

# Pierce's Disease Control Program



**Report to the Legislature  
January 1, 2001**

**California Department of Food and Agriculture**

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## Statement of the Secretary

In August of 1999, alarmed grape growers in Temecula who saw unprecedented numbers of their vines scorched and dying with Pierce's disease, went to their Board of Supervisors looking for help. The Board declared a state of emergency and contacted the California Department of Food and Agriculture to see what resources were available to help them meet this crisis.

The magnitude of the threat, not only to California's grape crop but to other important crops like almonds, citrus, alfalfa and ornamental plants, made it clear that this challenge had statewide implications but no easy answer. A coalition made up of affected industry groups, government, and the university, formed in record time and became determined to develop a sustainable plan to combat both the disease and its new carrier, the glassy-winged sharpshooter.

The first priority of this group was to identify and support the research that would be necessary to manage Pierce's disease outbreaks. The second focus was to stop the spread of the disease carrier before it became established in other premier grape-growing areas in the state. I am proud of the Department's role in this effort and I am also extremely impressed by the commitment and enthusiasm shown by other members of this coalition.

We have made a great start at developing a comprehensive program to contain the spread of the sharpshooter and will continue to improve it through continued meetings with local communities, environmental groups, the agricultural industry and other stakeholders. In the long term, we hope that research will provide management tools to control the disease. I look forward to continuing to expand the partnership that is making this program a success.

***Secretary William (Bill) J. Lyons, Jr.***  
***California Department of Food and Agriculture***

# Overview

## Background

In the summer of 1999, winegrape growers in Riverside County experienced a sudden and alarming increase in the death of grapevines in a number of area vineyards. In August, after experiencing the rapid destruction of over 300 acres of vineyards in the Temecula Valley, the Riverside County Board of Supervisors declared a local emergency. The culprit of the destruction was the deadly Pierce's disease accelerated by a new carrier of the causal bacteria of the disease, the glassy-winged sharpshooter.



Riverside County and the City of Temecula each contributed \$125,000 for research to combat Pierce's disease. Within days, Secretary William J. Lyons, Jr. of the California Department of Food and Agriculture (CDFA) adopted an action plan and appointed a task force to develop long-term strategies and resources to combat the emerging threat. The CDFA resources were redirected to meet

with stakeholders, coordinate activities and develop plans for action. Governor Gray Davis signed legislation allocating \$2.25 million over three years for Pierce's disease research and creating the Pierce's Disease Advisory Task Force while Secretary Lyons successfully sought federal assistance to reduce sharpshooter populations in Temecula.

January marked the first meeting of the Pierce's Disease Advisory Task Force and subcommittees were established to review research proposals and develop management and control plans. A preliminary survey uncovered a significant presence of the glassy-winged sharpshooters in eight southern California counties.

By February, the CDFA had already expended thousands of hours of staff time to meet with stakeholders, coordinate activities and develop protocols for regulatory action and treatment. Concerned about the spread of the glassy-winged sharpshooter through nursery stock, the nursery industry adopted a voluntary inspection and treatment program while Secretary Lyons met with federal government officials to seek their assistance.

In the Spring, a number of significant developments affected the fight against Pierce's disease and the glassy-winged sharpshooter. The CDFA developed and released protocols and guidelines for counties to determine the presence of the

glassy-winged sharpshooter. Concerned that nursery inspections at origin still left destination counties somewhat vulnerable, several non-infested counties began to inspect nursery stock shipments from infested areas upon arrival. Mandatory inspections were implemented statewide after the CDFA upgraded the pest rating of the glassy-winged sharpshooter.

Meanwhile, scientists from the CDFA and the University of California traveled to Mexico in search of natural enemies of the glassy-winged sharpshooter.

Responding to the need to keep stakeholders informed, the CDFA developed and activated a website dedicated to Pierce's disease and the glassy-winged sharpshooter.

In May, a glassy-winged sharpshooter was trapped in a San Joaquin County nursery distant from the infested areas. The subsequent large-scale survey effort helped establish the protocol for responding to sharpshooter discoveries in the future. Later in the month, an infestation of the sharpshooter was discovered in a residential area of Tulare County. Multiple state and local agencies were mobilized for rapid response.

The end of May marked the formal establishment of the Pierce's Disease Control Program as legislation (SB 671 by Senator Wes Chesbro) was adopted outlining specific requirements for county agencies and authorizing the Secretary of CDFA to adopt program regulations. Governor Davis sponsored the legislation approving \$6.9 million in program funding from the State's

1999/2000 budget and supported an additional \$6.9 million in the 2000/2001 Budget Act.

While treatment activities continued in Tulare County, action on the part of alert residents led to the discovery and treatment of two new infestations in Fresno County.



On June 23, the federal government responded to Governor Davis' request for a federal emergency declaration. Federal assistance of \$22 million was committed to control the spread of the glassy-winged sharpshooter and support research to cure Pierce's disease.

During the summer, survey and detection efforts uncovered new infestations in the counties of Fresno and Sacramento and concerns about the movement of nursery stock and bulk grapes intensified. On July 25, the CDFA adopted emergency regulations for nursery stock and bulk grapes and coordinated statewide systems for compliance.

In August, scientists from the CDFA and the University of California initi-

ated a pilot project by releasing limited numbers of a natural enemy of the glassy-winged sharpshooter. Small numbers of the tiny, stingless wasp from Mexico were released in test locations in Kern, Riverside and Ventura Counties. The wasp parasitizes the sharpshooter by laying its eggs inside those of the larger sharpshooter.

In the final quarter of the year, new glassy-winged sharpshooter infestations were discovered in Butte, Contra Costa, Fresno and Tulare Counties. State and local agencies worked together to treat over 250 residential properties and the Environmental Protection Task Force created by the CDFA began a series of meetings to review the potential environmental impacts associated with program treatments.

In November, significant numbers of the glassy-winged sharpshooter were discovered in bulk citrus shipments moving from Kern County to packing facilities in Tulare County, leading to the immediate suspension of shipping activities. Following an assessment of citrus processing activities, the CDFA adopted emergency regulations requiring citrus to be free of the sharpshooters prior to shipping.

The CDFA conducted regional stakeholder meetings in Napa, Orange, San Luis Obispo, Stanislaus and Tulare Counties to gather input regarding program activities. Hundreds of grape growers, vintners, nursery operators, environmental organizations and general public members attended and expressed their opinions about the program to combat the disease and the glassy-winged sharpshooter.

In December, an international symposium focused on research for Pierce's disease was conducted at the University of California in Davis. More than 60 scientists from around the world who are undertaking research participated to review critical research and define the best directions for future research. The symposium provided the first opportunity for researchers to collectively share progress, critical information and identify gaps in current research efforts. A follow-up symposium is scheduled for early 2001.

Throughout the year, the program was encouraged by significant progress on a number of research projects. The DNA of the *Xylella* strain that causes citrus variegated chlorosis, closely related to Pierce's disease, has been completely identified enhancing our ability to determine how the Pierce's disease strain works and where it might be susceptible to attack. Several DNA-based identification kits are in the final stages of testing. They will greatly enhance our ability to determine if a plant or the sharpshooter has the Pierce's disease strain of the bacteria. Movement of the sharpshooter and how the pest transmits the disease has been studied and documented to assist in developing effective pest management activities. A pilot test for lowering insect population without extensive spraying has initially produced encouraging results. A number of insecticides were tested and appear to be effective against the sharpshooter. Approximately \$3.7 million dollars is currently funding 32 research projects with an additional \$4 million earmarked for other research projects.



## Program

The Pierce's Disease Control Program accomplishes many of its activities through county agricultural commissioners supported by the CDFA employees located throughout the state. Industry, federal and other state agencies also play a critical role in supporting the program and providing feedback to maintain program effectiveness. The program has five central elements:

### 1. Contain the Spread

Preventing the spread of the glassy-winged sharpshooter to new areas of the state by regulating shipments of host plants and plant materials.

### 2. Statewide Survey and Detection

Identifying and monitoring glassy-winged sharpshooter infestations and populations through trapping and visual inspection.

### 3. Rapid Response

Providing guidelines and oversight to local authorities to develop and implement work plans for response to new infestations.

### 4. Outreach

Raising awareness about Pierce's disease and its vectors while responding to the concerns of growers and the general public.

### 5. Research

Developing solutions to reduce or eliminate the risk of Pierce's disease.

Additional information on the Pierce's Disease Control Program and its activities is contained in the following sections of this report. An electronic copy of this report and further detailed information can be found at the program website:

[www.cdfa.ca.gov/gwss](http://www.cdfa.ca.gov/gwss).



## Major Accomplishments

Since the discovery of the serious new threat presented by the glassy-winged sharpshooter, the accomplishments of the cooperative program have been significant. Program highlights include the following:

- A task force with broad representation from industry, research communities, and local government was appointed to advise the CDFA Secretary on each phase of the program.
- Inspectors performed an initial survey statewide and determined that 45 counties were apparently free of glassy-winged sharpshooter.
- Following a review of the risks posed by glassy-winged sharpshooter, CDFA designated the pest as one of limited distribution and major economic importance.
- The CDFA adopted emergency nursery, bulk grape and citrus regulations to prevent the artificial spread of the glassy-winged sharpshooter.
- County staff inspected over 52,000 nursery shipments, finding less than one-half of 1% of the shipments carried life stages of the sharpshooter.
- Counties inspected close to 115,000 loads of bulk grapes resulting in zero sharpshooter finds.
- The CDFA developed protocols for a statewide detection program to provide guidance to counties for their work plans.
- County staff, with the help of the public, detected new glassy-winged sharpshooter infestations in five counties.
- Local groups met to establish 17 pest management groups to provide input into local county work plans to combat glassy-winged sharpshooter.
- Counties treated over 2,000 glassy-winged sharpshooter infested properties in five counties.
- State staff participated in over 200 outreach meetings for growers and the general public to provide status reports and opportunities to contribute feedback to the program.
- The CDFA established an interactive website providing program guidance and information. This site has been visited over 500,000 times since its unveiling in March 2000.
- State, local and university cooperators have worked in partnership to distribute over 100,000 brochures (in English and in Spanish) to increase public awareness of the pest and its potential impact.
- Outreach efforts and program activities have generated over 500 press releases and articles in national and international publications.



- CDFA, working closely with industry and the University of California, has coordinated the investment of \$7.7 million in research to seek short and long-term solutions to Pierce's disease and the glassy-winged sharpshooter.
- Scientists from the University of California, CDFA and the U.S. Department of Agriculture (USDA) have imported and released a limited number of parasitic wasps to determine if they reduce the sharpshooter population and survive California conditions.
- An independent panel was appointed by the CDFA to identify environmental concerns associated with the treatment element of the program and made recommendations to the Secretary in a formal report.
- The USDA committed \$22.3 million for the fight against Pierce's Disease and its vectors.

Additional information regarding program accomplishments may be found in the following sections of this report.

# Organization

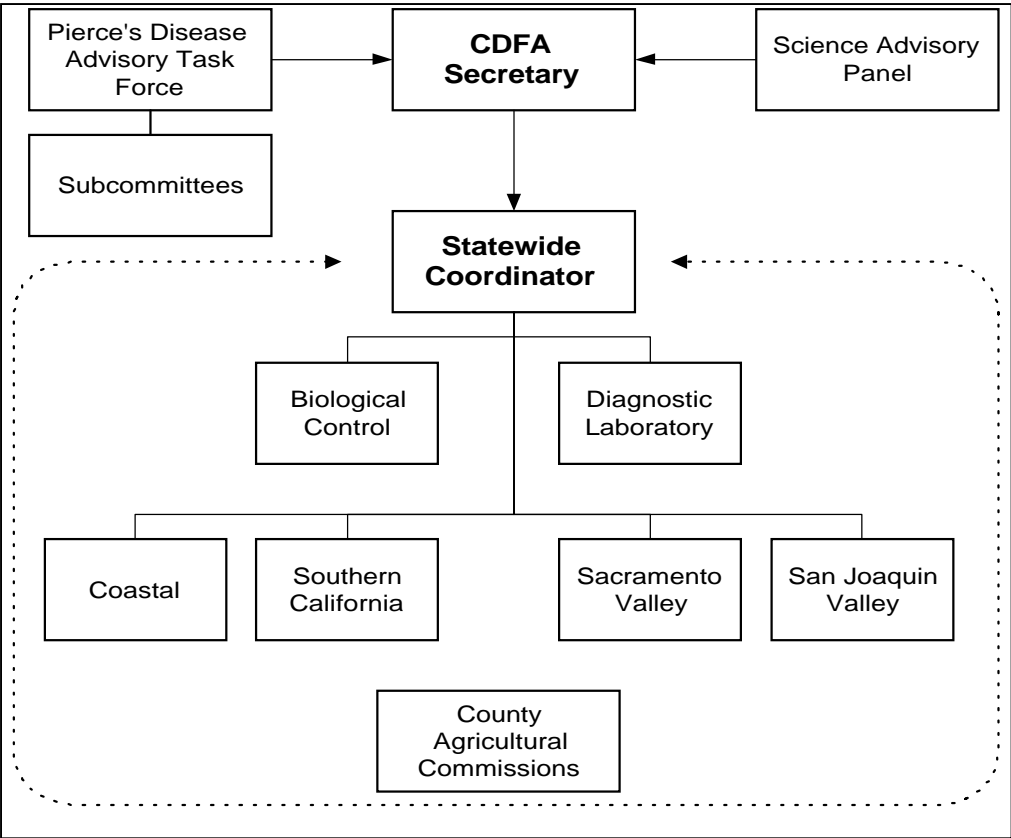
The Pierce's Disease Control Program is a partnership with county agricultural commissioners, universities, federal agencies, other state and local agencies, and agricultural organizations throughout the state.

The Pierce's Disease Control Program is advised by a task force and subcommittee structure. A Statewide Coordinator directs the program in accordance with the policies approved by the Secretary.

Offices located throughout the state are responsible for overseeing and implementing various elements of the program, as well as communicating with program stakeholders.

They work in partnership with the offices of county agricultural commissioners to ensure that activities are being conducted in accordance with all statutory and regulatory requirements.

Identification of the disease and the sharpshooter is performed by the systematists at the CDFA's Plant and Pest Diagnostic Laboratory. Natural enemies of the sharpshooter will be reared in the CDFA lab facilities. Research is being performed statewide by researchers under contract and coordinated by the CDFA and industry.

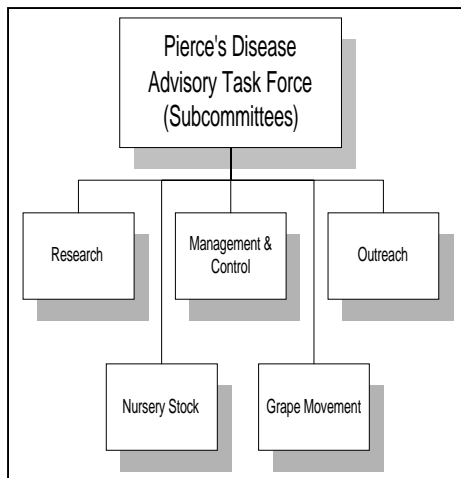


## Planning

Recommendations from the Pierce's Disease Advisory Task Force, the Science Advisory Panel and internal technical expertise guide the program's structure, goals and objectives.

### Pierce's Disease Advisory Task Force

The Pierce's Disease Advisory Task Force and its subcommittees serve as the key management advisory group. Composed of county agricultural commissioners, scientists, agricultural representatives and other experts, the task force meets regularly to review and make recommendations for program improvements.



### Science Advisory Panel

Members of the Science Advisory Panel (SAP) are experts in glassy-winged sharpshooter. The panel regularly reviews the scientific elements of the program and recommends direction in the

biology of the vector and the most effective means of containment and control.

### Local Management

The county agricultural commissioner of each county has lead responsibility for conducting local Pierce's Disease Control Program activities. Agricultural commissioners are responsible for developing and seeking CDFA approval for program work plans addressing the disease and its vectors. As stated in legislation (SB 671), county work plans must include the following minimum elements:

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

Seventeen local management areas and task forces have been formed throughout the state and are instrumental in mobilizing local resources to assess and combat the glassy-winged sharpshooter.

# The Disease & the Insect

## Pierce's Disease

Pierce's disease of grapevines was first noted in California near Anaheim in 1884. The disease is caused by a strain of the bacterium *Xylella fastidiosa* and kills grapevines by clogging up 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 (including oaks, elms, maples and sycamore). Since its discovery, Pierce's disease has spread to other areas of the state and is currently known to exist in 24 counties. According to a report issued by the University of California, the disease has destroyed over 1,000 acres of grapevines resulting in damages of \$30 million since 1994<sup>1</sup>. There is no known cure for the disease.

## The Sharpshooter

The glassy-winged sharpshooter, first noted in California in 1994, is native to the southeastern U.S. and northeastern Mexico. It feeds on the xylem fluid of over 70 species of crop and ornamental plants. The glassy-winged 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 risk from these two pests occurred in Riverside County in August of 1999 when over 300 acres of grapevines infested with glassy-

winged sharpshooter were rapidly destroyed by Pierce's disease.



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 *X. fastidiosa* bacteria to crops;
- Covers longer distances in a shorter time than other sharpshooters;
- Makes use of more breeding habitats and plant hosts than native Pierce's disease vectors; and
- Transmits the disease from vine-to-vine, resulting in an exponential, rather than linear, increase in disease incidence in vineyards (per Dr. A. Purcell, University of California, Berkeley).

The combination of Pierce's disease and the glassy-winged sharpshooter constitute an unprecedented threat to California's multi-billion dollar grape, wine and almond industries, as well as ornamental and highway plantings of oleanders.

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

## Contain the Spread

The contain the spread element of the program is designed to prevent the artificial spread of the glassy-winged sharpshooter on those commodities that present a risk of carrying the insect. The activities of this element focus on commodities moving from infested areas to non-infested areas within California as well as on commodities entering from other states.

Regulations and standards were adopted on July 25, 2000 to control the movement of nursery stock and bulk grapes. On November 8, subsequent regulations for the movement of citrus were adopted. The regulations are intended to prevent the artificial spread of the glassy-winged sharpshooter and to enable certification that shipments of plant material are pest-free.

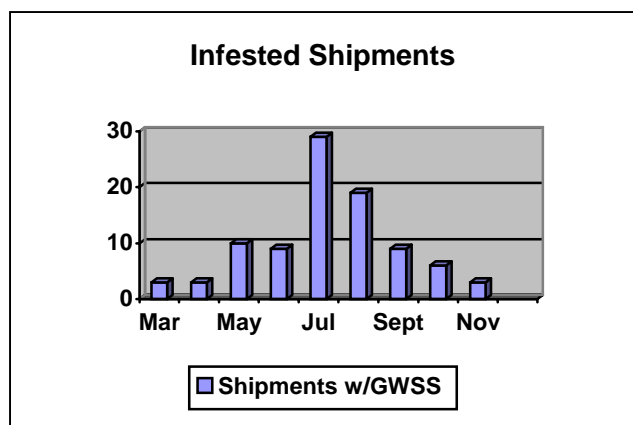
### Nursery Stock Inspections

California has almost 9,000 licensed nurseries. Approximately 60% of the state's nurseries are located in counties that have infestations and many ship to uninfested areas. Because nursery stock has been confirmed as a high risk commodity for transporting the sharpshooter, activities to mitigate the risk include: 1) the inspection of nursery stock from nurseries in infested areas prior to shipping to non-infested areas; 2) treatment of nursery stock when necessary; 3) certification of shipments; and 4) notification of counties receiving nursery stock to hold the commodities for inspection prior to sale.

Destination counties may allow shipments from an infested area if the shipping nursery is operating under a written compliance agreement. Compliance agreements require nurseries to monitor their facilities continuously and the local office of the agricultural commissioner is responsible for monitoring compliance. The additional expense incurred by the nursery industry to comply with program requirements is currently unknown. However, the nursery industry in Orange County estimates additional costs of \$700 per acre annually. The California Association of Nurserymen is currently in the process of identifying the costs associated with program compliance on a statewide basis. This economic survey is intended to assess loss of sales, additional labor costs and treatment costs for California nurseries.

### Inspection Results

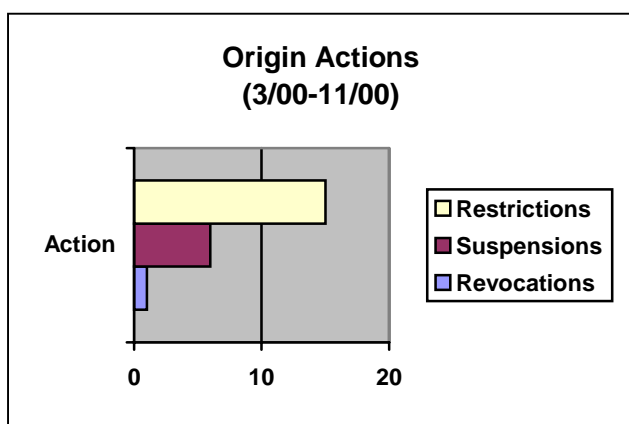
As of the end of November 2000, there have been over 52,000 shipments of nursery stock from infested areas. Of these, viable life stages of glassy-winged sharpshooter have been discovered in less than 1%. Egg masses are the most frequently discovered life form of the sharpshooter in nursery stock and efforts are underway to develop a chemical treatment (ovicide) that will kill egg masses. An effective ovicide could significantly reduce the activity level of the current inspection program.



### Compliance Actions

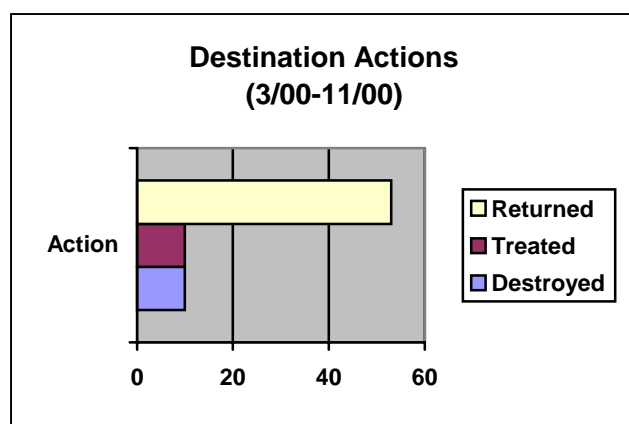
A number of regulatory actions have been taken to ensure nursery compliance with the shipping protocols at both origin and destination. Actions that may be invoked at the origin of nursery shipments include the following:

- ◆ **Suspension.** The nursery is suspended from shipping out of the infested area until the risk is mitigated.
- ◆ **Restriction.** The nursery is restricted from shipping certain host material species out of the infested area for a period of time.
- ◆ **Revocation.** The nursery's compliance agreement is revoked for an established period of time because of repeated violations.



Actions that may be invoked at the final destination of nursery shipments include the following:

- ◆ **Treatment.** The county may allow the treatment of a nursery shipment upon the discovery of glassy-winged sharpshooter life stages.
- ◆ **Returned.** The county may reject all or part of a nursery shipment upon the discovery of glassy-winged sharpshooter.
- ◆ **Destroyed.** The county may reject all or part of a nursery shipment and elect to have it destroyed.



### Bulk Grapes

Many of the state's grape growers sell their two million ton annual harvest to grape processors (i.e., wineries, juice manufacturers) located considerable distances from the production vineyard.

To determine whether the glassy-winged sharpshooter was being transported with these harvests, close to 115,000 shipments were inspected and certified this season.



Since inspections failed to uncover the sharpshooter in these shipments, the Science Advisory Panel and the Bulk Grape Movement Subcommittee will be evaluating this element of the program.



crews. However, once the weather turns cold, the glassy-winged sharpshooter is relatively inactive. It is believed that the insects are pulled into picking bags when the fruit is harvested and ultimately end up at processing facilities in other parts of the state.

As a result of this discovery, the CDFA adopted emergency regulations to establish standards for the movement of citrus fruit from infested areas to noninfested areas. These standards are intended to provide flexibility for the citrus industry with adequate controls to prevent the spread of the glassy-winged sharpshooter through this movement.

## Citrus

On October 28, 2000, significant numbers of sharpshooters were found in orange shipments arriving at packing facilities in Tulare County. This discovery led to the immediate examination of the harvesting and processing practices associated with citrus.

Citrus plants have been identified as a primary feeding plant for the glassy-winged sharpshooter. Although citrus is harvested throughout the year, the insects are active when the weather is warm and generally avoid the disturbance created by harvest



## Statewide Survey and Detection

The statewide detection and survey element of the program is designed to identify and monitor the glassy-winged sharpshooter infestations and populations.



The activities of this element focus on systematically surveying commercial and residential properties to detect the presence of the glassy-winged sharpshooter.

In the spring of 2000, the CDFA distributed survey and inspection guidelines to all California counties emphasizing techniques for detecting the glassy-winged sharpshooter in agricultural areas of the state outside of the currently

known infested areas. County agricultural commissioners incorporated survey activities into their local work plans and were provided resources for implementation. Additional detection training and educational materials are made available by the CDFA, and staff entomologists have assisted with field surveys.

The published guidelines outline trapping and visual inspection of the sharpshooter's preferred host plants. While yellow panel traps have been found to be useful for adult glassy-winged sharpshooter detection, visual inspection is considered the most effective method for detecting sharpshooter life forms, yet it is labor intensive and time consuming.

An initial statewide survey determined that 45 counties were apparently free of the glassy-winged sharpshooter. Ongoing survey efforts later in the season uncovered new sharpshooter infestations in three counties.

Ongoing and expanded surveys will be an important component for the program. Experience from the first season of the program has provided better information about high-risk areas and about the best times of the year to survey in different parts of the state. The extent of the sharpshooter's presence in California will not be known until a more comprehensive statewide survey is performed.

## Rapid Response

When a glassy-winged sharpshooter infestation is discovered in a previously uninfested area of the county, the local agricultural commissioner is the lead agency and proceeds according to established protocols. The county agricultural commissioner initiates a delimitation survey to determine the extent of the infestation.

Once the extent of the infestation is determined, the county will take action on the basis of its approved workplan. If the sharpshooter is discovered in an agricultural setting, the pest may be treated at the cost of the property owner in a manner approved and supervised by the agricultural commissioner. If the infestation is detected in an urban or residential area, it may be eradicated where feasible. If eradication is not feasible, the infestation will be contained within the smallest possible area, as determined by the commissioner.

### Treatment Preparation

If the county elects to execute a plan of treatment, advance approval is generally obtained from the county governing body or an authorized representative (e.g., board of supervisors, county counsel) and must also be obtained from the CDFA.

Before treatments begin, the county agricultural commissioner consults a California database of endangered and threatened species maintained by the Department

of Pesticide Regulation. If a species was identified in the treatment area, the commissioner would contact the U.S. Fish and Wildlife Services or the California Department of Fish and Game (CDFG) to identify appropriate mitigation for threatened or endangered species and environmentally sensitive areas within proposed treatment areas. In addition, notification is provided to the California Department of Pesticide Regulation, which monitors treatment activities, and the California Department of Health Services, which responds to illness reports.

All treatments are preceded by a public meeting to provide community members the opportunity to discuss the treatment process with environmental health and program specialists. Door-to-door contacts, direct mail and local media sources are used to solicit resident participation in public meetings. Occupants of all properties as well as adjacent properties scheduled for treatment are provided individual, advanced notification including the proposed pesticide label (ingredients) and a "help line" phone number.

### Pesticide Use & Monitoring

The California Department of Pesticide Regulation (DPR) is the lead agency for approving the use of pesticides in California. The main consideration for selection of a pesticide to use against the glassy-winged sharpshooter is

whether the product is effective against the pest and whether it is labeled for use on the host plants found in the infested area. Impacts on public health and the environment are considered when any product is registered in the state, but making sure any impacts can be kept to a minimum is also a consideration that is paramount in a treatment program.

The insecticide carbaryl has been used in the five new infestations detected in the first year of the program. This material is labeled for use in residential settings on a broad variety of ornamental plants and fruit trees. The CDFA also had previous experience with the material and had done a full environmental review on similar uses, showing that any risks from the product could be mitigated. (*Final Environmental Impact Report: Gypsy Moth, CDFA. 1992*).

New research has shown that imidacloprid is also very effective against the sharpshooter. It has had some limited use in treatment programs on ornamental plantings in commercial areas.

The Environmental Hazards Program of the Department of Pesticide Regulation assesses environmental impacts of the program by monitoring treatments to determine chemical concentrations in the air, surface water, leaves and representative backyard fruits and vegetables. This information is also used by the CDFA to assess proper application rate and coverage.

Over 2,000 properties infested with the sharpshooter in five counties were treated this year. Glassy-

winged sharpshooter populations appear to have been markedly reduced on treated properties. Further evaluation will continue in the spring of 2001. Maps of treatment areas are contained in the appendix.

Sampling results and related glassy-winged sharpshooter monitoring reports are available at DPR's website ([www.cdpr.ca.gov/docs/gwss](http://www.cdpr.ca.gov/docs/gwss)).

### Strategic Alliances

The CDFA has enlisted the cooperation of the California Conservation Corps (CCC) and the California Department of Transportation (Caltrans) to assist in the fight against Pierce's disease and the glassy-winged sharpshooter.

Employees for the CCC have been essential to the program, rushing into action in several communities where new infestations have been found. The flexible staff of the CCC allows local officials and the CDFA coordinators to quickly assess the extent of sharpshooter infestation. The CCC staff has also assisted in preparation for treatment activities.

The miles of oleander and other plants lining the medians and shoulders of California's highways are ready hosts to the sharpshooter. Caltrans employees have been trained to identify the sharpshooter and can quickly respond to new infestations when discovered.

# Biological Control

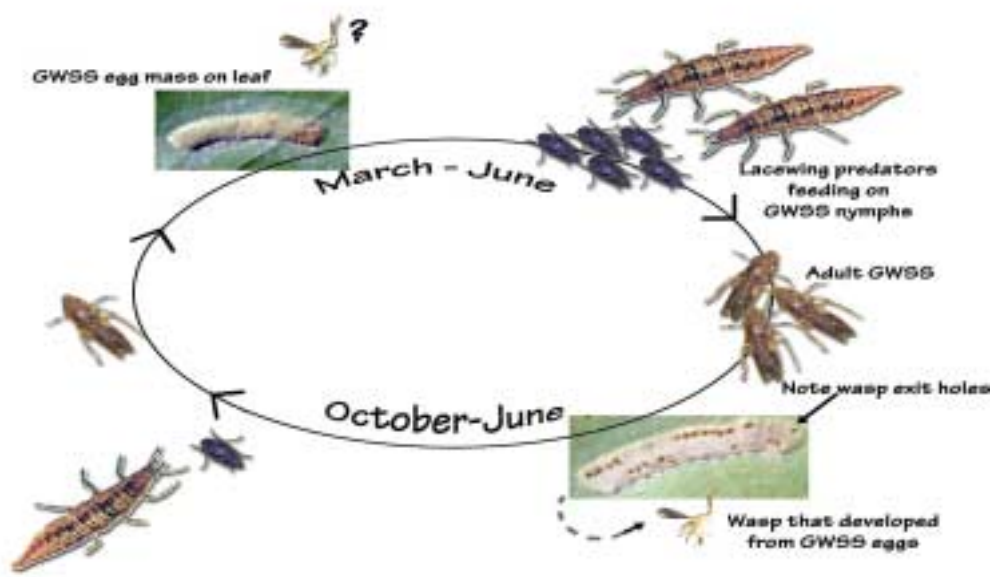
One of the most promising long-term solutions for controlling the glassy-winged sharpshooter may be biological control. Biological control serves to identify and introduce natural enemies to minimize the glassy-winged sharpshooter population.

Currently, localized outbreaks of the sharpshooter found outside the known infested areas are being suppressed with selective applications of carbaryl and other materials. However, restricting this pest with natural enemies is a more sustainable approach.

The California Department of Food and Agriculture has had a strong commitment to biological control since 1977. Traditional biological control involves collecting natural enemies that can be found in the pest's native range, rearing large numbers of these natural enemies and releasing them so they can

begin to exert control over the unwanted pest populations. Before the insects are released, they are rigorously evaluated in a controlled laboratory environment to make sure that there will be no unwanted impacts on non-target plants or animals. The U.S. Department of Agriculture will only issue a permit for release of new biocontrol agents after this evaluation is completed.

A key objective of the program's biological control component is to locate a full complement of parasites and predators that can attack multiple life stages of the sharpshooter. These natural enemies will also have to have the ability to survive the extremes of California's environment, including dry summers, winter freezes and urban settings. Releasing large numbers of parasites or predators at the right time in the season will reduce the need for insecticides.



**A complement of natural enemies is needed to control various stages of the glassy-winged sharpshooter throughout the season.**

The CDFA has budgeted approximately \$2 million in Fiscal Year 2000/2001 to develop the biological control program. Ten scientists from the CDFA, the University of California and the USDA are currently engaged in foreign exploration, establishing rearing facilities, evaluating possible natural enemies for pilot field releases prior to broad scale releases of suitable natural enemies.

### Sharpshooter in California

The glassy-winged sharpshooter is native to the southeastern United States and northeastern Mexico where naturally occurring parasitoids drive populations down, making sharpshooters difficult to find. Currently, the most effective natural enemies appear to be stingless parasitoid wasps that attack sharpshooter eggs. In some areas of California, up to 85% of the

attacks the sharpshooter eggs in late summer and early fall, new imported wasps are needed to attack the pest in the spring. Other predators are also needed to attack the immature stages of the sharpshooter.

### Accomplishments

#### ***Discovered new parasitoids***

Working with University of California researchers, the CDFA scientists have made two exploratory trips to Mexico and the southeastern U.S. to find and collect natural enemies of the sharpshooter in its native range. As a result, two new stingless wasp parasitoids known to attack and kill glassy-winged sharpshooter eggs have been collected, imported, and released into California.

#### ***Assessed environmental impacts***

An important phase in assessing the suitability of a new parasite is determining whether it will attack non-pest organisms, such as valuable native insects. The parasitic wasp imported from Mexico received rigorous screening at a quarantine facility at the University of California in Riverside. Other natural enemies will also be evaluated as required by the USDA.

#### ***Established rearing protocols***

In order to increase the chances that a new natural enemy will become established and have an impact on the pest organism, large numbers of the new insect must be reared and released. The process for rearing the sharpshooter parasitoid is complex. Host plants must be raised to serve as food for a colony of sharpshooters. The eggs produced by these lab-reared sharpshooters are then used to



glassy-winged sharpshooter egg masses are attacked by a native parasitoid in late summer. Although this stingless wasp readily



rear the wasp parasitoids. Over the last year, staff members from UC Riverside and the CDFA have been developing a rearing protocol for the sharpshooter and associated parasitoids.

### ***Coordinated multi-agency effort***

The program's biological control component has developed partnerships with the USDA, the University of California and county agricultural commissioners. The CDFA has taken the lead in importing new biocontrol agents, with the USDA providing funding and personnel, the University of California providing research and expertise in support of these efforts and the agricultural commissioners providing local support. Traditional biological control follows several steps as shown in the table below. The roles for each of the cooperating agencies in this project are based on their expertise and resources.

### **Roles of Cooperating Agencies**

Activity	Agencies
Collect new parasitoids in U.S. & Mexico	UC Riverside & CDFA
Collect new parasitoids in South America	USDA
Screening & host testing	UC Riverside
Rearing & field testing	CDFA & UC Riverside
Mass rearing & regional releases	CDFA & USDA
Evaluation	CDFA

### ***Trial Releases of Parasitoids***

University of California researchers have released 1,200 parasitoid wasps in Riverside, Kern and Ventura Counties. Scientists from the University and the CDFA are monitoring these release sites to determine if the parasitoid survives and has an impact on glassy-winged sharpshooter populations.



### ***Help from private industry***

In a continuing effort to foster public/private partnerships, the CDFA has contracted with a private biocontrol rearing operation to produce glassy-winged sharpshooter eggs. These eggs, produced in an area that is already infested, will be used to increase populations of the wasp parasitoid.

## The Future

While the biological control component has made significant progress, considerable work remains in the following areas:

### ***Additional foreign exploration***

USDA staff has made arrangements for exploration in South America to search for additional parasitoids that will attack either the egg or immature stage of the glassy-winged sharpshooter.

The CDFA will resume foreign exploration for new natural enemies of the glassy-winged sharpshooter next spring. New agents will be screened initially under controlled laboratory conditions to determine their effectiveness and suitability for release in California.

### ***Improved rearing protocols***

UC Riverside and CDFA staff members are testing new rearing techniques for the glassy-winged sharpshooter. Studies include:

- (1) Determining the best mix of plants to rear the sharpshooter;
- (2) Improving artificial diets;
- (3) Testing hydroponics for rearing the hosts of the sharpshooter; and
- (4) Developing ways to induce the insect to lay eggs during the winter (which they don't normally do).

### ***New rearing facilities***

A former USDA field station in Riverside is being retrofitted for rearing insects. Host plants will be grown and insects reared under controlled environmental condi-

tions to protect them from summer and winter extremes. The facility will be secured to prevent parasitic wasps from invading the sharpshooter rearing area. Negotiations are underway to secure greenhouse space at the UC Riverside campus and Kern County is being considered for an additional rearing facility.



### ***Colonizing new natural enemies***

To increase the chances of successful establishment, new natural enemies must be released in an environment that will support their survival. In search of the optimal habitat for parasitoids, CDFA will be evaluating a number of sites throughout infested areas of the state. Once new natural enemies are released in the field, their impact on sharpshooter populations will be measured carefully to determine if the new predator or parasite significantly reduces the pest populations.

# Environmental Review

The Glassy-winged Sharpshooter Environmental Protection Task Force is composed of state agency representatives, environmental and public health and non-governmental organizations and advocacy groups, grower organizations, a university researcher and a county agricultural commissioner. In the Fall of 2000, the Environmental Protection Task Force met to suggest measures to the California Department of Food and Agriculture (CDFA) that would reduce possible harm to public health and the environment in its implementation of a statewide program to eradicate and prevent glassy-winged sharpshooter and Pierce's disease.

The task force met on four different occasions and received extensive amounts of information on the statewide program including: CDFA's strategic alliances, public outreach and education, eradication and prevention methods, biology of the glassy-winged sharpshooter and the program's compliance with the California Environmental Quality Act.

Task force members engaged in candid discussion regarding concerns with the program elements and potential impacts to public health and the environment. Their principal concerns were the emergency nature of the program, the selection of treatments for the pest, public information, and environmental and health impacts from residential spray programs.

Task force members conducted intensive research regarding public

health and environmental issues. The meetings culminated with the development of one finding, three consensus recommendations and two minority recommendations issued to the CDFA by the task force. The varying opinions and interests of the task force members led to the incorporation of individual/organization recommendations. Overall, task force members expressed appreciation of the opportunity to participate on the task force and convey perspectives on the important environmental and public health issues facing the Pierce's Disease Control Program.

During each meeting, the task force members asked questions and provided feedback regarding the program and its approach to public health and environmental issues. At regular intervals, task force members outlined issues or concerns that arose in light of the information presented. Eight primary categories of concern were identified, as follows:

## ***Emergency Conditions/Legal Issues/Problem Identification***

The task force discussed the legitimacy of the emergency declaration. Research and review conducted by a few task force members generated questions with respect to the magnitude of the problem. One panel member stated that the Legislature was presented with testimony from the agricultural community regarding projected losses based upon the approximate 300-acre devastation experienced in Temecula. This led to an estimate of con

tinuing losses of \$6.5 million. In spite of this fact, task force members presented current photos of vineyards in Temecula that depicted recent plantings adjacent to citrus groves. Since the glassy-winged sharpshooter can have heavy populations in citrus groves, the young grapevines depicted in the photos appeared to present a contradictory picture to the contention that sharpshooters pose a significant threat. Grower representatives noted that there are a number of different factors to be considered when analyzing the situation and the limited sample, as presented, could skew the overall data. However, it was acknowledged that these facts generated questions as to the true magnitude of the problem, and whether or not the Legislature's declaration of an emergency situation was well founded.

Some task force members asserted that the answers to many questions could have been provided to the public through the preparation of a full environmental impact report under the provisions of the California Environmental Quality Act. These members contended that the emergency declaration and subsequent Notice of Exemption effectively short-circuited the review of potential environmental impacts of the overall program. Conversely, other members noted that it was not the role of the task force to question the legitimacy of the emergency declaration and the decisions that well-qualified, informed CDFA staff had made. Rather, the role of the task force was to provide recommendations that would reduce the potential, harmful effects of pesticide use on public health and the environment.

### ***Pesticide Selection and Application***

Primary concerns noted were the choice to apply pesticides as part of the program and the selection of particular pesticides such as carbaryl, imidacloprid and baythroid.

The task force noted a lack of transparency in the decision-making process that led to the choice of these pesticides, as well as the apparent elimination of non-pesticide alternatives that in their opinion, could have been as effective as pesticides. Some felt that the peripheral, temporal effects of pesticides, such as non-target loss of beneficial insects and pollinators, as well as potential harmful human health impacts, were not sufficiently considered during the selection process.

Concern was also expressed about whether or not an aggressive pesticide application campaign was justified when the Science Advisory Panel (SAP) had noted that eradication measures in Kern County would not likely be successful because the sharpshooter had been deemed an established population. In light of these facts, concern was expressed with pesticide application as a short-term answer that may not ultimately be effective. The CDFG representative did state that, based upon 25 years of CDFG incident records and a review of its fish and wildlife toxicology, carbaryl has not been a problem to fish and wildlife in California.

Other task force members felt that the task force should not be second-guessing decisions made by CDFA and the advice of Science Advisory Panel regarding the choice to use

pesticides. Rather, the task force should make prudent recommendations regarding program refinements that could minimize adverse public health and environmental effects, and enhance public knowledge.

### ***Consideration of Alternatives***

The task force expressed concerns regarding the consideration of alternative methods in the decision-making process. The SAP was responsible for making recommendations to CDFA for effective control and eradication methods. Whether or not the SAP considered alternative methods was uncertain to task force members. Methods such as soaps, botanical insecticides, repellents, and bug vacuuming, while not efficacious for the purpose of eradication, in their opinion, slow the progress of the sharpshooter.

It was also uncertain to some members of the task force whether or not the SAP evaluated long-term alternative methods for control and eradication of the sharpshooter and Pierce's disease, such as trimming, planting of varieties that demonstrate higher resistance to diseases and improving cultivation practices.

### ***Public Information, Notice, Disclosure and Involvement***

In order to properly assess the potential environmental and public health effects of CDFA's statewide program, the task force expressed a desire to have a better understanding of the entirety of the program, including the county-based rapid response plans and future research topics. Task force members were concerned with the level of public input into the program.

The CDFA program contains a public information forum prior to pesticide application in urban areas. That forum is intended to allow the public to ask questions and receive feedback. However, some members felt that the public meetings do not adequately discuss the potential ecological and health impacts of the pesticides.

### ***Public Health and Safety***

The chosen pesticides have been registered by the U.S. Environmental Protection Agency (USEPA) and the California Department of Pesticide Regulation for use in home and garden settings. However, task force members who represented human health advocacy groups pointed out that the CDFA cannot provide 100 percent assurance that no adverse health effects will occur, particularly for the percentage of the population that is chemically sensitive.

Other task force members expressed concern for the chemically sensitive population and asked the public health advocacy groups to suggest practical measures to the CDFA that would reduce the risks to these persons while balancing all interests, beliefs and positions. These members felt that a coordinated effort through the CDFA and county agricultural commissioners, who are properly informed and aware of the statewide situation, would prevent unnecessary use of pesticides by homeowners concerned about the glassy-winged sharpshooter on their properties. Without a coordinated effort, the public could use pesticides without concern for general public health, without reading label requirements, and without warning to nearby

neighbors that could result in greater impacts to sensitive populations.

### ***Pollinators***

Some task force members felt that pesticide application could result in unintentional non-target kill of beneficial insects, disrupting the balance of the pollinator community. A few members expressed concern that there was no formal program to address pollinators, other than following label instructions to avoid application when plants are blooming or when wind conditions were high. These members felt that pesticide application in urban settings could also negatively impact backyard organic gardens or disrupt privately operated biological control activities. Some members expressed concern that there was no program element that analyzed or monitored the potential cumulative impacts on the food chain that could result from pesticide application.

Other members rebutted some of those concerns. Many melon farmers, who rely heavily on pollinators for crop development, use imidacloprid, one of the pesticides applied by the CDFA as part of the program. When applied according to the label requirements, non-target losses can be controlled and should not represent a significant threat.

### ***Endangered and Threatened Species***

Endangered and threatened species were of great concern to some of the task force members. These members indicated a perception that the implementation of the program could have adverse impacts on endangered and threatened species,

and expressed concern for what was considered to be a lack of input from the appropriate resource agencies such as the California Department of Fish and Game, United States Fish and Wildlife Service, and National Marine Fisheries Service. Pesticides could enter waterways and have unknown impacts on aquatic organisms at the base of the food chain causing cumulative impacts. These members also noted concern with pesticide application near urban creeks, which may contain spawning grounds for endangered fish species, such as salmon and steelhead. It was the opinion of some task force members that the CDFA did not choose a pesticide with the least harmful effects (i.e., low toxicity and persistence) that would adequately protect endangered and threatened species.

Final discussion about recommendations focused on the emergency status and California Environmental Quality Act (CEQA) review. Suggested recommendations varied from the discontinuance of the emergency condition as well as cessation of all eradication efforts and release of any research monies until a full CEQA review was completed, to the continuance of the program with the most efficacious and least toxic chemical available for use. Others noted that there was not enough information disclosed to the public to support the determination of an emergency, yet an emergency could still exist and the CDFA actions should not cease. However, it was acknowledged that increased public disclosure and review would have given the emergency status a greater degree of validity in the eyes of the public. Still others noted that the emergency status had short-



circuited the CEQA process that would have opened up avenues for discussion of alternatives with the public. Ultimately, the task force arrived at consensus on three recommendations.

### *Consensus*

#### *Recommendations*

- The CDFA establish and adequately document, within 45 days of receipt of the report, the basis for the emergency declaration and conduct and document regular review of the status of sharpshooter and Pierce's disease in the state of California to determine if an emergency exists and if local control programs are necessary while effectively and expeditiously managing the occurrence and preventing the spread of Pierce's disease using the guiding principle of least possible harm to public health and the environment. *(Unanimous of those task force members present)*
- The CDFA conduct full review, evaluation, and disclosure of the program, alternatives, and mitigation of potential adverse im-

pacts pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code. - *(Unanimous of those task force members present)*

- The CDFA should set the stage for statewide dialogue on the issue of transference of agricultural risk to backyards and private property, beginning with a review of the Food and Agricultural Code, Chapter 6, Abatement Generally, Section 5401, which gives the right to the Secretary of Agriculture and County Agricultural Commissioners to spray private property against the will of the property owner. - *(Unanimous of those task force members present)*

The balance of the recommendations made originated from three or less of the panel members. A full copy of the panel's report, including minority and individual recommendations is available from the California Department of Food and Agriculture. (2001 Glassy-winged Sharpshooter Environmental Task Force Recommendations.)

## Research

Research to develop solutions for Pierce's disease and to minimize the threat of transmitting the disease to agriculture and plant life is critical.

Research priorities for the disease and its vectors have short-, medium-, and long-term objectives. From the short-term perspective, tools are needed to reduce the natural and artificial spread of the glassy-winged sharpshooter. This includes understanding the biology of the insect in California, finding new natural enemies of the pest and determining which insecticides are most effective.

Medium-term objectives blend research on the sharpshooter with an effort to determine how to manage Pierce's disease. Areas of concern include: (1) discovering how the sharpshooter selects a host plant; (2) analyzing the epidemiology of the disease; (3) searching for disease pathogens that will attack the sharpshooter; and (4) determining if cultural practices can reduce the disease's infection in grapevines.

Long-term research focuses almost exclusively on the disease – breeding grapevines resistant to Pierce's disease, finding a non-pathogenic strain of the disease to use as a biological control agent and determining whether the sharpshooter could be modified so that it cannot spread the disease.

### Research Task Forces and Funding

In August 1999, CDFA Secretary Lyons appointed an ad hoc committee to develop research priorities and identify sources for funding Pierce's disease research. Governor Gray Davis signed AB 1232 (Cardoza) in October 1999, allocating \$750,000 in state funds, with a requirement for matching industry funding of \$250,000 a year, for three years for competitive research grants. Using the priorities established by the Secretary's ad hoc committee, these funds have been dispersed to researchers.



In addition to research funding, AB 1232 created the Pierce's Disease Advisory Task Force. Recognizing the enormity of the challenge and the limited resources available for research, the task force formed a research subcommittee comprised of representatives from affected commodities, including viticulture and viticulture research, the almond and citrus industries and the USDA. Coordinating the efforts of these groups has helped to eliminate redundant research, increased available research funds and fostered collaborative efforts among researchers. This combined research effort has funded 32 projects with approximately \$3.7 million from the State of California, the United States Department of Agriculture and various industry groups (refer to appendices for a complete list of funded research projects).

An additional \$5.2 million in research funding is available from the USDA. The research subcommittee reviewed 44 proposals and recommends that all or a portion of 19 projects receive USDA funding. If approved by the Secretary of the CDFA and the USDA, the combined research effort for Pierce's disease and its vectors will total an investment of \$7.7 million for 51 projects.

### **Scientific Communication**

Sharing the results of ongoing projects and any new research projects is vital to ensuring rapid progress. To promote scientific communication, a series of focused research meetings have been conducted statewide. This year alone, a meeting was held in Riverside in October to discuss research done in Temecula; a sec-

ond meeting in Bakersfield in November emphasized research by University of California scientists; and a December symposium held in Davis featured more than 60 scientists from around the world focused on finding a solution for the Pierce's disease problem.

Early in 2001, the Pierce's Disease Advisory Task Force will sponsor a symposium for research grant recipients to report their results and programs for the coming year. The symposium will include both a technical session and public session to provide progress reports. The task force will continue to review research priorities, coordinate research funding and provide progress reports on all program-related research projects.

### **Accomplishments**

There has been significant progress on a number of short-term research objectives, as follows:

- A number of materials have been tested and appear effective against the sharpshooter. Products that exterminate insect nymphs as they emerge from the eggs will be important to use on nursery stock.
- The pathogen that causes Pierce's disease uses the gum in the xylem tubes as a growth substrate. This indicates that the relationship between the plant and the pathogen may be more complicated than originally thought. It also opens new avenues for plant resistance to the disease.
- Initial studies of the seasonal movement of the sharpshooters in citrus in Southern

California have been completed. If we know where and when the sharpshooter moves along its host plants, it increases our ability to target control measures more accurately.

- The suspected movement of the sharpshooter from citrus orchards in vineyards has been documented to help growers develop an effective pest management program.
- Scientists in Brazil have sequenced the DNA from the *Xylella* strains. Accurate DNA tests will assist in determining if a plant or a sharpshooter is infected with *Xylella* and identify the pathogen strain.
- A preliminary model of how the sharpshooter transmits Pierce's disease through a vineyard has been developed.
- A pilot test for an areawide sharpshooter management program in Riverside County is being evaluated and may be able to lower insect populations without extensive spraying to a single crop if successful.

## Outreach

The outreach component of the program serves to raise awareness of Pierce's disease and the glassy-winged sharpshooter. Citizens informed through outreach activities have already contributed to the program's efforts to detect new infestations of the pest. The CDFA hopes to build on this success by targeting outreach to those Californians who are best positioned to help find the pest.

Compared to native vectors, the biology of the glassy-winged sharpshooter -- its flying strength, general fortitude, reproductive rate, and voracious appetite -- makes it a particular threat. Consequently, outreach seeks to enlist the public, stakeholders and other state agency employees to help detect the pest's movement into new territories as quickly as possible. Finding a new infestation before it has a chance to settle in allows the opportunity to contain and reduce the spread while minimizing impacts to the environment.

Outreach also works to help community members understand the significance of the sharpshooter threat and the measures can be taken to combat it. Upon the discovery of a new infestation, outreach staff will assist local authorities with the planning and presentation of public meetings; inform the media; provide information and instructive materials for community organizations; and work with local officials to respond to the unique social, environmental, and public health needs of each community.

### Help from Backyard Gardeners

Public awareness of the disease and the sharpshooter has steadily increased since program inception. Outreach efforts have experienced success, as illustrated by the informed citizen who reported the initial detection of the sharpshooter's presence in Contra Costa County after viewing an outreach poster at a local nursery. Hundreds of insect samples have been submitted for analysis by homeowners and others who learned about the insect through fliers, posters, meetings and other program activities.

Outreach plays an important role in the cooperative arrangement with the California Department of Transportation by putting information in the hands of hundreds of workers. The miles of oleander and other plants lining the medians and shoulders of California's highways are ready hosts for the sharpshooter, so outreach to these key cooperators is essential in finding and quickly responding to new infestations.

Outreach helps foster the relationships with strategic alliances that are critical for program success.

## Accomplishments

### ***Published Articles***

Over 500 articles about Pierce's disease and the sharpshooter have appeared in national and international publications.

### ***Television***

Dozens of TV news reports have followed initial reports of infestations in each new area, contributing to public awareness during the critical survey and delimitation period.

### ***Outreach Meetings***

CDFA has participated in over 200 outreach meetings statewide.

### ***Informational Materials***

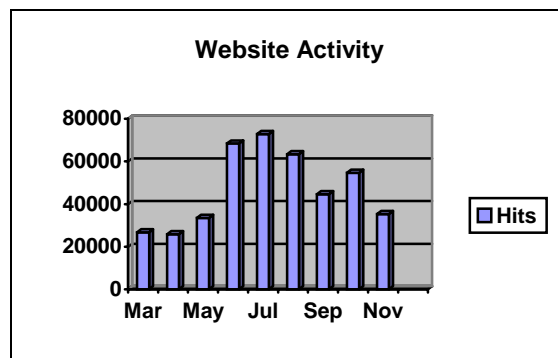
Over 100,000 bilingual brochures, handouts, posters and other informational materials have been distributed statewide.

### ***Website***

The CDFA developed and activated a website dedicated to Pierce's disease and the glassy-winged sharpshooter. Since its unveiling in March, the site has received over 500,000 hits. The site offers frequent updates on program activities, survey and regulation guidelines, treatment information, upcoming meetings and events, a host list, and other information.



In addition, the website provides an interactive interface that allows direct activity reporting by local entities.



## The Future

The program's outreach efforts will be expanded in 2001 to be more proactive in heightening awareness and will include the following elements:

### ***Local Training***

County outreach committees will be trained to effectively communicate messages in print and broadcast media.

### ***Updated Materials***

New materials, such as brochures, videos, posters, and presentations, will be developed and distributed to the public and stakeholders. Materials will be developed in various languages to address California's changing demographics.

### ***Media Guide***

A printed and online media guide will be developed containing key government, university and industry contacts to encourage factual reporting of developments in the Pierce's Disease Control Program.



## Conclusion

This has been a significant year in the fight against Pierce's disease and the glassy-winged sharpshooter, one in which statewide agricultural organizations and other stakeholders united for a common purpose. Several strains of the bacteria that cause Pierce's disease exist and can attack and cause damage to a number of different plants. Consequently, a number of agricultural organizations have a vested interest in the program's success. As the Pierce's Disease Control Program originated and the fight itself continued to gain momentum, stakeholders asked for more input on policy and decision-making activities. The CDFA listened and used the feedback in its leadership of key initiatives. In the coming year, the CDFA hopes to build on the spirit of communication and interaction to bring the State of California closer to an integrated solution for Pierce's disease and its vectors.

Although the accomplishments have been significant, there are many challenges ahead that must be overcome. The first challenge is the unknown extent of the glassy-winged sharpshooter's presence in California. While an initial statewide survey was conducted early in the year, comprehensive surveys remain to be completed. Urban area infestations are very much a threat and a comprehensive statewide survey is necessary to more accurately assess the sharpshooter population and risk.

Emerging changes in the discovery of the glassy-winged sharpshooter led the CDFA to implement several new initiatives, including the creation of nursery, bulk grape and citrus regulations requiring industry to ensure that shipments are sharpshooter-free. While the introduction of these new regulations impacts business operations, cooperation has been commendable. Very few nursery shipments are infested with the sharpshooter and nurseries are working hard to prevent the spread. This is verified by the fact that less than 1% of over 52,000 shipments this year uncovered the sharpshooter.

The accomplishments in research have been very encouraging. Research priorities have been identified, the experts to perform the projects have been identified and \$7.7 million in funding has been committed. In less than six months, demonstration projects have already developed tools for industry to use in their management practices and have established a foundation for significant future accomplishments.

The ongoing development of the biological control element is critical to the success of an integrated pest management approach. Identification and release of natural enemies of the sharpshooter will help to minimize pesticide treatments. Although the limited pesticide treatments applied this year appear effective, their impact won't be fully known until next spring.

when the sharpshooter populations typically increase.

A key challenge is the availability of resources. State and local government resources are being stretched and are in growing demand. The federal government recognized the importance of a solution by committing \$22 million to the effort but has not provided any indication of future support. Continued support will be necessary to ensure that sufficient resources are available to impact Pierce's disease and its vectors.

In 2000, the program emphasis has been on the urgent need to prevent artificial movement of the glassy-winged sharpshooter and to delimit the areas infested with this

pest. In 2001, program activities will be expanded to include additional elements to combat Pierce's disease, such as survey and identification methodology and training.

The CDFA will continue to focus on the ongoing development of the biological control element, a continued emphasis on statewide surveys and enhance our research efforts. To reach our objectives, we will continue to rely on the dedication and initiative of county agricultural commissioners and the many stakeholders. The CDFA is confident that stakeholder cooperation will lead us closer to a long-term solution for Pierce's disease.

# Financial Statement

## REVENUE & EXPENDITURE REPORT

(Program inception to 11/30/00)

	FY 99/00	FY 00/01
Beginning Balance	-	3,196,989
<b>REVENUE</b>		
State Budget	6,900,000	6,900,000
State Research (AB 1232)	750,000	750,000
USDA	-	14,600,000
<b>Total</b>	<b>7,650,000</b>	<b>22,250,000</b>
Available Resources	7,650,000	25,446,989
<b>EXPENDITURES &amp; OBLIGATIONS</b>		
Salaries & Wages	245,378	418,198
Staff Benefits	-	42,173
General Expense	170,898	182,311
Printing	16,514	46,908
Communications	28,150	22,610
Postage	4,832	1,351
Travel In-State	36,507	111,675
Travel Out-State	1,336	1,707
Training	40	26
Facility Operations	185	1,559
Professional Srvs (IntraState)	212,227	1,183,821
Professional Srvs (External)	-	150,342
Data Processing	3,889	244,638
Intradepartmental Charges	9,945	37,823
Equipment	807,572	51,287
Other	842,213	751,093
County Payments	2,073,327	6,273,840
<b>Total</b>	<b>\$4,453,011</b>	<b>\$9,521,362</b>
<b>Fund Balance</b>	<b>\$3,196,989</b>	<b>\$15,925,627</b>

# Task Force and Advisory Panel Members

## Pierce's Disease Control Program Advisory Task Force

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**Kevin Andrew**

Sun World International  
Bakersfield, CA

**Ted Batkin**

Citrus Research Board  
Visalia, CA

**Larry Bezark**

California Department of  
Food & Agriculture  
Sacramento, CA

**Robert Crudup**

Valley Crest Tree Nursery  
Sunol, CA

**Ben Drake**

Drake Enterprises  
Temecula, CA

**Patrick Gleeson**

American Vineyard  
Foundation  
Napa, CA

**Chris Heintz**

Almond Board of California  
Sacramento, CA

**Scott Hudson**

San Joaquin County  
Department of Agriculture  
Stockton, CA

**Andrew Johnson**

Beringer Wine Estates  
St Helena, CA

**Terry Lee**

E & J Gallo Winery  
Modesto, CA

**Michael Orazo**

United States Department  
of Agriculture  
Riverdale, MD

**Steve Pavich**

Pavich Farm  
Terrabella, CA

**Vincent Petrucci**

Fresno State University  
Fresno, CA

**Corky Roche**

Central Coast Pierce's  
Disease Task Force  
Salinas, CA

**James Wallace**

Riverside County  
Department of Agriculture  
Riverside, CA

**Craig Weaver**

Callaway Vineyards  
Temecula, CA

**Robert Webster**

University of California  
Davis, CA

**Paul Wenger**

California Farm Bureau  
Federation  
Sacramento, CA

**David Whitmer**

Napa County Department of  
Agriculture  
Napa, CA

## Science Advisory Panel

---

**Dr. Alex Purcell**

University of California  
Berkeley, CA

**Dr. Beth Grafton-Cardwell**

University of California  
Parlier, CA

**Dr. Rick Redak**

University of California  
Riverside, CA

**Dr. James Kamas**

Texas A & M University  
Fredricksburg, TX

**Dr. Russell Mizell**

Agricultural Research  
Center  
Monticello, FL

**Dr. William Peacock**

Tulare County Farm  
Advisor  
Visalia, CA

**Dr. Phil Phillips**

University of California  
Ventura, CA

**Dr. John Kabashima**

University of California  
Cooperative Extension  
Los Angeles, CA

## Environmental Protection Task Force

---

**Dr. Les Ehler**

University of California  
Davis, CA

**Brian Finlayson**

California Department of  
Fish and Game  
Rancho Cordova, CA

**Hank Giclas**

Western Growers  
Association  
Sacramento, CA

**Richard Greek**

San Luis Obispo  
Department of Agriculture  
San Luis Obispo, CA

**Jessica Hamburger**

PCL- Pesticide Action  
Network  
San Francisco, CA

**Rick Kreutzer, M.D.**

California Department of  
Health Services  
Oakland, CA

**Ron Macedo**

California Farm Bureau  
Turlock, CA

**Ann Maurice**

Ad Hoc Committee for  
Clean Water  
Occidental, CA

**John McCaull**

National Audubon Society  
Sacramento, CA

**Linda J. McElver**

Central Coast Canaries  
San Luis Obispo, CA

**Ron Oshima**

California Department of  
Pesticide Regulation  
Sacramento, CA

**Mike Reid**

State Water Resources  
Control Board  
Sacramento, CA

**Erik Vink**

California Department of  
Conservation  
Sacramento, CA

## Outreach Subcommittee

---

**Ken August**

California Department of  
Health Services  
Sacramento, CA

**Debra Calvo**

Alliance for Food and Fiber  
Los Angeles, CA

**Bob Falconer**

California Association of  
Nurserymen  
Sacramento, CA

**Veda Federighi**

California Department of  
Pesticide Regulation  
Sacramento, CA

**Larry Hawkins**

United States Department  
of Agriculture  
Sacramento, CA

**Gladys Horiuchi**

California Wine Institute  
San Francisco, CA

**Bob Krauter**

California Farm Bureau  
Federation  
Sacramento, CA

**Steve Lyle**

California Department of  
Food and Agriculture  
Sacramento, CA

**Kathleen Nave**

California Table Grape  
Commission  
Fresno, CA

**Karen Ross**

California Association of  
Winegrape Growers  
Sacramento, CA

**Terry Stark**

California Raisin Marketing  
Association  
Fresno, CA

**Kerry Tucker**

Nuffer, Tucker, and Smith  
San Diego, CA

**Marilyn Watkins**

California Tree Fruit  
Agreement  
Reedley, CA

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## Grape Movement Subcommittee

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**Brad Alderson**

Robert Mondavi Winery  
Woodbridge, CA

**Kevin Andrew**

Sun World International  
Bakersfield, CA

**Phil Bava**

E&J Gallo Winery  
Modesto, CA

**Barry Bedwell**

Allied Grape Growers  
Fresno, CA

**Bud Bradley**

Delicato Family Vineyards  
Manteca, CA

**Kirk Brown**

Golden State Vintners  
Parlier, CA

**Nat Dibudio**

Allied Grape Growers  
Fresno, CA

**Pete Downs**

Kendall-Jackson Vineyards  
& Winery  
Santa Rosa, CA

**Ben Drake**

Drake Enterprises  
Temecula, CA

**Fred Franzia**

Bronco Wine Company  
Ceres, CA

**Don Galleano**

Galleano Winery  
Mira Loma, CA

**Hal Huffsmith**

Sutter Home  
St. Helena, CA

**John Ledbetter**

Vino Farms  
Lodi, CA

**David Lucas**

Robert Mondavi Winery  
Lodi, CA

**Dana Merrill**

California Association of  
Winegrape Growers  
King City, CA

**Steve Quashnick**

Western Farm Service  
Stockton, CA

**Al Rossini**

Rossini Farming  
Ceres, CA

**Bob Steinhauer**

Beringer Vineyards  
St. Helena, CA

**Jim Unti**

Mission Bell Winery  
Madera, CA

**David Whitmer**

Napa County Department of  
Agriculture  
Napa, CA

## Research Subcommittee

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**Ted Batkin**

Citrus Research Board  
Visalia, CA

**Larry Bezark**

California Department of  
Food and Agriculture  
Sacramento, CA

**Dr. Ed Civerolo**

University of California  
Davis, CA

**Patrick Gleeson**

American Vineyard  
Foundation  
Napa, CA

**George Gutman**

Hines Nursery  
Irvine, CA

**Chris Heintz**

Almond Board of California  
Sacramento, CA

**Andrew Johnson**

Beringer Wine Estates  
St. Helena, CA

**Ross Jones**

California Table Grape  
Commission  
Fresno, CA

**Joe Kretsch**

Sun Maid Growers of  
California  
Kingsburg, CA

**Terry Lee**

E&J Gallo Winery  
Modesto, CA

**Cliff Ohmart**

Lodi-Woodbridge  
Winegrape Commission  
Lodi, CA

**Bob Staten**

United States Department  
of Agriculture  
Phoenix, AZ

**Robert Webster**

University of California  
Davis, CA

**Lloyd Wendell**

United States Department  
of Agriculture  
Sacramento, CA





## Pierce's Disease Control Program

### Research Summary

Principal Investigators	Title	Funding Source	Total Funding
Carole Meredith	Genetic transformation: A means to add disease resistance to existing grape varieties	AVF	17,000
Rick Redak	Developing an integrated pest management solution for pierce's disease spread by the glassy-winged sharpshooters in Temecula	AVF	268,172
Bruce Kirkpatrick, Alexander Purcell, Peter Anderson (UF), M. Andrew Walker, Edward Weber	Biological, cultural, and chemical management of Pierce's disease	AVF	180,000
Russ Mizell (UF)	Key to management of glassy-winged sharpshooter: manipulation of host plants to explore nutrient limitations and natural enemies	AVF	60,000
Rick Redak	Controlling the spread of <i>Xylella fastidiosa</i> the causal agent of oleander leaf scorch by disrupting vector acquisition and transmission	Cal Trans	47,428
Carole Meredith	Genetic transformation: A means to add disease resistance to existing grape varieties	CCGPRVE	17,000
Donald Cooksey	Biological control of Pierce's disease with non-pathogenic strains of <i>Xylella fastidiosa</i>	CDFA	154,629
Donald Cooksey, Heather Costa	Epidemiology of Pierce's disease in Southern California: Identifying inoculum sources and transmission pathways	CDFA	255,000
Mark Hoddle, Sergui Triapitsyn, Robert Luck, Rick Redak	Biological control of GWSS in California: one cornerstone for the foundation of an IPM program	CDFA	375,000
Rick Redak	Impact of layering control tactics on the spread of Pierce's disease by the GWSS	CDFA	360,000
Robert Luck, Mark Hoddle, Rick Redak	Seasonal changes in the GWSS age structure, abundance, host plant use, and dispersal	CDFA	225,000
Jeffrey Granett, M. Andrew Walker, Amir Omer	Prevention of Pierce's disease transmission and infection: role of induced plant resistance	CDFA	20,000
Bruce Kirkpatrick, Alexander Purcell, Peter Anderson (UF), M. Andrew Walker, Edward Weber	Biological, cultural, and chemical management of Pierce's disease	CDFA	675,000
John Peloquin, Thomas Miller, Carol Lauzon (CSU Hayward)	Insect-symbiotic bacteria inhibitory to <i>Xylella fastidiosa</i> in sharpshooters	CDFA	36,556
Jerome Seibert	Economic impact data gathering for Pierce's disease	CDFA	10,000
Beth Grafton-Cardwell	Evaluation of efficacy of Sevin (carbaryl) treatments in the Porterville glassy-winged sharpshooter infestation	CDFA	20,000
Ed Civerolo et al.	Genomic work on strains of <i>Xylella fastidiosa</i>	CDFA	62,500
Ron Brlansky (UF)	Transmission of the citrus variegated chlorosis bacterium, <i>Xylella fastidiosa</i> , with the glassy-winged sharpshooter, <i>Homalodisca coagulata</i>	CRB	8,500
Phil Phillips	Surveys for more effective glassy-winged sharpshooter parasitoids	CRB	10,437

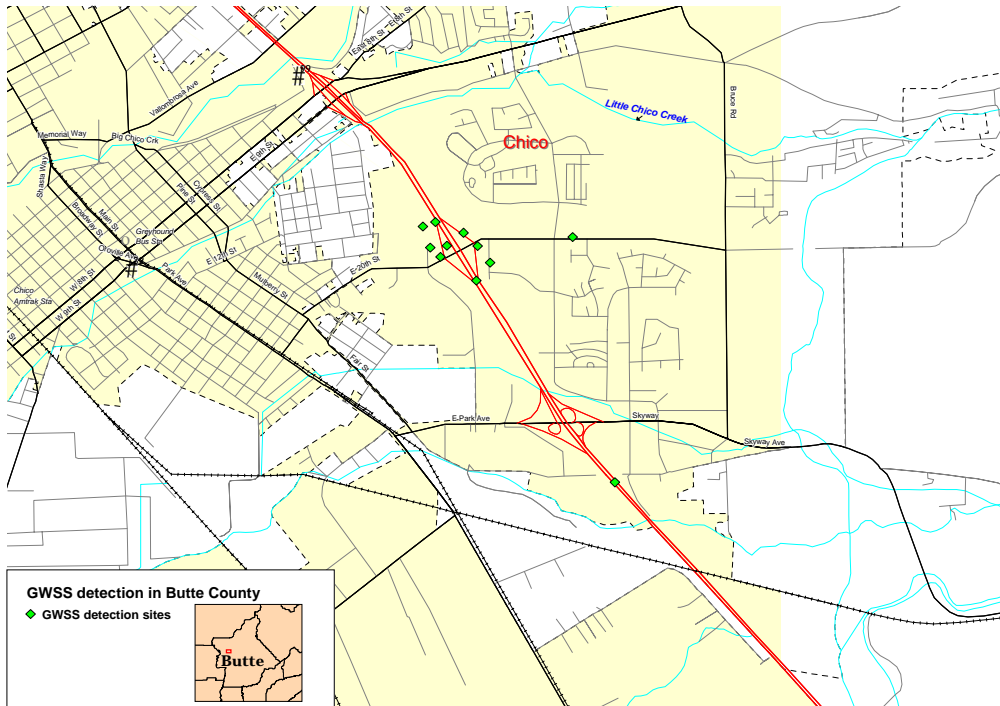
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## Pierce's Disease Control Program Research Summary

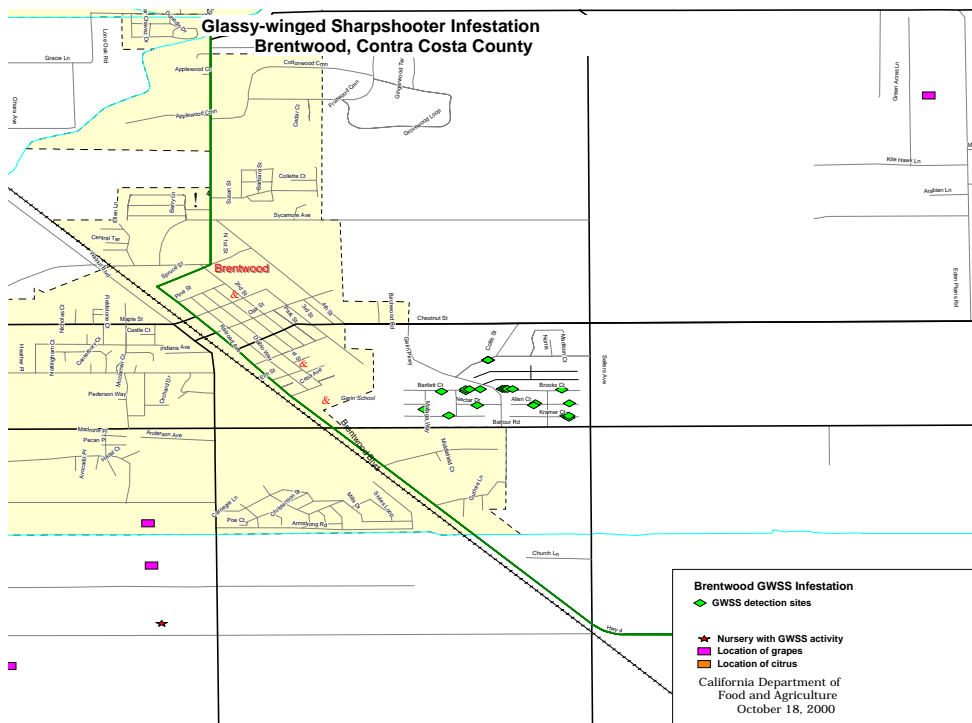
Principal Investigators	Title	Funding Source	Total Funding
Beth Grafton-Cardwell	Efficacy of insecticides used for glassy-winged sharpshooter control in citrus	CRB	19,965
Donald Luvisi	GWSS/PD Research	Kern/ Tulare	48,600
Nick Toscano	Monitoring of the GWSS	Riv. Co.	51,349
Alexander Purcell	Pruning for control of Pierce's disease	UCIPM	21,268
Rick Redak	Basic information on the spread of PD by the GWSS, and investigate plant protection tactics.	USDA	50,000
Bruce Kirkpatrick, Alexander Purcell, Peter Anderson (UF), M. Andrew Walker, Edward Weber	Biological, cultural, and chemical management of Pierce's disease	USDA	50,000
Tad Poprawski et al	Test novel biorational insecticides on glassy-winged sharpshooter	USDA	150,000
Gary Puterka et al.	Repellents and biorationals for control of GWSS	USDA	150,000
T. J. Henneberry et al.	Potential of biorationals for glassy-winged sharpshooter control	USDA	164,000
Nick Toscano et al.	Area wide abatement of the glassy-winged sharpshooter (GWSS) , a Pierce's disease vector	USDA	299,143
Ed Civerolo et al.	Epidemiology of <i>Xylella fastidiosa</i> diseases in California: relationship between Pierce's disease and almond scorch, and the relationship of stone fruits and citrus to the epidemiology of these diseases	USDA	150,000
Walker	Classical biological control of <i>Homalodisca coagulata</i>	USDA	150,000
Carole Meredith	A genetic map of <i>Vitis vinifera</i> : A foundation for improving the management of disease and flavor	VC	37,000
Bruce Kirkpatrick, Alexander Purcell, Peter Anderson (UF), M. Andrew Walker, Edward Weber	Biological, cultural, and chemical management of Pierce's disease	VC	50,000
		<b>TOTAL</b>	<b>\$ 4,193,547</b>
<b>RESOURCES PENDING ALLOCATION</b>			
	Not Designated	USDA	4,036,857
<b>TOTAL COMMITTED RESEARCH FUNDING</b>			<b>\$ 8,230,404</b>
<b>FUNDING SOURCE KEY</b> AVF: American Vineyard Foundation CalTrans: California Department of Transportation CCGPRVE: California Competitive Grants Program for Research in Vit./Enology CDFA: California Department of Food and Agriculture CRB: Citrus Research Board Kern/Tulare: Kern/ Tulare GWSS Task Force Riv. Co: County of Riverside UC-IPM: Univ. of California Statewide IPM Project USDA: United States Department of Agriculture VC: Viticulture Consortium			

# Treatment Sites

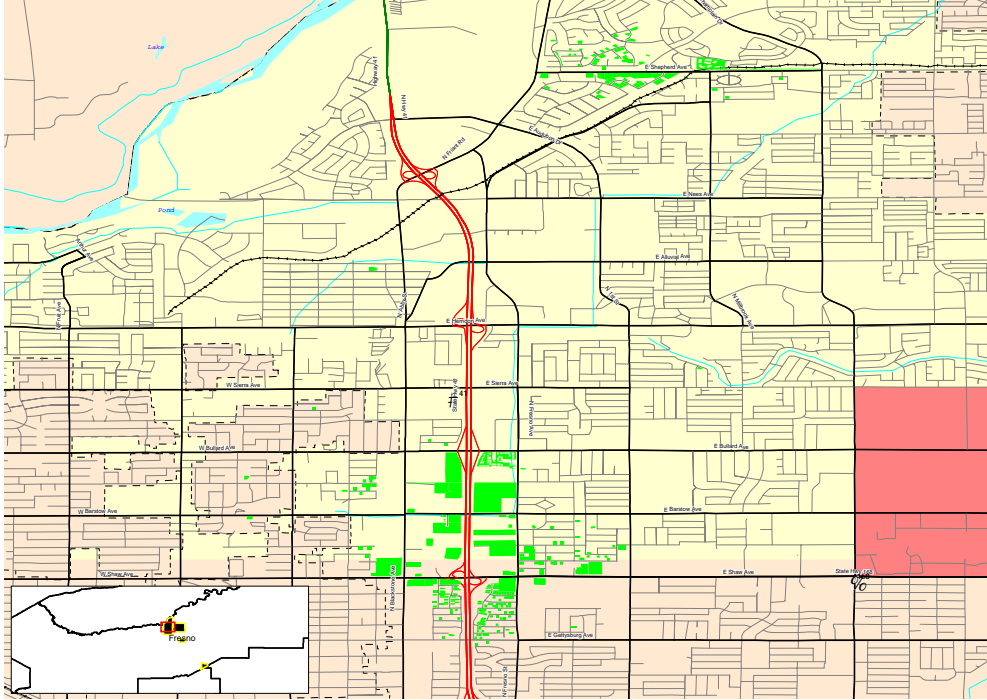
## Butte County



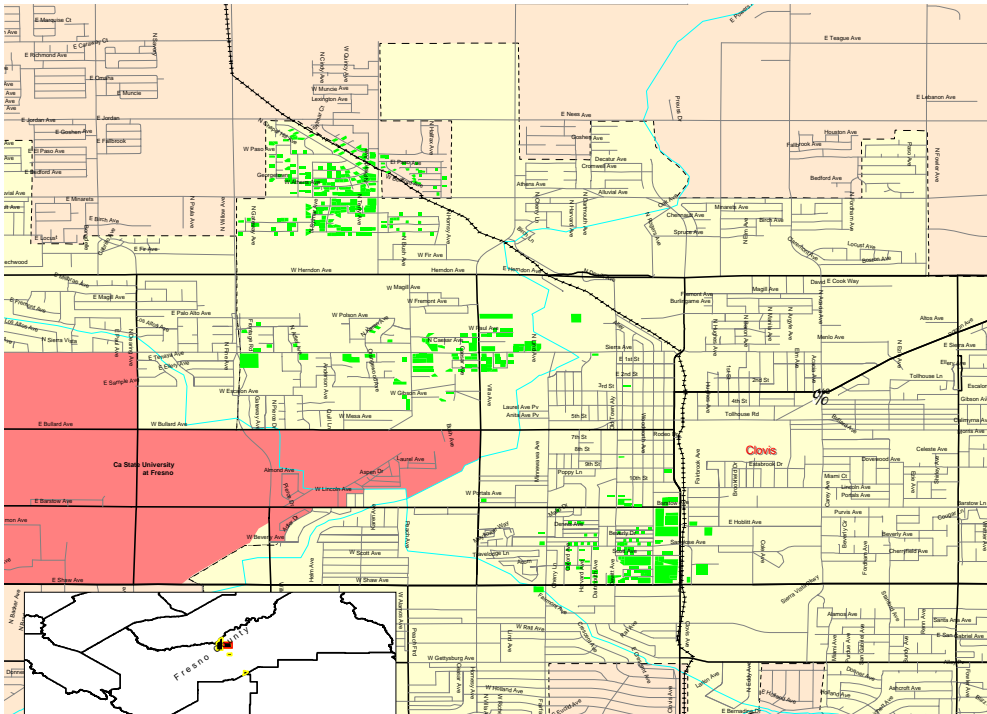
## Contra Costa County



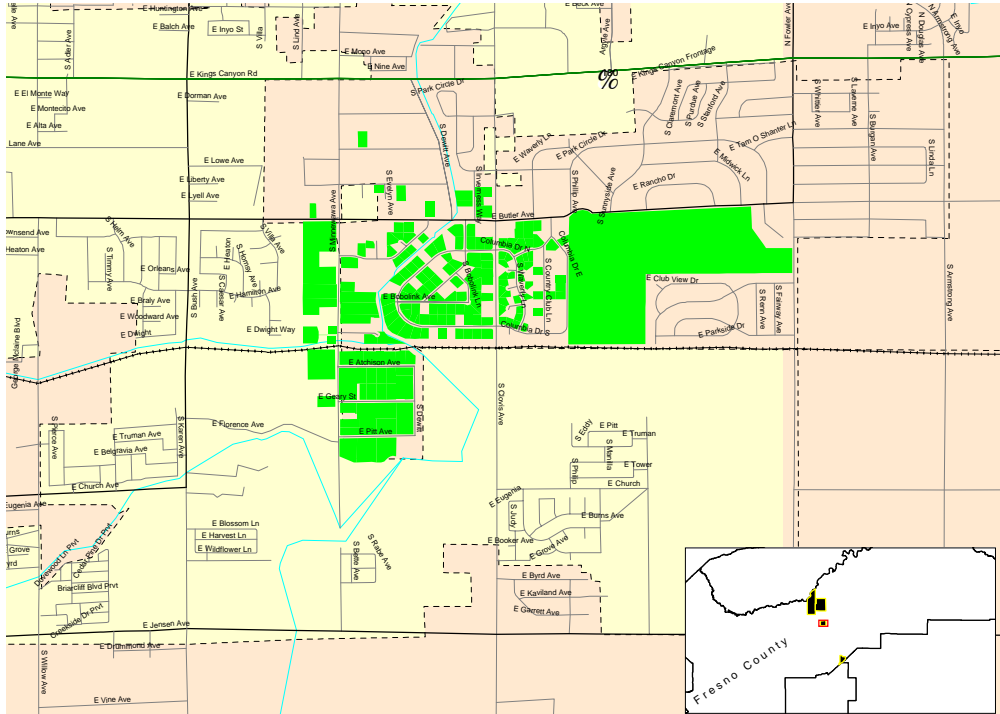
## Fresno County



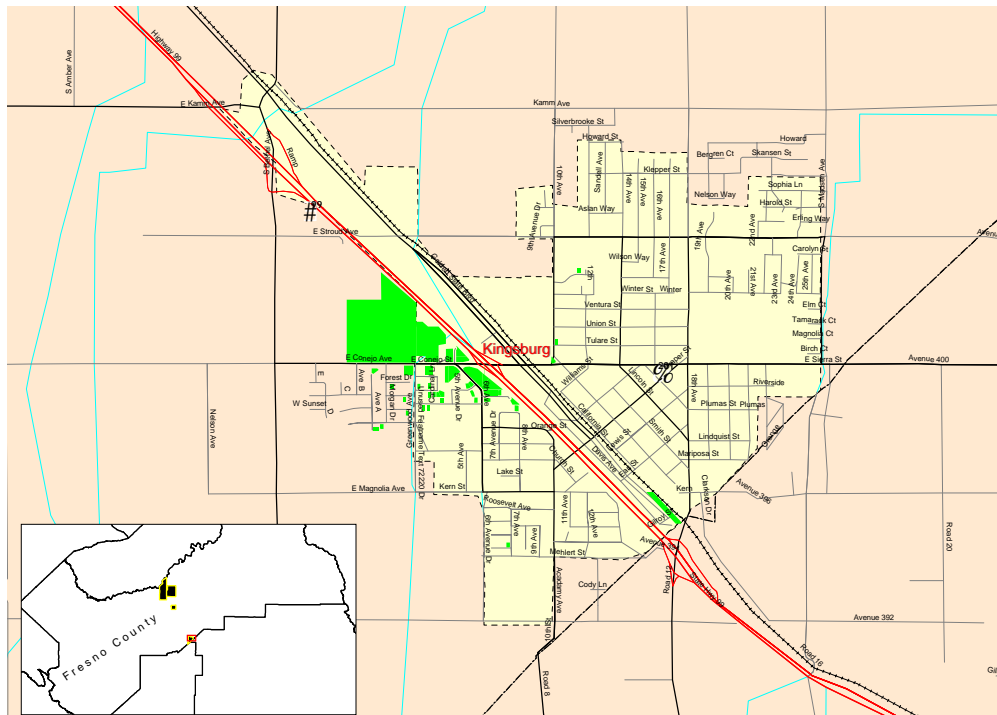
## Fresno County



## Fresno County



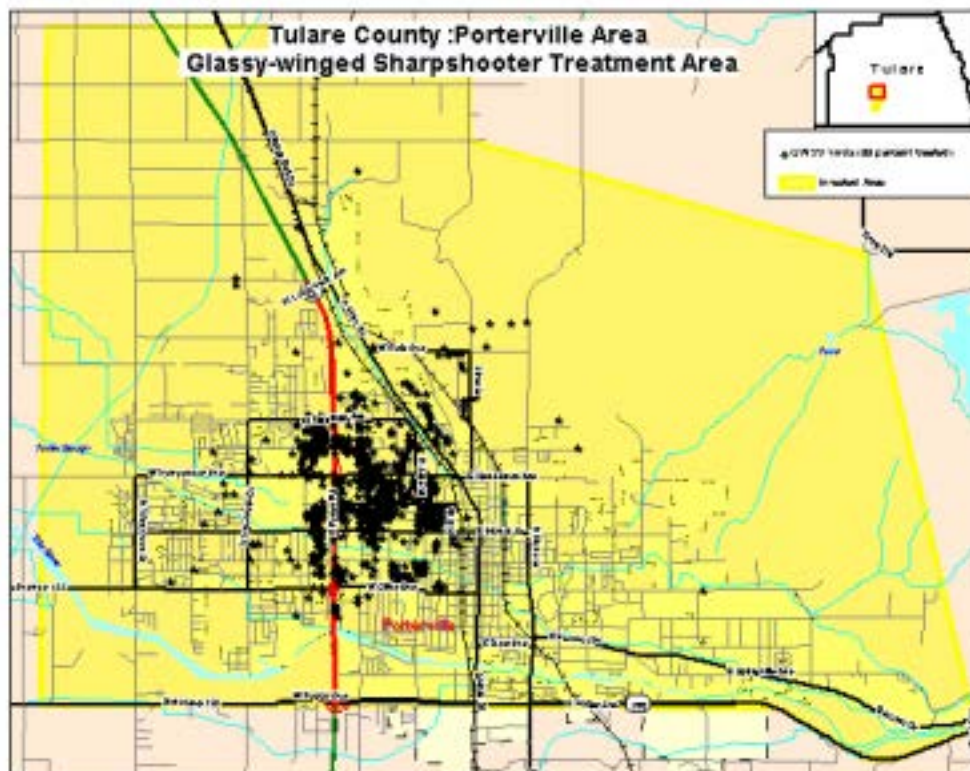
## Fresno County



## Sacramento County

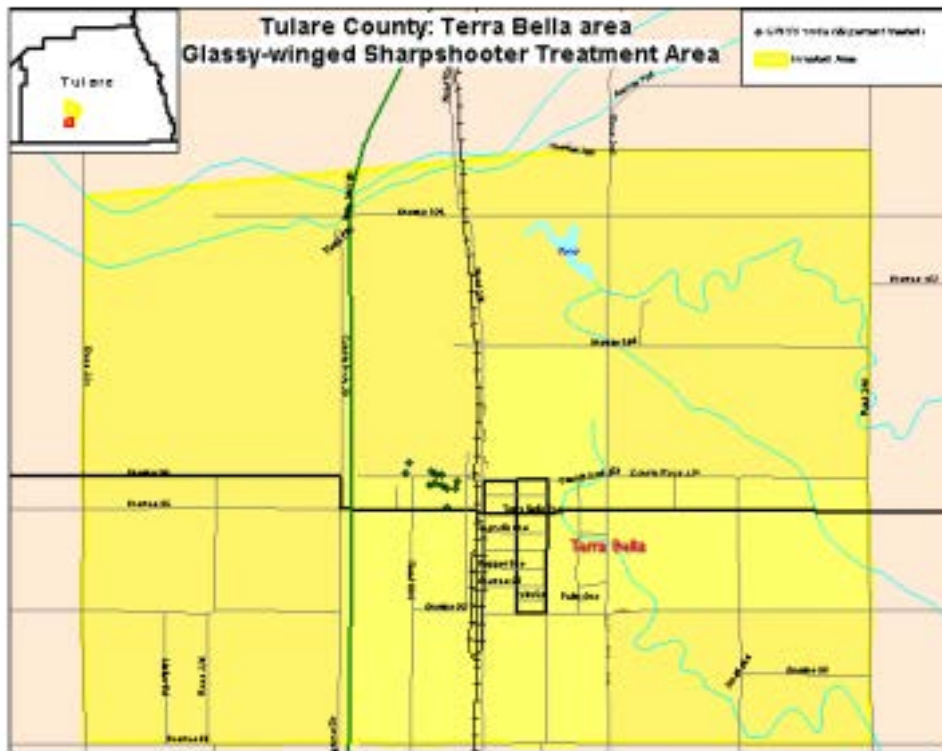


## Tulare County





**Tulare County**



**Pierce's Disease Control Program**  
**County Contract Requests**

County	FY 99/00	FY 00/01	Program Total
Alameda	83,087	312,108	395,195
Amador	18,747	48,017	66,764
Butte	16,697	41,327	58,024
Calaveras	12,300	44,600	56,900
Colusa	9,476	16,116	25,592
Contra Costa	85,605	241,852	327,457
El Dorado	21,069	92,252	113,321
Fresno	124,321	1,771,972	1,896,293
Glenn	12,138	35,124	47,262
Imperial	34,085	167,684	201,769
Kern	99,018	1,692,912	1,791,929
Kings	25,199	144,917	170,116
Lake	14,846	29,120	43,965
Los Angeles	124,770	1,464,718	1,589,488
Madera	61,948	280,561	342,509
Marin	4,580	58,920	63,500
Mariposa	7,325	12,562	19,887
Mendocino	11,692	29,419	41,111
Merced	67,214	219,091	286,305
Monterey	113,310	317,345	430,655
Napa	51,461	414,966	466,427
Nevada	5,050	9,897	14,947
Orange	59,919	1,166,892	1,226,811
Placer	32,782	100,360	133,142
Riverside	77,268	250,000	327,268
Sacramento	67,262	663,536	730,798
San Benito	17,638	51,411	69,049
San Bernardino		10,651	10,651
San Diego	165,036	791,345	956,381
San Francisco	21,276	54,904	76,180
San Joaquin	92,416	391,068	483,484
San Luis Obispo	100,935	315,345	416,280
San Mateo	38,704	109,644	148,348
Santa Barbara	64,395	174,887	239,282
Santa Clara	68,166	182,254	250,420
Santa Cruz	21,900	146,458	168,358
Shasta	23,681	66,226	89,907
Solano	16,651	181,850	198,501
Sonoma	50,254	153,943	204,197
Stanislaus	63,507	409,328	472,835
Sutter	10,104	47,040	57,144
Tehama	16,840	34,161	51,001
Trinity	4,811	10,647	15,458
Tulare	173,115	898,696	1,071,811
Tuolumne	13,624	32,264	45,888
Ventura	17,314	249,789	267,103
Yolo	21,789	59,210	80,999
Yuba	19,215	34,169	53,384
<b>Total</b>	<b>2,262,538</b>	<b>14,031,558</b>	<b>16,294,096</b>

**NOTE:** This chart represents projected county requests at beginning of Fiscal Year 2000/01. Approved contract amounts may vary.