



Agricultural Water Optimization Program 2025 Annual Report



November 28, 2025

Prepared by the Division of Water Resources, Department of
Agriculture and Food and the Division of Water Rights



Contents

Executive summary.....	3
Introduction.....	4
Program background.....	5
2025 activities.....	5
2025 project selection.....	7
Program funding status.....	8
Other committee accomplishments.....	8
Program effectiveness.....	9
Program goals.....	9
Agricultural and other program benefits.....	10
Water use yield efficiency.....	10
Water use impacts.....	12
Saved water.....	12
Reduced diversion and depletion.....	12
Water use impact case studies.....	13
Depletion estimation methods.....	13
Off-farm projects.....	14
Off-farm Case Study 1 – Piute County.....	14
Project information:.....	14
Analysis observations.....	15
Off-farm Case Study 2 – Uintah County.....	18
Project information:.....	18
Analysis observations.....	18
On-farm projects.....	21
On-farm Case Study 1 – Davis County.....	21
Project information:.....	21
Analysis observations.....	21
On-farm Case Study 2 – Box Elder County.....	23
Project information:.....	23
Analysis observations.....	24
On-farm Case Study 3 – Box Elder County.....	25
Project information:.....	25
Analysis observations.....	26
On-farm Case Study 4 – Wayne County.....	27

Agricultural Water Optimization Program 2025 Annual Report

Project information:.....	27
Analysis observations.....	28
On-farm Case Study 5 – Piute County.....	29
Project information:.....	29
Analysis observations.....	30
On-farm Case Study 6 – Rich County.....	31
Project information:.....	31
Analysis observations.....	32
On-farm Case Study 7 – Cache County.....	33
Project information:.....	33
Analysis observations.....	34
On-farm Case Study 8 –Box Elder County.....	35
Project information:.....	35
Analysis observations.....	36
On-farm Case Study 9 –Utah County.....	37
Project information:.....	37
Analysis observations.....	38
2026 program outlook.....	40
2026 application period.....	40
Program modifications and improvements.....	40
Studies and research.....	40
Appendix.....	41
Ranking criteria.....	41
Water use analysis description.....	43
ET method.....	43
Off-farm depletion estimation methodology.....	43
On-farm depletion estimation methodology.....	45

Executive summary

The Agricultural Water Optimization Program funds agricultural efficiency projects throughout Utah that maintain viable agriculture without increasing water depletion to enhance water availability. The Agricultural Water Optimization Committee was created in 2023 to manage the program through the Utah Department of Agriculture and Food, and \$200 million was appropriated to the program (Utah Code 73-10g-2). This committee consists of a range of water experts and leaders and has already completed numerous activities.

For 2025 funding, the committee accepted applications from Jan. 1 to Feb. 28, 2025 for agricultural efficiency projects based on scoring criteria established by the committee. In total, the committee selected 161 on-farm and off-farm projects for funding at a cost of approximately \$39 million in program funds. The committee continues to be active in establishing guiding principles and improving project application scoring criteria. The committee engaged with stakeholders at regular monthly meetings.

As of October 2025, three saved water change applications have been filed with the Division of Water Rights and are being processed. Measuring the impact of this program on water use will be more accurate and effective as projects are completed and data becomes available.

To evaluate program impacts on water depletion, the Division of Water Resources selected eleven case studies: two off-farm and nine on-farm. These case studies have sufficient data available to begin establishing an estimation process for impacts on water depletion. The division also relied on methods and information provided by a 2025 report, *Quantifying Depletion Differences from Irrigation Practice Changes in Utah*, from the Division of Water Rights and Utah State University. Based on these case studies and methods, the Division of Water Resources found varied results. Water was saved in some instances, but depletion increased in others. Initial analysis suggests that the greatest water depletion savings are associated with off-farm projects. Given the margin of error and short timeframe being considered, no firm conclusions are appropriate at this time, but this effort has been helpful in testing concepts.

The 2026 application period will be held from Jan. 1, 2026 to Feb. 28, 2026. The committee anticipates spending \$20-30 million in grant funds for the upcoming funding cycle. The committee is also developing research objectives and plans to allocate up to \$1 million in program funds on priorities identified through this process.

Introduction

Recognizing the need to promote best practices in agricultural water use, the Utah Legislature established the Agricultural Water Optimization Committee through SB 277 (2023). This legislation defines committee authority and duties, directs the process by which program grant funds are to be issued, and establishes the qualifications of individuals eligible to serve on the committee. Current committee membership is presented in Table 1.

SB 277 allocated \$200 million in funds that the Utah Department of Agriculture and Food may administer as grant funding for agricultural water optimization projects. By statute (Utah Code 73-10g-203.5), agricultural water optimization is defined as the “implementation of agricultural and water management practices that maintain viable agriculture without increasing water depletion to enhance water availability and minimize impacts on water supply, water quality, and the environment.”

Under the legislation, the Utah Division of Water Resources, with support from the Utah Department of Agriculture and Food and the Division of Water Rights, has prepared this report regarding projects implemented, water saved and the overall success of the program. This report will be submitted annually by Nov. 30 and delivered to the Legislative Water Development Commission, Natural Resources, Agriculture, and Environment Interim Committee, Utah Water Task Force and Utah Watersheds Council.

Table 1: Agricultural Water Optimization Committee Members

Agency	Committee Member
Utah Department of Agriculture and Food	Kelly Pehrson
Utah Division of Water Resources	Candice Hasenyager
Utah Division of Water Rights	Teresa Wilhelmsen
Utah State University	Dr. Burdette Barker
Local Conservation Districts	Jason Morgan
Conservancy Districts	William Merkley
Agriculture Representative	Brett Bunker (Chair)
Agriculture Representative	Jeff Hardy (Vice Chair)
Agriculture Representative	Brandon Yardley

Program background

Historically in the state of Utah, agricultural water use has represented about 80% of total diverted use. With urban development, this number is steadily declining in some areas, but agriculture still remains the industry with the highest water consumption throughout the state.

Decades ago, the majority of farmers in Utah relied on unimproved flood irrigation to water crops, but this method has known inefficiencies. Additionally, unlined ditches have commonly been used to deliver water to fields, which results in seepage and evaporative losses. In some areas of the state, rising numbers of producers have been converting their systems to other forms of irrigation that can result in water use reductions and other economic and environmental benefits. These changes have been bolstered by funding from various federal grant programs and state loan options.

With water scarcity becoming a significant issue across the state, there has been more interest in incentivizing farmers to adopt updated irrigation methods. In 2018, the state Legislature established the Agricultural Water Optimization Task Force to research opportunities for improving water efficiency in the agricultural sector and initiated studies to evaluate the most effective ways to accomplish this goal. The task force successfully oversaw seven studies aimed at expanding understanding of agricultural water optimization and its impacts.

After five years, necessary changes were identified and made to the program through the passage of SB 277 during the 2023 General Legislative Session. The task force was dissolved and replaced with the Agricultural Water Optimization Committee, and the mission and objectives of the program were clarified. This included adding a definition of saved water to Utah Code (further clarified in SB 18 in 2024) and allowing diversion savings alone as an acceptable outcome for efficiency projects.

2025 activities

The committee hosted a spring 2025 application period from Jan. 1 to Feb. 28, 2025. During this period, 394 on-farm applications and 59 off-farm/other project applications were submitted for a total of 453 projects. Of the 453 applications, the committee approved 161 projects under the 2025 application period. The number and types of approved projects are presented in Table 2. Figure 1 shows an overview of major project milestones.

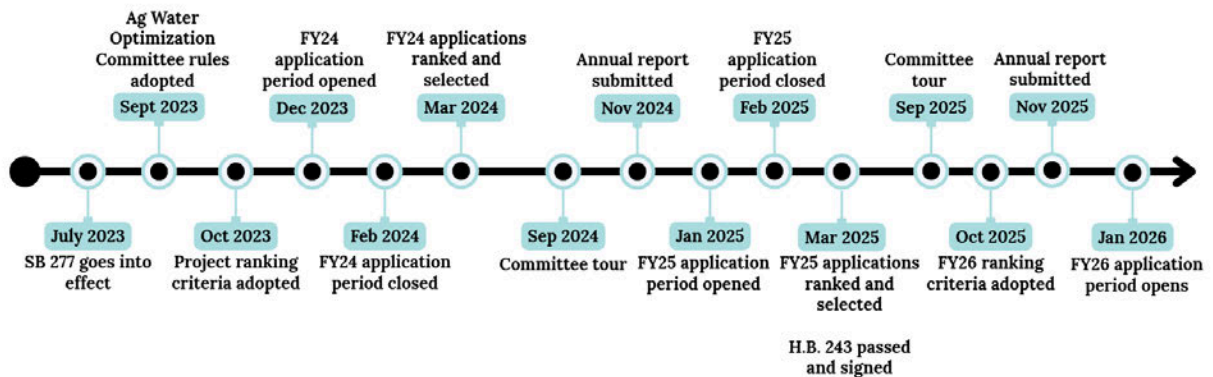
Table 2: Summary of grant applications from 2025 applications

Project Type	Number of Projects
On-Farm	120
Canal Piping	23
Measurement/Telemetry	4
Water Loss Study	11
Other	3
Total	161

A notable amendment was made to SB 277 through HB 243 during the 2025 General Session. It introduced the following provisions:

- Allows the Agricultural Water Optimization Committee to use certain money to fund research
- Modifies eligibility requirements related to grants for agricultural water optimization
- Makes technical and conforming amendments

Figure 1: Timeline of past and future committee activities



2025 project selection

Prior to the spring 2025 application period, the committee established ranking and project selection criteria to prioritize projects for funding. As part of the application process, the Division of Water Rights conducted 505 pre-consultations, evaluating the likelihood of water savings for each proposed project. On-farm projects were ranked separately from canal/irrigation company projects, and each had its own ranking criteria. These criteria are provided in Appendix A as Table 18 for on-farm projects and Table 19 for off-farm projects. Table 3 summarizes the outcome of this process, showing the number of grants recommended and funding amount by county. For 2025, a total of approximately \$39 million was recommended for project funding throughout the state.

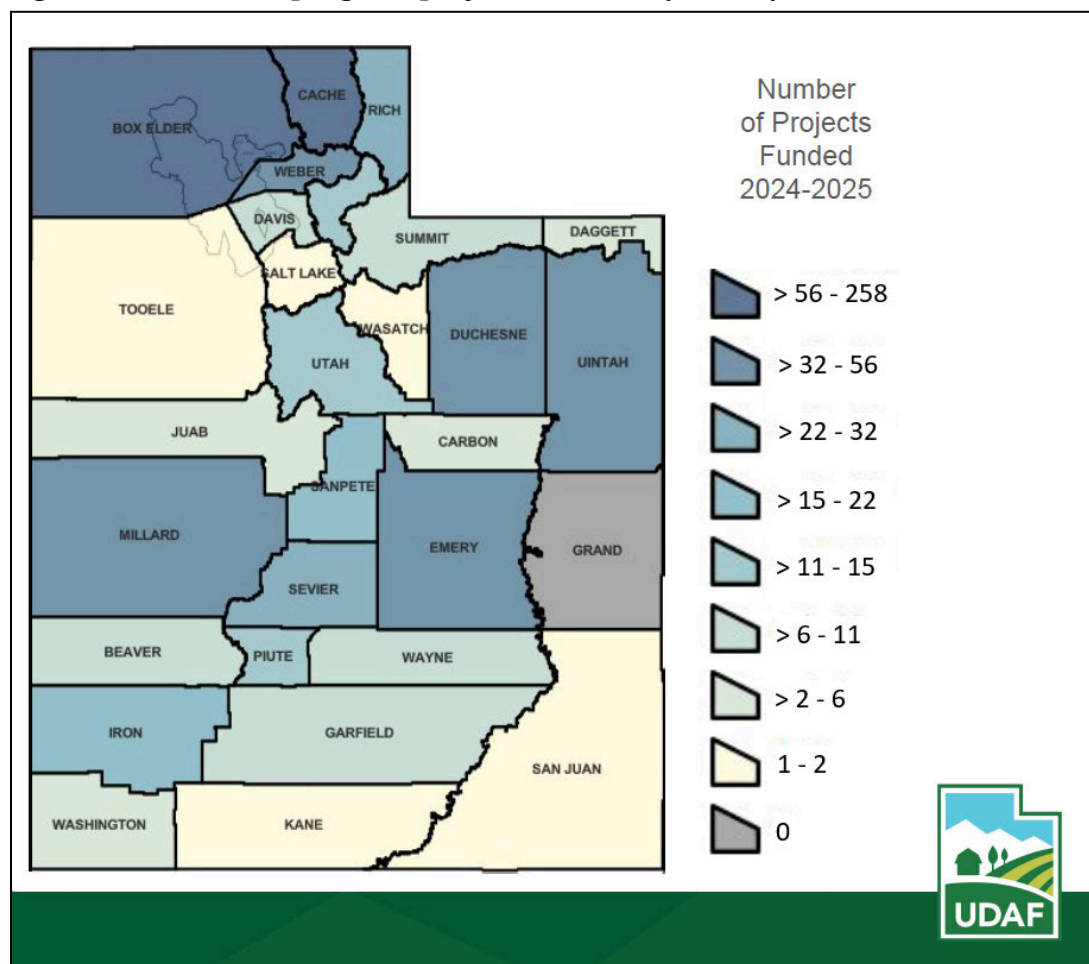
Table 3: Summary of grants recommended from 2025 applications by county

County	Grants funded	Cost
Beaver	3	\$701,700
Box Elder	29	\$4,857,285
Cache	34	\$7,220,515
Carbon	3	\$233,568
Daggett	1	\$1,000,000
Duchesne	17	\$5,481,530
Emery	7	\$787,161
Garfield	2	\$212,000
Iron	1	\$975,000
Juab	3	\$333,282
Kane	1	\$15,000
Millard	9	\$1,405,000
Morgan	4	\$2,100,247
Piute	3	\$1,700,000
Rich	7	\$1,420,882
San Juan	1	\$79,830
Sanpete	6	\$1,291,250
Sevier	8	\$3,007,000
Summit	2	\$1,097,500
Tooele	1	\$81,000
Uintah	10	\$1,932,106
Utah	3	\$1,014,050
Wayne	2	\$143,017
Weber	4	\$1,946,795
Total	161	\$39,035,718

Program funding status

Between 2024 and 2025, the Agricultural Water Optimization Program received 786 applications, resulting in 386 funded projects statewide. Of the funded projects, 75 involve off-farm improvements and 293 improve on-farm optimization. To date, the program has obligated \$86.6 million dollars in total funding and has paid out \$23.8 million. Ninety projects have been completed, representing a total investment of \$15.7 million in agricultural water efficiency improvements. Of the \$23.8 million, \$8.1 million has gone to projects that are in the process of implementation but have not yet been completed.

Figure 2: Number of program projects funded by county



Other committee accomplishments

The committee has been successful at coordinating and bringing partners together on these efforts. A variety of state agencies, academic voices and water users are represented

on the committee, and they are all successfully moving the program forward. On September 5, 2025 the department hosted a committee tour in Delta, Utah to learn more about the Sevier River and the challenges those communities face with water management. It was well attended and served as a great opportunity to learn and engage.

Figure 3: Photo from committee tour



Program effectiveness

Program goals

The mission of the Agricultural Water Optimization Program, as defined by the committee in its strategic plan, is to help agricultural producers optimize their water use to improve water resiliency in Utah. This mission is accomplished through the following goals:

- Support agricultural water use resilience
- Support agricultural water users
- Effectively communicate program information
- Bolster resilience of agricultural operations
- Explore emerging technologies

Agricultural and other program benefits

Some of the benefits and value of the program to agriculture were covered in the 2024 report. While these aspects were mostly discussed qualitatively, that report shares helpful information and perspectives. For this year’s report, the agricultural benefits narrative will be limited, but readers should refer to the 2024 report to learn more about how the program helps support agriculture and improve the environment. Keep in mind that the benefits identified in the 2024 report are expected to be ongoing and expand as the program grows. Some of the identified benefits from the 2024 report include: long-term management flexibility, expanded measurement and telemetry, open space retainment, heat island avoidance and water quality improvement.

Water use yield efficiency

Water optimization program participants are required to submit annual reports that compile comprehensive crop data, including crop yield, pre-project water usage, and post-project water usage. Water use efficiency, computed by dividing the produced crop yield by the total amount of water applied, can be calculated for each project. To allow for comparison between different crops, the average price in dollars per crop unit was used to convert the water use efficiency from acre-feet of water applied to dollar value per acre-foot of water applied, allowing for more uniform comparisons across crops and years.

Table 4: Average financial return per acre-foot of water applied per acre for completed water optimization projects with annual reporting

Project Status	Average Financial Return per Acre-Foot of Water Applied per Acre
Pre-project	\$318
Post-project	\$808

Of the water optimization projects reviewed that completed installation and had a full irrigation season in 2024 (seven projects total), data indicates a significant positive financial impact. Post-project, the average financial return increased by \$490, rising from \$318 to \$808 per acre-foot of water applied per acre.

Furthermore, the projects showed a 45% average increase in crop yield and a 270% average increase in water use efficiency within one year, compared to pre-project figures.

Beyond financial and yield improvements, labor hours have also significantly decreased. Pre-project, irrigation labor averaged 902 hours per season. This decreased to 288.5 hours post-project, resulting in a saving of 613.5 hours. This reduction in labor, often performed by one farmer during late-night hours, has allowed for producers to focus their time and attention on other critical farm operations.

Table 5: Pre-Project water use yield efficiency

Project #	Pre-Project Applied Water (ac-ft)	Crop	Yield	Yield Unit	Yield Efficiency of Water Use (unit/ac-ft)	Labor Hours
1	69	Annual Grass Hay	3	tons/ac	3.7	18
2	100	Alfalfa	5	tons/ac	1.7	18
3	60	Alfalfa	2.5	tons/ac	0.8	100
4	39	Annual Grass Hay	2	tons/ac	0.7	150
5	195	Pasture	2	tons/ac	0.6	100
6	132	Alfalfa	2.3	tons/ac	0.2	160
7	336	Grain Corn	175	bushel/ac	40.1	336

Table 6: Post-Project water use yield efficiency

Project #	Post-Project Applied Water (ac-ft)	Crop	Yield	Yield Unit	Yield Efficiency of Water Use (unit/ac-ft)	Labor Hours
1	53	Annual Grass Hay	4	tons/ac	6.5	15.5
2	19.59	Alfalfa	5	tons/ac	8.9	1
3	37.76	Alfalfa	6	tons/ac	3.2	1
4	16.9	Annual Grass Hay	2.75	tons/ac	2.3	15
5	46.34	Pasture	2	tons/ac	2.8	8
6	30.36	Alfalfa	4.5	tons/ac	1.6	60
7	247.65	Grain Corn	170	bushel/ac	52.8	168

Water use impacts

Saved water

Saved water is defined by Utah Code 73-3-3 as:

- The net decrease in depletion or a net reduction in diversion resulting from an agricultural water optimization project as quantified by the State Engineer in a final order approving a change application, or certificate of beneficial use issued on an approved change application. Further, Utah Code 73-3-3 defines:
 - “Net decrease in depletion: means a net decrease in water consumed that is accomplished by implementing an agricultural water optimization project under a perfected water right.
 - “Net reduction in diversion” means a net decrease in water diverted under a perfected water rights that is accomplished by implementing an agricultural water optimization project.

During this year’s application period, 505 pre-consultations were performed by the Division of Water Rights regional office staff. Of the reviewed projects, 447 were identified as having potential diversion savings. Another 217 were identified as having a potential for depletion reductions. These pre-consultations are important to the program and help producers prepare their applications. Additionally, the information was used in the project rankings and the selection process by the Agricultural Water Optimization Committee.

A saved water application is currently the only mechanism whereby depletion savings can be legally protected and shepherded for other purposes. At this time, three saved water change applications have been submitted and are currently being processed by the Division of Water Rights. These applications are not expected to be finalized until after this report is fully published, and therefore will not be reported for this year.

Reduced diversion and depletion

For this report, the Division of Water Resources has elected to take a case study approach to analyzing water use impacts from agricultural water optimization projects. Given the limited number of completed committee projects¹ with a full irrigation season worth of data. This approach makes the most sense at this time and gives some insight into how the

¹ Although the Agricultural Water Optimization Program has existed since 2018, the division only evaluates projects approved under the committee, which was established in 2023.

projects are impacting water use. This approach also provides an opportunity to closely examine the results and develop additions or improvements for future reports.

Currently, the data show mixed results regarding depletion changes. Some projects show depletion savings while others show increased depletions. The margin of error associated with the analysis of these projects makes arriving at definitive conclusions unreasonable at this time. As the program progresses, analysis will become more certain as the number of projects and irrigation seasons worth of data increase. At this time, no confident assessment of overall increase or decrease in depletion can be made. Unique circumstances and annual water supply for an individual producer can play a major role in any one single year's result, and each case should be considered with that understanding. Long-term effects from water and field management choices stemming from these changes will become more apparent with further data and time.

Even with the requirement for metering post-project, there is limited available information regarding pre-project diversions. This makes it difficult to evaluate the diversion savings for projects that didn't have a baseline for diversion without making assumptions. For the few projects that were metered prior to the project installation, only two have post-project data available. Metered data is submitted to the Utah Department of Agriculture and Food at the end of each irrigation season. As more post-project data becomes available, it will be incorporated into future analysis.

Water use impact case studies

Depletion estimation methods

Estimating water depletion reductions as it occurs in agriculture is a challenging endeavor, and this is no exception when it comes to the Agricultural Water Optimization Program. There are many techniques and methods that can be considered. With that in mind, the Division of Water Rights contracted with Utah State University to evaluate the variety of options and data sources available for estimating depletion differences resulting from irrigation changes. The report from this effort, *Quantifying Depletion Differences from Irrigation Practice Changes in Utah* was completed in spring 2025 and is a key source of information that the Division of Water Resources has relied on to evaluate water use impacts from the program.

Depletion for off-farm projects were estimated by quantifying the change in depletion in the conveyance system as the sum of the differences in evapotranspiration from the conveyance corridor, surface water evaporation, and wet canal bed evaporation before and

after the change during the irrigation season. Because the project canal corridors do not meet the recommended spatial constraints for OpenET products, reference areas with similar land cover and proximity were used as substitutes for both pre- and post-project conditions. Pre-project evapotranspiration was estimated using OpenET products and the evaporative fraction method to obtain a calculated depletion.

Depletion changes for on-farm projects were estimated by taking the difference between pre- and post-project water use conditions. The pre-project water use was estimated from a representative sample of fields within the vicinity of the project field for the time period the project was completed. The sample fields were the same crop and pre-project irrigation method. Evapotranspiration from the fields was obtained from OpenET (eeMETRIC model) and irrigation losses were accounted for based on table estimates and metered data when available. For more information regarding the calculations performed for estimating depletion changes, refer to the appendix. The summary presented in this report focuses primarily on the results.

The following analysis does not account for any other changes that may occur beyond the area evaluated and what may happen to the water from reduced depletions, i.e. whether it is used to irrigate another field, goes downstream to the next appropriator, or is kept in a reservoir.

Off-farm projects

An off-farm project primarily deals with the conveyance of water from one location to another and any improvements made to this process, which could include ditch lining or piping. Water savings are possible through decreased losses to evaporation, seepage and evapotranspiration from phreatophyte use. The presented information includes the length of pipe installed and the project completion date. Only two completed projects were evaluated for this report due to the timing of project construction completion. As further information becomes available, the evaluation will include more projects in future reports.

Off-farm Case Study 1 – Piute County

Project information:

- Project type: canal to pipe
- Length: 11,880 feet
- Date completed: 1/21/2025

Analysis observations

This canal to pipe conversion project was completed late January 2025 as part of a phased construction effort. ET data was obtained for a nearby reference area meant to simulate post-project conditions. This reference area is absent of influence from the subject canal seepage, surface water evaporation and phreatophyte uptake.

The canal corridor for this project encompasses an area of approximately 8.2 acres. The Utah State University report used in this analysis recommends employing the evaporative fraction method for fields less than ten acres and conveyance corridors. A sub-irrigated field in the vicinity of the project area was selected as a representative area for the subject canal corridor. This approach was used in both off-farm case studies.

A mean depletion difference estimate for the irrigation season is estimated to be approximately 14.7 acre-feet, indicating a depletion reduction of about 1.8 acre-foot per acre. Monthly estimates show the greatest depletion reductions occurring in June and July, corresponding with peak irrigation demand, while the smallest reductions occur in April and September. The canal to pipe conversion will reduce water losses by improving conveyance efficiency. Figure 4 shows the irrigation season total monthly depletion estimates, Figure 5 shows the irrigation season monthly depletion difference as a result of the project, and Table 7 shows the irrigation season monthly depletion difference values with the annual total.

Figure 4: Case Study 1 total estimated post-project depletion and estimated depletion from subject canal corridor based on a dry upland area representative of potential post-project conditions within the vicinity of the subject canal using available monthly OpenET data

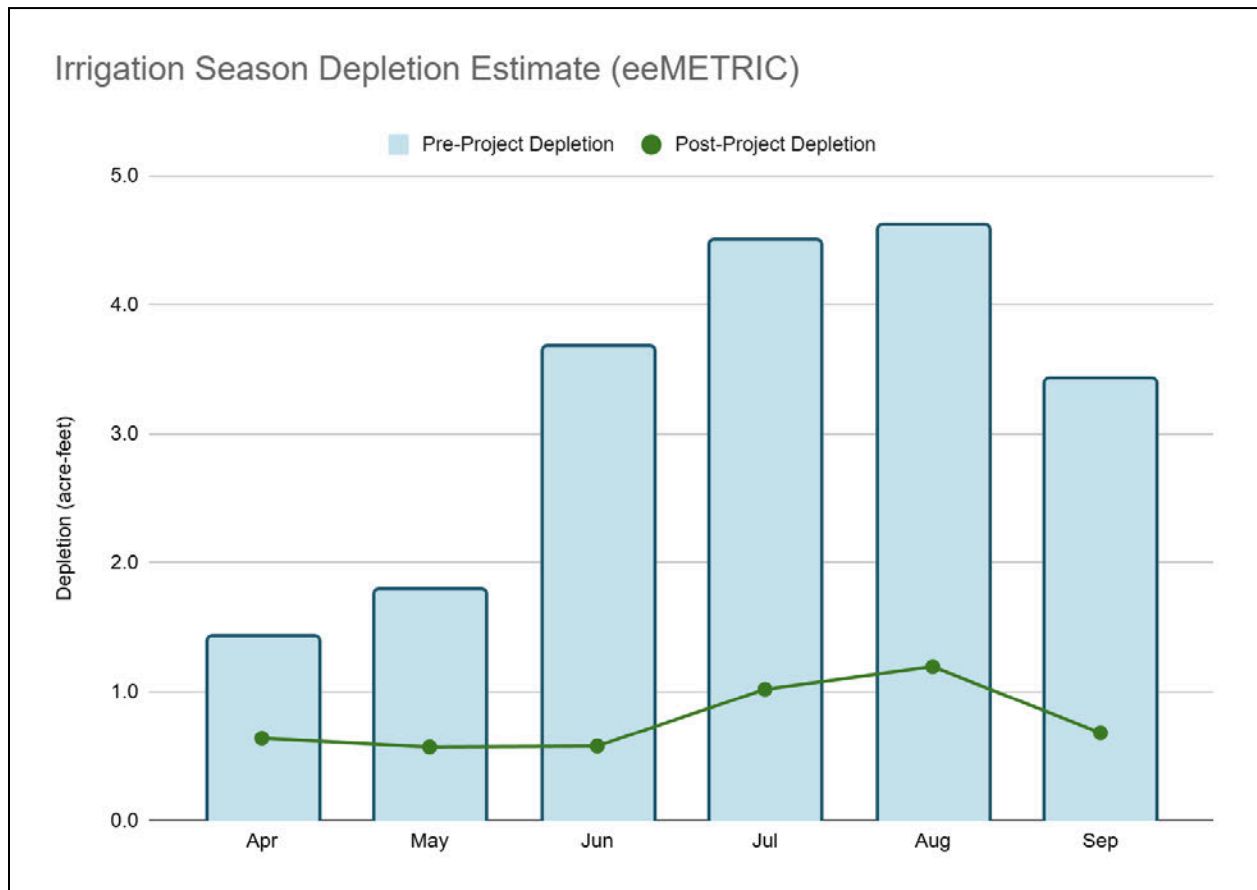


Figure 5: Case Study 1 estimated irrigation season depletion difference from project with associated margin of error based on dry upland area representative of potential post-project conditions within the vicinity of the subject canal using all available monthly OpenET data

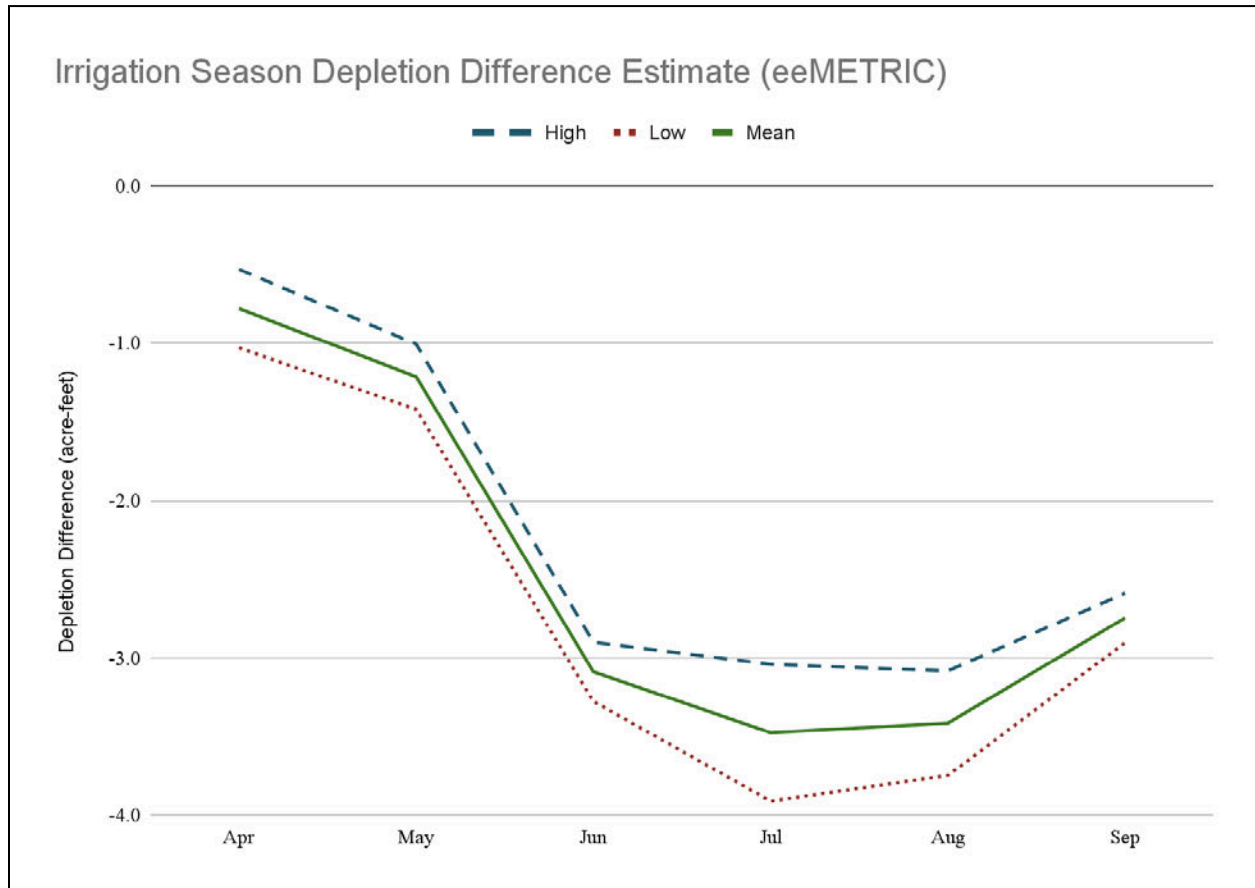


Table 7: Case Study 1 estimated irrigation season depletion difference (in acre-feet) from project with associated margin of error based on a dry upland area representative of potential post-project conditions within the vicinity of the subject canal using all available monthly OpenET data

	Apr	May	Jun	Jul	Aug	Sep	Total
High	-0.53	-1.01	-2.90	-3.04	-3.08	-2.59	-13.15
Low	-1.03	-1.42	-3.28	-3.91	-3.75	-2.90	-16.28
Mean	-0.78	-1.21	-3.09	-3.47	-3.41	-2.75	-14.72

Off-farm Case Study 2 – Uintah County

Project information:

- Project type: canal to pipe
- Length: 19,540 feet
- Date completed: 3/25/2025

Analysis observations

This canal to pipe conversion project was completed late March 2025 as part of a phased construction effort. ET data was obtained for a nearby reference area meant to simulate post-project conditions. This reference area is absent of influence from the subject canal seepage, surface water evaporation, and phreatophyte uptake.

The canal corridor for this project encompasses an area of approximately 11.9 acres. A mean depletion difference estimate for the irrigation season is estimated to be approximately 16.4 acre-feet, indicating a depletion reduction of about 1.6 acre-feet per acre. From April to June, average monthly depletions estimates are slightly less over time and may be credited to seasonal climatic variability. Similarly, this project will continue to reduce water losses by improving conveyance efficiency. Figure 6 shows the irrigation season total monthly depletion estimates, Figure 7 shows the irrigation season monthly depletion difference as a result of the project, and Table 8 shows the irrigation season monthly depletion difference values with the annual total.

Figure 6: Case Study 2 total estimated post-project depletion and estimated depletion from subject canal corridor based on a dry upland area representative of potential post-project conditions within the vicinity of the subject canal using available monthly OpenET data

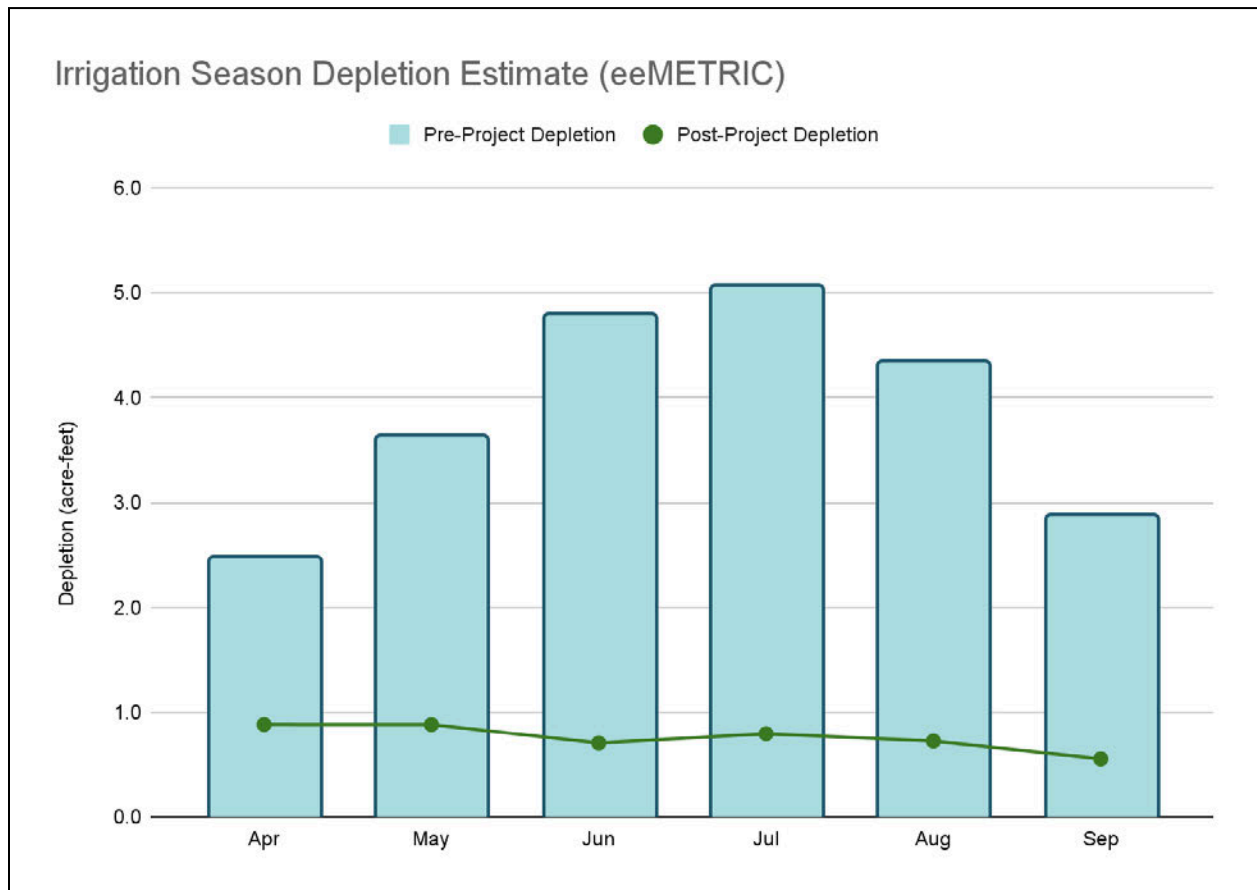


Figure 7: Case Study 2 estimated irrigation season depletion difference from project with associated margin of error based on dry upland area representative of potential post-project conditions within the vicinity of the subject canal using all available monthly OpenET data

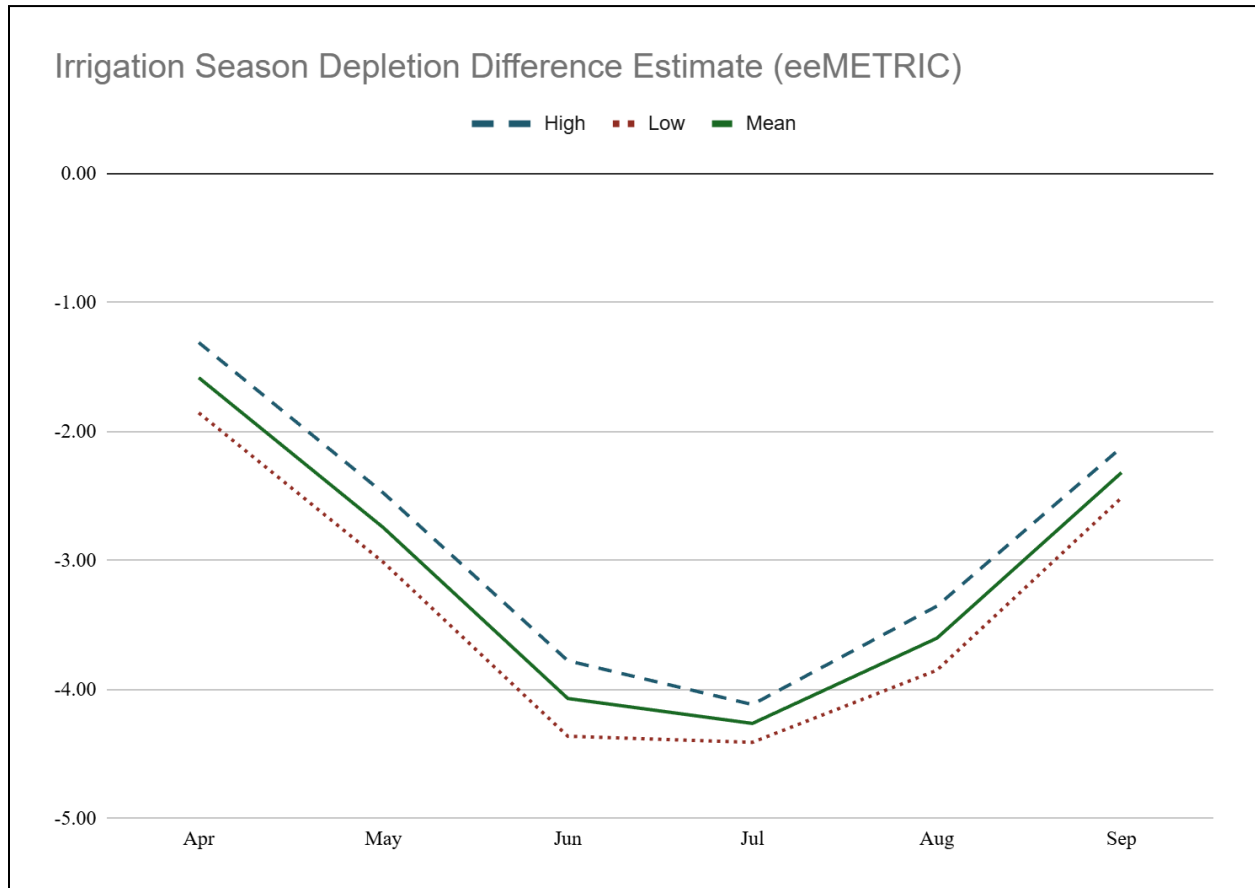


Table 8: Case Study 2 estimated irrigation season depletion difference (in acre-feet) from project with associated margin of error based on a dry upland area representative of potential post-project conditions within the vicinity of the subject canal using all available monthly OpenET data

	Apr	May	Jun	Jul	Aug	Sep	Total
High	-1.31	-2.48	-3.78	-4.12	-3.35	-2.12	-17.16
Low	-1.86	-3.01	-4.36	-4.41	-3.85	-2.51	-20.01
Mean	-1.58	-2.75	-4.07	-4.26	-3.60	-2.32	-18.59

On-farm projects

Projects are considered to be on-farm if the irrigation improvements are focused on the field and how water is applied to the crop. Diversion savings can often be achieved through efficiency gains if return-flows from deep percolation and field run-off are avoided. While depletion savings are more difficult to quantify, they can be achieved through management practices (crop, watering, land etc.) that adapt to the new type of system installed. Basic information for each project includes the number of acres treated, crop type and irrigation type conversion. There were a total of nine on-farm projects with enough data to perform analysis on for this report. As with the off-farm projects, when additional data become available, the evaluation will include more projects in future reports.

On-farm Case Study 1 – Davis County

Project information:

- Irrigation conversion type: flood to pipe and riser
- Area: 19.7 acres
- Crop type: grass hay
- Date completed: 6/11/2024

Analysis observations

Of the projects under review, this is one of the few that has been installed for over a year and thereby provides a valuable opportunity to look at water use changes from an annual perspective, rather than just several months. At an annual 1.6 acre-feet increase from the 72.8 acre-feet no-project estimate, overall there is a near negligible change in mean annual depletion and the margin of error suggests there is a range of possibilities that span decreased and increased depletions. With a minor change in flood method for this project, it is not surprising that there is little noticeable difference. On-field savings for pipe and riser projects may not be as pronounced if the field itself was mostly unchanged. Figure 8 shows the total monthly depletion estimates, Figure 9 shows the monthly depletion difference as a result of the project, and Table 9 shows the monthly depletion difference values with the annual total.

Figure 8: Case Study 1 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

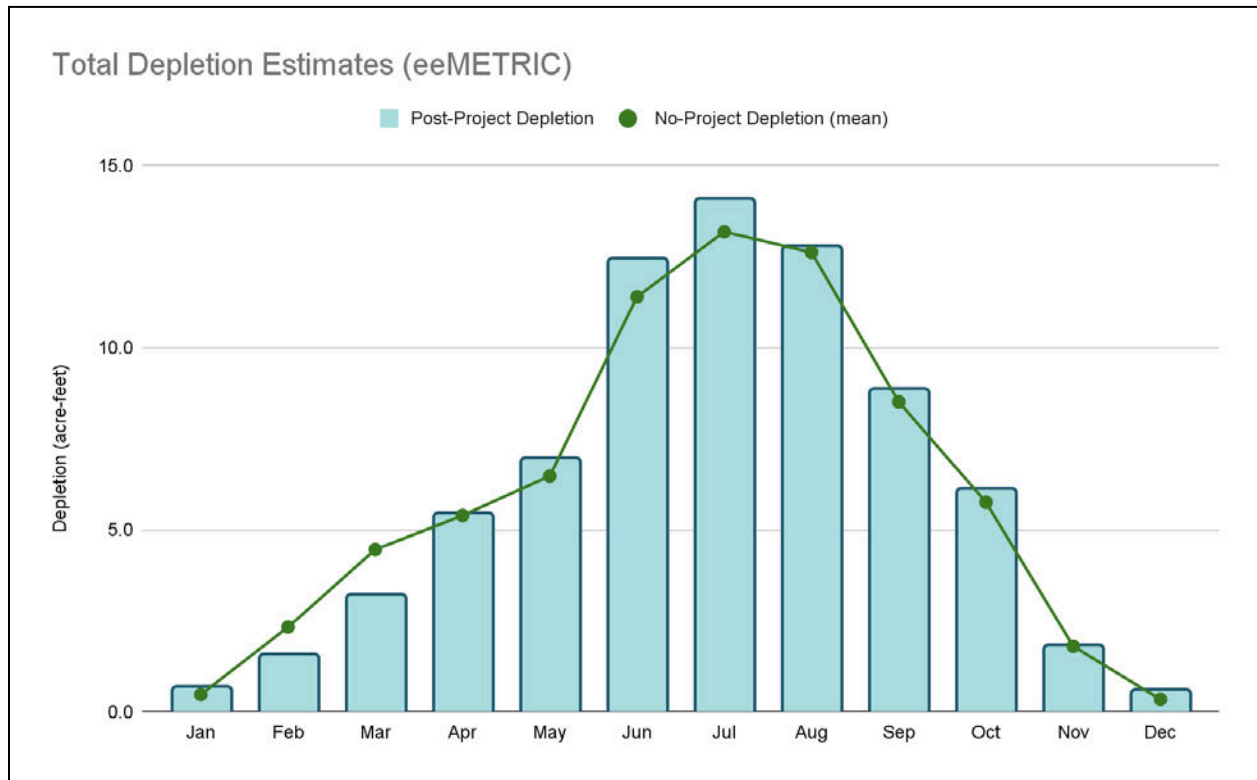


Figure 9: Case Study 1 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

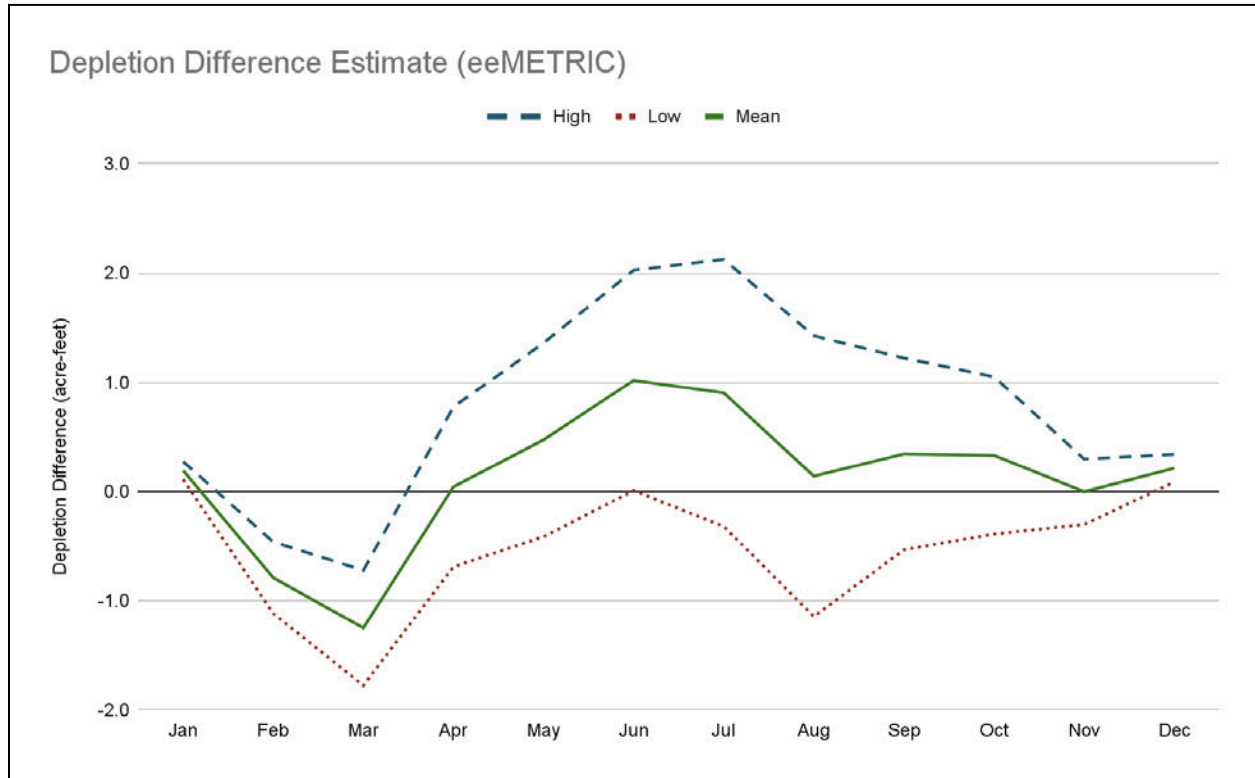


Table 9: Case Study 1 estimated depletion difference (in acre-feet) from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High	0.3	-0.5	-0.7	0.8	1.4	2.0	2.1	1.4	1.2	1.0	0.3	0.3	9.7
Low	0.1	-1.1	-1.8	-0.7	-0.4	0.0	-0.3	-1.1	-0.5	-0.4	-0.3	0.1	-6.5
Mean	0.2	-0.8	-1.2	0.0	0.5	1.0	0.9	0.1	0.3	0.3	0.0	0.2	1.6

On-farm Case Study 2 – Box Elder County

Project information:

- Irrigation conversion type: wild flood to pipe and riser
- Area: 30.8 acres
- Crop type: alfalfa

- Date completed: 10/2/2024

Analysis observations

As with most of the projects analyzed, this project does not have a full year of data to consider in the evaluation, and any observations made here could change with a few more months added to the dataset. There were, however, many fields available for establishing a baseline of comparison. This has resulted in a very narrow window for the margin of error, and this project appears to be using less water currently. At about 8.9 acre-feet there is a notable reduction from the estimated partial season total of 51.3 acre-feet no-project mean. The monthly distribution of water use has been altered quite a bit from what might have been expected for the area with a very low spring, and a spike in June followed by a low July. Figure 10 shows the total monthly depletion estimates, Figure 11 shows the monthly depletion difference as a result of the project, and Table 10 shows the monthly depletion difference values with the annual total.

Figure 10: Case Study 2 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

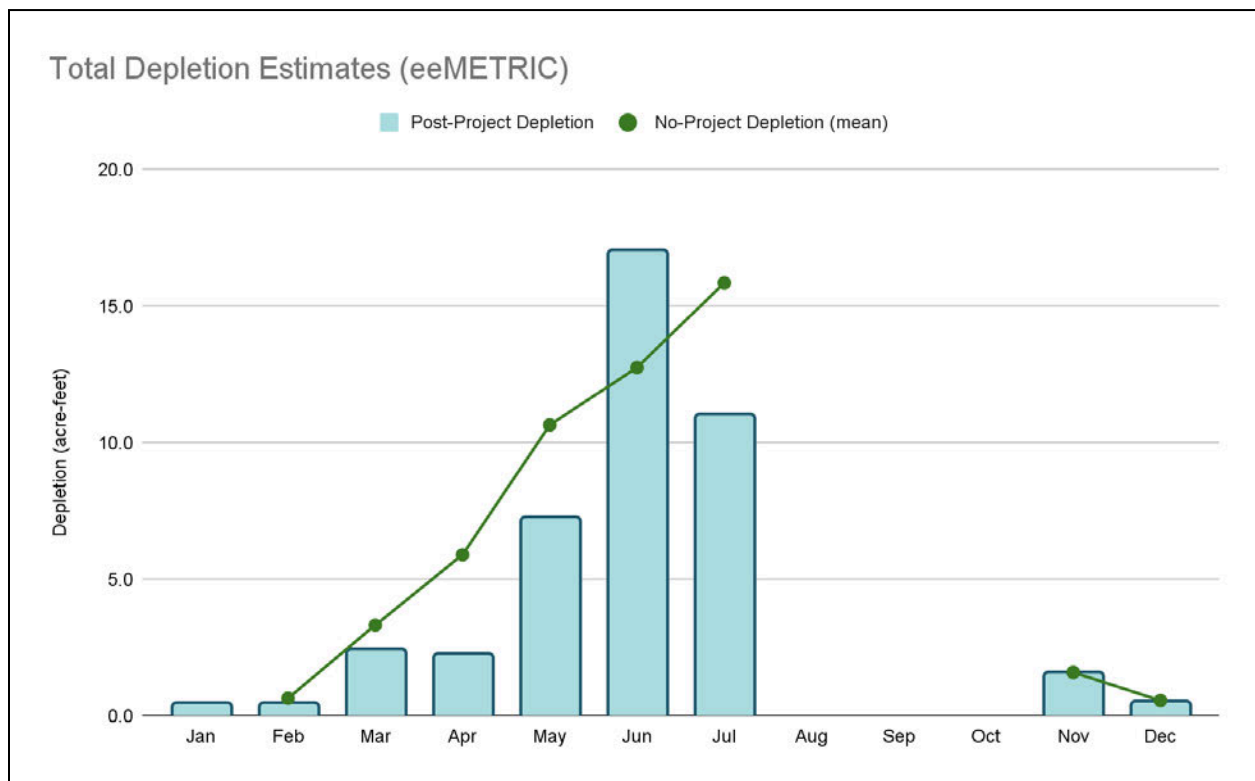


Figure 11: Case Study 2 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

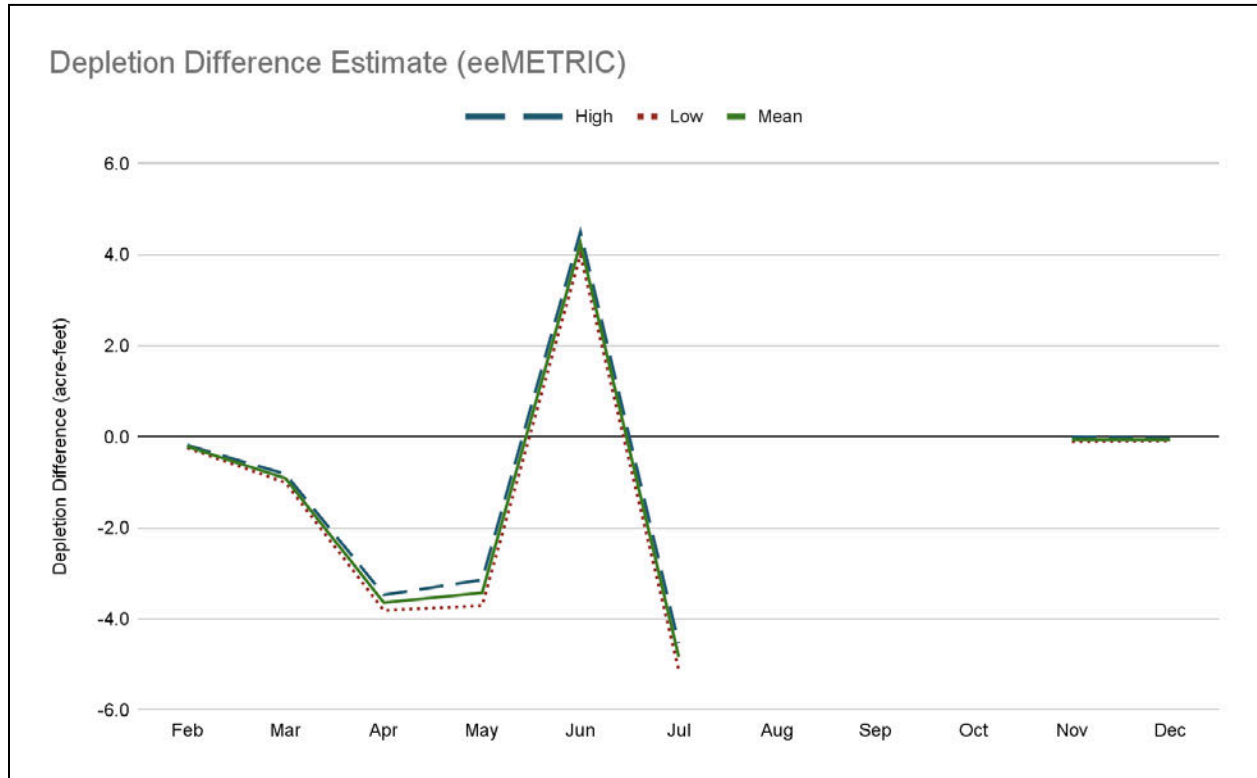


Table 10: Case Study 2 estimated depletion difference (in acre-feet) from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High		-0.2	-0.8	-3.5	-3.1	4.5	-4.5				0.0	0.0	-7.7
Low		-0.2	-1.0	-3.8	-3.7	4.0	-5.1				-0.1	-0.1	-10.1
Mean		-0.2	-0.9	-3.6	-3.4	4.3	-4.8				-0.1	-0.1	-8.9

On-farm Case Study 3 – Box Elder County

Project information:

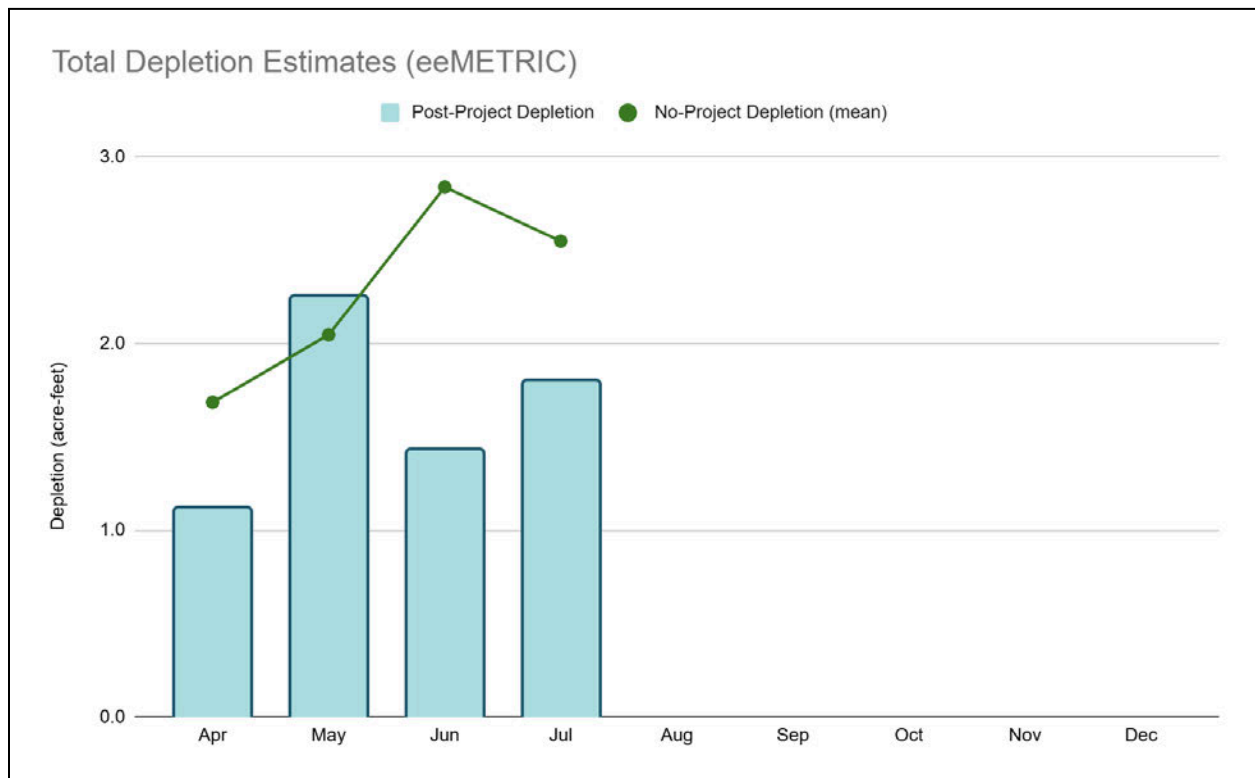
- Irrigation conversion type: wild flood to pipe and riser

- Area: 5.0 acres²
- Crop type: winter wheat
- Date completed: 3/13/2025

Analysis observations

This is the most recently completed project that was used as a case study in this analysis. At a 2.5 acre-feet reduction from the 9.5 acre-feet mean, it is tracking well below the no-project estimated depletion, even considering the margin of error. But as with the other projects having only partial year data, more months might tell a different story. This highlights the need to collect more years of data to increase confidence in how optimization projects are affecting water use. Figure 12 shows the total monthly depletion estimates, Figure 13 shows the monthly depletion difference as a result of the project, and Table 11 shows the monthly depletion difference values with the annual total.

Figure 12: Case Study 3 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data



² In *Quantifying Depletion Differences from Irrigation Practice Changes in Utah* it is not recommended to use OpenET for fields less than 10 acres. For this reason, this field analysis is a more coarse estimate.

Figure 13: Case Study 3 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

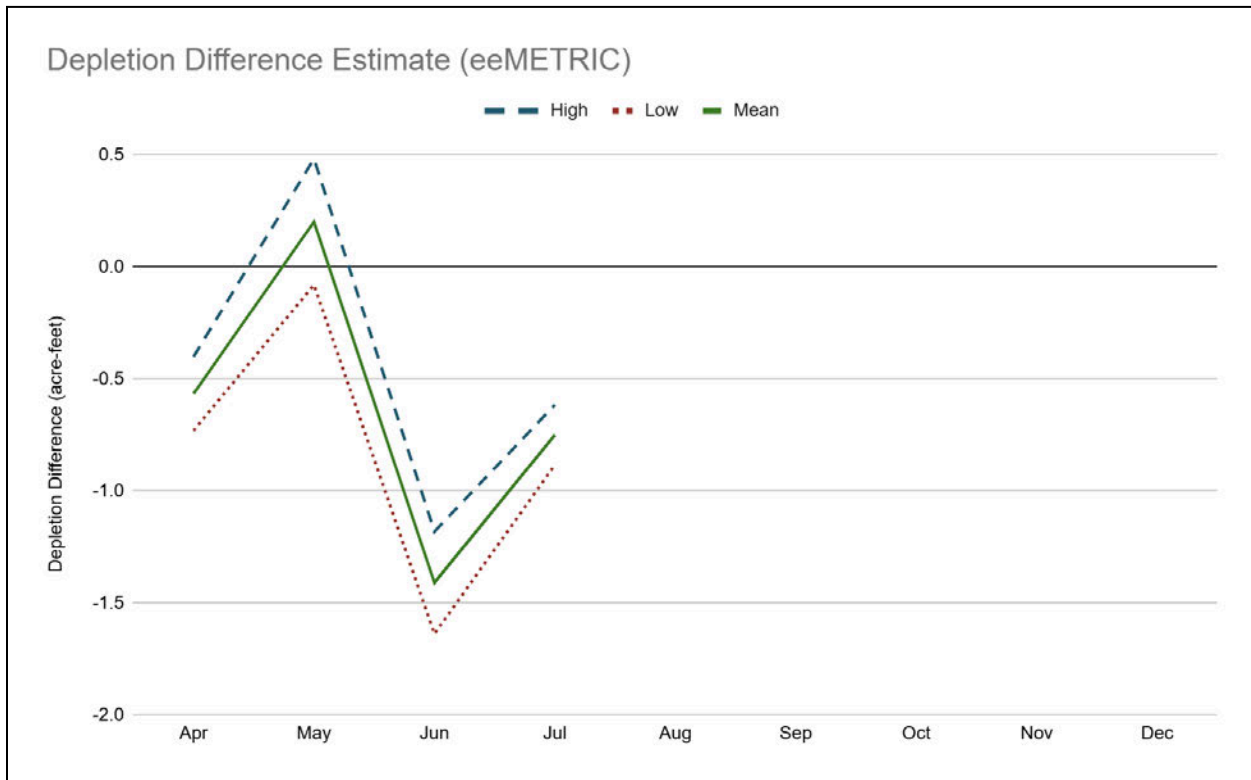


Table 11: Case Study 3 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High				-0.4	0.5	-1.2	-0.6						-1.7
Low				-0.7	-0.1	-1.6	-0.9						-3.3
Mean				-0.6	0.2	-1.4	-0.7						-2.5

On-farm Case Study 4 – Wayne County

Project information:

- Irrigation conversion type: wheel line/handline to pivot-LESA
- Area: 46.5 acres
- Crop type: alfalfa

- Date completed: 11/25/2024

Analysis observations

This project is tracking where expected for this type of conversion. With a low elevation spray application evaporative losses from wind drift would typically be reduced. We are seeing a partial season decrease for both high and low estimates, with 8.9 acre-feet at the mean, which is notable relative to the field size and estimated no-project depletion of 102.2 acre-feet, but there are still two more months needed to really understand the impact. Figure 14 shows the total monthly depletion estimates, Figure 15 shows the monthly depletion difference as a result of the project, and Table 12 shows the monthly depletion difference values with the annual total.

Figure 14: Case Study 4 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

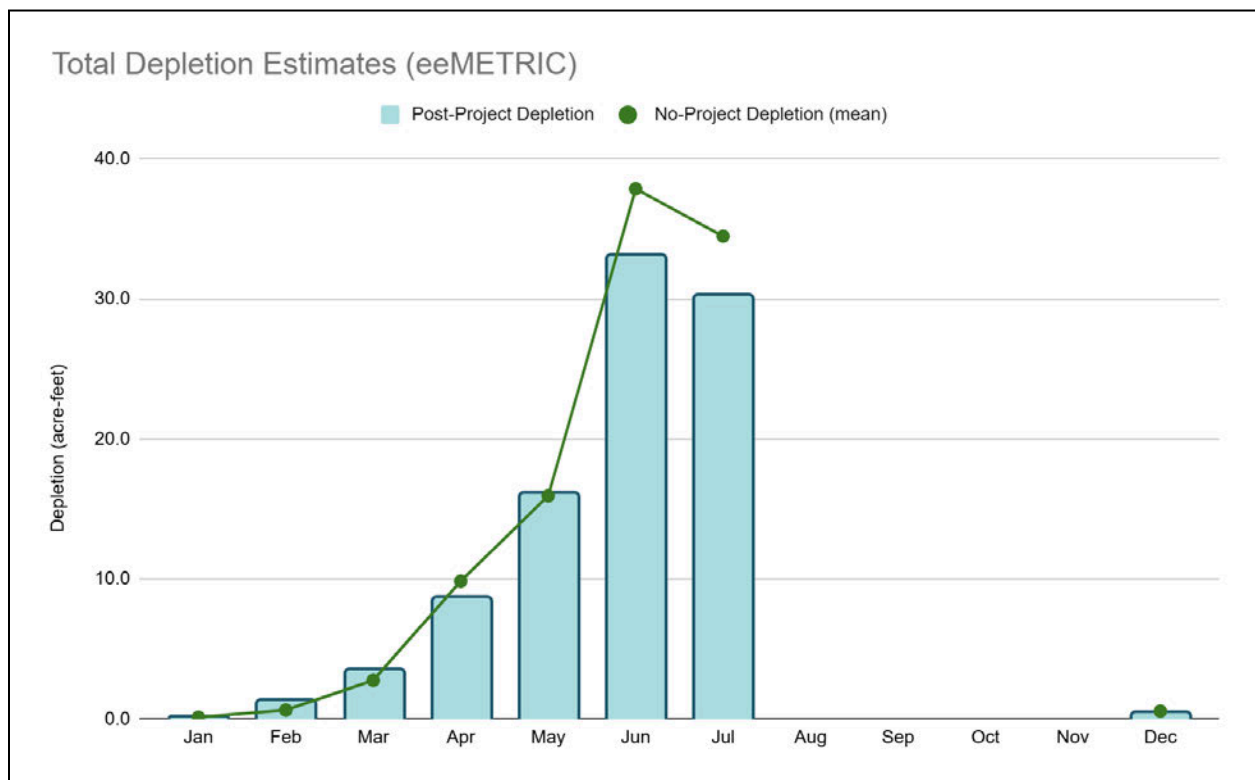


Figure 15: Case Study 4 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

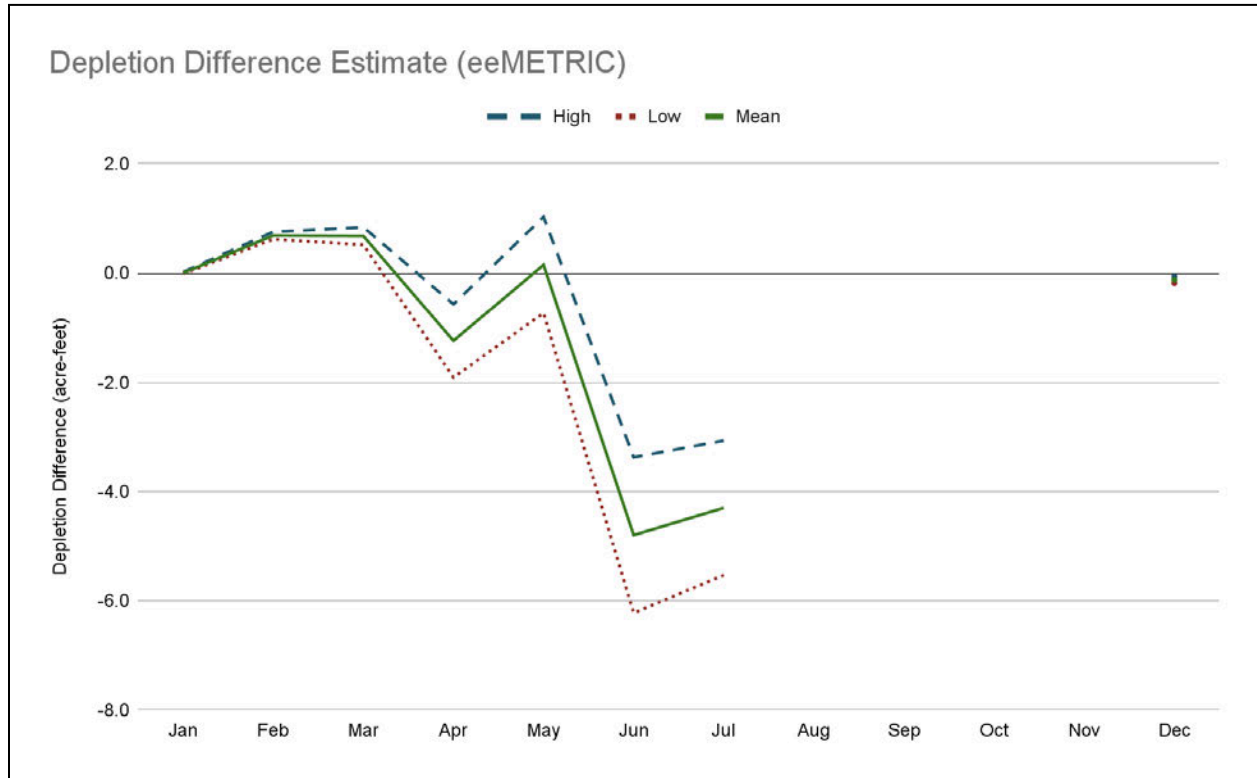


Table 12: Case Study 4 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High	0.0	0.8	0.8	-0.6	1.0	-3.4	-3.1					-0.1	-4.4
Low	0.0	0.6	0.5	-1.9	-0.7	-6.2	-5.5					-0.2	-13.5
Mean	0.0	0.7	0.7	-1.2	0.1	-4.8	-4.3					-0.1	-8.9

On-farm Case Study 5 – Piute County

Project information:

- Irrigation conversion type: wheel line/handline to pivot-MESA
- Area: 20 acres
- Crop type: alfalfa

- Date Completed: 5/22/2024

Analysis observations

With two full irrigation seasons available to analyze, this project can meaningfully inform how depletion is being impacted. There is a definite reduction in annual depletion of 17.8 acre-feet from an estimated no-project total of 50.2 acre-feet, and even the high estimate shows savings. The level of savings shown in this analysis is consistent with what is expected for conversions from wheel line to pivot-MESA. Another interesting observation is that the monthly distribution for actual depletion has flattened a bit and doesn't spike in June and July as the estimated no-project does. Figure 16 shows the total monthly depletion estimates, Figure 17 shows the monthly depletion difference as a result of the project, and Table 13 shows the monthly depletion difference values with the annual total.

Figure 16: Case Study 5 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

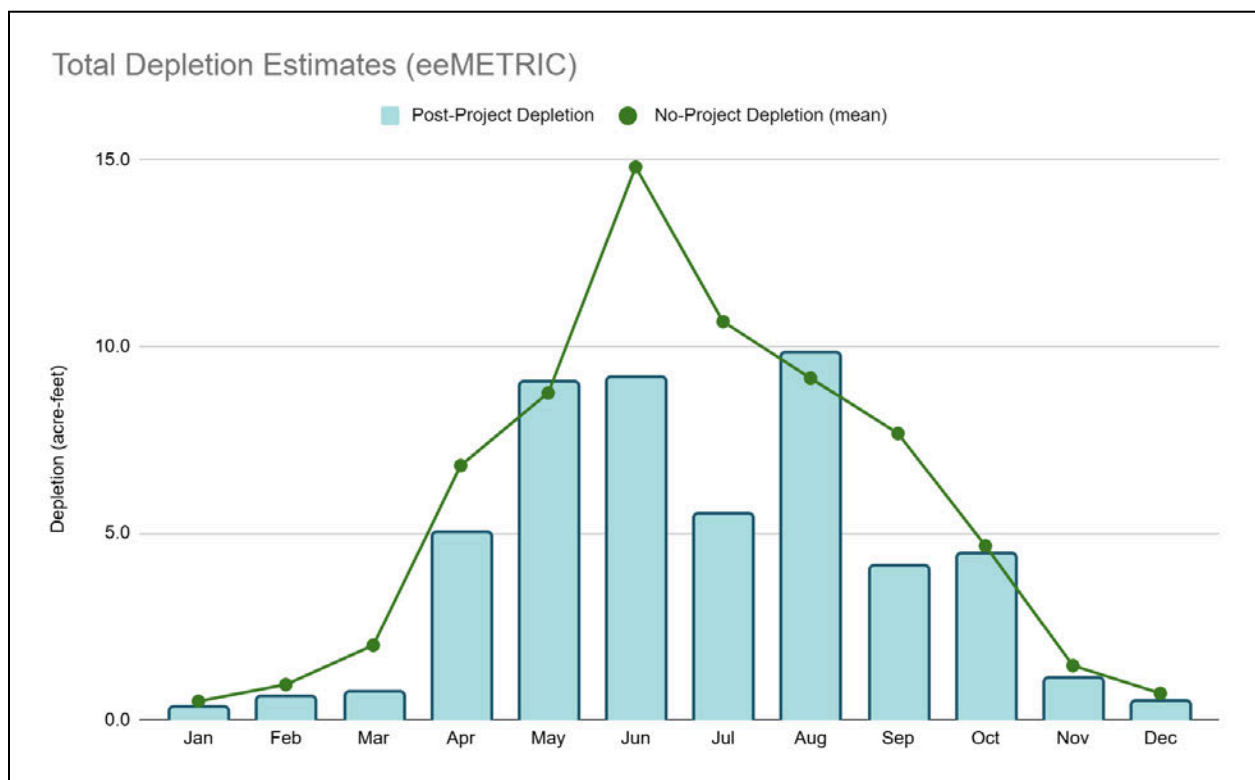


Figure 17: Case Study 5 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

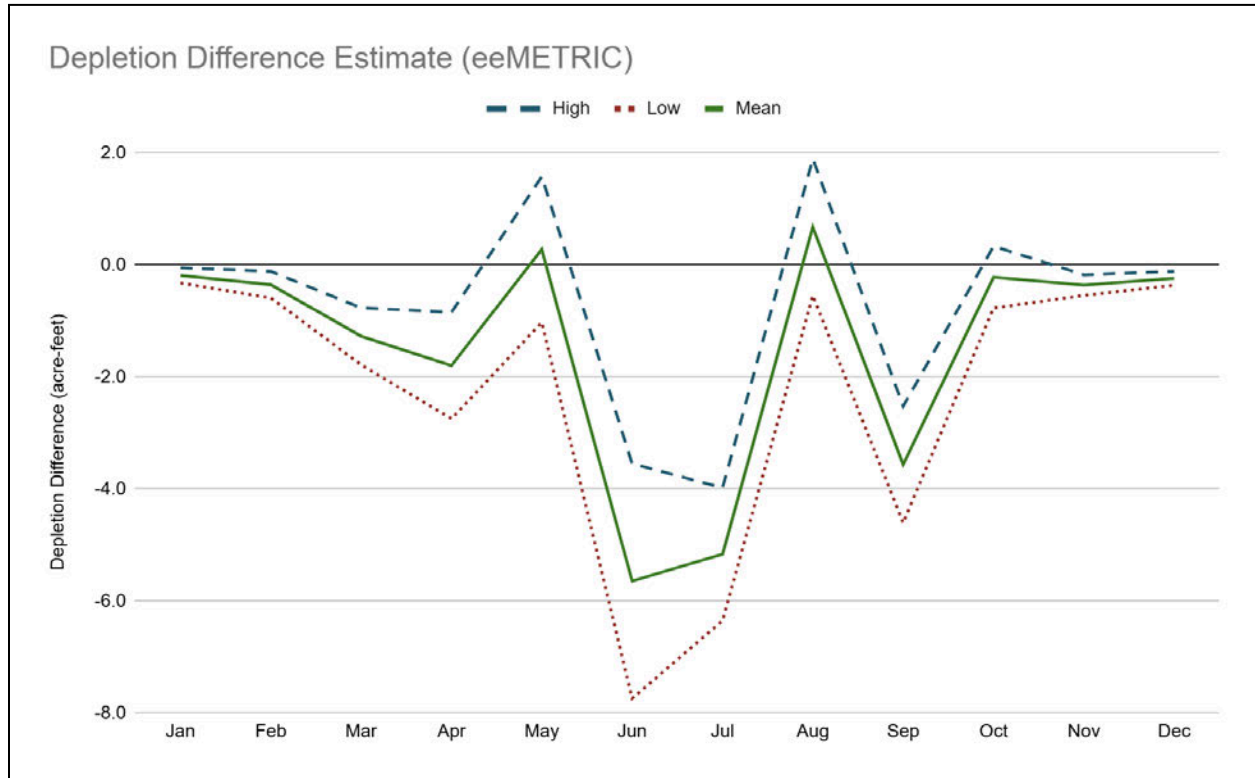


Table 13: Case Study 5 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High	0.0	-0.1	-0.8	-0.8	1.6	-3.5	-4.0	1.9	-2.5	0.3	-0.2	-0.1	-8.3
Low	-0.3	-0.6	-1.8	-2.7	-1.0	-7.7	-6.4	-0.5	-4.6	-0.8	-0.5	-0.4	-27.4
Mean	-0.2	-0.3	-1.3	-1.8	0.3	-5.6	-5.2	0.7	-3.6	-0.2	-0.4	-0.2	-17.8

On-farm Case Study 6 – Rich County

Project information:

- Irrigation conversion type: wild flood to pivot-MESA
- Area: 272.7 acres
- Crop type: alfalfa

- Date completed: 6/21/2024

Analysis observations

This field is by far the largest area evaluated and therefore has the highest values for estimated changes in depletion. For this project, there is a clear indication of increased depletion. With only 19 comparison fields this equates to a very wide margin of error and highlights the need for larger sample sizes to narrow error. The mean shows an increase of 220.6 acre-feet from an estimated no-project depletion of 679.6 acre-feet, but also could be much higher and that. Another observation from the plots is that the distribution of water use is shifted from the no-project estimate to earlier in the season. Whether this change will hold long-term, however, is yet to be seen, but there could be a variety of reasons for this result. Figure 18 shows the total monthly depletion estimates, Figure 19 shows the monthly depletion difference as a result of the project, and Table 14 shows the monthly depletion difference values with the annual total.

Figure 18: Case Study 6 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

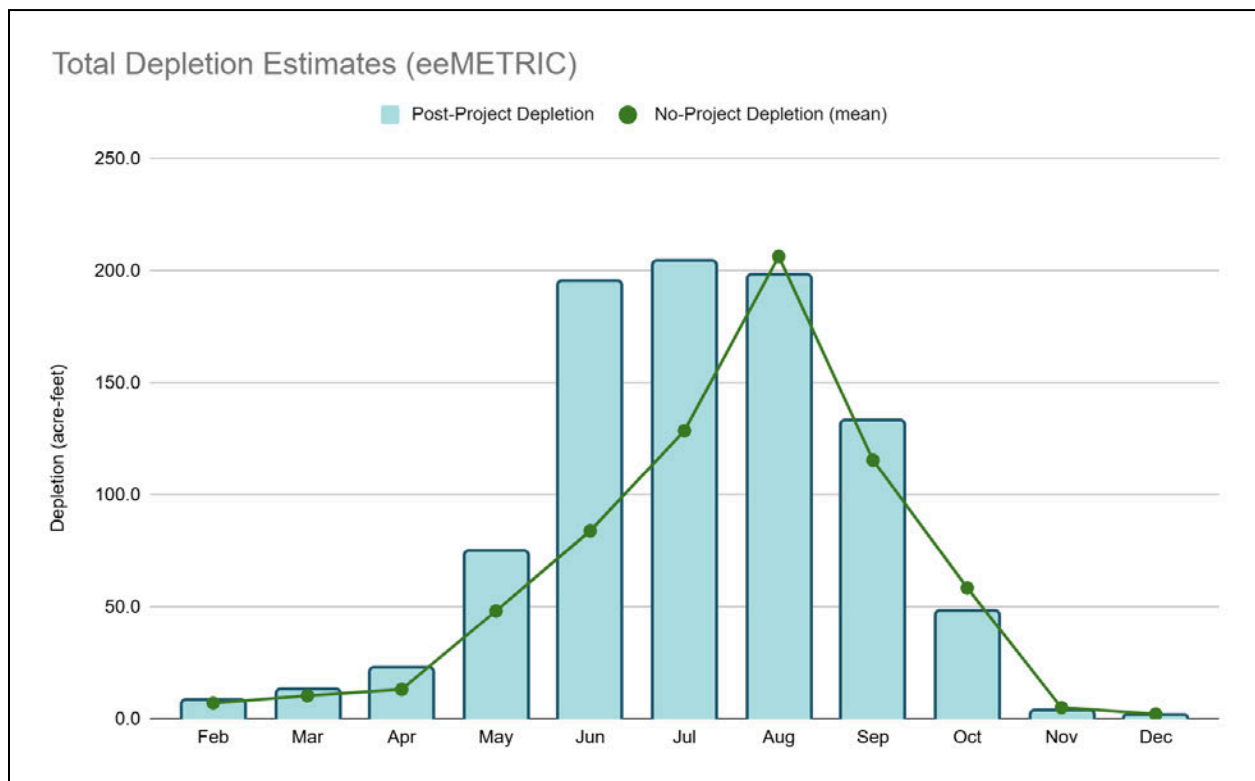


Figure 19: Case Study 6 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

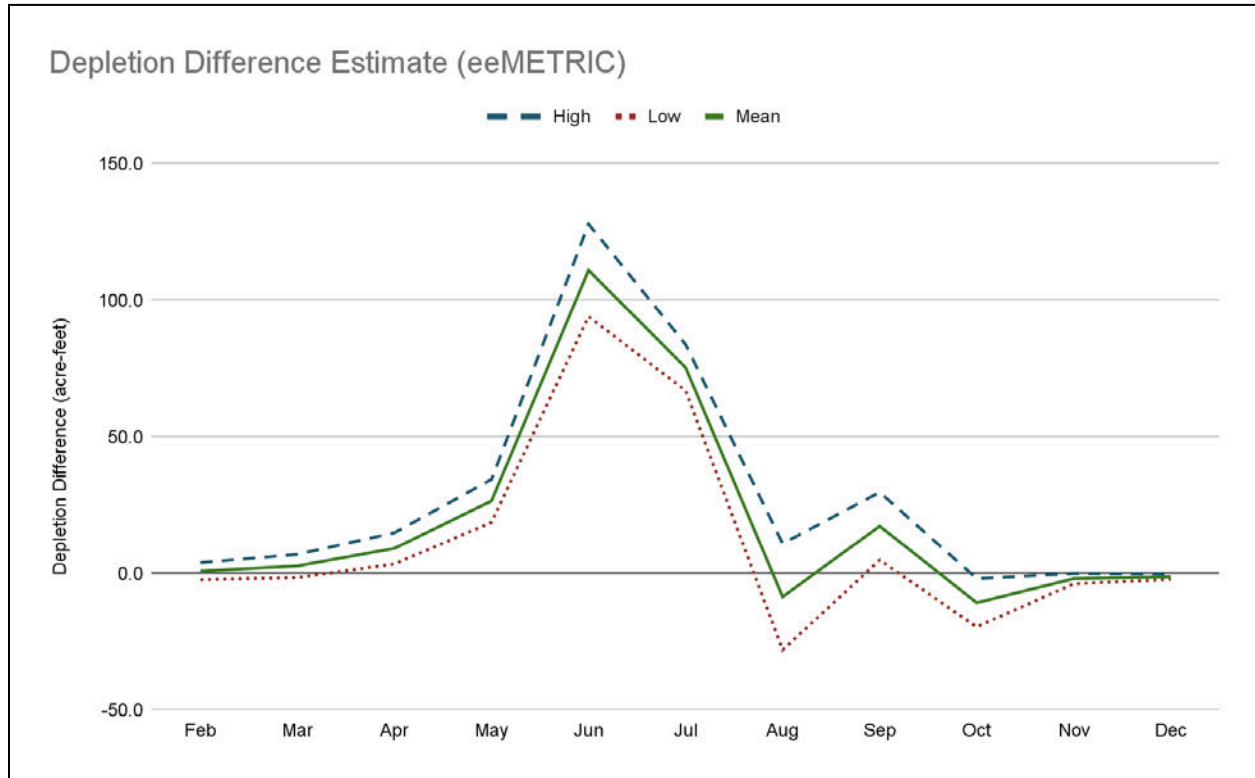


Table 14: Case Study 6 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High		3.9	7.0	14.9	34.4	128.0	83.8	10.9	29.7	-1.9	0.0	-0.2	310.5
Low		-2.3	-1.5	3.5	18.7	94.1	67.0	-28.0	4.9	-19.6	-3.8	-2.2	130.7
Mean		0.8	2.7	9.2	26.5	111.0	75.4	-8.6	17.3	-10.8	-1.9	-1.2	220.6

On-farm Case Study 7 – Cache County

Project information:

- Irrigation conversion type: wheel line/handline to pivot-MESA
- Area: 25.2 acres
- Crop type: alfalfa

- Date completed: 6/25/2024

Analysis observations

This project is one of the longest existing committee projects, with data available going back into last season. There is a very similar distribution observed when compared with the no-project estimation, and a notable decrease in annual depletion of 9.2 acre-feet compared to the estimated total of 118.7 acre-feet. There is a low margin of error with the high estimate still showing a reduction of 6.3 acre-feet. Figure 20 shows the total monthly depletion estimates, Figure 21 shows the monthly depletion difference as a result of the project, and Table 15 shows the monthly depletion difference values with the annual total.

Figure 20: Case Study 7 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

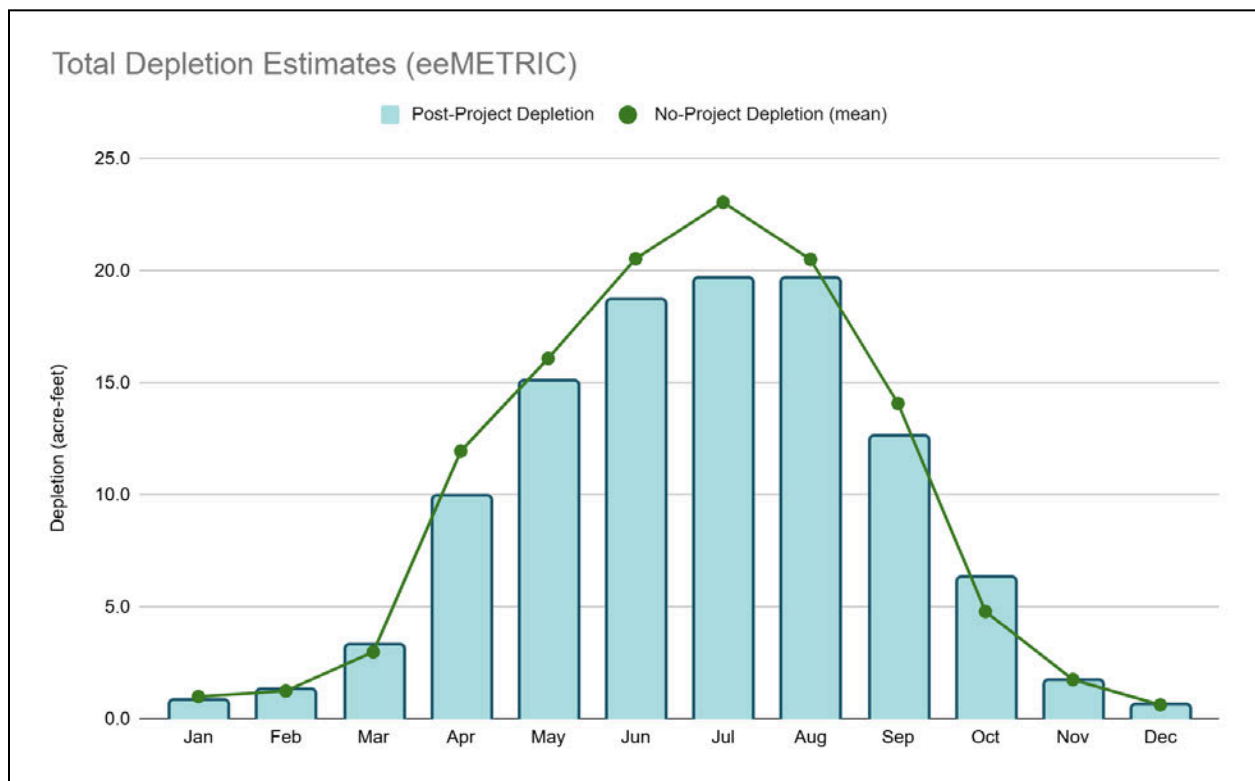


Figure 21: Case Study 7 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

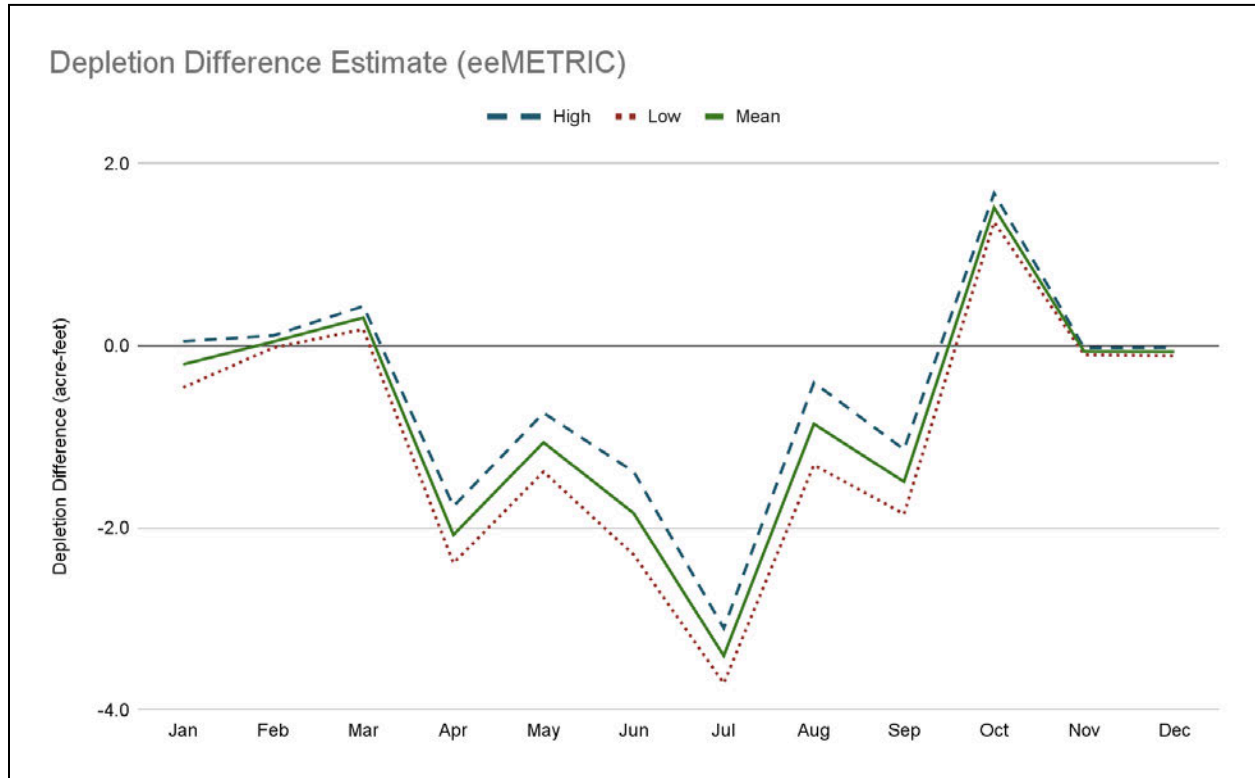


Table 15: Case Study 7 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High	0.0	0.1	0.4	-1.8	-0.7	-1.4	-3.1	-0.4	-1.1	1.7	0.0	0.0	-6.3
Low	-0.5	0.0	0.2	-2.4	-1.4	-2.3	-3.7	-1.3	-1.8	1.4	-0.1	-0.1	-12.1
Mean	-0.2	0.0	0.3	-2.1	-1.1	-1.8	-3.4	-0.9	-1.5	1.5	-0.1	-0.1	-9.2

On-farm Case Study 8 –Box Elder County

Project information:

- Irrigation conversion type: flood-border to pivot-MESA
- Area: 10.9 acres
- Crop type: alfalfa

- Date completed: 1/6/2025

Analysis observations

As with the other projects completed in mid-2025, this information provides little insight into how depletion changes as a result of this project. There is a large decrease in depletion for the month of May and large increases for June and July when compared to the no-project estimate. A very different distribution is observed. Because this system came online around June it is possible that some catch-up was needed in irrigation, and caused this dramatic shift. Again, more months are needed to understand the full impact, but there was an estimated partial season increase of 2.9 acre-feet from the 13.6 acre-feet no-project estimate. The low error still shows an increase in depletion at 1.5 acre-feet. Figure 22 shows the total monthly depletion estimates, Figure 23 shows the monthly depletion difference as a result of the project, and Table 16 shows the monthly depletion difference values with the annual total.

Figure 22: Case Study 8 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

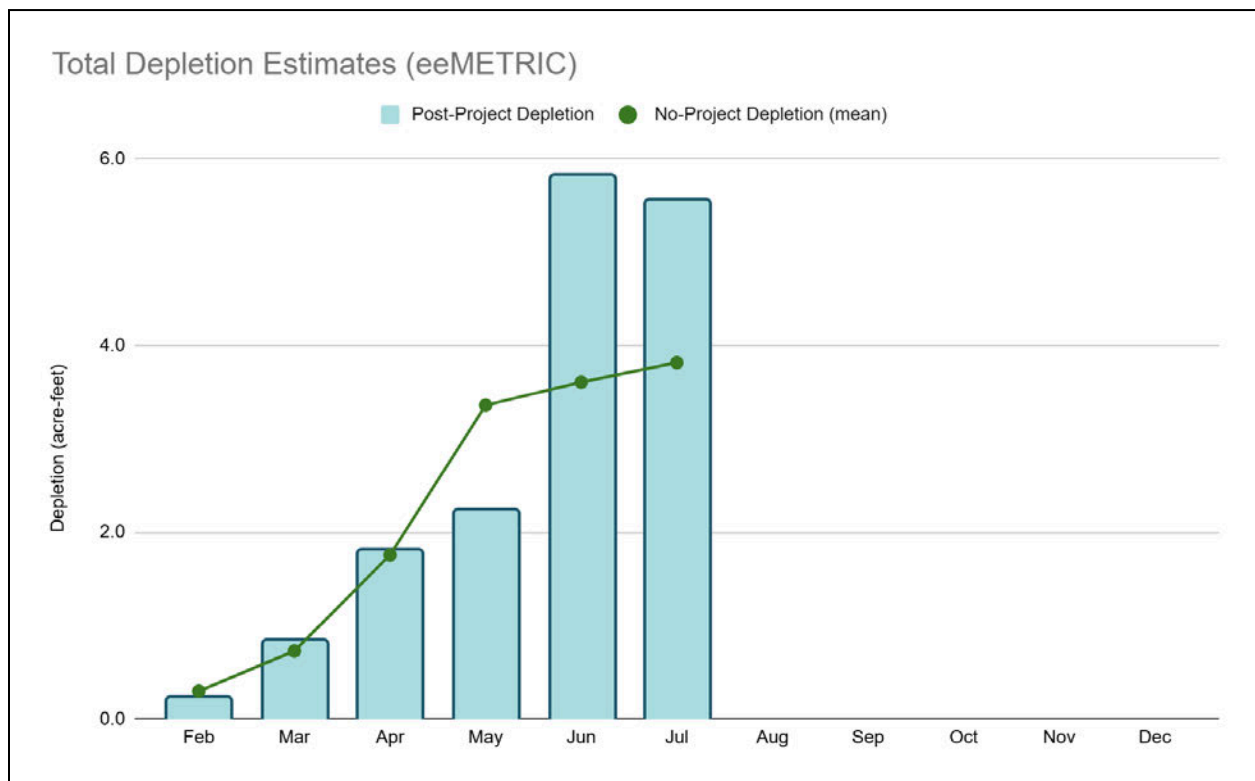


Figure 23: Case Study 8 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

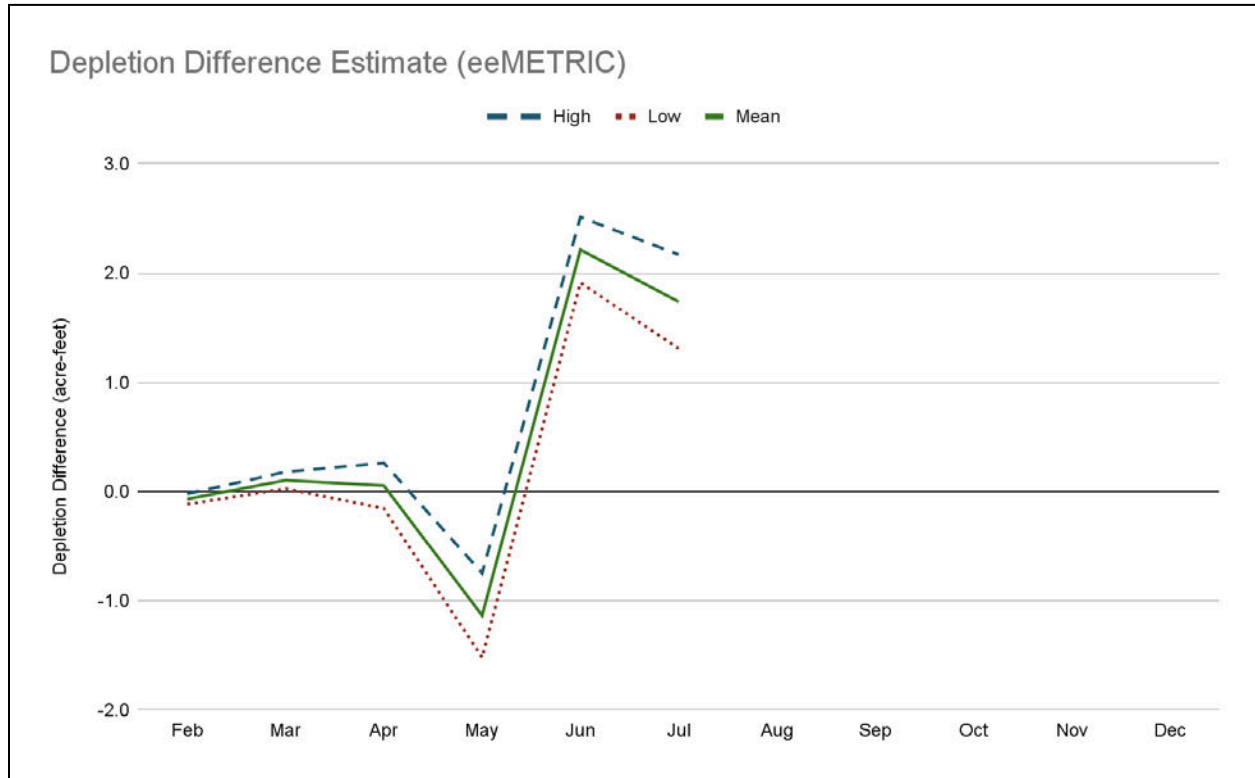


Table 16: Case Study 8 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High		0.0	0.2	0.3	-0.7	2.5	2.2						4.4
Low		-0.1	0.0	-0.2	-1.5	1.9	1.3						1.5
Mean		-0.1	0.1	0.1	-1.1	2.2	1.7						2.9

On-farm Case Study 9 –Utah County

Project information:

- Irrigation conversion type: flood-furrow to wheel line
- Area: 11.6 acres
- Crop type: alfalfa

- Date completed: 5/14/2024

Analysis observations

This project has been installed for nearly two full irrigation seasons and there is a notable increase in annual depletion observed, 11.7 acre-feet compared to an estimated total of 29.7 acre-feet for the no-project mean. There also is an increase in depletion at the low estimate at 9.1 acre-feet. The distribution pattern does not appear to have altered much when compared to the no-project estimates. Figure 24 shows the total monthly depletion estimates, Figure 25 shows the monthly depletion difference as a result of the project, and Table 17 shows the monthly depletion difference values with the annual total.

Figure 24: Case Study 9 total estimated post-project depletion and estimated depletion from subject field based on comparison fields within the vicinity of the subject field using available monthly OpenET data

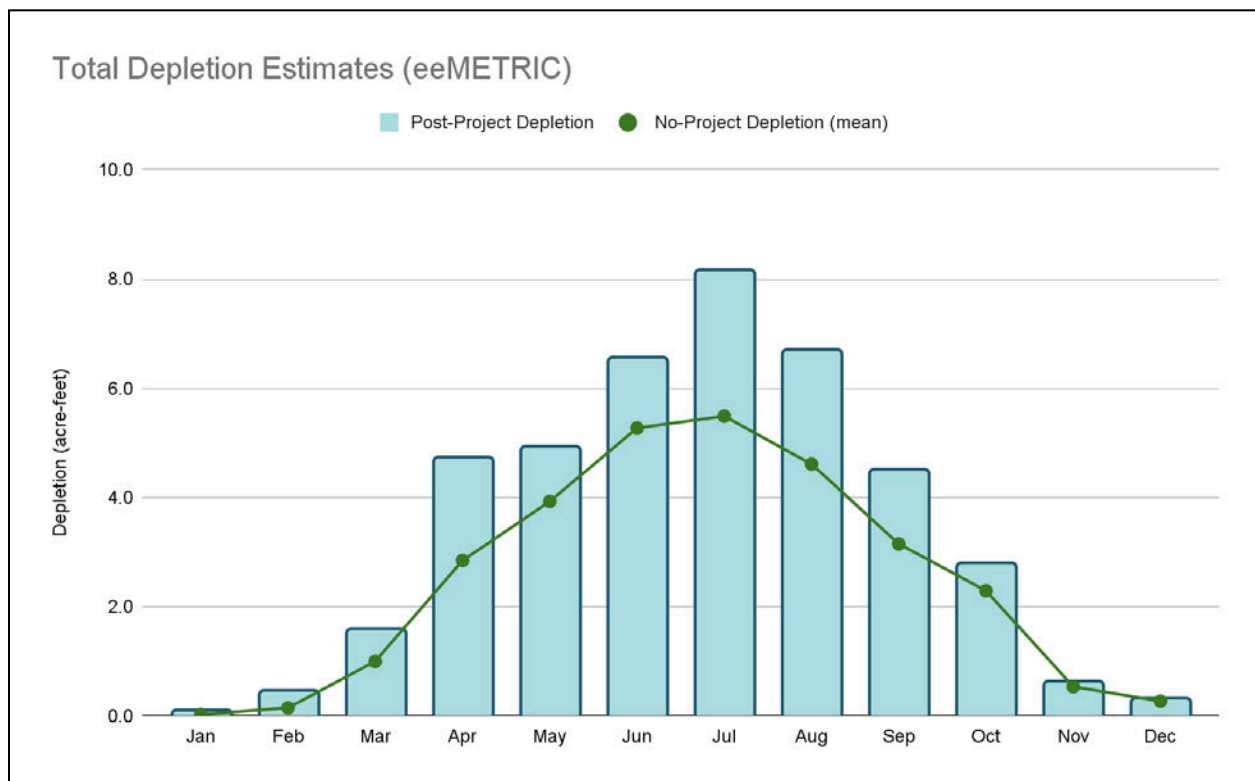


Figure 25: Case Study 9 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

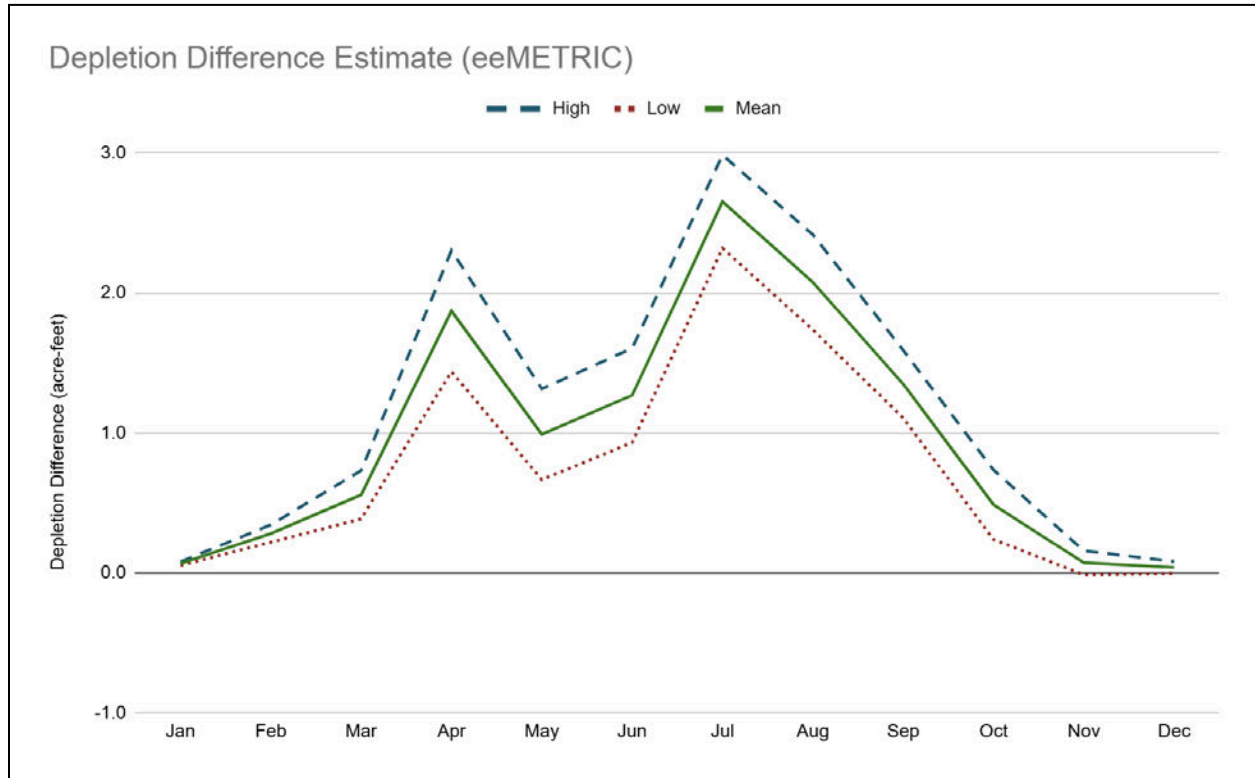


Table 17: Case Study 9 estimated depletion difference from project with associated margin of error based on comparison fields within the vicinity of the subject field using all available monthly OpenET data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High	0.1	0.3	0.7	2.3	1.3	1.6	3.0	2.4	1.6	0.7	0.2	0.1	14.4
Low	0.1	0.2	0.4	1.4	0.7	0.9	2.3	1.7	1.1	0.2	0.0	0.0	9.1
Mean	0.1	0.3	0.6	1.9	1.0	1.3	2.7	2.1	1.3	0.5	0.1	0.0	11.7

2026 program outlook

2026 application period

The 2026 application period will open Jan.1, 2026 and close Feb. 28, 2026. The upcoming application period is expected to be a \$20-30 million funding opportunity.

Program modifications and improvements

The committee meets monthly to discuss recommendations regarding program improvements. At a recent committee meeting in October 2025, the program's project application scoring criteria was amended to improve scoring for projects within the Colorado River and Great Salt Lake basins. Additionally, scoring criteria for automated surge and drip irrigation projects were refined to no longer prioritize these projects, opening up funding opportunities for projects that facilitate producer implementation and broader irrigation efficiency.

Studies and research

HB 243 allows \$1 million for research opportunities. The committee has begun to develop priorities and objectives regarding research and studies. These guidelines will be finalized in the coming months, but are unavailable for this report.

Appendix

Ranking criteria

Table 18: FY2025 On-Farm Ranking Criteria

Question #	Ranking Question	Response	Possible Points	Total Points
1	Is the proposed project type one of the following priority projects; subsurface drip, automated surge, measurement/telemetry?	Yes	35	35
		No	0	
2	What type of potential saved water was identified during the pre-consultation with the Utah Division of Water Rights?	Depeletion	15	15
		Diversion	10	
		None	0	
3	What is the status of the saved water change application (if any)?	Approved	20	20
		Filed	10	
		None	0	
4	Does the current irrigation system have an existing real time water measurement device or will the proposed project install a real time water measurement device to be used for one year prior to project installation?	Meter Installed Now	10	10
		1 Year Before Project	5	
		None	0	
5	Is the project located within the Great Salt Lake Watershed?	Yes	5	5
		No	0	
6	Is the project located within an adopted groundwater management plan area, or under consideration for a groundwater management plan area by the State Engineer?	Yes	5	5
		No	0	
7	Is the project located in the Colorado River Basin?	Yes	5	5
		No	0	
8	Is the project funded within a Natural Resources Conservation Service (NRCS) Irrigation Strategic Funding Proposal (SFP)?	Yes	2	2
		No	0	
9	Do you currently have a written financial agreement with another party to fund this project?	Yes	2	2
		No	0	
10	Does this project include one of the following irrigation water management practices; variable frequency drive (VFD), flood irrigation sensor, real-time soil moisture sensors, laser land leveling?	Yes	2	2
		No	0	

Agricultural Water Optimization Program 2025 Annual Report

11	Does the project have a design?	Yes	1	1
		No	0	
12	What is the total project cost/acre?	\$0 - \$4,000/acre	4	4
		\$4,001 - \$8,000/acre	2	
		\$8,001 or more/acre	0	
13	Do you have a current water optimization project under a contract extension?	Yes	-10	0
		No	0	
Total Points				106

Table 19: FY2025 Off-Farm Ranking Criteria

Question #	Ranking Question	Response	Possible Points	Total Points
1	Is this an application for a water loss study that meets program criteria?	Yes	100	100
		No	0	
2	What type of project?	Piping, Telemetry, Automation	30	30
		Lining	15	
		Other	0	
3	What is the status of the saved water change application?	Approved	20	20
		Filed	10	
		None	0	
4	Do you currently have a written financial agreement with another party to fund this project?	Yes	10	10
		No	0	
5	Is the project located within the Great Salt Lake Watershed?	Yes	10	10
		No	0	
6	Is the project located within the Colorado River Basin?	Yes	10	10
		No	0	
7	Is the project located within an adopted groundwater management plan area, or under consideration for a groundwater management plan area by the State Engineer?	Yes	10	10
		No	0	
8	Does the project have a design?	Yes	5	5
		No	0	
9	Is this project an additional phase of a previously funded water optimization project?	Yes	5	5
		No	0	
		Total Points		200

Water use analysis description

For the water use analysis performed in this report, the Division of Water Resources relied on methods recommended in *Quantifying Depletion Differences from Irrigation Practice Changes in Utah*³ (USU report), a report produced by Utah State University for the Utah Division of Water Rights. The following descriptions for ET, off-farm and on-farm methodologies all draw on this report.

ET method

In order to understand the impacts to water use from optimization projects, ET is an essential element of the calculations. The USU report recommends OpenET as a preferred and accessible source for doing this. OpenET is an organization that provides ET at a field level and offers a suite of ET methods to choose from. The USU report recommends using the Ensemble ET or eeMETRIC models. On OpenET's website the ensemble was not available beyond January 2025 for most cases, therefore eeMETRIC has been used in this report. The results may be less sensitive to choice for ET data because the calculation takes a difference between two depletion estimates with the same method and bias is cancelled out.

Off-farm depletion estimation methodology

The change in depletion resulting from converting an open irrigation canal to a pressurized pipe was estimated using an approach outlined in the USU report. The employed methodology considers the change in depletion of the conveyance system by comparing pre- and post-project conditions using Equation 1.14 from the USU report. This equation defines the change in depletion in the conveyance system as the sum of the differences in evapotranspiration from the conveyance corridor, surface water evaporation, and wet canal bed evaporation before and after the change. Equation 1.14 is defined as follows:

$$\Delta D_{conv} = \{[(ET_{corr})_{season}]_{after} - [(ET_{corr})_{season}]_{before}\} + [(E_{open})_{after} - (E_{open})_{before}] + [(E_{bed})_{after} - (E_{bed})_{before}]$$

where:

ΔD_{conv} = Change in depletion from conveyed water from *before* the practice is changed to *after* (AFY),

$[(ET_{corr})_{season}]_{after}$ = Evapotranspiration from vegetation in the conveyance corridor

³ Barker, B., Yost, M., & Bildim, S. (2025). *Quantifying depletion differences from irrigation practice changes in Utah*.

	during the irrigation season <i>after</i> the change (AFY),
$[(ET_{corr})_{season}]_{before}$	= Evapotranspiration from vegetation in the conveyance corridor during the irrigation season <i>before</i> the change (AFY),
$(E_{open})_{after}$	= Direct evaporation of conveyed water (open water surface evaporation) <i>after</i> the change (AFY),
$(E_{open})_{before}$	= Direct evaporation of conveyed water (open water surface evaporation) <i>before</i> the change (AFY),
$(E_{bed})_{after}$	= Wet canal bed evaporation <i>after</i> the change (AFY), and
$(E_{bed})_{before}$	= Wet canal bed evaporation <i>before</i> the change (AFY)

Under pre-project conditions, the open canal is subject to direct surface evaporation from the water surface, evaporative losses from the wet canal bed, and evapotranspiration by vegetation supported along the canal corridor. Following the conversion of an open canal to a pressurized pipe, surface water and wet canal bed evaporation are eliminated and the corridor's evapotranspiration regime shifts to that of a dry or native landscape. Under post-project conditions, surface water and wet canal bed evaporation are assumed to be zero, and the remaining seasonal depletion is represented by the evapotranspiration of the vegetation established in and adjacent to the corridor.

The spatial domain for each evaluated project's canal corridor was digitized using a geographic information system (GIS) application, ensuring that bank vegetation was captured. Evapotranspiration datasets for the mapped pre-project canal corridor were then obtained from OpenET. The USU report recommends that OpenET products be utilized for fields and areas greater than ten acres or nominally 930 feet wide and long. OpenET relies on Landsat satellite imagery, which has a pixel size of approximately 100 meters. For smaller areas evapotranspiration estimates can become less accurate because a single pixel may mix multiple land cover types or there may be edging effects.

For the two off-farm projects presented in this report, a representative area for the subject canal corridor was selected for each project. The selected representative areas reflect the conditions of a sub-irrigated field and were determined to be reasonably representative. The evaporative fraction method was then applied to the subject field using evapotranspiration datasets obtained from OpenET to estimate pre-project evapotranspiration and depletion for the conveyance corridor. For post-project conditions, a baseline or reference area was selected adjacent to the canal corridor which represents the expected vegetation and hydrologic condition along the canal corridor once seepage and surface flow are eliminated. Using OpenET,

evapotranspiration datasets for the post-project reference areas were obtained and then used in Equation 1.14 to estimate the change in depletion. A negative value indicates a reduction in depletion and a potential water savings resulting from the conveyance system improvement.

Figure 26: Digitized canal corridor used for off-farm depletion analysis and OpenET data extraction



On-farm depletion estimation methodology

The change in depletion resulting from converting irrigation systems is estimated using an approach outlined in the USU report. The employed methodology considers the change in depletion as a result of on-field irrigation improvements by comparing pre- and post-project conditions using Equation 1.19 from the USU report. This equation calculates the depletion change by taking the difference in depletion between the subject field and a baseline field that has been normalized to the subject field by a historical relationship. Equation 1.19 is defined as follows:

$$\Delta D \approx (D_{subject})_{after} - \left(\frac{(D_{subject})_{before}}{(D_{baseline})_{before}} \right) (D_{baseline})_{after}$$

where:

ΔD	= Change in depletion from <i>before</i> the practice is change to <i>after</i> (AFY),
$(D_{\text{subject}})_{\text{after}}$	= Depletion from the <i>subject</i> area using data from <i>after</i> the change (AFY),
$(D_{\text{subject}})_{\text{before}}$	= Depletion from the <i>subject</i> area using data from <i>before</i> the change (AFY),
$(D_{\text{baseline}})_{\text{before}}$	= Depletion from a neighboring <i>baseline</i> area assumed to represent the <i>subject</i> area <i>before</i> the change (AFY), $(D_{\text{baseline}})_{\text{before}}$ is for the same period as $(D_{\text{subject}})_{\text{before}}$, and
$(D_{\text{baseline}})_{\text{after}}$	= Depletion from a neighboring <i>baseline</i> area <i>after</i> the change; the <i>baseline</i> area is assumed to represent the <i>subject</i> area <i>before</i> the change (AFY), $(D_{\text{baseline}})_{\text{after}}$ is for the same period as $(D_{\text{subject}})_{\text{after}}$

For the on-farm projects evaluated a collection of baseline fields were used to represent a no-project scenario. This sample of comparison fields was developed by looking within a two mile buffer from the subject field edge for fields with the same crop type and pre-conditions as the subject field. By using this approach a median with a margin of error relative to the estimated change could be calculated. The sample size varies from case to case, but a 95% confidence interval is applied to each evaluation. An example of how the sample fields were developed in GIS is shown in Figure 27.

Figure 27: Project field boundary and sample of baseline fields used for on-farm depletion analysis and OpenET data extraction



The subject and baseline fields collected from through GIS were then processed in OpenET to obtain estimated depletion from ET. An approximately ten-year period (2015-2025) was used to establish the relationship element in equation 1.19. For the post-project condition all available months through 2025 were used for the depletion change calculation.

Depletion was calculated based on equation 1.2 in the USU report with some basic assumptions applied. The equation is defined as follows:

$$D_{\text{Field}} = ET_{\text{Irr}} + L_{\text{cu}} - ET_{\text{Non}}$$

where:

- | | |
|--------------------|---|
| D_{Field} | = Depletion from an irrigated field (acre-feet/year), |
| ET_{Irr} | = Evapotranspiration from the irrigated field (acre-feet/year) |
| L_{cu} | = Consumptive losses from applied water (acre-feet/year), and |
| ET_{Non} | = Evapotranspiration from the non-irrigated landcover (acre-feet/year). |

For this analysis evapotranspiration from the field was obtained from OpenET using the eeMETRIC model (as described above). Losses from applied water were derived from table 6.1 in the USU Report based on irrigation methods pre- and post-project as shown in Table 20. Where metered data was available it was used to help determine these losses. Evapotranspiration from the non-irrigated landcover was assumed to be the same for pre- and post-conditions because crop was not changed.

Table 20: Assumed irrigation efficiencies from table 6.1 in USU Report

Type	Irrigation System	Reasonable Application Efficiency	WDE	RO	DP	RO+DP
Drip	Subsurface Drip	98%	0%	0%	2%	0%
	Surface Drip	95%	0%	0%	5%	0%
	Mobile Drip Irrigation	96%	0%	0%	4%	0%
Sprinkle	Pivot/Linear LEPA	86%	13%	0%	1%	0%
	Pivot/Linear LESA	90%	10%	0%	1%	0%
	Microsprinkler	74%	22%	0%	4%	1%
	Under-tree Orchard	80%	19%	0%	1%	0%
	Pivot/Linear MESA	78%	21%	0%	1%	0%
	Solid Set Sprinklers	71%	28%	0%	1%	0%
	Hand Move	67%	31%	0%	2%	1%
	Wheel Line	67%	31%	0%	2%	1%
	Big Gun	57%	41%	0%	2%	1%
Surface	Pivot/Linear (Top of Pipe)	57%	41%	0%	2%	1%
	Basin	80%	0%	0%	20%	4%
	Border	78%	0%	2%	20%	5%
	Graded Furrow	78%	0%	3%	19%	5%
	Contour Border	78%	0%	2%	20%	5%
	Furrow	70%	0%	6%	24%	9%
	Corrugation	68%	0%	6%	26%	10%
	Wild Flood	50%	0%	5%	45%	25%

To learn more, visit
Ag.utah.gov/agricultural-water-optimization

