SWEEP 2021 Pilot Project
Summary of Public Comments

#	Organization or Individual	Summary of Comment	CDFA Response
1	Keshav Boddula	Commenter does not think that large scale growing agribusiness activity in the Imperial Valley is wise given the ecological impacts and thinks that the state should consider treating the root of the problem. The comments seem to express opposition to commercial food production in Imperial Valley	The SWEEP Pilot program is designed to help farmers decrease their water use for agricultural production
2	California Farm Bureau Federation	The California Farm Bureau Federation is encouraged that CDFA has added flexibility in the proposal which allows applicants without demonstratable GHG emission reductions to be awarded SWEEP funding. CDFA should consider allowing projects that increase baseline energy use to also qualify for the grant. The department should consider allowing for proposals where the applicant pursues energy decreases through renewable energy generation elsewhere, such as converting farm equipment to renewable fuels, or offers other practices to offset increased emissions from irrigation conversion. Another solution would be to consider the upstream power generation that is produced via hydro-energy generation before the water reaches farms. The Farm Bureau encourages the Department to adjust the language on page 6 of the draft Request for Grant Applications, to be more expansive to proposed projects that result in an increase to greenhouse gas emissions that can be offset elsewhere.	SWEEP is part of the Climate Smart Agriculture suite of programs within CDFA with one of the primary goals of the programs being to combat climate change and reduce greenhouse gas emissions from California farms and ranches. For this reason, Climate Smart Agriculture programs (including SWEEP) must not result in an increase in GHG emissions. Additionally, the program (along with other CSA incentive programs at CDFA) has a limited scope to "on-farm" and, in the case of SWEEP, project scopes are limited to irrigation strategies.
3	California Climate and Agriculture Network (CalCAN)	The California Climate Action Network largely supports the pilot RGA and recognizes the efforts of the ad hoc advisory group in creating recommendations. CalCAN has three recommendations: 1. The application period should be extended from 6 weeks to 12 weeks. They cite that most technical assistance providers think the current application period is too short to gather the needed information. Additionally, the ad hoc advisory group recommended 90 day application periods. 2. Some project types might not have a viable way to power the increased pumping with renewable energy and CDFA is encouraged to continue to explore opportunities to quantify the total net GHG impacts of project, including nitrous oxide emission reductions. For this reason, expedite the incorporation of nitrous oxide emissions into the GHG quantification methodology. 3. Include language in the RGA to address how CDFA will evaluate and communicate the lessons learned in this pilot program as this informaiton may be informative to future SWEEP solicitations and to farmers throughout the state.	1. CDFA will extend the application period to 10 weeks to help applicants gather the needed information to apply for this competitive grant. 2.CDFA will continue to work on incorporating nitrous oxide in the GHG quantification methodology for SWEEP. The addition of nitrous oxide calculations into the GHG calculations is a significant rework of existing tool. The revised tool will not be complete in time for the Pilot program solicitation, but one reason for inclusion in future SWEEP cycles is to support additional projects in the southern desert and throughout California. 3. CDFA will explore ways to share results of the outcome reporting (for example, in a report or at future meetings of the EFA SAP).
4	Rubicon Water	1. Government policy does not need to shift irrigation practices from flood irrigation to pressurized drip in the pursuit of higher application efficiencies. Modernizing inefficient flood systems can result in high performance service over irrigation systems while maintaining zero greenhouse gas emissions with on-farm irrigation systems. 2. CDFA should consider emerging data technologies to ensure multiple beneficial use on the complete water supply chain and its management. Rubicon suggests using software that allows for the on farm irrigators to communicate with the irrigation districts and compile data from numerous users that can lead to district wide water savings. 3. The program should consider the investments required at the interface of supply from the irrigation districts as an enabler for on-farm irrigation efficiencies. Things like automated control gates for distribution networks and integrated canal management systems can provide delivery efficiencies. 4. The program should consider the investment required for data infrastructure as an enabler for on-farm irrigation efficiencies. The use of the internet of things as an interconnected system can provide great benefits to the agriculture sector as a whole.	Improvements to flood-irrigated systems are eligible for SWEEP funding. The SWEEP program is focused on on-farm irrigation methods, technologies and practices that result in water conservation. Water saving methods, technologies and strategies upstream of the farm operation will continue to be outside of the scope of SWEEP's objectives.

SWEEP 2021 Pilot Project
Summary of Public Comments

#	Organization or Individual	Summary of Comment	CDFA Response
5	University of California, Agriculture and Natural Resources; Kearney Agricultural Research and Extension Center	1. Additional practices should be added to the list of water saving practices located on page 6 of the Request for Grant Applications: - Automation of surface irrigation systems to conserve water. - Modification of surface irrigation fields to allow for increased flow rate by replacing ditches and increasing border width. - Land leveling to increase irrigation efficiency and reduce surface runoff. - Upgrading existing on farm delivery systems by replacing leaky ditches and replacing water delivery gates. - Installing new or upgrading existing tailwater recovery systems. 2. The irrigation water savings assessment tool should be modified to have added flexibility to estimate water savings. Estimates of water savings from outside resources such as the scientific community in California or from feedback from local irrigation districts should be allowed/encouraged. 3. Projects should only be required to provide baseline energy records if they are using energy from a service provider or non-renewable energy source.	1. The irrigation water savings assessment tool does allow for some of the additional practices to be included for water savings calculations. These include tail water recovery, replacing leaky lines, and land leveling. Automation and the increase of border width is not within the tool. CDFA will expand upon the listed water savings practices that are shown on page 6 of the RGA to include these additional practices. It should be noted that the RGA does not outline every eligible practice that can result in on-farm water savings through irrigation system improvements and that applicants are able to apply for support for management practices outside of those listed in the RGA as long as benefits can be calculated and assessed. 2. CDFA allows for supporting and supplemental documentation to be provided to allow reviewers to consider additional water saving potential beyond the water savings assessment tool's outcome. The Technical Reviewers will need to review the legitimacy of these clamed amendments and estimate the water savings accordingly. 3. For the purpose of this Pilot program, CDFA will only require baseline energy records be provided if there is baseline energy associated with the current irrigation system and practice. The applicant providing renewable energy generation as a baseline will add further clarity for the technical reviewers to ensure no additional GHG production is anticipated as a result of any proposed project. Applicants with no baseline energy use will provide sufficient explanation of the baseline scenario.
6	University of California Cooperative Extension, Imperial, Riverside and San Diego Counties; Imperial County Farm Bureau; IVH20	The comments support the use of the irrigation water savings assessment tool and the dropping of the requirement to provide baseline energy records for projects that do not have such records. In order to support conversion from gravity-fed flood irrigation systems to micro-irrigation in appropriate crops, CDFA could accept the reduction of nitrous oxide emissions to offset increase in GHG due to irrigation method. Including nitrous oxide will likely show a total reduction of GHG emissions associated with such practices, but is not captured at this time. CDFA should allow applicants to provide justification regarding total GHG emissions that include both carbon dioxide from pumping and nitrous oxide from the change in land management.	CDFA will continue to work on incorporating nitrous oxide in the GHG quantification methodology for SWEEP. The addition of nitrous oxide calculations into the GHG calculations is a significant rework of existing tool. The revised tool will not be complete in time for the Pilot program solicitation, but one reason for inclusion in future SWEEP cycles is to support additional projects in the southern desert and throughout California.

From: kikibo22 <kikibo22@gmail.com>
Sent: Tuesday, March 1, 2022 7:58 AM
To: CDFA OEFI@CDFA <CDFA.OEFI@cdfa.ca.gov>
Subject: general concern/comment on increasing irrigation efficiency in southern desert region

Hello CDFA OEFI,

I'm assuming this is in the Imperial Valley, and I basically understand that large-scale growing in an environment that is not really meant for such agribusiness activity is challenging and impressive regarding the human ingenuity, however, seems to really be not as wise when you more holistically see the ecological impact, right? Again, not to take away from the good, intelligent (though more narrow-minded) efforts in such technologies, but to increase irrigation efficiency seems like just treating the symptom rather than addressing the root cause of the problem in relation to ?why they're even trying to grow food at that scale, with that non-ecological mentality to begin with, you know?

Sincerely,
Keshav Boddula

University of California
Agriculture and Natural Resources

9240 South Riverbend Avenue
Parlier, CA 93648
phone: 559-646-6541
fax: 559-646-6593
http://kare.ucanr.edu/

March 18, 2022

CDFA-SWEEP
cdfa.oefi@cdfa.ca.gov

Ref: Comments on the State Water Efficiency and Enhancement Program (SWEEP) Pilot Program-Water Savings Focused Projects Limited to the Southern Desert Region

Thank you for giving us the opportunity to provide comments on the above pilot program.

I suggest including the following practices to the list of "**Water Savings**" practices on page 6 of the DRAFT:
- Automation of surface irrigation systems to conserve water.
- Modification of surface irrigation fields to allow for increased flow rate by replacing ditches and increasing border width.
- Land leveling to increase irrigation efficiency and reduce surface runoff.
- Upgrading existing on farm delivery systems by replacing leaky ditches and replacing water delivery gates.
- Installing new or upgrading existing tailwater recovery systems.

Comments on "Water Use Documentation" page 10:
The current language "Applicants must use the SWEEP Irrigation Water Savings Assessment Tool to demonstrate baseline water use and projected water savings estimates."
I would suggest adding a language that gives the applicant the flexibility to estimate water savings based on the use of other scientific methods that are not listed in the current SWEEP Irrigation Water Savings Assessment Tool. The current Water Savings Assessment Tool does not have estimates for water savings using new practices such as automation of surface irrigation systems or runoff recovery systems. I would suggest using estimates for water saving for such new projects using tools or methods developed by the scientific community in California or based on feedback from the local irrigation districts in the low desert.

General comment:
All projects should include documentation for water savings, documentation for energy savings should be required only if the applicant is using energy from a service provider or non-renewable energy sources.

Please feel free to contact me if you have any questions.

Sincerely,

Khaled Bali

Khaled M. Bali, Ph.D.
kmbali@ucanr.edu
Statewide Irrigation Water Management Specialist
UCANR- Kearney Agricultural Research & Extension Center (KARE)

March 18, 2022

Secretary Karen Ross
California Department of Food and Agriculture
1220 N Street
Sacramento, CA 95814

Re: State Water Efficiency and Enhancement Program (SWEEP)
Pilot Program Request for Grant Applications (RGA)

Dear Secretary Ross:

Thank you for the opportunity to provide comment on the draft Request for Grant Applications (RGA) for the proposed Southern Desert Region Pilot Program within the State Water Efficiency and Enhancement Program (SWEEP). These comments are offered on behalf of the California Farm Bureau Federation (Farm Bureau), which includes broad membership seeking to access the SWEEP Program in the inland empire region. The Farm Bureau is a farmer and rancher-led organization, representing more than 36,000 farmers in California. We strive to protect and improve the ability of farmers and ranchers to provide a reliable supply of food and fiber through stewardship of California's natural resources.

We would primarily like to thank the Department of Food and Agriculture, the Environmental Farming Act Science Advisory Panel (EFA-SAP) and the staff of the Office of Environmental Farming and Innovation (OEFI) for convening the SWEEP Ad Hoc Advisory Group to discuss the concerns of those farmers not eligible under the current conditions in the SWEEP guidelines. Farm Bureau believes that recommendations that originated within that Ad Hoc Advisory Group have provided for a more nuanced and robust pilot proposal for access by underserved farm populations.

Due to the gravity-fed nature of the water distribution systems utilized by these inland empire farm operations, we are encouraged by the Department's flexibility in establishing this pilot. More specifically, we are thankful for the considerations in the proposed RGA allowing applicants without demonstrable greenhouse gas emission *decreases* to be awarded, contingent upon justification of not increasing the baseline energy use.

We do, however, offer one reflection for consideration. We expect several farmers to attempt to utilize this pilot program to convert from surface to drip irrigation systems, as is common in the larger SWEEP grant solicitations. Within these scenarios, while water efficiencies may be substantial, they will result in an *increase* to baseline energy use. Under the current RGA, these projects would not qualify.

While we recognize there are creative solutions offered in the RGA, including using renewable energy generation to power pumps, we would ask the Department to consider a broader suite of justifications to demonstrate offset increased emissions elsewhere on farm. For example, we encourage the Department to consider proposals where an applicant pursues energy decreases through renewable energy generation (i.e., solar or wind) elsewhere, converts farm equipment to renewable fuel use, or offers other practices to offset increased emissions from irrigation conversion. Another creative solution may be to consider that the water provided to most of the farms served by this program is directly used for hydro-energy generation upstream. If an energy efficiency score was offered on a per-acre foot basis for water used by these farm operations, in coordination with the servicing irrigation district, the water would inherently be greenhouse gas negative and satisfy the energy efficiencies required in this program. The California Energy Commission used a similar justification, in citing a study specifying "agricultural applied water is directly proportional to energy use by agricultural water pumping. If the amount of applied water is reduced, in theory the energy use will be reduced."[1] Therefore, Farm Bureau encourages the Department to adjust the language on page 6, to be more expansive to proposed projects that result in an increase to greenhouse gas emissions that can be offset elsewhere.

On behalf of the southern California and broader agricultural community, we thank you again for the opportunity to provide input. We are very encouraged by this proposal and the opportunities for increased water efficiency in these times of resource constraint.

Sincerely,

Taylor Roschen, Policy Advocate
California Farm Bureau Federation

cc: Amrith Gunasekara, Science Advisory, California Department of Food and Agriculture

[1] Irrigation Training and Research Center. *California Agricultural Water Electrical Energy Requirements-Final Report.* (December 2003). California Agricultural Water Electrical Energy Requirements (calpoly.edu)

March 18, 2022

Office of Environmental Farming and Innovation (OEFI)
California Department of Food and Agriculture (CDFA)
1220 N Street
Sacramento, CA 95814

Re: **Support & Comments for SWEEP Southern Desert Region Pilot**

Dear OEFI Staff:

On behalf of the California Climate and Agriculture Network (CalCAN), I write to share our support for the proposed Southern Desert Region pilot within the State Water Efficiency and Enhancement Program (SWEEP).[1]

The current drought has again laid bare the vulnerability of farmers in the state to the vicissitudes of a changing climate. Our coalition welcomed the legislature's timely investment in SWEEP of $50 million from the General Fund in FY 21-22 and strongly supports the Governor's proposed investment of $70 million from the General Fund in FY 22-23. With the change in funding sources to General Funds, CDFA has the flexibility to consider new, creative ways of meeting farmers' needs and advancing climate smart, resilient irrigation systems.

We applaud CDFA for using this flexibility to launch a SWEEP pilot for farms in the Southern Desert Region. Farms in this region have historically been excluded from the program due to their unique irrigation and energy circumstances and SWEEP's requirement to estimate GHG emissions reductions from an energy use baseline – an issue we first wrote about in 2018.[2] This water-focused pilot also advances one of the SWEEP ad hoc advisory group's highest-ranking recommendations, which is to "divide [SWEEP] funding into two categories: 'Water-focused' and 'Water- and GHG-focused,' potentially setting aside a specific funding amount for each category of project."[3]

We have three recommendations to further improve the impact of this pilot.

First, we recommend extending the application period from 6 weeks to 12 weeks. As we wrote in our 2018 SWEEP Report, "Most of the [technical assistance] providers we spoke with agreed that the [six week] application period was too short, especially for those producers who were

[1] CalCAN is a statewide coalition of farmers and ranchers, allied organizations, ag professionals, scientists and advocates that advances policy to realize the powerful climate solutions offered by sustainable and organic agriculture.
[2] Climate Smart: Saving Water and Energy on California Farms. Available at: calclimateag.org/wp-content/uploads/2018/09/SWEEP-Policy-Brief-CalCAN-9-11-18.pdf
[3] Draft Report on the Recommendations of the SWEEP Ad Hoc Advisory Group, available at: https://www.cdfa.ca.gov/oefi/sweep/docs/SWEEPAAGReport_final.pdf

learning about the program for the first time at their workshops. Providers cited the need for project planning and gathering of information—such as pump efficiency tests, irrigation system plans, and utility bills—as major barriers to finishing an application in six weeks." The SWEEP ad hoc advisory group also recommended in its June 2021 report a 90-day application window for SWEEP to accommodate farmers' harvest and work schedules.

Second, for farmers who wish to convert from surface irrigation to micro or drip irrigation (resulting in significant water savings) and do not have a viable way to power their increased pumping with renewable energy, we encourage CDFA to continue exploring options to quantify the total net GHG impacts of projects, including nitrous oxide (N_2O) emissions. It may be the case for some of these projects that reduced N_2O emissions (which have 265-300 times the global warming potential of carbon dioxide) from more efficient fertilizer application and irrigation may more than offset any increased CO_2 emissions from increased pumping. CDFA previously indicated at the July 2021 Science Advisory Panel that it is "is working on an update to the QM that would capture nitrous oxide emission reductions" and that "this would open the program up to additional farmers." We urge CDFA to expedite this work.

Finally, we encourage CDFA to specify in the final RGA how it will evaluate and communicate the lessons learned in this pilot program. This pilot should inform future rounds of SWEEP and the lessons learned may apply to farms in other regions of the state that have faced similar barriers to farms in the Southern Desert Region.

Thank you for your consideration.

Sincerely,

Brian Shobe
Associate Policy Director
Brian@calclimateag.org

March 18, 2022

Peter Moller

General Manager - FarmConnect

Rubicon Water

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RUBICON™

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CDFA-SWEEP

cdfa.oefi@cdfa.ca.gov

Re: Public comment on a Draft Request for Grant Applications for a SWEEP Pilot for the Southern Desert

Thank you for the opportunity to submit a public comment regarding the Draft Request for Grant Applications for a SWEEP Pilot for the Southern Desert.

Rubicon Water acknowledges that this proposed program would provide financial assistance to California-based agricultural operations whose projects are located in the Southern Desert Region of California. Rubicon Water acknowledges that this proposed program will support the installation of agricultural irrigation water efficiency technologies that will result in on-farm water savings and no increase in GHG emissions.

Rubicon Water provides solutions to irrigation districts and farmers to increase water use efficiency and agricultural productivity. Our advanced technology provides managers of gravity fed irrigation supply networks and farmers using gravity fed surface irrigation with improved tools to manage their water resources with unprecedented levels of efficiency and control.

Our gravity fed canal solutions developed over a 27 year period, enable irrigation authorities to modernize existing gravity fed open canal systems with precise measurement and control equipment to deliver accurately-measured, high-flow water to farmers. Our solutions provide a high-quality near on-demand water supply service to farmers, while accurately measuring flow and eliminating operational spills. These improvements enable farmers to receive water from the irrigation district's delivery system on time, with a constant flow rate and matched to the crop's water demand.

Our on-farm technology solution, FarmConnect, developed over a 12 year period, extracts even more value by enabling farmers using gravity fed surface irrigation to remotely monitor and schedule their crop water requirements, understand the environmental conditions influencing crop production and water use, manage the automation of their irrigation operations with precision, thus achieving high application efficiency. Farmers use FarmConnect's app and web portal via the on-farm Internet of Things (IoT) network provided by Rubicon's Internet of Agriculture™ (IoAg™) Platform.

These improvements enable farmers to achieve higher yields using less water whilst capitalizing from the energy free, gravity fed, zero greenhouse gas (GHG) emission irrigation canal distribution systems managed by irrigation districts and on-farm surface application systems. Leveraging from the sunk cost of surface irrigation

bay layouts, on farm canals and laser leveling, by irrigators in surface irrigation regions like Southern California, the capital cost to modernize a surface system is significantly less dollars per acre than converting to drip irrigation or sprinkler irrigation systems.

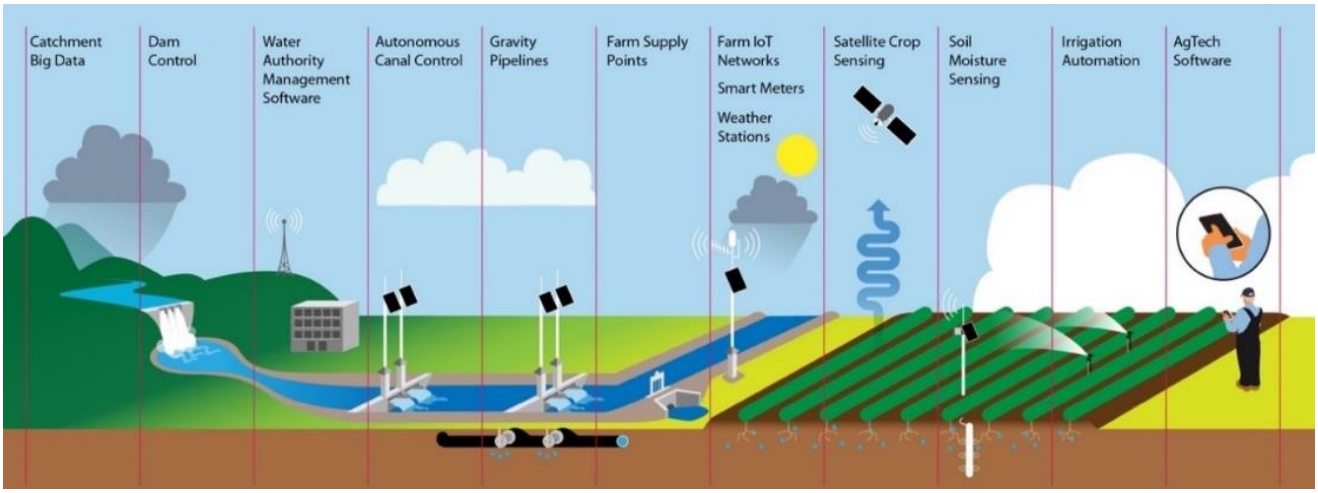

Figure 1 Illustration demonstrating the range of Rubicon's solutions

Rubicon's combined solutions offer our customers a full suite of solutions that empower irrigation districts and their end-users to manage water from the reservoir or river to the crop with unparalleled efficiency.

1.0 High performance surface irrigation as a viable policy option for on-farm water savings and no increase in GHG emissions.

Rubicon has been able to demonstrate that its solutions can transform inefficient flood irrigation with 50%-60% application efficiency to high performance surface irrigation with 80%-95% application efficiency. In many cases yield was also increased, significantly improving the ratio of productivity/volume of water applied, in some cases producing double the dry matter per acre foot of applied water.

> **It is Rubicon Water's position supported by evidence based scientific research projects and commercial industry, that government policy does not need to shift irrigation practices from flood irrigation to pressurized drip or sprinkler irrigation infrastructure in the pursuit of higher application efficiencies. By modernizing inefficient flood irrigation systems to high performance surface irrigation systems, irrigators can gain similar application efficiencies, increases in yield and lower labor costs whilst capitalizing from the energy free, gravity fed water supply, thus maintaining zero greenhouse gas (GHG) emissions with on-farm irrigation application system using surface irrigation and lower capital and operating costs.**

Rubicon, in collaboration with the University of California Division of Agriculture and Natural Resources (UC ANR), commenced a number of projects with the principal objective to demonstrate the gains in application efficiencies possible through the use of optimally-managed, automated, high-flow gravity fed surface irrigation using border check bays in Southern California for alfalfa (Riverside and Imperial counties) and furrow irrigation in Holtville, California for sugar beet production.

A secondary objective is to demonstrate and evaluate the techniques for calculating in real time the time to cut-off for each irrigation, using data captured during that irrigation, in sufficient time to provide optimum control of that irrigation, to reduce tail water runoff losses.

Recently, UC ANR commenced collaboration with the Sugar Beet industry to identify solutions solving the problems associated with labor cost with furrow irrigation and improving water application efficiencies associated with a manual system of siphons. Rubicon introduced the new irrigation methodology and design of studies to UC ANR and California Sugar Beet industry as a result of the success with the Australian Cotton Research and Development Corporation (CRDC) and University of Southern Queensland (USQ) which demonstrated automation of gravity fed surface irrigation with furrows from 2013 to 2018.

This project utilizes Rubicon's FarmConnect solution of smart automation systems for furrow irrigation (of sugar beet), wetting advance sensors and soil monitoring at UC ANR's Desert Research and Extension Centre, located in Holtville, California.

Rubicon's solution with FarmConnect - Smart Furrow irrigation has been well documented by the cotton industry over the last 8 years. The following YouTube links from CottonInfo (Australia) summarises the cotton irrigation project Rubicon was involved in for the CRDC (2014-18) with partners USQ, for automated furrow irrigation:

Automated small pipe irrigation system: https://youtu.be/bmltNZYXkMA

Moving to an autonomous irrigation system: https://youtu.be/J1CrcKBuADk

It applies the best available automation, flow control infrastructure and in-field sensor technology integrated with adaptive irrigation control and simulation software to maximise water efficiency performance of surface irrigation systems. The significance of this project for sugar beet growers with furrow irrigation is that it will provide avenues to deliver similar application efficiency performance as pressurised systems at lower capital and operating costs. Local research carried out by UC Davis at the UC Desert Research and Extension Center in Holtville, ran the Imperial Valley Sugar Beet industry research project over the 2019 – 2021 irrigation seasons, and demonstrated it is possible to achieve an Application Efficiency (AE) of 85% - 97% (Bali & Kaffka) in Imperial valley with surface irrigation using automated furrow. Labor saving using automated surface irrigation, replacing manual labor is also an important problem to solve in California.

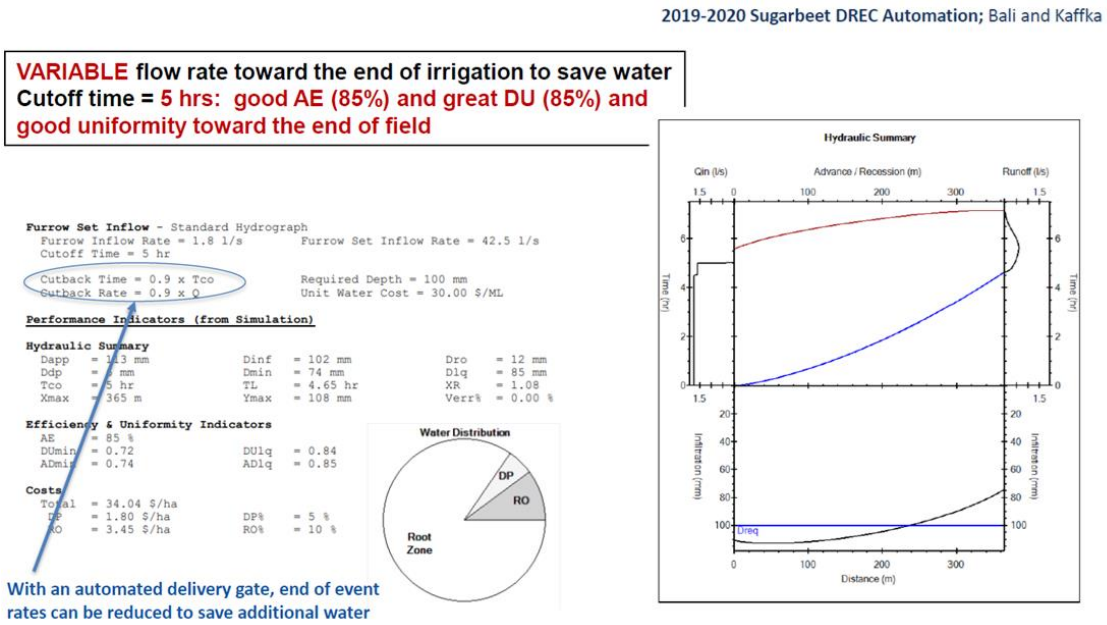

Figure 2 . Extract from Research findings by Bali and Kaffka 2021

These findings are supported by a number of irrigation research projects into gravity fed surface irrigation in Australia over the last 10 years. Some key finding from Rural R&D for Profit Program (1st July 2015 to 31 May 2018), Smarter Irrigation for Profit (Phase 1)

Final Report, can be summarized as:

Surface irrigation (be it by furrow or in bays) is the most common form of irrigation due to its low capital cost and low energy requirements. Well-designed and well-managed surface irrigation can achieve application efficiencies of 95%, showing that efficiency comes from design and management, and is not an inherent characteristic of the system itself. Smarter Irrigation for Profit trials showed that application efficiencies for surface irrigation can often be improved by better design and scheduling – reducing losses through deep drainage and run-off (p5 in the Smarter Irrigation for Profit (Phase 1) Final Report).

Figure 3 . Automated outlet at UC Desert Research and Extension Center in Holtville

Recent media articles describe the project at UC Desert Research and Extension Center in Holtville:

Media Reference https://irrigationleadermagazine.com/how-automating-furrow-irrigation-can-save-water-and-reduce-labor-costs/

https://irrigationleadermagazine.com/how-rubicons-farmconnect-solution-is-turning-flood-and-furrow-irrigation-into-an-efficient-system/

Rubicon has been active in supporting the investigation and proof of its surface irrigation technology in desert regions in Southern California with a commercial farm since 2012/13. Ronald C. Leimgruber Farms (RCL Farms) have piloted Rubicon's on-farm automation for control of bay outlets for gravity fed surface irrigation, soil moisture monitoring solution, wetting advance sensors and metering with flow control and recently a Rubicon Weather Station for irrigation prediction.

Figure 4 Example of a BayDrive actuation for farm canal at RCL Farms Holtville CA

Recent media article describes the RCL Farm project in more detail:

Media Reference https://irrigationleadermagazine.com/ronald-leimgruber-using-farmconnect-in-the-imperial-valley/

2.0 Data management from catchment to crop

As technology in the agricultural industry continues to evolve, so does the availability of rich data to assist governments, irrigation districts and farmers in making informed decisions. It is presently common for multiple parties to manage discrete links of the water supply chain – with management decisions for catchments and storages, natural carriers, irrigation canal networks, and farmers' irrigation schedules dispersed amongst independent organizations using independent information and data sources.

With increasing need for productivity, profitability and sustainability of agricultural water, there is a need to introduce a multi-disciplinary approach that holistically combines 'catchment to crop' information, data and technologies, and consolidates raw data into comprehensive insights for irrigation districts and end-users and for the industry as a whole.

Managing water from its source to the root zone of the crop involves an approach that draws on the disciplines of agronomy, on-farm operations management, along with the decision to irrigate, canal distribution infrastructure management, catchment management, environment and multiple fields of research to collaboratively focus on the complete water supply chain.

> **It is Rubicon Water's position that government policy for on-farm water savings and no increase in GHG emissions considers the emerging data technologies to ensure multiple beneficial use on the complete water supply chain and its management.**

To address this, Rubicon has developed the FarmConnect and Water Ordering platform which is an important operational tool for irrigators, providing key information at their fingertips, including a spatial view of their farms, a range of alerts that lead to greater water use efficiencies and streamline their water ordering process. At the same time, it allows the water authority to capture a wealth of data compiled from numerous users that can lead to other benchmarking and district-wide water saving opportunities. For example, this will be available to approximately 16,000 farmers in Australia's Murray-Darling Basin, as a shared interface for communications between irrigation districts and farmers.

To further assist Irrigation Districts and Catchment managers, this data platform delivers aggregated district-wide weather data and forecasts of crop water demand (with satellite imagery), enabling more precise water delivery system operations to match the crop water requirements on each farm, but at a large scale.

This multidisciplinary approach delivers irrigators and district operators with a shared network of integrated tools and data analytics to maximize agricultural production with data-driven information from multiple inputs - including water ordering software, metered outlets at turnout points with irrigation districts, soil moisture probes, climate sensors, data analytics from irrigation system automation and satellite imagery.

3.0 Precision application for the irrigator requires an on-demand supply from the irrigation district

For the irrigator to achieve on-farm water savings with investment from government policy, it requires an on-demand supply from the irrigation district. It's important to get the application volume right, otherwise irrigators will either over irrigate or under irrigate. When irrigating with gravity fed surface irrigation at a constant flow rate, the applied volume is determined by the irrigation duration. Therefore, flexible irrigation start times and durations are required to achieve on-farm efficiency potential.

> **It is Rubicon Water's position that government policy for on-farm water savings and no increase in GHG emissions should consider the investment required at the interface of supply from irrigation districts, as an enabler for on-farm irrigation efficiencies.**

Rubicon's irrigation district customers are the utilities that manage irrigation water supply to irrigators. Our solutions consist of software, smart automated control gates, flow meters and wide-area data and RF network technology that integrate to autonomously operate open canal distribution networks. Rubicon offers a complete, integrated canal management system which enables our customers to achieve unrivalled levels of delivery efficiency and provide their users with a high-performance supply service.

For example, Rubicon's solutions were the enabling technology for the GMW Connections Project that is set to deliver the anticipated 350,000 acre-feet of annual water savings while boosting productivity through improved water efficiency and consistent flow rates for more than 7,600 irrigators. The automated network achieves up to 90% delivery efficiency in modernised areas. The official media release highlighting this accomplishment was published by the Federal Minister for Resources, Water and Northern Australia, Keith Pitt, and Victorian Minister for Water, Lisa Neville on October 27th:

See here - https://minister.awe.gov.au/pitt/media-release/connections-project

4.0 Farm Internet of Things Network as a viable policy option for on-farm water savings and no increase in GHG emissions.

Recent advancements in irrigation management on-farm are starting use data analytics and predictive algorithms on cloud-based computing to interpret real-time field conditions from smart sensors and connected devices. These solutions deliverable adaptive irrigation management using science-based field optimisation to deliver dynamic irrigation prescriptions to each part of the property. In addition to smart operation of irrigation systems, newly generated 'big' data ensures continuous improvement from season to season or between enterprises.

> **It is Rubicon Water's position that government policy for on-farm water savings and no increase in GHG emissions should consider the investment required for data infrastructure, as an enabler for on-farm irrigation efficiencies.**

For example, Rubicon has introduced The Internet of Agriculture (IoAg) as an interconnected system that uses agriculture and water sensor technology to obtain and interpret data from the physical world to improve management, increase, efficiency and productivity in food and fibre production. The Internet of Agriculture (IoAg) refers to a platform that allows any object that has the capability to be connected wirelessly online and has the potential to help farmers make better, faster decisions, automate processes and enables the prediction of future events for irrigation management. It uses the **AgPod™**: as a powerful on-farm IoT gateway with the capability to integrate both FarmConnect and third-party devices to process raw inputs to inform data-driven decisions.

The AgPod features Motorola's MC-Edge RTU with powerful edge-of-field computing features to ensure accurate and responsive calculations for automation control and data analytics. The AgPod's unique capability of calculating ETo, rainfall and applied irrigation when interfaced with the Rubicon Weather Station enables users to derive soil moisture deficit status in real-time - a fundamental input for irrigation scheduling. The open platform provides flexibility and the capability to interface with other vendor's on-farm IoT devices, to introduce a single, scalable and powerful IoT solution to digitize the farm.

Thank you for the opportunity to submit a public comment regarding the Draft Request for Grant Applications for a SWEEP Pilot for the Southern Desert, and if you have any further questions, please do not hesitate to ask.

Regards,

Peter Moller
General Manager - FarmConnect
Direct: +1 970 482 3200
USA Cell: +1 970 685 7460
peter.moller@rubiconwater.com

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Office of Environmental Farming and Innovation (OEFI)
California Department of Food and Agriculture (CDFA)
1220 N Street
Sacramento, CA 95814

Re: Support & Comments for SWEEP Southern Desert Region Pilot

Dear OEFI Staff,

We write to express support for and share comments on the proposed Southern Desert Region pilot within the State Water Efficiency and Enhancement Program (SWEEP).

We would like to offer our special thanks to the Science Advisory Panel, the SWEEP team, and the SWEEP Ad Hoc Advisory Group for the collective efforts conducted to shape the program. A water-focused incentive program for the Southern Desert Region, where farmers were having difficulty obtaining SWEEP funding over the previous solicitations, is a potential solution and it appears that the pilot program is intended to address this region's specific needs. The proposed Southern Desert Region Pilot is expected to obviate the major restrictions that have caused regional disparities in the program, especially lower participation, and result in successful applications from the desert region.

The pilot program may support a variety of water conservation projects that the irrigation water saving calculator can be completed for, such as automation of surface irrigation, surface irrigation optimization, tailwater recovery systems, irrigation scheduling technologies, and the conversion from high energy use irrigation systems to low energy use irrigation systems. It is also very wise and supportive that the pilot program allows growers to be exempted from the requirement to provide energy use documentation if they can justify, they don't have an energy use baseline due to not using energy in their current projects. In the desert region, the use of canal water and surface irrigation methods are the majority. In most cases, these irrigation practices don't contribute greenhouse gas emissions because no or little pumping is involved.

One concern about the pilot program guidelines is that they may prevent some farms from converting surface irrigation to drip irrigation. Due to this conversion, some farms may increase CO_2 emissions from increased pumping, but will likely reduce N_2O (Nitrous oxide) emissions (which has a global warming potential that is nearly 300 times that of CO_2) from more efficient fertilization and irrigation (USEPA, 2017). Researchers reported significant reduction of N_2O emissions due to switching surface irrigation to drip irrigation (Kuang et al., 2021; Gao et al., 2019). As a result, such conversions will likely reduce the total CO_2-equivalent emissions.

A potential solution for growers who propose a system conversion from surface to drip irrigation could be accepting the above justification regarding total GHG emissions reduction that includes both CO_2 and N_2O. In other words, SWEEP could accept that the N_2O reductions from converting from a surface to drip irrigation system will offset any possible CO_2 increases. Growers in the low desert have adopted micro irrigation for

several vegetable, agronomic, and tree crops; and have observed its considerable impact as an effective water conservation practice. We cannot see another solution to address the pilot program's potential restriction of surface to micro irrigation, so highly recommend seeking an easy and applied approach. Otherwise, we eliminate the opportunity of supporting an efficient irrigation technology from the SWEEP list.

Thank you for your consideration.

Sincerely yours,

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