

CONSERVATION INNOVATION GRANTS FINAL REPORT

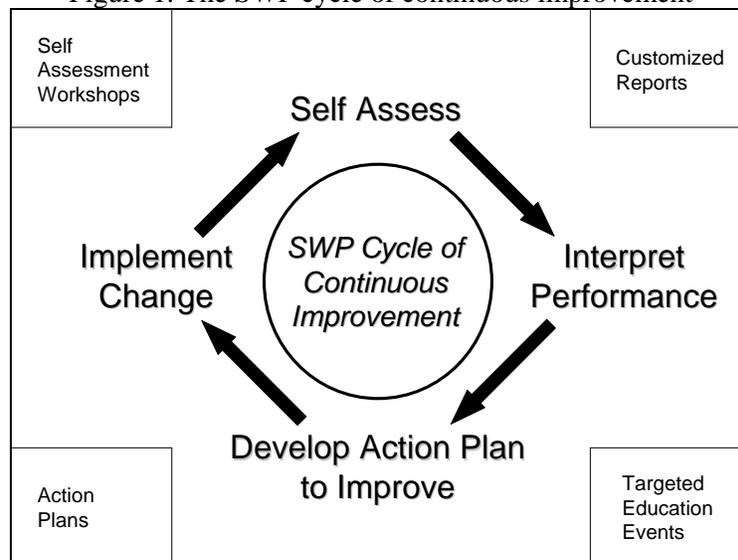
Grantee Name: California Sustainable Winegrowing Alliance	
Project Title: California Code of Sustainable Winegrowing Practices – Innovations for Air and Water Quality	
Project Director: Jeff Dlott	Project Manager: Joe Browde
Period Covered by FINAL Report: October 1, 2004 – January 31, 2008	

Summary of Project Activities:

The California Sustainable Winegrowing Program (SWP) began in 2001 as an initiative to promote and adopt “ground to bottle” sustainable practices for producing grapes and wine. Leadership is provided by the California Sustainable Winegrowing Alliance (CSWA), a non-profit organization represented by the two major statewide associations affiliated with California grapes and wine – Wine Institute and the California Association of Winegrape Growers.

The CSWA advocates winegrowing operations that balance the three E’s or principles of sustainability – **E**nvironmentally Sound, **S**ocially **E**quitable, and **E**conomically Feasible. To date, the SWP does not include performance-based certification. Instead, the program relies on its iterative self-improvement model (Figure 1), the “cycle of continuous improvement,” designed to ensure confidentiality, extensive voluntary participation, and collective progress along the continuum of sustainability. The cycle consists of self-assessment, the interpretation of performance, action planning, and the implementation of change. An extensive partnership network helps facilitate these interrelated activities.

Figure 1. The SWP cycle of continuous improvement

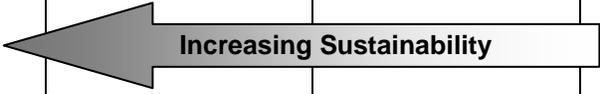


The cycle’s centerpiece is the *Code of Sustainable Winegrowing Practices Self-Assessment Workbook* covering a broad range of farming and winemaking practices in 14 chapters – Viticulture, Soil Management, Pest Management, Vineyard Water Management, Winery Water Management, Wine

Quality, Ecosystem Management, Energy Efficiency, Waste Management, Environmentally Friendly Purchasing, Material Handling, Human Resources, Neighbors and Communities, and Air Quality. The Air Quality chapter was developed with funds from this Conservation Innovation Grant (CIG). Each chapter includes criteria (specific management areas) for evaluating practices using a four-category measurement system (Table 1). Participants submitting assessments receive reports displaying their performance against regional and statewide averages. Individualized reports constitute the framework for evaluation and improvement. Follow-up targeted education complements assessment and action planning by emphasizing areas most needing improvement. Peer-to-peer education and presentations by external experts is used to extend information at field meetings, workshops, and seminars.

Table 1. Criterion 16-6 from the Air Quality chapter exemplifying the four-category measurement system

AIR QUALITY				
Criteria	Category 4	Category 3	Category 2	Category 1
16-6 Pesticide Stewardship	I never use fumigants* <i>And</i> I follow recommended practices for dust (e.g., sulfur) and liquid applications to minimize PM10 and drift** <i>And</i> I am familiar with and avoid use of pesticides associated with higher VOC emissions (see Box 16-13) <i>And</i> Applicators are trained about pesticide issues relevant to air quality and training includes written material.	I never use fumigants* <i>And</i> I follow recommended practices for dust (e.g., sulfur) and liquid applications to minimize PM10 and drift** <i>And</i> I have some understanding of pesticide products associated with higher VOC emissions (see Box 16-13).	I only use fumigants to address verified biological problems* <i>And</i> I follow recommended practices for dust (e.g., sulfur) and liquid applications to minimize PM10 and drift**.	I choose and apply pesticides without considering impacts to air quality other than following legal requirements.



This CIG project fit into the broader program by funding elements to increase the adoption of practices for improving air quality and water conservation and quality (Attachment A). Objectives were: 1) develop, print, and refine an Air Quality chapter for the workbook, 2) modify, upgrade, and support SWP software to determine EQIP eligibility, 3) establish, maintain, and enhance demonstration vineyards, 4) create and disseminate targeted education materials and conduct action-plan workshops, and 5) develop methods for ascertaining and then document CIG impacts. The following details activities by objective during the course of the project, October 1, 2004 – January 31, 2008 (includes no-cost extension).

Objective 1– Develop, print, and refine an air quality chapter for the self-assessment workbook.

The Air Quality chapter was completed in September 2005. The finished content is a result of vast collaboration among CSWA staff and consultants, external technical experts (Attachment B), and the Sustainable Winegrowing Joint Committee – a group of 50 experienced and highly respected growers and vintners. The chapter includes 10 key criteria and associated practices categorized by increasing sustainability, 17 educational boxes, numerous resource links, and other guidelines and information to

measure performance and help growers and vintners exceed regulatory compliance in mitigating emissions of criteria air pollutants and greenhouse gases. The 10 air quality criteria are listed below.

- 16-1 Planning, Monitoring, Goals, and Results
- 16-2 Vineyard Floors
- 16-3 Unpaved Surfaces – Roadways and Traffic and Equipment Staging Areas
- 16-4 Irrigation
- 16-5 Pest Management Strategy
- 16-6 Pesticide Stewardship
- 16-7 Agricultural and Winery Chemicals and Materials
- 16-8 Energy Sources and Efficiency
- 16-9 Transportation
- 16-10 Agricultural Burning

Paper copies of the Air Quality chapter were used for grower and vintner assessments during September 2005 to November 2006. During this interval, the chapter content was reviewed and refined to produce a second edition. The refined chapter was incorporated into the second edition of the *Code of Sustainable Winegrowing Practices Self-Assessment Workbook* released in November 2006 and the web-based assessment and reporting system (via www.sustainablewinegrowing.org) launched in December 2006. CIG funds supported the production of the first and second editions of the Air Quality chapter; production and printing of the second edition of the workbook; and the design, development, and implementation of the online system.

Objective 2 – Modify and support the SWP software and reporting process to enable winegrape growers to simultaneously determine EQIP eligibility based on NRCS requirements.

A significant challenge was to modify the SWP assessment and reporting software so workbook criteria could be linked to NRCS practice standards. This was achieved through partnership with California NRCS leads Diane Holcomb (NRCS State Resource Conservationist), Daniel Mountjoy (NRCS Assistant State Conservationist – Field Operations), Rita Bickel (NRCS State Conservation Agronomist), and other NRCS regional and county leads. A reporting option was developed and is being used to align NRCS practice standards with relevant SWP assessment criteria ranked by grower performance. This advance in customized reporting benefits NRCS and CSWA by highlighting NRCS support and technical capabilities, increasing awareness and use of EQIP cost-share, and simplifying and streamlining EQIP (and potentially CSP) application and conservation planning processes. Use of this reporting option enables growers to rapidly adopt practices to protect natural resources and progress their performance in sustainability.

Key to increasing participation in and the value of the SWP and its cycle of continuous improvement has been the integration of second edition workbook content, the assessment and reporting software, and supplemental educational information and links into an interactive, web-based format (Figures 2-5). The new web-based system provides participants with a user-friendly and rapid means to assess and quantify their performance (including comparisons among blocks/vineyards or years), secure additional information and assistance (e.g., applicable NRCS practice standards and incentive programs), and develop and share action plans.

Figure 2. New online environment



Figure 3. Online self-assessment

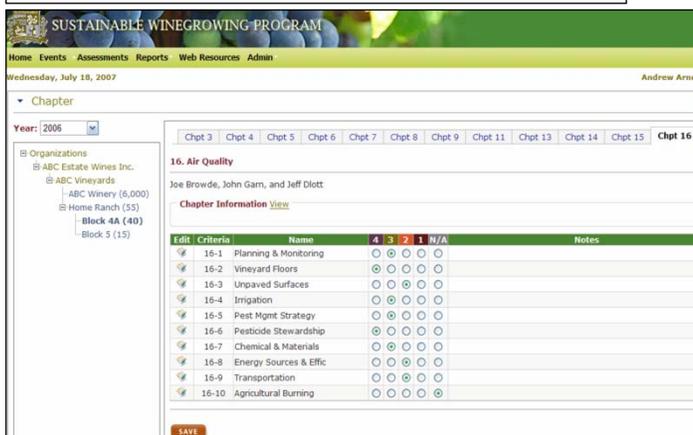


Figure 4. Online reporting of performance

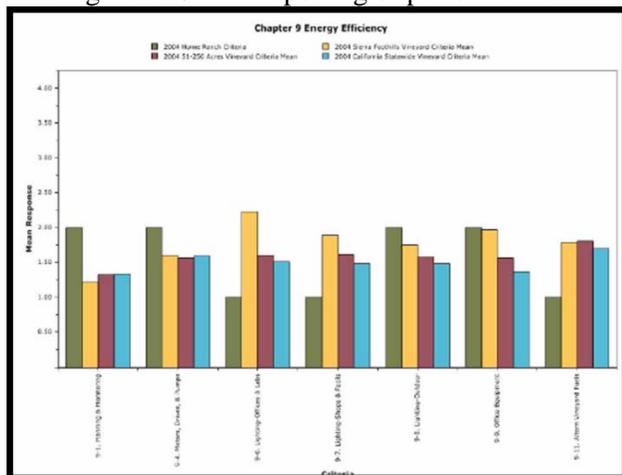


Figure 5. Online linking NRCS practices to SWP criteria

NRCS Practices and Associated SWP Criteria			
Year	2006		
Vineyard/Block or Winery Name	Block 4A		
County	Sonoma		
NRCS Practice	SWP Criteria	SWP Ranking	Ranking Description
311-Alley Cropping	3-19. Habitat Conservation	3	During vineyard establishment and/or development, habitat was impacted but buffers of 30 or more feet were maintained to minimize the disruption.
	3-20. Habitat Creation	3	Some native plants were established and resident vegetation was allowed to grow in non-crop areas (e.g., fence lines, ditchbanks).
	16-2. Vineyard Floors	3	I am knowledgeable about soil management practices for mitigating airborne dust and PM10 And I implement a soil conservation plan that includes cover cropping, reduced tillage, and one or more other practices.
322-Channel Vegetation	3-19. Habitat Conservation	3	During vineyard establishment and/or development, habitat was impacted but buffers of 30 or more feet were maintained to minimize the disruption.
327-Conservation Cover	3-19. Habitat Conservation	3	During vineyard establishment and/or development, habitat was impacted but buffers of 30 or more feet were maintained to minimize the disruption.
	3-20. Habitat Creation	3	Some native plants were established and resident vegetation was allowed to grow in non-crop areas (e.g., fence lines, ditchbanks).

Objective 3 – Establish, maintain, and enhance air and water quality demonstration vineyards throughout California to showcase innovative technologies and practices featured in the workbook.

Nineteen demonstration vineyards were established across California’s winegrowing regions (Table 2) and used as venues and models for showcasing and discussing vineyard practices and partnership opportunities (EQIP, CSP, and other conservation options and agreements) related to water and/or air protection. Displayed technologies and practices corresponded to those detailed as more sustainable in

the workbook. Demonstration vineyards were positioned based on regional concerns and needs (Attachment C), e.g., impaired watersheds, or non-attainment areas for the criteria air pollutants ozone and/or particulate matter (PM10/2.5). The number of demonstration sites increased over time to ensure a wide geographical distribution of sites, increase the diversity of practices/technologies shown, and maximize project exposure and impact.

Over the course of the project, 22 field meetings targeting air and/or water protection were held at demonstration vineyards, where grower-cooperators displayed and characterized their sustainable practices. Additionally, at inside venues (workshops and seminars), cooperators served as spokespersons to champion sustainability and describe specific practices for protecting natural resources, especially air and water.

Objective 4 – Create targeted education materials and facilitate action-plan workshops throughout California (utilizing demonstration vineyards) to encourage widespread adoption of recommended practices related to air and water quality.

Numerous preexisting materials relevant to air and water protection were distributed widely at educational events. These materials include NRCS technical sheets, California Department of Pesticide Regulation handouts about air quality and pesticides, regional water board and water quality coalition publications, Coalition for Urban and Rural Environmental Stewardship pamphlets, and other pertinent compositions.

The most important educational tools developed and used during the project are the second edition of the self-assessment workbook and the associated online assessment and reporting system. For the workbook, additions and improvements relevant to water and air issues were made throughout its many chapters, criteria, practices, educational boxes, and links. Besides the Air Quality chapter, the second edition includes a new criterion and educational box for mitigating erosion from roads, ditches, and culverts and enhanced resource sections for air and water quality. All workbook content is incorporated into the online system, with direct links to online resources for additional information. These two key achievements continue to generate enthusiasm, further increasing grower and vintner exposure to and the adoption of more sustainable practices.

Other educational materials developed using project funds (Attachment D) include three trade articles, one conference paper, and the *2006 California Wine Community Sustainability Progress Report*. The trade articles are “Improving Air Quality” in *Practical Winery & Vineyard* and “Characterizing the California Sustainable Winegrowing Program” and “Air Quality – The Latest Frontier for Sustainable Winegrowing” in *CAPCA Adviser*. “Application of a Behavioral Change Model for Improving the Sustainability of California Winegrowing” was prepared for the 2007 National Conference on Agriculture and the Environment (Monterey, CA). These compositions detail the CIG project and specific practices for protecting natural resources and were distributed widely to growers and other agriculturalists across California and nationally. The *2006 California Wine Community Sustainability Progress Report*, released at a press conference on December 7, 2006, highlights progress by the SWP and characterizes the CIG project and achievements.

Over the course of the project, 74 events (field meetings, workshops, and seminars) with an estimated 3,861 attendees (mostly growers and pest control advisors) were held across California’s winegrowing regions that involved targeted education about issues and practices relevant to air and water protection (Table 2). Topics included air and water laws and regulations; road design and maintenance; vineyard and winery energy efficiency; alternative energy sources (e.g., biodiesel and solar) and low-emission engines; carbon sequestration; diesel engine upgrades and conversions; alternatives to burning; customized cover cropping and other vegetative enhancements; low-drift and targeted canopy sprayers;

environmentally friendly weed and vineyard floor management equipment; stream and riparian area restoration and management; buffers; filter strips; integrated pest management tactics and pesticide characteristics; nutrient analyses and decision making; and EQIP, CSP, and other incentive programs for natural resource protection.

The numerous partners involved in extending information at events include NRCS, Sustainable Conservation, University of California Cooperative Extension, California State University, farm bureaus, non-government organizations, private companies, agricultural consultants, and experienced growers and vintners. Attachment E includes agendas from some of these events.

Table 2. Targeted educational events for air and/or water protection

Region	Targeted Education Events		Number of Events	Number of Attendees
	Counties	Demonstration Vineyards		
North Coast	Sonoma Lake Napa Mendocino	Clos du Bois Vineyards (Geyserville) Lagomarsino Estate (Healdsburg) Bloomfield Ranch (Sebastopol) Dehlinger Winery (Sebastopol) Benziger Winery (Glen Ellen) Crimson Hill Vineyard (Lower Lake) Adobe Creek Ranch (Finley) Page-Nord Vineyard (Napa) McNab Ranch (Ukiah)	36	1,718
Central Coast	Monterey San Luis Obispo Santa Barbara		9	342
Northern Interior	San Joaquin	Bokisch Ranch (Victor) McManis Vineyard (Ripon)	7	283
Sierra Foothills	Amador		1	14
S Francisco Bay	Contra Costa Santa Clara Alameda		4	123
Central Valley	Stanislaus Madera Fresno Tulare	Modesto Jr College (Modesto) Yonan Ranch (Keyes) Schafer Ranch (Madera) Fasi Ranch (Madera) Red Rock Ranch (Five Points) California State University (Fresno) Shannon Ranch (Dinuba) Shannon Ranch (Visalia)	17	1,381

Objective 5 – Develop methods and document project impacts through the collection and reporting of results.

The 10 criteria and associated metrics for the Air Quality chapter were developed to measure grower and vintner baseline performance and progressive adoption of sustainable practices for protecting air. These criteria, metrics, and supportive educational information were incorporated into the second edition of the workbook and the web-based system. The new erosion criterion (4-16 Erosion from Roads, Ditches, and Culverts) complements the original 45 criteria relevant to water conservation and quality for vineyards from workbook chapters 3 (Viticulture), 4 (Soil Management), 5 (Vineyard Water Management), 6 (Pest Management), and 8 (Ecosystem Management). Together, these 46 criteria (Figures 6a-b) provide a broad coverage of recommended grower practices for conserving and improving the quality of water. During the course of the project, 45 self-assessment workshops were conducted that included assessments against the air- and water-related criteria. Many other growers and vintners assessed their operations outside of workshops using the online system. The new workbook and online system continue to be used to facilitate the collection of self-assessment data and reporting of results.

To document project impacts on grower performance for the water-related criteria, assessment data collected before (2002-04; 661 assessed vineyards/blocks by 484 vineyard organizations over 131,990 acres) and after (2004-08; 408 assessed vineyards/blocks by 264 vineyard organizations over 86,332 acres) the start of the CIG project were compared.

Performance increased for 39 of the 45 original criteria (Figures 6a-b). Moreover, greater increases were noted for many criteria that include practices addressed during targeted education events – 4-1 Petiole Analysis (8%); 4-4 Nutrient Management (10%); 4-5 Nitrogen Management (6%); 4-12 Non-Point Source Pollution Prevention (7%); 4-14 Cover Crops and Soil Quality (9%); 5-3 Off-Site Water Movement (5%); 5-7 Flow Meters (18%); 5-10 Evapo-transpiration (22%); 6-4 Use of Reduced-Risk Pesticides (6%); 6-34 Pesticide Drift (6%); 8-3 Water Cycle (7%); 8-4 Nutrient/Mineral Cycles (14%); 8-8 Watershed Management (7%); 8-9 Enhancing Habitat by Vegetation Management (12%); 8-18 Wildlife and Pesticides (6%); and 8-20 Sensitive Species and Collaboration with Agencies (15%).

Data collected before the CIG project (2002-04) also were used to establish the initial statewide benchmarks in the *California Wine Community Sustainability Report 2004*. This report set a statewide goal of 20% improvement by 2009 for workbook criteria averaging less than 3 (1 to 4 scale; 4 is highest). The quantified improvements in grower performance for the water-related criteria noted here substantiate marked progress towards the 2009 goal and the positive impact of the targeted education.

From 2005 to 2008, a total of 224 vineyard organizations assessed 357 vineyards/blocks over 83,497 acres against criteria from the Air Quality chapter. Collected data were used to benchmark statewide grower performance (Figure 7). Certainly, the project's targeted education in air quality during this same interval affected results. Performance was highest for criteria associated with vineyard floor management (16-2), irrigation operations (16-4), pest management (16-5 and 16-6), and agricultural burning (16-10). However, results indicate that improvement is warranted for all criteria, especially 16-1 Planning, Monitoring, Goals, and Results; 16-8 Energy Sources and Efficiency; and 16-9 Transportation. The CSWA will apply these results to target future educational needs.

Significant Project Results:

- Composition, publication, and application of the ground-breaking Air Quality chapter for the *Code of Sustainable Winegrowing Practices Self-Assessment Workbook* (objective 1)
- Design, development, and implementation of the online self-assessment and reporting system, including a reporting option that aligns SWP assessment criteria with NRCS practice standards and EQIP (and possibly CSP) cost-share opportunities (objective 2)
- Establishment and use of 19 demonstration vineyards (with grower spokespersons) for extension of cost-effective information for increasing the adoption of technologies and practices relevant to air and water protection (objective 3)
- Development, distribution, and application of the second edition of the *Code of Sustainable Winegrowing Practices Self-Assessment Workbook*, including a refined Air Quality chapter; a new criterion and information for erosion from roads, ditches, and culverts; improved educational links; and other updated content (objective 4)
- Conduct of 74 targeted education events (field meetings, workshops, and seminars) with 3,861 attendees for showcasing and discussing specific practices pertinent to air quality and water conservation and quality (objective 4)
- Composition and publication of three trade articles, one conference paper, and the *2006 California Wine Community Sustainability Progress Report* that characterize the project and its achievements (objective 4)
- Conduct of 45 self-assessment workshops to collect data for documenting grower and vintner performance against criteria relevant to air and water protection (objective 5)
- Documentation of improved grower performance for 39 of 45 water-related criteria with greater increases noted for many criteria addressed by targeted education (objective 5)
- Benchmarking of grower performance against air quality criteria to highlight strengths and target post-project educational needs (objective 5)

Conclusion and the Transferability of Results:

Through this CIG project, NRCS made an investment to improve air quality and water conservation and quality, as affected by California winegrowing. Significant project activity resulted in marked accomplishments associated with this goal, e.g. the production of the second edition of the *Code of Sustainable Winegrowing Practices Self-Assessment Workbook* with the ground-breaking Air Quality chapter and the conversion to an online self-assessment and reporting system that includes a reporting option for aligning SWP and NRCS practices. The availability and use of the new workbook and online system, combined with value-added targeted education and self-assessment activities, generated enthusiasm among California's winegrowing community, extensive program participation, and an increased appreciation of SWP benefits. Most importantly, by applying elements of the SWP cycle of continuous improvement to air and water protection, grower performance improved for most self-assessment criteria pertinent to water conservation and quality. This achievement substantiates the use of this cycle for inducing change and as a "transferable" voluntary self-improvement model for other agricultural commodities pursuing sustainable agriculture and natural resource conservation. CSWA will direct future targeted education to improve grower performance against the benchmarks established here for the air quality criteria. As evidenced by this project, the CSWA and the California winegrowing community continues to demonstrate leadership in sustainable agriculture by balancing the economics of producing exceptional grapes and wine with high standards for environmental quality, human health, and social responsibility.

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