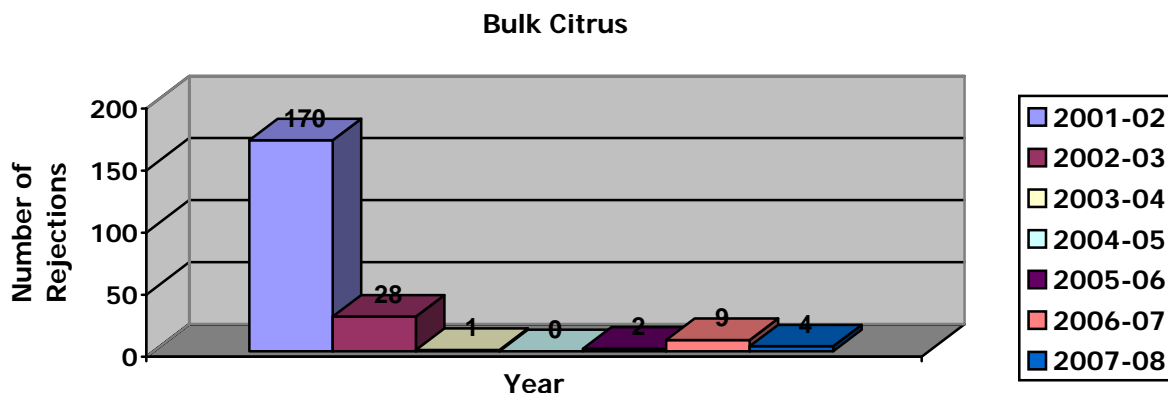
The Nursery Stock Approved Treatment Program began in June 2008. This program was implemented because of the successful three-year Nursery Treatment Pilot Program. With the ATP, qualified nurseries are allowed to ship nursery stock, treated with selected chemicals, to non-infested areas without an origin inspection.

## Bulk Citrus

Citrus trees are primary hosts for the glassy-winged sharpshooter 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 2007 through September 2008), live glassy-winged sharpshooters were found in only four out of approximately 34,000 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.



Bulk citrus rejections have been reduced drastically over the past seven years



Citrus harvest and inspections

## Statewide Survey and Detection

The Statewide Survey and Detection element of the program is designed to locate new glassy-winged sharpshooter infestations quickly and verify that uninfested areas remain free of infestation.

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

To survey for GWSS, yellow panel traps are deployed in 43 counties that are not infested or are 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 (March through October).

Each trap is checked bi-weekly and moved to a new location every six weeks. New traps are used as needed. Survey protocols were distributed to each county participant in the spring of 2008.

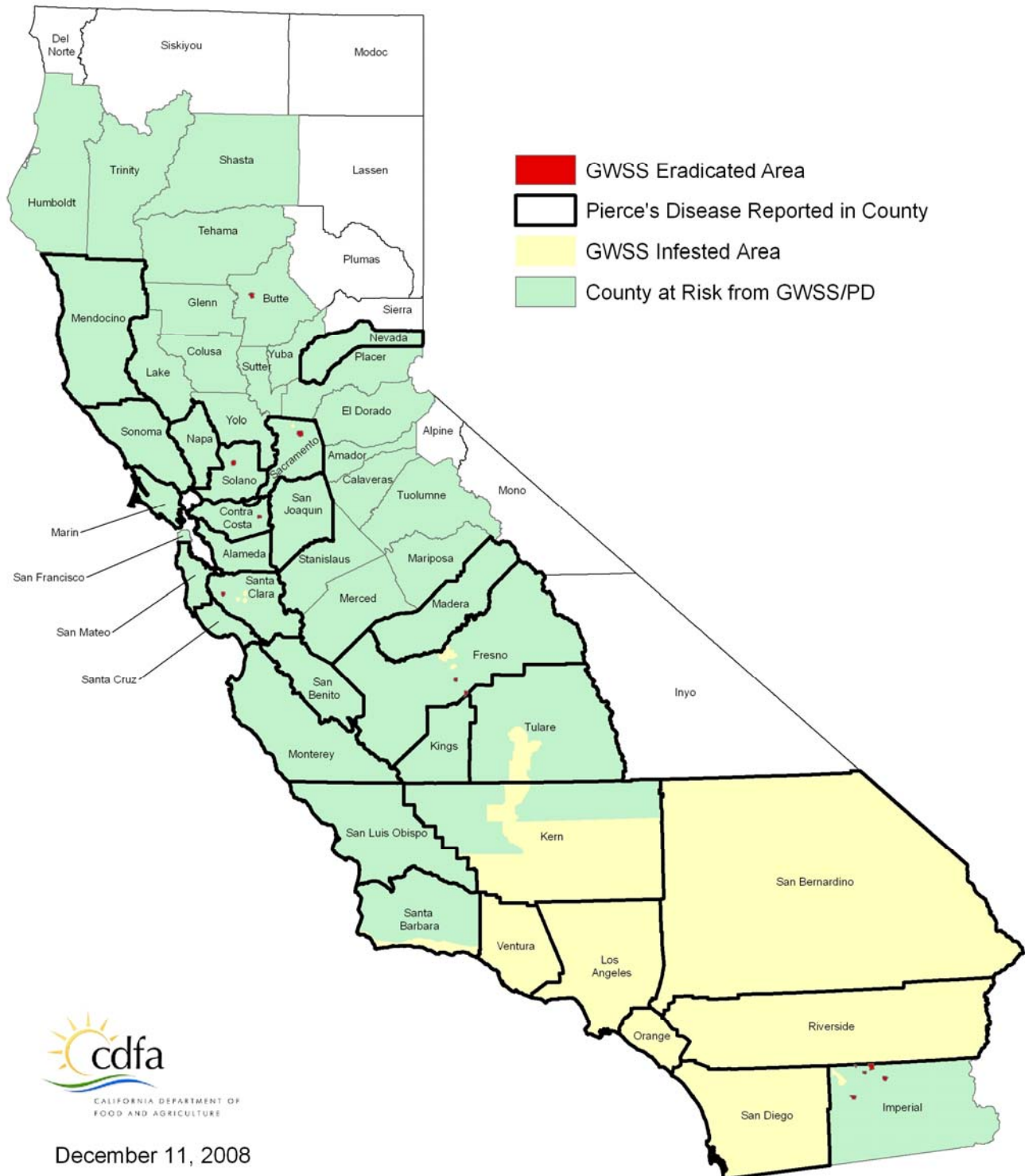
During 2008, program biologists provided detection training to 48 counties and border stations totaling 439 employees. PDCP biologists assisted county personnel with field surveys and also conducted quality control inspections. These inspections are done to ensure that target insect recognition, trap placement, host selection, servicing schedules and record keeping are being performed at the desired levels.



A yellow panel trap in crape myrtle



# Glassy-winged Sharpshooter and Pierce's Disease Distribution



# Rapid Response

The Rapid Response element of the program involves responding quickly to new glassy-winged sharpshooter detections in partial or non-infested counties. When one or more GWSS lifestages are found in a new area, a delimitation survey is conducted by the county agricultural commissioner's office to determine if an infestation is present and, if so, to identify the boundaries. In urban and residential areas, the PDCP provides the funding for treatments, which are applied under the supervision of the county agricultural commissioner. In agricultural settings, treatments are the responsibility of the grower and must be conducted in a manner approved and supervised by the commissioner.

Statewide, GWSS were detected at approximately 2,340 residential properties in the partially-infested counties of Fresno, Santa Clara, and Tulare. Approximately 4,450 properties (infested plus adjacent properties) were treated during rapid response activities.

## 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 with community members precedes treatment in urban and residential areas. This provides residents the opportunity to learn and discuss the treatment process with environmental health and program 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 individual, advanced notification of the treatment date and time, the label of the pesticide 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 Game, 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 pesticide 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 GWSS. It is used in treatment programs in urban and residential settings and can be used in both foliar and soil injection applications. Cyfluthrin is another material that has been used. The insecticide carbaryl has been used in residential settings and recent data shows that it is very effective against adults and emerging nymphs of GWSS on a broad variety of ornamental plants and fruit trees.



Checking a yellow panel trap as part of the rapid response survey activities after GWSS detection

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/>.



**Soil injection of a tree in an infested area  
by a pest control operator**



## Outreach

The goal of the outreach effort is to raise awareness about Pierce's disease, the glassy-winged sharpshooter, and the threat they pose to agriculture and the environment of California. Public awareness leads to public involvement, which in turn leads to earlier detection of infestations and reduced damage from this serious pest and disease complex. In 2004, the PD/GWSS Board initiated a communication effort to keep winegrape grower's informed about activities that are funded with the winegrape grower assessment.

### Local County Outreach

This year, 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.

### Research Symposium

The annual Pierce's Disease Research Symposium provided a venue for researchers and growers to interact and share information.



**Researchers and other attendees viewing scientific posters at the Pierce's Disease Research Symposium**

### Media Coverage

In 2008, articles and reports about Pierce's disease and glassy-winged sharpshooter continued to appear in publications, on television, radio shows, and Internet web sites. On balance, the coverage has been fair and factual and has included many statements and information generated by the PD/GWSS Board Outreach and Education Program.

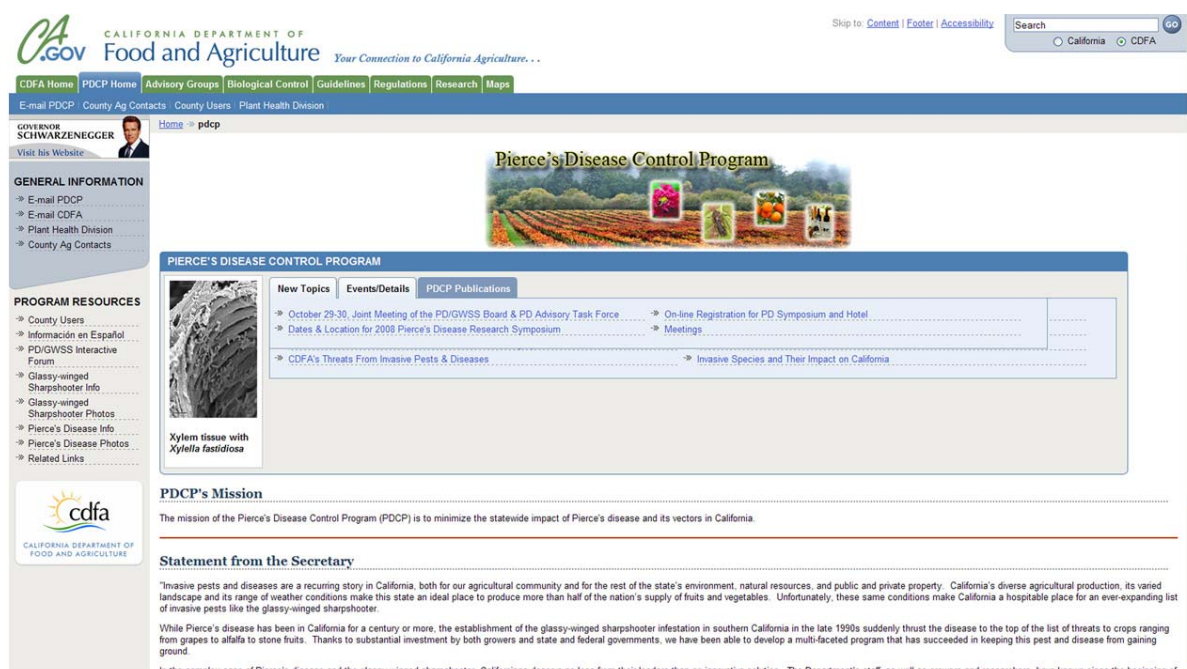
### Informational Materials

In 2008, tip sheets were made available to growers to help them manage PD and GWSS. They included sheets on creating sharpshooter barriers made of native plants, identifying PD in the

vineyard, a list of Internet resources, use of imidacloprid to control GWSS in southern California, and others.

## Web Site

The CDFA has a highly successful web site dedicated to Pierce's disease and the glassy-winged sharpshooter. The web site, which was activated in March 2000, offers frequent updates on program activities, survey guidelines, regulatory guidelines, 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.cdafa.ca.gov/pdcp](http://www.cdafa.ca.gov/pdcp).



A snapshot from the PDCP website

## PD/GWSS Board Outreach

In 2008, the PD/GWSS Board outreach and education campaign continued its efforts to keep winegrape grower's informed about the activities being funded with collected assessment dollars. This included communicating research progress and developments made possible by the assessments. The PD/GWSS Board continued to provide background and supporting material to other audiences (advisors, media, and farm, regional and wine associations).

The monthly e-newsletter, with current information about what is taking place around the state related to PD and GWSS, continued to be sent out. Information from it is often reprinted in many of the wine trade publications, usually verbatim. The e-newsletter quickly became a reliable method for getting program information out in a timely manner to all interested stakeholders.

The following materials were prepared or updated:

- Newsletters
- Web site message board
- A tabletop display/exhibit
- Brochures
- Speaking points
- E-newsletter
- Presentation kit containing fact sheets, frequently asked questions, background information, list of resources and informational sheets

A quarterly newsletter is mailed directly to California's 7,000+ winegrape growers. The program actively maintains a presence at key industry events with a tabletop display, accompanied with a brochure featuring research and control program progress around the state. This year, an interactive informational aspect was added to the trade show presence in the form of a computer-based game show viewed on a touch-screen display. Contestants become part of a game show where they are asked questions about PD and GWSS and scored, based on their knowledge.



## Research

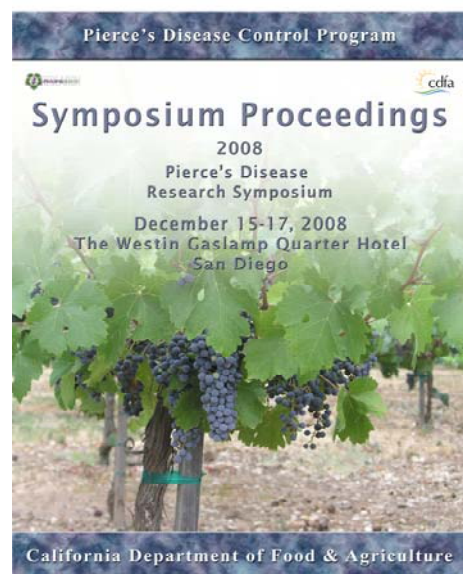
Research continues to be an integral part of the Pierce's Disease Control Program. In 2008, the flurry of research activity that began at the start of the program continued with approximately 60 projects being worked on by some of the nation's top plant health researchers. Projects ranged from lab-based investigations at the molecular and genomic levels to areawide projects in major agricultural areas. The information generated provided valuable insight into the biology, ecology, and behavior of Pierce's disease and its vectors, moving us closer to an eventual solution.

In 2008, the PDCP continued to contract with a consultant to serve as PD/GWSS research director. It also continued working with the Research Scientific Advisory Panel which was appointed in 2007 to provide input and expertise on the PD/GWSS research effort.

### Research Symposium

Every year the PDCP organizes a research symposium focused on Pierce's disease and its vectors. Approximately 200 people attend these meetings to share information and learn more about the progress being made against Pierce's disease. The 2008 symposium was held in mid-December in San Diego.

A compendium of research progress reports is prepared each year and distributed at the symposium. This document, known as the Proceedings, can be accessed electronically on the program's web site (<http://www.cdfa.ca.gov/pdcp/Research.html>).



### Research Proposal Solicitation and Review

In 2008, the PDCP coordinated its research proposal solicitation and review process with the University of California's Pierce's Disease Grant Program. A total of 45 proposals were reviewed, with CDFA managing ad hoc reviews and the University of California managing panel reviews. Based on the feedback received during this extensive vetting process, 11 research projects totaling \$2.6 million were selected for funding by CDFA using winegrape assessment funds. UC funded eight projects totaling \$1.2 million using funds provided by the USDA.

### Areawide Treatment Programs

The areawide program coordinates insecticidal treatments in commercial citrus blocks and urban areas along with the release of biological control agents.

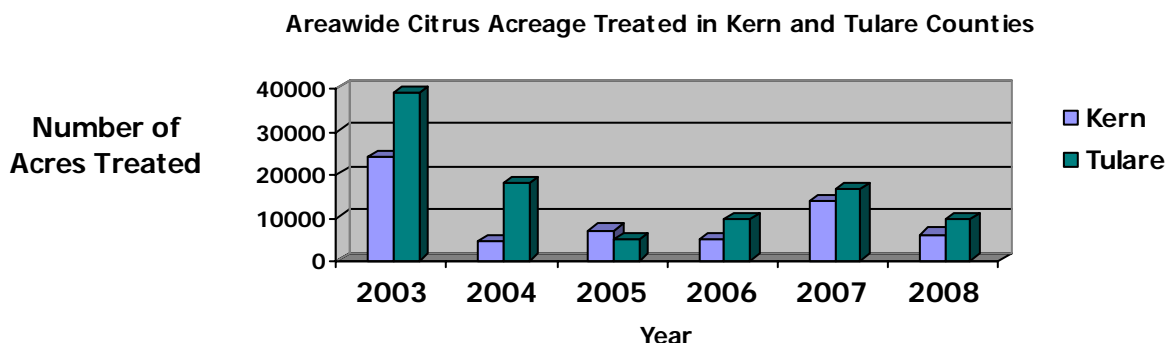
### Kern County

The Kern County Areawide Management Program has proven to be successful at dramatically reducing GWSS populations and was therefore utilized as the model for areawide programs in Fresno, Riverside, Tulare, and Ventura counties. Monitoring for GWSS and PD is occurring throughout most of these project areas.

In 2008, the boundaries of the Kern County infested area remained the same as in 2007. The infested area includes agricultural lands as well as Bakersfield and several smaller Kern County communities. There were 7,772 acres of citrus and some acreage of windbreaks treated in 2008. This is less than the 13,601 acres of citrus treated in 2007. The decrease is partially due to reduced insect populations following last year's coordinated pesticide applications.

#### Tulare County

The infested area in Tulare County has not expanded since 2004. In 2008, fewer GWSS were detected than in the prior year due to fall foliar treatments. There were 9,532 acres of citrus treated in 2008, compared to 16,609 acres treated in 2007.



#### Fresno County

In the summer of 2003, Fresno County implemented areawide-trapping for GWSS in citrus groves. This year there was one GWSS find on an areawide trap. It was on a trap inside the infested area, on the campus of Fresno State University. Visual survey after the trap find did not detect any additional GWSS so no treatments were conducted.

#### Riverside County - Coachella Valley

In 2008, the GWSS management boundaries remained the same as in 2007. Traps continued to be monitored on a ¼ mile grid system. Due to low GWSS populations, no treatments were necessary.

#### Riverside County - Temecula Valley

In 2008, the GWSS management boundaries remained the same as in 2007. Treatments were dependent on GWSS finds. There were 37 acres of conventional citrus treated with Lorsban, 93 acres of conventional citrus treated with imidacloprid, and 39 acres of organic citrus treated with PyGanic.

#### Ventura County

The GWSS management program in Ventura County continued in 2008 as an areawide trapping program, monitoring GWSS populations in citrus groves throughout the county. Nurseries within the Ventura areawide program were given the option of applying and being reimbursed for treatments. In 2008, nine nurseries treated 19 different locations totaling 1,617 acres.

## Epidemiology Projects

### Testing a New Bio-Control Approach to Preventing PD

Field trials were begun this year to test a promising microbial bio-control system to prevent damage from PD. This system was developed over the last 12 years in Florida, and is now being tested in California.

Dr. Don Hopkins, a PD researcher in Florida, discovered a novel and benign strain of *Xylella fastidiosa* (Xf) in elderberry that can colonize grapevines without causing Pierce's disease. Furthermore this strain has been shown in Florida to protect grapevines from the virulent strains of Xf, thus preventing the development of PD. Successful Florida field trials have continued over a 10-year period, and the bio-protective capability of this strain was found to persist and provide robust PD protection for otherwise vulnerable vines. The climate in Florida is ideal for PD, and the disease is so prevalent that the wine and table grapes grown in California cannot survive there. Because this bio-protective strain of Xf was so successful in Florida field trials, it was proposed that the strain might provide robust PD protection in California.

This year field trials of the Hopkins bio-protective strain were begun in both Temecula and in Sonoma County. The trials are being conducted by a team comprised of Don Hopkins, UC researchers, CDFA, and industry cooperators. Test plots were planted in commercial vineyards where the losses from PD continue to be high. Both bio-protected vines and controls were planted, and these will be followed over the next four years to determine if the Hopkins strain can protect California vineyards.

### PD Management In Southern California

This year UC Cooperative Extension advisors, in cooperation with county agricultural agents and CDFA, began an outreach program to assist smaller growers who may not be fully informed about new PD control protocols in southern California. Many of these small growers have suffered extensive losses over the last 10 years. Other growers, who have not yet had a PD problem, may be at risk for future losses. These growers can now be effectively protected. Vineyards that are using the new protocol are disease free and thriving, and this success has enabled major investment in vineyards and the associated Temecula tourism and recreation industries.

The new protocol is the result of seven years of cooperative epidemiological research following the severe Temecula PD epidemic of the late 1990s. The team is recommending the following three actions: (1) Apply a systemic insecticide such as imidacloprid at the recommended concentration in mid-May; (2) Monitor the vineyard for diseased vines at the end of the growing season (when symptoms are readily observable) and remove them; (3) Maintain an areawide GWSS management program to prevent the level of population outbreaks that occurred during the Temecula epidemic.

Because this new management tool is based on insecticides, it is possible that GWSS could eventually acquire resistance to the chemicals used. Therefore, this management practice is not a final solution, and does not replace the promising new lines of research that could lead to more robust solutions. The losses from PD in northern parts of the state are economically significant, and a more comprehensive cure that is not based on insecticides would benefit growers in all the regions of California. Because of the success of the new PD control practices



in Temecula, there are significant new investments in vineyards, wineries, resorts, and tourism activity. Many new vineyards are being planted, and recreational enterprises such as balloon rides are thriving.



**Many new vineyards are being planted and recreational enterprises such as balloon rides are thriving**

# Biological Control

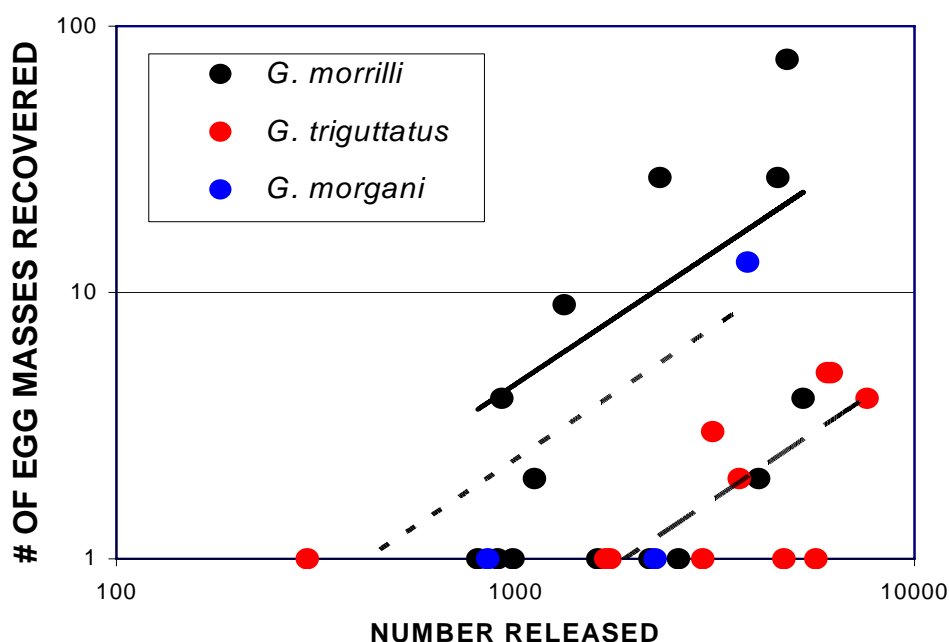
The GWSS biological control group has been producing, releasing, and evaluating biocontrol agents for the control of GWSS since 2001. The biological control agents selected are minute (1/16") wasps that parasitize eggs of the pest, thereby killing them. These wasps have a number of attributes that favor them as biological control agents: a short life cycle that allows rapid population increase compared to the pest, a very narrow host range so non-target insects are unaffected, and the ability to locate the target pest beyond the immediate release sites.

Since the inception of the program, over 1.7 million biological control agents have been released to control GWSS. Releases have been made in 13 counties, including the important agricultural counties of Kern, Fresno, Tulare, Ventura, and Riverside. In 2008, there were 65 active sites spread throughout southern California that were visited on a regular basis to release and evaluate agents. The efficacy of a particular species as a biological control agent was evaluated by collecting GWSS eggs at the release sites. The eggs were incubated to calculate parasitism rates and identify the species of agent responsible for the parasitism.

Four species of biological control agents were produced at the CDFA facilities in Kern and Riverside counties in 2008. Three others were discontinued due to poor recovery rates that indicated poor survivorship in California climate zones. Of the four in production, two are native to California (*Gonatocerus ashmeadi* and *Gonatocerus morganii*) and two (*G. triguttatus* and *G. morrilli*) were introduced from southeastern North America, the native range of GWSS. The addition of *G. morrilli* and *G. morganii* has greatly increased our success rate in establishing GWSS biological control agents in California.



*Gonatocerus morrilli* and *Gonatocerus morganii*



Recovery rates for introduced biological control agents in California, 2008. Each point represents one release site.

Recoveries of biological control agents are correlated with the time of year. *G. morrilli* has a faster development rate, which gives it an advantage earlier in the season; in some locations, it becomes the predominant agent before *G. ashmeadi* builds up its own numbers. The location of the release site also has an impact on the species of agent recovered; *G. morrilli* has a better chance of survival in coastal counties where the climate is cooler.

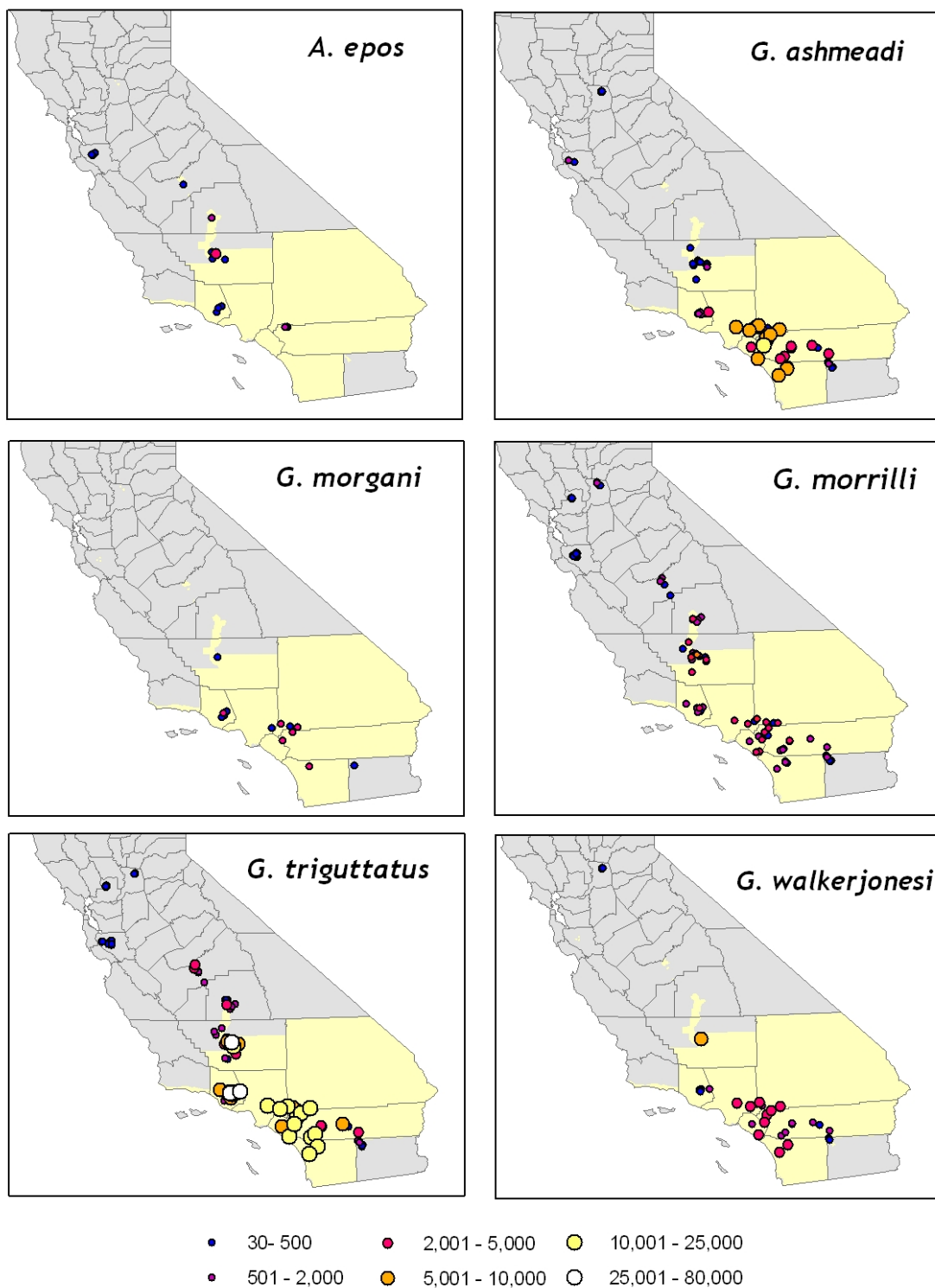
This year ranked the highest number of recoveries of biological control agents since the start of the program. *G. morgani* was recovered after less than one year's releases. A study conducted in 2008 evaluated our monitoring methodology and revealed that parasitism rates are underestimated. It revealed that parasitism rates of GWSS egg masses left in the field were over double that of egg masses recovered for monitoring. Consequently, the importance of egg parasitoids in suppressing GWSS populations is considerably greater than previously reported.

	Active Sites	Number of Sites with Recoveries			Number of Parasitoids Released		
		<i>G. morrilli</i>	<i>G. triguttatus</i>	<i>G. morgani</i>	<i>G. morrilli</i>	<i>G. triguttatus</i>	<i>G. morgani</i>
Los Angeles	2	0	0	0	2,441	713	441
San Bernardino	5	0	0	0	6,015	1,862	2,243
San Diego	4	2	0	0	3,124	746	1,062
Fresno	8	0	0	0	5,050	4,583	0
Imperial	6	1	0	0	4,458	1,805	596
Kern	11	1	5	5	18,212	28,441	100
Orange	3	1	1	0	2,757	718	0
Riverside	12	2	1	1	16,646	6,225	1,642
Tulare	7	0	0	0	7,311	5,908	0
Ventura	7	6	4	2	16,120	18,473	2,951
<b>Total</b>	<b>65</b>	<b>13</b>	<b>11</b>	<b>8</b>	<b>82,134</b>	<b>69,474</b>	<b>9,035</b>

Counties in California where recoveries of biocontrol agents have occurred and number of agents released in each county in 2008



# Biological Control Release Sites



Total # agents released for biological control of GWSS in California 2001-2008

*A* = *Anagrus*    *G* = *Gonatocerus*

## Environmental Compliance

In 2008, the California Department of Food and Agriculture continued with its commitment to ensuring that the Pierce's Disease Control Program 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, ensuring that pesticide applications are performed by licensed pest control professionals in strict accordance with pesticide laws and regulations, and conducting environmental monitoring during selected pesticide treatments.

A statewide programmatic environmental impact report (EIR) was released for the 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 2008, the CDFA solicited bids from environmental consulting firms for preparing the environmental analyses, documents, and risk assessments called for by the Appeals Court. Efforts on this project will continue in 2009.

# Financial Statement

<b>FISCAL YEAR</b>	<b>2007-08</b>	<b>2008-09</b>
<b>REVENUE</b>		
State (Budget Act)	\$ 4,548,681	\$ 4,150,000
Federal (USDA)	\$ 15,300,000	\$ 14,300,000
	<hr/>	
<b>Total Revenue</b>	\$ 19,848,681	\$ 18,450,000
<b>EXPENDITURES</b>		
Personal Services	\$ 3,839,267	\$ 3,800,863
Operating Expenses	\$ 3,428,939	\$ 1,549,137
County Payments	\$ 12,580,475	\$ 13,100,000
	<hr/>	
<b>Total Expenditures</b>	\$ 19,848,681	\$ 18,450,000



## Abbreviations and Acronyms

CACASA	California Agricultural Commissioners and Sealers Association
CDFA	California Department of Food & Agriculture
EIR	Environmental Impact Report
GWSS	Glassy-winged sharpshooter
PD	Pierce's disease
PD/GWSS Board	Pierce's Disease & Glassy-winged Sharpshooter Board
PDCP	Pierce's Disease Control Program
UC	University of California
USDA	United States Department of Agriculture
Xf	<i>Xylella fastidiosa</i>