

# Vineyard Water Use Efficiency Knowledge and Technology Transfer Project

## Summary Report

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## I. Introduction

Due to the unpredictability of climate change, many grape growing regions of the world have embarked on creating programs to assist growers in reducing the production impacts associated with excessive heat, drought, flooding, frost, pest pressures and other risks associated with climate destabilization. In partnership with the BC Agriculture and Food Climate Action Initiative, the BC Wine Grape Council and Sustainable WineGrowing BC (SWBC) are all seeking to build the resilience and competitiveness of the growing Okanagan wine grape sector in the face of climate change and shifting weather patterns.

Developing commodity-specific water management guides (or tools) was identified as a priority in the *Okanagan Adaptation Strategies*. There are existing BC-specific informational resources on vineyard water conservation and efficiency strategies, tools, and technologies, as well as extensive information and resources from other winegrowing regions. Organizations such as the California Sustainable Winegrowing Alliance and LIVE Certified have developed vineyard irrigation tracking and performance metric tools, which can be adapted for the Okanagan region. These tools can assist growers in tracking, communicating, and comparing vineyard water use and efficiency.

In April 2017, SWBC hired sustainable winegrowing and water efficiency experts, Synapse and ViewCraft, to evaluate the current state of knowledge and best management practices on vineyard water-use efficiency, to develop a BC-specific water use performance metric tool, and to develop and deliver two workshop events to share newly developed resources with Okanagan grape growers. The goal of this work is to increase awareness and adoption of sustainable water management technologies and practices by Okanagan grape growers. Ultimately, the hope is that the process associated with this pilot project will have transferability to other commodity groups.

In order to accomplish these goals the project included a combination of 'boots on the ground' research with local interviews, regional and global interviews, as well as traditional research methods, reviewing literature from regions across the world on best practices. The *Vineyard Water-Use Efficiency: State of Knowledge and Technology Report* (Appendix A) summarizes the compiled information and informed the remainder of the project, providing insight into which facts sheets and case studies (Appendix B) would be most useful to growers, along with the development of an easy to use water use tracking tool (Appendix C). The project concluded with the creation of summary materials, including a PPT presentation (Appendix D) and Summary Report (this document). This report shares the methods, outcomes and recommendations of the Vineyard Water Efficiency Knowledge and Technology Transfer Project.

## II. Approach and Methods

The project team began by working with the knowledge network of Sustainable Winegrowing BC, the BC Agriculture and Food Climate Action Initiative Working Group, and other members of the project oversight committee to aggregate current BC-specific sustainable water management resources, tools and successes in the Okanagan region. A range of growers representative of small to large-scale vineyard operations and vineyard management companies were identified and interviewed to collect additional knowledge and on-the-ground insights. The resulting information was filtered and prioritized to determine what practices and tools are most useful and needed, and to provide a “reality check” on how Okanagan grape growers acquire, collect, and use data and information to inform irrigation practices. This process was a critical first step to define the context and to keep the project on track and on budget, using available funds to target the technologies and practices that have the most potential to take root and thrive.

The research “net” was then broadened to capture best practices identified and utilized in other winegrowing regions that have direct application to the Okanagan Valley. The consulting team gathered input from experts in other jurisdictions with wine industry associations, non-profits, academia, and individual wineries to identify and catalogue the most advanced technologies and best behavioral practices available for improving vineyard water efficiency in a time of climate unpredictability. To incentivize and assist wine grape growers in increasing irrigation efficiency and overall focus on water conservation the recommendations focus on three main areas:

- Improving irrigation water use tracking and feedback to growers;
- Providing additional support and resources to growers that will assist them with time-and cost-effective strategies to track water use, assess vine stress and target irrigation timing and length; and
- Creating a Data Capture and Grower Exchange platform that:
  - Provides quick access to streamlined, easy to use tools to track water use and calculate the full cost of water and excessive irrigation.
  - Provides growers with the ability to share knowledge, observations, and ask questions in real-time, better capturing and capitalizing on the value of the grower knowledge network, and engaging growers in a two-way dialogue with industry associations and researchers.

Once the draft report was compiled, it was circulated to the project oversight committee, revised based on their feedback, and then used as a roadmap to develop the fact sheets/ case studies. The fact sheets/case studies include:

- Tools to Validate ‘Eyes on the Vine’
- The Full Cost of Water – Save Water, Save Money and Maximize Quality
- Vineyard Establishment and Maintenance Practices for Water-Use Efficiency

The Vineyard Water-Use Efficiency: State of Knowledge and Technology Report identifies the current vineyard irrigation tracking and water performance metric tools that have been developed in other winegrowing regions. Growers who have used these tools were interviewed to get feedback on functionality, applicability and benefits for vineyard water management. The consulting team then recommended elements of a metric tool to the oversight committee and sought their feedback on critical and desired elements for a BC-specific tool. The result was a custom-built Excel-based water use tracking database, providing a user-friendly, easily comprehensible tool for Okanagan growers.

The Performance Metric approach and methods include:

- Benchmarking water use by the grape growing sector in the Okanagan valley. What is the total amount of water used?
- Defining a metric of gallons of water used per ton of grapes harvested.
- Building in the Water: Energy nexus - connecting water use with energy used for pumping and distribution.

Through the project oversight committee – and input from leading growers – sites were identified for the two half-day grower field days. The focus was on providing the opportunity for local water efficiency champions to share their best practices, and on sharing the water use tracking tool with growers to receive their feedback for further refinement. Ideally these growers will use the resources created through this project to improve water-use efficiency on their vineyards.

After all of the substantive work was completed the fact sheets, water performance metric tool and Vineyard Water-Use Efficiency: State of Knowledge and Technology Report were finalized..

### **III. Deliverables**

#### **A. Vineyard Water-Use Efficiency: State of Knowledge and Technology Report**

The Vineyard Water Use and Irrigation Efficiency in the Okanagan Valley Report (The Report) defines the immediate Okanagan knowledge network and applied technologies as its foundation. Research and direct interviews with the consulting team's knowledge network in the global wine community provided the support structure for the rest of the report.

Notable Report Findings Include:

1. Given the relatively low cost of water in the Okanagan growers do not have an economic incentive to track water use and invest time in increasing irrigation efficiency. The onus of water meter installation, tracking, and feedback is on the water purveyors, and there are only a few examples of feedback on water use being provided to growers (e.g. South East Kelowna Irrigation District; Greater Vernon Water AgConnect tool) and utilized to inform, and in some cases restrict, irrigation water use.
2. The data and information associated with best management practices in the vineyard are pushed out to the growers but rarely are the growers

included in a two-way conversation where they have the opportunity to share their own observations, input and feedback. There is an extremely valuable knowledge bank in “old guard” growers that is not being captured for new and younger growers.

3. The collection and communication of best irrigation efficiency practices does not include an economic focus on the full cost of water or excessive irrigation (e.g. system maintenance, canopy management for excessive vigour, tractor runs for hedging or spraying for powdery mildew, botrytis, and other diseases, floor vegetation management, machinery wear and tear, and critically, reduced quality). Growers confirmed that if water was perceived to have a higher cost it would motivate greater attention to irrigation efficiency, and willingness to invest more time and money in tools and technologies to help target irrigation timing and length.

From these findings, a set of near-term and longer-term recommendations were developed, which informed the remainder of the project deliverables (fact sheets/case studies, monitoring tool). The recommendations are:

1. Water Use Tracking and Feedback
  - Encourage/ Incentivize Tracking Irrigation Timing and Sets
  - Develop Easy to Use Water-Use Tracking Tool
  - Create a Shared Resource Library
  - Overhaul/upgrade BC Water Agriculture Calculator to Version 2.0
  - Expand Purveyor Feedback Systems
2. Capturing Existing Knowledge and Building Grower Exchange
  - Create Visual Top 10 list
  - Hire a Dedicated Field Officer
  - Develop Online Grower Exchange
3. Cost of Water Calculator & Fully Leveraged Data Capture and Knowledge Exchange
  - Phase One – Develop Full Cost of Water Template/Calculator
  - Phase Two – Develop Fully Integrated App

## **B. Fact Sheets and Case Studies**

The Fact Sheets/Case Studies were developed directly from recommendations in The Report, as well as input from the project oversight committee about what would be most useful for the grower community. The Case Studies are incorporated as part of each Fact Sheet.

Fact Sheets/Case Studies include:

1. Tools to Validate ‘Eyes on the Vine’:
  - Nothing is more valuable than direct knowledge of your vineyards and boots on the ground observations that provide a “gut check” for many vineyard management decisions. However, tools and technologies that provide real-time data to validate and backup visual indicators and intuition are playing an increasingly beneficial role in precision irrigation to maximize fruit quality, and can help improve quality in low-performing vineyard zones.
2. The Full Cost of Water – Save Water, Save Money and Maximize Quality:

- Efficient, targeted irrigation has a cascade of benefits both for your bottom line and the quality of the fruit on the vine. Ensuring that vines get the right amount of water at the right time will: maximize grape quality, minimize operational costs and improve labor efficiency, and reduce risks to your crop.
3. Vineyard Establishment and Maintenance Practices for Water-Use Efficiency:
- This fact sheet focuses on non-irrigation related practices you can implement in your vineyard to use water efficiently.

#### **A. Water Use Performance Metric Tool**

The purpose of the tool is to help growers track their water use each season and to develop metrics of water use per ton/acre/vine that will help them calculate the true cost of the water they are using.

#### **B. Two field days**

The field days provided an opportunity to share key findings and resources from this project with growers in the region and to receive feedback from them on the first version of The Tool. Grower feedback gathered at the workshops was then incorporated to complete the Phase I Tool for this project. The workshops were well attended with 25 participants at each.

#### **C. Project Summary and PowerPoint Presentation**

The Summary and Powerpoint have been developed to assist the management of SWBC with sharing the Vineyard Water Efficiency and Technology Transfer Project process and deliverables with the broader community.

The goal was for the project deliverables to serve as a “living knowledge network” through which the Okanagan growers are active participants and not passive users of the knowledge. It is valuable for growers to join and contribute to this network. To that end the workshops were designed as a participatory dialogue, with feedback and suggestions encouraged.

### **IV. Conclusions and Recommendations**

In a region with increasing pressure on water supply the intention of this project was to highlight vineyard water-use efficiency opportunities, given grapes are one of the largest agricultural commodities in the region. Even though grapes rank quite low on irrigation water demand compared to other agricultural crops grown in the region, there are opportunities to increase vineyard irrigation efficiency and ensure that vines get the right amount of water at the right time. This is critical to the growing recognition of the Okanagan Valley as a premier winegrowing region.

Given the relatively low cost of water in the region, growers are not economically motivated to monitor their water use. During the interviews with growers, the link between overwatering and reduced grape quality, and the associated operational costs, resonated most as an incentive to monitor and optimize water use. Therefore the project aimed to expand the typical view of the cost of water (allocation and pump costs) to also include costs associated with excessive

irrigation, including labour and equipment costs, and reduced quality of grapes. The tool and resources that have been developed are a first step in sharing this idea, and providing a resource which will easily allow growers to begin to track their water use and understand the full cost of water from a broader, integrated perspective.

The ten recommendations that resulted from this project are discussed in detail in The Report. This project provides the foundation for pursuing and realizing the many methods and opportunities for increasing vineyard water use efficiency. Additional investment will be required to implement any/all of the recommendations.

In addition, this project only focused on one element of sustainable winegrowing and environmental stewardship for the Okanagan/British Columbia wine industry. The topic of water efficiency is interlinked with a broader context of energy efficiency, waste reduction, pollution prevention, greenhouse gas (GHG) emission reduction, business longevity, and social equity considerations for both vineyard and winery operations.

The SWBC vineyard and winery assessments provide a foundation for a third-party certification program. In all of the interviews growers noted the increasing market interest and demand for sustainability information, and in particular certification that verifies specific practices are truly being implemented. A third-party certification program for vineyards would provide an opportunity to require specific water management standards for irrigation. Ultimately, growers should receive a price premium for higher quality, certified sustainable grapes.

Given that Andrew Peller, an influential, large-scale land and winery owner, is requiring their growers to complete the SWBC vineyard assessment indicates an opportunity for the Okanagan wine industry to move to the next level with certification. In the near-future this could prove not only valuable but potentially mandatory for certain export markets in Europe and elsewhere.

The process and deliverables from this project could also be applied to other agricultural commodities. The grower and broader wine industry interviews were a key element in understanding current practices, grower needs, knowledge gaps, and opportunities. Research and resource collection from worldwide winegrowing regions, combined with extensive interviews, provided the knowledge and context to produce resources that will be beneficial for both new and well-established growers in the region. If grower input is sought in the development of new resources and tools, growers will feel more ownership; increasing the likelihood they will utilize these tools, and encourage others in their network to use them as well.

## **V. Schedule**

**Start-up meeting with SWBC and CAI**

May 4, 2017

### **State of Knowledge and Technology Report**

Delivered to Steering Committee for review  
Final Draft

June, 2017  
January 2018

### **Three (3) Fact sheet/case study documents**

Delivered to Steering Committee for review  
Final Drafts

July, 2017  
November, 2017

### **Performance Metric Tool**

Draft BC-specific metric tool for Steering Committee review  
Tool Review at field days  
Tool Finalized

July, 2017  
August, 2017  
November, 2017

### **Two half-day field days**

August 17 & 18

### **Summary PPT**

January 2018

### **Project Summary Report**

January 2018

### **Disseminate finalized project resources**

January 2018

## **VI. Project Team and Structure**

### **Oversight Committee**

Kellie Garcia – Sustainable Wine Growing BC  
Harmony Bjarnason - BC Agriculture and Food Climate Action Initiative  
Karen Gillis – BC Wine Grape Council  
Graham O'Rourke – BC Grape Growers Association  
Pat Bowen – Agriculture and Agri-Food Canada  
Andrew Peterson – BC Ministry of Environment  
Emily MacNair – BC Agriculture and Food Climate Action Initiative

### **Consultant Team**

Katie Pease - Synapse - Project Manager  
Anna Brittain - ViewCraft - Core Subject Expert  
John Garn - ViewCraft - Core Subject Expert

## **VII. Cost**

### **Total Project Budget:**

**\$41,901**

**Appendix A – State of Knowledge and Technology Report**

[Sustainablewinegrowingbc.ca/resources](https://sustainablewinegrowingbc.ca/resources)

**Appendix B – Fact Sheets/ Case Studies**

[Sustainablewinegrowingbc.ca/resources](https://sustainablewinegrowingbc.ca/resources)

**Appendix C – Performance Measurement Tool**

[Sustainablewinegrowingbc.ca/resources](https://sustainablewinegrowingbc.ca/resources)

**Appendix D – Project Summary PPT Presentation**

(available through Sustainable Wine Growing BC)