

## Kimberly Nicholas Cahill

Program in Horticulture and Agronomy • University of California, Davis  
Department of Viticulture and Enology • One Shields Avenue • Davis, CA 95616-8749  
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Dear Vice-Chancellor Eriksson, Dr. Olsson, and Members of the Search Committee:

I enthusiastically submit my application for the tenure-track position in Sustainability Science at Lund University (**Reference Number E 17 PA 2009/3194**). I am currently the McKeehan Fellow in Horticulture and Agronomy at the University of California at Davis. I received my Ph.D. from Stanford University in the Interdisciplinary Program in Environment and Resources in January 2009, and am keen to leverage my experience in shaping a new interdisciplinary environmental institution to contribute to the development of the Lund University Centre for Sustainability Science. I have listed five referees (Drs. Christopher Field, Pamela Matson, Jon Foley, William Durham, and Dan Cayan) at the end of my CV. As detailed in my CV, I have an excellent track record of designing, executing, and publishing research, teaching and mentoring students, successfully obtaining grant funding, and leading and participating in interdisciplinary teams.

My research focuses on the ecological impacts of climate change, particularly as it relates to issues such as food security, carbon sequestration, and biodiversity, and the role of human management in shaping and responding to ecosystems and climate. My current research aims to understand the effects of climate change on agriculture, particularly in the vulnerable wine industry. As I describe in my research statement, I have projected future winegrape yield and quality by integrating climate and crop models at broad spatial scales (Hayhoe et al., 2004; Lobell et al., 2006a, b; 2007), and conducted both an ecological field campaign (Cahill et al., in prep) and interviews with growers (Cahill and Durham, in prep) to bring our understanding of the impact of climate change on agriculture from regional scales to the level of individual ranches where management decisions are made. My interest in managed ecosystems began with my master's research at the University of Wisconsin, where I examined ecosystem structure and function (including carbon sequestration) in a restored prairie (Kucharik et al., 2006; Cahill et al., accepted).

In addition to developing and teaching courses, I have developed a thriving program for mentoring undergraduates to actively involve them in research. As a graduate student, I was the direct supervisor of and worked closely with 18 undergraduates from three universities. I am proud to say that most of these students have returned to work with me for many terms, and many have continued to careers in ecological research and practice. I have also been successful in grant writing. I wrote my first grants while working as a policy analyst for a nonprofit from 1999-2001, where I was the lead author for five grants totaling over \$232,000. I continued to fund my own research in graduate school, including a recently awarded grant for \$51,000 from the Napa Valley Vintners.

My ability to apply my training in climate impacts science, ecosystem ecology, and environmental anthropology and policy, and my experience in integrating across disciplines to form partnerships and lead diverse teams both within and beyond academia, has been effective for addressing real-world environmental issues. For me, research is driven by questions of basic curiosity as well as pressing societal importance; teaching is a way to both inspire students with knowledge and be inspired by their energy; and outreach beyond academia is a way to shape my own research questions and to ensure that my research has a practical audience.

I am excited about the opportunities for leadership in interdisciplinary scholarship, teaching, and outreach as a member of the LUCSUS. I enjoy learning new languages, and am keen to study Swedish. I look forward to the opportunity to discuss how my work and interests fit with Lund's vision for teaching and scholarship to better understand and manage the ecosystems which sustain us, and which we must find ways to sustain into the future.

Sincerely,  
Kimberly Nicholas Cahill

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## Research statement

What will human changes to the Earth's climate and land surface mean for the future of the ecosystems on which we depend, and how can we chart a more sustainable future? My research aims to understand the interactions and feedbacks between natural and human systems, both to elucidate basic mechanisms and to identify leverage points where people can make choices to better balance human needs with sustaining the planet's life support systems. I use modeling, observational, and laboratory approaches from the disciplines of ecosystem and plant physiological ecology, climate impacts science, and biogeochemistry to investigate how climate variability and change affect ecosystem structure (the distribution and composition of species present and their interaction with the physical environment) and function (such as atmosphere-biosphere exchanges, net primary productivity, and crop yield and quality). Based on the information needs I first identified as a policy analyst at Clean Air Council in Philadelphia, I work to produce rigorous research that can illuminate and quantify consequences and tradeoffs to support sound ecological decision-making. To this end, I have focused on the impacts of global change on local and regional scales where I feel most effectively positioned to engage with managers and policymakers. In the future, I would like to maintain the valuable research partnerships I have established in California, as well as expand to local field sites to engage students and local partners.

Broadly, my current and future research aims to address three overarching questions:

### 1. How does climate variability and change affect ecosystems?

#### Modeling Approaches

I coupled dynamically downscaled global climate model output with phenological development and quality models to project future wine quality in California as my contribution to a highly cited paper (Hayhoe et al., 2004, *PNAS*). Our group was the first to use multiple climate models and emissions scenarios applied to a range of climate-dependent sectors in California, thus elucidating the impact of human choices on the future of ecosystems, human health, and agriculture in the state. I disseminated these results to policymakers and stakeholders at state and local levels through an outreach campaign in partnership with my coauthors, coordinated by the Union of Concerned Scientists. More recently, we have made projections of future wine quality under global warming more spatially explicit, and based on quantitative measures of quality (numerical expert wine scores) (Reisman et al., in review at *Environmental Research Letters*).

I have collaborated with colleagues to develop empirical weather-based models of crop yields for twelve major California crops based on a large dataset of historical weather and crop distribution and yields (Lobell et al., 2007, *Climatic Change*). We used these models to forecast crop yields earlier in the growing season and with considerably less resource investment than was possible with previous methods (Lobell et al., 2006, *California Agriculture*; patent application filed). Also, we combined our crop models with the output of a suite of global climate models and emissions scenarios to project the impact of future climate change on crop yields, accounting for uncertainty (Lobell et al., 2006, *Agricultural and Forest Meteorology*). I would like to extend this line of analysis to other regions and crops, such as "orphan" crops important as food in developing countries.

After authoring a successful grant, I am currently coordinating a new collaboration between wine industry leaders and scientific colleagues at Stanford and Scripps Institute of Oceanography. We are

drawing on over 250 members of the Napa Valley Vintners to contribute data on historical climate and winegrape development and composition. This will allow us to develop empirical models for the response of many grape varieties to environmental controls and explore how this may vary by region, an important step in accurately predicting the effects of global change on agriculture.

#### Observational Approaches

My observational work has included field campaigns in Wisconsin to examine ecosystem carbon sequestration by quantifying carbon stocks and fluxes in restored and remnant prairies (Kucharik et al., 2006, *Global Change Biology*) and how restoration protocol affects ecosystem properties including species richness and diversity, above- and below-ground primary production, soil CO<sub>2</sub> respiration, and ecosystem carbon balance (Cahill et al., accepted at *Ecological Applications*). I recently completed a three-year field campaign to quantify the effect of vineyard-scale climate on the development of phenolic compounds in Pinot noir grapes. I found that anthocyanins (which give color to red wines) and tannins (responsible for astringency) were decreased by increasing heat during the final ripening period and by light at the levels I measured in commercial vineyards (Cahill, Matthews, Field, and Lobell, in prep). This means that wine composition and quality is vulnerable to climate warming. This novel bottom-up approach at the scale of individual growers' operations complements my work using top-down modeling at regional and state levels, which helps bring the issue of climate impacts on agriculture to a scale relevant to managers. I would like to extend this observational work correlating climate with crop phenology, yields, and composition to other sites nationally and internationally, building on partnerships I have developed in California, France, and Portugal.

#### Laboratory Approaches

I have worked in the lab to improve a recently published spectrophotometric assay for phenolic compounds important to both plant defense and food and wine color and taste, which is simple and inexpensive enough for widespread in-house adoption in the wine and food industries (Cahill and Matthews, in prep). I am interested in further expanding my analysis of grape and wine composition to include important but poorly understood aroma and flavor compounds through lab techniques such as gas chromatography-mass spectrometry and solid-phase microextraction. Extending these measures would provide a powerful way to quantify the effect of environmental conditions on the overall composition and quality of grapes and wine, as well as other climate-sensitive fruit and vegetable crops where composition is an important component of value, and allow more accurate predictions of future crop quality under climate change. This approach could also be used to model altered plant-herbivore interactions under climate change due to changing allocations of secondary metabolites for defense.

## **2. How will land use and ecosystem distribution change under a changing climate?**

#### Land Use Modeling

Our work (Lobell et al., 2006, *Ag and Forest Met.*) has shown that the areas expected to be most climatically suitable for future perennial crop production in California shift towards the coast and northward with climate warming. However, the potential adaptation strategy of moving cultivated areas has not been integrated with additional land use and soil constraints that may further limit future agricultural practice. In future work, I would like to integrate these additional factors, as well as assess the conservation implications of abandoning cropland.

#### Ecosystem Services Assessment

Another future direction I would like to pursue is an assessment of the ecosystem services provided by a suite of agricultural systems (e.g., perennial orchards and vines, annual row crops, biofuels, and livestock) under a range of management intensities, relative to other possible land uses (e.g., housing, industrial development, and conservation land). This is important to understand the tradeoffs between

provisioning services (e.g., production of food, fiber, fuel, and materials and land for housing) and supporting and regulating services (e.g., carbon sequestration and water filtration). Improving projections of the areas most suitable to provide these services, and how they may shift under a changing climate, can inform effective land-use planning and strategic conservation investments.

### **3. How will coupled ecological-social systems respond to climate change?**

#### *Resilience and Adaptation to Climate Change*

For me, an important aspect of conducting my work in managed ecosystems is to include the managers in the scope of my research. I believe this is essential to ask relevant questions for scientific study, and to be able to include potential adaptation behavior in projecting future outcomes under climate change, as well to understand the constraints on and limits to that adaptive capacity and the role of mitigation. To this end, I have conducted interviews with winegrowers to develop a typology of winegrape quality, which serves to highlight the sensitivity of winegrapes to climate change (Cahill, in prep). I also used these interviews to analyze historical responses to environmental stresses. I concluded that grower responses to environmental stresses tended to be individual, reactive, and based on past experience, which presents challenges for adapting to the novel and increased stresses of climate change (Cahill and Durham, in prep). I have conducted extensive outreach to growers throughout this research, and continue to work closely with them as community climate change response efforts are beginning to develop. I have recently authored a proposal to build on this research to conduct a full vulnerability analysis of the system of winegrowing in California's North Coast, and I would like to expand this line of inquiry both within agriculture and to extend to other fields.

#### *Individual Impacts Assessment*

I would like to extend my research in this area to quantify the greenhouse gas emissions from individual lifestyle choices such as energy use and resource consumption of everyday goods. A rigorous bottom-up approach to understanding personal environmental impacts is a first step towards empowering average citizens to make more sustainable decisions. Such research also lends itself to student and local campus involvement, including participating in campus carbon neutral movements, and can be a powerful way to teach both course content (as I describe in my "Individual Actions, Global Change" course below) and the research process. Along these lines, I am currently conducting an analysis of the carbon footprint of various vineyard weed control options in a consulting capacity for a private vineyard management company.

### **Approaches to Interdisciplinary Research**

I am part of a new generation of natural scientists who have been educated in an explicitly interdisciplinary program. I have a strong personal commitment to both employ and teach interdisciplinary approaches where advantageous. I have taught classes from an interdisciplinary framework and elaborated interdisciplinary theory with colleagues in a recent paper (Khagram et al., in review). Two approaches that I have successfully used to pursue interdisciplinary research are to draw from an array of disciplinary approaches in place-based research, and to work in teams with researchers from various disciplinary backgrounds, ranging from ecophysicologists to economists to hydrologists. I find that one of the greatest challenges in such collaborations is achieving clear communication and shared understanding of purpose between individuals with different training and disciplinary perspectives. My ability to serve as a "translator," drawing from my experience in both natural and social sciences as well as environmental policy, helps to make these collaborations succeed.

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### Teaching statement

We were in the rugged, remote, and majestic tundra near Denali National Park, scores of miles from the nearest outpost that could properly be called civilization, and the truck containing all of our research equipment was hopelessly lost. When it became clear that we would not see the truck until we met back at our camp at the end of the day, I figured that my research project on permafrost subsidence and plant community composition for our intensive three-week field course was a write-off. But I was fortunate to have a wonderful teacher, Terry Chapin, who led me to see the situation differently. He asked me about my hypotheses and suggested ways that we could still test them with simpler tools. Among the students in the class, we had enough duct tape, Ziploc bags, field notebooks, and Swiss Army knives in our pockets and daypacks to whittle a permafrost probe and a sampling quadrat, and enough ingenuity to revise our experimental design to accommodate our new constraints. I want to be a professor because I am inspired by the teachers and professors who changed the way I looked at the world, and who are passionate, engaged, and knowledgeable.

I have sought out teaching experiences starting with college jobs as a docent and naturalist, which were a way for me to integrate my love of sharing knowledge and engaging curiosity with my enthusiasm for the natural world. Teaching opportunities in graduate school allowed me to hone my course development, organization, and preparation skills, and to polish my communication skills to effectively target audiences from students in large introductory lectures to experts in the field. Further, I took advantage of formal teaching programs in my graduate training to learn more about motivating and engaging students, using creative and effective teaching strategies, and including ongoing evaluation to make the teaching process itself an opportunity for constant learning. At the University of Wisconsin, I was a National Science Foundation GK-12 Teaching Fellow in the Kindergarten Through Infinity program. At Stanford, I took a graduate seminar in university-level Science Course Design, where I applied education research to the design of my own environmental science course. I look forward to continuing my participation in teaching development programs available for new faculty.

In addition to teaching my own courses, I look forward to working with other faculty members to co-teach existing classes and develop new ones. A highlight of my classroom experience has been working as part of a team of graduate students to develop the curriculum and design and evaluate assignments and exams for a large lecture class at Stanford, "Introduction to Earth Systems." This gave me experience in developing a shared framework for course goals and content, cultivating a spirit of commitment and mutual respect among teaching colleagues, and agreeing to a transparent process for teaching team participation and making clear decisions.

I want to connect with students who will go on to be leaders in industry, policy, and the arts, as well as future scientists; the need for well-informed ecological citizens and stewards transcends the boundaries of undergraduate majors. To this end, I am excited about teaching lower-level environmental and sustainability science courses available to anyone in the University, as well as upper-division and postgraduate offerings. In addition, I am prepared and eager to teach new courses, including:

- **Sustainability Science:** Sustainability science applies geophysical, biological, social, and engineering sciences to address the fundamental challenge of meeting human needs while preserving the life-support systems of the planet. We will use this lens to explore the interactions of

humans and the environment on local, regional, and global scales. *Please see attached course syllabus.*

- **Sustainable Agriculture:** How traditional and innovative management and technology can be used to supply food and fiber that meets criteria for ecological, economic, and social sustainability. Organic agriculture; soil and water conservation and management; nutrient, pest, and disease management; biotechnology; ecosystem services; climate change; labor and social issues.
- **Ecosystem Services and Global Change:** Upper-division. The interplay between global changes (climate and land use change, nitrogen cycling, invasive species) and ecosystem services (pollination, water regulation, crop production, carbon sequestration, cultural and aesthetic services), including decision-making frameworks and human drivers of global change.
- **Individual Actions, Global Change:** First-year seminar on how individual actions and choices (including energy, transportation, land use, resource consumption, and political behavior) can both exacerbate the problems of global climate change and contribute to its solutions.
- **Wine, Civilization, and Global Change:** Introductory course. Using the grapevine as a model system, we will explore how plants interact with their physical environment, how human management mediates this interaction, and the resulting influences on grape and wine characteristics. We will examine ecological and cultural traditions of winegrowing around the world, and the effects of historical and projected environmental changes on winegrowing.

My teaching philosophy is to give students both a broad intellectual framework and specific analytical tools for interpreting the world around them. I want students to be critical consumers of information and to be articulate and knowledgeable enough to contribute to meaningful social discussion and action. From my own experiences as a student, I know that I learn best when the instructor clearly articulates how the subject connects to other fields, when questions and interaction between the teacher and fellow students are encouraged, and when I can engage in a hands-on way in the classroom, lab, or field. I strive to teach to a diverse range of learning styles while creating this kind of learning environment for my students. I also motivate students by demonstrating that their contributions are taken seriously, and their ideas are implemented and credited. For example, I changed my lab protocols for grape skin extract preparation when student research assistant suggestions streamlined the process and reduced processing time by 30% per sample.

My advising philosophy is to demonstrate the very real element of discovery in the research process, to help students move away from a mindset of trying to get the one “right” answer, as if on a multiple choice test, and towards a mindset of figuring out the criteria by which they can weigh competing options or hypotheses for themselves. I have developed this philosophy through mentoring undergraduates in designing, carrying out, and communicating and interpreting research, both as an advisor to independent projects and as a mentor to assistants working with me on my dissertation projects. I work with students to explain and share the process of scientific research from start to finish, as well as to train them in specific skills. My students have done everything from collecting field data and running assays in the lab, to carrying out independent statistical analyses and data interpretation, and designing further experiments to test hypotheses generated from data analysis. My students have told me that being part of a team that persists in the face of the inevitable glitches in the field and lab, and finds creative ways around them, is very satisfying. They also tell me that engaging in the world of research has been extremely valuable to them in shaping how they think about the scientific process, the role of science in environmental problem-solving, and their own capabilities for contributing to the world, through pursuing further scholarly training and in their chosen careers. I am gratified to be inspiring a new generation of students in new settings, as I myself was once inspired in the tundra of Alaska.

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### Education and Employment

- 01/09-present **McKeehan Fellow in Horticulture and Agronomy**, University of California, Davis  
**Viticulture Associate**, Department of Viticulture and Enology, UC Davis
- 05/08-present **Principal**, Fruit Fly Wine Sciences, Sonoma, CA  
Provide consulting services on technical and sustainability issues to the wine industry.
- 09/03-01/09 **Ph.D.**, Interdisciplinary Program in Environment and Resources, Stanford University  
*Major professor*: Dr. Christopher Field, Founding Director, Department of Global Ecology  
*Dissertation*: Global change in local places: Climate change and the future of high-quality winegrowing in Napa and Sonoma, California
- 09/05 **Participant**, Potsdam Institute for Climate Impact Research Summer School, Peyresq, France
- 07/04-09/04 **Visiting Scholar**, The Nature Conservancy of California
- 08/01-08/03 **Master of Science**, Land Resources  
University of Wisconsin-Madison  
*Major professor*: Dr. Jonathan Foley, Director, Center for Sustainability and the Global Environment (now Director, Institute on the Environment, University of Minnesota)  
*Thesis*: Issues in evaluating carbon sequestration and attributing carbon credits to grassland restoration efforts
- 12/99-05/01 **Policy Analyst**, Clean Air Council, Philadelphia, PA
- 09/96-06/99 **Bachelor of Science (honors)**, Earth Systems (Biosphere track), Human Biology minor.  
Stanford University  
*Thesis Advisor*: Stephen S. Schneider, Professor, Biological Sciences  
*Honors thesis*: Private and social costs of electric, compressed natural gas, and gasoline vehicles in the Bay Area

### Awards and Scholarships

- 2008 Stanford University School of Earth Sciences Research Review, *Third Place, Oral Presentation*
- 2007 American Society for Enology and Viticulture, Annual Meeting *Best Viticulture Student Poster Award*
- 2007 American Society for Enology and Viticulture *Graduate Scholarship*
- 2003-06 Stanford University *David and Lucille Packard Foundation Stanford Graduate Fellow*
- 2002-03 National Science Foundation GK-12 Program *Kindergarten-Through-Infinity Teaching Fellow*
- 2002, 03 National Science Foundation Graduate Research Fellowship Program *Honorable Mention*
- 2001-03 S.C. Johnson Distinguished Fellowship *Graduate Research Fellow*
- 2001-02 University of Wisconsin *University Fellow*
- 2001 National Clean Cities, Inc. *Coordinator Achievement Recognition Award*
- 1999 Honors in Environmental Science, Policy, and Technology *Goldman Program, Stanford University*

## Peer-Reviewed Publications

9. **Cahill, KN**, CJ Kucharik, and JA Foley. "Prairie restoration and carbon sequestration: Difficulties in quantifying carbon sources or sinks using a mass-balance approach." Accepted at *Ecol. Appl.*
8. **Cahill, KN**. 2009. "Global change in local places: Climate change and the future of high-quality winegrowing in Napa and Sonoma, California." Ph.D. Dissertation, Interdisciplinary Graduate Program in Environment and Resources, Stanford University, Stanford, CA. 210 pp.
7. **Cahill, KN**, DB Lobell, CB Field, C Bonfils, and K Hayhoe. 2008. "Modeling climate change impacts on wine grape yields and quality in California." Proceedings of the UNESCO Wine and Culture Colloquium: "*Réchauffement climatique, quels impacts probables sur les vignobles?*" 3/28-3/30/07, Dijon, France.
6. Lobell, DB, **KN Cahill**, and CB Field. 2007. "Historical effects of temperature and precipitation on California crop yields." *Climatic Change* 81: 187-203.
5. Lobell, DB, **KN Cahill**, CB Field, and C Bonfils. 2007. "Impacts of future climate change on California perennial crop yields: Model projections with climate and crop uncertainties." *Agricultural and Forest Meteorology* 141: 208-218.
4. Lobell, DB, **KN Cahill**, and CB Field. 2006. "Weather-based yield forecasts developed for 12 California crops." *California Agriculture* 60 (4): 211-215.
3. Kucharik, CJ, NJ Fayram, and **KN Cahill**. 2006. "A paired study of prairie carbon stocks, fluxes, and phenology: comparing the world's oldest prairie restoration with an adjacent remnant." *Global Change Biology* 12 (1): 122-139.
2. Hayhoe, K, D Cayan, CB Field, PC Frumhoff, EP Maurer, NL Miller, SC Moser, SH Schneider, **KN Cahill**, EE Cleland, L Dale, F Davis, R Drapek, RM Hanemann, LS Kalkstein, J Lenihan, CK Lunch, RP Neilson, SC Sheridan, and JH Verville. "Emissions pathways, climate change, and impacts on California." 2004. *Proceedings of the National Academy of Sciences of the USA* 101 (34): 12422-12427.
1. **Cahill, KN**. 2003. "Issues in evaluating carbon sequestration and attributing carbon credits to grassland restoration efforts." MS Thesis, Department of Land Resources, University of Wisconsin-Madison, Madison, WI. 113 pp.

### *Submitted*

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3. **Cahill, KN**, and ELS Hinckley. "A Perspective on Building Successful Research Partnerships in California's North Coast Vineyards." Submitted to *Journal of Extension*.
2. Reisman, CA, K Hayhoe, J Van Dorn, **KN Cahill**, EP Maurer, MA Matthews, and DE Block. "A genetic algorithm approach to projecting climatic impacts on the quality of California Cabernet Sauvignon wine." Submitted to *Environmental Research Letters*.
1. Khagram, S, **KN Cahill**, DP MacMynowski, J Warren, E Richards, K Oleson, J Kitzes, R Katz, R Hwang, R Goldman, J Funk, and KA Brauman. "Thinking about knowing: Intellectual foundations for interdisciplinary research." Submitted to *Frontiers in Ecology and the Environment*.

### *In preparation*

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4. **Cahill, KN**, MA Matthews, CB Field, and DB Lobell. "Effect of vineyard-scale climate variability on Pinot noir phenolic composition and implications for future wine quality." For submission to *Agricultural and Forest Meteorology*.
3. **Cahill, KN**, and MA Matthews. "Effect of sample preparation method on the analysis of phenolic compounds in grape skin: Recommendations for efficient analysis design." For submission to *American Journal of Enology and Viticulture*.
2. **Cahill, KN**, and WH Durham. "Winegrower responses to environmental stresses: An analysis of farm-scale adaptive capacity." For submission to *Global Environmental Change*.
1. **Cahill, KN**. "Qualifying and quantifying quality: How growers define and manage for winegrape quality." For submission to *Journal of Wine Research*.



## Technical and Government Reports, Outreach Articles, and Patents

6. **Cahill, KN**, and M. Tyree. 2009. "Wine grape bloom." pp. 146-149 in: *Indicators of Climate Change in California*. California Environmental Protection Agency, Sacramento, CA.
5. **Cahill, KN**. 2008. "Evaluation of phenolic compounds in grapes and wines." Technical report prepared as a consultant to Walsh Vineyards Management for their internal use and for distribution to clients.
4. **Cahill, KN** and CB Field. 2008. "Climate change science and the future of the wine industry." *Practical Vineyard and Winery*, March/April 2008, 29 (6):16-33.
3. Lobell, DB, **KN Cahill**, and CB Field. September 2007. US Patent application filed for invention of an "Empirical Yield Forecaster."
2. Kong, A, **KN Cahill**, K Hristova, and L Jackson. February 2006. "Land use change in California's agricultural landscapes in response to climate change." pp. 65- 74 in: *Climate Change: Challenges and Solutions for California Agricultural Landscapes* (T. Cavagnero, L. Jackson, and K. Scow, eds.). Report CEC-500-2005-189-SF of the California Climate Change Center. Available from: [http://www.climatechange.ca.gov/climate\\_action\\_team/reports/index.html](http://www.climatechange.ca.gov/climate_action_team/reports/index.html)
1. **Cahill, KN**, and CJ Kucharik. 2003. "Prairie carbon sequestration." In: *Wisconsin Department of Natural Resources Voluntary Emission Reduction Registry: Examples for Quantifying and Registering Emission Reductions*. Wisconsin Department of Natural Resources, Madison, WI, 53707. Report is available from: <http://dnr.wi.gov/org/aw/air/registry/quantexamples/example9.html>

## Grants Received

### Lead Contributor:

10. Napa Valley Vintners. 2007. "Historical Napa climate and its impact on wine grape phenology and composition." PIs: Dan Cayan, UC San Diego; Chris Field, Stanford. \$51,032 for 2 years.
9. Rudolf Summer Grant, School of Earth Sciences, Stanford University. 2007. Support for summer research assistants. \$4,920.
8. Faculty Grant, Vice Provost for Undergraduate Education, Stanford University. 2006. Support for summer research assistants. PI: Chris Field. \$4,870.
7. McGee Grant in Earth Sciences, School of Earth Sciences, Stanford University. 2006. Support for research expenses, including travel to present research at an international conference. \$1,100.
6. McGee Grant in Earth Sciences, School of Earth Sciences, Stanford University. 2005. Support for research expenses, including dataloggers used in field experiment. \$2,400.
5. Pennsylvania Department of Environmental Protection. 2001. "Don't Trash It! Pennsylvania Statewide Reuse Guide". \$70,000.
4. U.S. Department of Energy- Philadelphia Regional Office. 2001. "Support of Activities Related to 2001 National Clean Cities Conference." \$20,000.
3. The Energy Foundation. 2001. "Pennsylvania and Delaware Low Emissions Vehicles Campaign, Phase 2." \$80,000.
2. U.S. Department of Energy- Golden Field Office. 2000. "Clean Fuels 101: Rebates for Light-Duty University Niche Fleets." \$30,000.
1. The Energy Foundation. 2000. "Low Emissions Vehicles Campaign in Pennsylvania and Delaware." \$32,000.

### Co-Contributor:

2. "Rebates for Alternative Fuel Vehicles in Greater Philadelphia." 2000. U.S. Department of Transportation. Congestion Mitigation Air Quality Projects. \$369,000.
1. "Alternative Fuels Incentive Grant." U.S. Department of Energy. \$90,000.

### Advisor to student proposal:

1. Quarterly Grant, Undergraduate Research Programs, Stanford University. 2006. Mentored freshman Emily Humphreys to write successful grant to sponsor her work with me over the summer. \$1,500.

## Conference Presentations and Posters

8. **Cahill, KN**, MA Matthews, CB Field, and DB Lobell. 6/25/09. "Vineyard-scale climate variability, vine light intensity, and Pinot noir phenolic composition." Oral presentation at the American Society for Enology and Viticulture Annual Meeting, Napa, CA.
7. **Cahill, KN**, and MA Matthews. 6/19/08. "Grape preparation methods for fast, accurate results with the Harbertson-Adams phenolic assay." Poster presented at the Annual Meeting of the American Society for Enology and Viticulture, Portland, OR.
6. **Cahill, KN**, DB Lobell, CB Field, and C Bonfils. 6/20/07. "Modeling climate and climate change impacts on wine grape yields in California." Poster presented at the Annual Meeting of the American Society for Enology and Viticulture, Reno, NV. Best Student Poster Award (Viticulture).
5. **Cahill, KN**, DB Lobell, CB Field, C Bonfils, and K Hayhoe. 3/29/07. "Modeling climate change impacts on wine grape yields and quality in California." Talk given at UNESCO Chair of Wine and Culture Colloquium "Global warming: Which potential impacts in the vineyards?", Dijon, France.
4. **Cahill, KN**, CA Reisman, K Hayhoe, J Van Dorn, EP Maurer, MA Matthews, and DE Block. 3/29/07. "Climate and climate change impacts on California Cabernet Sauvignon wine quality." Talk given at UNESCO Chair of Wine and Culture Colloquium, Dijon, France.
3. **Cahill, KN**, CB Field, and K Hayhoe. 12/17/04. "Emissions pathways, climate change, and future wine grape quality in California." Poster presented at American Geophysical Union, San Francisco, CA. Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract A53B-0897.
2. **Cahill, KN**, JA Foley, and CJ Kucharik. 12/12/03. "Large uncertainties in estimating grassland carbon fluxes: Can net ecosystem production be inferred?" Poster at the American Geophysical Union, San Francisco, CA. Eos Trans. AGU, 84(46), Fall Meet. Suppl., Abstract B51D-0986.
1. **Cahill, KN**, JA Foley, CJ Kucharik, and TC Balser. 12/6/02. "Carbon cycling in restored Wisconsin grasslands: examining linkages between plant diversity, microbial communities, and ecosystem processes." Poster at the American Geophysical Union Fall Meeting, San Francisco, CA. Eos Trans. AGU, 83 (47), Fall Meet. Suppl., Abstract A12A-0138.

## Invited Presentations

### Scientific Presentations

12. 6<sup>th</sup> Annual California Climate Change Conference, Sacramento, CA. September 2009.
11. Association of American Geographers Annual Meeting, Las Vegas, NV. March 2009.
10. California Department of Water Resources, Sacramento, CA. January 2009.

### Outreach/Wine Industry Presentations

9. American Harvest Workshop, Cakebread Cellars, Rutherford, CA. September 2009.
8. Symposium for Professional Wine Writers, St. Helena, CA. February 2009.
7. Napa Valley Vintners, St. Helena, CA. January 2009; September 2009.
6. Climate Change and Wine Seminar for Professionals, Sonoma, CA. July 2008.
5. Napa Sustainable Winegrowing Group, Napa, CA. April 2008; January 2009.
4. Great Wine Capitals Annual Meeting, Porto, Portugal. November 2007.
3. Napa Wine Educators Academy, Napa, CA. August 2007.
2. Frog's Leap Winery, Rutherford, CA. May 2006.
1. Sonoma Valley Vintners and Growers Alliance Annual Meeting, Sonoma, CA. March 2006.

### Guest lectures at universities on climate change\* and interdisciplinary scholarship<sup>#</sup>

6. Research Approaches for Environmental Problem Solving<sup>#</sup>, Stanford University. May 2008.
5. Environmental Science\*, Macalester College, St. Paul, MN. November 2007.
4. Research Design in IPER<sup>#</sup>, Stanford University, Stanford, CA. March 2007.
3. Global Climate Change\*, St. Mary's College, Moraga, CA. January 2005, 2006, 2007.
2. Interdisciplinary Environmental Problem Solving<sup>#</sup>, Stanford University. April 2006.
1. Introduction to Earth Systems\*, Stanford University, Stanford, CA. February 2006.

## Teaching and Advising Experience

09/08-06/09 **Advisor**, International Policy Studies Practicum, Stanford University

Advised team of 5 graduate students on an analysis of the impacts of climate change on international wine prices, and policy recommendations to the California legislature on competitiveness and adaptation in the wine industry.

05/08 **Participant**, FORWARD to Professorship, Gallaudet University, Washington, DC.

Selected to participate in an NSF-ADVANCE 3-day workshop on teaching, research, and service for women in science, mathematics, and engineering pursuing academic careers.

09/07-12/07 **Graduate**, Science Course Design, Stanford Center for Teaching and Learning, Stanford, CA.

Participated in a quarter-long course on effective pedagogy in science teaching at the college and graduate level. Developed course materials, including syllabi developed through “backwards design” (starting with learning goals) and activities designed to confront student misconceptions in global change science.

09/02-08/03 **Undergraduate Research Mentor**, University of Wisconsin-Madison

10/05- **Undergraduate Research Mentor**, Stanford University

10/06- **Undergraduate Research Mentor**, University of California-Davis

Hired, trained, and supervised a total of 17 undergraduates (five from Wisconsin, seven from Stanford, and six from UC Davis) to collect field data, gather and analyze literature, perform lab work, analyze data, and interpret results as part of my dissertation research. Part-time during the academic year and full-time during summers.

10/05-06/06 **Undergraduate Honors Thesis Co-Advisor**, Stanford University.

Served as co-advisor to Stanford undergraduate Nicole Schuetz for her thesis, “Knowledge Transfer in Napa Valley, CA: Vine Mealybug Management.”

03/06-06/06 **Research Seminar Leader**, “Interdisciplinary Scholarship.” Stanford University

Initiated and led a graduate seminar on theoretical foundations for interdisciplinary scholarship. Coordinated team of 11 co-authors (one faculty member and 10 fellow graduate students) in writing a paper developing interdisciplinary theory (Khagram et al., submitted).

11/04-03/05 **Teaching Team Member**, “Introduction to Earth Systems.” Stanford University.

Taught a weekly discussion section and worked with team of seven other TAs to develop course content, design and assess assignments and exams, and integrate an interdisciplinary problem-solving framework in a 90-student introductory class taught by a series of guest lecturers, headed by Prof. W. Gary Ernst.

09/04-12/04 **Teaching Assistant**, IPER 310, “Environmental Forum Seminar.” Stanford University.

Organized speakers, readings, and discussions for weekly advanced graduate-level interdisciplinary environmental seminar for six students, taught by Profs. Roz Naylor and Rob Dunbar.

09/03-12/03 **Grader**, “Electric Power: Renewables and Efficiency.” Stanford University.

Designed grading rubric and graded weekly problem set assignments for class of 42 undergraduates, taught by Prof. Gil Masters.

6/02-8/03 **National Science Foundation GK-12 Teaching Fellow**, Madison, WI.

Worked with teachers at a shared elementary, high school, and college campus to develop an inquiry-based framework for their science curricula, connect them with science education resources at UW-Madison, develop collaborative research projects across grade levels, and design and implement project assessments.

## Environmental Policy Experience

12/99-05/01 **Policy Analyst**, Clean Air Council, Philadelphia, PA.

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*Coordinator, Greater Philadelphia Clean Cities Program*

- Coordinated public/private partnership of U.S. Department of Energy to promote alternative fuel vehicles, including organizing a national meeting for over 900 attendees and 250 local children.

*Statewide Coordinator, Clean Cars for Pennsylvania Campaign*

- Initiated, obtained funding for, researched, organized, and led a statewide campaign to adopt cleaner motor vehicle emissions standards in Pennsylvania.

*Co-Organizer, Recycling Alliance of Philadelphia*

- Organized grassroots coalition of 24 local businesses, environmental and civic groups to advocate for improved recycling in Philadelphia.

*Manager, Intern and Volunteer Program*

- Participated in the hiring of interns and volunteers. Direct supervisor to a total of five interns working on reuse and alternative fuels projects.

07/00 **Graduate**, League of Conservation Voters Environmental Leadership Institute.

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Participated in intensive one-week seminar with 30 environmental advocates to learn strategic planning, grassroots campaign organizing, electoral politics, legislative lobbying, message development, targeting, media training, negotiating, budgeting, and fundraising.

09/01—present **Scientific Advisor**, State Climate Change Initiatives.

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- 8/04-present Conducted public outreach and education to legislators, regulators, and industry members on the results of studies (Hayhoe et al., 2004; Lobell et al., 2006a, 2006b, 2007) on the potential impacts of climate change on California, focusing on agriculture.
- 9/01- 8/03. Served on the Advisory Committee for the Wisconsin Department of Natural Resources Voluntary Greenhouse Gas Emissions Registry. Coauthored sample protocol for carbon credits for a prairie restoration and served as advisor to state agency on carbon sequestration issues.

## Science Outreach and Communication Experience

**Staff**, Aldo Leopold Leadership Program. 06/06, 09/07.

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- Hired to coordinate speakers and logistics for one-week intensive training program in science communication for mid-career academic environmental scientists. Participated in trainings to promote effective communication with the media, policymakers, and the public.

**Commentator** discussing my research findings and related research, 2004- present

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Radio:

- BBC World Service; KRCB, Santa Rosa, California; KVON, Napa, California (live); Adelaide Public Radio, Australia (live)

TV/Video:

- The Weather Channel; Bay Area NBC-11; “California: On the Front Lines of Global Warming,” Union of Concerned Scientists. <http://www.fancyfilm.com/UCS/UCS.html>

Print:

- *On Earth; The Economist; Wine Spectator; Bay Nature Magazine, Stanford Magazine; InterAction; Los Angeles Times; Contra Costa Times (CA); Sonoma Index-Tribune (CA); Santa Rosa Press Democrat (CA); Napa Valley Register (CA); St. Helena Star (CA); Forecast: How Climate Change Will Impact Politics, War, the Economy, and Where We Can Live*, by Stephan Faris; Living Through The Storm: Our Future Under Global Warming, by Mark Hertsgaard (forthcoming).

## Professional Service and Additional Information

12/08-present **Editorial Board Member**, *Agriculture, Ecosystems, and Environment*

11/07-present **Invited member**, UNESCO “Culture et Traditions du Vin” Researchers

03/06- 05/07 **Appointed member, Climate Science Faculty Search Committee**, Stanford University.

Reviewed applications and participated in selecting, scheduling, and interviewing of candidates. Informed graduate and undergraduate students about the search and solicited and conveyed their input on candidates. Participated in hiring decision.

12/03- 05/05 **Member and Chair, Graduate Student Advisory Committee**, School of Earth Sciences, Stanford University.

Liaison between graduate students in five programs and departments within the School of Earth Sciences and the Office of the Dean. Initiated presentation of the School’s Strategic Plan to graduate students, and quarterly Town Hall Meetings to facilitate student-administration communication. Planned and carried out School-wide academic, strategic, and social events, including initiating an annual Research Review of graduate student research. Achieved increased summer funding opportunities for graduate students, increased teaching opportunities across departments, and student input in faculty searches.

1999-2001 **Appointed member, Philadelphia Recycling Advisory Committee**, Philadelphia, PA.

### Professional Memberships

- American Geophysical Union, 2001- present.
- Earth Science Women’s Network, 2004- present.
- Ecological Society of America, 2005- present.
- American Society for Enology and Viticulture, 2005- present.
- Association of American Geographers, 2008- present.

### Peer-reviewed Referee

- *Proceedings of the National Academy of Sciences; Agriculture, Ecosystems, and Environment; Climatic Change; Ecological Applications; Earth Interactions; American Journal of Enology and Viticulture; IPCC Fourth Assessment Report of Working Group II (Chapter 4: Ecosystems)*

### Policy and Technical Paper Referee

- *Interactive Market, Strange Days on Planet Earth. 2008. <http://www.pbs.org/strangedays/>*
- *Northeast Climate Change Impacts Assessment: Agriculture, 2006.*
- *Climate Change in California: Health, Economic, and Equity Impacts. Redefining Progress, 2006.*
- *Air Quality Chapter, Code of Sustainable Winegrowing, 2005*

### Language Skills

- Proficient in Spanish; intermediate French.