

**CDFA PD/GWSS BOARD PROGRESS REPORT**  
**October 1, 2008 – June 30, 2011**

**I. Project Title**

The Benefits and Costs of Alternative Policies for the Management of Pierce's Disease

**II. Principal investigator and cooperators**

*Principal Investigator*

Professor Julian M. Alston

Department of Agricultural and Resource Economics, University of California, Davis

*Co-operator(s)*

Professor M. Andrew Walker

Department of Viticulture and Enology, University of California, Davis

Dr. Matt Daugherty

Department of Entomology, University of California, Riverside

Dr. Barry Hill

California Department of Food and Agriculture

*Other*

Ms. Kate Fuller, Graduate Research Assistant

Department of Agricultural and Resource Economics, University of California, Davis

Mr. Kabir Tumber, Junior Specialist

Department of Agricultural and Resource Economics, University of California, Davis

Professor James Sanchirico

Department of Environmental Science and Policy, University of California, Davis

Dr. Jonathan Kaplan

Department of Economics, California State University, Sacramento

### **III. List of objectives and description of activities conducted to accomplish each objective**

The overall objective of this project is to develop a detailed, practical, quantitative understanding of the economic consequences of Pierce's Disease and alternative management strategies. More specific objectives are to quantify the current and potential economic impacts of the disease, to estimate the potential economic payoff to investments in Pierce's Disease R&D, to evaluate alternative management strategies including alternative research investments, and to guide policy decisions, including research priorities. To pursue these objectives we are working to develop an economic model of the California wine and wine-grape sector. The model will be structured to allow us to simulate market outcomes under alternative scenarios for the prevalence of Pierce's disease, and alternative technologies and policies for its management, and to assess the economic consequences of these alternatives for various stakeholder groups. The model will be designed specifically with a view to using it to evaluate the likely expected benefits from investments in alternative R&D projects related to the management of Pierce's disease.

Our project commenced formally on September 1, 2008. Kate Fuller has been employed as a Graduate Research Assistant to work half-time on the project. Kate's doctoral dissertation work will form an element of the project. Jim Sanchirico, an expert bio-economic modeller, has been added to the team of participants and he is actively involved in co-chairing Kate's dissertation committee with Julian Alston. Kate and Jim have completed a model that can be used to examine control decisions made by growers. Their model allows for vectors that are mobile across properties belonging to several growers with several different treatment options.

In early work we emphasized investment in developing our own knowledge and information resources. One important element of this was to develop a detailed data base on the economics of wine and wine grape production in California. We have completed this data-gathering phase, and compiled this information into a report documenting by county and crush district for each important grape variety the bearing and non-bearing acres, yield, quantity produced (crush volume), price, and other such variables over the past 30 years. This information has been useful for other purposes as well as for parameterizing our model of the industry, which was our primary purpose for developing the data base.

We also made some investment in learning both (1) about how to structure and use models of spatial-dynamic processes, such as the spread of vector-borne diseases, and how such models can be adapted and applied to the present context, and (2) about the biology and economics of the pest and disease problem, and the surrounding issues, through consulting with scientists and other industry experts and reviewing literature. We learned that the PD/GWSS problem is more difficult in some ways to model than we envisioned at the outset, and that we would have to revise our modelling strategy to deal with the difficulties of modelling PD/GWSS in California. Consequently, and with advice from our scientist collaborators, we opted to focus initially on studying the issues as they arise in the north coastal valleys where Pierce's Disease is endemic and spread by native sharpshooters. This approach has the advantage that the pest and disease is a more regular continuing phenomenon, which has enabled us to develop some economic data and insight into the problem, management strategies, and costs of prevention, control, and eradication strategies.

To guide our efforts to understand the PD issues in different areas of the state, we conducted interviews with vineyard managers in the Napa Valley utilizing a process known as “participatory mapping,” in which managers were asked to sketch out PD incidence, controls, and associated costs onto aerial images of their vineyards. Taking this approach has enabled us to develop a better understanding that has helped us in designing approaches to study the more general problem, including the role of the GWSS. Based on this work, Kate Fuller has written two research essays (as required by the Ph.D. program in Agricultural and Resource Economics at UC Davis). These essays entailed a review of relevant literature as well as the development of the framework for a general economic model of vector-borne disease as applicable to Pierce’s Disease. As well as providing a useful reference document for our project, it formed the basis for Kate’s oral qualifying examination and prospectus.

Kate’s dissertation research plan, to be conducted over the next year, entails elements related to the main objectives of the project. It begins with (now nearly completed) work on the BGSS in northern California as a basis for work on the GWSS, ultimately providing a basis for evaluating payoffs to research. Kate is now working to estimate a model of the demand for California winegrapes, which will be used as an element of our simulation model to quantify the impacts of PD in the California wine market.

On January 14, 2010 we held a meeting in Sacramento with key people to review the status of the project and guide future directions. The participants included Bob Wynn, Tom Esser, Judy Stewart-Leslie, Joe Morse, Dan Sumner (moderator), Beth Stone-Smith, Sandy Purcell, Andy Walker, and Barry Hill, as well as Kate Fuller and Julian Alston. In the course of that very productive discussion we clarified a range of issues and ideas. We resolved to begin work in Spring 2010 gathering information pertinent to modeling Pierce’s Disease as spread by the GWSS, beginning in Temecula, and to continue consultation with other participants in the discussion, especially Barry Hill.

On May 13-14, 2010, Julian Alston and Kate Fuller traveled with Barry Hill to Riverside and Temecula to meet with a variety of individuals and discuss the disease and its vector in that part of the state, and to visit vineyards and develop a better understanding of the issues on the ground. We visited several vineyards and held meetings with researchers at UC-Riverside (Matt Daugherty and Frank Byrne) as well as consultants and growers (Ben Drake and Billy Bauers). In the course of these visits and discussions we learned about research efforts underway, as well as concerns held by some of the industry participants. This visit was very useful in helping us develop a clearer conception of the issues and as a preliminary step towards designing and conducting some more in-depth work on the problem of PD/GWSS in Temecula. In August, 2010, Julian and Kate made a follow-up trip to Riverside to meet with experts there: Matt Daugherty, Frank Byrne, Nick Toscano, and Thomas Perring.

On October 14-15, 2010 Julian Alston and Kate Fuller traveled to Bakersfield to meet with Beth Stone-Smith, Judy Stewart-Leslie and others, to discuss PD/GWSS as they affect that part of the state, to learn about the implementation of the control program in the southern San Joaquin Valley, and develop a better understanding of the issues on the ground.

In December 2010, Kate Fuller traveled to Temecula to conduct a series of interviews similar to those conducted in Napa. She interviewed nine growers and managers to get a better idea of the current situation there and how it varies for different types of growers: organic versus conventional, small-scale operations versus larger-scale ones, vineyards that are surrounded by grassland as well as those that are adjacent to citrus groves. These interviews were helpful in understanding the problem and will likely prove useful in future modeling work. Additionally, she was able to meet with Matt Daugherty and Nick Toscano, and Matt accompanied her on several of the interviews.

On December 28, 2010, Julian Alston, Kabir Tumber, and Kate Fuller met with Greg Morris, Tom Esser, and Stacie Oswalt to discuss PD-related costs borne by the nursery industry. This meeting was part of an effort to quantify the costs of Pierce's Disease borne by different entities throughout the state. This meeting helped to inform us on the different protocols the nursery industry must follow and the costs of doing so. On May 11, 2011, we met with David House of Village Nurseries to follow up on this meeting with someone with direct experience. On July 22 we will meet with David Whitmer, the Napa County Agricultural Commissioner, for his perspective on these issues, and on August 3, 2011, we will travel to southern California to meet with nursery managers recommended to us by David House.

We have made good progress on a paper, documenting the various costs of the disease borne by various government bodies and industry groups under the existing program. This assessment of costs is of direct interest in its own right, as a measure of the importance of the pest and disease problem and the potential payoff from alternative policies or technological innovations. In addition, it will help us to define a benchmark for our model which we will apply to assess the benefits from the PD Control Program and research projects funded by that entity.

We are currently working on the detailed specification of a market model for California, which we can then use to conduct policy analyses to evaluate the impact of various policies related to PD/GWSS. Since PD/GWSS also affects raisins and table grapes, along with citrus growers and the nursery industry, the model has to incorporate these effects as well, even though our primary focus is on impacts on the wine industry. To aid in this part of the project, and to accelerate progress on the work generally, we recruited two economists to the project team. Kabir Tumber, a recent M.S. graduate from the Department of Agricultural and Resource Economics at UC Davis, has been employed full time to work on the project. Dr. Jonathan Kaplan from Sacramento State University is being employed as a consultant, part-time, to assist with some technical aspects of the market model. In particular Dr. Kaplan is helping with the construction of the dynamic systems simulation model of the market for California wine grapes that we will use to model various PD/GWSS policy scenarios.

We are about six months behind the original schedule, reflecting the combination of a delayed start (while we waited for funding to be approved), a slow beginning (as we learned that we had to revise our modeling strategy), and some further delays as we sought to identify suitable assistance in view of the revised strategy. Now we are making excellent progress having established a revised strategy and put together a very good team appropriate to that strategy. The project was originally due to end on June 30, 2011. We have received approval for a 12-month

no cost extension to the project to allow us to complete the work and make best use of the expertise of the team to draw useful insights and publish (and publicize) the results.

We have made significant progress on the conceptual development of the model and assembling relevant previous studies that can be used to guide model design and parameterization. A prototype, single-region, version of the supply side of the model has been developed and we have been working with this prototype to debug the programs and validate the approach. The demand side of the model is being estimated econometrically as part of Kate's dissertation, and the estimation phase should be completed soon.

We expect to have the full, five-region dynamic supply and demand systems simulation model working by the end of July 2011; to have it fully validated and operational by October 2011; to have a range of simulation results in hand by December 2011 for presentation at the annual PD/GWSS workshop; to spend the first quarter of 2012 conducting further simulations and analysis, in light of things learned from the workshop; to spend the second quarter of 2012 writing up the results and wrapping up the project.

#### **IV. Summary of major accomplishments and results for each objective**

As described above, we have been making progress generally as planned towards achieving the specified objectives, though on a delayed schedule. We have been developing data and other information, drafting papers on elements of the issues, and building the elements for the simulation model, all of which should come together in the next few months. Kate Fuller has continued to make progress in meeting the requirements for her dissertation, which will be an important output from the project, including her research essay (July 2009) and her dissertation prospectus (August 2010) and is making progress on several dissertation chapters. Intermediate research outputs have been presented (or are to be presented) at several conferences.

#### **V. Publications or reports resulting from the project**

Fuller, Kate B. "A Demand System for California Winegrapes." Ph.D. dissertation essay. Forthcoming, December, 2011.

Fuller, Kate B. "Spatial Externalities and Vector-Borne Plant Diseases." Pierce's Disease and the Blue Green Sharpshooter in the Napa Valley." Ph.D. dissertation essay. Forthcoming, December, 2011.

Fuller, Kate B. "Spatial Externalities and Vector-Borne Plant Diseases." Pierce's Disease and the Blue Green Sharpshooter in the Napa Valley." Paper prepared for presentation at the Agricultural and Applied Economics Annual Meeting, Pittsburgh, PA, July 2011. Available at <http://ageconsearch.umn.edu/handle/103865>.

Fuller, Kate B. "The Economics of Pierce's Disease Policies in California." Dissertation prospectus, as required by the Ph.D. program in Agricultural and Resource Economics at UC Davis. August, 2010.

Fuller, Kate B. “Optimal Management Strategies for Vector-Borne Agricultural Pests and Diseases: Theory and Application to Pierce’s Disease of Wine Grapes in Northern California.” Research essay, as required by the Ph.D. program in Agricultural and Resource Economics at UC Davis. July, 2009.

## **VI. Presentations on research**

Fuller, Kate B. “Spatial Externalities and Vector-Borne Plant Diseases: Pierce’s Disease and the Blue-Green Sharpshooter in the Napa Valley.” Presented at the Western Economics Association International Annual Meeting, San Diego, California, June 28-July 3, 2011.

Fuller, Kate B. “Spatial Externalities and Vector-Borne Plant Diseases: Pierce’s Disease and Land Abandonment in the Napa Valley.” Presented at the World Conference on Natural Resource Modeling, Ottawa, Canada, June 14-17, 2011.

Alston, Julian M. “The Benefits and Costs of Alternative Policies for the Management of Pierce’s Disease.” Presented at the 2010 Pierce’s Disease Symposium, Manchester Grand Hyatt Hotel, San Diego, California, December 15-17, 2010.

Fuller, Kate B. “The Economics of Pierce’s Disease Policies in California.” Dissertation prospectus presentation, as required by the Ph.D. program in Agricultural and Resource Economics at UC Davis. University of California, Davis, August 2010.

Fuller, Kate B., Sanchirico, James N., and Alston, Julian M. “The Benefits and Costs of Alternative Policies for the Management of Pierce’s Disease.” Poster presented at the 2010 American Agricultural Economics Association Annual Meeting, Sheraton Downtown Hotel, Denver, CO, July 25-27, 2010.

Fuller, Kate B., Sanchirico, James N., and Alston, Julian M. “Optimal Management Strategies for Vector-Borne Agricultural Pests and Disease: Theory and Application to Pierce’s Disease of Wine Grapes in Northern California.” Presented at the 2010 American Association of Wine Economists Annual Meeting, University of California, Davis, June 25-27, 2010.

Alston, Julian M. “The Benefits and Costs of Alternative Policies for the Management of Pierce’s Disease.” Presented at the 2009 Pierce’s Disease Symposium, Doubletree Hotel, Sacramento, December 9-11, 2009.

Fuller, Kate B., Sanchirico, James N., and Alston, Julian M. “The Benefits and Costs of Alternative Policies for the Management of Pierce’s Disease: A Case Study of Pierce’s Disease and the Blue-Green Sharpshooter in the Napa Valley.” Poster presented at the 2009 Pierce’s Disease Symposium, Doubletree Hotel, Sacramento, December 9-11, 2009.

## **VII. Research relevance statement**

This project will contribute to solving the PD/GWSS problem in California by providing detailed, practical, quantitative information about the economic consequences of Pierce's Disease and alternative management strategies. More specifically the project will provide quantitative information about (1) the current and potential economic impact of the disease, (2) the potential economic payoff to investments in Pierce's Disease R&D, and (3) the benefits and costs of alternative management strategies (including alternative research investments), which can be used to guide policy decisions, including research priorities.

## **VIII. Lay summary of current year's results**

In work on the project to date we have concentrated on gathering data and other information and learning about Pierce's Disease and the sharpshooters that spread it and in laying the foundation for our simulation model. Our progress has led us to revise some aspects of the research strategy, but the work has gone generally according to plan, albeit after a delayed start. We focused attention to begin mostly on the disease as spread by native sharpshooters in the northern coastal valleys. We have now shifted attention to southern California, the Central Valley, and the GWSS, and have learned much about those aspects of the disease. We are currently developing a model of the market for California winegrapes, which can then be used to conduct policy simulations and analyses. We have made significant progress on this model but it is not yet complete. It should be working by October 2011.

## **IX. Status of funds**

We have spent less of the funds to date than originally budgeted (1) because of some delays in the approval process and in establishing the grant account, (2) because we were able to cover some expenses related to this work from other sources, (3) because we were not able to identify a suitable postdoctoral scholar to employ on the project until recently, and (4) because we revised our approach based on things learned during the initial months of work on the project. We have been granted a 12-month no-cost extension to the project. Under the current plan of work, we project a balance of a little over \$90,000 at the end of July 2011. We expect to expend those resources over the following year as we proceed to complete the work.

## **X. Summary and status of intellectual property produced during this research project**

None to date.