Vina Groundwater Sustainability Agency
308 Nelson Avenue
Oroville, CA 95965
(530) 552-3592

VINA GROUNDWATER SUSTAINABILITY AGENCY BOARD MEETING

Meeting Agenda
March 10, 2021, 5:30 p.m.
ONLINE MEETING ONLY VIA ZOOM

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PUBLIC PARTICIPATION:

This meeting is being conducted via teleconference in accordance with Executive Order N-25-20 and N-29-20. Members of the public may virtually attend the meeting remotely using the ZOOM platform.

The public may listen to and/or participate in the Vina Groundwater Sustainability Agency (GSA) Board Meetings via landline or mobile telephone or via computer, with both video and audio enabled or audio only. If you wish to comment on an item, but do not wish to participate during the meeting, the public may submit comments prior to the meeting via email to **vinagsapubliccomments@chicoca.gov.** Please submit emails with the subject line "**PUBLIC COMMENT ITEM NO.__".** The public is encouraged to not send more than one email per item or comment on numerous items in one email.

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   a. When prompted, use Meeting ID: 869 8360 0705

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   a. +16699006833, 86983600705# US (San Jose)

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   a. 1 669 900 6833
   b. When prompted, use Meeting ID: 869 8360 0705

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Please note that when you access the meeting, ***you will be placed into a waiting room and admitted*** into the meeting by the meeting host

Agenda Prepared: 3/5/2021
Agenda Posted: 3/5/2021
Prior to: 5:30 p.m.

Please contact the City of Chico Public Works Department at (530) 894-4200 if you require an agenda in an alternative format or if you need to request a disability-related modification or accommodation. This request should be received at least three working days prior to the meeting.

1. VINA GROUNDWATER SUSTAINABILITY AGENCY (GSA) REGULAR BOARD MEETING.

1.1. Call to Order - Chair Tuchinsky

1.2. Roll Call

2. CONSENT AGENDA - all matters listed under the consent agenda are to be considered routine and enacted by one motion.

2.1. APPROVAL OF 1/13/21 VINA GSA BOARD MEETING MINUTES.

Action: Approve minutes of Vina GSA Board meeting held on 1/13/21

2.2. APPROVAL OF 2/10/21 VINA GSA BOARD/ROCKCREEK RECLAMATION DISTRICT BOARD JOINT MEETING MINUTES.

Action: Approve minutes of Vina GSA Board meeting held on 2/10/21

2.3. APPROVAL OF THE VINA GSA MONTHLY FINANCIAL STATUS REPORT

Action: Approve the Vina GSA Financial Status Report as of 3/02/2021.

3. ITEMS REMOVED FROM CONSENT – IF ANY

4. BUSINESS FROM THE FLOOR

Members of the public may address the Board at this time on any matter not already listed on the agenda; comments are limited to three minutes. The Board cannot take any action at this meeting on requests made under this section of the agenda.

5. NOTICED PUBLIC HEARINGS - NONE

6. REGULAR AGENDA

6.1. CONSIDERATION OF THE DEVELOPMENT OF THE SUSTAINABLE MANAGEMENT CRITERIA FOR THE VINA GROUNDWATER SUSTAINBILITY PLAN (GSP).

Staff will provide an update on the development of the required Groundwater Sustainability Plan (GSP) for the Vina subbasin, which will include discussion of the following:

6.1.1. Overview of Proposed Approach to Developing Sustainable Management Criteria **(Report – Dr. Christina Buck)**

6.1.2. Update on the Project Management Actions Regarding:

6.1.2.1. Status of PMA Development **(Paul Gosselin**)
6.1.2.2. Legal Implications of Projects and Management Actions **(Report Valerie Kincaid)**
6.1.2.3. Possible co-sponsorship of Agricultural Irrigation Efficiency Evaluation Study (**Report Paul Gosselin)**

Recommendation: The Board is requested to:

1. Provide input or possible direction to the Management Committee as appropriate on all these items.

2. Approve being a co-sponsor of the Agricultural Irrigation Efficiency Evaluation Study.

6.2. PRESENTATION ON THE REPORT, 20-YEAR LAND AND WATER USE CHANGE IN BUTTE COUNTY (1999-2019).

Joel Kimmelshue from Land IQ will present an analysis on how land use and water use has changed in Butte County and Vina subbasin from 1999-2019.

Recommendation: None, this is an informational item only.

7. COMMUNICATIONS AND REPORTS.

These items are provided for the Board's information. Although the Board may discuss the items, no action can be taken at this meeting. Should the Board determine that action is required, the item or items may be included for action on a subsequent posted agenda.

7.1 Vina GSA Management Committee Updates:

7.1.1 Vina GSA Board Update/Reminders **(Verbal Report -Management Committee)**

7.1.2 Vina Stakeholder Advisory Committee Update **(Written Report -Kelly Peterson)**

7.1.3 Inter-basin Coordination Update **(Verbal Report -Paull Gosselin)**

7.1.4 Brown Bag Seminars **(Verbal Report –Paul Gosselin)**

7.1.5 Town of Paradise Sewer Project (**Verbal Report - Erik Gustafson)**

7.1.6 Paradise Irrigation District Options Study (**Verbal Report – Paul Gosselin)**

7.2 Rock Creek Reclamation District Update **(Verbal Report –Paul Gosselin)**

7.3 Tuscan Water District Update **(Verbal Report –Paul Gosselin)**

8. ***ADJOURNMENT*** **–** The Vina GSA Board meeting will adjourn to the next regular Vina GSA Board meeting on 4/14/21.

Vina Groundwater Sustainability Agency
308 Nelson Avenue
Oroville, CA 95965
(530) 552-3592

VINA GROUNDWATER SUSTAINABILITY AGENCY BOARD MEETING

Regular Meeting
January 13, 2021, 5:30 p.m.
ONLINE MEETING ONLY VIA ZOOM

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1. REGULAR BOARD MEETING

1.1. Call to Order

Called to order by Vice Chair Tuchinsky at 5:30 p.m.

1.2. Roll Call

Board Members Present:
Evan Tuchinsky
Jeffrey Rohwer
Raymond Cooper
Tod Kimmelshue
Kami Denlay

Board Members Absent:
None

Staff Present:
Erik Gustafson (City of Chico Public Works Director), Paul Gosselin (BCDWRC Director), Kelly Peterson, (BCDWRC Water Resource Scientist), Kamie Loeser (Durham Irrigation District), Valerie Kincaid (Attorney O'Laughlin & Paris LLP), Colin Klinesteker (non-JPA member representing the Mechoopda Tribe), and Linda Herman (City of Chico Park and Natural Resources Manager).

1.3. Election of Chair and Vice Chair

Action: Elect a new Vina GSA Chair.

Board Member Kimmelshue elected Vice Chair Tuchinsky to become the new Chair. Seconded by Board Member Cooper.

Motion carried as follows:

AYES: Board Member Rohwer, Board Member Cooper, Board Member Kimmelshue, Board Member Denlay, Vice-Chair Tuchinsky.

NOES: None

Action: Elect a new Vina GSA Vice-Chair.

Board Member Kimmelshue elected Board Member Rohwer to become the new Vice Chair. Seconded by Chair Tuchinsky.

Motion carried as follows:

AYES: Board Member Cooper, Board Member Kimmelshue, Board Member Denlay, Chair Tuchinsky, Board Member Rohwer.

NOES: None

2. CONSENT AGENDA - all matters listed under the consent agenda are to be considered routine and enacted by one motion.

2.1. APPROVAL OF 12/09/20 VINA GSA BOARD MEETING MINUTES

Action: Approve minutes of Vina GSA Board meeting held on 12/09/20.

2.2. APPROVAL OF THE VINA GSA MONTHLY FINANCIAL STATUS REPORT

Action: Approve the Vina GSA Financial Status Report as of 1/04/2021.

Vice Chair Rohwer motioned to approve the consent agenda. Seconded by Board Member Denlay.

Motion carried as follows:

AYES: Vice Chair Rohwer, Board Member Cooper, Board Member Kimmelshue, Board Member Denlay, Chair Tuchinsky.

NOES: None

3. ITEMS REMOVED FROM CONSENT – NONE

4. BUSINESS FROM THE FLOOR - NONE

Members of the public may address the Board at this time on any matter not already listed on the agenda; comments are limited to three minutes. The Board cannot take any action at this meeting on requests made under this section of the agenda.

5. NOTICED PUBLIC HEARINGS - NONE

6. REGULAR AGENDA

6.1. UPDATE ON THE DEVELOPMENT OF THE VINA GROUNDWATER SUSTAINBILITY PLAN (GSP)

Staff provided an update on the development of the Vina GSP, which included a presentation on the development of Sustainable Management Criteria, and an update on the Inter-basin Coordination efforts. **(*Presentation/Verbal Report – Paul Gosselin)*.**

Phone comments were received by Debra Lucero and Jim Brobeck.

6.2. CONSIDERATION OF 2021 VINA GSA BOARD REGULAR MEETING CALENDAR.

The Board considered for approval a proposed Vina GSA regular Board meeting calendar and meeting time for 2021. **(*Report – Linda Herman).***

There we no conflicts with the 2021 regular Board meeting calendar.

7. COMMUNICATIONS AND REPORTS

These items were provided for the Board's information. Although the Board may discuss the items, no action could be taken at this meeting. Should the Board determine that action is required, the item or items may be included for action on a subsequent posted agenda.

7.1 Vina GSA Management Committee Updates

7.1.1 Vina Stakeholder Advisory Committee Update ***(Written Report -Kelly Peterson)***

7.1.2 DWR Technical Support Services Facilitation Services Update (***Verbal Report-Paul Gosselin)***

7.1.3. Rock Creek Reclamation District Update ***(Verbal Report-Paul Gosselin)***

7.1.4 Tuscan Water District Update ***(Verbal Report-Paul Gosselin)***

8. ***ADJOURNMENT*** **–** The meeting adjourned at 6:53 p.m. to the next regular Vina GSA Board meeting on February 10, 2021.

Vina Groundwater Sustainability Agency
308 Nelson Avenue
Oroville, CA 95965
(530) 552-3592

Rock Creek Reclamation District
P.O. Box 1679
Oroville, CA 95965-1679
(530) 533-2885

VINA GROUNDWATER SUSTAINABILITY AGENCY AND ROCK CREEK RECLAMATION DISTRICT JOINT BOARD MEETING

Meeting Minutes
February 10, 2021, 5:30 p.m.
ONLINE MEETING ONLY VIA ZOOM

1. VINA GROUNDWATER SUSTAINABILITY AGENCY (GSA) REGULAR BOARD MEETING

1.1. Call to Order

Called to order by Chair Tuchinsky at 5:34 p.m.

1.2. Roll Call

Board Members Present:
Evan Tuchinsky
Jeffrey Rohwer
Tod Kimmelshue
Matt Doyle

Board Members Absent:
Kami Denlay

Staff Present:
Erik Gustafson (City of Chico Public Works Director), Paul Gosselin (BCDWRC Director), Kelly Peterson, (BCDWRC Water Resource Scientist), Kamie Loeser (Durham Irrigation District), Valerie Kincaid (Attorney O'Laughlin & Paris LLP), and Linda Herman (City of Chico Park and Natural Resources Manager).

2. ROCK CREEK RECLAMATION DISTRICT (RCRD) SPECIAL BOARD MEETING

Call to Order

Called to order by Chair Crain at 5:36 p.m.

2.1. Roll Call

Board Members Present:
Hal Crain
Darren Rice
Bruce McGowan
Dan Paiva
Elvin Bentz

Board Members Absent:
Jon Lavy

Staff Present:
Winley Durham

3. REGULAR AGENDA

3.1. PUBLIC WORKSHOP ON THE DEVELOPMENT OF THE SUSTAINABLE MANAGEMENT CRITERIA FOR THE VINA GROUNDWATER SUSTAINBILITY PLAN (GSP)

The joint Vina GSA and RCRD Board members will receive a presentation and accept public comment on the development of the required GSP Sustainable Management Criteria needed to avoid undesirable results for six sustainability indicators. The discussion will include the establishment of monitoring locations, measurable objectives, and minimum thresholds. (***Report- Management Staff, Geosyntec technical consulting team members, and CBI consultants)***.

Recommendation: Provide input to the Management Committee and the technical consulting team as appropriate.

The Management Team and the Consultants provided a presentation regarding the Sustainable Management Criteria to be established for the GSP, and received comments from the Vina GSA and Rock Creek Reclamation Boards and the Vina GSA Management Committee. There was much discussion concerning the proposed measurable objectives and minimum thresholds and the potential effects on domestic wells.

The two Boards also discussed the effects on groundwater dependent ecosystems and water quality indicators.

Public comments were received by Jim Brobeck, Debra Lucero, Greg Sohnrey, Sam Goepp, Anne Dawson, Aimee Raymond, Eddie Teasdale, and two other anonymous public members.

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4. COMMUNICATIONS AND REPORTS

These items are provided for the Board's information. Although the Board may discuss the items, no action can be taken at this meeting. Should the Board determine that action is required, the item or items may be included for action on a subsequent posted agenda.

7.1 Vina GSA Management Committee Updates

7.1.1 Vina Stakeholder Advisory Committee Update ***(Written Report -Kelly Peterson)***

Comments were received by Jim Brobeck, Debra Lucero, Greg Sohnrey, Sam Goepp, Anne Dawson, Aimee Raymond, Eddy Teasdale, and two other anonymous public members.

This agenda item was moved to the next scheduled Vina GSA board meeting.

8. ***ADJOURNMENT*** –

The Vina GSA Board meeting adjourned at 9:09 p.m. to the next regular Vina GSA Board meeting on 3/10/21.

The RCRD Board meeting adjourned at 9:09 p.m. to the next special RCRD Board meeting on 3/1/21.

Vina
Groundwater Sustainability Agency
Agenda Transmittal

Agenda Item: 2.3

Subject: Vina GSA Financial Report

Contact: Kelly Peterson **Phone: 530-552-3588** **Meeting Date: 3-10-21** **Consent Agenda**

Department Summary: Attached is the financial report for the 2020-2021 fiscal year for the Vina GSA as of 3/2/21.

Fiscal Impact: None

Staff Recommendation: Approve the financial report.

Vina GSA Financial Report

FY 2020-2021 (7/1/2020 - 6/30/2021)

Fund Balance:	**$ 9,011.46**
Balance Date:	**3/2/2021**

Expenditures

Budget Item	Date	Amount	Notes
Legal			
O'Laughlin & Paris	8/25/20	$ 1,785.00	
O'Laughlin & Paris	10/6/20	$ 1,330.00	
O'Laughlin & Paris	11/10/20	$ 630.00	
O'Laughlin & Paris	12/15/20	$ 595.00	
O'Laughlin & Paris	1/5/21	$ 2,065.00	
O'Laughlin & Paris	1/19/21	$ 770.00	
O'Laughlin & Paris	2/19/21	$ 1,260.00	
Total Legal Spent		$ 8,435.00	
Legal Budget		$ 10,000.00	
% of Legal Budget Spent		84%	
Insurance			
Golden State Risk Management Authority	7/7/20	$ 1,800.00	GSA insurance
Total Insurance Spent		$ 1,800.00	
Insurance Budget		$ 1,800.00	
% of Insurance Budget Spent		100%	2020 fees increased by $300
Audit			
Total Audit Spent		$ -	
Audit Budget		$ 2,000.00	
% of Audit Budget Spent		0%	
Contingency			
Total Contingency Spent		$ -	
Contingency Budget		$ 1,080.00	
% of Contingency Budget Spent		0%	
Website			
Digital Deployment		$ 240.00	Website Hosting Services
Total Website Spent		$ 240.00	
Website Budget		$ 240.00	
% of Website Budget Spent		100%	
All Expenditures		**$ 10,475.00**	
Total Budget for Expenditures		**$ 15,120.00**	
% of Budget Spent		**69%**	

Vina GSA Financial Report

FY 2020-2021 (7/1/2020 - 6/30/2021)

Revenue

Budget Item	Date	Amount	Notes
Member Agency Contributions			
City of Chico	7/28/20	$ 5,000.00	
Durham Irrigation District	9/17/20	$ 1,000.00	
Durham Irrigation District	9/17/20	$ 1,000.00	
Durham Irrigation District	9/29/20	$ 1,000.00	
Durham Irrigation District	10/29/20	$ 1,000.00	
Durham Irrigation District	11/30/20	$ 1,000.00	Final Payment
Total Member Agency Contributions Received		$ 10,000.00	Note: Butte County's FY 20-21 contributions ($7K)were posted in previous FY and included in carry over balance
Total Member Agency Contributions Budget		$ 15,000.00	
% of Member Agency Contributions Budget Received		100%	
Interest	7/1/20	$ 41.99	Interest from last quarter
	10/15/20	$ 36.55	Interest from last quarter
	1/15/21	$ 30.41	Interest from last quarter
Total Interest Received		$ 108.95	
Total Interest Budget		$ 120.00	
% of Interest Budget Received		91%	
All Revenue		**$ 10,108.95**	
Total Budget for Revenue		**$ 15,120.00**	
% of Budget Received		**100%**	Includes the Butte County contribution made last FY

Fund Balance

Starting Balance 7/1/2020	$	9,377.51
Expenses	$	10,475.00
Revenue	$	10,108.95
Fund Balance 3/2/21	**$**	**9,011.46**

Vina
Groundwater Sustainability Agency
Agenda Transmittal

Agenda Item: 6.1.1

Subject: **Draft Sustainable Management Criteria Update**

Contact: Dr. Christina Buck **Phone: 530.552.3590** **Meeting Date: Wednesday,** **Regular Agenda**

Department Summary: A required component of a Groundwater Sustainability Plan is the Sustainable Management Criteria. The Sustainable Management Criteria describes the evaluation of the six sustainability indicators and potential undesirable results to groundwater users. The Sustainable Management Criteria establishes quantifiable levels where significant and unreasonable conditions would occur for groundwater users (Minimum Thresholds) and quantifiable operational levels for the basin (Measurable Objective) by 2042.

On February 10, 2021, a joint Sustainable Management Criteria workshop was conducted by the Vina GSA Board and the Rock Creek Reclamation District GSA Board. The Management Committee had a subsequent discussion with the Stakeholder Advisory Committee (SHAC) on the workshop. The Management Committee is collaborating with the Rock Creek Reclamation District GSA on the draft Sustainable Management Criteria for the North Vina area.

Based on the comments from the workshop, SHAC discussions and collaboration with the Rock Creek Reclamation District GSA, a draft Sustainable Management Criteria chapter will be released for a 30-day public comment period in early April. Staff will provide an update to the Board on the approach, next steps and timeline for the Sustainable Management Criteria. Expected next steps and timeline include: once released, the draft Sustainable Management Criteria will solicit comments and recommendations from the public on setting the Minimum Thresholds, Measurable Objectives, Interim Targets and the Sustainability Goal Statement. Upon the completion of the comment period, the Management Committee will summarize the comments and hold discussions with the SHAC. Recommendations from the SHAC to the Board on the Sustainable Management Criteria is expected in June for the Board's consideration and approval.

Fiscal Impact: None

Staff Recommendation: Provide direction as appropriate.

Vina
Groundwater Sustainability Agency
Agenda Transmittal

Agenda Item: 6.1.2.1

Subject: Projects and Management Actions Update

Contact: Paul Gosselin **Phone: 530.552.3590** **Meeting Date: Wednesday,** **Regular Agenda**

Department Summary: Projects and Management Actions are a required element of Groundwater Sustainability Plans. Projects and Management Actions comprise the steps that will be taken to achieve groundwater sustainability. Projects can be conducted by the Vina GSA and/or by other entities (project sponsors).

A Projects and Management Actions solicitation form has been added to the Vina GSA webpage for entities to submit suggested projects or actions. The Stakeholder Advisory Committee will evaluate submitted Projects and Management Actions for possible recommendation to the Vina Board. The Stakeholder Advisory Committee has held discussions over many meetings on potential Projects and Management Actions. The Stakeholder Advisory Committee raised questions and concerns regarding potential Projects and Management Actions. The initial concern was over the potential for out-of-basin water transfers.

In October 2019, the Vina GSA Board directed the Management Committee to draft a rule regulating out-of-basin transfers. In discussion with the Stakeholder Advisory Committee, the issues and concerns were broader than regulating transfers. Issues related to recharge projects resulted in the drafting of a paper, "Legal Implications of Potential Projects and Management Actions". The paper provided guidance on key issues to consider when evaluating potential Projects and Management Actions. The issues also raise the question of whether the Vina GSA take steps to lead certain Projects and Management Actions and/or adopt rules to avoid unintended consequences from projects. Adoption of rules may be important to address projects that do not come before the Vina GSA for inclusion in the GSP. In light of the issues and potential implications, the Management Committee is seeking direction from the Board on whether the Vina GSA should take a lead role in certain projects and/or pursue actions under Board GSA authority to prevent activities that would be detrimental to achieving the sustainability goals in the Groundwater Sustainability Plan.

Fiscal Impact: None

Staff Recommendation: Direction from the Board.

Glossary of Potential Projects and Management Actions

Groundwater Demand Reduction

Crop idling (Fallowing) — This represents the temporary or permanent fallowing of land previously under irrigation that results in a reduction in stresses to a water system (e.g., alternate land use must result in a reduction in water use or an enhancement of water quality, or both).

Groundwater pumping allocation (metering, markets, etc)
The sustainable yield for a basin or Management Area would be allocated on a per acre basis. Landowners would have the authorization to pump up to the per acre limit. Typically, pumping allocations would not be sufficient to meet the crop needs. Meters would be required to ensure that pumping does not exceed acceptable amounts. Implementation options include assessing a fee for pumping above the allocation. Funds would be used for other projects that offset pumping above the allocation. Another option includes marketing allocation within the basin or Management Area. Landowners could forgo using a portion of their allocation and make their allocation available to others within the basin.

Pressure regulated sprinklers
Pressure regulated sprinklers can significantly reduce misting and fogging. This means that water is not wasted due to evaporation or being blown away, which can result in considerable water savings.

Grey water systems (catchment)
Greywater systems filter water coming out of bathtubs and washing machines from the home for use again. Additionally, water from a bath or a shower is recycled rather than flowing directly into a sewer or a septic system.

Automatic water metering (urban)
Gives near real-time reading that are accurate and not estimated. Perfects the billing process. Accurately and clearly tracks the water usage of all clients.

Rain capture
Water supplies can be augmented by capturing rainwater for later use on landscape and gardens.

Non-native vegetation removal
Removal of non-native vegetation would reduce the water demand.

Water efficient appliances (urban)
Water efficient appliances would reduce the urban water demand. During drought periods, water purveyors had provided rebates for certain water efficient appliances to customers

Moratorium on artificial lakes
Most artificial lakes are created from groundwater pumping. Artificial lakes are used for recreational activities. There are a number (unknown) artificial lakes in Butte County. New artificial lakes require a use permit from the Butte County Department of Development Services.

Swimming pool regulations
Regulation of swimming pools would be under the authority of the applicable land use agency.

Groundwater Recharge

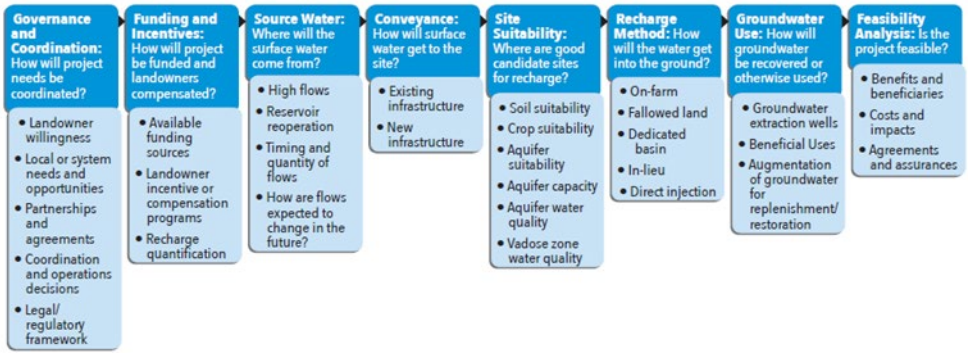
Natural recharge — Replenishment of an aquifer generally from snowmelt and runoff, through seepage from the surface. Recharge of an aquifer that occurs without human interference — also referred to as unintentional recharge.

Recharge basin — A surface facility constructed to infiltrate surface water into a groundwater basin. Recharge basins are frequently used to recharge unconfined aquifers. Water is spread over the surface of a basin or pond in order to increase the quantity of water infiltrating into the ground and then percolating to the water table. Recharge basins concentrate a large volume of infiltrating water on the surface. As a result, a groundwater mound forms beneath the basin.

Field Flooding
A recharge project that involves flooding agricultural fields during the non-growing season.

Flood-Managed Aquifer Recharge (Flood-MAR) is an integrated and voluntary resource management strategy that uses flood water resulting from, or in anticipation of, rainfall or snow melt for managed aquifer recharge (MAR) on agricultural lands and working landscapes, including but not limited to refuges, floodplains, and flood bypasses. Flood-MAR can be implemented at multiple scales, from individual landowners diverting flood water with existing infrastructure, to using extensive detention/recharge areas and modernizing flood management infrastructure/operations.
https://water.ca.gov/Programs/All-Programs/Flood-MAR

FIGURE 6. *Factors for Implementing Flood-MAR*



In-lieu recharge — The practice of providing surplus surface water to historical groundwater users, thereby leaving groundwater in storage for later use.

Injection wells — Injection wells are used primarily to recharge confined aquifers. The design of an injection well for artificial recharge is similar to that of a water supply well. The principal difference is that water flows from the injection well into the surrounding aquifer under either a gravity head or a head maintained by an injection pump.

Low-impact development (LID) — LID uses site design and stormwater management to maintain the site's pre-development runoff rates and volumes. Design techniques filtrate, filter, store, evaporate, and detain runoff close to the source of rainfall. LID can be used to benefit water quality and to address the modifications to the hydrologic cycle, and it can be a means to augment local water supply through either infiltration or water harvesting. LID is seen in California as an alternative to conventional stormwater management.

Watershed management

Improved watershed management primarily through forest management and restoration can increase inflow from upper watersheds and increase streamflow and recharge.

Groundwater banks **—** Consists of water that is "banked" during wet or above-normal water years. The water to be banked is provided by the entity that will receive the water in times of need. Although transfers or exchanges may be needed to get the water to the bank and from the bank to the water user, groundwater banks are not transfers in the typical sense. The water user stores water for future use; this is not a sale or lease of water rights. It is typical for fees to apply to the use of groundwater banks.

Recycling

Recycled water **—** Volume of water that, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use, which would not otherwise occur. It includes wastewater treated, stored, distributed, and reused or recirculated for beneficial use.

Water recycling **—** (1) The process of treating wastewater for beneficial use, storing and distributing recycled water, and the actual use of recycled water; (2) the reuse or recirculation of water through the same series of processes, pipes, or vessels more than once by one user, often without treatment between uses, such as in cooling towers or cascading uses within an industry where the wastewater from one process is the source water for another process. Types of water recycling include "water reuse" and "water scalping".

Mitigation

Well screen depth regulations

Depending upon the hydrogeology in a specific location, regulating the well screen depth can avoid drawing groundwater that would impact shallow wells or interconnected streams.

Groundwater contamination clean up (emerging contaminants)

The clean-up of contaminated groundwater can increase the available groundwater to meet local demand.

FOR DISCUSSION PURPOSES- *ADAPTED FROM COLUSA & BUTTE SUBBASINS (9/9/20 & 12/9/20)*

DRAFT VINA Subbasin GSP Project and Management Action Submittal Form

This form is available online at: https://forms.gle/1WN3Xh76DCtZUwva8

Overview

The purpose of this form is to gather ideas for potential projects and management actions (PMAs) that could be evaluated and ultimately included in the Vina Subbasin Groundwater Sustainability Plan (GSP). Once ideas are gathered, an initial screening and evaluation process will be conducted, followed by ranking of potential PMAs for more detailed evaluation and inclusion in the initial GSP.

Potential PMAs may fall under several categories, including but not limited to the following:

- Recharge projects
- Supply augmentation projects
- Water conservation projects
- Projects to reduce non-beneficial consumptive use
- Groundwater pumping allocations
- Monitoring programs (inter-basin flows, stream-aquifer interactions, groundwater pumping, water levels, etc.)

Please provide supporting documentation and/or links to that documentation for each question, if available. NOTE: It is recognized that much of the requested information may not be available at this time.

Project or Management Action Name and Contact

Project or Management Action Name:

Contact Person:

Organization/Affiliation:

Contact Phone:

Contact Email:

Project or Management Action Description and Status

Project or Management Action Name:

Project or Management Action Type:

Project or Management Action Proponent(s):

Project or Management Action Location:

Project or Management Action Status (Planned, Potential, or Conceptual):

Brief Project or Management Action Description (1-2 short paragraphs):

Measurable Objectives Expected to Benefit

Implementation Timing/ Criteria for Implementation:

Estimated Cost:

Potential Funding Sources:

Required Permitting and Regulatory Process:

Expected Yield (e.g. water contributed to the groundwater system, acre-feet per year):

Status of permitting and CEQA/NEPA compliance:

Does this Management Action or Project serve a disadvantaged community? If so, which one(s)?

Additional Information Sources:

Other:

Vina Groundwater Sustainability Agency
308 Nelson Avenue, Oroville, California 95965
(530) 552-3592 • VinaGSA@gmail.com

December 18, 2020

To: Vina Stakeholder Advisory Committee (SHAC)

From: Paul Gosselin, Vina GSA Administrator
Valerie Kincaid, Vina Legal Counsel

Re: Legal Implications of Potential Projects and Management Actions

The Vina SHAC voiced concerns about the ability to proceed with identifying potential Projects and Management Actions (PMA) without a greater understanding of the legal implications, particularly those involving recharge. Legal implications are one of many considerations whether a PMA is suitable for inclusion in a GSP. Since there are not specific proposed projects, the discussion of legal implications and other considerations are hypothetical. However, the general discussion of legal implications may identify aspects of potential projects requiring limitations that the Vina GSA Board may need to impose through management actions. The SHAC may identify and recommend management actions that would allow for projects to proceed consistent with the Vina GSP and without harming the basin or groundwater uses. Management actions could involve establishing rules, ordinances, policies and procedures governing projects.

Currently, there are no specific projects proposed in the Vina subbasin. Evaluating the acceptability of a PMA must be based on the specific project's scope, design and intent. However, management actions could be identified through an evaluation of potential characteristics of projects that have negative aspects or are inconsistent with the GSP. For the purposes of this discussion paper, potential projects involve those that result in increased groundwater in the basin. Recharge, conservation and recycling projects could result in increased groundwater in the basin that could be put to beneficial use by the project proponent. Refer to the glossary of potential PMAs.

The following are questions concerning potential legal implications of potential projects. If there are other questions, please let me know prior to the January meeting.

1. Does a project proponent gain water rights over recharged groundwater?
   Yes. A project proponent maintains the right to water that is recharged whether it results from recharge projects or groundwater demand reduction projects (e.g., conservation, recycling). If a project uses or obtains a surface water supply and recharges into the aquifer, the project proponent would have a legal right to the recharged water. Water does not legally become "common" or "native" supply available to overlying groundwater right holders unless it is abandoned by the project proponent. (Los Angeles v. Glendale (1943) 23 Cal.2d 68, 76-78; Los Angeles v. San Fernando (1975) 14 Cal.3d 199, 258-60; Stevens v. Oakdale Irrigation District (1939) 13 Cal.2d 343, 352-43; Crane v. Stevinson (1936) 5 Cal. 2d 387, 398.) Abandonment occurs when there is no evidence the recharger intended to account for recharged water and later extract that water and put it to beneficial use. The recharger is only allowed to extract the amount of water that recharged to the basin. Therefore, usually, when extracting recharged

water, there must be some accounting for "leave behind" or "loss" depending on the local practices and technical components of the subbasin/recharge.

A recharge project could result in recharged water becoming "common" or "native" supply. A project proponent could agree to certain terms of recharge, for example, a leave behind of a certain percent of the total recharge. Alternatively, the GSA may consider an ordinance or other enforcement mechanism that requires some portion of recharged water to be water dedicated to "common" or "native" supply. The recharging party or agency adopting any sort of ordinance would need to be cautious that the agreement/ordinance would not result in exposure to forfeiture for the recharging party (as recharge without later extraction and application to beneficial use is not itself a beneficial use of water).

2. What rights could a project proponent exercise over recharged water?

   If a project includes the application for a new right to recharge water, it would need to obtain a water right permit from the State Water Resources Control Board (SWRCB) through a surface water right application and a supplemental groundwater recharge form. The water right permit application would need to identify the "beneficial use" that the project intends to meet. Recharging groundwater is not considered a beneficial use, however, meeting the sustainable management criteria in a GSP may be determined to be a beneficial use. The amount of recharged water that could be put to future use would be determined from project specific analysis and would be included in the water right permit. Depending upon the water source and the intent of the project, it may be eligible for a streamlined water right permit process established by the SWRCB to facilitate Flood Managed Aquifer Recharge (Flood MAR) and other GSP programs.

   If a water right holder diverts surface water pursuant to an existing right, the diversion of that water makes it the possession of the diverter. Recharging the water into an aquifer changes the location or storage of diverted surface water, but it does not change the ownership. For this reason, recharged water remains the possession of the diverter/recharger and the diverter/recharger may exercise full control over that water unless it can be established that the diverter/recharger abandoned the recharged water or it is subject to reasonable losses.

3. Could a project affect groundwater users rights to pump groundwater or have it limited?

   Not directly. Overlying groundwater rights are held by landowners whose land overly the groundwater aquifer. (Pasadena v. Alhambra (1949) 33 Cal.2d 908, 925.) An overlying water right is not quantified, but allows the water right holder to divert as much water as is reasonable to support beneficial uses on the overlying land. (Katz v. Walkinshaw (1902) 141 Cal. 116; Pasadena, at 925.) These rights are appurtenant to land and cannot be sold or otherwise detached from the land.

   However, recharge projects could decrease the amount of water that has previously been abandoned. In this situation, there would be a decrease in native groundwater supplies available for groundwater right holders. Groundwater users would not lose their right to divert groundwater to support beneficial uses on the overlying land, but lower groundwater elevations may increase cost or make it impracticable. It is also possible that recharge projects may underestimate the amount of water that migrates or is "lost", which could result in allowing the recharger to extract more water than is reasonable, which could result in decreasing the amount of water available for overlying groundwater users.

4. For managed recharge projects, does it matter what the source of the water is or if it comes from another basin?

   No, the source of the water only matters to the extent that it affects ownership. The water source could come from high storm flows, surface water held by the project proponent or surface water supply held by another agency. So long as the water was diverted pursuant to a valid water right prior to recharge, the recharged water would be owned by the diverter.

   There has been discussion and interest of having local surface water supplies be used for recharge projects (e.g., in-lieu, recharge basins) in groundwater dependent areas. Surface water sources would come from outside the Vina subbasin. The legal right to surface water that is imported and recharged into an aquifer is held by the project proponent (importer). (Los Angeles v. San Fernando (1975) 14 Cal.3d 199, 245-55; Water Code 7075.)

   In-lieu recharge occurs when a groundwater right holder does not extract groundwater due to an alternate supply of water (usually surface water deliveries). The water "recharged" in this situation is water that the groundwater holder had a right to extract, but did not, due to the alternate supply. The amount of in lieu recharge would depend on the amount of water available to the groundwater right holder and the amount of groundwater that remained in the ground (not pumped). For example, if an overlying water right holder had the right to pump 100 acre feet and they only pumped 20 because they purchased 80 acre feet of surface water, they would have a right to the 80 acre feet of in lieu recharge. (Water Code 1005.1)

5. Could the owner of a surface water lose their ownership/water right by making their water available to a project proponent?

   Not if they are careful. As noted above, recharge is not a beneficial use of water. (Water Code, 1242.) Therefore, if a surface water right holder diverted surface water and recharged that water into the aquifer without any intent to later extract it and put it to beneficial use for a period of 5 consecutive years, the surface water right could be subject to forfeiture. More likely, the surface water right holder would sell or transfer the surface water through a contract to a project proponent. The transfer of water is a beneficial use. (Water Code, 1745.07.) Water sale/transfer arrangements are not unique and have not resulted in losing ownership or water rights. The owner of a surface water supply would only lose their ownership/water right through a permanent sale and filing of a change in water rights with the SWRCB.

6. How would projects affect groundwater users, the environment (streams, GDEs, all species), and water quality (surface and groundwater)?

   Recharge projects have the potential to affect groundwater users, groundwater quality and/or environmental beneficial uses. Recharge projects will be subject to environmental evaluation under the California Environmental Quality Act (CEQA). Prior to project approval, the project proponent would be required to identify and evaluate the impacts of the proposed project on the environment hydrology, housing, traffic, agriculture, etc. However, CEQA does not require that projects consider or comply with GSPs. The exception is that general plan updates and zoning ordinances must consider the applicable GSP.

7. Could a project be available for out-of-basin export?

   Potentially. Depending upon the project scope, it could intend to export recharge water out-of-basin.

8. Could a project in the Vina subbasin benefit users downslope subbasins?

   Potentially. The Vina and the other subbasins in the Northern Sacramento Valley are interconnected to certain degrees. Depending upon the scope and location of a project, the

benefits could extend beyond the Vina subbasin. As part of the project design, the benefit of the project would be analyzed and monitored.

Potential Management Actions

Management actions would allow the Vina GSA to protect the Vina subbasin and the implementation of the GSP from negative implications from artificial recharge projects through enactment of rules, ordinances and/or policies.

1. Require any recharge project, in lieu project or other project that affects the sustainable management criteria in the GSP be subject to review and approval by the Vina GSA Board for consistency with the GSP.

2. Evaluate ordinances or policies that the GSA may adopt to ensure recharge projects are operating without adverse impact to the basin or the GSA's ability to achieve sustainability.

Vina
Groundwater Sustainability Agency
Agenda Transmittal

Agenda Item: 6.1.2.3

Subject: Projects and Management Actions – Agricultural Irrigation Efficiency Evaluation Project

Contact: Paul Gosselin **Phone: 530.552.3590** **Meeting Date: Wednesday,** **Regular Agenda**

Department Summary: The Management Committee is requesting that the Board support participation and co-sponsorship of the Agricultural Irrigation Efficiency Evaluation Project. The Vina GSA would join the Agricultural Groundwater Users of Butte County (AGUBC) and the Butte County Farm Bureau as co-sponsors. The project will identify current irrigation practices, the extent of the adoption of irrigation efficient practices and opportunities to increase adoption of efficient irrigation practices. Survey questions will include information about crops, acreage, types of irrigation methods (sprinkler, drip, micro-sprinkler, flood), irrigation practices (soil moisture sensors, irrigation scheduling methods, flow meters and barriers to adoption of certain irrigation methods and practices.

The project could result in potential projects that would reduce the demand of groundwater in an agronomic way. The project will involve an online survey of growers in the Vina subbasin. The AGUBC and Farm Bureau will distribute the survey and conduct outreach to all agricultural groundwater users. The results of the survey will be analyzed by researchers at the Environmental Social Research Analysis, LLC (ESRA). Researchers at ESRA have conducted agricultural irrigation surveys throughout California primarily focused on the Irrigated Lands Regulatory Program. Butte County has been working with the AGUBC, Farm Bureau and ESRA on the survey design, distribution plan and analysis. By being a co-sponsor, the Vina GSA will be part of the outreach to participating growers and participate in the development of recommendations that may be considered for inclusion in the Groundwater Sustainability Plan. Additionally, the data on irrigation methods and practices could be beneficial to other GSP analysis and programs. The Vina GSA will not have any obligations or commitments as a co-sponsor other than being named in the distribution materials.

Fiscal Impact: None

Staff Recommendation: Support having the Vina GSA be a co-sponsor of the Agriculture Irrigation Efficiency Evaluation Project

Vina
Groundwater Sustainability Agency
Agenda Transmittal

Agenda Item: 6.2

Subject: Presentation of 20-Year Land and Water Use Changes in Butte County and the Vina Subbasin (1999-2019)

Contact: Paul Gosselin **Phone: 530.552.3590** **Meeting Date: Wednesday,** **Regular Agenda**

Department Summary: The Agricultural Groundwater Users of Butte County (AGUBC) sponsored an analysis by Land IQ of land use and water use changes in Butte County and the Vina subbasin from 1999-2019. A presentation of the analysis will be presented by Joel Kimmelshue Land IQ from to the Board as an information item.

Fiscal Impact: None

Staff Recommendation: None. For information only

February 5, 2021

Dear Reader:

We are pleased to provide a strong endorsement for the enclosed report, ***20-Year Land and Water Use Change in Butte County (1999-2019)***, which was recently prepared by Land IQ for the Agricultural Groundwater Users of Butte County ("AGUBC"), a 501(c)(6) organization that represents 56,273 acres of land in Butte County.

Groundwater in Butte County, and particularly in the Vina Subbasin, is essential for life and growth – for the food we eat, the families we raise, and the regional economy it supports. **In this report, Land IQ's analysis of land and water use changes and trends in Butte County over the past twenty years provides regional stakeholders with accurate, factual data.** This data will contribute to a better understanding of the baseline condition in Butte County, particularly as we move toward implementation of the Sustainable Groundwater Management Act ("SGMA") in the years to come.

Several **key findings** from the following report:

- Today, **agriculture in Butte County uses roughly 17% less groundwater than in 1999**.
- The decrease is the result of:
  - A **significant reduction of overall irrigated acreage**.
  - An increase in walnuts which commonly replaced peaches, prunes, and almonds, most of which have higher water demand.
  - **New orchards being installed with modern and more efficient irrigation systems**.
- As more efficient irrigation systems are installed on agricultural land and water conservation practices are implemented, **it should be expected that applied water use will continue to decrease**.

A team of soil scientists, agronomists, ecologists and environmental scientists from Land IQ used advanced data and mapping systems to develop this report. **Land IQ currently works for more than 12 Groundwater Sustainability Agencies**, **various irrigation districts, multiple environmental groups**, 7 crop commodity organizations, up to 8 urban water agencies, and various other private and public entities related to accurate water resources management within and at the interfaces of environmental, urban, and agricultural land uses.

Butte County is in a unique and enviable position. SGMA will require more from all of us and there is still room for improvement, but this report clearly illustrates that **local farms in Butte County can be proud of how they've continuously improved the management of this critically important groundwater resource** over the years.

Lee Heringer
President, Butte County Farm Bureau

Mark Pierce
President, North Valley Ag Services

Richard P. Smith
President & CEO, Tri Counties Bank

Nadine F. Bailey
Chief Operations Officer, Family Water Alliance

Maureen Kirk
Former Supervisor, Butte County

Steve Lambert
Former Supervisor, Butte County

PRAISE FOR THE LAND IQ REPORT

"Agricultural water use has decreased significantly as farms continue to become more water efficient. That's one of the primary agricultural trends in Butte County, according to this important study that looks at land and water use changes over the past 20 years."

Lee Heringer, President, Butte County Farm Bureau Board of Directors

"It is essential that data inform decisions regarding future water use in Butte County. The report of Land IQ demonstrates the trend of more water for urban and environmental use over the past 20 years, while water efficiency in agriculture continues to improve. Ultimately, making sure this precious resource is appropriately allocated to support production of food should be critical to all Butte County residents."

Dave Daley, PhD, Professor Emeritus, Farm Administrator Chico State Farm,
Chair of the California Cattle Council, and Past President of California Cattlemen Association

"Agriculture is the number one industry in California. Our farmers feed the world. This report by Land IQ is an opportunity for us to better understand what our farmers have done and are trying to tell us and trust them to make good choices about water that ultimately determines what's on our dinner plate."

Jamie Johansson, President, California Farm Bureau Federation

"Land IQ's report is exactly what we needed. This 20-year snapshot of agricultural land and water use in Butte County will be a tremendously useful tool to support future decision making."

Rick Smith, President and CEO, Tri Counties Bank

"A most informative report concerning agricultural water usage over the past 20 years. It's eye opening, you see that urban and environmental water use has greatly increased. Land IQ's data is needed for information in future decision making involving our most precious resource."

Walter Stile, W.L. Stile & Son LLC

"This study illustrates important trends in Butte County agricultural use over the past 20 years that cannot be ignored as we work to protect our water for generations to come."

Steven Koehnen, C.F. Koehnen & Sons

"This report commissioned by the Agricultural Ground Water Users of Butte County brings us one step closer to what the farmers have been saying all along - let's use factual information to secure our groundwater for future generations."

Colleen Cecil, Executive Director, Butte County Farm Bureau

"Many thanks to The Agricultural Groundwaters Users of Butte County for commissioning the study preformed by Land IQ on groundwater usage in Butte County. The study outlines historical groundwater usage in Butte County using science and facts as the guideline. This is information water users in Butte County have been seeking since the 1980's. It will be very helpful in making informed decisions about future water usage in Butte County."

Les Heringer, Manager, M&T Chico Ranch

"Great report. This 20-year look at agricultural land use and water use trends in Butte County is exactly what we need to help support future decision making."

Greg Sohnrey, Sohnrey Family Foods

"Thank you, Agriculture Groundwater Users of Butte County, for collaborating with Land IQ to provide a document that is a data based, factual overview of Butte County's agricultural land and water use to share with both farmers and the general public. It is enlightening!"

Joanne Parsley, Parsley Farms

20-Year Land and Water Use Change in Butte County and the Vina Subbasin (1999-2019)

Prepared For:

Agricultural Groundwater Users of Butte County

Prepared By:

Reviewed By:

Allan Fulton, M.S., UC Irrigation and Water Resources Advisor, Emeritus

JANUARY 28, 2021

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SUMMARY

INTRODUCTION

Quantifying land and water use by agricultural, environmental, and urban sectors and how it is expected to change over time is an important component of Groundwater Sustainability Plans (GSP) developed by Groundwater Sustainability Agencies (GSA) (e.g. Vina) in Butte County as well as overall water resource management practices. This report describes the methodology and results of an analysis that compared agricultural, environmental, and urban land use change and associated changes in water use at the beginning and end of a 20-year period from 1999 to 2019. The information contained within this report primarily focuses on agricultural land and water use change over this period, however results are also provided for environmental and urban land uses.

METHODS

Agricultural water use is dependent on crop type, crop acreage, rainfall, irrigation methods, and associated irrigation efficiencies. Applied water was determined from annual estimates of crop consumptive use, crop acreage for each year, irrigation efficiency of irrigation methods used on each crop, and precipitation data were used. The spatial land use dataset from California Department of Water Resources (DWR) was used for crop acreage. The spatial accuracy of the field-by-field historical mapping database is over 97.6% for all crops (California Department of Water Resources, 2019). Any misclassified crops (2.4% in 2016 metadata) are usually of similar type (e.g. almonds confused for peaches). As such, in the rare occurrence of a misclassification, the water use will be similar. Therefore, estimates of water use should be highly accurate when calculating consumptive use based on spatial mapping.

Crop consumptive use values developed by local University of California Cooperative Extension researchers and California Polytechnic State University Irrigation Training and Research Center (Cal Poly ITRC) were used for crop evapotranspiration (ET). Irrigation efficiency values were assigned to each irrigation method assumed for crops, as developed by local University of California Cooperative Extension researchers. Growing season precipitation data was summarized from Butte County weather stations. Applied water of Butte County agricultural crops was estimated for each year from available DWR spatial mapping in 1999 and 2004 representing a historical period and from DWR spatial mapping from 2014, 2016, 2018, and 2019, representing current conditions. The two time periods were developed to address change over the past approximately 20 years. All quantified changes are relative to historical conditions.

RESULTS AND CONCLUSIONS

The results and conclusions presented here are based on the analysis inputs used in this study, which may differ from other water use studies. Inputs that might differ between studies include acreages and methods for calculating water use. Acreage data may differ because of sources for the data and how those acreages were derived, and their public availability. Water use for various land uses may differ because of assumptions about crop water use, irrigation methods used for each crop, and irrigation efficiency.

BUTTE COUNTY LAND AND WATER USE

Results and conclusions of this study conducted over a 20-year time frame include:

- Agricultural land use has decreased by 12,366 acres or 5%.
- Estimated annual applied agricultural irrigation water has decreased by approximately 166,884 acre-feet or 17%.
- The greater decrease in agricultural water use compared to the small decrease in land use indicates that agricultural water use has become more efficient and/or that the crop distribution has shifted towards crops that use less water.
- Urban land use has increased by 3,580 acres from 43,707 to 47,287 acres or 8%.
- Environmental land use acreage has increased in the past 20 years. Managed wetlands replaced 5,474 acres of agricultural land and native lands replaced 5,153 acres of agricultural land. In addition, 1,799 acres of agricultural land was converted to urban and/or restoration/conservation use.
- Due to acreage changes and installation of modern and more efficient irrigations systems, applied water decreased in high acreage crops such as almonds (10%), rice (18%), peaches (50%), prunes (41%), alfalfa (80%) and pasture (76%). Alternatively, applied water estimates to walnuts increased by 81% almost entirely due to increased acreage.
- The decrease in applied water is the result of:
    - the increase in walnuts (26,645 acres) which likely replaced crops such as alfalfa and pasture, both of which have higher water demand and are irrigated with less efficient systems;
    - new orchards being installed with more efficient irrigation systems and management practices; and
    - much of the alfalfa acreage (a higher water user) being converted to other crops or agricultural land, which has a lower water use.

VINA SUBBASIN LAND AND WATER USE

Results and conclusions of this study conducted over a 20-year time frame include:

- While 4,486 acres of previously undeveloped agricultural land came into production, 7,254 acres of farmland were removed from production. The result was a net decrease in agricultural land use of 2,768 acres or 3.4%

- Estimated applied agricultural irrigation water has decreased by 29,004 ac-ft or 9%.
- Applied water increased by 72% in walnuts due to expansion of acreage and decreased by 13% in almonds (primarily due to improved irrigation efficiency) and 28% in rice (due to conversion to other crops). Other major crops that decreased in acreage and estimated applied water included alfalfa, pasture, peaches, and prunes.
- Urban land use within the Vina Subbasin increased by 2,550 acres from 16,848 to 19,398 acres.

GENERAL RESULTS AND CONCLUSIONS

- No quantitative estimates of changes in consumptive use were developed for the increases in urban or managed wetland areas, however the increase in these specific urban and environmental acreage footprints are expected to increase total water use.

- Although smaller in acreage, conversions of previously irrigated agricultural land to non-irrigated or flooded conservation or native areas (excluding managed wetlands) are expected to reduce water use in these areas.

- This analysis compared 5-year averages of applied water from the beginning and end of the study period as a more representative assessment of the actual conditions than individual year to year comparisons. Comparing applied water estimates of individual years skew the overall trends in applied water. The main reason for this in Butte County is that rice acreage, which accounts for a major portion of applied water (nearly 50% on average), fluctuates considerably from year to year. A significant area of rice land can be fallowed in some years because of water shortages.

- As more efficient irrigation systems and management practices are adopted on agricultural land, it should be expected that applied water use will continue to decrease as evidenced by the results of this 20-year analysis.

INTRODUCTION

Quantifying water use by the agricultural, environmental, and urban sectors and how it is expected to change over time is an important component of the Groundwater Sustainability Plan (GSP) developed by various subbasins in Butte County, as mandated by the Sustainable Groundwater Management Act (SGMA). Agriculture is a major water user in Butte County, and as such, quantifying it should be based on the best available data and use standard agronomic methods.

The purpose of this report is to describe the methodologies and results of an agricultural water use analysis that compared water use at the beginning and end of a 20-year period beginning with 1999 and ending in 2019 in Butte County and in the Vina Subbasin.

METHODS

Water use is dependent on crop type, crop acreage, precipitation, and irrigation practices and their associated efficiencies. Therefore, quantification methodologies must include each of these important components; omitting one or more of these will result in erroneous estimates of water use. In this section, the methods for obtaining and using these data and their sources are described.

CROP CONSUMPTIVE USE DEFINITIONS

Crop consumptive use, or evapotranspiration (ET) varies by crop and climate. It is a measure of the water that is used or transpired by both a crop and the soil in which it grows during the growing season. The water consumed by a crop is not the same as the water applied to a crop. The following definitions are useful for understanding the information in this report:

Crop consumptive use/evapotranspiration - The amount of water transpired during plant growth plus what evaporates from the soil surface and foliage in the cropped area.

Crop water requirement – The amount of water required by a crop to grow optimally minus precipitation. Some of the crop consumptive use is supplied by precipitation; therefore, the water required to supply the crop's water needs must take this into account.

Irrigation requirement, or applied water – The amount of water applied to a crop during the growing season assumed to meet the full demand of the crop. This amount is more than the crop ET and more than the crop water requirement because it must take irrigation efficiency into account. Irrigation systems are not 100% efficient, i.e. more water must be applied than is needed to compensate for non-uniform water application and supply crop water requirement. Irrigation efficiency depends on irrigation type and system management. Typically, but not always, pressurized irrigation systems (such as sprinkler, drip, and micro-sprinkler) have higher potential efficiencies than non-pressurized systems (surface methods such as flood, furrow and border check).

CROP CONSUMPTIVE USE DATA

Crop consumptive use values for California have been developed and maintained by the Irrigation Training and Research Center (ITRC) at California Polytechnic State University (Cal Poly). Using this resource, crop consumptive use can be found for all the major crops grown in different regions of California. The regions are delineated using the California Irrigation Management Information System (CIMIS) zones. These zones represent broad climatological conditions. For example, the agricultural area of Butte County largely falls in CIMIS Zone 12.

While ITRC ET values are good estimates of crop specific consumptive use, locally developed values should be used when possible. Therefore, where possible, ET values for permanent crops and pasture, including alfalfa, were sourced from those developed and published by UCCE specific to Butte County.

Consumptive use values for each Butte County crop used in this analysis are provided (Table 1). Some crops were grouped into crop categories because of their small acreage or because of the categories used in crop acreage land use databases. Although a component of applied water, frost protection is not included in this analysis because it is negligible compared to the overall applied water during a year. It is most often applied to almonds (a portion of the overall irrigated crop footprint) and much less often to walnuts and other fruit and nut crops. Also, it does not occur every year and the irrigation system usually runs for 3 to 6 hours for 1 to 2 frost events when it does occur. In comparison, an irrigation system on almonds usually runs for 12 to 24 hours each set and can comprise about 10 to 20 irrigation events per year depending on the system. In addition, a portion of frost applied water is stored in the soil profile and consumptively used by the almond crop in the early spring.

Table 1. Crop Consumptive Use in Butte County

Crop	Consumptive Use	
	(in/yr)	(ft/yr)
Almonds	48.9	4.1
Apples	41.0	3.4
Apricots	41.0	3.4
Misc. Deciduous	38.7	3.2
Grapes (wine)	41.2	3.4
Kiwi fruit	48.0	4.0
Mandarins	35.3	2.9
Olives (oil)	32.6	2.7
Orange	35.3	2.9
Peach	40.5	3.4
Pecan	38.7	3.2
Persimmons	38.7	3.2
Pistachio	42.5	3.5
Plum	41.0	3.4
Prunes	43.2	3.6
Walnuts	41.7	3.5
Beans (dry)	28.4	2.4
Alfalfa	53.3	4.4
Pasture (irrigated)	54.3	4.5
Rice	42.5	3.5
Wheat	28.4	2.4
Safflower	28.9	2.4
Misc. field and specialty crops	30.0	2.5
Young perennials	27.9	2.3

Note: See reference for Fulton et al. 2017. Young perennials = average ET of almond, peach, pistachio and prune 3rd leaf and walnut 2nd leaf

PRECIPITATION

As described above, growing season precipitation is subtracted from crop consumptive use values to determine crop water requirement from applied irrigation. Growing season precipitation data was collected from the Western Region Climate Center, which summarizes weather station data throughout California. Four weather stations were selected that are representative of the agricultural growing area. Monthly precipitation averages for March through September for each location were converted to effective precipitation using the Bureau of Reclamation method reviewed in Ali and Mabarak (2017). Monthly averages were summed to find an average growing season precipitation value (Table 2).

Table 2. Growing Season Effective Precipitation in Agricultural Areas of Butte County

Weather Station	Growing Season Effective Precipitation	
	(in)	(ft)
Chico Exp Station	5.90	0.49
Oroville (046521)	5.77	0.48
Oroville Ranger Station	5.10	0.43
Gridley	4.49	0.37
AVERAGE	**5.32**	**0.44**

IRRIGATION EFFICIENCY

Reasonable estimates of irrigation efficiency are required to convert crop water requirement to irrigation requirement. Because irrigation methods are less than 100% efficient, growers must apply more water than the crop requires to meet crop water needs. Irrigation methods and efficiencies for the Sacramento Valley are shown in Table 3 (Fulton, 2020). Irrigation methods were assigned to crops, as shown in Table 4, based on local agronomic conditions, commonalities, and knowledge. Pressurized systems such as drip, micro-sprinklers, and to a lesser extent solid set sprinklers are typically used on nut crops (e.g. minisprinklers are commonly used in walnut orchards), whereas sprinklers are used on some stone fruits and citrus and surface systems are more common on field crops. As an indication towards the future, some growers are now installing sub-surface drip systems, which have even higher potential irrigation efficiencies, on permanent crops.

Table 3. Butte County Irrigation Methods and Efficiency

Irrigation Type	Irrigation Method	Efficiency Range (%)	Average Efficiency (%)
Mini/micro	Drip	80-95	88
	Micro	80-90	85
	Mini	75-90	83
	Solid set	70-90	80
Sprinkler	Solid set	70-85	78
	Hand move	65-85	75
Surface	Conventional furrow	45-65	55
	Conventional furrow with tailwater return	60-80	70
	Basin flood	60-75	68
	Precision level basin flood	60-80	70

Table 4. Butte County Irrigation Methods and Irrigation Efficiencies by Crop

Crop	Irrigation Method	Irrigation Efficiency (%)
Almonds	Micro/drip	86.5
Apples	Micro/drip	86.5
Apricots	Flood	68.0
Misc. deciduous	Micro/drip	86.5
Grapes (wine)	Micro/drip	86.5
Kiwi fruit	sprinkler	78.0
Mandarins	sprinkler	78.0
Olives (oil)	surface	68.0
Orange	Micro/drip	86.5
Peach	surface furrow	55.0
Pecan	sprinkler	78.0
Persimmons	sprinkler	78.0
Pistachio	Micro/drip	86.5
Plum	surface	68.0
Prunes	basin flood	68.0
Walnuts	Micro/drip/solid set	86.5
Beans (dry)	sprinkler	78.0
Alfalfa	basin flood	68.0
Pasture (irrig)	basin flood	68.0
Rice	Precision level basin flood	70.0
Wheat	surface	68.0
Safflower	surface	68.0
Misc. field and specialty crops	surface	68.0
Young perennials	Micro/drip	68.0

CROP ACREAGE

Changes in crop distribution and corresponding changes in irrigation methods and irrigation efficiency represent the largest influences on total agricultural water use. For this analysis, the spatial databases of land use from California Department of Water Resources (DWR) from 1999 through 2016, and from Land IQ for 2018 and 2019 were used to compute total crop water use. (Land IQ performs the land use mapping and develops the datasets for DWR. Datasets from 2018 and 2019 have been completed but are not available to the public yet. Accuracies are 97.6% or greater.) The main purposes of these spatial databases are to comply with the statewide requirements of land use of the Sustainable Groundwater Management Act (SGMA), estimate crop water use for water budgeting, overall water management activities, water transfer planning, and various other purposes.

DEPARTMENT OF WATER RESOURCES LAND USE DATA

California DWR has historically mapped crop acreage in all California counties. Because of staffing, budget and time constraints, county crop maps were not updated every year. For this reason, data from 2000 through 2003 crop years were not available for Butte County, however the bookend years for this timeframe (1999 and 2004) were available. Prior to 2014, this database was developed through ground survey where DWR staff visually inspected accessible fields in the county.

In 2014, a statewide spatial land use database was developed using remotely sensed image analysis approaches. Every field that is at least 2 acres (and sometimes less) was mapped. Non-cropped and non-irrigated areas (roads, berms, etc.) are excluded in this spatial database. Therefore, this represents the true irrigated area of every homogeneous cropped field. An automated analytical process based on known cropped fields is used to identify crops (calibration), and where there is uncertainty, fields are confirmed with ground surveys. Some of this ground truthing data is used to calibrate the analytical algorithm, while different data is held back and used to validate accuracy of the spatial mapping results. The spatial map database was updated every other year from 2014 to 2018 and now every year.

An analysis of land use polygons that transitioned from agricultural to non-agricultural land uses was conducted on polygons at least 10 acres in area.

Accuracy has been determined on the DWR dataset. Currently, 2016 dataset accuracy values are publicly available (California Department of Water Resource, 2019). Example accuracies for major Butte County crops in the 2016 DWR dataset are as follows:

- Almonds 99.8%
- Kiwi fruit 100.0%
- Olives 100.0%
- Peaches/nectarines 99.1%
- Mixed pasture 98.6%
- Plums, Prunes and Apricots 99.0%
- Rice 99.7%
- Walnuts 99.2%
- Young perennials 97.0%

OTHER LAND USE DATA - BUTTE COUNTY CROP REPORTS

California's Agricultural Commissioners in produce annual crop reports for each county that document crop acreage and value. Butte County crop reports were available for every year from 1999 to 2019; however, the 2000 crop report was less detailed than reports in other years.

Butte County develops their crop database from pesticide use permits. When growers want to apply pesticides, they must obtain a permit from the county that specifies what crop they are growing, what parcel it is grown on, how many acres will be treated, and what pesticides will be used. Each year, when a grower requests a new permit for a field that is already in the permitting system, the information is updated as necessary (if crop type and/or acreage changes) by county staff. For pasture and other areas where pesticides are not applied, the County cannot rely on these permits for crop acreage data. The County sources pasture acreage information from University of California Cooperative Extension livestock farm advisors, and information on organic acreage, which might not be registered through pesticide use permits, from California Department of Food and Agriculture (CDFA) (L. Mendoza, Butte County Agriculture Commissioner, 2020 pers. comm.). No accuracy assessments are performed on this data, and the data is tabular rather than spatial. Also, the reliability and accuracy of the data are

dependent on the grower reporting them. For this analysis, Butte County records are not useful for the Vina Subbasin because they are not spatially referenced and could therefore not be attributed to a specific area of the county.

RESULTS

The annual applied water results can be evaluated in several ways. One way is to compare annual water use from one year to the annual water use of another year. Another, more appropriate way is to use multi-year averages. Results for the Butte County and Vina Subbasin water use change analyses are provided below.

BUTTE COUNTY

CHANGE IN AGRICULTURAL LAND USE FROM 1999 TO 2019

Agricultural land use decreased by 12,366 acres from 1999 to 2019 (Figure 1). While 15,472 acres of undeveloped land was converted to agriculture, 27,838 acres of farmland was removed from production. In general, agricultural land use increased in the following areas:

- West of Durham bordering the Sacramento River;
- South and east of Oroville and Gridley; and
- Southwest corner of Butte County.

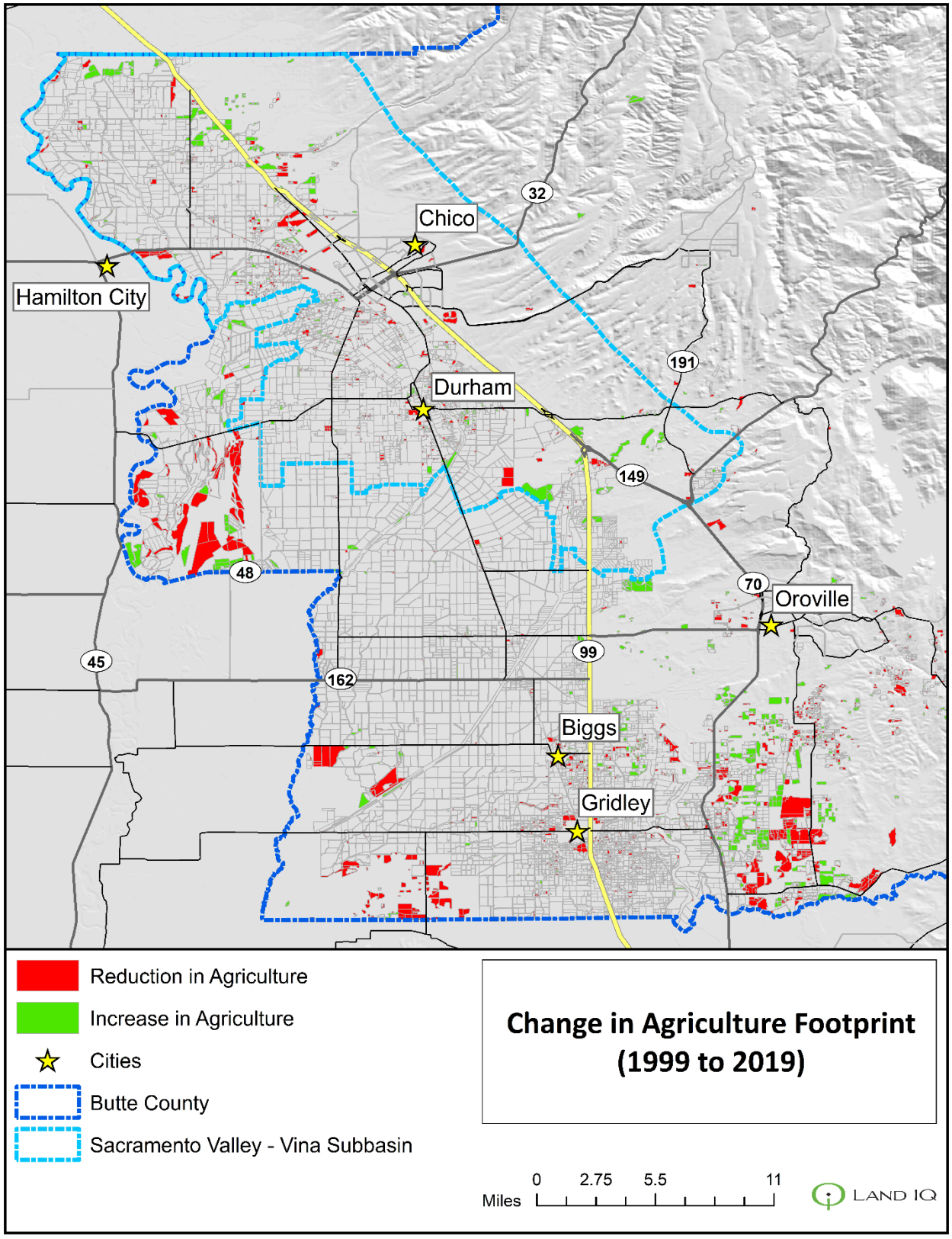

Figure 1. Change in Butte County agricultural land use from 1999 to 2019

Most of the decrease in agricultural acreage was the result of the following:

- Agriculture (frequently rice) to conservation/managed wetland (example below)
- Agriculture to urban (example below)
- Pasture to native (essentially termination of irrigation)

Rice to Managed Wetlands (1998 (closest available image year to 1999) to 2019).

Tree Crops to Urban (1998 (closest available image year to 1999) to 2019)

Most of the increase in agricultural land was the result of the following:

- Native to pasture
- Native to misc. grain and hay (likely non-irrigated, rain-fed)
- Native to tree crops
- Native to rice

The land use accounting for the highest increase of converted agricultural land was managed wetlands (5,474 acres). Of those acres, most of the crop land that was converted was formerly rice, accounting for 3,424 acres or 63%. The land use accounting for the second highest gain of converted agricultural land was native (5,153 acres). Additional acres of rice and other crops were converted to urban and restoration or conservation land use (1,799 acres). Land area previously cropped but not evaluated for specific current land use totaled 13,306 acres, because each field polygon was less than 10-acres. It should be assumed that the 13,306 acres of small fields converted from agriculture to urban and environmental land uses correlates with larger land uses that were verified as conversions to urban or environmental land uses. A complete list of crops and their net increase (new agriculture) or decrease (retired agriculture) in acreage between 1999 and 2019 is provided in Appendix A.

CHANGE IN URBAN LAND USE FROM 1998 TO 2019

Urban land use in Butte County was compared between 1998 and 2019 (imagery for spatial analysis was not available for 1998). The net increase in urban land use was 3,580 acres from 43,707 to 47,287 acres. Most urban expansion occurred around the cities of Chico, Oroville, and to a lesser extent, Gridley (Figure 2).

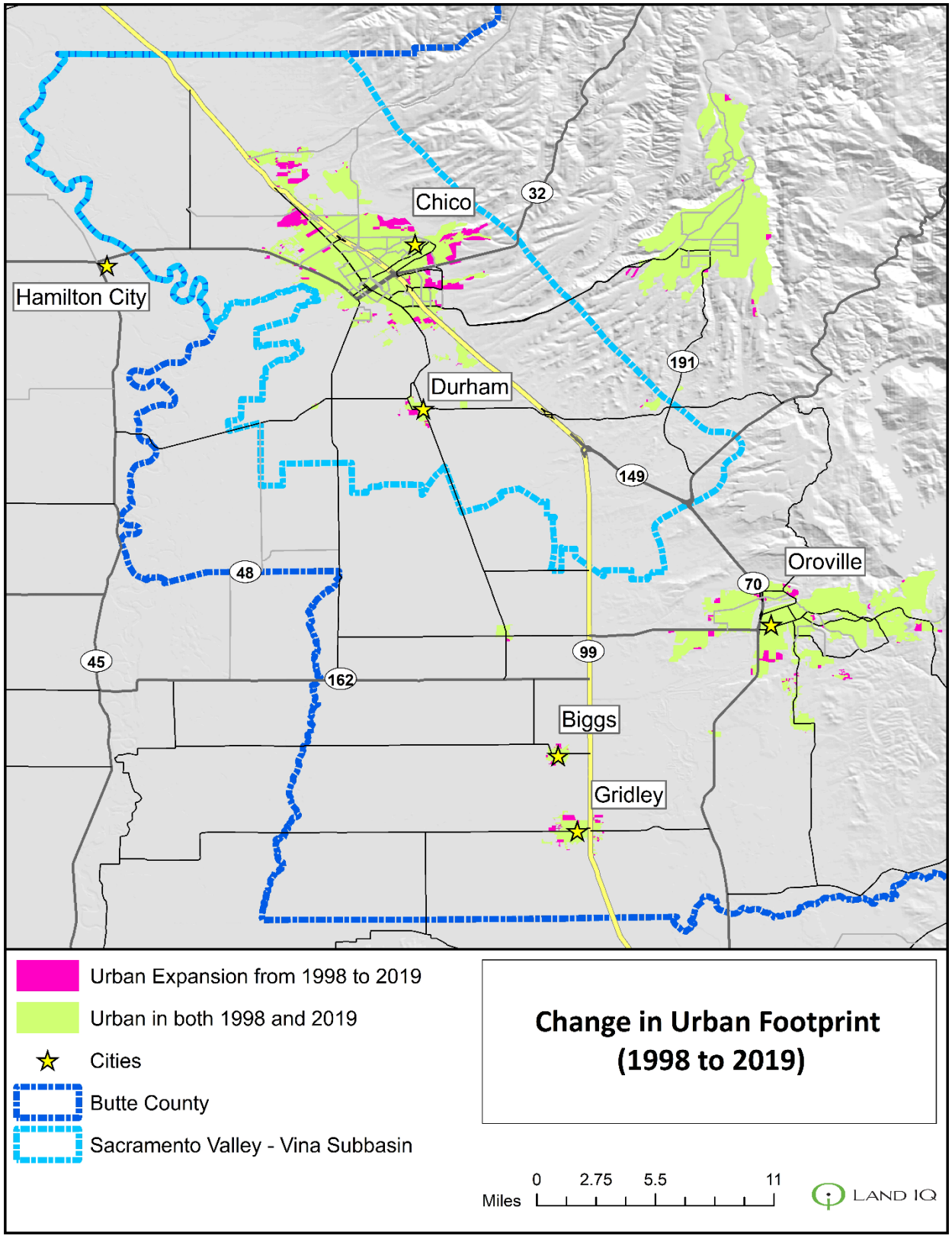

Figure 2. Change in Butte County urban land use from 1998 to 2019

Single Year to Year Comparisons Of Applied Water

It is difficult to draw meaningful results from two single year comparisons for at least two reasons. First, Butte County has a high acreage of rice, which is an annual crop that can fluctuate considerably in acreage from year to year. Though a small portion of Butte County rice acreage has been replaced by permanent crops such as walnuts, most of the rice ground lies fallow and remains part of the long- term rice growing area. However, it is temporarily fallowed (and is not converted to other crops) as part of a management response to drought conditions and water shortages.

DWR rice mapping is highly accurate (99.7%) and shows that rice acreage fluctuated from about 82,098 acres to 101,240 acres between 2014 and 2016. This swing in acreage was likely because of lower planting in 2014, a drought year when less land was planted in-lieu of water shortages, and much more land was planted in 2016 when water was more plentiful. Second, seasonal weather influences how much water is applied to crops and changes from year to year. Therefore, crop ET is usually expressed as a seasonal average, and not based on one year's data.

Therefore, choosing any two years to compare applied water would generate different results. If 2016 were compared to 2018, when rice decreased from 101,240 acres to 78,504 acres, rice acreage, and therefore applied water, was decreasing significantly. This latter comparison results in a difference of 448,017 to 347,402 ac-ft of applied water.

Comparing applied water for all crops between the crop years 1999 and 2019, total applied water decreased from 1,006,089 ac-ft in 1999 to 827,819 ac-ft in 2019 – a reduction of 178,270 ac-ft, or 18%. The year-to-year comparisons are not reflective of overall trends in increases or decreases in how much water growers are applying to crops in Butte County over time because they are heavily influenced by fluctuations in weather and annually fluctuating acreage of rice, which accounts for a major portion of applied water (Figure 3).

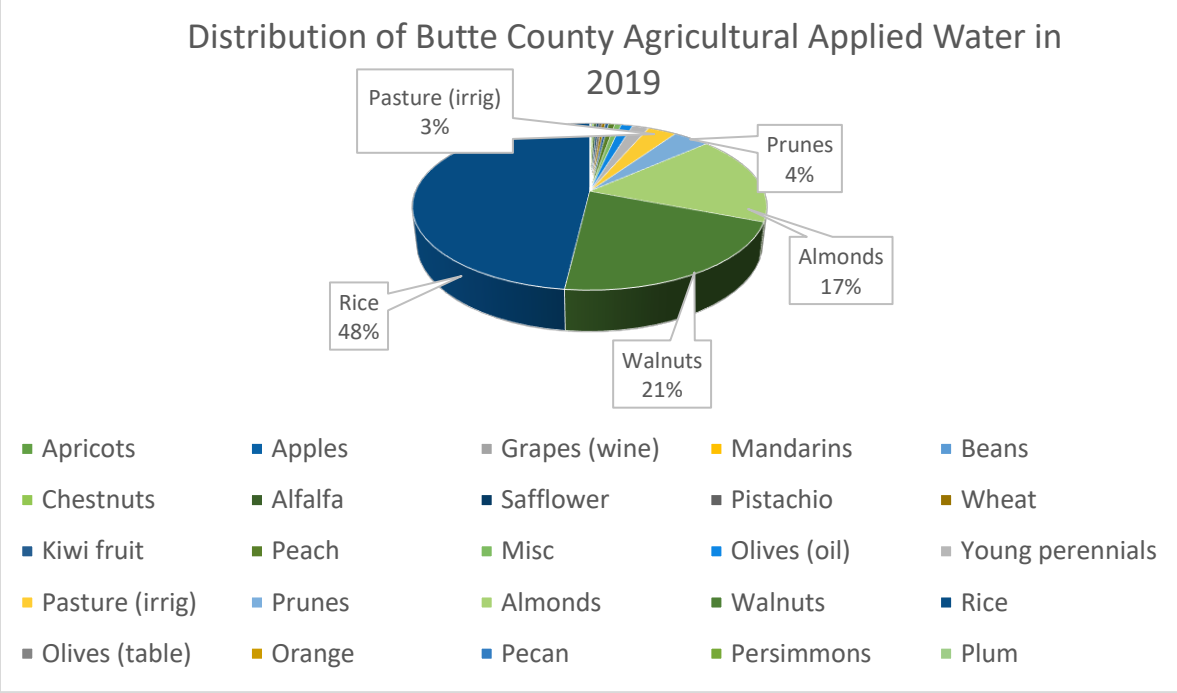

Figure 3. Estimated applied water in 2019.

MULTI-YEAR AVERAGE COMPARISONS OF APPLIED WATER

A more representative approach is to compare multi-year averages of applied water. Land use data from 1999 and 2004 was used to represent the historical period of 1999-2004, because data was only available for those two years. Land use data from 2014, 2016, 2018 and 2019 was used to represent the current period of 2014-2019 (Data for 2015 and 2017 was not available). Water use was calculated for each of these years using the respective land use data, then averaged for each period. Using this approach resulted in annual applied water decreasing from 983,462 to 816,578 ac-ft, a decrease of about 166,884 ac-ft or 17% (Table 5) from the historical 5-year period to the current 5-year period. Comparing these multi-year averages, applied water increased by 81% in walnuts and decreased by 10% in almonds and 18% in rice (Figure 4). Other major crops that decreased in acreage and estimated applied water include alfalfa, pasture, peaches, and prunes.

The decrease in applied water is because of at least two reasons. First, the decrease in almonds, peaches and prunes from 1999 to 2019 was 15,692 acres, not accounting for young orchards (under 2 years).The overall increase in walnuts from 1999 to 2019 was 26,765 acres, and assuming some of this change was almonds converted to walnuts, this change represents a decrease in water use because walnuts use less water than almonds (Fulton, 2020) (Table 1). Conversion from peach and prune to walnuts likely caused little change in water use because crop water consumption for these three crops is very similar. The most likely reason the conversion from peach and prune to walnut would result in decreased water use would be if the irrigation method changed from a less efficient flood or furrow system to a more efficient drip, microsprinkler, or solid set sprinkler system. Second, conversion from flood or furrow irrigated crops such as alfalfa, pasture, or miscellaneous row crops or orchard removal and replanting is an opportunity for growers to convert to more efficient irrigation systems (Table 4). These types of land use changes and corresponding irrigation improvements would have resulted in less applied water. The remaining approximately 11,072 acres added to walnuts may have been converted from native land or rice ground, which represents an increase in water use, or from other crops such as alfalfa and pasture, which would likely represent a decrease in water use either because of lower consumptive use by walnuts and more efficient irrigation systems installed in new orchards.

Table 5. 5-year Average Applied Water in Butte County Using DWR Land Use Data.

Crop	1999-2004 Average Annual Applied Water (ac-ft)	2014-2019 Average Annual Applied Water (ac-ft)	Net Change (ac-ft)
Walnuts	91,370	165,223	73,853
Wheat	105	3,913	3,808
Pistachio	1,308	2,560	1,252
Misc. Dec	1,011	1,662	650
Mandarins	549	552	3
Grapes (wine)	452	375	-77
Beans	591	507	-85
Orange	455	Included in mandarins	-455
Olives (oil)	11,828	10,990	-838
Apples	1,063	84	-979
Kiwi fruit	4,751	3,157	-1,593
Safflower	2,749	1,154	-1,595
Young perennials	15,801	12,922	-2,879
Peach	15,014	7,456	-7,558
Alfalfa	13,607	2,739	-10,868
Misc.	19,621	7,159	-12,463
Almonds	162,713	146,821	-15,892
Prunes	58,577	34,331	-24,246
Pasture (irrig)	105,918	25,762	-80,156
Rice	475,977	389,211	-86,766
TOTAL	**983,462**	**816,578**	**-166,884**

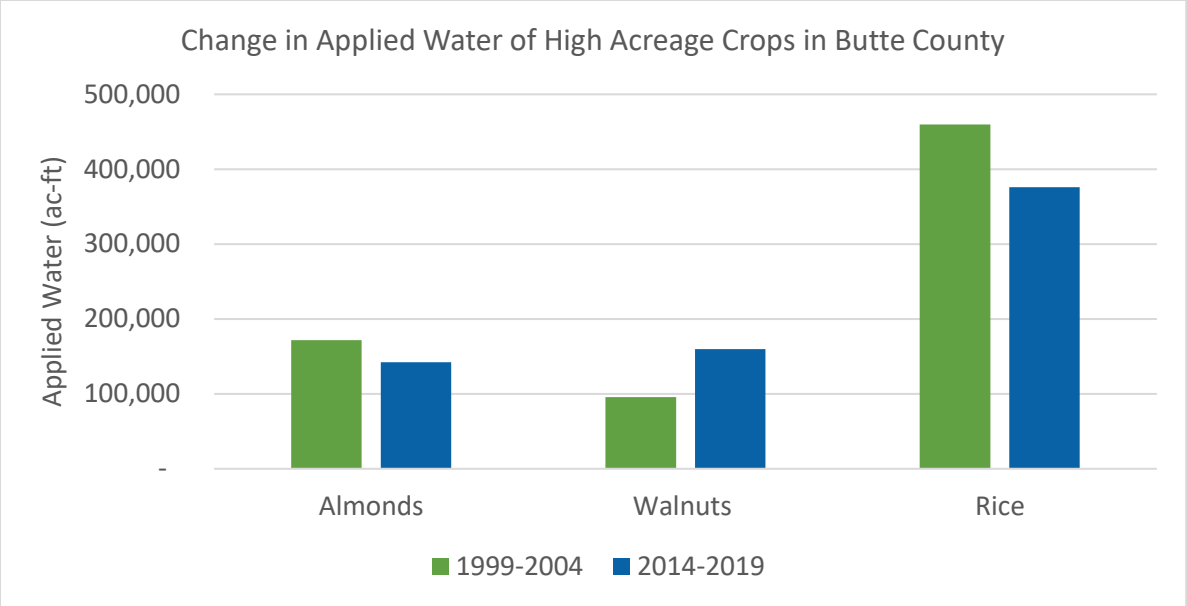

Figure 4. Almond, walnut and rice 5-year applied water averages.

VINA SUBBASIN

CHANGE IN AGRICULTURAL LAND USE FROM 1999 TO 2019

Agricultural land use decreased by 2,768 acres from 1999 to 2019 (Figure 2). While 4,486 acres of agricultural land came into production, 7,254 acres were removed from production. An analysis of land use polygons that transitioned from agricultural to non-agricultural land uses was conducted on polygons at least 10 acres in area.

CHANGE IN URBAN LAND USE FROM 1998 TO 2019

Urban land use in the Vina Subbasin was compared between 1998 and 2019. (Imagery for spatial analysis was not available for 1999.) The net increase in urban land use was 2,550 acres from 16,848 to 19,398 acres. Most urban expansion occurred around the cities of Chico and to a lesser extent Durham (Figure 3).

SINGLE YEAR TO YEAR COMPARISONS OF APPLIED WATER

Comparing applied water for all crops between the crop years 1999 and 2019, total applied water decreased from 327,590 ac-ft in 1999 to 287,750 ac-ft in 2019: a reduction of 39,840 ac-ft, or 12%. The distribution of agricultural applied water by crop in 2019 is shown in Figure 5.

As noted above, single year comparisons lack representation of conditions over multi-year comparisons. The Vina Subbasin has a lower proportion of rice compared to total crop acreage, which lessens annual fluctuations in water use; however, the impact of seasonal weather is still apparent.

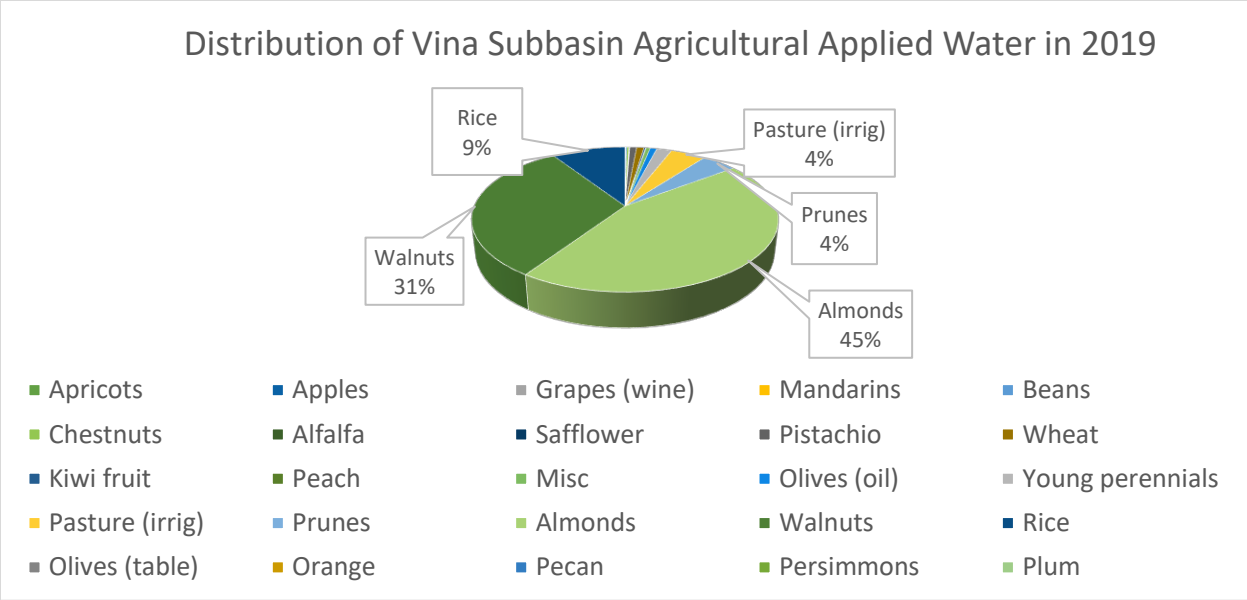

Figure 5. Distribution of applied water by crop in 2019.

Multi-Year Average Comparisons Of Applied Water

Using the same multi-year approach described above for Butte County, the comparison between historical and current periods resulted in annual applied water decreasing from 320,856 to 291,851 ac-ft, a decrease of about 29,004 ac-ft or 9% (Table 6). Applied water again increased in walnuts and decreased in almonds and in rice (Figure 6). Other major crops that decreased in acreage and estimated applied water include alfalfa, pasture, peaches, and prunes.

Table 6. 5-year Average Applied Water in Vina Subbasin Using DWR Land Use Data.

Crop	1999-2004 Average Annual Applied Water (ac-ft)	2014-2019 Average Annual Applied Water (ac-ft)	Net Change (ac-ft)
Walnuts	50,477	85,653	35,176
Wheat	73	1,972	1,899
Pistachio	1,284	2,278	994
Misc. Deciduous	238	671	433
Olives (oil)	2,043	2,457	413
Grapes (wine)	60	135	75
Mandarins	51	29	-22
Wheat	73	-	-73
Young perennials	5,127	4,883	-244
Apples	326	33	-293
Peach	528	182	-346
Beans	592	195	-397

Safflower	1,003	371	-631
Kiwi fruit	1,379	607	-772
Alfalfa	3,612	486.4	-3,127
Misc. field and specialty crops	8,444	1,765	-6,680
Prunes (and plums and apricots)	25,444	13,146	-12,298
Pasture (irrig)	21,364	8,983	-12,381
Rice	46,410	33,047	-13,363
Almonds	152,476	131,222	-21,254
TOTAL	**320,856**	**291,851**	**-29,004**

Similar to Butte County as a whole, the decrease in applied water can likely be attributed to the increase in walnut acreage and conversion from older, less efficient irrigation systems to newer, more efficient systems. Monitoring of land, crop and water use change is recommended and should be useful in making decisions about future groundwater management.

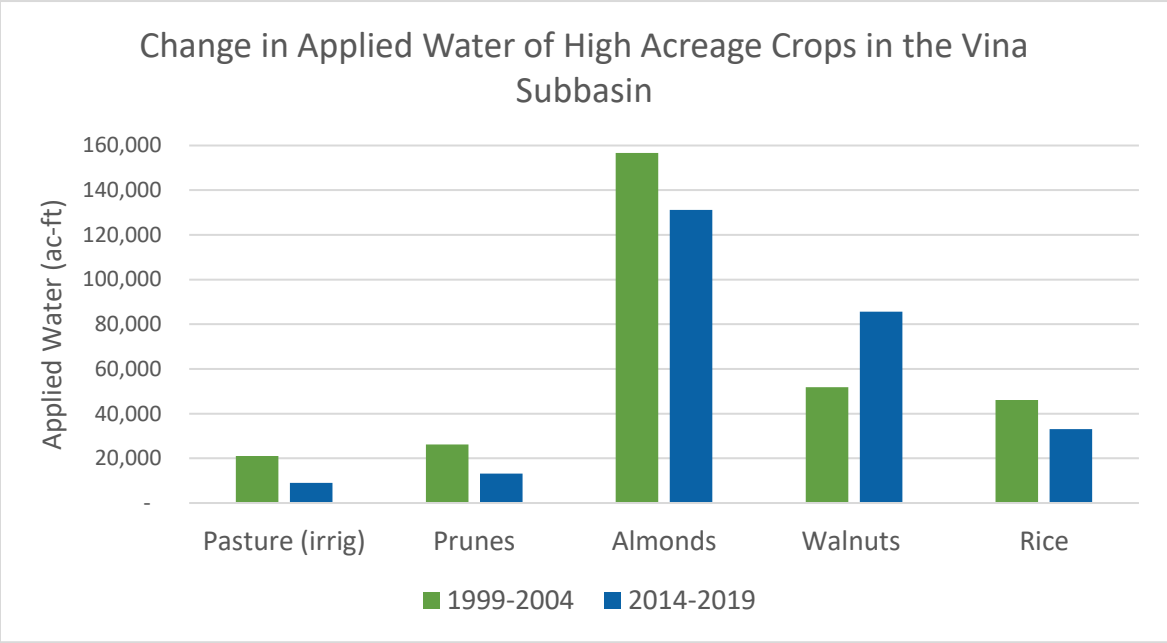

Figure 6. Change in applied water using 5-year averages.

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APPENDIX A

Table A-1. Crop Acreage Distribution in Butte County for Years Used in Water Use Analysis

Crop	1999	2004	2014	2016	2018	2019
Almonds	40,267	37,177	36,105	34,853	34,703	34,100
Apples	376	242	19	29	25	25
Chestnuts	287	342	426	503	598	539
Grapes (wine)	69	192	86	112	114	122
Kiwi fruit	1,113	971	689	708	696	677
Mandarins	153	190	164	166	180	180
Olives (oil)	3,375	3,713	3,620	3,265	3,148	3,139
Orange	141	175	-	-	-	-
Peach	3,148	2,486	1,700	1,558	1,296	1,042
Pistachio	395	336	638	673	775	775
Prunes	14,387	10,855	7,964	7,469	7,175	6,980
Walnuts	23,006	29,073	43,636	45,765	49,294	49,651
Beans	352	127	-	236	193	391
Alfalfa	3,006	1,621	502	535	453	373
Pasture (irrig)	17,709	17,616	5,765	4,769	7,873	8,475
Rice	109,077	106,039	82,091	101,231	78,477	90,005
Wheat	51	23	51	2,348	2,055	1,070
Safflower	1,619	287	303	130	396	770
Misc.	7,722	5,252	2,940	2,358	2,275	1,893
Young perennials	7,437	7,354	2,699	7,360	7,131	7,001
Total	**233,668**	**224,071**	**189,400**	**214,066**	**196,856**	**207,209**

Source: DWR 1999, 2004, 2014, 2016; Land IQ 2018, 2019

Notes: Citrus value was used for mandarin and is inclusive of orange. Plum, prune and apricot values were used for prunes. No value for beans because they are included in misc. field. Miscellaneous deciduous value used for chestnuts and includes pecan and persimmons. For 1999 and 2004, young perennial values calculated as 8% of orchard values. The large increase in wheat acreage may have been the result of differences in land use mapping between the historical and current periods.

Table A-2. Crop Acreage Distribution in the Vina Subbasin for Years Used in Water Use Analysis

Crop	1999	2004	2014	2016	2018	2019
Almonds	37,618	34,954	32,883	32,143	30,920	30,610
Apples	151	38	10	10	9	9
Chestnuts	66	82	219	180	224	222
Grapes (wine)	15	19	36	36	43	43
Kiwi fruit	331	274	131	138	135	135
Mandarins	17	15	-	-	18	18
Olives (oil)	617	608	811	736	718	718
Peach	105	93	44	39	29	28
Pistachio	387	330	630	577	686	686
Prunes	6,124	4,840	3,174	2,814	2,784	2,707
Walnuts	12,936	15,834	23,201	24,284	25,764	25,676
Beans	352	127	-	31	113	175
Alfalfa	677	551	132	86	84	29
Pasture (irrig)	3,310	3,816	663	741	2,540	2,127
Rice	10,876	10,099	8,361	8,075	7,800	6,029
Wheat	51	-	-	913	931	939
Safflower	602	93	297	74	75	75
Misc.	3,152	2,431	613	746	741	503
Young perennials	2,418	2,367	1,535	2,677	2,570	2,587
Total	**77,386**	**74,205**	**72,741**	**74,300**	**75,914**	**73,315**

Source: DWR 1999, 2004, 2014, 2016; Land IQ 2018, 2019

Notes: Citrus value was used for mandarin and is inclusive of orange. Plum, prune and apricot values were used for prunes. No value for beans because they are included in misc. field. Miscellaneous deciduous value used for chestnuts and includes pecan and persimmons. For 1999 and 2004, young perennial values calculated as 8% of orchard values. The large increase in wheat acreage may have been the result of differences in land use mapping between the historical and current periods.

Vina
Groundwater Sustainability Agency
Agenda Transmittal

Agenda Item: 7.1.2

Subject: Management Committee Report - Vina GSA Stakeholder Advisory Committee Update

Contact: Kelly Peterson Phone: (530) 552-3588 Meeting Date: March 10, 2021 Regular Agenda

Department Summary: The Vina GSA Stakeholder Advisory Committee (SHAC) met virtually last month on February 16, 2021, the draft meeting notes are attached.

At the last meeting, the SHAC:

- Provided input on the SMC Vina GSA Board Workshop (2/10/21). SHAC members also provided feedback on the Management Committee's recommendation to the board for proposed Measurable Objectives (MO) and Minimum Thresholds (MT)

- Briefly reviewed PMA requirements, the relationship between the SMCs and PMAs, the proposed timeline, approach, and next steps.

- Discussed legal implications of PMAs and shared concerns and ideas to address their concerns. Materials prepared by the Vina GSA Management committee included a presentation, a staff memo discussing legal implications, a PMA glossary of terms, and a draft PMA submittal form.

Next Meeting: The SHAC will meet again via video conference on March 16, 2021 from 9:00-12:00.

SHAC membership details, meeting materials, detailed meeting notes and recordings of the meetings are on the Vina GSA website: https://www.vinagsa.org/. All SHAC meetings are open to the public and scheduled for the third Tuesday of each month from 9:00 a.m. – 12:00 p.m. in an online format using Zoom. The SHAC will meet again via video conference on March 16, 2021 at which time they will consider in addition to other items, approval of the February 2021 meeting summary, continue SMC discussions (Minimum Thresholds and Measurable Objectives) and continue PMA discussions.

Fiscal Impact: None

Staff Recommendation: Accept as an information item.

Item 7.1.2

Meeting Brief

- The Vina Stakeholder Advisory Committee (SHAC) met virtually on February 16, 2021.
- **Sustainable Management Criteria (SMC):** The SHAC provided input on the SMC Vina GSA Board Workshop (2/10/21). SHAC members also provided feedback on the Management Committee's recommendation to the board for proposed Measurable Objectives (MO) and Minimum Thresholds (MT) [Access Presentation Slides].
- **Projects & Management Actions (PMAs):** The SHAC briefly reviewed PMA requirements, the relationship between the SMCs and PMAs, the proposed timeline, approach, and next steps. The SHAC discussed legal implications of PMAs and shared concerns and ideas to address their concerns. Materials prepared by the Vina GSA Management committee included a presentation [Access Here], a staff memo discussing legal implications [Access Here], a PMA glossary of terms [Access Here], and a draft PMA submittal form [Access Here].
- **Next Meeting:** The SHAC will meet again via video conference on March 16, 2021 from 9:00-12:00.

Action Items

Item	Lead	Completion
• Incorporate suggested revisions to the meeting notes (1/19/21).	CBI & Management Committee	
• Include overview of GSP completion timeline in next Vina SHAC agenda.	CBI & Management Committee	
• Add PDF and Word versions of the PMA submittal form to the website.	CBI & Management Committee	[Access Online Form]
• Share Dr. Todd Green's (Chico State) dataset information from the Airborne Electromagnetic Study (AEM) to evaluate which monitoring wells align with which aquifer zones.	Christina Buck, Butte County	
• Provide examples of successful recharge projects (e.g., Yolo County's FLoodMAR, Glenn and Colusa pilot projects).	CBI & Management Committee	
• Post meeting recording on the website.	CBI & Management Committee	[Access Video | Access Audio].

Summary

The Vina SHAC met on February 16, 2021 via video conference, as a result of COVID-19. Participants included Vina SHAC members, Groundwater Sustainability Agency (GSA) member agency staff, technical consultants, representatives of the CA Department of Water Resources (DWR), and members of the public. Below is a summary of key themes and next steps discussed at the meeting. This document is not intended to be a meeting transcript. Rather, it focuses on the main points covered during the group's discussions. The video-conference meeting recording is available at the Vina GSA website [Access Video | Access Audio].

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1. Introductions & Agenda Review

The SHAC members, facilitator, technical consulting teams, and staff introduced themselves. The facilitator gave a brief overview of the agenda.

2. Public Comment for Items Not on the Agenda

a. G. Sohnrey (SHAC ag well user representative) suggested inviting Land IQ to an upcoming Vina SHAC meeting to present their report on the 20-year land and water use changes in Butte County and the Vina Subbasin (1999-2019).

b. S. Goepp (SHAC domestic well user representative) raised concern about water pollution caused by homeless camps along the drainage way and asked for further clarification related to the water storage component of the 2014 Water Bond and the Delta Conveyance Project. P. Gosselin (Butte County) shared the GSA is not responsible for water quality impacts from human activities, other than those related to groundwater pumping, such as salinity. GSAs need to be aware of water quality concerns, as well as avoid mobilizing plumes or exacerbating pollution through pumping. In terms of the Delta Conveyance Project, Butte County acknowledged it is a major concern. The County has previously opposed the proposal and will evaluate the impacts if and when the project moves forward.

3. Meeting Notes Review & Consideration

The SHAC reviewed the previous meeting notes (1/19/21) [Access Here]. The facilitation team took note of specific edits and will bring back a revised summary, with tracked edits for SHAC review. In addition, SHAC members requested adding attribution to their comments and including a time stamp to specific agenda items to simplify navigating the video recording.

4. Sustainable Management Criteria (SMC) Overview - Discussion

The SHAC provided input on the SMC Vina GSA Board Workshop (2/10/21) [Access Presentation Slides]. The SHAC also provided feedback on the Management Committee's recommendation to the GSA board on proposed Measurable Objectives (MO) and Minimum Thresholds (MT), with the purpose of soliciting public comment and SHAC discussion.

Debrief SMC Workshop

The Management Committee solicited SHAC members' feedback and insights on the SMC Vina GSA Board Workshop (2/10/21). Meeting materials, including video and audio recording, are available on the website [Access Here].

Discussion

a. G. Sohnrey (ag well user) thought it was nice to have the workshop with members from both boards. He thought the process was moving too fast, there was too much to cover, and the SHAC did not have enough time to discuss, reach agreement, and come away with

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formal recommendation to the GSA Board. He thought it was important to clarify that the information presented did not reflect SHAC consensus recommendations.

b. J. Brobeck (environmental rep) referred to the SMC for depletion of inter-connected surface and groundwater. Specifically, Brobeck expressed the desire to include non-riparian Valley Oak Trees in the subbasin that are currently not identified as GDE; the only identified so far are those in the narrow bands around the creeks. J. Brobeck has been in contact with TNC representatives, who suggested including non-riparian areas currently absent from the database in the basin's GDE map. P. Gosselin (Butte County) suggested bringing this item to a future meeting agenda.

c. A. Dawson (domestic well user) expressed the workshop was not useful, did not encourage a bilateral flow of information and questions. The SMC conversation was not framed adequately and felt the SHAC is being rushed through the process. The new tables presented seem to gloss over the domestic well impact, and the board did not have time to extract information. She felt that the GSA Board Members did not seem well informed, and some did not show up.

d. S. Lewis (ag well user) expressed concern with the polling questions used in the meeting, as they did not offer enough options (e.g., all of the above, none of the above, etc.).

e. A member of the public echoed SHAC members' comments and suggested greater clarity in terms of goals and public expectations for future workshops.

f. D. Rice (Rock Creek Reclamation District (RCRD) GSA) shared their Board has been in conversations with the Vina GSA Management Committee and have been thinking about setting different MOs and MTs in the North Vina Management Area. RCRD will be reviewing more data and plans to provide recommendations soon.

g. D. Skinner, and domestic water user and Chair of the Butte County Water Commission, shared some observations from the joint board meeting. His suggestions included developing a schedule highlighting the goals the SHAC needs to meet by month, removing unnecessary information from the charts provided, and specifying how much water will need to be obtained or saved per area to achieve sustainability. He suggested following a conservative and protective approach, and then loosening the requirements, if warranted. Lastly, he highlighted the reality that GSAs will need to make decisions with incomplete information in order to meet the January 31, 2022 deadline.

Management Committee Recommendation & Next Steps

After receiving the SHAC's input on the workshop and reflecting on the feedback received so far, the Management Committee proposed establishing the **MT on the 10th percentile and the MO based on the 2015 trend**. The language in the SMC would reflect that the proposed MOs and MTs would be adjusted if insufficient PMAs are brought forward. P. Gosselin (Butte County) shared that although these initial recommendations may be challenging to reach, they represent an aspirational goal to be the most protective of groundwater uses and domestic wells.

P. Gosselin echoed the SHAC members' concerns related to the time pressure to submit the plan in time and meet compliance. Originally, the Management Committee was planning to prepare

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the SMC and share for public review in February. Considering the SHAC and GSA Board requested more time for discussion and consideration, the schedule will be adjusted for the SMC chapter to be released late March. Given the time constraints, the GSA needs to ensure the right caveats and structures are established to adapt as more information becomes available. P. Gosselin also noted that the GSP submitted would just be a start, and the GSA would have the opportunity to improve and evaluate the plan over the years.

SHAC Member Input

a. G. Sohnrey (ag well user) suggested setting the MT at the 15% percentile and the MO at the 2030 trends. Since the plan can be amended prior to the 5-year update, the GSA can consider indicating data necessary to evaluate and determine any revisions.
b. B. Smith (business rep) expressed he needs more information. He expected to see greater reference to the electric well logs and descriptive well logs, which inhibits his ability to make recommendations. C. Buck (Butte County) suggested bringing in Dr. Todd Green's (Chico State) dataset from the airborne electromagnetic study (AEM) to evaluate which monitoring wells align with which aquifer zones. B. Smith would greatly appreciate bringing that information in, acknowledging the SHAC is capable of understanding highly technical data. He expressed hesitancy about making a recommendation for the 10-15% MT levels. As the business representative, he is concerned about a significant number of household wells that may go dry relatively soon. Lastly, he emphasized the importance of ground truthing results with well screening data.
c. A. Dawson (domestic well user) supports the Management Committee's recommendation, setting the MT at 10% and the MO at the 2015 trend line, as long as it is attainable and allows for a sufficient margin of operation. She highlighted it would be useful for domestic well owners to know at what depth to drill their wells. She appreciated the suggestion of starting with the 10% percentile, accompanied by a substantial effort to obtain more data and information about the wells at that level. Then, the GSA could possibly lower to 15% coupled with substantial/aggressive mitigation measures.
d. S. Lewis (ag well user) echoed the need for flexibility and supports relying on science and modeling available. She advocates for the 2030 trendline, as picking the 2015 trendline might leave the subbasin in an inflexible position. In terms of the MT, statistically, the 15th percentile seems to make most sense. She would advocate choosing the MT and MO levels in tandem, either both conservative or both less conservative.
e. C. Madden (Butte College) stated that establishing the MT at the 15th percentile and the MO at the 2030 trendline would maximize operational flexibility. He requested more information before making a final recommendation and supported continued use and support for the BBGM.
f. S. Goepp (domestic well user) shared establishing the MT at the 15th percentile seemed like an educated guess, based on the consultants' suggestions. P. Gosselin (Butte County) clarified that the consultants present data and analysis, but it will be up to the GSA Boards to make policy decisions. These decisions are risk mitigation decisions, including the

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choice of where to set the level of protection based on what local stakeholders value, prioritize, and consider to be significant and unreasonable conditions.

g. J. Brobeck (environmental rep) shared he needs more information and is not ready to make a recommendation.
h. T. Beynon (CalWater substitute for D. Kehn) refrained from commenting, without more information.

Non-SHAC:

a. D. Rice (Rock Creek Reclamation District GSA) shared that the MT at 10th percentile and MO at observed 2015 levels will not work for the North Vina Management Area. He suggested greater focus on management areas. Further, the board at Rock Creek will make further analysis and come back with more recommendations.
b. A member of the public requested greater clarity regarding management areas. They were concerned that from a public perspective, setting differing SMC per management area might be confusing and difficult to digest.

SHAC Vote on Management Committee's initial recommendation to set the MT on the 10th percentile and the MO based on the 2015 observed water levels trend

	SHAC Members
Support	A. Dawson
Do not support	S. Lewis, G. Sohnrey – they support setting MT at 15% and MOs at the 2030 trend.
Need more information	S. Goepp, B. Smith, C. Madden, J. Brobeck, T. Beynon

Outcomes & Next Steps | SMC

a. The Management Committee will bring the SHAC's feedback to the next GSA Board Meeting.
b. The SMC draft chapter will be released by late March for public review.

5. Projects and Management Actions:

The SHAC briefly reviewed PMA requirements, the relationship between the SMCs and PMAs, the proposed timeline, approach, and next steps. The SHAC discussed legal implications of PMAs and shared concerns and ideas to address concerns. Materials prepared by the Vina GSA Management committee included a presentation [Access Here], a staff memo discussing legal implications [Access Here], a PMA glossary of terms [Access Here], and a draft PMA submittal form [Access Here].

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Legal Implications & Potential Consequences

V. Kinkaid (O'Laughlin & Paris LLP) shared initial thoughts regarding the PMA Chapter and the SHAC concerns expressed thus far. While the issues and rules for water recharge and storage are not new, V. Kincaid shared the GSAs will need to consider (1) what projects GSAs seek to promote and what rules they want to establish, including those related to ownership; and (2) what will the GSA's role be and what falls under their purview and authority. P. Gosselin shared that the legal implications document will be very useful when reviewing and evaluating specific project proposed. There may be certain projects that do not go through the GSA; however, GSAs can set potential management actions to ensure projects that may impact their ability to achieve sustainability would need to be reviewed and approved by the GSA board before getting implemented.

SHAC Discussion:

a. **Groundwater vs. Stored Surface Water:** G. Sohnrey (ag well user) shared he thought discussing potential implications of PMAs without specific projects and actions to consider is not useful and productive. He suggested considering establishing a management action that specifies that any groundwater recharge project could not gain any rights to groundwater that supersedes existing groundwater rights and beneficial uses in the Butte County. V. Kinkaid when one recharges surface water, that water does not legally "become groundwater," and rather is considered "stored surface water." Establishing a management action like the one proposed would fall outside the GSA's authority and lead to immediate lawsuits. GSAs do not have the authority to change surface water laws. That said, the GSA could be more strategic about how to lawfully protect reaching sustainability. Some tools at the GSA's disposal include 1) establishing structural rules regulating potential impacts to sustainability, 2) timing (when the water can be taken out), 3) supply augmentation (ensuring only "recharged water" can be extracted), and 4) water migration into rivers, streams, or neighboring subbasins. These rules, however, need to be clearly supported by facts.
b. **Upland Forest Management:** J. Brobeck (environmental rep) shared that in his understanding the aquifer system the Vina GSA is trying to protect is founded on a pressurized system recharged from the foothills. The overlying layers can leak into it if the pressurized system is depressurized. Thus, applying water to the surface will not recharge the deep aquifer. He would like to focus on PMAs, such as upland forest management, which could benefit stream flows. These projects would require collaboration with other agencies.
c. **Urban Conservation and Efficiency:** J. Brobeck asked whether urban conservation and efficiency projects create new rights. V. Kincaid shared that conservation does protect "conserved water," which means the users could sell, recharge, or use it in a different way.
d. **Overlying Groundwater Rights:** J. Brobeck asked about groundwater pumpers' ability to extract recharge water that is not considered "native" and possible regulations that may accompany recharge. V. Kincaid clarified that this would lead to an accounting issue. If all

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users with overlying water rights claim recharge, the overall overlying water rights might be reduced. With SGMA, people will account for their water differently.

e. **FloodMAR:** J. Brobeck asked a clarifying question about the permits required to pursue FloodMAR. V. Kincaid clarified that it would require applying for a streamlined temporary permit (or regular application) and would also need to apply to the State Water Board for a right to recharge. This could present a challenge or an opportunity. Credits for recharged water would be exempt from county groundwater ordinances, as the water would be considered "stored surface water."

f. **Groundwater pumping rights:** V. Kincaid clarified that a pumper taking more water than their "yield" could be sued by recharge proponents, could be charged for additional water, or water right holders may try to extract it leading to overdraft. GSAs could put constraints on how much water could be claimed and recovered. J. Brobeck expressed that the 5-consecutive year forfeiture rule might provide incentives to sell or transfer stored groundwater in order to recuperate investment rather than leave the water in storage for the environment. V. Kincaid explained that diverted stored surface water is not a beneficial use in California. Users could be compensated to recharge for sustainability purposes or for credit. J. Brobeck is concerned with recharge proponents claiming recharge credit even if the efficacy is not proven. Further, he is concerned that recharge projects would be a step towards privatizing the water in the aquifer. Then, the aquifer could be more aggressively exercised by drawing it down to create storage. Potentially, water could be available for out of basin transfers and exports.

g. **Recharge as a challenge or an opportunity:** V. Kincaid shared that with every challenge there is an opportunity. One way to see recharge is the fear of turning groundwater into surface water, legally. Another way to see it is an opportunity to increase groundwater supply, delineating "migration" and setting up rules for recharge recover, which need to be supported by facts and science. The GSA cannot tax or regulate surface water rights. Further, location is critical. If there is a cone of depression, the GSA might need different rules and will be on better legal footing. The GSA could structure programs to encourage people to recharge and leave some water behind.

h. **Cross-boundary flows and GDEs:** C. Buck emphasized that the GSA will also need to consider that neighboring subbasins are also accustomed to a certain level of cross-boundary migration. Further, the GSA might consider utilizing recharge as a strategy to avoid stream depletion. V. Kincaid said these strategies need to be followed carefully. The GSA needs to be clear that recharged water is not abandoned but rather being recharged to increase sustainability. Further, there could be some recharge projects developed by surface water exporters, which are not managed by the GSA. However, the GSA could regulate indirectly by arguing for sustainability.

i. **CEQA:** G. Sohnrey (ag well user) asked whether the Vina GSA could require recharge proponents to prove scientifically, through CEQA, they are actually extracting recharged water. The GSA can establish policies, fees, or an ordinance about migration and "leave behind" could be established founded on science. However, any project led by an agency would require following CEQA beforehand, and the GSA would be a responsible agency.

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j. **Case law and regulations:** In response to a question by S. Goepp, V. Kincaid explained that these recommendations are based on cases, some ordinances, some water code sections, and some new rules. Recharge is not established as a beneficial use in the water code. Political pressure from Southern California heavily opposed including recharge as a beneficial use in SGMA. Augmentation and migration are based on case law. More specific rules will come out of SGMA. Accounting for recharge under SGMA will undoubtably evolve through litigation.

Public Discussion:

a. A member of the public asked V. Kincaid her view of the Butte County Chapter 33 in view of SGMA. V. Kincaid advised caution, as the County does not have the authority to regulate surface water rights, rooted in constitutional law. Further, this public member asked about overlying water right holders' native yield, which is the first step for establishing water markets. A first step is calculating natural water supply, divided by reasonable overlying water demand. SGMA will significantly change the accounting. Lastly, this public member asked about voluntary inter-basin coordination agreements. V. Kincaid shared that the requirement is very high level, "do no harm." The real question is communicating and making sure the subbasins are not overcounting water flows to achieve sustainability. How inter-basin coordination will be worked out during implementation will be complicated.
b. Another public participant wanted to clarify if Vina wants to strategically implement PMAs to protect agricultural users to provide additional supply during dry years, for users without sufficient native yield to support their beneficial use. The GSA could apply for its own flood flow water right, buy surface water and recharge the aquifer. The question is where the financing will come from, assuming the supply is available. This strategy could on a management area basis.

Additional information needed:

a) Butte County will provide the SHAC some examples of successful recharge projects (e.g., Yolo County's FLoodMAR, Glenn and Colusa pilot projects).
b) J. Brobeck would like to have a more precise and clear discussion about inter-basin flows (between the Vina, Butte, Glenn County), broken down per aquifer layers, groundwater flow contour maps (per layer), and a depiction of vertical flows to evaluate cross-boundary flows.
c) B. Smith requested some examples of technical information and legal information used in other subbasin showing the efficacy of recharge projects.
d) G. Sohnrey would like clearer direction related to SHAC input for PMAs. He would rather discuss criteria for evaluation.
e) J. Brobeck highlighted the need to coordinate across numerous GSAs through foundational PMAs that may benefit more than one subbasin and require significant investments. PMAs that cross jurisdictional boundaries have the potential to lead to significant benefits to the region.

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f) V. Kinkaid shared that at some point GSAs will make a policy decision of whether it wants to be a GSA that sits back and monitors projects or an active regulator of the system by establishing rules and regulations. This choice may depend on the level of water deficit and the preferred approach.

PMA Solicitation Form

The Vina Subbasin is launching an online solicitation form to gather ideas for potential projects and management actions (PMAs) that could be evaluated and ultimately included in the Vina Subbasin Groundwater Sustainability Plan (GSP). Once ideas are gathered, an initial screening and evaluation process will be conducted, followed by ranking of potential PMAs for more detailed evaluation and inclusion in the initial GSP. Proposals will be brought to the SHAC for discussion. *This form is available online at: https://forms.gle/1WN3Xh76DCtZUwva8*

6. Updates

a) Vina GSA Board Updates

No updates

b) Inter-basin coordination updates:

Staff representatives from Antelope, Bowman, Butte, Colusa, Corning, Los Molinos, Red Bluff, Sutter, Vina, Wyandotte Creek, and Yolo subbasins met to continue discussing inter-basin coordination. During the last meeting, subbasin staff reflected on shared learnings in inter-basin efforts and priorities moving forward, provided updates on their GSP development status, and shared key takeaways from adjacent subbasin technical meetings. Efforts will shift towards establishing a framework for continued inter-basin coordination and dialogue throughout GSP implementation. Subbasin representatives will provide regular inter-basin coordination updates at their respective public venues and gather public input related to the direction of current efforts and desired priorities for inter-basin coordination during GSP development and beyond. Meeting materials and updates are available at the website [Access Here].

c) Next Steps

The SHAC will meet again via video conference on March 16, 2021 from 9:00-12:00.

Participants

Participant	Representation/Affiliation	Present
Vina Stakeholder Advisory Committee (SHAC) Members		
Anne Dawson	Domestic well user	Y
Bruce Smith	Business representative	Y
Cheri Chastain	CSU Chico	N
Christopher Madden	Butte College	Y
Gary Cole	Agricultural well user	Y

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Participant	Representation/Affiliation	Present
Tavis Beynon (sub for David Kehn)	California Water Service	Y
Greg Sohnrey	Agricultural well user	Y
James Brobeck	Environmental representative	Y
Sam Goepp	Domestic well user	Y
Samantha Lewis	Agricultural well user	Y
Groundwater Sustainability Agency (GSA) Member Agency Representatives		
Christina Buck	Butte County	Y
Paul Gosselin	Butte County	Y
Kelly Peterson	Butte County	Y
Linda Herman	City of Chico	Y
Erik Gustafson	City of Chico	Y
Jeff Carter	Durham Irrigation District	N
Kamie Loeser	Durham Irrigation District	Y
Colin Klinesteker	Mechoopda Indian Tribe	Y
Darren Rice	Rock Creek Reclamation District GSA	Y
Technical Consultants		
Joe Turner	Geosyntec	Y
Amer Hussain	Geosyntec	Y
Bob Anderson	Geosyntec	Y
Other Representatives		
Debbie Spangler	CA Department of Water Resources	Y
Valerie Kinkaid	O'Laughlin & Paris LLP	Y
Facilitator		
Tania Carlone	Consensus Building Institute	Y
Mariana Rivera-Torres	Consensus Building Institute	Y

Approximately ten members of the public attended the meeting.

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