

CDFA PD/GWSS BOARD PROGRESS REPORT
October 1, 2008 – March 1, 2012

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 have developed an economic model of the California wine and wine-grape sector. The model is 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 is 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 forms 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 includes elements related to the main objectives of the project. It begins with 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 has now also completed chapters that detail an economic history of Pierce’s Disease, the estimation of a model of the demand for California winegrapes, and a simulation model, which can be used 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 to 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 August 3, 2011, Kabir and Julian traveled to southern California and met with Robert Crudup, president of Valley Crest Tree Company, and Richard Sanchez, head foreman of Coiner Nursery, both recommended to us by David House. We were able to acquire data and knowledge that has allowed us to draw conclusions about how much the nursery industry spends annually in complying with regulations related to GWSS and PD. 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 it funds.

We have recently completed the detailed specification of a market model for California, which we can 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 analysis 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 were 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. During the past 12-18 months we have made 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 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.

The work on conceptual development of the model and assembling relevant previous studies that could be used to guide model design and parameterization was completed in 2011. A prototype, single-region, version of the supply side of the model was developed in June 2011, and we worked with this prototype to debug the programs and validate the approach. The demand side of the model was estimated econometrically as part of Kate's dissertation. In November 2011, we completed the development of an integrated three-region dynamic simulation model of the production and pricing of winegrapes in California. In February 2012, we extended this model to six regions, differentiated by winegrape production, prices, and Pierce's Disease pressure, using information from CDFA Crush Reports and consultation with experts including Andy Walker and Bruce Kirkpatrick. This model can be used to simulate 50-year forward projections of the production and prices of California winegrapes, by region, under various scenarios of pest and disease prevalence and policy, and the associated pattern of benefits and costs to growers and others. We presented initial simulation results at the annual workshop in December 2011.

In January 2012, we solicited detailed quantitative advice from relevant experts, including farm advisors, academic and government researchers, grape growers, and pest-control advisors, on current and potential Pierce's Disease incidence under a range of scenarios, for each of the six supply regions. Specifically, we distributed a survey questionnaire that asked what would be the likely future patterns of Pierce's Disease incidence if the Pierce's Disease Control Program (PDCP) were to end. Using results from the survey, we have spent the first quarter of 2012 conducting further simulations and analysis. Our results suggest that the PDCP yields significant benefits; over \$250 million per year, which is large compared with its \$50 million annual cost. Using the most conservative estimates of PD incidence from the survey the net benefit of \$60 million per year while the most-likely estimates imply a net benefit of \$200 million per year.

In the second quarter of 2012 we plan to conduct further simulations and refine our parameters in order to gain insight about benefits of specific components of the program, and to evaluate the relative merits of alternative types of research investments. We also plan to spend time documenting the results and concluding 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 will file her dissertation by the end of March, 2012. 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 Model of Supply and Demand for Winegrapes in California.” Ph.D. dissertation essay. Forthcoming, March, 2012.

Fuller, Kate B. “The Costs and Benefits of Pierce’s Disease and Programs to Control it in the California Winegrape Industry: Simulation Results.” Ph.D. dissertation essay. Forthcoming, March, 2012.

Fuller, Kate B. “A Demand System for California Winegrapes.” Ph.D. dissertation essay. Forthcoming, March, 2012.

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, March, 2012

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

Alston, Julian M. “The Benefits and Costs of Alternative Policies for the Management of Pierce’s Disease.” Presented at the 2011 Pierce’s Disease Symposium, Sheraton Grand Sacramento Hotel, Sacramento, California, December 13-15, 2011.

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 have developed a detailed model of the market for California winegrapes, using advice from Pierce's Disease experts such as farm advisors, grape growers, and researchers across the state. We have used this model to conduct policy simulations and analyses. Results using this model suggest that the CDFA Pierce's Disease Control Program (PDCP) yields significant benefits. Taking into account the program's \$50 million annual cost, we estimate that the program has a net benefit of over \$200 million per year. Even using the most conservative estimates of potential PD losses if the PDCP were ended, we estimate a \$60 million annual net benefit to the program.

IX. Status of funds

We spent less of the funds in the early phases 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 were granted a 12-month no-cost extension to the project. Under the current plan of work, we project to have exhausted the remaining funds by June 30 2012.

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

None to date.