

**QUARTERLY MEETING OF THE BOARD OF MANAGERS
OF SPECIAL IMPROVEMENT DISTRICT #1
OF THE RIO GRANDE WATER CONSERVATION DISTRICT
March 16, 2022 at 1:30 p.m.
8805 Independence Way, Alamosa CO 81101
And by Zoom Teleconference**

Present: Brian Brownell, President; Carla Worley, Vice-President; Clay Mitchell, Secretary/Treasurer; Jamie Hart, BOM; Miguel A. Diaz, BOM; Sheldon Rockey, BOM; Chris Miner, BOM; Tony Holcomb, BOM; Jake Burris, BOM; Asier Artaechevarria, BOM; and, Mike Kruse, Ex-Officio Member.

Staff and Consultants: Pete Ampe, Hill & Robbins P.C.; Marisa Fricke, Program Manager; Linda Ramirez, Program Assistant; Clinton Phillips, Davis Engineering; Wylie Keller, Water Resource Specialist; Michael Carson, Database Administrator; and April Mondragon, Administrative Assistant.

Guests: James Cooley, Les Alderete, Deb Sarason, David Hofmann, David Gladem, Tony Windhem, Roger, Anna Greenburg, Leslie Bechaver, Mirko Kruse, Dale Bartee, Chris Lopez, Bill Paddock, Dee Greeman, Brian Rue, Andrea Rue, Kurt Reynolds, Chance Reynolds, Chad Spearman, Ernie Myers, Curtis Tremble, Chayito Espinoza, Trish Caton, Judy Jolly.

Meeting Called to Order

President Brownell called the meeting to order at 1:40 p.m. A quorum was present, the Pledge of Allegiance was recited.

Approval of the Agenda

President Brownell asked for approval of the agenda. The agenda was amended to remove letter C under Program Manager Report, and add Statements of Surface Water Rights Owned by the Board of Managers below Election of Officers. A motion was made by Carla Worley to approve the agenda as amended. The motion was seconded by Clay Mitchell and unanimously approved.

Oath of Office for James Cooley and Jake Burris

President Brownell asked for the Oath of Office for James Cooley and Jake Burris. Pete Ampe swore in Jake Burris and explained why James Cooley would not be sworn in at this meeting.

President Brownell thanked Les Alderete and Asier Artaechevarria for serving on the Subdistrict No. 1 Board of Managers.

Approval of the Minutes

President Brownell asked for approval of the following minutes:

- December 1, 2021-Special Meeting
- December 8, 2021-Special Meeting
- December 8, 2021-Executive Session
- January 7, 2022-Special Meeting

A motion was made by Carla Worley to approve the minutes as presented. The motion was seconded by Miguel Diaz and unanimously approved.

Election of Officers

President Brownell asked for Election of Officers. Pete Ampe reminded the Board of the current officers and asked for nominations for president including self-nominations or a nomination to maintain the current officers.

A motion was made by Miguel Diaz to maintain the current officers. The motion was seconded by Chris Miner and unanimously approved.

Board of Managers Declaration of Surface Water Rights

President Brownell asked for the Board of Managers to declare their surface water rights. Pete Ampe explained the purpose of the disclosure.

Brian Brownell: San Luis Valley Canal, San Luis Valley Irrigation District, Santa Maria and Rio Grande Canal.

Jamie Hart: Rio Grande Canal, Santa Maria, McDonald Ditch and Butler Ditch.

Clay Mitchell: Prairie Ditch, San Luis Valley Irrigation District, Rio Grande Canal and Santa Maria.

Carla Worley: Rio Grande Canal, Santa Maria, and Prairie Ditch.

Chris Miner: Rio Grande Canal, Santa Maria, Prairie Ditch and McDonalds Ditch.

Tony Holcomb: Rio Grande Canal.

Jake Burris: well only, no surface water.

James Cooley: Prairie Ditch and Farmers Union.

Sheldon Rockey: Santa Maria, Rio Grande Canal and Farmers Union.

Miguel Diaz: Rio Grande Canal, Santa Maria, Billings Ditch and Prairie Ditch.

Mike Kruse: Santa Maria, Rio Grande Canal, Special Water, San Luis Valley Canal, Farmers Union, Lagararita Creek and wells.

Public Comment

President Brownell asked for public comment. Curtis Tremble asked for further explanation of the sustainability factor. Clinton Phillips reported the factor is no longer being considered, but explained how it could have worked. Dale Bartee expressed his concern with not abandoning well permits once they have been purchased by the Subdistrict. Pete Ampe explained that a water right held under a conservation program by a water conservation district is not subject to the abandonment list.

Program Manager's Report

President Brownell asked for the Program Manager's report. Marisa Fricke highlighted current business including the revisions being done to the Plan of Water Management No. 4, the 2022 ARP process, the 2022 Farm Unit mailing, surface water credit lease reports and the Rio Grande Water Users meeting. She reported on the old business of finishing up the 2021 Annual Report, how the Master Irrigators Course went and looking forward to doing it again next year. Ms. Fricke gave a recap on the meetings and events she attended including the Southern Rocky Mountain Ag conference, Republican River Master Irrigators, and testifying at the Capital. She provided a water replacement update and presented photos of the cohorts from the Master Irrigators course.

Attorney's Report

President Brownell asked for the Attorney's report. Pete Ampe reported his focus has been on the fourth Plan of Water Management. He gave an update on Senate Bill 28, where it is now in the House and the next steps. Mr. Ampe also gave an update on the SWAG augmentation case.

Engineer's Report

President Brownell asked for the Engineer's report. Clinton Phillips presented the change in unconfined aquifer storage study update. He provided the change for March 2022, change between March 2021 and March 2022, the current aquifer level, the current five (5) year average and the acre feet needed to get to the -400,000 level.

Action Items

- *Plan of Water Management#4 revisions*

Marisa Fricke presented a memo outlining the revisions made to the Plan of Water Management #4 since the last meeting, she read through recommendation No. 1.

A motion was made by Carla Worley to approve recommendation No. 1. The motion was seconded by Clay Mitchell. Roll call vote was taken as follows:

Clay Mitchell: Yes

Carla Worley: Yes

Chris Miner: Yes

Tony Holcomb: Yes

Jake Burris: No

Sheldon Rockey: Yes

Miguel Diaz: Yes

Brian Brownell: Yes

Jamie Hart: Yes

Asier Artaechevarria: no response

There were eight (8) yeses, one (1) no and one (1) no response, the motion passed.

Ms. Fricke highlighted the recommendations of section seven (7) of the Plan of Water Management No. 4 regarding wells voluntarily leaving the Subdistrict to be included in a plan for augmentation and what the Subdistrict would be responsible for. Discussion was held on how the depletions would be handled when the Subdistrict purchases well permits and past obligations including CREP contracts.

A motion was made by Sheldon Rockey to take recommendation from staff on how to add language into the new Plan of Water Management to prorate the CREP cost when someone removes their well from the Subdistrict into an augmentation plan. The motion was seconded by Miguel Diaz. Roll call vote was taken as follows:

Clay Mitchell: Yes

Carla Worley: Yes
Chris Miner: Yes
Tony Holcomb: Yes
Jake Burris: Yes
Sheldon Rockey: Yes
Miguel Diaz: Yes
Brian Brownell: Yes
Jamie Hart : Yes
Asier Artaachevarria : Abstained

There were nine (9) yeses, one (1) abstained, the motion passed.

Ms. Fricke presented the memo of recommendations for the Delayed Stream Depletions. Pete Ampe explained the options available for the delayed stream depletions.

A motion was made by Jake Burris that when a well leaves it is no longer liable for any liabilities to the Subdistrict for depletions, the Subdistrict keeps and makes up those remedies those depletions in each ARP and that well is responsible for any pumping or accrued depletions after that point of leaving the Subdistrict. The motion was seconded by Sheldon Rockey. Roll call vote was taken as follows:

Clay Mitchell: No
Carla Worley: No
Chris Miner: Abstained
Tony Holcomb: Yes
Jake Burris: Yes
Sheldon Rockey: Yes
Miguel Diaz: No
Brian Brownell: Yes
Jamie Hart: Yes
Asier Artaachevarria: Abstained

There were five (5) yeses, three (3) nos, and two (2) abstained, the motion passed.

A motion was made by Jake Burris that in the future if change to the response function that would cause retroactive depletion liabilities to a well that is no longer in the Subdistrict, the Subdistrict would cover those obligations. The well would only cover the obligations it accrues after it leaves the Subdistrict, it would not be liable for any obligations when it was part of the Subdistrict. The motion was seconded by Sheldon Rockey. Roll call vote was taken as follows:

Clay Mitchell: No
Carla Worley: No
Chris Miner: No
Tony Holcomb: No
Jake Burris: Yes
Sheldon Rockey: Yes
Miguel Diaz: Yes
Brian Brownell: Yes
Jamie Hart : Yes
Asier Artaachevarria : Abstained

There were five (5) yeses, four (4) nos, and one (1) abstained, the motion passed.

Ms. Fricke presented and highlighted the recommendation for the Depletion Fee section of the Plan of Water Management. Discussion was held on if crops could be raised on \$500 or higher and the amount credits could be sold for. President Brownell reported on an economic report that was completed for the Subdistrict by Colorado State University, a copy is attached. Ms. Fricke presented the recommendation for Timeline for Achieving Sustainability.

A motion was made by Clay Mitchell that the initial depletion fee will be \$500 per acre foot and the Board must look at whether that is achieving a one for one each year then adjust the depletion fee as the Board finds reasonable to achieve that one for one as soon as possible.

Clay Mitchell amended his motion to establish that beginning after the second year of operation of the Plan of Water Management No. 4 and each year thereafter if the net groundwater withdrawals are above or more than 2,000 acre feet per year the Board must adjust the depletion fee upwards by \$500 per acre foot; that does not change the Board's ability to act if the net groundwater withdrawals are less than

2,000 acre feet they have that ability but it is mandatory if it is above 2,000 acre feet per year. The motion was seconded by Jake Burris.¹ Roll call vote was taken as follows:

Clay Mitchell: Yes
Carla Worley: Yes
Chris Miner: Yes
Tony Holcomb: Yes
Jake Burris: Yes
Sheldon Rockey: No
Miguel Diaz: No
Brian Brownell: Yes
Jamie Hart: Yes
Asier Artaachevarria: Abstained

For the record Sheldon Rockey was not opposed, he voted no due to over amending the motion.

There were seven (7) yeses, two (2) nos, and one (1) abstained, the motion passed.

Ms. Fricke presented the recommendations for Allocation of Groundwater when a Sustainable Aquifer Level is Achieved, she read the options available from the memo. Discussion was held on rim inflow credit; staff was directed to revise the section and bring it back to the Board for review and consideration.

Ms. Fricke presented the recommendations for Augmentation Plans and what the Subdistrict would no longer do for the well. Mike Kruse questioned the ownership of rim inflow.

Ms. Fricke presented the memo of recommendations for Subdistrict Land Supplied from the Confined Aquifer which has similar language on how Augmentation wells would be managed. Jamie Hart asked the Board to address what happens to the Subdistrict once it meets sustainability and its goals are met. Pete Ampe explained the Subdistrict could be dissolved once it has met all of its goals or reduce all of its fees to zero in case something happens down the road.

- Subdistrict No. 1 Properties

Marisa Fricke reported receiving interest from the Brown's wanting to use the Subdistrict owned Lacy property to graze their sheep and interest from Chad Spearman wanting to use the Medano property to graze his cattle. Chad Spearman provided a written proposal to repair fence and install cattle guards in lieu of pasture/grazing on the Medano property. President Brownell stated Mr. Spearman's offer would be discussed at a future meeting. Ms. Fricke reported the Brown's do summer time grazing; she provided the number of sheep they would be grazing as well as the price per head.

A motion was made by Sheldon Rockey to accept the Wayne Brown lease on the Medano property. The motion was seconded by Tony Holcomb and unanimously approved.

- Contract Wells

Marisa Fricke reminded the Board and attendees what the Rules state about contracting wells into the Subdistrict. She reported six (6) contract wells had been notified by DWR of not meeting their terms in connection with SWSP's, therefore would no longer be covered by Subdistrict No. 1.

- Well Purchase Program Application Form

Marisa Fricke asked the Board for an application deadline, program process deadline and if there were any changes that needed to be done to the Well Purchase Program application form. The application deadline was set on May 1st and the ranking deadline was set on June 7th.

- Appeals

Marisa Fricke reported staff prepared a summary of appeals with the recommendation to approve all eighteen (18). Jake Burris reported being a part of the appeal referenced in the summary as No. fourteen (14) under Aspen Produce.

A motion was made by Sheldon Rockey to accept the recommendation from staff on approvals, all except No. fourteen (14). The motion was seconded by Clay Mitchell and unanimously approved.

A motion was made by Clay Mitchell to accept appeal No. fourteen (14). The motion was seconded by Sheldon Rockey, Jake Burris abstained, the motion passed.

¹ **Amended to add the second to Clay Mitchell's motion. This set of minutes was approved at the June 16, 2022 Quarterly Meeting with this change

A motion was made by Clay Mitchell to follow staff recommendation and not approve appeal No. one (1). The motion was seconded by Sheldon Rockey and unanimously approved.

New Business

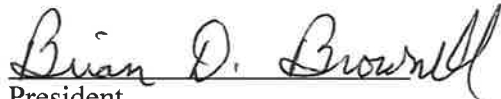
Mike Kruse gave an update on a meeting he attended representing the Subdistrict to discuss permanent forbearance with the Rio Grande Canal. Jaime Hart attended the meeting as a representative of the canal company and reported on what the Rio Grande Canal company is considering as a trade for permanent forbearance. Ms. Fricke and Carla Worley updated the Board on a meeting held with a few of the Board of Managers from Subdistrict Nos 2, 3 and 6.

Next Meeting

A special meeting was scheduled for April 12, 2022 at 9:00 a.m.
The next quarterly meeting is scheduled for June 7, 2022 at 1:30 p.m.

Adjournment

The meeting was adjourned at 5:38 p.m.



President



Secretary/Treasurer

Estimating the variable water fee to eliminate over-pumping in
Subdistrict No.1

Prepared for the Special Improvements District of the Rio Grande Water Conservation District

Allison Bauman and Rebecca Hill
Colorado State University

Estimating the variable water fee to eliminate over-pumping in Subdistrict No.1

Water levels in the Unconfined aquifer, under jurisdiction of Subdistrict No.1,¹ are declining. Prolonged drought that has greatly reduced inflows and surface water diversions into the Subdistrict Territory are leading to groundwater withdrawals exceeding the total amount of recharge. Since its inception in 2011, Subdistrict No.1 has put in place economic incentives to encourage voluntary reductions in groundwater use, with the goal of and achieving and maintaining a sustainable aquifer. Voluntary groundwater reductions to date have not been sufficient to prevent aquifer decline. If aquifer levels continue to decline the State Engineer will, at some point, not be able to approve a future Annual Replacement Plan, resulting in the curtailment of Subdistrict Wells. The curtailment of all Subdistrict Wells will have a severe negative impact on individual producers, the agricultural economy of Subdistrict No. 1, and the San Luis Valley as a whole.

As voluntary conservation methods have been unsuccessful, the Subdistrict is focusing on achieving sustainability through economic disincentives to reduce net groundwater consumptive use. The variable water fee, based on acre-feet pumped, has increased each year, starting at \$45 per acre foot in 2010 and increasing to \$150 per acre foot in 2021. There has been no appreciable decrease in groundwater use as the fee has increased. The goal of this project is to estimate the variable water fee for pumping water in Subdistrict No. 1 that will cause producers to stop overpumping groundwater from the aquifer. Producers will be charged one fee (tier one) for the amount water that is replenished by surface water each year. We estimate the short-run break-even variable water fee for an average farm (based on the enterprise budgets provided) that producers will be charged when they go beyond this amount (tier two). In this study, we are addressing groundwater only acres, we are not considering surface water use.

Methods and Assumptions

The future short-run break-even value of water in Subdistrict No. 1 varies greatly depending on the climatic conditions as well as crop prices. Because future climatic conditions and prices are unknown, we are unable to estimate the exact short-run break-even price of water next year or in subsequent years. Instead, we estimate a range for the tier two variable water fee, similar in concept to the enterprise crop budgets from CSU Extension², showing the estimated short-run break-even tier two variable water fee for an average farm for alternative yields and alternative prices.

This range of fees is based on the farming conditions that are represented in the crop budgets provided to us by Subdistrict No. 1. Depending on actual climatic conditions and crop prices, the variable water fee at which producers will not overpump may or may not fall within this range. The range of the variable water fee provided will not guarantee the basin will not be over pumped. We provide the best estimate we can given the budget, time, and data constraints.

¹ Geographic boundaries of the district are part of the San Luis Valley in Colorado and include parts of Alamosa County, Rio Grande County, and Saguache County. See map in Appendix.

² <https://abm.extension.colostate.edu/enterprise-budgets-crop/>

To estimate the tier two variable water fee range (herein referred to as the variable water fee), we use data provided by the Subdistrict No.1 for each major crop grown in the basin including yield, market price, and variable cost per acre (not including variable water fee).³ Yields are based on crop water requirements provided and assumed to be yields in a normal year. Crops include potato, barley, established alfalfa⁴, hemp, and quinoa.

To calculate the price of water which will incentivize producers not to overpump, we identify the variable water fee at which profit is equal to zero (i.e., variable cost per acre is equal to revenue per acre, for each crop). Beyond this amount, producers cannot cover short-run costs and we assume they will choose to fallow additional acres. From the crop budgets provided, all items are considered variable costs except for land rental value and property taxes. In our approach, due to lack of data on the heterogeneity of crop yields across farms, we provide an estimate for a variable water fee for a representative farm for which it either makes sense to irrigate or not. In reality, yields differ across farms and the effect of a specific variable water fee will differ by producer.

We assume all water use changes are made on the extensive margin, meaning that producers will reduce acreage when faced with higher water prices. This is in contrast with changes on the intensive margin, where producers would choose to operate the same number of acres but reduce the amount of water applied per acre. This assumption is made because we do not have the data that would allow us to estimate changes on the intensive margin.

In this study, we are not predicting the breakeven point at which *each* producer will stop pumping groundwater, we are evaluating the breakeven point for the “*average*” producer. The full financial picture for each producer will affect the variable water fee at which they will stop pumping groundwater. Some aspects that will impact an individual producers’ finances but are not included in this study include government payments, insurance payments⁵ (e.g., prevented planting⁶, crop insurance), off-farm income, conservation programs (e.g., CREP⁷), and access to surface water.

Results

Results are presented for each crop separately, showing the variable water fee per acre-foot for an average price and yield as well as 10% and 25% lower and higher yields and prices. A portion of the estimated negative variable water fees are influenced by the availability of surface water, in this study we are only focusing on groundwater. Additionally, producers may receive insurance payments to offset low price/low yield years, have off-farm income sources, and/or receive government payments, none of which is not included in this analysis.

³ Thompson, Kirk, Crop Rotation Economics Given the Increased Cost of Water, 2020 Agro Engineering Workshop.

⁴ While other types of hay/grass are grown in the region (including Sudan grass hay and grass hay/pasture), we do not have enough data to make a reasonable prediction for the variable water fee for hay/grass other than alfalfa.

⁵ <https://www.rma.usda.gov/>

⁶ <https://www.rma.usda.gov/en/Topics/Prevented-Planting>

⁷ <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-enhancement/index>.

The necessary price point for incentivizing CREP is beyond the scope of this project, our focus is on the variable water fee.

Potatoes

Potatoes represent around 30% of irrigated acres in Subdistrict No.1 and have the highest estimated variable water fee. Assuming an average yield and price, the variable price of water at which producers would stop pumping is \$1,062 per acre-foot. To account for a range of climatic and economic conditions, assuming a 25% lower yield and price up to a 25% higher yield and price, the variable price of water at which producers will stop pumping ranges from \$38 to \$2,738 per acre-foot.

Table 1. Potato variable water fee per acre-feet for a range of yields and prices

		ALTERNATIVE PRICES (\$/cwt)				
		-25%	-10%	10%	25%	
ALTERNATIVE YIELDS		\$7.50	\$9.00	\$10.00	\$11.00	\$12.50
-25%	263.25	\$38	\$301	\$477	\$652	\$916
-10%	315.90	\$301	\$617	\$828	\$1,039	\$1,354
cwt/acre	351.00	\$477	\$828	\$1,062	\$1,296	\$1,647
10%	386.10	\$652	\$1,039	\$1,296	\$1,553	\$1,939
25%	438.75	\$916	\$1,354	\$1,647	\$1,939	\$2,378

Note: Yields are based on net production.

Barley

Barley represents around 21% of irrigated acres in Subdistrict No.1. Assuming an average yield and price, the variable price of water at which producers would stop pumping is \$44 per acre-foot. To account for a range of climatic and economic conditions, assuming a 25% lower yield and price up to a 25% higher yield and price, the variable price of water at which producers will stop pumping ranges from -\$136 to \$275 per acre-foot. Barley is often planted as a cover crop in a potato rotation. While barley is not always a profitable crop (as seen by the negative water fees), the profits earned during the potato rotation on the same field help to mitigate any losses.

Table 2. Barley variable water fee per acre-feet for a range of yields and prices

ALTERNATIVE YIELDS		ALTERNATIVE PRICES (\$/cwt)				
		-25%	-10%	10%	25%	
		\$7.13	\$8.55	\$9.50	\$10.45	\$11.88
-25%	54.00	(\$136)	(\$90)	(\$59)	(\$28)	\$18
-10%	64.80	(\$90)	(\$34)	\$3	\$40	\$95
cwt per acre	72.00	(\$59)	\$3	\$44	\$85	\$146
10%	79.20	(\$28)	\$40	\$85	\$130	\$198
25%	90.00	\$18	\$95	\$146	\$198	\$275

Note: Yields are based on net production.

Alfalfa

Alfalfa represents around 18% of irrigated acres in Subdistrict No.1. Assuming an average yield and price, the variable price of water at which producers would stop pumping is \$133 per acre-foot. To account for a range of climatic and economic conditions, assuming a 25% lower yield and price up to a 25% higher yield and price, the variable price of water at which producers will stop pumping ranges from -\$30 to \$344 per acre-foot.

Table 3. Alfalfa variable water fee per acre-feet for a range of yields and prices

ALTERNATIVE YIELDS		ALTERNATIVE PRICES (\$/ton)				
		-25%	-10%	10%	25%	
		\$136.50	\$163.80	\$182.00	\$200.20	\$227.50
-25%	3.60	(\$30)	\$12	\$40	\$68	\$110
-10%	4.32	\$12	\$62	\$96	\$130	\$180
tons per acre	4.80	\$40	\$96	\$133	\$171	\$227
10%	5.28	\$68	\$130	\$171	\$212	\$274
25%	6.00	\$110	\$180	\$227	\$274	\$344

Note: Yields are based on net production.

Hemp

Hemp represents around 2% of irrigated acres in Subdistrict No.1. Assuming an average yield and price, the variable price of water at which producers would stop pumping is \$2,529 per acre-foot. To account for a range of climatic and economic conditions, assuming a 25% lower yield and price up to a 25% higher yield and price, the variable price of water at which producers will stop pumping ranges from -\$1,409 to \$7,591 per acre-foot. Hemp is an emerging market in the United States which has seen large changes in prices and profitability for producers over time. This analysis relies on the market conditions outlined in the provided enterprise budgets and may not represent the current market conditions for hemp. Due to the emerging nature of this crop further analysis would be needed to obtain a more reliable estimate of the short-run break-even price.

Table 4. Hemp variable water fee per acre-feet for a range of yields and prices

ALTERNATIVE YIELDS		ALTERNATIVE PRICES (\$/lb.)				
		-25%	-10%	10%	25%	
		\$6.00	\$7.20	\$8.00	\$8.80	\$10.00
-25%	135,000	(\$1,409)	(\$396)	\$279	\$954	\$1,966
-10%	162,000	(\$396)	\$819	\$1,629	\$2,439	\$3,654
lbs.	180,000	\$279	\$1,629	\$2,529	\$3,429	\$4,779
10%	198,000	\$954	\$2,439	\$3,429	\$4,419	\$5,904
25%	225,000	\$1,966	\$3,654	\$4,779	\$5,904	\$7,591

Note: Yields are based on net production.

Quinoa

Quinoa represents around 2% of irrigated acres in Subdistrict No.1. Assuming an average yield and price for cleaned quinoa, the variable price of water at which producers would stop pumping is \$468 per acre-foot. To account for a range of climatic and economic conditions, assuming a 25% lower yield and price up to a 25% higher yield and price, the variable price of water at which producers will stop pumping ranges from \$126 to \$906 per acre-foot.

Table 5. Quinoa variable water fee per acre-feet for a range of yields and prices

ALTERNATIVE YIELDS		ALTERNATIVE PRICES (\$/lb.)				
		-25%	-10%	10%	25%	
		\$0.49	\$0.59	\$0.65	\$0.72	\$0.81
-25%	900	\$126	\$214	\$273	\$331	\$419
-10%	1,080	\$214	\$319	\$390	\$460	\$565
lbs. per acre	1,200	\$273	\$390	\$468	\$546	\$663
10%	1,320	\$331	\$460	\$546	\$631	\$760
25%	1,500	\$419	\$565	\$663	\$760	\$906

Note: Yields are based on net production.

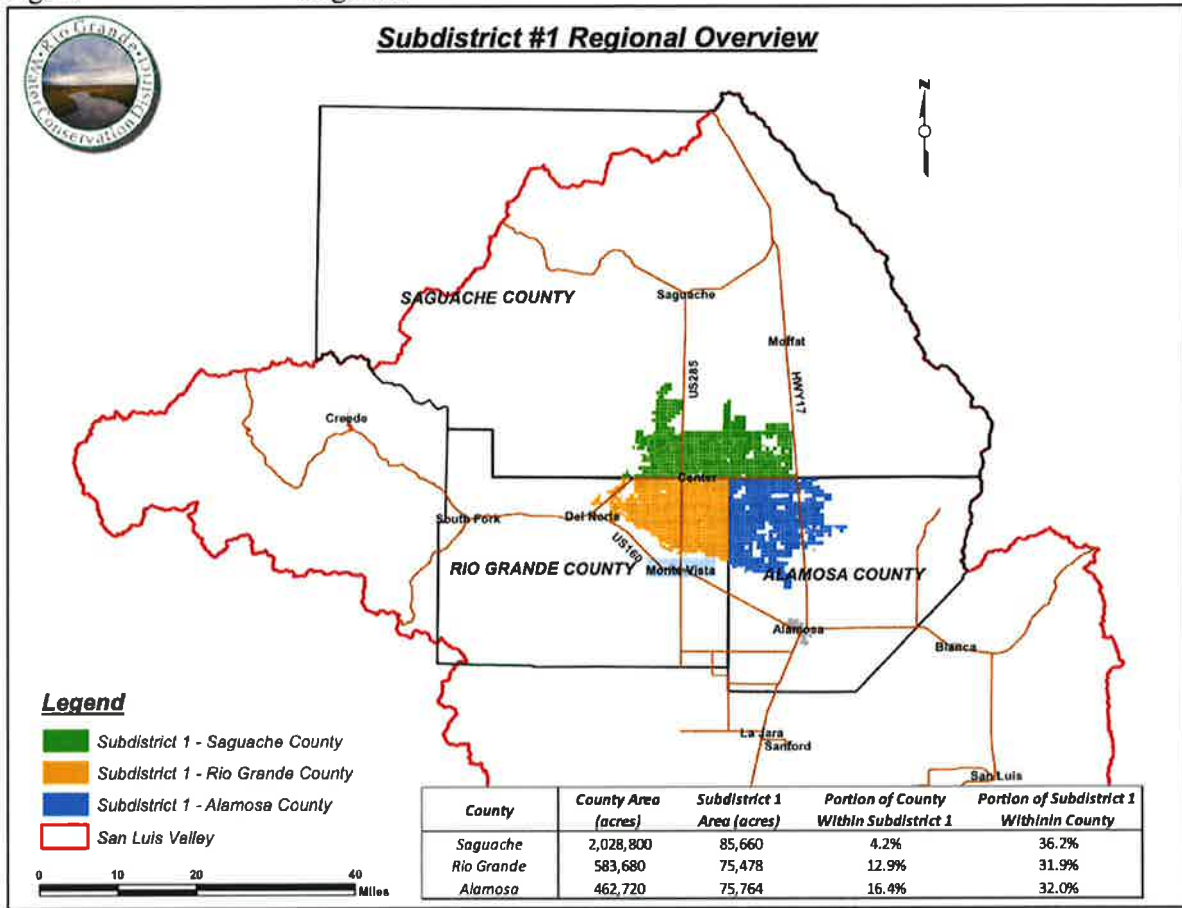
Recommendations

In an average year, the estimated variable water fee per acre-foot at which producers will stop pumping groundwater is \$44 for Barley, \$133 for Alfalfa, \$468 for Quinoa, and \$1,062 for Potatoes. The variable water fee is estimated based on the assumption that when profit is zero (i.e., the variable cost per acre is equal to the revenue per acre), producers will choose to fallow additional acres. Because future climatic conditions and prices are unknown, we are unable to estimate the exact price that will cause producers to halt overpumping of water next year or in subsequent years, these estimated fees are based on an “average” year. A sensitivity analysis is also provided, showing a range of potential water fees based on higher and lower yields and prices.


Another scenario that could achieve the goal of reducing aquifer depletions would be to allocate groundwater pumping credits, equal to the sustainable depletion rate, to each producer and allow producers to trade credits. This way, the basin is guaranteed not to pump more than the target and the district does not have to set a single price, which will vary from year to year based on crop prices and climatic conditions. If Subdistrict No.1 is still utilizing economic incentives to curb groundwater use in the future, another option that could be pursued would be to index the price of water to climate conditions. The marginal value of water in production differs greatly depending on the climate and soil conditions. Linking the variable price of water to climatic conditions would allow conservation goals to be met as the climatic conditions change from year to year.

Appendix

Figure 1. Subdistrict #1 Regional Overview



I Jake Burris, do [select swear, affirm, or swear by the everliving God] that I will support the constitution of the United States, the constitution of the state of Colorado, and the laws of the state of Colorado, and will faithfully perform the duties of the office of the Board of Managers of Special Improvement District No. 1 upon which I am about to enter to the best of my ability.


Signature

3/16/2022
Date

