Re-designing Supply Chains for Sustainability:

Supply Chain Partners Best Practices for Collecting, Sharing and Comparing Stewardship Metric Data

Introduction and Background

Across food supply chains, businesses are advancing environmental, social and economic values. Balancing production with continually improving conservation stewardship demands an aligned approach across supply chains to both measure and communicate on-farm sustainability data.

The Stewardship Index's (SISC) metrics exist so the entire specialty crop (all fruits, nuts, and vegetables) industry can understand baselines and track continual improvement in one consistent way. While having consistent ways to measure is an essential first step, the next step is to consider the best ways for supply chain partners to collect, share, and use such data.

In order for the supply chain to work together towards a common goal of continually improving natural resource stewardship, each node of the chain must feel safe sharing data. Each node of the supply chain must also share in the overall value being created.

Sharing this new form of on-farm stewardship information across industry wide supply chains requires new levels of integration between each of the players in the chain, essentially a metric-enabled supply chain model. This model is designed to facilitate cooperation around the common goal of resource stewardship in order to create a more resilient future for the food and agricultural industry.

Current attempts at sharing on-farm sustainability performance metric data push existing supply chain models past the limits of what they were designed to communicate. Current supply chains were built to communicate price, timing and amount. Adding very detailed, context specific, on-farm sustainability performance information into that existing system will not work. Attempting to layer the sharing of on farm performance data onto the current limits of supply chain communication and design have the potential to result in green washing, or worse, penalizing farmers for data that is misunderstood by buyers. If Food Companies are genuinely interested in helping to create greater sustainability in their supply chains, then they will need to work with growers and supply chain partners to collectively create the best ways to do that. It will take the whole supply chain, working together, to improve regional natural resource stewardship on the ground.

In order to effectively share and use on-farm stewardship information, supply chains will need to evolve by developing more intimate nodes of communication, and closer relationships between participants. The model outlined here, and its supporting guidelines, have been developed to support supply chains so that they are better able to share the value of on-farm stewardship and collaborate to achieve resource stewardship.

One thing that this project, and these resulting guidelines, has made very clear is this: growers feel very strongly that FoodCos and Buyers should know what data means before they determine how they will use it. Knowing what the data means will require understanding issues associated with farming, both in general and within specific regions and ranches within each unique supply chain. This is what we refer to, throughout this content, as understanding the 'context' of each region or ranch. This 'context' must inform all data, or the data will, quite literally, be taken out of context – and then will not lead to real positive continual improvement on the ground.

This will require a new level of communication and relationships between supply chain partners. Without that contextual knowledge, the data can all too easily be misinterpreted – and thus lose all of its value. Many of the guidelines outlined here help guide FoodCos and Buyers in how to work with their supply chain partners to create the most value out of using performance metrics.

Again, the goal of this model and guidelines is to support the successful sharing of on-farm stewardship data in order that the entire supply chain – from farm to point of sale – can successfully enact the values of measure to manage, continual improvement, and greater natural resource stewardship over time.

The guidelines described in this document are best practices that provide a clear and safe way for growers, and the supply chains of which they are a part, to understand, use, and share this important information. In the end, our goal is to create a system that helps with both on-farm management **and** with communicating the value of that improved management throughout the supply chain.

Note on using this content: While these guidelines are broken down into categories, some of which apply directly to growers, while other apply to FoodCos, it is our strong suggestion that any organization aggregating metric data review and understand **all** of these guidelines. Understanding the growers' perspective is key for anyone looking to collect, share, or compare this kind of performance metric data.

How These Guidelines Were Developed

The model and guidelines that follow were developed over a two-year project by an entire working supply chain. A real time fresh lettuce supply chain of buyers, distributors, packer shippers, processors, and growers all participated in collecting, sharing, comparing on farm performance metric data and participated in the creation of this model and guidelines via multiple rounds of meetings, interviews, and reviews of the content. It was key to have the actual relationships between supply chain partners be real-time, in order for the project outcomes to be valuable to specialty crop industry supply chains. The project was funded by a California USDA Conservation Innovation Grant and supported by the many businesses, NGO's, growers, and grower organizations engaged with SISC. For more details on who participated in this project, and details on how it was done, please see the appendix.

SISC Supply Chain Model – Guideline Details

The Stewardship Index for Specialty Crops (SISC) initiative was founded on the principle that measuring performance through sustainability metrics would provide a valuable tool for growers to help track impacts of management practice changes and guide continual improvement in their operations. That information could then be shared with peers, their packer/shipper and processor customers and ultimately retail and foodservice buyers to help tell the agricultural sustainability story and create supply chain wide improvement as other businesses also used metrics in their operations.

At the foundation of the performance metrics is data. The diagram below depicts the three key elements of SISC metrics: data, calculations and metric results. The following guidelines focus on the on-farm data used in calculations and the metric results as they are used and shared by growers and other downstream supply chain partners.

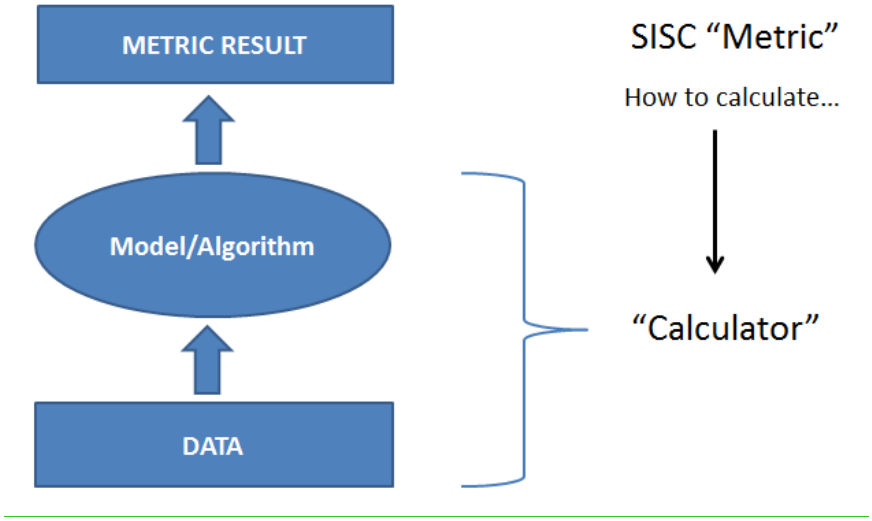
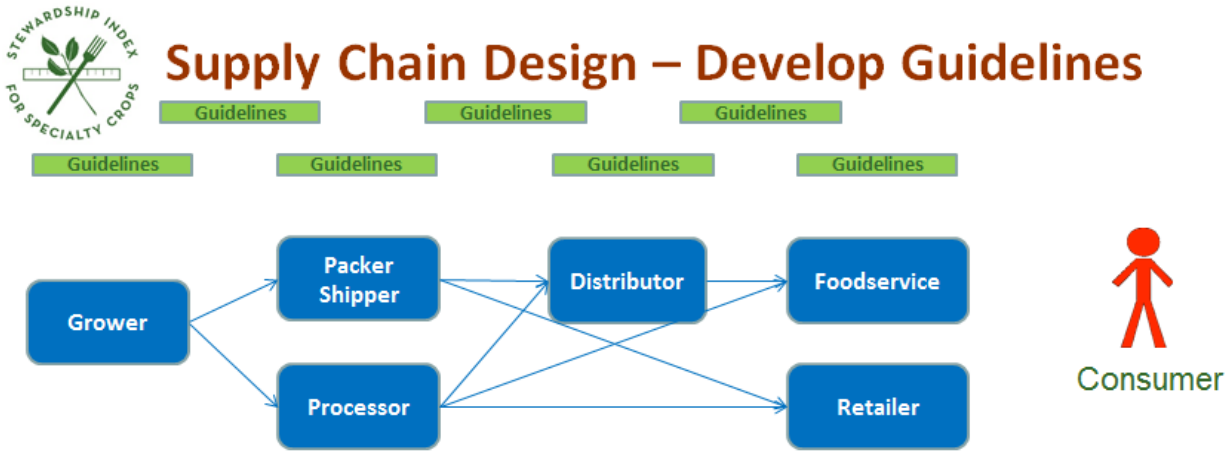


Figure 1: Three elements comprising a SISC metric

This document provides details on the guidelines needed to establish the "ground rules" and best practices for using SISC on-farm performance metrics within and across the supply chain. The implementation of the guidelines will help promote ease of use and value to each supply chain member, between supply chain partners and for the entire supply chain itself.

The following diagram illustrates how distinct sets of guidelines need to exist to support the unique relationships and interactions that make up a supply chain.



The guideline framework below was used to address the various steps involved in collecting, calculating, sharing and using metric results, and which of the supply chain actors are responsible for those steps. This chart was used to ensure we covered each supply chain partner's time they 'touched' the data. It serves, as a useful tool to track which supply chain partner needs a 'best practice' at each point of the data collection, sharing and use. The numbering scheme ("ID" in the table) is used in the document to discuss each guideline. (Note: Packer/Shippers and Processors are collectively referred to as FoodCos in the document.)

Guidelines	ID	Grower	Grower-FoodCo	FoodCo	FoodCo-Distrib	Distrib	Distrib-Buyer	Buyer	Buyer-Consumer	Consumer
On-Farm Metric Data Collection										
Metric calculation data clearly defined	1.1	X								
Data collection protocol understood	1.2	X								
Farm management areas defined	1.3	X								
Temporal data collection boundaries are clearly defined	1.4	X								
Collect metric data in a crop recordkeeping system	1.5	X								
Metric revision feedback mechanism defined	1.6									
Metric Calculation										
Use SISC metric calculator or an "approved" equivalent SISC metric calculator	2.1	X		X		X				
Save annual metric results in farm management software/tool	2.2	X								
Potential context issues for the metric defined	2.3	X								
Metric Results Usage - Grower										
Review annual metrics results as part of farm management operations planning	3.1	X								
Using metric results to provide regulatory reporting	3.2	X								
Using metric results in industry reporting initiatives	3.3									
Using metric results in buyer reporting needs	3.4	X								
Usage and analysis of on-farm metric results	3.5	X								
Metric Results Sharing										
Metric result data privacy/confidentiality policy in place	4.1			X		X		X		
Metric result data security policy in place	4.2			X		X		X		
Metric results data sharing agreement in place	4.3			X		X		X		
Reporting guidelines in place for supply chain partners	4.4		X		X		X			
Reporting format and form in place	4.5		X		X		X			
Submission mechanism in place	4.6		X		X		X			
Metric Results Usage - Aggregation										
Data should be anonymized before aggregation	5.1	X								
Approach for statistical analysis of aggregated data is defined	5.2									
Aggregation policy should be defined	5.3			X		X		X		
Recommendations on usage/analysis of on-farm metric	5.4	X		X		X				

Figure 2: Guideline framework with individual sections, guideline IDs and affected supply chain nodes

The guidelines are broken into the following main sections:

1. On-Farm Metric Data Collection
2. Metric Calculation
3. Metric Results Use – By Grower
4. Metric Results Sharing
5. Metric Results Use – By Aggregators
6. Metric Results Use – By Supply Chain

Each section has a description of the supporting guidelines for that catagory.

Each guideline within the six sections lists: who in the supply chain its intended for, the statement and rational of the guideline, and a description of the best practice.

Guidelines for Collecting, Sharing, and Comparing Metric Data

Section 1: On-Farm Metric Data Collection

Who: Growers

What: The collection and recording of farm management data is the first step in using metrics to better understand the sustainability of farming practices over time. Growers and their support teams can collect and input data into metrics calculators and obtain metric results. Gathering this data, and then seeing metric results year over year, can help growers and their teams better understand the impact of their management decisions, and their overall operations.

How it works: These metric results can also be shared with downstream supply chain partners for reporting purposes and as part of the farming sustainability story. For example, a large retailer may request information on water use efficiency from the packer/shippers they buy fresh product from. In order to answer the retailer's information request, those packer/shippers will need to ask their growers to track and report water usage data, and water use efficiency metric results. The packer/shipper will then need to aggregate that data for its growers, and report it to the requesting retailer. All of that metric information will need to move from the field, through the supply chain, to the retail buyer that originally requested it. The retailer could then, after a number of years of tracking data, work with its supply chain partners to help create continual improvement in water use efficiency. The retailer could then use this program, and its partnerships across the supply chain, to tell a farming sustainability story to consumers.

And, as with any data-dependent effort, the quality of input data, dictates the quality of the output results. As the old saying goes: garbage in, garbage out. So, providing clear guidance on the what, where, when and how of data collection is critical for growers and those collecting the on-farm data to create value out of this process. The guidelines in this section address this.

And, even the highest quality data can be subject to improper use and mis-interpretation unless upstream data users are aware of and understand the relevant context in which the data was collected. Farming operations are as varied as the landscape and climate themselves – so the data aggregator must be keenly aware of unique context of the farm for which the data is reported. And, when relevant to resource stewardship issues, the aggregator must communicate this contextual information up to the buyer along side aggregated data. This is key to the data being used with integrity, and in a way that actually helps the entire supply chain create greater resiliency. This entails developing, and maintaining, much closer and more knowledgeable relationships between buyers and the growers they work with. The guidelines in this section also address this.

The following are guidelines for On-Farm Metric Data Collection:

(1.1) Metric calculation data clearly defined

A clear picture of the data required for metric calculations allows growers and farm managers to add required data elements to their crop recordkeeping procedures.

Responsible: Metric development organization, here: SISC's Metric Review Committee

Guideline:
Data required for metric calculations should be clearly stated in a list with an accompanying description of each data item. The list should be arranged by data input topic area, e.g., irrigation, nutrients. The list should be available on the metric website.
Metric technical sheets will also include a clear statement of the purpose of each metric and the issues/questions the metric is intended to address. Assumptions about the metric and/or the required data also be included.

(1.2) Data collection protocol understood

A data collection protocol helps metric users understand how data should be collected for a metric. This provides a repeatable process leading to high quality metric results from year to year and is especially important for aggregation of data or peer-to-peer comparisons.

Responsible: Metric development organization, here: SISC's Metric Review Committee

Guideline:
A data collection protocol should be defined for the data used to calculate the metric. The protocol provides the grower information on how to collect the data to ensure consistency across years and across SISC metrics users that helps when metrics results are used in aggregated data efforts or any peer comparison reports. The protocol should be part of the metric tech overview sheet.

(1.3) Farm management areas defined

A "farm management area" is the geographic level at which on-farm data is collected and the metrics results apply to. SISC does not define the granularity of management areas.

Responsible: SISC's Technical Advisory Committee

Guideline:
A "farm management area" is meant to define a geographic area where cropping practices are the same so as to be considered a representative "field" for a grower. Management areas may be defined based

upon: the grower's decision-making/operational needs; regulatory or buyer compliance needs; and/or data availability within the grower's crop recordkeeping method.

The acreage:

- may be contiguous or may be separated
- can be a field, a block within a field, or a collection of fields
- should have the same crop or a rotation of crops during one growing season
- should be in the same county/state

Depending on various needs, growers will have to weigh their options on defining management areas in their operations.

- For internal management decisions – Growers have varying decision-making processes that drive field-by-field, crop-by-crop planning. A higher level of geographic granularity provides more detailed information on crop production analysis.
- For buyer reports – FoodCos and buyers should provide guidance to tier one aggregators on the level of geographic aggregation they require for their analysis/reporting needs.
- For regulatory reports – Regulators will provide guidance on the granularity of geographic reporting needed for regulations and monitoring (if applicable).

(1.4) Temporal data collection boundaries are clearly defined

To facilitate consistent and comparable use of the SISC metrics, specific periods are prescribed for collecting the data needed for each metric.

Responsible: Metric development organization, here: SISC's Technical Advisory Committee

Guideline:

The following guidelines are taken from the SISC calculator User Guide.

Reporting Year

The reporting year for a SISC-measured crop is the calendar year in which a crop is harvested, regardless of when the crop was planted or when the data are reported.

> **Example One:** Crop A is harvested in October 2013 but the grower reports it to SISC or another party in 2014. The reporting year for this crop is 2013 because that is when it was harvested.
>
> **Example Two:** Crop B is planted in November 2012 and harvested in April 2013. The reporting year for this crop is 2013 because that is when it was harvested.

Start and End Dates for Data Collection

The data collection interval is different for different metrics, as described in Table 1 below. The SISC calculator automatically calculates the correct reporting intervals based on the harvest dates provided by the user.

Table 1. When to collect data for SISC Metrics

Metric	When Data are Collected
Applied Water Use Efficiency	Harvest-to-harvest
Energy Use	Harvest-to-harvest
Nitrogen Use	Harvest-to-harvest
Phosphorus Use	Harvest-to-harvest, with P soil tests annually
Soil Organic Matter	Soil Organic Matter tested every 3 to 5 years

Harvest-to-harvest Timeframe

SISC uses a harvest-to-harvest timeframe for collecting water, energy, and nutrient application data. While the realities of farming often include post-harvest activities and applications, we have selected a harvest-to-harvest timeframe with the aim of capturing all relevant cropping activities and following the growing cycle while still providing clear timeframes for consistent data collection.

When using a harvest-to-harvest timeframe, data collection for a given crop begins directly after the previous crop in that location (i.e., on the same ground) was last harvested. It ends on the last date that the crop is harvested. This means that all inputs of water, energy, and nutrients applied after a previous crop was harvested are included in evaluating the crop in the current reporting year, even if those applications were made in a prior calendar year. Where multiple crops are grown in one year, there may be more than one harvest-to-harvest interval. The last harvest date in the reporting year marks the end of data collection for that year.

Inputs applied after the last harvest date should be reported in the following reporting year. Inputs applied to a non-commercial cover crop are included as part of the cash crop that follows. If the cover crop is harvested for sale it should be treated as a separate cash crop. If no crop was harvested in the prior reporting year, then the harvest-to-harvest timeframe is considered to be the 12 months prior to the last harvest date.

Example One: Crop A is harvested in September and October, with the last date of harvest on October 31, 2013. No other crops are grown on this ground in 2013.

- Water, energy, and nutrient data: All applications beginning after the last date the same ground was harvested in 2012 should be included. If no crop was harvested in 2012, inputs applied from October 31, 2012 through October 31, 2013 should be included.
- Soil data: The most recent soil test should be used to calculate the soil metric.

Example Two: Crop A was planted in November 2012 and last harvested on April 20, 2013. Crop B is planted on the same ground in June 2013 and harvested over several weeks from August through October 31, 2013. Prior to these crops, this ground was last harvested in September 2012.

- The reporting year for both Crops A and B is 2013.
- Water, nutrient, and energy data: All inputs applied from September 2012 through April 2013 should be attributed to Crop A. All inputs applied from the time after Crop A's harvest in April until Crop B's harvest is finished in October should be attributed to Crop B. (Anything applied after harvesting Crop B should be reported with the first crop harvested in 2014).
- Soil data: The most recent soil test should be used to calculate the soil metric.

(1.5) Collect metric data in a crop recordkeeping system

Crop recordkeeping systems are an important tool for storing data about farming operations. Systems can vary from handwritten journals to spreadsheets to sophisticated software applications. Metrics require farming data input from the previous season's activities for the crop. Keeping records electronically allows for easier use of metrics as a tool to track year-over-year trends and document on-going continual improvement within an individual operation.

Responsible: Grower

Guideline:
In order to use the SISC metrics, the grower needs to understand the data needed for each metric they would like to use and collect that data annually, beginning prior to the crop season (see *Temporal data collection boundaries* above). Storing the data in an easily accessible format and at the management area granularity level desired by the grower (see *Farm management area* above) will allow easier data entry into a metric calculator. Capturing and storing data in an electronic format will give the grower the most flexibility in using data for multiple purposes including metric calculation.

(1.6) Metric revision feedback mechanism defined

Continuous improvement also applies to the Metrics themselves. The development of metrics is an ongoing process. The Metric Review Committee (MRC) facilitates periodic revisions to individual metrics based on feedback collected from users.

Responsible: Metric development organization, here: SISC's Technical Advisory Committee/Metric Review Committees

Guideline:
Metric users can submit specific issues/comments about a metric by using the Contact Us page on the SISC website. The SISC program director will acknowledge receipt and maintain a list for consideration by the metric MRC. The MRC meets approximately bi-annually.
http://www.stewardshipindex.org/contact.php

Section 2: Metric Calculation

Who: Growers and anyone collecting, aggregating and reviewing data from a group of growers.
What: The following are guidelines for the process of metric calculation. The basics include following the metric protocol and using approved tools to calculate performance metrics. The more complex aspects of metric calculation require a that regional 'context' be tracked and attached to metric data so

that, when interpreted, data can be understood in light of regional differences (in climate, soil type, ect.).

(2.1) Use SISC metric calculator or an "approved" equivalent SISC metric calculator

To ensure accurate calculation of the SISC metrics, metric calculations are done in the SISC calculator or in an approved equivalent SISC metric calculator. The underlying metric algorithms are defined in the SISC metric tech overview sheet and implemented in the current SISC Excel-based calculator. Other third-party software providers will need to have their calculator and algorithms approved by SISC to support comparability between different applications' metric results.

Responsible: Grower/FoodCo/Buyer

Guideline:
The SISC website has a page that is updated with the latest SISC Excel calculator and provides links to other software companies that provide a SISC-approved metric calculator.
http://www.stewardshipindex.org/metric_calculator.php
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(2.2) Save annual metric results in farm management software/tool to track year over year performance compared to management changes

One of the tenets of the SISC initiative is to use the metrics to demonstrate continuous improvement over time. To do this, the grower should save their annual metric results for a management unit so the results can be compared year over year. Individual growers' use of a farm recordkeeping software system will allow for best results in considering how changes in management practices impact metric results/performance over time. For best results and as an internal management tool for growers, tracking farming inputs, management practices, data, and metric results, in a farm management software system is recommended.

Responsible: Grower

Guideline:
Metric results for only one, individual crop season can be saved in the SISC Excel calculator itself. To compare multiple seasons or years, the user must save each season (or years') metrics results and identifying information in a separate software application (e.g., Excel) that allows analysis.

(2.3) Potential context issues for the metric are clearly defined and agreed upon by all supply chain partners

Geography, climate, farming practices, other environmental conditions such as soil types, pests, disease, and supply and demand in the marketplace (waste) are among the many factors than can influence metric results.

Some of these factors (geography, practices, general climate and soil types) are with the grower all season long and can be somewhat anticipated. But they still impact metric results especially when comparing one farm to another. Because of this buyers must take the on-farm metric results within this context. Doing this will require that all buyers be able to view all their aggregated data in disaggregated, regionally specific form. Viewing regional data, by crop, and with regional context issues (such as soil type, climate, ect. Taken into account, will allow everyone to see trends, identify potential issues of concern, ask questions and link growers with on the ground solutions – which then can be implemented in new management practices and tracked for continual improvement over time. This is the supply chain working together towards the common goal of continual improvement.
Not all farms are the same. Farms are as varied as the landscape, the soil, and climate itself. Understanding results and doing comparisons will require buyers to have a much more nuanced understanding of, and relationship with, their supply chains and the general tenants of agriculture. This guideline encourages those collecting, requesting, and sharing metric results (aggregators) to become informed and remain aware of how these context issues that can greatly affect outcomes. Your knowledge of the farming context, and your ability to share both context and metric results, is critical to ensuring the best possible use of performance metric results, and actually help support greater natural resource stewardship on the ground.

Responsible: Grower/FoodCo/Buyer

Guideline:
Metric results are based upon data from potentially very different farming operations based upon geography, climate, farming practices, markets, etc. Growers, FoodCos and buyers should work together to define key contextual issues for crops that may help explain metric results within one crop season and across multiple crop seasons. This exercise will be extremely important when comparing results across regions or even within an individual grower's farming operations. *During the course of SISC pilot discussions, Growers, FoodCos and buyers acknowledged and agreed that metric results cannot and will not be compared without determining how to incorporate these important contextual details in the discussion.*

<u>Big Benefits to Understanding & Sharing Context:</u>

- Ability to ask different or more detailed questions about the metric results and improvement.
- Ability to notice regional issues/trends on a landscape level and then help link individual growers with programs to help find solutions.
- Create partnerships across supply chains that improve resource stewardship, and reward those creating that improvement.
- Avoid misinterpreting data on broad scales, avoid green washing.
- Improve the quality and accuracy of the sustainability story that can be shared with others.
- Support your buyers and consumers with information linking them to the realities of farming.
- Make the stories that can be told more interesting and gain a broader, more aware audience.
- Develop a more connected and resilient supply chain; mitigate supply chain risks.

Table of Key On-Farm Context to Consider by Metric

Context	*Applied Water*	*ET Water*	*Phosphorous*	*Nitrogen*	*Energy*
Climate type	X	X		X	X
Soil type	X		X	X	X
Field grown vs. greenhouse	X		X	X	X
Conventional vs. organic			X	X	X
No-till	X		X	X	X
Harvest timeframe	X	X	X	X	X
Planting date	X	X		X	X
Location/geography	X	X			X
Harvest age (baby vs. mature)	X			X	X
Rotation (previous crop)	X		X	X	
Intended use of crop (packed vs. value-add)	X		X	X	X
Ranch history (new vs. old ground)	X		X	X	X
Salinity of Irrigation Water	X	X		X	
Plant date/Second crop	X	X	X	X	
Harvest timeframe	X				X

Section 3: Metric Results Usage – By Grower

Who: Growers

What: The Stewardship Index for Specialty Crops (SISC) initiative was founded on the principle that measuring performance through sustainability metrics would provide a valuable tool for growers to help track impacts of management practice changes and guide continual improvement in their operations. Growers have found performance metrics to be useful management tools in tracking outcomes from management changes over time, as well as in meeting regulatory and buyer requests.

Many growers find that tracking metric results over many years can result in real efficiencies as well as real natural resource stewardship improvements. The following guidelines outline ways for growers to use performance metrics as an on farm management tool.

(3.1) Internal evaluation and management using metrics

SISC calculators and metrics were designed to provide growers a yardstick to measure how they are doing in key sustainability areas. For growers, the act of reviewing annual metric results to better

understand how any management changes impacted overall farming operations compared to previous seasons can create on-farm continuous improvement efforts. Making that review part of the overall farm management planning process can help growers receive value for their sustainability efforts.

Value for growers includes: tracking management practice changes against performance data results, opportunities to create greater efficacy throughout operation, ability to see and track continual improvement over time, etc. Electronic recordkeeping and software programs facilitate the ease of use of metrics to track continuous improvement efforts.

Using the metrics as a management tool to internally evaluate your farming operation also gives growers experience interpreting and understanding metric results before a buyer asks for a report. This allows the grower to explain the metric results within the context of their own growing operation, and also gives the grower a chance to inform buyers of what/how the grower is changing any management practices to improve results in the future. **Note to both growers and buyers here**: this is a very informative opportunity for buyers to understand and develop a real, lasting and impactful sustainability program for their supply chain.

Responsible: Grower

Guideline:
Use the metric results from the just-completed crop year (see 2.2 above) to drive an internal discussion on what caused the observed results. Look for the following:

- What practices changed? Why?
- What new technologies were introduced? Why?
- Did climate issues impact the farming operation?
- Pests, disease, mildew, etc. events happened?
- Did soil type impact the farming operation?
- Did pest or disease pressure impact the farming operation?
- What benefits and/or improvements were noted?
- What efficacies were created? What efficacies could be created?
- Using this discussion, incorporate findings in the farm management plan for the upcoming season.

(3.2) Using metric results to provide regulatory reporting

A number of the SISC metrics (e.g., water use, nitrogen use) may have use in regional regulatory reporting situations. The data collected for SISC metric calculation or even the metric results themselves may also be required by regulatory agencies.

Responsible: Grower

Guideline:

Growers should determine if there is a fit between SISC metrics and any regulatory reporting requirements applicable to their operations. (In many cases, regional grower groups (e.g., Western Growers) will also be tracking these issues and may do the "mapping" for their grower members.) Data entered into a SISC calculator may also be used in reports.

Note: Usage of a farm management software system to hold all your on-farm data and to parse it out into various results and reports will make this much easier and more useful for each operation.

(3.3) Using metric results in industry reporting initiatives

More and more, crop associations and trade groups are looking to facilitate sustainability programs for their members. Metrics are becoming an integral part of the "sustainability story" and a better understanding of how the industry is doing on the whole to share with the community, policymakers and the media. Metric result analysis can also help drive additional research, and educational activities, and connect growers with new management solutions to help improve efficacies.

Responsible: Grower/Industry associations

Guideline:
Growers should consider being involved in an industry association program that is promoting the usage of metrics and providing tools to anonymously compare metric results with peers, regional groups and industry-wide results.
Determine if there are associations providing this service and ask what information is required to participate and what their data confidentiality/security policy provides. Request information on how the industry association will help link growers with new programs and management solutions to help improve efficacies and stewardship opportunities.

(3.4) Using metric results in buyer reporting needs

Buyer sustainability surveys and questionnaires are becoming more commonplace. Part of SISC's mission has been to provide one common performance metric yardstick for these efforts so that reporting redundancy does not overwhelm growers, and so growers and FoodCo's could use the same data and metrics for all buyer reporting.
Buyers making reporting requests, aggregating data, and comparing data points must take regional contextual issue (climate type, soil type, etc. See list above in guideline 2.3) into account when interpreting data. If buyers fail to do this, they run the risk of comparing apples to oranges.

In order to take contextual information into account, all aggregated data must be delivered in a form where it can be de-aggregated down to a regional level (always with anonymous data points for growers). Being able to aggregate and dis-aggregate data will be key to identifying regional landscape

scale stewardship issues and helping link growers with regional solutions. This is key to creating actual, on the ground, natural resource stewardship improvement over time.

Responsible: Grower/FoodCos

Guideline:
Growers and their immediate FoodCo buyers (i.e., packer/shippers and processors) should be in a two-way conversation about what questions FoodCo is getting from their buyers (i.e., distributors, food service operators, and retailers) about the farming end of the supply chain.
Specifically, FoodCo's should notify grower suppliers about the type of information being requested by their buyer(s), what scale and timeframes are required, and what are the expected uses of metric results (see Metrics Results Usage – Supply Chain below). Helping growers understand the supply chain relevance of the metrics and the issues being addressed is critical to buy-in to the buyer survey process and how to best present results in a useable and understandable way. Also, helping growers understand the value of the metrics as a measure to manage tool is key here as well. Cooperation across the supply chain to create continual improvement in natural resource stewardship needs to be the central goal.
Note to buyers: Growers need to be your partners in creating such outcomes as stated above. Growers are the ones making the changes on the ground. Consider them partners, work with them to identify stewardship issues, help them connect with programs that offer solutions, and reward them when they move towards continual improvement.

This dialogue between grower supplier and FoodCo is critically important to ensure the appropriate data is developed for use in calculating metrics that will meet the reporting need.

(3.5) Analysis and use of on-farm metric results by grower

***This guideline is meant for growers only.** For FoodCo's and buyers, see guideline 5.4 below and the Metric Results Usage – Supply Chain section.

Calculating metric results is the just the beginning. Analyzing the results and using them for decision making and understanding overall sustainability performance is a good business practice and places growers in a position of knowledge much more about the overall performance their own operations. SISC metrics have been developed to serve as an internal management tool for growers first, and as a tool to report across supply chains second. Measuring to manage is a real time tool for growers to track how changes in management practices create results over time.

Responsible: Grower/FoodCo

Guideline:
The following approaches are recommended to help growers analyze their metric results.

Within Your Operations

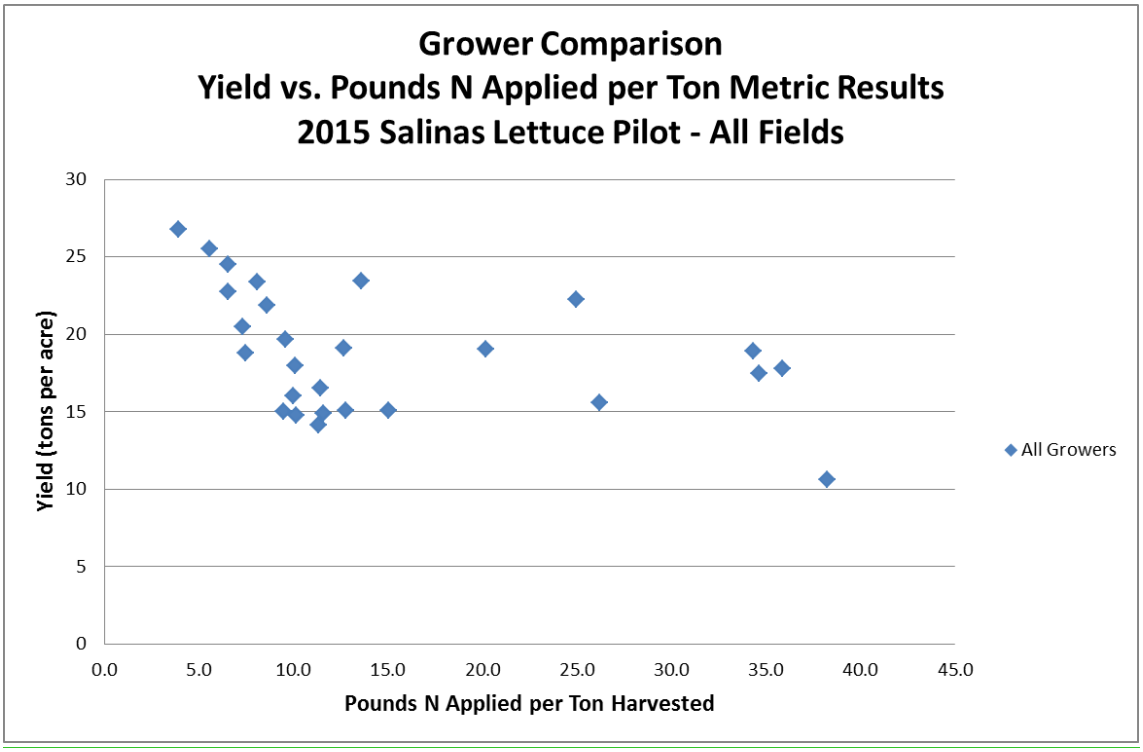
- Compare metric results across management areas for a season
    - Discuss what context items (geography, soil, variety, etc.) may be influencing differences
- Compare metric results from one management area across seasons to see the temporal performance trend
    - Discuss what context items (weather, practice changes, etc.) may be influencing differences
- Compare metric results from all management area across seasons to see the temporal performance trend
    - Discuss what context items (weather, practice changes, etc.) may be influencing differences

Across Growers

It can be useful for an individual grower to be able to see their metric results compared anonymously to other growers. This can generate discussion on how to continue to develop new management practices that create continual improvement. The initial aggregators of metric results (FoodCo's, industry associations, etc.) can provide individual growers with this information, notice and discuss trends, and initiate relationships with possible outside partners (local RCD's, NRCS, etc.) who can help identify possible management practice changes to drive improvement on those issues/trends.
Interested in how their farms are different to improve internal practices
The ability to anonymously compare metric results with peer companies can lead to group learning and insights. (See sections below about data sharing guidelines.)

- Compare metric results across all growers' management areas for a season
    - See example chart on next page
    - Identify each grower's data on a chart compared to the anonymous results of fellow growers (see example below where one grower's data points could be displayed in a different color)
    - Discuss what context items (geography, soil, variety, etc.) may be influencing differences
    - Compare metric results from all growers' management area across seasons to see the temporal performance trend
    - Discuss what context items (weather, practice changes, etc.) may be influencing differences
    - Discuss possible reasons why data points might vary across growers with each grower. This is key to cooperatively identifying landscape scale issues and trends.

      See sample chart for this below.



4. Metric Results Sharing - Critical Agreements for Strong Supply Chain Partnerships

Who: All supply chain partners.

What: While performance metrics are good internal management tools for growers, they also can be used to communicate performance between supply chain partners. The key to this kind of sharing of metric results is that all supply chain partners share a common goal of continual improvement of natural resources on the ground – and always keep that goal in mind in requesting, collecting, reviewing, and understanding metric data. The following guidelines outline the best practices for helping all supply chain partners feel both safe and rewarded for sharing data. These guidelines are designed to help supply chain partners collaborate in creating greater resource stewardship on the ground.

(4.1) Metric result data privacy/confidentiality policy in place

Any company or organization that is promoting/requiring growers to contribute metric results to a sustainability analysis program will need to have a data privacy/confidentiality policy in place that can be reviewed and agreed upon by data contributors.

Terminology: Metric results are provided by a contributor to a requestor (a requestor is an organization requesting metric results and aggregating those results - could be the FoodCo, an association, etc.)

Responsible: Grower/FoodCo/Association/Buyer/Data aggregator

Guideline:
The following items should be included in a data privacy/confidentiality policy or an NDA agreement between growers and supply chain partners:

- Extent of data privacy/confidentiality policy – the policy should apply to all data contributors for a named program (e.g., Lettuce sustainability metrics analysis program)
- Data being requested – grower name, year, management area name and size, management area location, metric(s) results [and *potentially other items depending on the circumstances*]
- Statement on making data anonymous – personal identifying information (see data items above) removed from data points so that individual contributors cannot be identified by other participants
- Data presentation – description of how contextual data will be paired with numerical data in the future.
- Data aggregation – statistical analysis guidelines should be followed regarding the minimum number of data points and contributors to be displayed on any charts or reports
- Data usage – an explanation of how the data will be used (presentations, reports, etc.) by the requestor, in what format.
- Data report back - clarify what will be provided back to the data contributor and in what format (all charts and reports developed, hard copy and electronic, etc.)
- Data ownership – ownership of data should be clearly spelled out. SISC recommendation is that the grower owns metric results data and that ownership is acknowledged in data sharing agreements (see below).
-

Note: Some programs may provide charts/reports back to contributors where their data is displayed with other anonymous contributor data. SISC recommends that supply chain partners provide this service back to growers as a way to support continual improvement in management practices.

(4.2) Metric result data security policy in place

Ensuring data contributors that their data is safe and secure is a critical element of any data sharing relationship. The contributor needs assurance and commitment that only the right person(s) have access to the data to be used in the manner laid out in the data privacy/confidentiality policy.

Responsible: Grower/FoodCo/Association/Buyer/Data aggregator

Guideline:
The data aggregator will have a statement about the "good computing practices" that are in place to ensure that: database user access scheme is in place to protect data; metric result data is not compromised in terms of unauthorized access; data storage systems are secure; and data retention times are defined and followed.

(4.3) Metric results data sharing agreement in place

A metric results data sharing agreement incorporates the above data privacy/confidentiality policy and data security policy. The agreement will be developed by the requestor and can be as formal a policy as deemed necessary between the contributor and the requestor.
If a third-party data aggregator is involved in the process, they should be named in the agreement and language included defining their role as the "go between" in the relationship.

Responsible: FoodCo/Association/Buyer/Data aggregator
(SISC may provide suggestions or a template)

Guideline:
The data sharing and NDA agreement should have the following elements:

- Data privacy/confidentiality policy
- Data security policy
- Statement on who will have access to the metric results and in what form downstream in the supply chain or through a crop association
- Explanation of role of third-party data aggregator (if one is used) and the rules governing their handling of contributor data and any aggregated charts/reports/analysis

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(4.4) Reporting Elements for supply chain partners are clearly stated and agreed upon

Depending on the goals and objectives of using metric results in supply chain partner discussions, the partners will agree on reporting elements. Both the data to be submitted and the analysis results to be shared with downstream partners should be clearly understood to maximize value to both companies. This agreement will necessarily clarify and define what data is to be used, the analyses to be conducted, what context information needs to be taken into account and communicated together with metric results, and what portions will be reported out and to whom. We also strongly suggest that any aggregator also spell out your protocol for how/when you will talk with growers about their annual data.

Responsible: Grower/FoodCo/Association/Buyer/Data aggregator (SISC may provide suggestions in these guidelines)

Guideline:
The following reporting guidelines apply to different links in the supply chain.

Grower – FoodCo

- FoodCo will define the management area granularity (individual fields, whole farms, average of all farms, X% of fields/farms, etc.) of metric results required for their needs/program. The temporal reporting period (annual results) for each crop will be established.

- Grower will provide agreed upon contextual data (soil types, climate types, planting dates, crop rotations, etc.) and FoodCo will be responsible for ensuring this information is considered in identifying trends among grower groups as well as in individual operations, and that they are appropriately communicated alongside metric results to illustrate trends and accurately "tell the story" of the data.
- Assumptions for each analysis report will be documented and included with the report.

Suggested reports:

- Anonymous peer-to-peer comparison given back to grower
- Annual conversations between grower and FoodCo to understand data and identify possible regional issues and trends.

FoodCo – Buyer

- Buyer will define the parameters for reporting metrics results in aggregate. This will include data in an aggregate form that is able to be dis-aggregated down to regional data sets.
- Reported data will all be aggregated at this level - no individual grower's data will ever appear on a report. (Exception would be a single-source FoodCo who would have only one grower supplier.)
- The percentage of suppliers reporting their results should be clearly stated.
- There will be an annual mechanism or discussion of how contextual data may or may not relate to the metric results. FoodCo's will work with growers to understand factors that impact (positively or negatively) trends in performance, and will then communicate the story behind the data to the buyer. Both FoodCo and Buyer will consider metric results, trends, and issues through the lens of continual improvement – in order to find solutions that help/reward growers with improved stewardship.
- FoodCo will help connect growers with other organizations (NRCS, RCD's for example) that support growers with new management solutions to issues identified.

(4.5) Reporting format and form in place

To ensure consistency in reporting between supply chain partners, report templates should be developed that clearly describe the requested data.

Note: A good example of a reporting format can be found in The Sustainability Consortium's (TSC) product category toolkits that list Key Performance Indicators (quantitative metrics or qualitative indicators) and various answer styles.
http://www.sustainabilityconsortium.org/product-sustainability-toolkits/#prettyPhoto

Responsible: FoodCo/Buyer

Guideline:

Metric results requestors should develop a reporting format and associated content (i.e., instructions, examples, FAQs, timeline for submitting responses) to clearly convey to the submitter what data/responses are being requested and how to answer survey or questionnaire questions.

(4.6) Submission mechanism in place

Submitting requested metric results data to a requestor should be made as simple and as efficient as possible. The mechanism should have clear step-by-step instructions on what to do and who to send the submission to.

Responsible: FoodCo/Buyer/Third-party software providers

Following items should be part of guideline:

As early as possible in the process, a clear outline of the data requested should be delivered to the grower/producer in order to allow time for data gathering. The data request should be incorporated into a Data Sharing Agreement and data submission form. These should clearly describe all details of the request, submission process and the reporting format to be used, including providing the actual submission form and parameters of the partnership.
Ideally, a web-based electronic submission tool should be in place. If not, manual forms or electronic form templates (including spreadsheets) can be used. Third-party software providers are beginning to address this need (e.g., SAP, SupplyShift, FoodLogiQ) and buyers can subscribe to their applications.

5. Metric Results Usage – Aggregation

Who: Grower/FoodCo/Association/Buyer/Data aggregator
What: How metric results data is aggregated has everything to do with how it can be understood, considered, and used. There are more and less helpful ways to use aggregated data.
For instance, aggregated data can be useful to growers to see how they are performing in relation to their anonymized peers. This can really be a great way to encourage growers to want to try new more efficient management practices.
Or, alternately, data has the potential to be aggregated up to such a high level that it can lose all of its regional context – and thus lose all of its value to in helping the supply chain collaborate towards a common goal of continual improvement.

The following guidelines outline best practices for how to aggregate performance metric data, and use that aggregated data, towards greater supply chain connectivity and collaboration towards continual improvement of natural resource stewardship on the ground.

(5.1) Data should be anonymized before aggregation

One of the key elements of data sharing is the assurance that data can be anonymized to protect the identity of submitters.

Responsible: FoodCo/Association/Buyer/Data aggregator

Guideline:
Depending on where in the supply chain data is being aggregated and by whom (i.e., by grower groups or by FoodCos), grower level data should be anonymized so that individual metric results cannot be attributed to their individual operations.

FoodCo metric results reported to buyers will be aggregated across grower suppliers so an individual grower's results would not be visible to the buyer.
There should be an opt-out mechanism where permission from the grower is received to use individual data if required or needed in some cases. (For example, FoodCo reporting may require growers to submit individual data.)

In order for aggregated, anonymized data to be of value to actually contributing to improvement in resource stewardship on the ground – data must be presented in a form that can be easily dis-aggregated down to a regional level. Data will still be anonymized. Context information will be associated with regional data sets. Understanding the data regionally, in context, will allow FoodCo's to understand regional stewardship issues and how their supply chain partners are working on improving them. These regional improvements in management practices around identified issues will be trackable over time with multiple years of metric data.

Ensuring "context" moves forward with results:
If an opt-out option is elected by grower allowing their individual results to move forward, it is the responsibility of the grower to ensure any contextual information necessary for interpreting the results is also moved forward. On their end, FoodCo should inquire about context information and ensure it is obtained if any exists.

(5.2) Approach for statistical analysis of aggregated data is defined

Statistical analysis rules/techniques should be followed to provide adequate levels of anonymity and statistical validity to aggregated metric result data. Sample size determination may vary depending on the total number of responses and the need to separate the responses into smaller groups (e.g., by geography or other key contextual similarities described in section 2.3 above).

Responsible: Grower/FoodCo/Buyer/Third-party software providers

Guideline:
The following rules should be defined:

- Minimum number of data values to create a statistically valid analysis.
- Minimum number of submitting business entities to be able to protect the identity of individual entities in data comparison reports.

Above rules would apply to subsets of data that may be used for more detailed analysis such as geographic region, specific management practices (e.g., organic/conventional, irrigated/non-irrigated), and market type (fresh vs. processed). (See aggregation policy below.)

(5.3) Aggregation policy should be defined

Depending on how metric results will be used by each supply chain partner, an appropriate grouping of metric results is critical for better understanding sustainability performance over time. At the grower end of the supply chain, comparing results across an entire operation will have specific aggregation rules related to location, practices, etc. For FoodCo's and buyers, high-level comparisons versus more context-oriented analysis may lead to different insights. A key concern of data contributors is not getting "lumped into the wrong bucket" so as to make comparisons less meaningful, or potentially even harmful.

There needs to be a balance between a buyer's needs and the underlying complexities of farming to "tell the sustainability story" to audiences with varying degrees of interest.

We suggest that aggregators deliver and annualize data in **both** its aggregate form (for example, all lettuce) and in a dis-aggregated form (for example: Salinas Valley lettuce, as separate from Yuma lettuce). Regional data sets are more able to hold context information along side data than overall aggregate data sets. In fact, contextual information is very difficult to consider in relation to overall aggregate data sets.

Create an aggregation policy that facilitates regional supply chain cooperation to identify possible issues and solve those regional issues over time. This means regional data sets by product type.

Responsible: Grower/FoodCo/Buyer/Third-party software providers

Guideline:

Metric results requestors should clearly define:

- What data is being requested?
- Who is aggregating the data and their relationship to the requestor?
- How will it be aggregated?
- What analysis is going to be done? What is the purpose of the analysis?
- How will it be used (intended audience) and in what formats (i.e., report/analysis feedback to submitters)?
- How will aggregated data track numeric contextual data (such as reference ET, soil infiltration rates etc.)

- How will aggregated data track non-numeric contextual data (such as changes in climate, pest outbreaks, under-harvested fields etc.)?
- How will data be aggregated on regional levels? How will data be aggregated on whole product categories?

Grower, FoodCo, and Buyer Levels

The following factors should be taken into account when aggregating results across farming operations:

- Crop type
    - Different crop types usually have different management practices and crop input needs
- Growing season and harvest timeframe: dates and planting timing (depending on geographic locale)
    - Different growing seasons (e.g., Salinas in summer vs. CA/AZ desert in winter) may have different practices and input requirements
- Open field vs. enclosed growing (i.e., greenhouses) where applicable
    - The two growing environments for tomatoes, for example, are very different
- Geographic location – with both climate and soil parameters understood
    - Some examples: growing conditions for crops in California and Florida are quite different, and growing conditions between coastal and inland California can be very different.
- Water year - wet vs. dry - (in CA Dept. of Water Resources designates years in retrospect...this would be a good one to look into for context of drought of 1 or more years consecutively)
    - Wet or dry years have an impact on precipitation component of crop irrigation and availability of water from outside surface water sources
- Harvest decisions – waste created via food being under-harvested by FoodCo due to market conditions, etc.
    - Unexpected overlap with other crop production geographies or market conditions may cause a buyer to reduce the orders for crop and FoodCo decides not to harvest acreage – leaving food behind in field. The inputs (water, fertilizer, etc.) which went into the waste needs to be tracked and taken into account by FoodCos.
- Crop rotation, i.e. what was planted previously
    - Heavy feeding (and fertilized) crop previously planted may leave a nitrogen "credit" thereby reducing the amount of fertilizer applied
- Conventional vs. Organic
- Intended use of product– field packed vs. value-add
    - A higher proportion of the field is typically harvested for value-add products which increases the yield element of the metric calculation
- Tillage practices

Reduced or no-till practices will reduce the number of passes for a field and reduce the fuel used on the crop, tillage practices could also impact soil quality and water use/retention

- Irrigation Water Salinity
    - If irrigation water is high in salts, growers must apply a leaching requirement (additional water) to leach the salts and make it possible to grow salt intolerant crops such as lettuce. This will result in higher reporting for both water and potentially nitrogen metrics (due to

nitrogen contribution from irrigation water) compared to other growers with better water quality.

Note to FoodCos:
Contextual clues explain data, so in creating your aggregation protocol, consider pairing simplistic explanations on why resource use varies. Otherwise buyers may assume that the growers using Y amount of water could easily reduce, which would be a wrong assumption on the buyers part.

(5.4) Recommendations on usage/analysis of on-farm metric results are clearly stated by each supply chain partner

The annual and multi-year interpretation of metric results data will drive discussions with supply chain partners on both short- and long-term actions by businesses to improve their sustainability performance. Recommendations for interpreting metric results should be given to all audiences looking at individual year data and multi-year (current recommendation is 3 to 5 year rolling averages) data as well as comparison reports.
Knowledge of the dynamics of farming and how they impact metric results will vary across the supply chain: growers will have the greatest understanding, buyers' merchants the least. Knowledge of farming issues, regional growing context, and crop specific management practices will be critical for buyers to understand and gain ultimate value of using performance metrics. Understanding the underlying reasons behind the trends in data will be the only way that the whole supply chain can work together to actually create continual improvement in stewardship on the ground. This will require supply chain partners to learn from growers, and become more familiar with farming practices in general. It will also require new levels of knowledge about the growers and regions that make up their own unique supply chain.

Responsible: Grower/FoodCo/Buyer/Association – all supply chain participants

Guideline:
The following are potential uses of grower-level metric results or aggregated on-farm metric results.
Grower

- Understanding and comparing your crop production performance level to others in your peer group and to your own performance year-over-year
- Discussing how contextual differences in growing regions may or may have not influenced the final metrics of resources use and/or yields with whomever is requesting and aggregating the metric results.
- Working with supply chain partners to look at regional data sets, and consider how results could point to regional stewardship issues that could be improved upon. For example, looking at N results regionally might illuminate some outlining trends that, once discussed, could show historical accumulation on N in groundwater. Work with supply chain partners to identify and solve these landscape scale issues to improve natural resource stewardship regionally.

- Cooperate with, and educated buyers towards above noted common goal.

FoodCo, Distributors

- Make your intentions about how/why you plan to use the metric results data clear to growers/FoodCos prior to discussing data with both growers and their immediate supply chain partners (those who initially collect and aggregate the data).
- Let your growers know what your FoodCo is being asked by your buyers – what are the downstream/market drivers? Share this information with your growers.
- Create a way to incentivize and reward your growers to collect and submit data.
- Have your buyers/your sustainability staff/whoever is processing and analyzing the submitted metric results data, understand and have some background with agriculture/farming operations and management. Have them want to learn from growers.
- Always look to understanding your growers' current crop production performance level in relation to the context behind it. Geography (location), climate type, crop type, soil type, and planting date are some of the context issues (see guideline 2.3 for full list) that always need to be taken into account when considering on-farm metric results. Variation in these context items across individual farms, across regions, and across crop types effect metric outcomes. Comparisons of metric outcomes to identify sustainability trends are only valid when these context items are taken into account. Without this context, one would be comparing apples to oranges – which would not lead to any real value in improving on-the-ground stewardship.
- Always look to understand your supply chain current performance levels in relation to previous levels. 3-5 year rolling averages are recommended. A single data set should **never** be used to "grade" a supplier.
- Work with growers towards continual improvement to ensure supply chain consistency.
  One way to do this is to help individual growers see trends across/with their peers
  It can be useful for an individual grower to be able to see their metric results in comparison to other (anonomized) growers in their peer group (same crops/similar locations). This can generate discussion on how to continue to develop new management practices that create continual improvement. The initial aggregators of metric results (packer/shippers, industry associations, etc.) can provide individual growers with this information, notice and discuss trends, and initiate relationships with possible outside partners (local RCD's, NRCS, etc.) who can help identify possible management fixes to drive improvement in those trends.
- Tracking/managing risk (e.g., water availability)
- Cooperating across supply chain to build resiliency and continuous improvement
- Tell the story of how your supply chain is building resiliency and continuous improvement to your customers and general public.
- Reporting to buyers

Retailer/Foodservice

- Always look to understand your supply chain current performance levels in relation to previous levels. 3-5 year rolling averages are recommended. A single data set should **never** be used to "grade" a supplier.
- Consider communications around metrics results to be about enhancing the relationship with a supplier.
- Always look to understanding your supplier's aggregated metric results in relation to the context behind them. Geography (location), climate type, crop type, soil type, irrigation water quality, and planting date are some of the context issues (see Guideline 2.3 for full list) that always need to be taken into account when considering on-farm metric results. Variation in these context items across individual farms, across regions, and across crop types effect individual metric results as well as the aggregated values. Comparisons of metric results to identify sustainability trends are only valid when these context items are taken into account. Without this context, one would be comparing apples to oranges – which would not lead to any real value in improving on the ground stewardship.
- Only use trends derived from multiple years of metric results data (3-5 year minimum) to track/manage risk (e.g., water availability).
- Look at metric results in terms of historical trends and re-evaluate trends over time as more data becomes available and reinterpret as needed.
- Build cooperation across the supply chain to build resiliency and continuous improvement into either buyer's or sustainability manager's job functions. These positions within retail or foodservice businesses will need to have a working knowledge of farming and crop production-related context issues in order to understand metric results and manage communication about continual improvement with both supply chain partners and also to consumers.
- Engage in fact-based sustainability marketing to consumers. Use real data from numerous years of metric results to substantiate sustainability stories about supply chain partnerships that help create greater on-farm stewardship and continual improvement.
- "Reward" suppliers who reward growers.
- Tell the story of how your supply chain is building resiliency and continuous improvement to your customers and general public.
- Only make decisions based on data when you know you have the necessary data and are confident in its quality and integrity.

6. Metric Results Usage - Supply Chain

Who: All supply chain partners.

What: How metric results are used within and between supply chain partners will be key in determining if supply chain sustainability programs actually result in real, on the ground natural resource improvements or not. The following guidelines outline the best practices for how to consider using performance metric data with your supply chain partners in order to create collaborations that result in continual improvement on the ground. Real supply chain sustainability programs will engage, work with, and support networked supply chains that share a common goal of more resilient agriculture.

(6.1) Define and explain comparison "rules"

Depending on how metric results will be used by each supply chain partner, an appropriate grouping of metric results is critical for better understanding sustainability performance over time. At the grower end of the supply chain, comparing results across an entire operation will have specific aggregation rules related to location, practices, etc. For FoodCo's and buyers, high-level comparisons versus more context-oriented analysis may lead to different insights. A key concern of data contributors is not getting "lumped into the wrong bucket" so as to make comparisons less meaningful. A key solution is to outline and explain how comparisons will be done, and specifically, how context will be taken into account in each comparison.

Responsible: Grower/FoodCo/Association/Buyer/Data aggregator
(SISC can provide guidelines for development and/or possible templates)

Guideline:
Where comparison reports are used to show suppliers their metric results relative to their peers, the parameters used in the comparison should be clearly described.
Rules should include:

- Always compare only by crop type – only compare similar crops to each other. (e.g., only head lettuce or only almonds).
- Always have a consistent temporal period of comparison (e.g., one crop season, one year, or one five-year rolling average).
- Always compare only with specific regional boundaries taken into account (based upon reasonable granularity that encompasses climate variation, soil type variation, etc.).
- Always compare only within similar cropping practices (e.g., organic vs. conventional, field grown vs. greenhouse).
- Always take planting date, and cropping rotation into account in comparisons. (e.g., spring planting might use different resources than mid-summer planting).
- Always have data sets be viewable on a regional level. Always only compare like with like on a regional level.

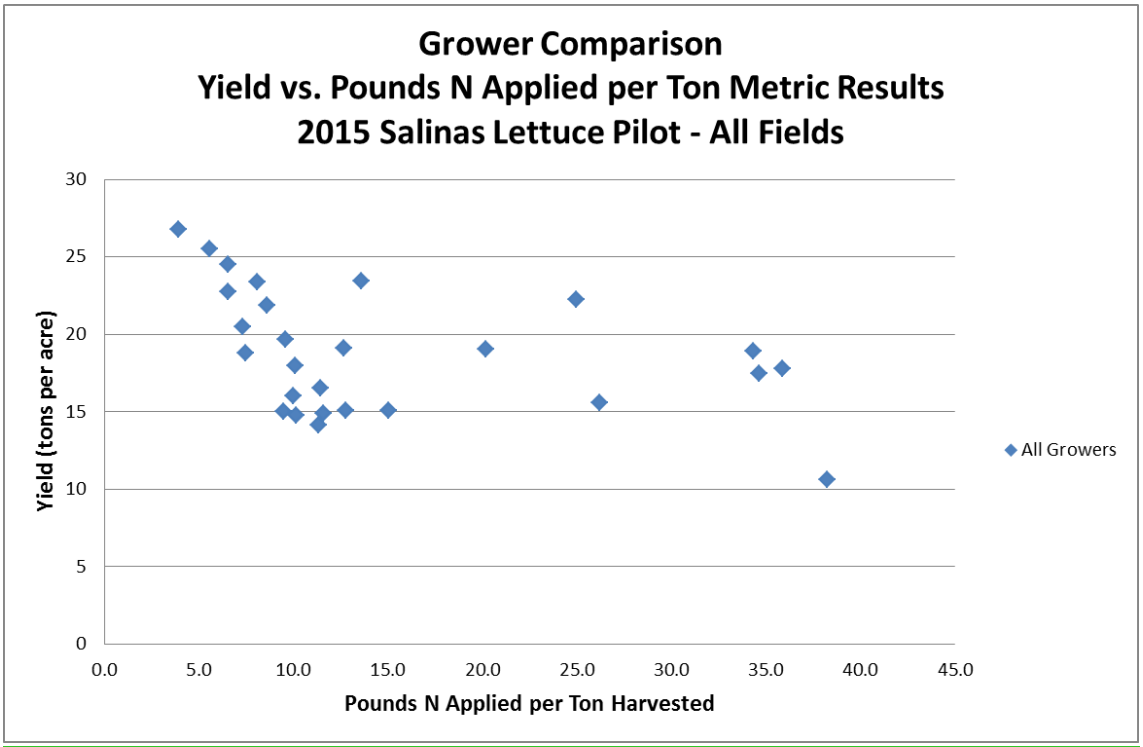
(6.2) Peer comparison reports should anonymize other participants

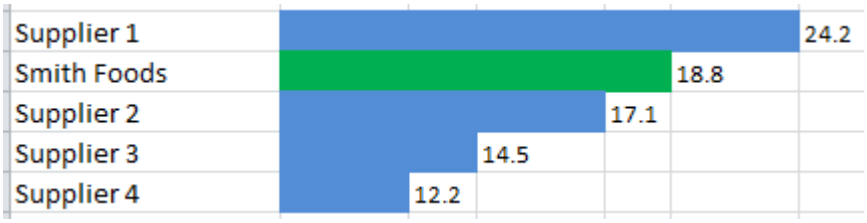
Data privacy concerns should be honored in all peer comparison reports (see above for Data privacy/confidentiality guidelines).

Responsible: FoodCo/Buyer/Third-party software providers

Guideline:
When peer comparison reports are part of a feedback mechanism to program participants, metric results for individuals should always only be identified against anonymized peer results.

See example chart below.





(6.3) Annual results averaged over appropriate time periods

On-farm metric results can be influenced by annual variations in climate and management practices. Understanding the reality behind these annual variations can be achieved by looking at metric results and context trends over set time periods. Due to the natural annual climatic variations that can impact agricultural production, we suggest that only metric results data that has been averaged over a three-to five-year period or more should be disclosed to third parties (in accordance with producer consent). And, in certain cases (such as the current CA drought) context specific variations may require time periods to be flexible in order to take that variation into account. This is a good example of why context information must travel along side data analysis.

Note: A final appropriate time interval for comparison recommendations will require metric use and data collection over a minimum of a three- to five-year (or longer) period.

Responsible: Grower/FoodCo/Buyer/Third-party software providers
(SISC provides suggestions and potential guidelines in this document)

Guideline:
SISC recognizes that fluctuations in weather, pest pressure, climate, markets, and other context specific variables for individual farms will inevitably change metric results from year to year. To better reflect the on-going sustainability performance of an operation, it is recommended that SISC metrics be considered on a three-to five-year rolling average for each metric. For perennials, this should be the last three reporting years. For crops that are rotated, the last three harvests of the same crop should be used for this average (regardless of when they were harvested). It may take more or fewer than three years to collect three data points for specific crops, depending on how often they are rotated.
Although this is the recommended usage, the SISC calculator itself only represents a single year of harvests. Rolling averages should be calculated separately using the results of the calculator. These averages should be reported in feedback reports alongside individual year results.

(6.4) Provide feedback to growers to see how they are performing related to their peers

At the core of sustainability programs is the desire to promote continuous improvement. Performance metrics are designed to track progress over time. Providing feedback to program participants helps them see how they are performing internally (across operations, over time) but can also help them see how they are doing compared to their peers.

Responsible: FoodCo/Buyers

Guideline:
FoodCo's should include (and buyers should help support) a grower feedback process/buyer education process in their sustainability programs.

Peer comparison charts and reports that identify the grower against anonymous metric results from other growers will help them gauge their performance and drive ongoing sustainability initiatives is a good start. Previous reporting period results should also be included to help show performance trends for individual growers, year over year. Ranking and scoring algorithms should be clearly stated as well as any assumptions made in the comparisons. Contextual data that was taken into account will be presented with results to give growers an informed comparison.

In addition, holding annual discussions with growers on their metric results in comparison their peers can provide a collaborative opportunity for both supply chain partners to work together to notice and call out landscape scale/regional natural resource issues. FoodCos can then help connect growers with

other organizations (NRCS, RCD's, research institutions) who can link growers to new management solutions to begin to address identified regional issues.

FoodCo's and buyers can also discuss how they are addressing improvement in their management practices, and how those practices impact metric results will build trust between supply chain partners, and will also inform FoodCos on important details on context. This is where FoodCos can gather the story to tell their buyers alongside the metrics results. (e.g. who is doing what, why, and how they are working to improve it over time).

(6.5) Provide feedback to suppliers to see how they are performing related to their peers

One concern that is heard from growers and suppliers about sustainability programs where data is submitted via surveys and questionnaires is that they do not receive feedback on how they are performing related to their peers. This information can help a business gauge where they have room for improvement and areas where they are performing above their peers. The feedback can then be used in sustainability initiatives within their company. Having the information to help with continual improvement flow up and back down the supply chain will improve supply chain resilience and industry-wide sustainability performance.

Responsible: Buyers

Guideline:

Buyers should include a supplier feedback process in their sustainability programs. Peer comparison charts and reports that identify the supplier against anonymous metric results from other suppliers will help companies gauge their performance and drive ongoing sustainability initiatives. Previous reporting period results should also be included to help show performance trends. Ranking and scoring algorithms should be clearly stated as well as any assumptions made in the comparisons.

Buyers need to both acknowledge that they understand the "story" (contextual information explaining why metric results are how they are) behind the metric results numbers their suppliers are providing, and have one-on-one conversations with their suppliers about those "stories." This is how buyers will be able to ask questions and understand who is doing what work to create continual improvement. If buyers are putting any system of rewards into place, rewards need to be given via the information gleaned from these one-on-one conversations and metric results combined.

(6.6) If rolling averages of metric results are ever used in buying decision, follow the recommendations listed in these guidelines prior to instituting such a program.

Responsible: FoodCo/Buyers

Guideline:

Prior to making any buying decisions based on metrics results, take all recommendations put forth in this document to develop a comprehensive program to work closely with your supply chain partners to understand issues and trends within all the growing operations within your supply chain. Also,

A suggested timeframe would include at least 3-5 years of study to understand baseline with an additional 3-5 years allowed for tracking continual improvement:

- A final appropriate time interval for comparison recommendations will require metric use and data collection over a minimum of a three- to five-year (or longer) period. (Section 6.3)
- After this comparison time period, and prior to using any metric results to make buying decisions, communicate closely with supply chain partners of continual improvement and allow time for growers to make continual improvements.
- Only after years of across the supply chain and on-the-ground work to improve management practices, and thus metric results, can any buying decisions be made by metric results with integrity.

If standards are put into place to make buying decisions, those standards need to be communicated with the supply chain with (years? #? Of advance notice) so that supply chain partners have adequate lead-time to implement procedures in their operations to adjust and manage to those standards over time.
Also, only ever use metric results data to make buying decisions if data has been verified for accuracy.

(6.7) Supplier recognition programs should encompass all guidelines above

Supplier recognition programs are valuable for highlighting those businesses that are performing ahead of their peers and for rewarding program participants for their efforts. Again, a "level playing field" and transparent approach to the program will benefit the program participants as well as the potential program audience (e.g., consumers).

Responsible: FoodCo/Buyers

Guideline:
Supplier recognition programs should follow all the guidelines for aggregation and comparison described above to determine suppliers that should be recognized. Assumptions and ranking approach (if that is the basis of recognition) should be spelled out so that participants and the potential audience understand how suppliers were ranked.