CONSERVATION INNOVATION GRANTS
FINAL REPORT

Grantee Name: SureHarvest	
Project Title: The Stewardship Index for Specialty Crops	
Period Covered by FINAL Report: October 1, 2009 – March 31, 2011	

Summary of Project Activities:

As the sustainability landscape has progressed over the past five years, there has been increased emphasis on quantifying "sustainability" within individual business operations as well as for products themselves. In December of 2008, a diverse group of 30 growers, trade association leaders, retail and food service companies, food processors, and NGO's launched the Stewardship Index for Specialty Crops (SISC). The initiative was motivated by: 1) a desire to avoid duplicative reporting and auditing requirements from buyers to growers as had occurred in the response to food safety; 2) a recognition of the need to measure the environmental and social impacts in the specialty crops supply chain; 3) a recognition of the limitations of practice-based approaches to sustainability that do not allow for flexibility and innovation within a farm-specific context; and 4) the desire to create a system in which all operators could participate regardless of their original level of performance.

The SISC initiative is an ambitious and unprecedented undertaking involving a multi-stakeholder governance structure to define sustainability performance metrics within the scope of the entire specialty crop agri-food supply chain. Additionally, sustainability discussions have historically focused on qualitative practices used for crop production, manufacturing, etc. and SISC added a quantitative element driven by data collected for business operations.

This Conservation Innovation Grant (GIG) project was a multi-stakeholder initiative to develop a system for measuring sustainability performance throughout the specialty crop supply chain. The project funded a critical and historic opportunity for a collaborative effort between diverse and influential stakeholders to proactively define a suite of outcomes-based metrics to enable operators at any point along the supply chain to benchmark, compare, and communicate their own performance. In contrast to other broad sustainability "standard" initiatives, SISC does not seek to provide standards, but will instead provide a yardstick for measuring sustainable outcomes. In the future, SISC hopes to also provide tools and resources to help specialty crop companies advance sustainability goals.

This CIG project fit into the NRCS Water Resources focus area by developing metrics for water use, water quality, pesticides, nutrients, and soil quality. Objectives were: 1) complete draft metrics for sustaining air quality, biodiversity and habitat, community, energy, GHG emissions, human resources, plant nutrients, packaging, pesticides, soil quality, waste, water quality, and water use; 2) demonstrate through pilot projects that using SISC sustainability metrics can improve conservation performance and provide value to supply chain participants; and 3) establish industry-wide consensus on a tool or protocol for voluntary sustainability reporting in the specialty crop sector. The following details activities by objective during the course of the project, October 1, 2009 – March 31, 2011.

Objective 1: *Complete draft metrics for sustaining air quality, biodiversity and habitat, community, energy, GHG emissions, human resources, plant nutrients, packaging, pesticides, soil quality, waste, water quality, and water use.*

Personnel from the three organizations funded by the grant, SureHarvest, Natural Resources Defense Council, and Western Growers, provided the staffing for the SISC project. A governance structure and process was established to manage the overall objectives of the project.

- A Coordinating Council (CC) of 35 members was formed at the beginning of the project with approximately equal representation from the following stakeholder groups: Growers, Suppliers, and Trade Associations; Buyers and Trade Associations; and Environmental and Public Interest Groups. (See Attachment A for a list of the current CC members.) The CC was responsible for approving the readiness of the draft metrics for pilot testing as well as determining the final "Beta" metrics when the pilot testing was completed. A process document was drafted by the CC to guide all aspects of the project.

- A Steering Committee (SC) of 6 members (two from each stakeholder group) was formed to be the high-level project management team. The SISC staff worked closely with the SC on project planning, project issue resolution, CC meeting planning, and broad advice on metric and supply chain dynamics.

- A Metric Review Committee (MRC) was formed through an open process so that any interested party could join. There are currently 560+ MRC members. (See Attachment B for the list of organizations/businesses represented by the members.) An MRC Workgroup, including experts from throughout the food supply chain, was formed for each resource area for which one or more metrics was to be drafted and pilot tested. It was the job of the MRC Workgroup to draft the metrics for their assigned resource area and then, once the pilot testing was completed, evaluate the usability of the metric(s). When there was consensus within an MRC Workgroup that a metric was ready for pilot testing, they notified the CC for its approval. More than 50 webinars were convened by the various MRC Workgroup coordinators to draft the metrics.

Communications Mechanism

Process transparency and both external and internal communications were critical to keep the broad group of SISC participants as well as the public informed on the project progress. MRC workgroup coordinators were recruited to take metric discussions from initial ideas to a suite of draft metrics ready for piloting. Some metrics were less controversial than others and quickly passed through the process while others such as the pesticide and human resources metrics made initial progress and then were slowed down and finally tabled due to impasses in the definition of the metrics themselves. Healthy discussion was key to the effort, but despite strong facilitation efforts, science and ideological differences could not be avoided.

Important to the effort was the development of the SISC website (www.stewardshipindex.org) to facilitate the above structure and process and to provide status updates for internal and external audiences. The website was similar to foundational needs of the Field to Market (www.fieldtomarket.org), ANSI Sustainability Standard (http://www.leonardoacademy.org/programs/standards/agstandard.html), and The Sustainability Consortium (www.sustainabilityconsortium.org) initiatives for metric/standard development. To encourage a greater level of transparency and active dialogue among MRC members and others visiting the SISC website, a significant amount of work was done midway through the project to improve the website's utility. Changes to the site included:

- improved layout and design

- ability to receive email alerts when documents, comments, or events are posted
- improved facility to post comments for the MRCs and SISC staff
- easy registration to participate in MRCs
- improved functionality for registered SISC MRC members regarding all aspects of metrics development, reporting, and communications among members

The SISC site was also used to recruit MRC members and pilot participants. Attachment C has sample pages from the SISC website.

A quarterly newsletter was instituted to improve communications with the MRC workgroups. It is emailed to all MRC members and also posted on the SISC website.

Metrics Development
Grant partner Natural Resources Defense Council played a crucial and leading role in organizing the metric development effort, coordinating many of the MRC metric efforts, and reaching out to NGO groups to participate in the process.

While the MRC sign-ups numbered over 560, the actual number of individuals that actively participated in the MRC process via webinars was approximately 20-25% of that number. Many individuals signed up to monitor the progress of the initiative, receive email on the project, and to gain access to the private SISC site with metric development documents and comments. Technical experts were recruited for the MRC workgroups as necessary. A total of 35 webinars were held during the grant period.

The table below shows the status of the various metric areas. Some metric areas only had one metric (e.g., energy was Btu's per unit of production) while others had two or three sub-metrics. While SISC strived to create quantitative performance-based metrics, the biodiversity/ecosystems MRC added practice-based metrics for best management practices that contributed to improved biodiversity in both cropped and non-cropped areas. The potential for more practice-based metrics (e.g., a "score" based upon Integrated Pest Management practices employed) was opened up based upon a CC decision. The list of the actual on-farm and non-farm metrics is presented in Attachment D.

Table 1. SISC metric status

Metric	***Status***
Air Quality	Both on-farm and non-farm piloted in 2010
Biodiversity/Ecosystems	On-farm piloted in 2010
Energy	Both on-farm and non-farm piloted in 2010
Pesticides	Limited on-farm piloting due to MRC disagreements on metric definition; SISC put this metric on hold for future deliberation
Soil, Nutrients, and Water Quality	On-farm piloted in 2010
Waste	Both on-farm and non-farm piloted in 2010
Water use	Both on-farm and non-farm piloted in 2010
Human Resources	Conflicts in metric definition being resolved; new facilitators appointed
GHG Emissions	On-farm "proof of concept" in progress via the Sustainable Food Lab Cool Farm Tool; Non-farm piloted in 2010
Packaging	Metric development coordinators have been appointed and the MRC process started
Community	Has not been started

Non-farm metrics took a lower priority in the MRC process as the CIG grant was focused on grower-oriented metrics. Because packer/shippers and food processors are intimately involved with growers and there is an increased need to collect information on the sustainability of their crop suppliers, a set of metrics was developed for this supply chain sector. There was also a need to convey to growers that measuring sustainability was not "falling only on their backs," but was of interest to the entire supply chain.

Challenges Encountered

As mentioned above, the MRC process was not always perfect. The following is a list of metric areas that encountered problems and a brief description why.

Pesticides – As defined, this metric focused only on pesticide risk; MRC could not agree that science, toxicity, and pesticide use adjustment factor algorithms had been peer reviewed thoroughly; MRC decided to re-establish goals for the metric

Human Resources – Social metrics are proving difficult to develop; insufficient progress on fair wage and right-to-organize discussions caused several stakeholders to disengage from the process

GHG Emissions (on-farm) – The science of the biogeochemical element of on-farm GHG models is still evolving and there are several modeling tools in development; much discussion was held on the different approaches to calculate GHG emissions and their relative accuracies; inclusion of GHG emissions from compost and manure soil amendments was also debated

Biodiversity/Ecosystems – Quantifying the impact of best management practices is a difficult task but research and on-farm experience shows that many have a directionally positive impact on resources. (The Sustainability Consortium calls these Sustainability Performance Indicators.) This MRC decided to add two practice-based scores to their set of sub-metrics. The practices had a strong correlation to NRCS Conservation Practices.

Lessons Learned

The following lessons were learned during the metric development process:

- It was clear that the project management processes needed to be very well defined and as transparent as possible so that everyone understood what was being done and why. In hindsight, in a multi-stakeholder initiative with a broad reach via the MRC process, it was imperative to over-communicate with the constituents.
- MRCs should have recruited additional experts earlier in the process.
- The somewhat low turnout on webinars was probably related to lack of time to commit to the MRC process and not due to lack of interest. The concept of initiative "fatigue" is real as several groups are developing similar metrics in parallel.
- Metrics to measure some outcomes, such as water use and nutrient use, are much more straightforward to develop than others, such as human resources and biodiversity/ecosystem management.
- Non-farm metrics are more generic and straightforward due to the nature of the businesses and data collection capacity within those businesses. SISC will need to re-evaluate how to participate with other metric initiatives to complete this supply chain-wide sustainability performance element of its vision.

Objective 2: *Demonstrate through pilot projects that using SISC sustainability metrics can improve conservation performance and provide value to supply chain participants.*

As a key step in any scientific process of invention, the purpose of pilot testing is to advance learning. The CC wanted to give the metrics a "test flight" in the fields and farming operations by growers and processors as the "test pilots" and ask them for feedback in order to improve the metrics design.

The SISC Pilot Program was focused on learning the answers to these key questions:

1. Data Availability: How readily available is the data for completing the metrics? Are growers currently collecting the data? How is the data collected? Is it easily accessible?
2. Practicality: Do the metrics make practical sense to growers?
3. Usefulness: Will the metrics provide growers with useful information to better monitor and manage their farming operation?
4. Feedback: What other concerns, ideas, and feedback do growers have about the sustainability metrics? What is the risk that the metrics will create unintended consequences or undesired incentives? Will the metrics address the needs of their buyers?

A Pilot Testing Committee was formed of CC members to oversee the development and implementation of the metric Pilot Testing program. SureHarvest managed the pilot process with assistance from the Natural Resources Defense Council on the non-farm element.

Pilot Recruiting

Recruitment of producers and producer groups for the pilot testing project continued during the first 12 months of the project via face-to-face presentations, phone, and email. Grant partner Western Growers played an important role recruiting grower participants in California as well as speaking at other national grower gatherings to promote participation in the pilots. The following companies/organizations agreed to provide in-kind matching funds through their piloting efforts: California Sustainable Winegrowing Alliance, Del Monte Foods, Driscoll's Strawberry Associates, Del Cabo/Jacobs Farms, IPM Institute, Markon Cooperative, National Potato Council, Sodexo, Stemilt Growers, Sunwest Fruit Company, and Wada Farms.

Pilot participant recruitment was similar to a marketing and sales campaign – we had a maximum "commitment" of approximately 110 growers who, after hearing a presentation on the SISC initiative and pilot overview, said they would participate in the pilot and submit data for one or more of their fields. (This number would have exceeded the goal of at least 100 producers participating in the pilot testing stated in the grant contract.) As the harvest ended and we reached out to growers to ask when they would be sending in data, it became clear that our "closing" statistics would be lower than anticipated. In the end, 38 growers submitted data. Growers gave the following reasons for not sending in data: lack of time, data not as easy to gather as they thought, waning interest in the metric concept (i.e., not being able to answer the question "what's in it for me?"), and concerns over who would see their data. These value proposition issues need to be addressed in the next round of piloting.

Pilot testing participants were asked to provide two types of data for each metric: data for the metrics themselves ("performance data") and also feedback on the usability of the metric, ease of data collection, and cost of data collection ("process data"). These data were to be shared on a limited basis with CC and the MRCs in order to refine each of the metrics in preparation for the CC's approval for use of the metric in the supply chain. To ensure data confidentiality for individual producers participating in the pilot testing, SISC developed a data confidentiality policy. Through this policy, all data and results from pilot participants were anonymized. Lessons learned, anecdotes, and other learnings from the process data were shared with MRC workgroups. In addition, the anonymized performance data was also shared with CC members. A Non-Disclosure/Data Confidentiality agreement was developed for growers and CC

members to signify the importance of data security and to describe the data anonymity scheme. The agreement was finalized and approved by the CC in September prior to data submission.

Pilot Process

Once draft metrics were approved by the CC, a 46-page SISC On-Farm Pilot Testing Binder and an accompanying Excel data collection workbook were finalized for distribution to potential pilot participants. The binder sections included: 1) an overview of the pilot testing project, including goals and purpose; 2) a description of the pilot testing process; 3) data collection instructions for the metrics and how the binder is laid out; 4) a data collection form for high level data such as company name, company contact, field name, field location, etc.; 5) sections for each SISC resource area and the metric(s) for that area, including entry forms for the data required for that metric, a guide to data requirements, notes that may aid in collecting data for the metric, and a feedback form with questions about the availability of the data, difficulty and cost in collecting the data, usefulness of the metric in their farming operations, and suggestions for improving the metric. (Attachment E has sample pages from the binder.) The Excel workbook was created for those growers wanting to submit their pilot testing data electronically. (Attachment F has a sample sheet from the workbook.) A similar SISC Non-Farm Pilot Testing Binder was created for packer/shippers and processors. A lower priority was placed on the non-farm pilot and the binders were mainly used for discussion purposes and to obtain feedback on the metric from a small number of businesses.

Each producer was oriented to the pilot process by SureHarvest staff via face-to-face meetings, telephone calls, or webinars. Figure 1 shows that a total of 66 orientation sessions were carried out by SISC staff from April to November, 2010. Over the course of the growing season, SureHarvest staff also made several follow-up contacts with each producer to ensure any piloting questions were answered.

Figure 1. SISC pilot recruiting/orientation sessions

Month (2010)	***Face-to-face***	***Phone***
April	11	6
May	3	11
June	3	6
July	6	1
August	1	1
Sept	3	3
Oct	3	5
Nov	2	2
Total	31	35

Growers selected one or more fields to collect data from for the 2010 growing season. In addition, space for 2009 data was included for those inclined to provide two years of data (10 growers did this). We suggested that growers collect data for all the metrics but could select fewer if desired. Growers then collected and recorded data as well as the feedback forms and submitted them to SureHarvest. The deadline for submission was October/November 2010 so that metric calculations could be completed and reports generated by December/January. Achieving this timeline would have allowed for pilot findings and feedback to be conveyed to the CC and MRCs so metrics could be appropriately modified for the planned 2011 pilot.

Pilot Results

Despite the challenges in getting the targeted number of growers to submit data sets, a significant number of growers did submit data for metric calculations. A total of 38 growers from 8 states (Figure 2) representing 18 crops (Figure 3) submitted pilot data.

Figure 2. States with submitted data

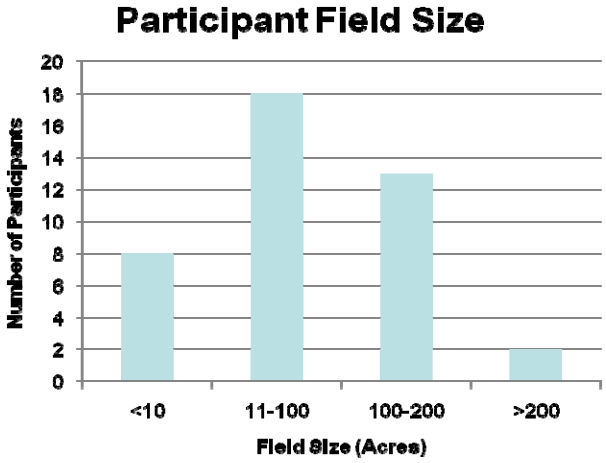
California	Colorado	Florida
Idaho	Michigan	Oregon
Pennsylvania	Wisconsin	

Figure 3. Crops with submitted data

Avocados	Berry (nursery)	Carrots
Green beans	Herbs	Lemons
Lettuce	Onions	Oranges
Peaches	Peppers	Potatoes
Raspberries	Strawberries	Sweet Corn
Tomatoes (processing)	Walnuts	Winegrapes

Figure 4 shows a good distribution of field sizes for the submitted data. Several organic fields were included in the data sets.

Figure 4. Field size distribution for submitted data sets.



By the end of the pilot period, 59 data sets were submitted by the 38 growers. Some growers submitted data for multiple fields for a single crop, multiple crops, and multiple years (i.e., 2009 and 2010) for a single field. Many growers also submitted the feedback survey asking for input on the time required to gather data for the metrics, any costs involved in collecting the data, usefulness of the metrics in helping them better manage their operations, and suggested improvements for the metrics themselves.

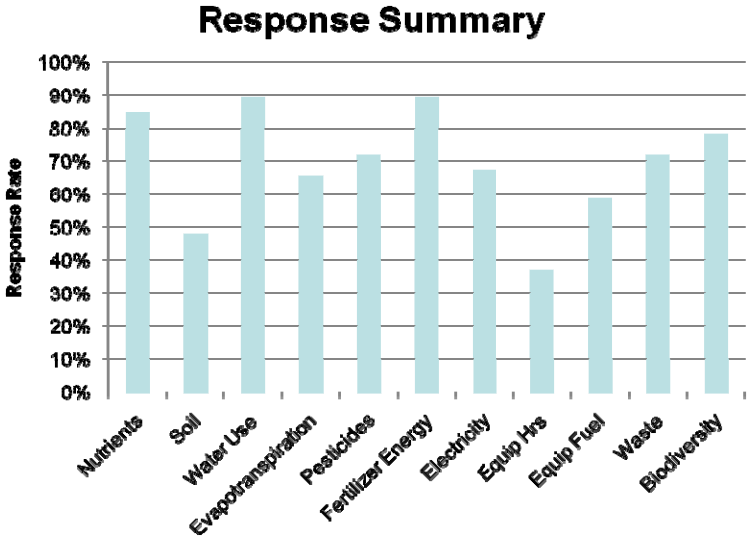
The overall pilot had a number of "pilots-within-the-pilot" that tested various scenarios of motivation, cooperation, and incentives to collect performance metric data. This was an important element of the project to gauge the adoption of voluntary performance metric reporting. Most of these efforts were successful in terms of participants submitting data.

Table 2. "Pilot-within-the-pilot" descriptions

Pilot-Within-The-Pilot	***Scenario***
Food processors and their grower suppliers	Influence of buyers on supplier participation
Nationwide participation for a specific crop	Regional learning/experience with metrics
Usage of graduate student volunteers to shepherd data collection	Dedicated resources for data collection and reporting
Organic vs. conventionally grown crops	Metric experience in different cropping systems
Certified Sustainable tree fruit grower	Acceptance of metrics as another step in the evolution of sustainability programs
Grower association recruiting	Collective learning and value of industry-wide metric collection
Three supply chain links in different regions collaborating	Collaboration amongst supply chain partners for collective learning

The quality of the data submitted varied from "very good" (both from the perspective of completeness across the metrics as well as thoroughness in following instructions for data values) to "not so good." Figure 5 below indicates the level of completeness of data submission as well as its impact on the calculation of metrics. The Response Rate indicates the percentage of datasets that had data for the various metric areas. Water use and fertilizer use data were most commonly available while soil organic matter and equipment usage hours were the least available.

Figure 5. Response rates for data submission for the various metric areas



Follow-up emails and phone calls were required for data "cleansing and scrubbing" purposes to ensure accurate metric calculations and results. It was also determined that there were challenges with the calculators used for several of the metrics due to incomplete reference data (e.g., embedded energy factors for pesticide active ingredients) and missing critical data from participants (e.g., engine hours for air quality emission calculations). These calculator shortcomings will need to be addressed by the MRC workgroups to ensure that meaningful metric results can be achieved.

The non-farm workbook was vetted by several shippers and processors and then ~10 potential participants were recruited for the pilot. We did not receive data back from any of the participants but were told by most that the data would not be difficult to gather and it was just a matter of priorities to actually submit data.

To complete the pilot experience, participants were sent an Excel spreadsheet report of the metric results derived from their submitted data. Where data submission was incomplete (most commonly for detailed equipment usage data for the air quality and energy metrics), the overall metric was not calculated. Participants were also provided an anonymized summary of the comments received for the feedback survey on each metric so they could see what their peers thought about the piloting experience. In addition and at the direction of the CC, a series of three webinars were held during March 2011 with 20 pilot growers to drill down on metric-specific questions and to get direct feedback on specific high-level issues identified during the pilot.

The following are observations on the metric calculation process and results:

- Questionable data will lead to questionable metric results which will make metric comparisons very difficult. This has bearing on the need for strong data collection and reporting protocols as well as data integrity checks built into data collection tools and metric calculators.
- For those data sets for multiple years on the same field, metric result differences (i.e., water usage, pesticides, fuel usage) were largely attributed to annual weather differences. Yield differences for the same field over multiple years were also attributed to annual weather differences. This has bearing on the ability to set baseline years and comparability time horizons (i.e., 1 year? 3 years? 5 years?).
- For data sets for the same crop, regional "contextual" differences (e.g., climate, soil, quality/yield drivers, etc.) had an impact on metric results. This has bearing on the comparability of metric results across geographic regions. (Growers expressed concerns about efforts to generalize results across broad areas.)
- Calculators for N-P-K amounts, embedded energy in fertilizers and pesticides, and air quality emissions from agricultural equipment and pesticides will be a common need for various metric initiatives beyond specialty crops (e.g., Field to Market, Dairy Management Inc.). The agricultural sector should strive to have common calculators created for efficiency purposes as these are complex tools that require frequent updates and maintenance of the underlying reference data used in the calculations.

Key Findings

The experience of growers responding to the data requests for the draft metrics provides SISC with invaluable insight and learning. Findings from the pilot testing were separated into "Data Collection Readiness" and "Draft Metrics." The first refers to the availability of data inputs, the ease with which they are collected, and the ability to translate them into the format required for the metric calculations. The second refers to feedback on the metrics themselves or the specific data requirements that were requested.

<u>Feedback on Data Collection Readiness</u>

"Data collection readiness" refers to the availability of data inputs, the ease with which they are collected, and the ability to translate them into the format required for the metric calculations. Key findings on the availability and ease of collecting and providing the data include:

- Some pioneering growers are collecting most of the data required for the metrics in the requested format, but the majority of growers are not.
- Data for many of the metrics was available, but not accessible in the requested format.
- Of those growers collecting data for metrics such as water and energy use, data are not being collected in ways that allow for allocation to individual management units (fields).
- Some of the datasets were incomplete and differences in data collection methods affected data quality.
- Data collection methods, costs, and time requirements varied amongst growers.

Feedback on Draft Metrics
Key findings on the metrics and their data inputs include:

- The metrics are generally acceptable.
- Guidance on data inputs needs further revision.
- Simplify where possible.
- Several cross-cutting issues (e.g., ag input allocations, multi-cropping) need to be addressed.
- The value proposition for using the metrics was unclear to some participants.

The motive for pilot testing was to learn how the draft metrics would fair in real world farming and food processing situations. Much insight and learning has been gleaned from this first effort that can now be applied to the next phase of work to develop, test, and release sustainability performance metrics for the specialty crop supply chain. The lessons from the pilot test experience present several clear steps for the path ahead:

- Focus on building the capacity for growers to collect data for monitoring sustainability performance and adoption of continuous improvement business management strategies.
- Focus on releasing "version one" of several of the metrics and continue to develop and pilot test the remainder. It may be best to focus on getting fewer metrics done well.
- Focus the development of a data aggregation software platform as a secondary priority until more farm-level data collection capacity is built.
- Develop options for non-farm metric development, particularly packer/shippers and processors who interact directly with growers.

Additional details about the pilot findings can be found in Attachment G.

As defined by the CC in meetings in February and April 2011, next steps for the SISC project include:

- Reduce the number of metrics to pilot as "Version 1.0 Beta Metrics" during the 2011 growing season. These include:
    - Water use efficiency by acre and unit of production.
    - Simple irrigation efficiency using crop evapotranspiration.
    - Soil organic matter as compared with the soil's organic matter potential.
    - Nitrogen and phosphorus use efficiency by acre and unit of production.
    - Energy use by acre and unit of production.
- Develop a simple allocation calculator for testing by growers during the pilot to address issues with collecting data at the field level as opposed to the farm operation level.
- Recruit grower trade associations and their processor customers to reach out to their members/suppliers to participate in the 2011 pilot.
- Continue development of the on-farm greenhouse gas metric. Review the on-farm waste metric for relevance and data collection issues. The biodiversity metric was not discussed.

Lessons Learned
The following lessons were learned during the piloting process:

- Field level data collection is not being done consistently across farming operations.

- The value proposition for growers and supply chain members to participate in performance metric piloting needs to be strengthened. The "fear factor" expressed by a number of growers about more paperwork, more regulatory reporting, and more questions from buyers must be addressed.
- Because the sustainability performance metric concept is in its infancy, asking growers to be involved in piloting so that both they and their customers (i.e., food companies and retailers/foodservice) can learn what is practical and operationally meaningful is a key selling point. Also, every effort should be made to discuss other benefits from participating in the pilot testing such as cost savings through increased efficiencies as a result of using the metrics to measure performance.
- Many growers voiced the opinion that metric denominators should also be displayed on a per acre basis in addition to the per unit of production used in the pilot because their farm-level decision making is mostly on a per acre basis.
- Certain metrics – water, soil, energy, nutrients – are more meaningful to growers as they relate directly to on-farm economics.
- Translating the metrics into data collection components highlighted the importance of ensuring data consistency. If guidance around data collection is not specific, clearly delineating scope, boundary, and acceptable data sources, comparisons with peer grower types will not be possible. For SISC to be a benchmarking tool, further refinement of the data collection guidance will likely be necessary once a significant pool of pilot results can be analyzed.
- Performance improvement will only be possible when growers have metric results available for several years to be able to set realistic baselines and account for climate-related variance.

Objective 3: *Establish industry-wide consensus on a tool or protocol for voluntary sustainability reporting in the specialty crop sector.*

One of the key objectives of the grant was to define how the developed metrics could be used both in the chain of commerce and for external reporting. Because this has been a multi-stakeholder initiative from the outset, there are many interests and objectives represented in the discussion of sustainability reporting. The spectrum of uses of metric results runs from individual growers/businesses "measuring to manage" their operations more effectively to buyers asking suppliers to provide data on the sustainability of their products to NGOs seeking more transparency on the performance of the agri-food chain. Dynamics among these different groups represented a challenge to reach consensus on a protocol for data sharing which then would have direct bearing on the requirements for an online data management system to enable the protocol.

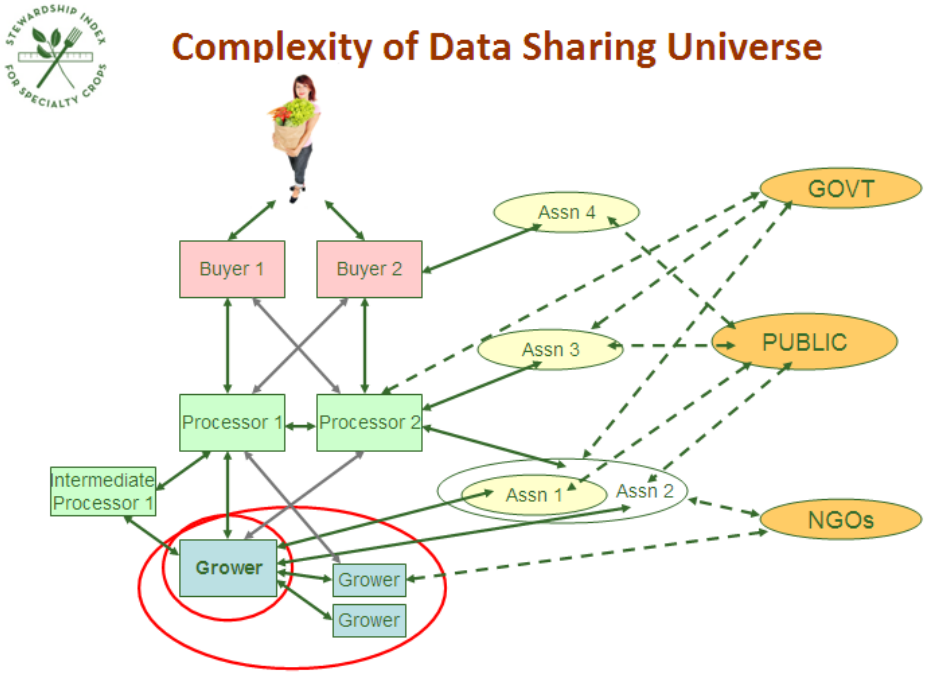
SISC is not the only initiative facing this challenge. The Field to Market initiative in commodity program crops; the Dairy Management Initiative for the dairy chain; the Sustainability Consortium for Life Cycle Assessment of food, beverage, and ag products; and the ANSI effort to define sustainability standards are all grappling with data collection, aggregation and reporting issues. Because of this, it was important for the SISC team to engage in outreach activities with all participating stakeholder groups during the grant period to share experiences and educate each other on the various approaches being utilized. (See the References section below for a list of these activities.)

In late 2009 and early 2010, the SISC CC considered desirable and undesirable future uses for the SISC metrics. Early in these discussions, the group agreed that SISC would "Explore the development of a centralized system to house sustainability performance data to enable voluntary benchmarking, self-assessment through comparison to others in the system (e.g. to system averages), and, where desired by

individual users, external reporting of the users' scores, keeping in mind stakeholders' varying needs for confidentiality and transparency."

Figure 6 below illustrates the complexity of defining data sharing scenarios within the specialty crop supply chain as well as with external entities. Because quantitative business data is more sensitive than qualitative information on business practices, there is a high degree of confidentiality placed on that data. Anxieties over "who gets to see my data and what can/will they do with it?" were expressed by a number of growers. The multi-stakeholder nature of the SISC initiative with buyers, sellers, and environmental NGOs discussing access to data created tensions in defining appropriate scenarios.

Figure 6. Complexity of potential SISC metric result data sharing relationships



Due to concerns among the three stakeholder groups (suppliers, buyers, and NGO's) it took significant time to draft and negotiate an acceptable data sharing policy that is a prerequisite for implementing an online tool. Attachment H depicts the framework that was developed to define data sharing policies to address the complex needs shown in Figure 6. Individual case studies between data sharing "nodes" were defined to drive the detailed policy making process. During the September 2010 CC meeting, the CC reviewed and approved the framework with the understanding that further work is required to examine all applicable use cases. This was a significant project milestone due to concerns among the three stakeholder groups.

The next step of developing an online tool to collect, store, and transmit data along the supply chain could not be completed during this project. The policies will dictate the system requirements for data security, aggregation, and access for a data management platform. Associated discussions and findings from the project that will also inform the platform development requirements include:

- Online metric calculators are not readily available and will require ongoing maintenance to keep elements such as fertilizer and pesticide product lists, GHG emission factors, embedded energy values, etc. up to date.
- Integration of third-party calculators and software into a centralized data sharing "hub" is needed.

- Regional spatial aggregation algorithms need to be defined (i.e., three separate growing environments in California's Salinas Valley).
- Temporal comparison and aggregation algorithms need to be defined (i.e., how to smooth out annual climatic differences).
- Nuances of business structure/types need to be defined to ensure comparability of operations (i.e., processing facilities vary in their activities).
- "Crop" definitions need to be further defined to address concerns about differences in variety-level resource utilization (i.e., "an onion isn't an onion").
- The information technology implementation and management needs of SISC should be a separate undertaking than the metric portfolio maintenance and management initiative.

Lessons Learned
The following lessons were learned during the sustainability metric data platform and result-sharing discussions:

- At this point in the definition and adoption of performance metrics, data sharing is a delicate and complex issue within multi-stakeholder initiatives. Ensuring data confidentiality is a critical success factor.
- The adoption of performance metrics by businesses and/or buyer-driven supply chain programs will dictate the pace of data reporting and sharing initiatives such as SISC.
- Establishing trust between supply chain partners is critical in moving supply chains to value chains where there are shared objectives and value for better understanding product-level sustainability.
- Establishing trust between the agri-food chain and external entities is critical to have a well-informed discussion of agri-food chain sustainability.
- There are similar issues in other agri-food sustainability initiatives where broader data management platforms may address the needs of multiple crop sectors.
- Data collection and quality issues observed in the metric pilot will need to be addressed as a first step in gathering enough data for aggregation to make comparisons meaningful.

Significant Project Results:

- Created a multi-stakeholder governance structure comprised of a Steering Committee and a Coordinating Council for the design, development, and implementation of SISC performance metrics. (objective 1)
- Conducted numerous in-person and conference call meetings with the Steering Committee and Coordinating Council for project guidance, deliberation, and decision making that resulted in the piloting of a suite of metrics during the 2010 growing season. (objective 1)
- Design, development, and implementation of the SISC website to provide project information to the public and to provide a password protected environment for collaborating on SISC metric development. (objective 1)
- Conducted 30+ outreach presentations at food industry, grower association, and sustainability conferences and published 6 articles to seek feedback on and raise awareness for the SISC initiative. (objective 1)
- Piloted seven on-farm metrics – Soil, Nutrient & Water Quality; Water Use; Pesticides (limited); Air Quality; Energy; Waste; and Biodiversity – with a wide range of specialty crop growers during the 2010 growing season. (objective 2)

- Collaborated with The IPM Institute of North America in field-testing their PRiME pesticide toxicity model (another NRCS CIG grant awardee) tool as a candidate for the SISC Pesticide metric. (objective 2)
- Introduced five non-farm metrics – Water Use & Quality; Air Quality; Energy; Greenhouse Gases; and Waste – to a limited number of packer/shipper and processing companies. (objective 2)
- Design, development, and distribution of a 46-page on-farm pilot binder and a 30-page non-farm (i.e., packer/shipper and processor) pilot binder. (objective 2)
- Received, processed and created reports for 59 metric data sets from 38 growers of 18 different crops in 8 US states. (objective 2)
- Conducted 20 phone interviews with growers who did not submit metric data to gain insights on performance adoption barriers. (objective 2)
- Developed a voluntary data sharing/reporting framework and policy-making decision rubric to guide future development of a data sharing system for supply chain members and external audiences. (objective 3)
- Data management and sharing platforms will be complex and clear system definitions will need to be developed. (objective 3)

Conclusion and the Transferability of Results:

Through this CIG project, NRCS was able to have a large, multi-stakeholder body explore the introduction of performance metrics into the specialty crops supply chain and develop a set of preliminary metrics to help quantify sustainability. Many dynamics were in play as different audiences participated in discussions on the "right" metrics for sustainability, how the results could be used to convey progress in resource management, and how businesses could operationalize sustainability metrics in individual businesses and within the supply chain. Incentivizing adoption of data collection and reporting in the production agriculture sector will be a critical success factor.

The transferability and impact of this project have already been felt in the specialty crops industry and other agri-food sectors. As mentioned, the Field to Market group, the Innovation Center for U.S. Dairy, and The Sustainability Consortium have continued to collaborate with the SISC team to share learnings and better understand the data collection process designed for the project. The results of the project have already been used to further the next round of metric development and use on the farm. A number of specialty crop groups have already benefited from the approved list of SISC metrics and the pilot experience to implement metrics with their grower and processor members. The California Sustainable Winegrowing Alliance, a successful sustainability program with six years of support from NRCS CIG funds, is utilizing a number of the SISC metrics in its current CIG project to add performance metrics to their practice-based program. The California Almond Sustainability Program has also included several metrics in their recently developed program.

As evidenced by this project, the agri-food system will need to join together to establish and promote the value of implementing performance metrics. We have much to learn still, but the SISC project was a successful first step in the journey of quantifying sustainable performance in the complex crop production sector and downstream steps in the food chain as well as in the ecosystems services arena.

References:
The following is a list of presentations and articles featuring SISC during the CIG grant period:

Arnold, A., February 2010. *Sustainability Programs: Practices AND Performance.* Presentation at 2010 American Society of Agronomists California Chapter Conference. Tulare, CA.

Arnold, A., Kaplan, J. February 2010. *The Stewardship Index for Specialty Crops.* Presentation to ANSI National Sustainable Ag Standard leadership. Via webinar.

Arnold, A., April 2010. *Sustainability Programs and Performance Metrics.* Presentation at 2010 California League of Food Processors Ag Production Committee Meeting. Oakhurst, CA.

Arnold, A., Balling, S., Dlott, J., and Gunders, D. July 2010. *The Stewardship Index for Specialty Crops: Piloting Supply Chain Sustainability Metrics.* Session held at 2010 Soil and Water Conservation Society Annual Conference. St. Louis, MO.

Burfield, T. 2010. *A Sustainability mpg Rating. The Grower.*

Dlott, J., January 2010. *Sustainability Metrics and Sustainable Winegrowing: The Next Frontier.* Presentation at 2010 Unified Wine and Grape Symposium Meeting. Sacramento, CA.

Dlott, J., York, T. August 2010. *Getting Strategic About Measuring Sustainability*. *The Packer.*

Giclas, H., April 2010. *The Potential Role of Metrics in Measuring Sustainability.* Presentation at 2010 United Fresh Foundation's Center for Global Produce Sustainability Meeting. Las Vegas, CA.

Hansen, M. 2010. *Metrics to measure sustainability. The Good Fruit Grower.*

Lavin, K. 2009. *Consumers Go Green on Own Terms. Wines & Vines.*

Meister, B., July 2010. *The Stewardship Index for Specialty Crops.* Briefing for USDA's Deputy Secretary Kathleen Merrigan and Carol Kramer LeBlanc. Washington, DC.

Meister, B., February 2011. *Sustainability Partnerships: Standards, Metrics & Markets.* Presentation at USDA Agricultural Outlook Forum. Washington, DC.

Meister, B., December 2010. *Measuring What Matters in the Produce Supply Chain.* Presentation at Sustainability Summit sponsored by Food Marketing Institute and Grocery Manufacturers Association. Arlington, VA.

Neenan, R., January 2010. *Measuring Sustainability: Making Metrics Work for Growers.* Presentation at Potato Expo sponsored by National Potato Council. Orlando, FL.

Ohmart, C. 2010. *Pesticide Risk Calculator Debut. Wines & Vines,* July 2010 pp. 60-64.

Stern, R. 2011. *Groups seek balanced approaches to sustainability programs. The Grower.*

York, T. August 2010. *The Stewardship Index for Specialty Crops.* Presentation at Sustainable Ag Partnerships conference. San Francisco, CA.

Other interaction and discussions with:

- USDA NRCS staff
- The Sustainability Consortium's Food, Beverage & Ag sector group
- Innovation Center for U.S. Dairy
- Field to Market sustainability initiative for commodity program crops
- Sustainable Food Lab's *Metrics in Action* workshop
- Food retailers such as Safeway, Walmart, Whole Foods, Jamba Juice, Sysco, etc.

In the space below, provide the following in accordance with the Environmental Quality Incentives Program (EQIP) and CIG grant agreement provisions:

a. A listing of EQIP-eligible producers involved in the project, identified by name and social security number or taxpayer identification number;

To preserve grower anonymity essential for achieving our grant objectives, we are unable to provide the above information for growers participating in the pilot testing portion of the project.

b. The dollar amount of any direct or indirect payment made to each individual producer or entity for any structural, vegetative, or management practices. Both biennial and cumulative payment amounts must be submitted.

No direct or indirect payments were made to growers during the reporting period.

c. A self-certification statement indicating that each individual or entity receiving a direct or indirect payment for any structural, vegetative, or management practice through this grant is in compliance with the adjusted gross income (AGI) and highly-erodible lands and wetlands conservation (HEL/WC) compliance provisions of the Farm Bill.

No direct or indirect payment from this grant has been made to individual producers or entities for any structural, vegetative, or management practices.

Project Funding Received and Expended – Expenditures Summary Across Objectives
NRCS 69-3A75-9-157

	NRCS CIG	In-Kind Match	Cash Match	Total
Personnel	$100,000		$100,001	$200,001
Benefits				
Travel				
Equipment				
Supplies				
Contractual:				
SureHarvest Consultants	$180,000		$140,000	$320,000
NRDC	$205,000		$ 75,000	$280,000
Western Growers Assoc.	$75,000			$75,000
Ag Innovations Network	$70,000			$70,000
Other		$362,863.99		$362,863.99
Total	$630,000	$362,863.99	$315,001	$1,307,864.99

Attachment A – SISC Coordinating Council

The following is a list of the current Coordinating Council members within each stakeholder group:

CC = Communications Committee member *SC = Steering Committee member*

Growers, Suppliers and Trade Associations

- Community Alliance with Family Farmers - Dave Runsten
- Del Cabo - Larry Jacobs
- Farm Fresh Direct - Jim Knutzon
- Georgia Fruit and Vegetable Association - Charles Hall
- National Potato Council - John Keeling (CC)
- Torrey Farms - Maureen Torrey
- United Fresh Produce Association - Burleson Smith
- Washington Horticulture Association - Laura Mrachek
- Western Growers Association - Hank Giclas (CC, SC)

Buyers and Trade Associations

- California Sustainable Winegrowing Alliance - Allison Jordan (CC)
- California League of Food Processors- Rob Neenan
- Compass Group - Marc Zammit
- Del Monte Foods - Steve Balling
- Food Marketing Institute - Jeanne von Zastrow
- Heinz - Gary King
- Markon Cooperative - Tim York (SC)
- Produce Marketing Association - Kathy Means (CC, SC)
- Sam's Club - Jerry Hull
- Sodexo - Margaret Henry (CC)
- SYSCO - Craig Watson (CC)
- Unilever - David Pendlington
- Wal-Mart - Ron McCormick
- Wegmans - Bill Pool

Environmental and Public Interest Groups

- American Farmland Trust - Ed Thompson
- California Rural Legal Assistance - Martha Guzman-Aceves
- Defenders of Wildlife - Sara O'Brien
- Environmental Defense Fund - Suzy Friedman (CC)
- Natural Resources Defense Council - Jonathan Kaplan (CC, SC)
- The Organic Center - Chuck Benbrook
- World Wildlife Fund - David McLaughlin

(currently 1 NGO vacancy, nominations are being accepted by the Steering Committee)

Additional Experts

- SureHarvest - Jeff Dlott
- Sustainable Food Lab - Hal Hamilton (SC)
- University of Arkansas - Marty Matlock

Attachment B – SISC Metric Review Committee Organizations

The Metric Review Committee is represented by 560+ individuals from the following 390+ organizations (some individuals are independent consultants).

ACDI VOCA
Ag Innovations Network
AgraQuest Inc.
AgRefresh
Agrian
Agri-Business Consultants, Inc.
Agriculture and Agri-Food Canada
Agriculture and Life Sciences Inst.
Agro-Culture Liquid Fertilizers
AgSafe
AgSustain
Alcorn State University Extension Program
Almond Board of California
American Farmland Trust
Apple Leaf LLC
Applied Geosolutions, LLC
ARAMARK
Arizona State University
Australian Farm Institute
AVATRON LLC
B & B Ag Consulting
BAL Associates
Bayer CropScience
Bennelong Holdings
Berkeley Institute of the Environment
Better Cotton Initiative
BioLogical Capital
Blu Skye
Blu Skye Sustainability Consulting
Bolthouse Farms
Bon Appetit Management Co Fdtn
Booth Ranches
Bren School
Brown University
Bryant Christie Inc.
Business for Social Responsibility
C & R Orchards
C and B Farms, Little Cypress Organics, Charles Farms
CA Climate and Agriculture Network
Cal/EPA Dept. of Pesticide Regulation
California Agricultural Water Stewardship Initiative
California Association of Winegrape Growers
California Department of Food and Agriculture
California Farm Bureau Federation
California Grape & Tree Fruit League
California Institute for Rural Studies
California Specialty Crops Council
California State University Monterey Bay / NASA Ames Research Center
California Strawberry Commission
California Sustainable Winegrowing Alliance
California Tomato Farmers
Calpine Containers
Calvert Group, Ltd.
Campbell Soup
Cape Cod Cranberry Growers' Association
Capital Philanthropy Group, LLC
Cargill, Inc.
Carolina Farm Stewardship Association
Category Partners LLC
CCOF
Center for Agricultural Partnerships
Center for Agroecology & Sustainable Food Systems
Center for Environmental Health
Center for Reflection, Education and Action (CREA)
Center for Urban Education about Sustainable Agriculture
Center on Race, Poverty, & the Environment
Central Coast Agricultural Water Quality Coalition
Central Coast Vineyard Team
CERAI- centre for rural studies and international agriculture
Certified Sustainable Wine
Chateau Boswell Winery
Chiquita
Cirrus Partners, LLC
City of Los Angeles
City University of New York
Clean Water Fund
Climate Earth
ClimatePath
Coloma Farms, Inc.
Colorado Potato Administrative Committee
Colors Fruit
Common Fields
Community Alliance with Family Farmers
Compass Group
ConAgra Foods - Lamb Weston
Conservation Action Fund for Education
Constellation Wines US
Cornell University
Costa Ag Company
County of Sacramento Stormwater Program
Cranberry Institute
CRISP Greenhouses SA de CV
CropLife America
Crowell & Moring LLP
Cultivo Consulting
Cumberland Technology
Curry & Company
Dairy Management Inc.
Dartmouth College
Davenport Orchards, Vineyards and Winery
David Katz & Associates
Defenders of Wildlife
Del Monte Foods
Dell's Insurance Agency, Inc.
Delta Institute
Dept. of Revenue and Smith Farms
Diageo Chateau and Estate Wins
Dixon Ridge Farms
DNV
Driscoll's Strawberry Associates
Durrants
E. & J. Gallo Winery
Earth's Organic Produce (San Francisco Wholesale Prod
Earth Analytics Group
Earthbound Farm
Eco-Logic Strategies
Ecological Sustainability in the Pleasure Dome
Envirogent
Environment Canada
Environmental Defense Fund
Environmental Intelligence Inc.
Environmental Packaging International (EPI)
Environmental Protection Agency
Environmental Strategy Innovations
Environmental Working Group
EOS
Exigent
Fallbrook Community Gardens
FAO of United Nations
Farm Fresh Direct LLC
Farmstead Wines
Fetzer Vineyards
Five Winds international
Florida Fruit & Vegetable Association
Food Alliance
Food Fundamentals
Food Marketing Institute
Franklin Associates, A Division of ERG
FreshSense LLC/Tastco Cooperative
Full Circle Connect
General Mills Inc
Genesis Environmental Technologies
Georgia Fruit and Vegetable Growers Association
Glades Crop Care, Inc.

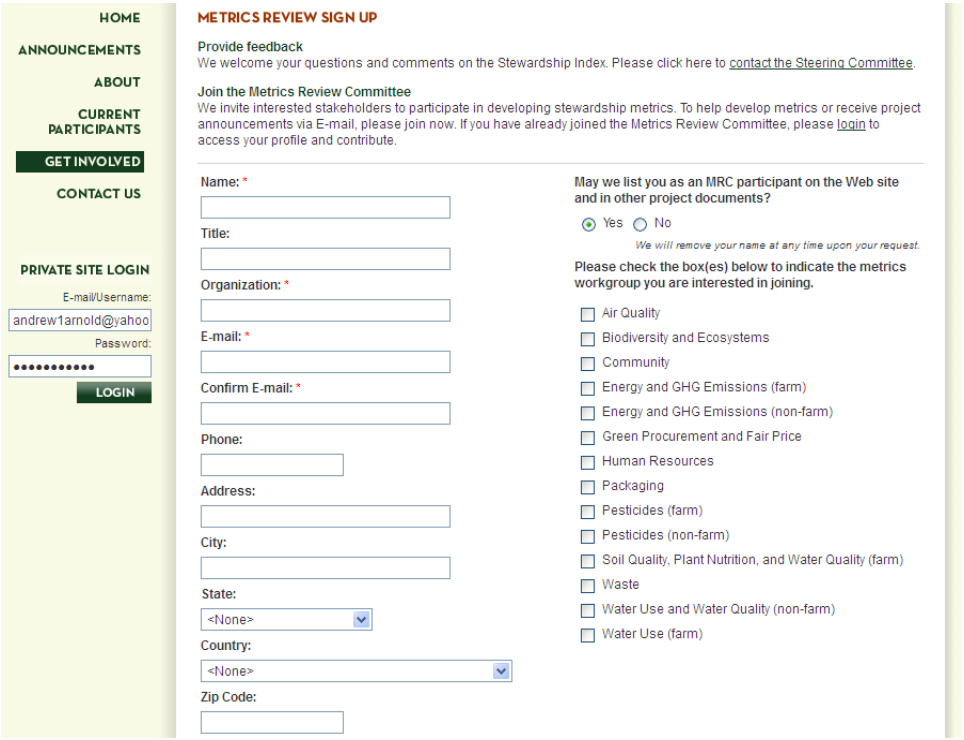
Global Environmental Ethics Counsel
Global Green USA
GLOBALG.A.P
Golden Sun Marketing
Great Valley Center
Green Giant Fresh
Green Mountain Coffee Roasters
Green Mountain College
Green Seal
GreenHouse Energy
GreenHow, Inc
Grow My Profits LLC
Growers Alliance Corporation
Growers Express
H. Brooks and Company
HBU Farms
HealthySoil
Henry J. Kaiser Family Foundation
HJ Heinz
Horticulture, Michigan State University
Idaho Potato Commission
IFCO Systems, N.A.
Independent
Independent Consultant
Independent Contractor
Independent Purchasing Co-op
Individual
Institute for Marketecology
Integral Impact Inc
International Crane Foundation
International Labor Rights Forum (ILRF)
International Resource Group
Interstate Container
INTI
Investor Environmental Health Network
IPM Institute of North America
Irrigation Association
Jacobs Farm / Del Cabo
JBS International
Jiggy Lloyd Consultancy
Just Harvest
Karp Resources
Kennedy/Jenks Consultants
LA Food Policy Task Force
Lake County Winegrape Commission
Last Drop Fine Wine
Le farme Soleil
Leonardo Academy
Leopold Center for Sustainable Agriculture, Iowa State
Liberty Fruit Co., Inc.
Life Cycle Associates LLC
Limoneira Company
Liseed Consulting
Los Angeles City, Office of Energy & Environment
LumiGrow, Inc.
Lundberg Family Farms
Magnanimus Wine Group
Manomet Center for Conservation
Markon Cooperative
Matthews Family Farm
Mayor's Office
McCain Foods USA
Metrolina Greenhouses Inc
Michigan State University
Michigan State University Extension
Miell Consulting
Milepost Consulting
Mirrageos/Cooper Land Corp.
Mission Markets
MIT
Monsanto
Moss Farms
Musco Family Olive Co.
Napa Valley Vintners
National Grape Cooperative / Welch's
National Pest Management Association
National Potato Council
National Wildlife Federation
Natural Logic, Inc.
Natural Resources Defense Council
Network for a Healthy California Retail Program
New York State IPM Program
NFREC-Quincy, Univ. of FL
North Carolina State University
Northgate Environmental Management
NRCS
Nutrifoodie
Ocean Spray Cranberries
Open Data Registry
Oregon Department of Agriculture
Oregon State University
Oregon Wildlife Institute
Oregon Wine Board
Organic Exchange
Organic Fertilizer Assoc of Ca/Ca Certified Crop Advisers
Orkin Inc.
OSU Energy Efficiency Center
Ovis and Vitus Vineyard
Pacific Exporting Group
Pacific Institute
Pacific Southwest Container
Pactiv
Parametrix, Inc.
Paul Dolan Vineyards
Penn State Cooperative Extension
PepsiCo
Peri & Sons Farms, Inc.
Permaculture Ins.
Permaculture.TV
Pesticide Action Network
Pesticide Research Institute
Phoenix Media Network
Plovgh
Posie Packer Corp
Potandon Produce, L.L.C./Green Giant Fresh
Prairie Ventures
Prairie View A&M University
Presidio School of Management
Procacci Brothers Sales Corporation/Santa Sweets, Inc.
Produce Marketing Association
Professional Landcare Network
Pulse Canada
Purdue University
PureSense
Purfresh
Raemelton Farm
Ramage Farms
Reiter Affiliated Companies
Responsible Source
Restaurant Opportunities Centers United
Reusable Packaging Association
Richard Swift Construction
Rio Farms
RISE (Responsible Industry for a Sound Environment)
River Point Farms
RUPRI - Rural Policy Research Institute
Rutgers Cooperative Extension
Sambrailo Packaging
Sam's Organic Acres
Save the River
Schneider Farms - Pasco LLC
Scientific Certification Systems
Serecon
SGS North America Inc.
Sodexo
Soil & Topography Information, LLC
Stanford University
State Water Resources Control Board (CA)
Stemilt Growers
Stetman Masser Inc.
Steve Shaffer Consultiing
Straus Family Creamery
Sun Orchard
Sun-Maid Growers of California
Sunview Shandon
Supply Change Associates
SureHarvest
Sustainable Agriclture Education
Sustainable Conservation
Sustainable Food Lab
Sustainable Harvest
Sustainable Napa County
Sustainable Supply Consulting
Sustainamatics
SustainBiz/Global Health & Safety Initiative

Sylvatica, UQAM, CIRAIG
Synergy Integrators
Syngenta
SYSCO
TANGO International
Teamsters Strategic Research and Campaigns Department
Terrien Consulting (to the wine industry)
The Dannon Company
The Kenyon Group
The Nature Conservancy
The Organic Center
The Packard Foundation
The Sustainability Consortium, University of Arkansas
Top 10 Produce
Toro Micro-Irrigation
TransFair USA
Trillium Asset Management
TRUETRAC LLC
TruGreen
two tons per acre
Tyson Foods, Inc.
Unilever
Union of Concerned Scientists
United Farm Workers
United Fresh Produce Association
United States Hispanic Chamber of Comerce
Universit of California, Santa Barbara
University of Arkansas - Center of Agricultural and Rural Sustainability
University of California, Berkeley
University of California Cooperative Extension
University of California, Davis
University of California, Davis Agricultural Sustainability Institute
University of California, Davis SAREP
University of California, Santa Barbara
University of Catania, Italy
University of Illinois, Urbana-Champaign
University of Maine Cooperative Extension
University of Michigan
University of Minnesota
University of Missouri
University of Nebraska Lincoln
University of New Hampshire
University of Queensland
University of Wisconsin-Madison
US EPA
US EPA Region 9
US Geological Survey
USDA - National Institute of Food & Agriculture
USDA NRCS
USDA/CSREES
UVM Center for Sustainable Agriculture
Validus
Vilicus Farms
Vino Farms
Wada Farms Marketing Group
Wake Forest University School of Medicine
Wallace Center at Winrock International
Wallendal Supply Inc
Walmart
Wal-Mart/Sam's Club
Walter P Rawl & Sons, INC
Washington State Horticultural Assoc.
Washington State University Tree Fruit Research and E
Washington Tree Fruit Research Commission
Water Insight
Water Stewardship, Inc.
Wegmans Food Markets
WEST TEXAS A&M UNIVERSITY
Western Growers
Whole Foods Market
WI Dept of Ag, Trade, & Consumer Protection
Wild Farm Alliance
Willard Bishop, LLC
William Blackburn Consulting, Ltd.
Wisconsin Department of Natural Resources
Woodland Produce
World Bank
World of Good Development Organization
World Resources Institute
World Wildlife Fund
WSU-CSANR
Wyndham Hotels and Resorts
Yale School of Forestry & Environmental Studies
Yorkville

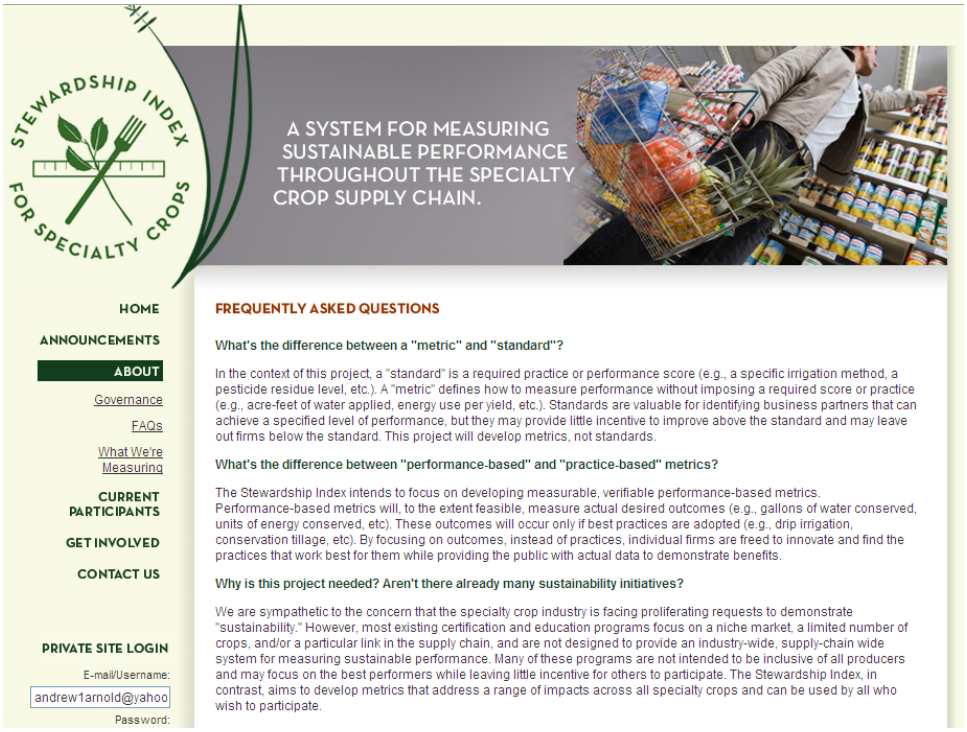
Attachment C – SISC Website Screen Shots

Main site with SISC initiative information.

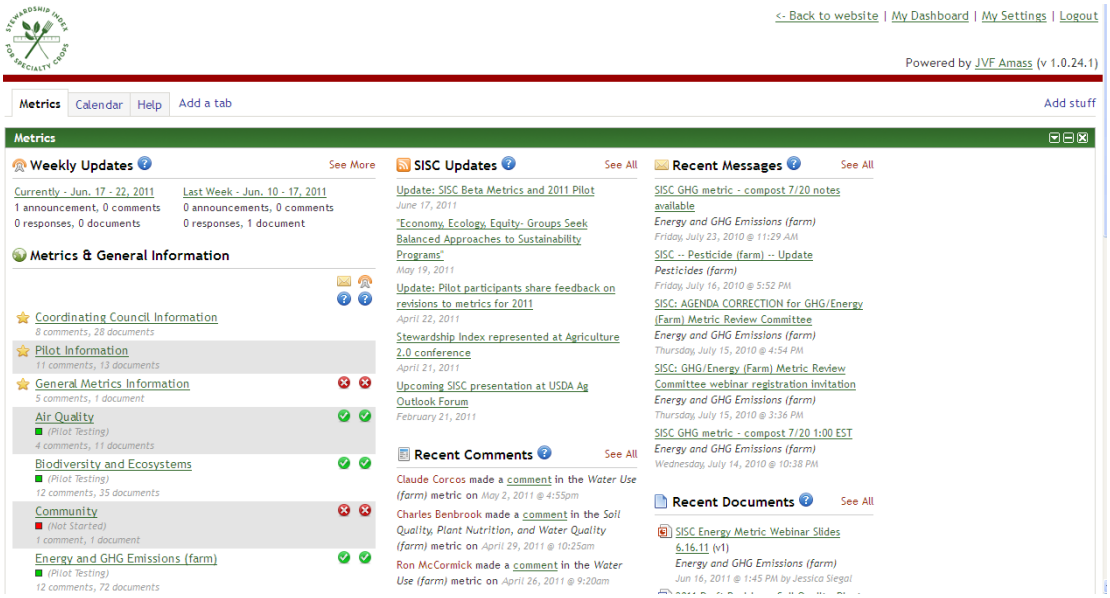
Metric Review Committee Sign Up page.



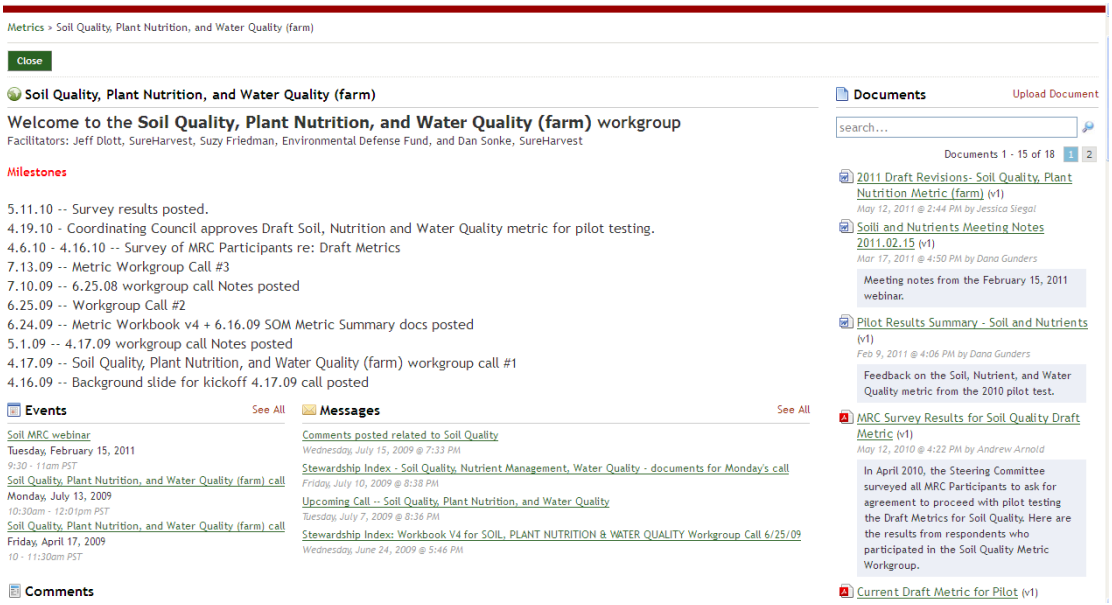
Informational pages for public.



Private, password-protected site to facilitate the metric development process by MRC members. This is the navigation dashboard with the latest comments, documents, messages, and updates.



Each metric has its own "workspace" to share and document the metric development process. Users can add comments and documents during the process.



Attachment D – SISC Performance Metrics

The following is a list of the actual metrics that were piloted during 2010.

On-Farm Metrics

Soil, Nutrient & Water Quality

1. **Nitrogen applied**

   Nitrogen applied = $\frac{\text{Pounds Nitrogen Applied}}{\text{Unit of Production}}$

2. **Phosphorous Applied**

   Phosphorous applied = $\frac{\text{Pounds Phosphorous Applied}}{\text{Unit of Production}}$

3. **Soil Organic Matter**

   Soil Organic Matter = $\frac{\text{Soil Organic Matter}}{\text{Soil Organic Matter Potential}}$

   Note: the Soil Organic Matter metric utilizes the Soil Organic Matter index portion of the NRCS Soil Management Assessment Framework tool to normalize the results across different soil types.

Water Use

1. **Simple Irrigation Efficiency**

   Simple Irrigation Efficiency = $\frac{\text{Crop evapotranspiration*}}{\text{Volume of applied water per acre}}$

   *Crop Evapotranspiration (ETc) can be measured, calculated, or referenced from agronomic tables.

2. **Water Use Efficiency**

   Water Use Efficiency = $\frac{\text{Crop yield per acre}}{\text{Volume of applied water per acre}}$

Air Quality & Energy Use

Air Quality

1. **Nitrogen Oxide Emissions**

   NOx Emissions = $\frac{\text{Tons NOx}}{\text{Unit of Production}}$

2. **Particulate Matter Emissions**

   PM Emissions = $\frac{\text{Tons PM2.5}}{\text{Unit of Production}}$

3. **Volatile Organic Compound Emissions**

   VOC Emissions = $\frac{\text{Tons VOC}}{\text{Unit of Production}}$

Energy

1. **Energy Use**

   Energy Use = $\frac{\text{BtU}}{\text{Unit of Production}}$

Waste

1. **Food Utilization**
   Food Utilization Percentage = $\frac{\text{acres harvested}}{\text{acres planted}}$

2. **Waste**
   Total waste/lb product = $\frac{\text{waste to landfill + waste to incineration + hazardous waste}}{\text{Unit of Production}}$

3. **Reclaimed Byproducts**
   Total reclaimed/lb product = $\frac{\text{recycling + composting + animal feed + reuse}}{\text{Unit of Production}}$

Biodiversity

1. **Overall Vegetative Cover**
   % total farm area vegetated = $\frac{\text{Farm area currently vegetated}}{\text{Total farm area}}$

2. **Perennial Vegetative Cover**
   % farm area in year-round vegetation = $\frac{\text{Area in perennial vegetation}}{\text{Total farm area}}$

3. **Native Vegetation**
   % farm area with native vegetation = $\frac{\text{Area where >50\% of vegetation is native (visual estimate)}}{\text{Total farm Area}}$

4. **Management Practices – Cropped Areas**
   Cropped Areas Management Score = $\frac{\text{\# of applicable BMPs implemented}}{\text{Total \# applicable BMPs}}$
5. **Management Practices – Non-Cropped Areas**
   Non-Cropped Areas Management Score = $\frac{\text{\# of applicable BMPs implemented}}{\text{Total \# applicable BMPs}}$

Non-Farm Metrics

Water Use & Quality

1. **Water Use Efficiency**
   Water Use Efficiency = $\frac{\text{Total Volume Water Used}}{\text{Unit of Production}}$

2. **Wastewater Nutrients**
   Wastewater Nutrient Mass* =
   $\frac{(BOD_5 \text{ in discharge * volume discharge})_{POTW} + (BOD_5 \text{ in discharge * volume discharge})_{LAND}}{\text{Unit of Production}}$

3. **Wastewater Salinity (option 1)****
   Wastewater Salinity Mass* =
   $\frac{(\text{TDS in discharge * volume discharge})_{POTW} + (\text{TDS in discharge * volume discharge})_{LAND}}{\text{Unit of Production}}$

4. **Wastewater Salinity (option 2)****

Wastewater Salinity Mass* =

$$\frac{(\text{FDS in discharge} * \text{volume discharge})_{POTW} + (\text{FDS in discharge} * \text{volume discharge})_{LAND}}{\text{Unit of Production}}$$

Waste

1. **Food Utilization**

   $$\text{Food Utilization \%} = \frac{\text{(Proportion of ingredients in final product} * \text{total product sold)}}{\text{Purchased Ingredients – Non-edible Food Waste}}$$

   Note: Only ingredients destined for the final product are included (not intermediaries).

2. **Waste**

   $$\text{Total waste/lb product} = \frac{\text{waste to landfill + waste to incineration + hazardous waste}}{\text{Total final product sold}}$$

3. **Reclaimed Byproducts**

   $$\text{Total reclaimed/lb product} = \frac{\text{recycling + composting + animal feed + reuse}}{\text{Total final product sold}}$$

Air Quality, Energy Use & Greenhouse Gas Emissions

Air Quality

1. **Nitrogen Oxide Emissions**

   $$\text{NOx Emissions} = \frac{\text{Tons NOx}}{\text{Unit of Production}}$$

2. **Particulate Matter Emissions**

   $$\text{PM Emissions} = \frac{\text{Tons PM2.5}}{\text{Unit of Production}}$$

3. **Volatile Organic Compound Emissions**

   $$\text{VOC Emissions} = \frac{\text{Tons VOC}}{\text{Unit of Production}}$$

4. **Toxics Emissions**

   $$\text{Toxics Emissions} = \frac{\text{Tons toxics}}{\text{Unit of Production}}$$

5. **Ozone Depletion**

   $$\text{\% contribution} = \frac{\text{Refrigerators w/ Ozone Depleting Chemical}}{\text{Unit of Production}}$$

Energy

1. **Total Energy Use**

   Total Energy Use = Total BtU

2. **Energy Use Per Unit**

   $$\text{Energy Use} = \frac{\text{Total BtU}}{\text{Unit of Production}}$$

Greenhouse Gas Emissions

1. **Total Greenhouse Gas Emissions**

   Total GHG Emissions = Total tons CO_2 equivalents

2. Greenhouse Gas Emissions Per Unit

$$\text{GHG Emissions} = \frac{\text{Total tons } CO_2 \text{ equivalents}}{\text{Unit of Production}}$$

Attachment E – SISC Pilot Workbook Page Samples

The following are sample pages from the SISC pilot workbook that was distributed to pilot participants.

Data Collection Instructions and Protocols

This binder contains instructions for collecting and reporting data for the pilot metrics. Each metric has its own section which includes the data requirements and any additional guidance necessary to submit data. In addition, a feedback survey form follows each of the metrics. As you proceed through this pilot, please keep the following parameters in mind.

PILOT METRICS

The following metrics will be piloted during the 2010 season:

- Soil, Nutrient & Water Quality
- Water Use
- Pesticides (for a limited number of crops)
- Air Quality
- Energy
- Waste
- Biodiversity

FILLING OUT THE METRIC PAGES

Each metric has a data collection chart with the following columns:

Data Item	Guidance	Unit	2009	2010	Data Source	Data Availability (0-4 scale)

- **Data Item** – Describes the data requirement
- **Guidance** – Provides guidance on what data is requested
- **Unit** – Lists the unit in which the data is collected. If you have the data in a different unit, please cross out the listed unit and replace it with the unit you prefer to use.
- **2009 and/or 2010** – Wherever possible, please enter data for both the previous and current year. As a reminder, data should all be annual, but the year may start at any date you designate.
- **Data Source** – Please list the source for the data you've entered. For example, management records, utility bill, estimate, etc.
- **Data Availability** – Please rate the ease and availability of the requested data on a scale of 0-4 according to these descriptions:

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Metric: Soil, Nutrient & Water Quality

Metrics:

1. **Nitrogen applied**
   Nitrogen applied = $\frac{\text{Pounds Nitrogen Applied}}{\text{Unit of Production}}$

2. **Phosphorous Applied**
   Phosphorous applied = $\frac{\text{Pounds Phosphorous Applied}}{\text{Unit of Production}}$

3. **Soil Organic Matter**
   Soil Organic Matter = $\frac{\text{Soil Organic Matter}}{\text{Soil Organic Matter Potential}}$

   Note: the Soil Organic Matter metric utilizes the Soil Organic Matter index portion of the NRCS Soil Management Assessment Framework tool to normalize the results across different soil types.

Data Collection:

If you filled in the Fertilizer Use data sheet in the Air Quality and Energy Use metric, you do not need to fill in the Total N and Total P data below.

Please fill in the table below

Data Item	Guidance	Unit	2009	2010	Source	Data Availability (0-4 scale)
Total N applied per unit area per time	*Total lbs N applied per acre per cropping season from all N sources*	*Lbs*				
Total P applied per unit area per unit of time	*Total lbs P (not P_2O_5) applied per acre per cropping season*	*Lbs*				
Dominant soil series name	*NRCS soil maps (available online) provide series names. If a field contains multiple series, choose a dominant series to use.*	*Series name*				
Soil texture class	*The appropriate class from the following list:* • *clay (with > 60% clay)* • *sandy clay, clay loam, clay, silty clay loam, silty clay, or clay (with < 60% clay)*	*Class name*				

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Attachment F – SISC Pilot Data Collection Spreadsheet Sample

Pilot participants were also provided with an Excel workbook with individual sheets for each metric to collect data for submission to SureHarvest. (See bottom of graphic for a number of the metric sheets.)

	A	B	C	D	E	F	G	H	I	J
1	**ELECTRICITY**									
2	**Field Name***	**2009 or 2010**	**Total Annual Electricity Use (in kWh)**	**Electricity Provider (name of utility)**	**Data Source**	**Data Availability (0-4 scale)**				
3										
4										
5										
6										
7										
8										
9	**Notes:**									
10	Field Name = the name of the field/orchard/vineyard you are piloting (If you are piloting multiple fields, write all field names.)									
11	If you have an irrigation pump that serves multiple fields, please allocate the electricity based upon the total hours for irrigation of the piloted field.									
12										
13	**STATIONARY ENGINES**									
14	**Field Name***	**2009 or 2010**	**Engine Type (Horsepower and Model Year)**	**Fuel Type** *Natural Gas, Gasoline, Diesel or Fuel Oil (1,2,&4))*	**Equip ID**	**Hours**	**Fuel Use (Gallons)**			
15										
16										
17										
18										
19										
20	**Notes:**									
21	Equip ID = your ID for the piece of equipment to help when doing the list									
22	Engine Type = the engine's horsepower and model year									
23	Equip ID = your ID for the piece of equipment to help when creating the list									

5 - Soil | 6- Water | 7 - Pesticides | **8a - Air Qual+Energy (Site)** | 8b - Air Qual+Energy (Vehicles) | 9 - Waste | 1

Attachment G – Pilot Findings Report

This attachment is a draft version of the pilot findings report presented at the February, 2011 CC meeting. It contains many important details about the pilot experience and challenges associated with implementing performance metrics in the specialty crops, or for that matter, the broader agri-food supply chain. It has not been finalized yet for release to the public. ***We will submit an amended final report when it is available.***

February 8, 2011
To: SISC Coordinating Council
From: SureHarvest
Re: *Confidential Report of the Pilot Findings*

Executive Summary

Pilot Program
In 2010, the Stewardship Index for Specialty Crops set forth to pilot test the practicality, usefulness and feasibility of 7 draft metrics for assessing sustainability performance within real-world farming and processing operations. Pilot data was collected from 38 growers farming in 8 states encompassing a total of 18 different crops. In total, there were 59 datasets as some growers provided data from multiple fields across 2 years. There was a good representation from a variety of small to large fields.

The pilot program was focused on learning about the availability, practicality, and usefulness of the metrics and data requirements. The data itself was not intended for use. The quality and completeness of the collected data varied across participants.

The pilot program did experience a high attrition rate from the initial 100 growers that agreed to participate. In addition to direct discussions with growers during the pilot recruiting and management process, interviews were conducted with 15 growers who did not provide data to understand their hesitations. Reasons for not participating included lack of time, priority, or comfort with data confidentiality and how the data would be used.

Key Findings
The experience of growers responding to the data requests for the draft metrics provides SISC with invaluable insight and learning. Findings from the pilot testing were separated into "Data Collection Readiness" and "Draft Metrics." The first refers to the availability of data inputs, the ease with which they are collected, and the ability to translate them into the format required for the metric calculations. The second refers to feedback on the metrics themselves or the specific data requirements that were requested.

Feedback on Data Collection Readiness
Key findings on the availability and ease of collecting and providing the data include:

1. Some pioneering growers are collecting most of the data required for the metrics in the requested format, but the majority of growers are not.
2. Data for many of the metrics was available, but not accessible in the requested format.
3. Of those growers collecting data for metrics such as water and energy use, they are not being collected in ways that allow for allocation to individual management units (fields).

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4. Some of the datasets were incomplete and differences in data collection methods affected data quality.
5. Data collection methods, costs, and time requirements varied.

Feedback on Draft Metrics
Key findings on the metrics and their data inputs include:

1. The metrics are generally acceptable.
2. Guidance on data inputs needs further revision.
3. Simplify where possible.
4. Several cross-cutting issues need to be addressed.
5. The value proposition was unclear to some participants.

The Path Ahead – The Next Set of Questions and Issues
The motive for pilot testing was to learn how the draft metrics would fair in real world farming and food processing situations. Much insight and learning has been gleaned from this first effort that can now be applied to the next phase of work to develop, test and release sustainability performance metrics for the specialty crop supply chain. The lessons from the pilot test experience present several clear steps for the path ahead:

1. Focus on building the capacity for growers to collect data for monitoring sustainability performance and adoption of continuous improvement business management strategies.
2. Focus on releasing "version one" of several of the metrics and continue to develop and pilot test the remainder. It may be best to focus on getting fewer metrics done well.
3. Focus the development of a data aggregation software platform as a secondary priority until more farm-level data collection capacity is built.

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I. Introduction

In 2010, the Stewardship Index for Specialty Crops set forth to pilot test the practicality, usefulness and feasibility of 7 draft metrics for assessing sustainability performance within real-world farming and processing operations. The following report documents the purpose for the pilot tests, the results and findings contributing to the learning and development of the SISC performance metrics. This report concludes with an outline of the next set of questions and issues for deliberation and discovery on the path of developing useful and practical sustainability metrics for the specialty crop supply chain.

The Stewardship Index for Specialty Crops

In December of 2008, a diverse group of 30 growers, trade association leaders, retail and food service companies, food processors and NGO's launched the Stewardship Index for Specialty Crops. The initiative was motivated by: 1) a desire to avoid duplicative reporting and auditing requirements from buyers to growers as had occurred in the response to food safety; 2) a recognition of the need to measure the environmental and social impacts in the specialty crops supply chain; 3) a recognition of the limitations of practice-based approaches to sustainability that do not allow for flexibility and innovation within a farm-specific context; and 4) the desire to create a system in which all operators could participate regardless of their original level of performance.

Participation in developing the metrics is open to all interested parties via website interactions and webinar meetings. The effort is governed by a Coordinating Council made of buyers, growers and NGO's.

The intention of the Stewardship Index is not to seek to prescribe standards or define a specific level of performance as "sustainable." Rather, it aims to provide a common yardstick for measuring stewardship performance consistently across enterprises.

Beginning in February 2009, 43 webinar meetings were conducted across 9 metric areas to deliberate and draft performance metrics. More than 550 people have registered on the SISC website to track the development of metrics and more than 100 have participated actively in the Metric Review Committees (MRC) webinar meetings where participants drew on the best available science and their own experience to develop draft metrics.

Funding for the Stewardship Index has been provided by the Packard Foundation in a grant to NRDC and the USDA NRCS as a Conservation Innovation Grant (CIG) awarded to SureHarvest. The CIG grant was awarded to underwrite the pilot testing of the draft metrics.

In April of 2010, MRC participants were surveyed to test for agreement to proceed to pilot test the draft metrics. Based on the survey results, the Coordinating Council voted to proceed to pilot test 8 of the draft metrics: Energy; GHG (non-farm only); Air Quality; Pesticides (on-farm only); Water Use; Soil, Nutrient & Water Quality; Biodiversity; and Waste.

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Pilot Testing the Draft Metrics

As a key step in any scientific process of invention, the purpose of pilot testing is to advance learning. The Coordinating Council wanted to give the metrics a 'test flight' in the fields and farming operations by growers and processors as the 'test pilots' and ask them for feedback in order to improve the metrics design.

The SISC Pilot Program was focused on learning the answers to these key questions:

1. Data Availability: How readily available is the data for completing the metrics? Are growers currently collecting the data? How is the data collected? Is it easily accessible?
2. Practicality: Do the metrics make practical sense to growers?
3. Usefulness: Will the metrics provide growers with useful information to better monitor and manage their farming operation?
4. Feedback: What other concerns, ideas and feedback do growers have about the sustainability metrics? What is the risk that the metrics will create unintended consequences or undesired incentives? Will the metrics address the needs of their buyers?

Pilot Participation

In early 2010, SureHarvest, acting on behalf of the SISC, with funding from the USDA-NRCS Conservation Innovation Grant, recruited growers to voluntarily pilot test the 7 on-farm metrics during the 2010 growing season. In total, initial commitments were made by 100 growers in 14 states encompassing 18 different crops.

Processing Tomatoes	Fresh market Tomatoes	Winegrapes
Citrus	Potatoes	Stone Fruit
Leafy Greens	Onions	Berries
Herbs (fresh)	Carrots	Almonds
Cherries	Pears	Apples
Green Beans	Sweet Corn	Peppers

SureHarvest staff met in person and via conference calls with growers to provide a pilot orientation to review the metrics and reporting requirements outlined in a Pilot Workbook throughout the spring and summer months. Pilot test participants were asked to provide data by either filling in the tables in the workbook or in provided Excel spreadsheet forms and asked to submit feedback on the pilot testing experience itself. Participants were given assurances that their data would be kept confidential and any presentation of data would be anonymized so as to protect confidentiality. Participating growers began to submit confidential data to SureHarvest in November, 2010 for analysis of the metric data and the pilot experience.

As of January 31, 2011, SureHarvest collected pilot data from 38 growers farming in 8 states encompassing a total of 18 different crops. In total, there were 59 datasets collected from

multiple fields across 2 years. Field size distribution can be seen in the figure below indicating that there was a good representation of data from a variety of small to large fields.

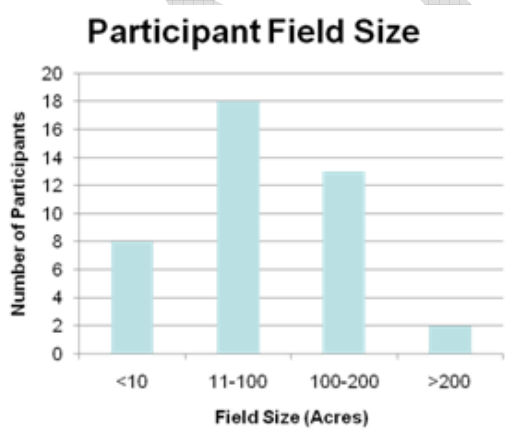
Crops:

Avocados	Berry (nursery)	Carrots
Green beans	Herbs	Lemons
Lettuce	Onions	Oranges
Peaches	Peppers	Potatoes
Raspberries	Strawberries	Sweet Corn
Tomatoes (processing)	Walnuts	Winegrapes

Geography:

California	Colorado	Florida
Idaho	Michigan	Oregon
Pennsylvania	Wisconsin	

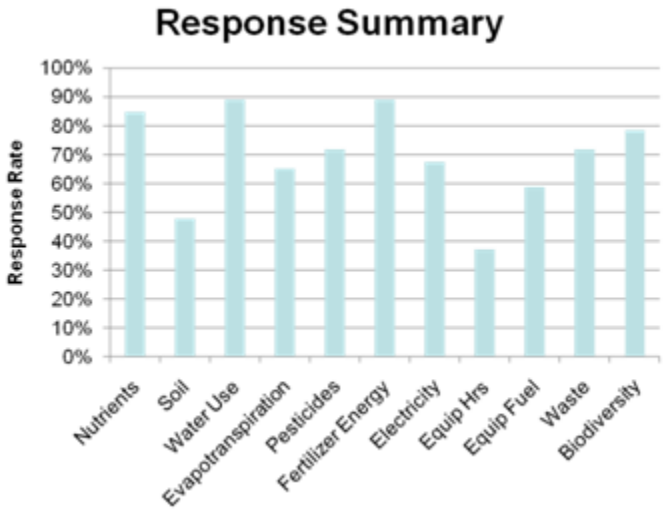
Field Size:



Data was collected for each of the 7 on-farm metrics being tested. The quality of the data submitted varied from 'very good' (both from the perspective of completeness across the metrics as well as thoroughness in following instructions for data values), to 'not so good.' Follow-up emails and phone calls were required for data "cleansing and scrubbing" purposes to ensure accurate metric calculations and results. It was also determined that there were challenges with the calculators used for several of the metrics due to incomplete reference data (e.g., embedded energy factors for pesticide active ingredients) and missing critical data from participants (e.g., engine hours for air quality emission calculations). These calculator shortcomings will need to be addressed by the MRC workgroups to ensure that meaningful metric results can be achieved.

The figure below indicates the level of completeness of data submission as well as its impact on the calculation of metrics. The Response Rate indicates the percentage of datasets that had

data for the various metric areas. Water use and fertilizer use data were most commonly available while soil organic matter and equipment usage hours were the least available.



Written feedback on the pilot experience was collected from approximately 20 participants providing valuable insight into the practicality of data collection and metric reporting. In addition, a similar number provided information on the source of the requested data (e.g., spreadsheets, utility bills, handwritten records) and the relative availability of the data from "not available" to "output from internal information systems."

Several findings regarding pilot participation should be noted:

Grower participation was less than anticipated. A significant finding of the pilot testing experience in and of itself, is the level of participation. While SISC secured commitments from over 100 growers, only 39 growers submitted datasets. In total, these 39 growers submitted 59 data sets from multiple fields, crops and/or two years of production data. The reasons for attrition are highlighted in the next finding.

Several of the pilot test participants were participating in a joint buyer-supplier effort to test the SISC draft metrics. These include a foodservice buyer and 2 food processor buyers. Even in these cases, where the buyer was asking their grower-supplier to provide data, on a voluntary basis, it was difficult to get the grower to comply with their buyer's data request. A similar scenario arose in a regional coordinated effort between processors and their grower suppliers where participation was not what the processors had anticipated.

Non-participants had several reasons for disengaging. The relatively high pilot 'dropout' rate is an indication of valuable learning in itself. In addition to direct discussions with growers during the pilot recruiting and management process, SureHarvest contracted with an independent consultant to interview the participants that did not follow through on their initial commitments to pilot test the SISC draft metrics. Of 20 growers contacted, interviews were completed with 15 growers, while 5 did not return phone calls and emails after repeated attempts. A sampling of verbal feedback can be found in the Appendix.

Based upon discussions and feedback over the course of the pilot, there are several reasons for the relatively high attrition rate:

*1. Some of the shippers/processors originally committed a larger number of growers to participate than they were able to deliver***.** Initial enthusiasm for participation in pilot testing waned as the shippers/processors realized how much effort they were asking of their grower suppliers. Because the effort was not mandatory, there was not a strong incentive to follow through on initial commitments to test the metrics and higher priorities won out for growers' limited time. Most shippers/processors are still in the process of defining grower supplier sustainability programs and the performance metric "messaging" from them was not clear.

*2. As a voluntary initiative, pilot testing the SISC metrics was not top of the to-do list compared to other operational priorities***.** For some growers, the SISC pilot testing was in competition with other initiatives. For example, some growers were focused on attaining GAP certification. Another barrier was the timing of the request for data submission. Because the data request came in the fall, just after harvest season, some growers were on vacation through the holidays or were busy moving operations to winter growing regions. Participation in the pilot testing was not a high priority for these growers and timing made a difference.

*3. For many, there was not a clear perceived benefit to the grower and concern that metrics would only advantage buyers***.** As noted above, only a few pioneering growers who are currently collecting energy and water data see the value of data collection for improving internal operational efficiencies. Many of the non-participating growers stated a concern about "where this is all headed" and did not perceive a direct benefit to using performance metrics. There is a perception that data will be used by buyers to discriminate against suppliers. Some perceive that the costs of collecting data and added paperwork will be burdensome and fear they will not be compensated in the form of higher prices to cover these added costs. More than one grower expressed frustration in the perception that the buyer benefits most from "telling the story of the farmer," but this value is not transferred into the contract price to the grower-supplier. This testimony indicates the current status of supply chain dynamics where most would not be described as 'value chains.'

4. Concerns over data confidentiality overwhelmed perceived benefits of participation. Several growers stated their concerns over data confidentiality as the reason for not following through on participation in the pilot testing. One grower who was supportive of the concepts of sustainability for the specialty crop sector stated he was very hesitant to share data for fear it would compromise their intellectual property. Another grower stated concerns that their buyer might use their data to calculate the cost of production and use this information to negotiate for lower prices.

Non-Farm Metric Pilot

Based upon work done by MRCs on non-farm metrics, a Pilot Workbook was developed for packers, shippers and processors, those businesses most closely linked to growers. The workbook was vetted by several shippers and processors and then ~10 potential participants

were recruited for the pilot. We did not receive data back from any of the participants but were told by most that the data would not be difficult to gather and it was just a matter of priorities to actually submit data. Combined with the unanticipated difficulties associated with the on-farm pilots and the apparent availability of metric data in a "four-wall" operation, the non-farm pilot took on a lesser priority.

II. Key Findings from the SISC Pilot Testing of Draft Metrics

The key findings from the pilot testing of the draft metrics can be categorized into two areas:

A. Feedback on Data Collection Readiness
B. Feedback on the Draft Metrics
C. Answers to the Pilot Test Questions

A. Feedback on Data Collection Readiness

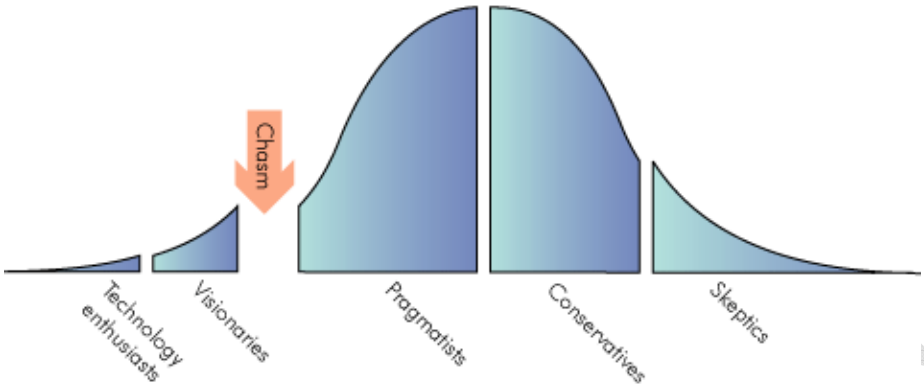
"Data collection readiness" refers to the availability of data inputs, the ease with which they are collected, and the ability to translate them into the format required for the metric calculations. The experience of growers responding to the data requests for the draft metrics provides SISC with invaluable insight and learning. Because the concept of sustainability performance metrics is a new concept for conducting business in the specialty crops supply chain, the experiences of the pilot testers provide SISC with a very useful 'reality check.'

Summary of Key Findings:

1. Some pioneering growers are collecting most of the data required for the metrics in the requested format, but the majority are not.
2. Data for many of the metrics was available, but not accessible in the requested format.
3. Of those growers collecting data for metrics such as water and energy use, they are not being collected in ways that allow for allocation to individual management units (fields).
4. Some of the datasets were incomplete and differences in data collection methods affected data quality.
5. Data collection methods, costs, and time requirements varied.

1. Some pioneering growers are collecting data required for the metrics, but the majority are not. The growers that participated in the pilot tests were those that in general, are already collecting data. A few of these growers are already involved in a sustainability certification program and were familiar with data collection and reporting requirements. These few pioneering growers have embraced the approach of 'measuring to manage' to manage their operations for continuous improvement, an essential strategy of sustainability.

Very few growers have software systems for managing all their farming data. Most data collection systems rely on paper records, vendor receipts and Excel spreadsheets. Several reported that they lacked any sort of centralized data repository within the company which made collecting data for the metrics particularly cumbersome.



As in most change-adoption evolutions, there exists a chasm between early adopters (the minority) to widespread adoption of new technology/change. The low participation in pilot testing of the SISC metrics is consistent with the general rate of change-adoption.

2. Data for many of the metrics was available, but not accessible in the requested format. In general, data for many of the metrics was available, but not always accessible or readily retrieved. Some pioneering growers are collecting much of the data required for the metrics, but others are either not collecting the data, collecting it in a different format than that requested for the metrics, or not collecting it at the level of granularity required by the metric. Therefore, most growers did not have the data 'readily available' such that they could retrieve the data from a computer or paper record and plug the data directly into the metric without manipulation or into the calculators that were required for several of the metrics.

As the response rate shows, however, many growers are collecting some of this data in their own format. The challenge for SISC will be to establish protocols that provide enough guidance so that data is collected in a similar fashion, but also allow for growers to use the systems they have established.

For instance, one metric that most growers could provide data for is pounds of nitrogen and pounds of phosphorus per unit of production. However, even in that case, the fertilizer records for a given block were not summarized at the end of the year to provide a figure for total N or P applied per block. It is not common practice to calculate total N or P per unit of production. In this instance, the SISC metric would require summing totals at the end of the year and providing yield totals in order to provide the N or P per unit of production metric.

3. Of those growers collecting data for metrics such as water and energy use, they are not being collected in ways that allow for allocation to individual management units (fields). Several of the metrics were asking for a level of data granularity that did not practically apply to growing operations. In particular, the air quality and energy metric asked for equipment usage on a field of block level, however, this level of detailed recordkeeping is not useful to growers in their current decision-making process.

4. Some of the datasets were incomplete and differences in data collection methods affected data quality. About half of the pilot participants did not follow instructions or submitted incomplete data. In addition, the differences in data collection standards created datasets of questionable quality. In particular, different regulatory requirements across different states for pesticide and fertilizer application reporting means differences in data collection. Another finding affecting data quality is that the available reference data for the embedded energy calculators for pesticides and fertilizers was missing in some places. Similarly, some growers did not track water usage by field and were looking for guidance in how to apportion use.

5. Data collection methods, costs, and time requirements vary.
In general, growers collect data in a variety of ways from paper records to electronic records. Most electronic records are kept as Excel spreadsheets. Very few growers have farming management database software systems. Unless a grower maintains a farming management database system, the data is not easily accessible because it exists in a myriad of spreadsheets, paper records, vendor records, handwritten notes, and other formats. Some participants reported that data was spread out across different parts of their company and tracking it down was time consuming.

Very few costs were incurred as part of the pilot data collection. However, several participants noted that there could be significant time and financial costs were they to collect the data for their entire enterprise.

Due to the varying scope of the size and number of fields submitted by participants and the size of the grower operation itself, the number of hours to gather data varied widely both between metrics and within metrics. Feedback varied from less than one-half hour to forty hours for a single metric.

B. Feedback on the Draft Metrics

The draft metrics and required data inputs were evaluated by pilot participants. Much of the evaluation focused more on the data requirements than the metrics themselves. In addition, facilitated MRC webinars were held for five of the metrics (water, energy, air quality, waste and biodiversity) during the first week of February 2011. Pilot feedback and data challenges were discussed along with first impressions on how/if the metrics themselves would need to be modified. Together, this has all provided helpful feedback to inform revisions of the metrics.

Summary of Key Findings:
1. The metrics are generally acceptable.
2. Guidance on data inputs needs further revision
3. Simplify where possible
4. Several cross-cutting issues need to be addressed.
5. The value proposition was unclear to some participants.

1. The metrics are generally acceptable.

Overall, the metrics themselves were generally acceptable to the pilot participants. Some participants did not find specific metrics to be of benefit to them, but generally did not object to the suite of metrics they were asked to pilot. The evaluation of the viability of the metrics themselves was overwhelmed by the preoccupation with the data requirements and availability.

2. Guidance on data inputs needs further revision.

Between the data collected, the data sources mentioned, and direct feedback from pilot participants, it is clear that some of the guidance related to specific data inputs needs revision. Some instructions were unclear and left too much interpretation up to the grower. Some asked for data in units that were not appropriate. And others could align better with existing programs. Overall, it would be useful for each metric workgroup to carefully look through the feedback and revise the guidance on data collection.

3. Simplify where possible.

For some participants, the combined data requirements for the suite of metrics were overwhelming and felt burdensome. This is to be expected to a certain extent, as the metrics were often asking for information in a different format than the growers were used to. Nevertheless, some of the metrics had high data requirements that may not be justified. Specifically, the air quality metric required fuel use by specific piece of equipment, estimated by hours of use for each equipment. This data requirement was particularly burdensome and had a low response rate. In general, simplifying the metrics such that less data is initially required may help to inspire more participation and support for metrics overall.

4. Several cross-cutting issues need to be addressed.

Throughout the pilot feedback, several issues were cited repeatedly that should be addressed holistically for the entire suite of metrics:

- Allocation – As mentioned above, several metrics were asking for data specific to a field when that data is typically collected at a higher level over multiple fields or the entire enterprise. Trying to estimate specific field-level usage was time-consuming and lowered the accuracy of the data. A protocol for allocating values should be established to increase consistency across operators in this situation.
- Scope and boundaries – Some questions related to the scope and boundaries of the reporting domain for the metric arose. These include
    - Which subcontractor operations should be included for each of the metrics?
    - Are tenants required to complete all metrics?
    - Does non-bearing acreage have to be included in estimates of planted area?
    - Can the biodiversity metric cover "whole farm" area when others are limited to the field boundary? What is encompassed?
- Units – The current unit of production is yield at harvest. The pilot feedback and data pointed out that this does not adjust for quality where lower yields may be intentional. In addition, it does not account for post-harvest losses before a product leaves the farm gate. Further conversation is warranted to ensure the functional unit is appropriate.

5. The value proposition was unclear to some participants.
Between feedback from participants and the low overall participation rate, it is clear the value proposition for using the metrics was not evident to all growers. Because the concept of performance-based assessments is a new approach to farming management, the potential benefit of metrics has not been fully understood or explored. There is a lack of familiarity with performance-based metrics, making the practicality and usefulness of the metrics seem questionable at times. This combined with concerns over the ultimate use of the metrics and data, reveals the need for a stronger value proposition for growers.

C. Answers to the Pilot Test Questions

1. *Data Availability: How readily available is the data for completing the metrics? Are growers currently collecting the data? How is the data collected? Is it easily accessible?*

How readily available is the data for completing the metrics?
For the growers that provided data for the pilot testing, the data for many of the metrics was not readily available. By 'readily available,' it is meant that the grower participant could retrieve the data from a computer or paper record and plug the data directly into the metric without manipulation or into the calculators that were required for several of the metrics.

Are growers currently collecting the data?
Some pioneering growers are collecting much of the data required for the metrics, but many growers are not. For the growers that are collecting data, it is not at the level of granularity required by the metric. The one metric that most growers could provide data for is pounds of nitrogen and pounds of phosphorus per unit of production. However, even in that case, the fertilizer records for a given block were not summarized at the end of the year to provide a figure for total N or P applied per block. It is not common practice to calculate total N or P per unit of production.

How is the data collected?
In general, growers collect data in a variety of ways from paper records to electronic records. Most electronic records are kept as Excel spreadsheets. Very few growers have farming management database software systems.

Is it easily accessible?
In general, unless a grower maintains a farming management database system, the data is not easily accessible because it exists in a myriad of spreadsheets, paper records, vendor records, handwritten notes, and other formats. Some participants reported that data was spread out across different parts of their company and tracking it down was time consuming. Due to the varying scope of the size and number of fields submitted by participants and the size of the grower operation itself, the number of hours to gather data varied widely both between metrics and within metrics. Feedback varied from less than one-half hour to forty hours for a single metric.

2. *Practicality: Do the metrics make practical sense to growers?*

The concept of performance-based metrics is a new frontier for production agriculture. Growers are most familiar with practice-driven sustainability assessments for measuring environmental impacts from their farming operations. For example, NRCS cost-share assistance is granted on whether or not a particular practice or technology is implemented. Current certification programs, for organic farming or other sustainability certification programs are all practice-based. It is much easier to complete and participate in practice-based assessments because the assessment requires a simple 'yes' or 'no' to questions about particular farming practices and the use of materials. Either the grower is doing a practice or they are not, either they used specific materials or they didn't.

Given the unfamiliarity with the concept of performance-based metrics, it appears too soon to say definitively if growers will find the metrics to have practical use in their farming operations or not. The assumption is that growers will discover opportunities for continual improvement based on measuring and managing inputs. This assumption is based on similarities with the manufacturing sector where management approaches such as lean manufacturing, six sigma, business process management, and others based on measuring performance and managing toward efficiency and quality have delivered significant return on investment.

3. *Usefulness: Will the metrics provide growers with useful information to better monitor and manage their farming operation?*

Feedback from pilot participants indicated that some metrics were more useful than others. The metrics that were most useful were: nutrient usage, water usage and energy. The metrics that did not present obvious benefit to the pilot participants are air quality, waste, and to a lesser extent, biodiversity. (The pesticide metric was not fully tested as the metric tool itself had some usability issues. The PRiME team conducted pilots of their own which can serve as a SISC proxy in terms of lessons they learned.)

Because the concept of performance-based assessments is a new approach to farming management, the potential benefit of metrics has not been fully understood or explored. The lack of familiarity with performance-based metrics means that this question cannot be answered definitively without additional experience and exploration about how the incorporation of metrics could support a "measure to manage" approach to farming decisions.

4. *Feedback: What other concerns, ideas and feedback do growers have about the sustainability metrics? What is the risk that the metrics will create unintended consequences or undesired incentives? Will the metrics address the needs of their buyers?*

What other concerns, ideas and feedback do growers have about the sustainability metrics? Feedback from participating growers revealed several dominant themes of opportunities and concerns:
Potential Opportunities:

- Metrics would give growers the opportunity to involve their buyers in understanding the complexities of farming.
- Monitoring of metrics would provide growers with information to evaluate their farming operations and provide feedback for making continuous improvements and saving on inputs and efficiency improvements.

Perceived Barriers:

- Buyers will use performance-based metrics to differentiate among their suppliers.
- Growers will invest in technologies to improve sustainability performance but buyers will not pay higher prices.
- There will be a cost to collecting and providing data and growers will not be compensated.
- Sustainability reporting will be very time consuming and require dedicated resources.
- If data is collected, regulators will be more likely to increase regulations.

What is the risk that the metrics will create unintended consequences or undesired incentives?
The nature of unintended consequences is that you do not see them coming so they cannot be anticipated. For many growers the idea of performance-based metrics made them very concerned about "where this is all going" and they perceived a very high risk associated with reporting quantitative elements of their business. Concerns also included the fact that quantitative data on crop inputs could allow rough crop production costs to be calculated and used in the buy-sell dynamic as well as by regulators in their work with production agriculture (e.g., current California Central Coast water quality regulatory monitoring proposal).

Will the metrics address the needs of their buyers?
The pilot testing did not provide information to answer this question.

III. The Path Ahead – The Next Set of Questions and Issues

The motive for pilot testing was to learn how the draft metrics would fair in real world farming and food processing situations. Much insight and learning has been gleaned from this first effort that can now be applied to the next phase of work to develop, test and release sustainability performance metrics for the specialty crop supply chain.

The lessons from the pilot test experience present several clear steps for the path ahead:

1. **Focus on building the capacity for growers to collect data for monitoring sustainability performance and adoption of continuous improvement business management strategies**. Since the pilot test revealed that a minority of growers are currently collecting data, there is first and foremost a need to develop this capacity if sustainability performance measurements are to be implemented in the future. It is not possible to measure impacts without data. An investment in grower outreach, education and training would generate greater adoption of the metrics, data collection practices and continuous improvement as a way of doing business.

2. **Focus on releasing "version one" of several of the metrics and continue to develop and pilot test the remainder**. Because the pilot test found that the metrics themselves were generally acceptable, the next steps should be for the MRC's to refine the metrics based on the pilot test feedback received and proceed through the peer review process and final approval by the Coordinating Council for release of V1.0 of the SISC metrics. It may be best to focus on getting fewer metrics done well. There might have been higher participation

in the pilot testing if there had been fewer metrics to test. The remaining metrics should continue to be developed and tested, but perhaps testing fewer metrics at any one time.

3. **Focus the development of a data aggregation software platform as a secondary priority until more farm-level data collection capacity is built.** Because the pilot test dataset is quite small and the quality of data is not robust enough, discussions about data aggregation and the development of a technology platform for aggregating data appears to be premature. While the development of grower capacity for data management has to occur as the first priority, discussions about data aggregation can begin to develop technology specifications based on stakeholder needs and input. Funding will need to be secured to research, define and build a technology platform and consideration is needed to determine an appropriate business model for owning, managing, and administering such a technology platform. Synergies exist for some metrics between other on-farm sustainability initiatives such as Field to Market and Dairy Management Inc. where collaborating on calculators (i.e., underlying reference data, algorithms and user interface) would be mutually beneficial.

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APPENDIX I

Quotes and views from growers that participated in the pilot testing of the SISC draft metrics:

In response to the question of overall impression of the **Soil, Nutrient and Water Quality** metric and how it can benefit your operations, some of the responses were:

- "This is something that we need to do for the benefit of our crop."
- "Easy, straight forward, nothing new."
- "Will help us move to a higher %OM content on our farms. Helps identify fields where more N & P is applied."
- "It will be of benefit when large companies are asking for it."
- "We have a great system set into place that would be hard to turn away from so I am thinking not much help here."
- **"**Helps to establish a baseline – good exercise."
- **"**This should help operation."
- "No benefit to our operation. Our overall impression of the metric: time consuming."
- "I think it will help to reduce waste and hopefully be better stewards to the land and our neighbors."

In response to the question of overall impression of the **Water Use** metric and how it can benefit your operations, some of the responses were:

- "Improves water management."
- "Assuming that the standard measuring method can be broadened, this will not required significant additional man-hours."
- "Valuable I guess, but very frustrating in the way it is set up. A monthly metric doesn't really make practical since for tracking the data."
- "Overall impression is good, benefit by possibly using less water which will save on energy costs and fertilizer/chemigation applications."
- "It would give us a good idea cost difference between Diesel motors and electric driven systems."
- "Useful information and important to develop a good system to track especially as water use is scrutinized more and more each season."
- "Establishing baseline is helpful."
- "This gives an overall idea, but many things change from field to field.
- "Water is a scarce resource, especially in California, and we think it will be very valuable for growers to be able to monitor their own water use accurately in future."
- "Not much, already use CIMIS and weather station data."

In response to the question of overall impression of the **Pesticide Use** metric and how it can benefit your operations, some of the responses were:

- "Collecting information for the PRiME tool was a more difficult exercise. My opinion is that growers who are not invested in sustainability tracking (those being asked to

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track sustainability by processors, for example) are not interested in taking the time required to use the PRiME tool. Entering each pesticide application and the necessary field location information one record at a time is particularly time consuming. Incorporating a function that allows seasonal application information to be uploaded directly might be useful."

- "Couldn't even get the gosh darn password into the dang program."
- "Not much value – too much time involved. Grower chooses a pesticide based on ones available – choosing the one that has least negative effects based on data found on the label and MSDS. Prime tool offers no additional information."
- "Not sure how the PRiME tool will work but it will require data entry. We would need to have someone dedicated to that project, requiring training on the tool and additional man-hours for data entry."
- "Could be interesting to view the PUR more than once, and compare to other fields."
- "Pesticides usage changes a lot year to year pending on the heat and rain, so don't see much help here."
- "This section was a waste. The program was hard to use."
- "I cannot believe that they charge for this. I feel this program is only half completed."
- "The data request is not very specific. Requesting specific information similar to other metric requests would ensure adequate data submission."

In response to the question of overall impression of the **Air Quality and Energy Use** metric and how it can benefit your operations, some of the responses were:

- "Too convoluted and difficult to keep track of as it exists in this system.
- "I understand what you want and why, but this doesn't directly benefit our farm."
- "We could isolate where there could be some areas of savings by seeing where high energy is expended."
- "If you can demonstrate that we will benefit from being able to track this information, then I am all for it. We aren't equipped to take it on right now."
- "Helps us keep track of fuel usage at a field level (calculated), and creates a vision while moving forward to have better records for a smaller unit."
- "It is useful to calculate irrigation and machinery costs."
- "The metric has no benefit for our farm operations."
- "Our growers have voiced the opinion that since fuel consumption is unlikely to change from year to year, it is not a useful thing to track. However, we believe that growers may find the information useful for cost accounting and evaluating their farm equipment if they can find a reasonable system for tracking it."
- "I found out how many kw it takes to irrigate crop and accurate $$ figure in field."
- "Very little."

In response to the question of overall impression of the **Waste** metric and how it can benefit your operations, some of the responses were:

- "Not relevant."
- "None."

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- "How can we track this better? Would we be able to cut down on waste or save money? I don't know."
- "Putting a number to waste gives us a way of quantifying and measuring which helps put it into perspective. It encourages recycling to go up, and landfill waste to decrease."
- "If we could have accurate data on total waste, it would be good information to account disease management."
- "Not much, most to all the land we farm is rented so we only pay and have control over the part we plant (under irrigation)."
- "No benefit."
- "The metric has no benefit for our operation."
- "Overall impression - This metric is useful to be able to establish a baseline of waste produced. However, we found the main source of waste to be packaging from the chemical applications. It is not clear if growers would have much control to reduce this source of waste, or if it would provide a benefit since the chemical application companies are dealing with this waste."
- "Minimal value."

In response to the question of overall impression of the **Biodiversity** metric and how it can benefit your operations, some of the responses were:

- "Very difficult to define these things. The value is in awareness of the various factors and a consciousness of them when making decisions."
- "No additional benefit to our operation but also did not adversely affect it either."
- "I liked it. It was hard to navigate and a bit too vague, but overall one of the easier ones to fill out."
- "It could help growers to improve their non-vegetated areas of the farm, and give a good parameter of management for different areas of the farm."
- "Not much, most to all the land we farm is rented so we only pay and have control over the part we plant (under irrigation)."
- "For research fields this metric is not applicable."
- "This metric has no benefit to our operation."
- "This metric provides a useful qualitative means to track best management practices being followed. However, the utility of the metric from a quantitative perspective may be diminished as a result of both imprecise acreage estimates and the subjectivity of responses for the wide array of best management practices followed dependent on the location."
- "Very little."

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Additional general Feedback:

> "Only one of our growers chose to fill out the workbook. The remaining growers decided not to fill out the workbook as it just seemed to be an exercise in filling out more paperwork for no return. Were all hoping this project would be a program that actually gave the grower some feedback as to where his farm fits in the big picture. For instance, how a certain task, product applied or not applied affects the cost in one's farming operation."

> "Issue with leased/rented land and continuity of 'information on the land' and how this would impact mid- to long-term metric comparisons. Growers will start growing on new ranches that have little prior information related to some of the info requested by SISC."

> "In some cases, there is a lower relative importance of data collection (i.e., pay back to the owner) in relation to actually doing the tasks (e.g., sprinkler pipe moving to get field watered vs. amount of water applied).

> "Crop production data is spread across different parts of business and hard to find and then collect."

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APPENDIX 2

Quotes and views from growers who committed to, but did not complete the pilot testing of the SISC draft metrics:

- "Not interested in sharing confidential information that he has learned through 25 years of farming with an academician/NRDC fellah who will publish it and/or try to impose unrealistic standards upon growers."
- "Number of audits per year keeps increasing. Now are getting audited for GlobalGAP and social audits from buyers such as WalMart and Costco. Buyers send auditors to their location to audit payrolls (to assure that they provide fair wages, pay overtime, etc.), do peak employment interviews, assure they provide a safe working environment, have recycling programs, etc. Audits are difficult for them since their field staff is not paperwork oriented and therefore office staff must be involved."
- This grower completed most of the worksheets but they didn't choose to share them at the moment. Believes "the sustainability movement and this program are beneficial, but I'm very hesitant to share data for fear it will compromise our intellectual property." (i.e., proprietary farming methods particularly with a small acreage crop).
- "With all of the simultaneous moving parts in the evolution of sustainability programs, where is this all going?" One of his biggest issues like so many other growers is time, or the lack thereof and he is concerned that this effort may lead to another time-consuming program.
- "Buyers are not treating growers as partners but rather as peons and that there is a lot of effort on behalf of big buyers to make claims on the little guy's back. In other words, there is little balance in the supply chain when it comes to sharing cost burdens."
- "There's just more and more paperwork."
- "We are faced with a difficult task with all of the different sustainability programs forced down on us by our buyers at this time. To spend the time on each one is time consuming and unless approved and accepted by our buyer, it doesn't make a lot of sense to spend a lot of time on them. Many times they are difficult to complete and require a lot of attention to details. We aren't opposed to any of them, we just get overwhelmed by having to jump through too many hoops. Our farming has many sustainable attributes and we are very proud of what we do and how we do it, it just is time consuming. We have 26 crops and almost each one has different requirements of each buyer, not to mention the organic program we have in place and its associated paperwork."
- Grower apologized but has no time to complete the worksheets.

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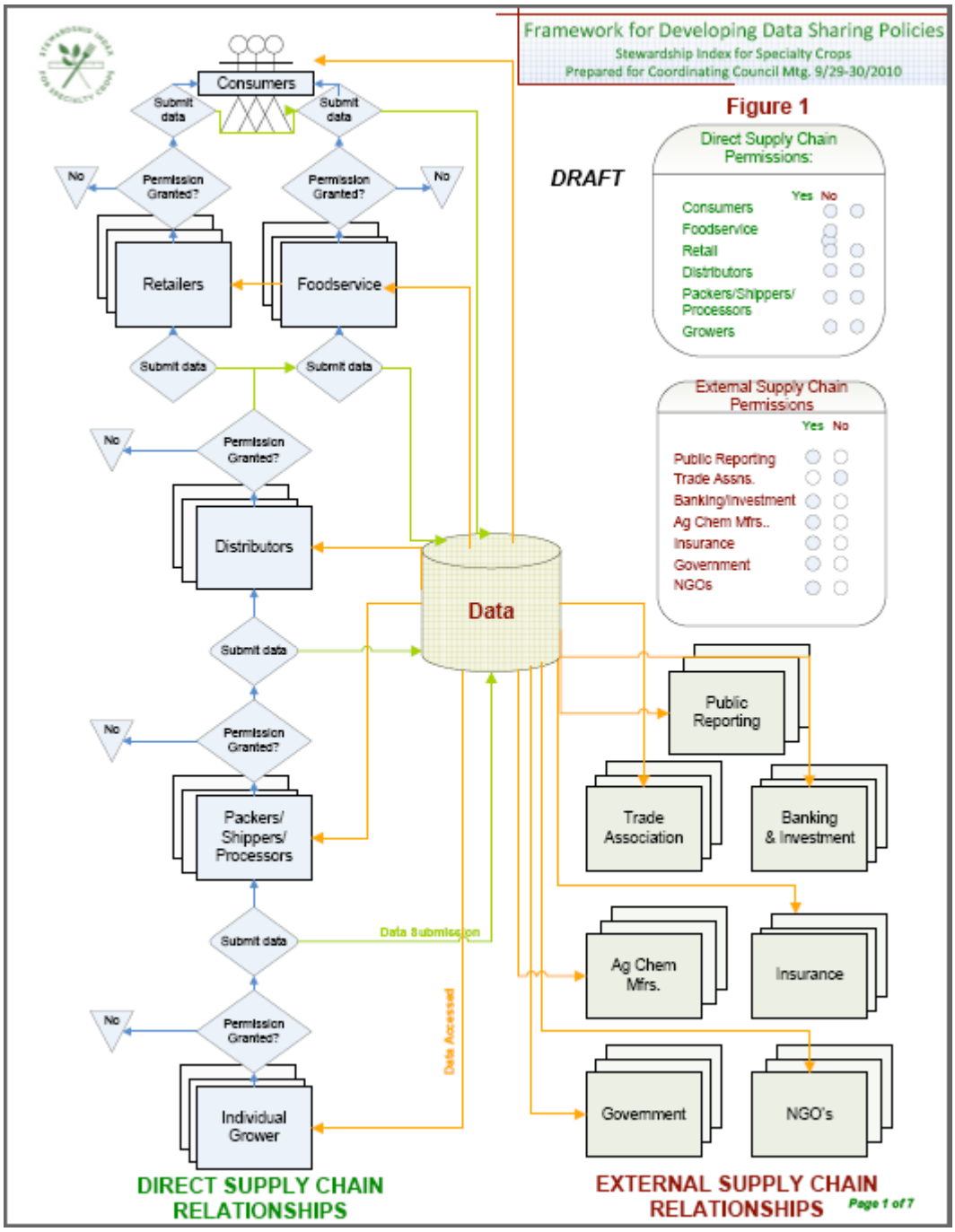
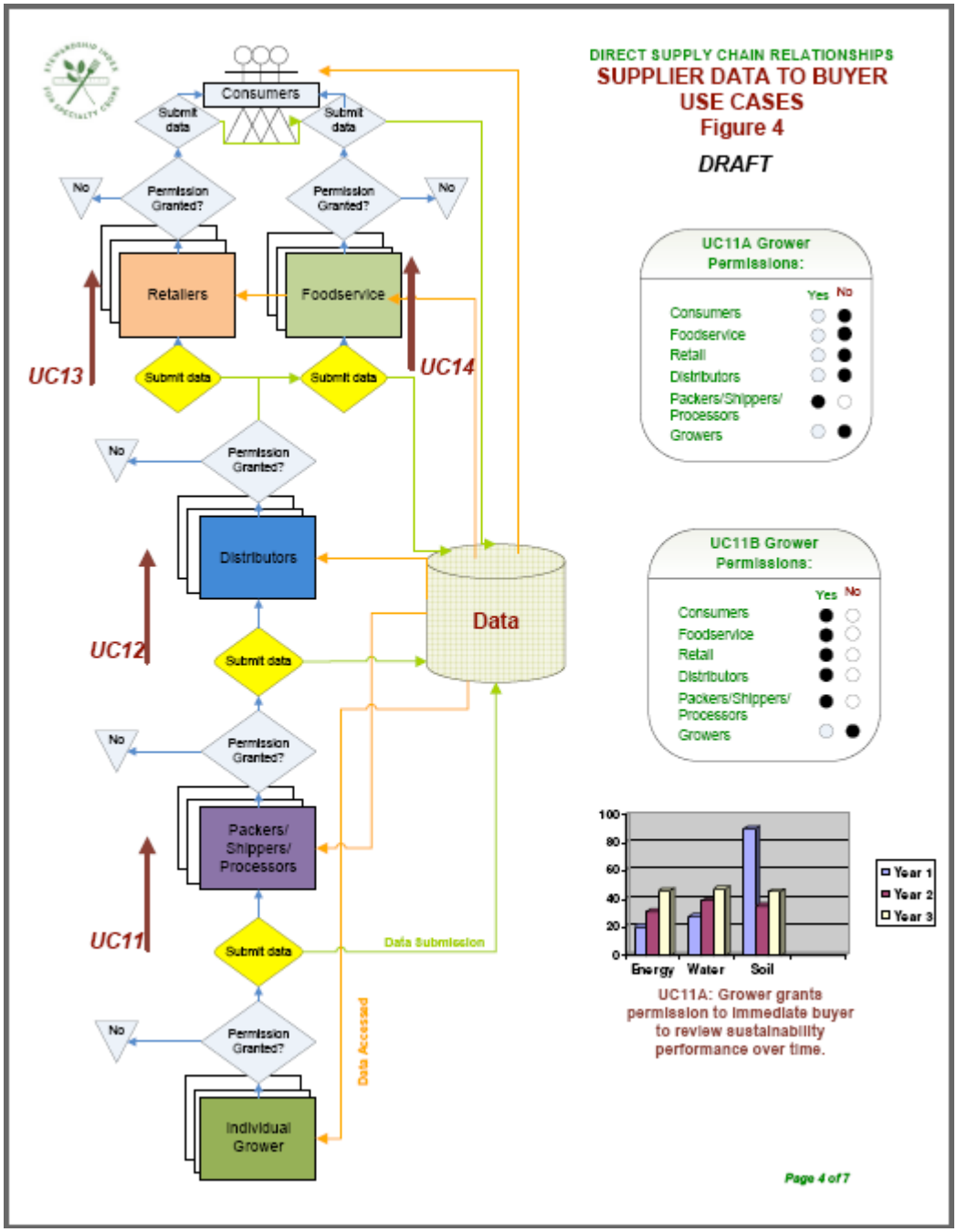
Attachment H – Framework for Developing Data Sharing Policies

The diagram below shows an overall framework for sharing SISC metric results. This was approved by the CC to further define data sharing elements of SISC.



Specific use cases were developed to analyze data sharing permission structures in accord with approved policies.