



ATTACHMENT H – Initial Evaluation of On-Farm Conservation Program

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Technical Memorandum

To: South San Joaquin Irrigation District
From: Davids Engineering
Date: September 10, 2012 revised December 27, 2012
Subject: Initial Evaluation of On-Farm Conservation Program

Overview and Summary

The South San Joaquin Irrigation District (SSJID) developed an ambitious on-farm water conservation program (Program) that was implemented in 2011 and has been continued in 2012. Through the Program, the District has provided direct funding to growers for the implementation of various water conservation measures, ranging from soil moisture monitoring to installation of drip irrigation systems. Overall objectives of the Program include the following:

- Promote and incentivize on-farm physical improvements, irrigation management practices and water measurement to support efficient water management.
- Ensure that water is being used efficiently and that it is being put to beneficial use.
- Support ongoing efforts to preserve existing water rights and to comply with current and emerging regulations, for example SBx7-7.
- Enhance the control of available surface water and groundwater supplies while promoting improved crop production within SSJID.

This technical memorandum describes an initial evaluation of the outcomes of the program. The objectives of the evaluation are as follows:

- Summarize program funding and participation
- Gather participant feedback in the following areas:
 - Program policies and procedures
 - Benefits of conservation measure implementation
 - Additional opportunities for improved water management
 - General feedback regarding water delivery service
- Increase understanding of on-farm irrigation practices and overall water management
- Perform a preliminary assessment of potential reductions in applied water that may occur as a result of conservation measure implementation

The evaluation included four primary activities. First, program funding and participation were reviewed and summarized. Second, a participant survey was developed and provided to all Program participants to elicit feedback on the Program. The survey was structured to gather background information on farming and irrigation practices, general program feedback, and specific feedback regarding conservation measure implementation. Third, focused interviews were conducted with selected program participants to better understand farming and irrigation practices, and obtain general program feedback and specific feedback regarding conservation measure implementation. Interviews were

conducted with four program participants. Each interview lasted approximately one hour and included visits to fields enrolled in the program. Fourth, an evaluation of water use prior to and following conservation measure implementation for participating fields was performed using available data from the District's TruePoint water order entry and delivery tracking system and from magnetic flow meters installed as part of the Program.

Based on the results of the evaluation, the following general observations are made regarding the Program:

- The program provided \$700,795 in cost share to eligible projects accounting for approximately 61% of the \$1,140,000 available Program budget for cost shares.
- The SSJID received a total of 143 applications for the Program of which 140 parcels serving 5,354 acres and representing 167 conservation measures – were selected to receive cost shares.
- The Program objectives are being met. Through the implementation of conservation measures, there is increased awareness of the importance of efficient management of available surface and groundwater supplies to maintain long term supply reliability, to protect and improve water quality, and to maximize productivity.
- The overall response of participants is very positive. Most participants are pleased with the program design and implementation.
- Some suggestions to make the program even better have been provided.
- All responding participants are interested in continuing to participate in the program, to the extent that they have fields that have not yet been enrolled.
- The program has helped improve relations between the District and participants, leading to increased understanding of District operations by participants and increased understanding of irrigation practices by District staff.
- For some fields, less water use has been observed, for others the Program has helped identify that more water is needed to maximize production. In many cases, it is difficult to quantify reductions in applied water due to the limited availability of pre- and post-implementation water use information.
- Participants note a range of benefits other than water conservation, including both improved crop health and yields and decreased costs.

The remainder of this technical memorandum describes the results of the evaluation in greater detail. The following sections are included:

1. Program Funding and Participation
2. Participant Survey Results
3. Summary of Focused Interviews
4. Comparison of 2010 and 2011 Deliveries for Participating Fields

Attachment A. Participant Survey Form

Attachment B. Detailed Review of Survey Results and Individual Comments from Participant Survey

Attachment C. Outline for Focused Interviews

Attachment D. Photos from Focused Interviews

1. Program Funding and Participation

1.1 Summary of Program Funding

The District allocated \$1.14 million in available funds for cost shares to encourage six specific conservation measures. The measures offered were chosen through the grower survey conducted in 2010 that gauged grower interest in the cost sharing program, identified which measures were the most attractive, and gained valuable information on irrigation methods and irrigation management in SSJID. The evaluation process resulted in the identification of the specific water conservation measures for which the District defined probable and reasonable implementation costs and a cost share percentage. Cost shares for each conservation measure are included in Table 1-1, below.

Table 1-1. 2011 On-Farm Water Conservation Program Conservation Measures and Budget

| Conservation Measure | District Share (% of Actual Cost) | Cost Share Budget | Max. per Grower |
|--------------------------------------|-----------------------------------|---------------------|-----------------|
| Delivery Measurement | 80% | \$ 190,000 | NA (see below) |
| Sprinkler Conversion | 50% | \$ 168,044 | \$ 25,000 |
| Drip Conversion | 50% | \$ 329,135 | \$ 25,000 |
| Tailwater Recovery | 50% | \$ 178,040 | \$ 25,000 |
| Irrigation Scheduling | 75% | \$ 49,500 | \$ 5,000 |
| Moisture Monitoring | 75% | \$ 45,500 | \$ 5,000 |
| Grower-Proposed Measures | 50% | \$ 179,781 | \$ 25,000 |
| | Total | \$ 1,140,000 | |
| Maximum Combined Payment per Grower: | | | \$ 50,000 |

A budgeting spreadsheet – referred to as the Program Administration Tool (PAT) – was developed to track applications, to monitor and record payments, and to maintain a running summary of the total budget remaining under each measure. Monthly financial statements were developed by the Program Manager to report total cost shares expended and projections for future cost share payments to allow the District’s financial department to make accurate cash flow calculations. Pending the review and approval of the completed conservation measure (including a field inspection), the Program Manager approved reimbursement by the financial department to the participant for the eligible expenses.

Reimbursements for physical improvements were paid directly to the grower subject to proof of implementation costs and payment. Costs for management practices (e.g. soil moisture monitoring) were paid directly to the material or service provider.

1.2 Summary of Grower Application and Participation

Applications were released to the Districts’ growers on February 10, 2011. A total of 143 different parcel applications were received from February until August with 78% (111 applications) occurring in February and March. Twenty-four total applications (17%) were received in April and May. Of the 143 total parcel applications, 140 met the approval criteria and were selected to receive funding (Table 1-2).

Approximately 76% (\$470,200) of the total cost share was paid to applicants who applied in February, while 20% (\$123,200) was paid to March applicants. On average, growers were notified of selection within one month of submitting an application, and payments were made to growers an average of 4.5 months after the grower submitted their application.

1.3 Summary of Conservation Measure Implementation

The District received and approved applications for all six of the conservation measures offered, as well as several grower-proposed measures. a total of 167 total conservation measures were implemented on the 140 parcels who received cost shares. Of these parcels, 56% performed soil moisture monitoring while 19% installed delivery flow measurement and 16% implemented irrigation scheduling. Additional summary statistics for the 2011 Program are shown in Table 1 through 3. It should be noted that many growers implemented measures on multiple parcels, and in some cases multiple conservation measures were implemented on a single parcel (i.e. delivery measurement and sprinkler conversion). For this reason, some columns in Tables 1 through 3 are totaled and others are not.

Table 1-2. General Statistics for 2011 On-Farm Water Conservation Program.

| Parcel Applications Received | Parcels Eligible | Parcels Selected | Measures Implemented | Parcels Receiving Cost Shares | | Acres Receiving Cost Share | Total Implementation Cost | Total SSJID Cost Share |
|------------------------------|------------------|------------------|----------------------|-------------------------------|---------------|----------------------------|---------------------------|------------------------|
| | | | | Total | % of Received | | | |
| 143 | 141 | 140 | 167 | 140 | 98% | 5354 | \$1,621,793 | \$700,795 |

Table 1-3. Cost Share Amounts by Conservation Measure.

| Conservation Measure | Parcels Receiving Cost Share | Acres | Implementation Cost | | | SSJID Cost Share | | | | Grower Cost Share | | | |
|-----------------------|------------------------------|-------|---------------------|----------|---------|------------------|----------|---------|------------|-------------------|----------|---------|------------|
| | | | Total | Average | \$/acre | Total | Average | \$/acre | % of Total | Total | Average | \$/acre | % of Total |
| Delivery Measurement | 27 | 1,005 | \$46,287 | \$1,714 | \$46 | \$39,388 | \$1,459 | \$39 | 85% | \$6,899 | \$256 | \$7 | 15% |
| Sprinkler Conversion | 7 | 272 | \$414,589 | \$59,227 | \$1,524 | \$125,571 | \$17,939 | \$462 | 30% | \$289,018 | \$41,288 | \$1,063 | 70% |
| Drip Conversion | 19 | 770 | \$601,993 | \$31,684 | \$782 | \$263,923 | \$13,891 | \$343 | 44% | \$338,070 | \$17,793 | \$439 | 56% |
| Tailwater Recovery | 3 | 228 | \$106,978 | \$35,659 | \$470 | \$41,871 | \$13,957 | \$184 | 39% | \$65,107 | \$21,702 | \$286 | 61% |
| Irrigation Scheduling | 23 | 909 | \$87,084 | \$3,786 | \$96 | \$49,500 | \$2,152 | \$54 | 57% | \$37,584 | \$1,634 | \$41 | 43% |
| Moisture Monitoring | 79 | 2,663 | \$54,380 | \$688 | \$20 | \$40,454 | \$512 | \$15 | 74% | \$13,926 | \$176 | \$5 | 26% |
| Grower-Proposed | 9 | 179 | \$310,482 | \$34,498 | \$1,736 | \$140,088 | \$15,565 | \$783 | 45% | \$170,394 | \$18,933 | \$953 | 55% |
| Total* | | | \$1,621,793 | | | \$700,795 | | | | \$920,998 | | | |

*Some parcels received cost share for two conservation measures, thus these columns are not totaled.

2. Participant Survey Results

2.1 Overview

This section provides a summary of responses from growers in SSJID to a survey conducted by the District in July and August of 2012 (Attachment A). The objective of the survey was to gain feedback from growers who participated in the District's On-Farm Water Conservation Program during 2011.

Responses were received from 26 individuals representing approximately 5,040 acres, or about 10% of the District's cropped area in recent years. For each question, the number of respondents and respondent acres are summarized for each response. Detailed comments received from respondents are provided in Attachment B.

2.2 General Observations

The following general observations are made based on the participant survey responses:

- The overall response of participants was very positive. Most participants are pleased with the program design and implementation.
- Some suggestions to make the program even better were provided.
- All responding participants are interested in continuing to participate in the program.
- The program has helped improve relations between the District and participants, leading to increased understanding of District operations by participants and increased understanding of irrigation practices by District staff.
- For some fields, less water use has been observed, for others the Program has helped identify that more water is needed to maximize production. In many cases, it is difficult to quantify reductions in applied water due to difficulties in measuring water.
- Participants note a range of benefits other than water conservation, including both increased crop health and yields and decreased costs.

2.3 Summary of Survey Results

2.3.1 Background Information

- Most responding growers indicated that farming is their full time occupation.
- Of the growers who provided their farming experience, most have more than 20 years of farming experience in SSJID or elsewhere.
- The majority of responding growers decide when to irrigate depending on availability of surface water when flood irrigating and soil moisture monitoring when irrigating by sprinkler or drip/micro.
- Most respondents decide which flow rate to irrigate with based on water delivery system constraints when flood irrigating and soil moisture monitoring when irrigating by sprinkler or drip/micro.
- Respondents generally decide how long to irrigate based on when the water reaches the end of the field or close to the end or delivery system constraints when flood irrigating, on past experience/always the same number of hours for a field when irrigating with sprinklers or use soil moisture monitoring when irrigating with drip/micro.

2.3.2 General Program Feedback

- Of all the conservation measures, soil moisture monitoring was implemented by the most responding growers on the largest number of fields.
- Respondents are generally satisfied with the enrollment and selection process of the Program.

- Most respondents were pleased with the type of conservation measures included in the Program.
- The majority of respondents felt the Program's payment amounts and limits were sufficient to encourage participation.
- Most responding grower indicated they would participate in the Program again if it were offered.

2.3.3 Specific Feedback Regarding Conservation Measure Implementation

- Most participating growers were able to implement the conservation measure(s) in time for the 2011 growing season.
- Most respondents thought that the implemented conservation measures resulted in less water use.
- The majority of responding growers indicated that there were additional benefits from the conservation measures and these benefits were about as expected.

3. Summary of Focused Interviews

3.1 Overview

This memorandum summarizes the interviews conducted with on-farm conservation program participants conducted by Davids Engineering on July 18, 2012. The primary objectives of the interviews were to obtain feedback from participants regarding their experience with the Program and to perform a qualitative assessment of water conservation and other benefits realized as a result of participation.

A total of four interviews were conducted with selected program participants. Interviewees were selected by SSJID staff based on perceived willingness to provide candid feedback and the level of participation in the Program. Each interview was structured more as a conversation, with a predetermined list of key topics to be addressed and lasted approximately 1 hour, including visits to fields enrolled in the Program.

Based on the interviews, the following objectives of the Program are being met:

- Promote and incentivize on-farm physical improvements, irrigation management practices and water measurement to achieve water conservation.
- Ensure that water is being used efficiently and that it is being put to beneficial use.
- Support ongoing efforts to preserve existing water rights and to comply with current and emerging regulations, for example SBx 7-7.
- Enhance the control of available surface water and groundwater supplies while promoting improved crop production within SSJID.

3.2 Background Information

All growers interviewed grow almonds exclusively, with the exception of one grower who also grows pomegranates. All are full time farmers ranging in age from approximately 40 to 60. Collectively, the interviewees farm approximately 1,550 acres, including 1,140 acres in SSJID's service area. Individual farming operations ranged in size from approximately 160 acres to over 600 acres. Based on typical field sizes in SSJID, it is estimated that approximately 100 fields are owned or managed by the interviewees.

Most interviewees farm at least one field using either flood, drip, micro, or solid set sprinkler irrigation. The timing of irrigation varies from field to field based on a number of factors, including the following:

- Surface water availability from SSJID - Varies depending on location in the system, delivery type (pump vs. gravity vs. Division 9 system), and division manager
- Time of year – including changes in weather and agronomic objectives (e.g., water stress to promote hull split and reduce hull rot prior to harvest; or timed to allow soil to dry for access to spray, mow weeds, harvest, etc.)
- Irrigation method and application rate
- Orchard age and soil characteristics
- Soil moisture levels relative to target amount
- Visual indicators of crop stress
- Experience (combining all of the factors above)

Irrigation delivery rates are typically fixed by SSJID based on the available flow for a flood head or are defined by the pump flow rate required to irrigate using a particular pressurized irrigation system and set size. Irrigation duration varies based on the following factors:

- Time required to flood the entire field (varies depending on soil type, existing moisture content, delivery flow rate)
- Time required to refill soil based on soil moisture monitoring data (pressurized irrigation)
- Time required to apply target depth of water (pressurized irrigation)

As indicated above, most participants interviewed use a combination of experience, visual observations, and soil moisture monitoring to manage irrigation of their fields.

Overall, the interviewees indicated that SSJID provides a good level of service, considering the constraints of the distribution system and relatively low cost of water. Additionally, one grower specifically noted that Jeff Shaw who has been helping get the Division 9 deliveries working should be commended. Specific suggestions for improvement include the following:

- Some Division Managers (DMs) are able to accommodate a 14 day rotation, while others strictly follow a 10-day or 20-day rotation. 10 days is too short and 20 days is too long. It would be great if a 14 day rotation could be provided more consistently.
- Drip, micro, and sprinklers are difficult on dead end lines due to flow fluctuations. It would be great if SSJID could better control flows to dead end laterals to avoid excess or insufficient flows, which typically result in spills to the farm due to having more flow than the pump can take or not enough flow, followed by pump shutoff, followed by spillage if not attended.
- During aquatic herbicide applications, deliveries for flood have a decreased flow rate. The grower is often unaware of this in advance and may need to make additional unplanned trips to the field due to irrigation requiring more time to complete. Better notification would be helpful.
- A system to allow growers to see where water is in the rotation and a schedule for future deliveries, including information on flow rates in the system would be helpful. This would allow growers to better plan their daily activities and manage their labor in advance.
- Better communication from DMs regarding changes in delivery measurement would be helpful. In at least some instances, only recently have DMs contacted growers to find out how much they are using at pump deliveries.
- Some growers must switch to groundwater for irrigation during aquatic herbicide treatment due to large amounts of algae moving through the system.
- One grower experienced a situation in which a district employee indicated that the district would cover the cost of a connection to the Division 9 pressurized pipeline, only to have the decision later reversed. He requested that in the future the District be consistent in its representations to growers.
- A shorter wait time to receive water in Division 9 would be appreciated (apparently water must currently be ordered 48 hours in advance).

- Recently, it was necessary to place orders 6 days ahead due to magnacide treatment. Advance notice of such delays in filling orders would be helpful to growers.
- The ability to adjust order duration in Division 9 would be appreciated. For example, it would be beneficial to add a few hours to an irrigation after it has begun, if needed to meet crop water requirements.
- Activation of the soil moisture sensors installed as part of the Division 9 project would be appreciated.

3.3 General Program Feedback

All participants interviewed have experience enrolling at least two fields in the program, and all have performed conversion to either drip, micro, or solid set sprinkler irrigation on at least one field. All but one have enrolled fields for either scientific irrigation scheduling or soil moisture monitoring. One grower converted an old solid set sprinkler system to drip under the program, reducing both water and electrical use. Another grower constructed an on-farm regulating reservoir to facilitate operation of a drip/micro system using District water.

All participants expressed satisfaction with the ease of enrollment in the program and flexibility to choose appropriate conservation measures for their fields. In particular, almost every participant contrasted the efficiency and practicality of the SSJID program as compared to the NRCS EQIP program. Growers greatly appreciate the timeliness of the District in reviewing and approving applications and issuing payment once conservation measures are implemented. Additionally, the timely, practical and convenient inspection of system installations by the District is appreciated to avoid unnecessary construction delays.

All participants indicated that they will continue to enroll in the program if it is offered in the future. One participant emphasized that he would not have implemented the conservation measures without program funding being available, and another indicated that the program funding for system conversion helped him encourage the landowner to install the pressurized irrigation system by helping incentivize the lease agreement.

The following suggestions were offered to help improve the program:

- Growers often plan improvements to fields a year or more in advance. Starting program enrollment for the following year in July or August would better match participants' planning horizons.
- The program payment amounts are meant to cover a set percentage of implementation costs, up to a limit per acre or per field. As costs increase, the district will need to increase payment caps to continue to pay the set percentage.
- A conservation measure to help pay the cost of converting surface drains to pipes would be helpful to increase the area that can be cropped and to reduce safety risks of operators running into large ditches.

3.4 Specific Feedback Regarding Conservation Measure Implementation

With the exception of the on-farm reservoir, soil moisture monitoring, and scientific irrigation scheduling conservation, participants had past experience with the conservation measures that they implemented (conversion to drip, micro, or solid set sprinkler). Although participants feel that they are using less water as a result of implementing the conservation measures, they were unsure as to how much less they are using, primarily due to difficulty in knowing how much water was used in the past under flood irrigation. Specific benefits of conservation measure implementation indicated by the participants include the following:

- Soil moisture monitoring and scientific irrigation scheduling
 - Better management of soil moisture to avoid water stress and control deep percolation
 - Better monitoring of temperature for frost protection (via weather station and temperature alarm systems installed for two of the participants)
 - Reduced water use
 - Example: 20 hrs/week of sprinkler run time vs. 30 hrs/week previously (33% reduction)
 - Reduced fertilizer use
 - Improved yields
- Conversion to drip/micro/solid set irrigation
 - Better control of amount of water applied
 - Reduced deep percolation and overall water use
 - Increased flexibility in timing of irrigation events
 - Improved yields
 - Better overall health of trees and better resistance to pests and disease
 - Ability to control orchard microclimate to reduce hull rot
 - Able to overcome soil limitations (e.g. sand streaks, etc.)
 - Reduced fertilizer and herbicide use
 - Reduced labor for irrigation, mowing weeds, etc.
 - Example: 3 hours to check drip system now vs. 8 hours irrigation labor in the past for flood
 - Example: no need to mow weeds now with drip
 - Example: drip system takes little time to run, only needs to be checked every 2 weeks or so
 - More convenient scheduling of labor (e.g., no need to change sets in middle of night)
 - Reduced wetting of orchard floor between trees to allow access to orchard for spraying, harvest, etc.
 - Reduced electrical use (conversion from 50 HP solid set to 20 HP drip pump)
- On-farm regulating reservoir¹

¹ This conservation measure was proposed by the grower to help him efficiently implement micro and drip irrigation on a deadend lateral. The reservoir helps to overcome mismatches between the SSJID delivery flow and

- Reduced labor (no need to frequently check pump)
- Avoid spillage of excess delivery flows to the farm
- Avoid spillage of delivery flows if pump shuts down

the flow rate of the pump used to operate the microirrigation system. On-farm reservoirs could be considered as a listed CM for future programs.

4. Comparison of 2010 and 2011 Deliveries for Participating Fields

4.1 Overview

This technical memorandum provides a summary of a preliminary comparison of deliveries during the 2010 and 2011 growing seasons for fields participating in the District's 2011 On-Farm Water Conservation Program (Program). Although this comparison does not provide a definitive quantification of conserved water achieved by the program participants, it provides insight into the potential magnitude of conserved water.

4.2 Approach

The volume of water conserved through improvements funded by the Program is equal to the difference between the without-improvement and with-improvement water deliveries (AWMC, 2004). The conserved water volume is estimated based on the difference in delivery volumes for participating fields between 2010 and 2011, according to Equation 1:

$$\text{Conserved Water Volume} = (\text{Farm Delivery})_{\text{without}} - (\text{Farm Delivery})_{\text{with}} \quad [1]$$

For this preliminary assessment, it is assumed that neither evaporative demand nor resulting crop water requirements varied between 2010 and 2011 for participating fields, such that recorded deliveries between 2010 and 2011 for participating fields can be compared directly. Additionally, for purposes of this preliminary conservation estimate, we assume that the reduction in delivered water results in a corresponding reduction in irrecoverable water losses. In the future, it is anticipated that these estimates will be refined to consider both changes in evaporative demand and cropping over time. Additionally, improved delivery measurement accuracy will further reduce uncertainties in conservation estimates. Finally, the additional benefits of groundwater recharge and reuse of surface water runoff by downstream users will be considered.

As described above, with and without project farm deliveries were estimated based on TruePoint (TP) delivery records between March 1 and October 31 in 2010 (without project) and 2011 (with project). Delivery records were extracted from a database of SSJID irrigation deliveries developed by Davids Engineering that imports delivery records from spreadsheets provided by SSJID. Delivery records in TP were matched to participating fields by Delivery Location, APN, participant name, crop, and acreage as identified in the Program Administration Tool (PAT) spreadsheet. In many cases, it was difficult to identify the TP records corresponding to a participating field with certainty, or there may have been no deliveries to the field during the time period of interest (e.g. the 2010 or 2011 growing seasons). Fields for which links could not be made between data sources or that appeared not to have been irrigated for substantial portions of either the 2010 or 2011 growing season were not included.

TP delivery amounts were compared for fields with recorded deliveries between March and October of 2010 and 2011 and that had a field visit for the 2011 program by August 2011 (suggesting that the conservation measure had been implemented prior to or during the 2011 growing season). Comparisons were made for approximately 51% of participating fields with conservation measures implemented before the end of the 2011 growing season (45% of participating acres with implementation during 2011).

Additionally, for some fields MagMeter (magnetic flowmeter) delivery measurements were obtained. Where available, these measurements were compared to corresponding TruePoint delivery records.

4.3 Results and Discussion

4.3.1 2010-2011 TruePoint Delivery Comparison

The following table (Table 4-1) provides a summary of 2010 and 2011 deliveries by conservation measure. For each measure, the total number of fields and corresponding acreage with available delivery data is provided, along with the 2010 and 2011 delivery totals. Finally, the difference between 2010 and 2011 deliveries is provided, expressed as acre-feet and inches.

Table 4-1. Comparison of 2010 and 2011 TruePoint Delivery Records for Selected Fields.

| Conservation Measure | Fields Evaluated | % of Total | Acres | % of Total | True Point Deliveries, ac-ft (March - October) | | Preliminary Conservation Estimate | |
|--------------------------|------------------|------------|-------|------------|--|------|-----------------------------------|--------|
| | | | | | 2010 | 2011 | ac-ft | inches |
| Drip Conversion | 8 | 53% | 379 | 54% | 1093 | 719 | 374 | 11.8 |
| Sprinkler Conversion | 4 | 80% | 220 | 90% | 472 | 373 | 99 | 5.4 |
| Tailwater Recovery | 0 | NA | 0 | NA | NA | NA | NA | NA |
| Grower Proposed | 1 | 11% | 25 | 10% | 100 | 101 | -1 | -0.6 |
| Irrigation Scheduling | 7 | 30% | 278 | 30% | 996 | 721 | 275 | 11.9 |
| Soil Moisture Monitoring | 47 | 61% | 1497 | 58% | 5242 | 4695 | 547 | 4.4 |
| Totals | 67 | 51% | 2399 | 45% | 7902 | 6608 | 1294 | 6.5 |

Assuming that the sample within each conservation measure is representative of all fields implementing that measure during 2011, the total preliminary conservation estimate for the 2011 growing season is approximately 2,700 acre-feet. This estimate is subject to substantial uncertainty due to the following factors:

- Uncertainty in the accuracy of TruePoint delivery records
- Differences in groundwater use between 2010 and 2011 for participating fields with access to groundwater as a supplementary source of water
- Changes in crop water requirements at participating fields between 2010 and 2011 due to weather and/or crop changes

Additionally, it should be noted that for the conservation measures including physical improvements in particular, it is anticipated that conservation will be achieved over the full life of the improvements.

The following figures (Figures 4-1 through 4-4) show the individual field results for each conservation measure with more than 1 participating field with available delivery data. As expected, differences in water use between 2010 and 2011 vary widely among fields, with some fields using more water in 2011 than 2010 based on the available records. Due to the large variability among fields, it is anticipated that overall estimates of conserved water amounts will improve as the number of field participating in the Program increases, as the Program continues over multiple years, and as TP delivery records improve.

Figure 4-1. Difference in TruePoint Deliveries between 2010 and 2011 Growing Seasons (March – October) for Fields Implementing Drip Conversion, Inches.

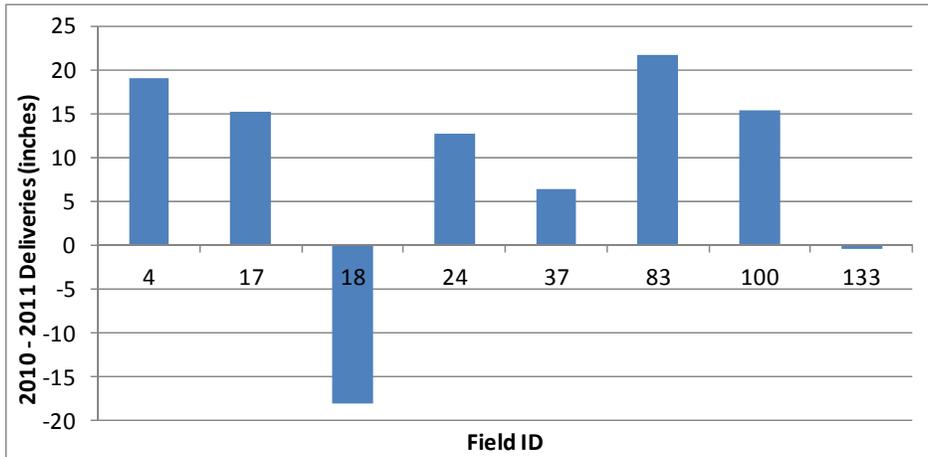


Figure 4-2. Difference in TruePoint Deliveries between 2010 and 2011 Growing Seasons (March – October) for Fields Implementing Sprinkler Conversion, Inches.

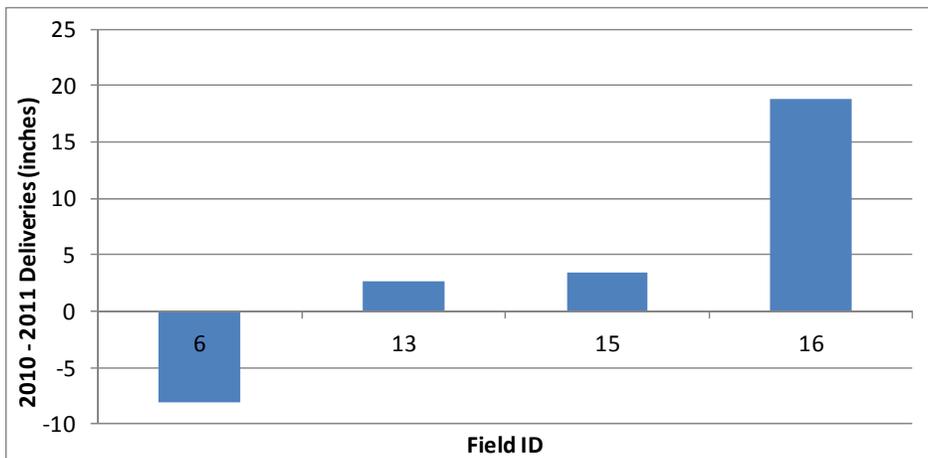


Figure 4-3. Difference in TruePoint Deliveries between 2010 and 2011 Growing Seasons (March – October) for Fields Implementing Irrigation Scheduling, Inches.

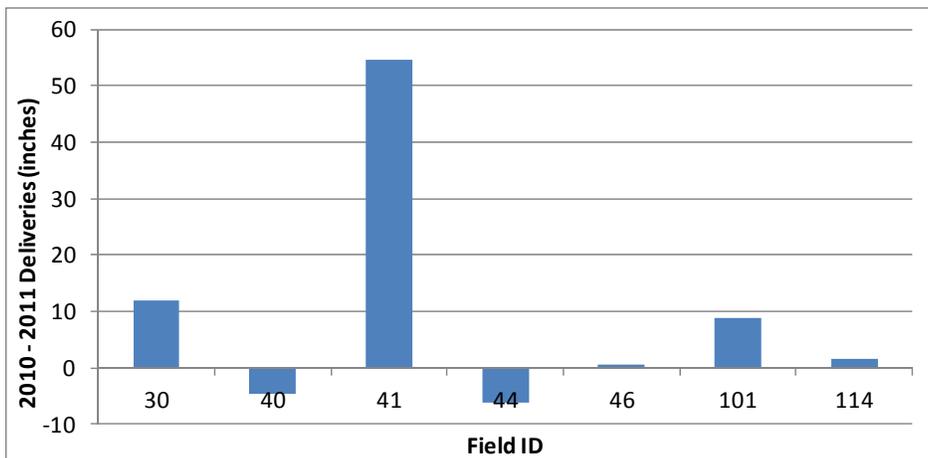
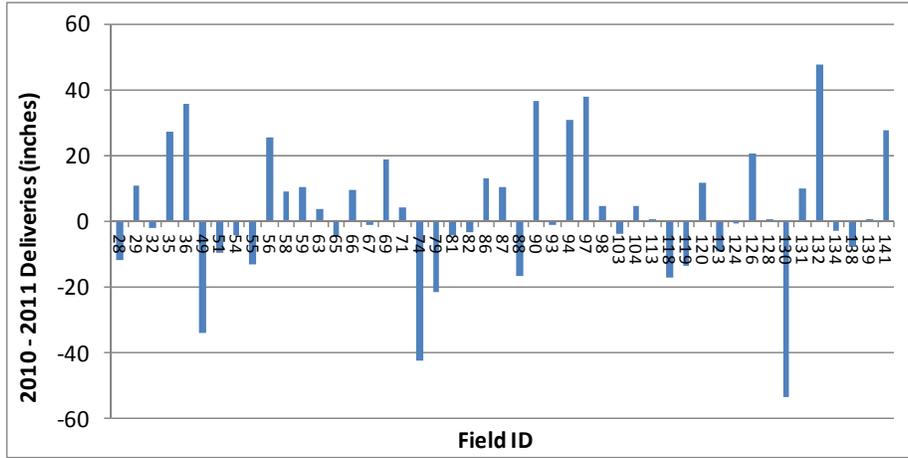


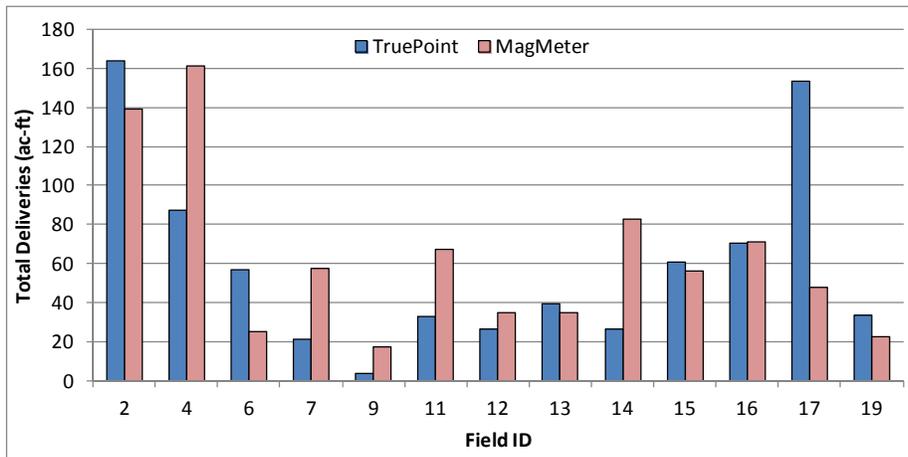
Figure 4-4. Difference in TruePoint Deliveries between 2010 and 2011 Growing Seasons (March – October) for Fields Implementing Moisture Monitoring, Inches.



4.3.2 2011 TruePoint and Magnetic Flowmeter Comparison

TruePoint and magnetic flowmeter data for 2011 are shown in Figure 4-5. As indicated, differences vary widely between TruePoint and MagMeter delivery amounts. Overall, the total TruePoint delivery volume of 776 acre-feet is 42 acre-feet less than the total MagMeter delivery volume of 818 acre-feet, a 5% overall difference.

Figure 4-5. Comparison of TruePoint and Magnetic Flowmeter Delivery Volumes.



4.4 References

AWMC. 2004. Monitoring and Verification On Farm. Available at http://www.agwatercouncil.org/images/stories/monitoring_and_verification_on_farm.pdf

Attachment A. Participant Survey Form

South San Joaquin Irrigation District 2011 On-Farm Water Conservation Program

Participant Survey

July 2012

Overview

The District desires to evaluate its On-Farm Water Conservation Program. As part of this evaluation, the District is interested in obtaining feedback from Program participants regarding their experience with the Program and water conservation and other benefits they have realized as a result of participation. This survey includes a series of questions designed to gather valuable feedback regarding the Program.

The District is hoping you can take time out of your busy schedule to fill out the survey and help us with our conservation efforts. After you have completed the survey, please return it in the enclosed self addressed stamped envelope.

Information provided is for District use only. No information will be shared with any third parties.

Instructions

Please take a few minutes to fill out the survey below. The questions are straightforward and should take no more than ten minutes to complete. We have also provided open-ended questions at the end of the survey for anyone wishing to provide additional thoughts on this topic. Please use the enclosed postage-paid envelope to return the survey directly to Attention: Julie Vrieling, South San Joaquin Irrigation District, Post Office Box 747, Ripon, CA 95366. **Please return your survey by August 15, 2012.**

If there are any questions that require more space to respond to, please feel free to use the back of the form or attach additional pages.

Thank you for your participation!

Background Information

1. Of the total acreage you farm within SSJID, how many acres fall into the following crops? What irrigation methods do you use (please enter approximate acres as appropriate)?

| | <u>Flood</u> | <u>Sprinkler</u> | <u>Drip/Micro</u> |
|--|--------------|------------------|-------------------|
| a) Almonds | _____ | _____ | _____ |
| b) Forage/feed crops (alfalfa, corn, oats, etc.) | _____ | _____ | _____ |
| c) Vineyards | _____ | _____ | _____ |
| d) Walnuts | _____ | _____ | _____ |
| e) Other: _____ | _____ | _____ | _____ |
| f) Other: _____ | _____ | _____ | _____ |
| g) Other: _____ | _____ | _____ | _____ |

2. Is farming your full time occupation?

- a. _____ Yes
b. _____ No

3. How many years of farming experience do you have in SSJID or elsewhere? _____

4. How do you decide when to irrigate? (Mark as many of the following as apply.)

| | <u>Flood</u> | <u>Sprinkler</u> | <u>Drip/Micro</u> | |
|----|--------------|------------------|-------------------|--|
| h) | _____ | _____ | _____ | Availability of surface water |
| i) | _____ | _____ | _____ | Soil moisture monitoring |
| j) | _____ | _____ | _____ | Crop evapotranspiration (ET) calculation |
| k) | _____ | _____ | _____ | Visual crop indicators (stress, wilting, etc.) |
| l) | _____ | _____ | _____ | Calendar/past experience |
| m) | _____ | _____ | _____ | Other: _____ |

5. How do you decide which flow rate to irrigate with? (Mark as many of the following as apply.)

| | <u>Flood</u> | <u>Sprinkler</u> | <u>Drip/Micro</u> | |
|----|--------------|------------------|-------------------|--|
| a) | _____ | _____ | _____ | Fixed by water delivery system constraints |
| b) | _____ | _____ | _____ | Turnout/irrigation system capacity |
| c) | _____ | _____ | _____ | Soil moisture monitoring |
| d) | _____ | _____ | _____ | Past experience |
| e) | _____ | _____ | _____ | Other: _____ |

6. How do you decide how long to irrigate? (Mark as many of the following as apply.)

| | <u>Flood</u> | <u>Sprinkler</u> | <u>Drip/Micro</u> | |
|----|--------------|------------------|-------------------|---|
| a) | _____ | _____ | _____ | Fixed by water delivery system constraints |
| b) | _____ | _____ | _____ | Soil moisture monitoring |
| c) | _____ | _____ | _____ | Water reaches end of field or close to end |
| d) | _____ | _____ | _____ | Target depth of water applied |
| e) | _____ | _____ | _____ | Past experience/always the same number of hours for a |

- f) _____ field
 Other: _____
7. Are there steps that SSJID could take to improve its level of service to help you irrigate more effectively or efficiently?

General Program Feedback

8. How many fields did you enroll in the program during 2011, and which conservation measures did you implement?

| <u>Conservation Measure</u> | <u>Fields</u> | <u>Acres</u> |
|--|---------------|--------------|
| a. Delivery measurement for pumped deliveries. | _____ | _____ |
| b. Conversion from flood to sprinkler irrigation. | _____ | _____ |
| c. Conversion from flood to drip/micro irrigation. | _____ | _____ |
| d. Tailwater recovery systems to prevent runoff. | _____ | _____ |
| e. Scientific irrigation scheduling. | _____ | _____ |
| f. Soil moisture monitoring. | _____ | _____ |
| g. Other: _____ | _____ | _____ |

9. Were you satisfied with the enrollment and selection process?
- a. _____ Yes
- b. _____ No

Please provide any suggestions to improve the enrollment and selection process: _____

10. Would you like to see additional conservation measures included?
- a. _____ Yes
- b. _____ No

Please describe any additional conservation measures you would like included: _____

11. Were the payment amounts and limits sufficient and appropriate to encourage your participation?

- a. _____ Yes
- b. _____ No

Please provide any additional feedback regarding Program incentive payments: _____

12. If the program continues to be offered, would you enroll/apply again?

- a. _____ Yes
- b. _____ No

Why or why not? _____

13. Please provide suggestions of how to make the program more attractive or effective:

Specific Feedback Regarding Conservation Measure Implementation

14. For the fields that you entered into the program and conservation measures implemented, did you have prior experience with these conservation measure(s) on other of your fields?

- a. _____ Yes
- b. _____ No

Please describe: _____

15. Did the timing of Program enrollment and selection allow you to implement the conservation measure(s) in time for the 2011 growing season?

- a. _____ Yes
- b. _____ No

Please explain: _____

16. Did conservation measure implementation result in less water use for the enrolled field(s)?

- a. _____ Yes
- b. _____ No

If possible, please explain how much less water was used: _____

17. Were there other benefits from the conservation measure, such as improved yields, labor savings, reduced energy costs, reduced chemical costs, or others?

- a. _____ Yes
- b. _____ No

Please describe the additional benefits including, if possible, an estimate of how much benefit was achieved:

18. Were the benefits less or more than expected?

- a. _____ About as expected
- b. _____ Less than expected
- c. _____ More than expected

Please explain: _____

19. Please describe any unexpected outcomes or implications of participating in the Program:

20. Please share any additional feedback regarding the Program: _____

21. Please provide your name and contact information below (Optional):

Name: _____

Address: _____

Daytime Phone Number: _____

Please return your survey to Julie Vrieling by August 15, 2012. If you have any questions regarding this survey or the overall Conservation Program, please contact Julie Vrieling at (209)249-4675 or jvrieling@ssjid.com. Thank you for your involvement, we appreciate your participation.

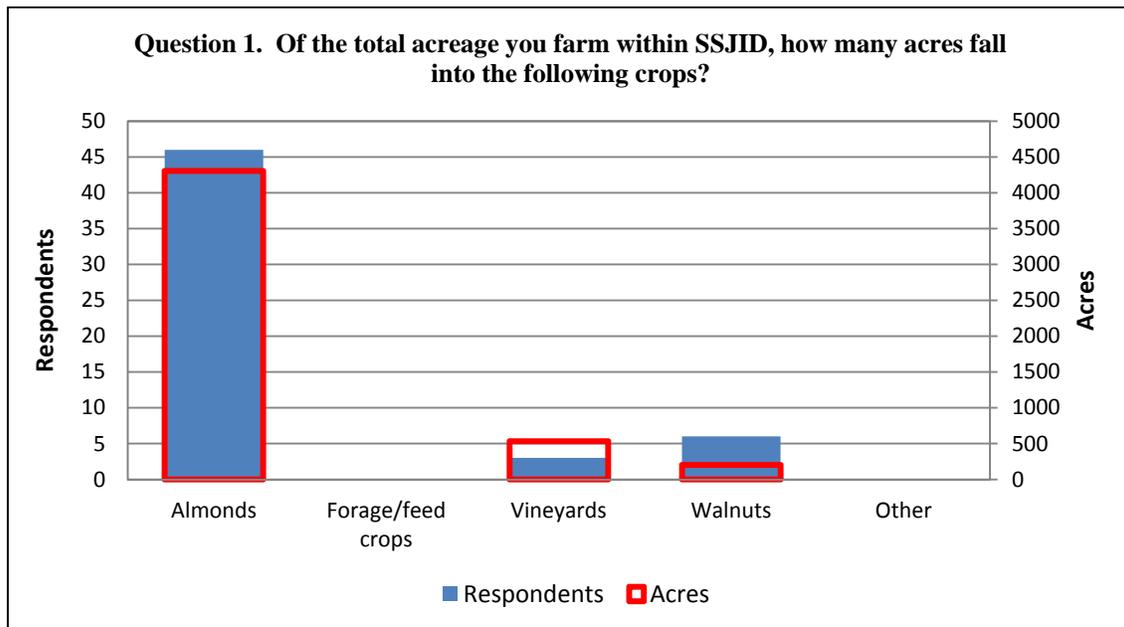
Attachment B. Detailed Review of Survey Responses and Individual Comments from Participant Survey

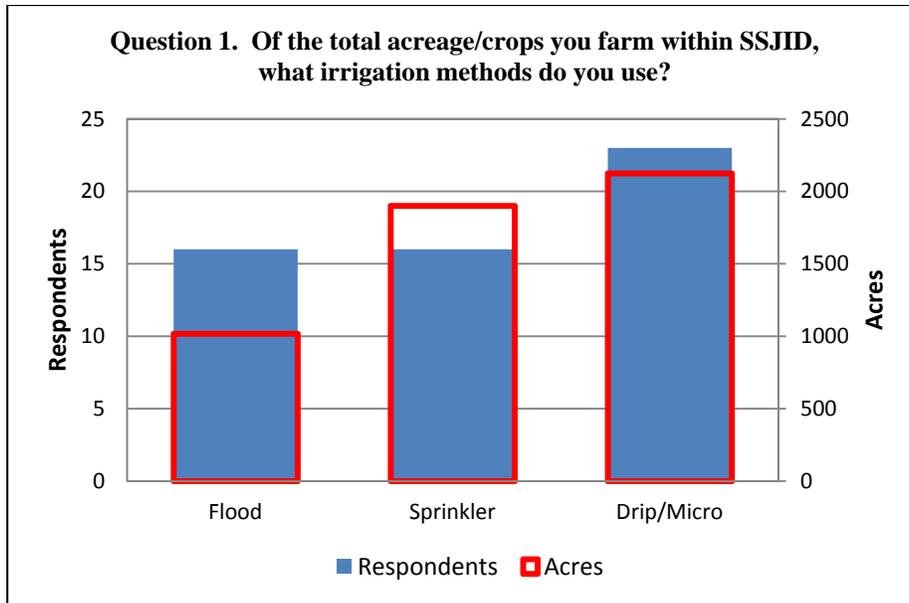
Detailed Review of Survey Results

Background Information

Question 1. Of the total acreage you farm in SSJID, how many acres fall into the following crops? What irrigation methods do you use?

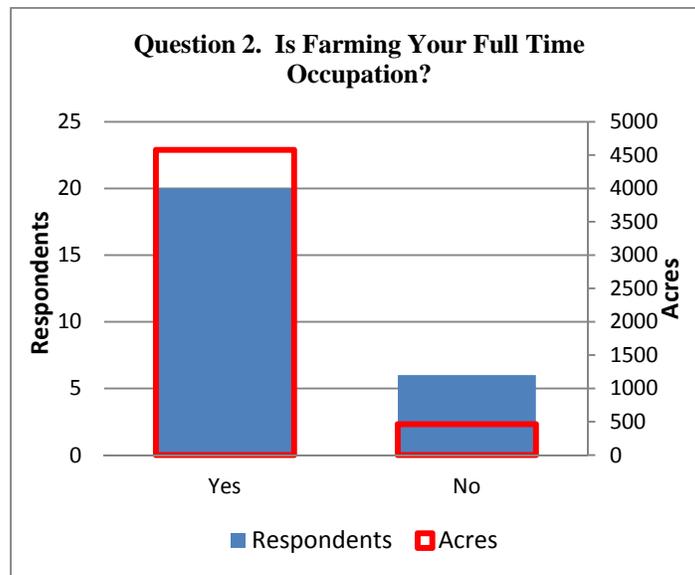
| Crop | Method | Number of Respondents | % of Respondents | Acres | % of Respondent Acres |
|-------------------|------------|-----------------------|------------------|-------|-----------------------|
| Almonds | Flood | 13 | 50% | 693 | 14% |
| Almonds | Sprinkler | 14 | 54% | 1798 | 36% |
| Almonds | Drip/Micro | 19 | 73% | 1815 | 36% |
| Forage/feed crops | Flood | 0 | 0% | 0 | 0% |
| Forage/feed crops | Sprinkler | 0 | 0% | 0 | 0% |
| Forage/feed crops | Drip/Micro | 0 | 0% | 0 | 0% |
| Vineyards | Flood | 1 | 4% | 308 | 6% |
| Vineyards | Sprinkler | 0 | 0% | 0 | 0% |
| Vineyards | Drip/Micro | 2 | 8% | 224 | 4% |
| Walnuts | Flood | 2 | 8% | 16 | 0% |
| Walnuts | Sprinkler | 2 | 8% | 101 | 2% |
| Walnuts | Drip/Micro | 2 | 8% | 85 | 2% |
| Other | Flood | 0 | 0% | 0 | 0% |
| Other | Sprinkler | 0 | 0% | 0 | 0% |
| Other | Drip/Micro | 0 | 0% | 0 | 0% |





Question 2. Is farming your full time occupation?

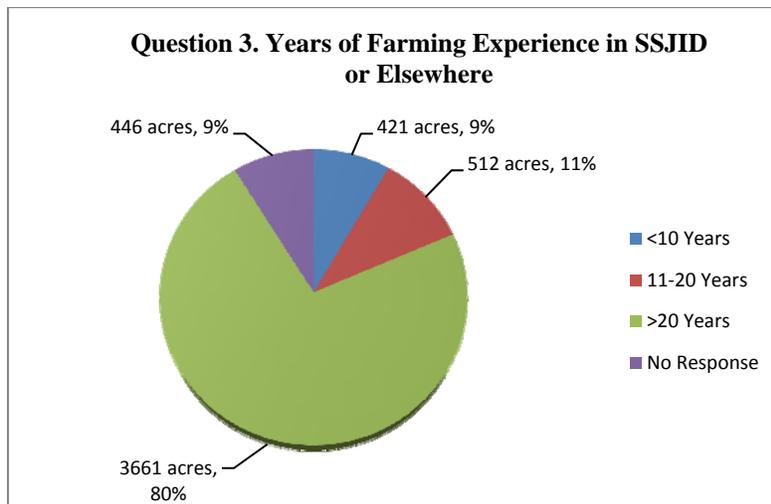
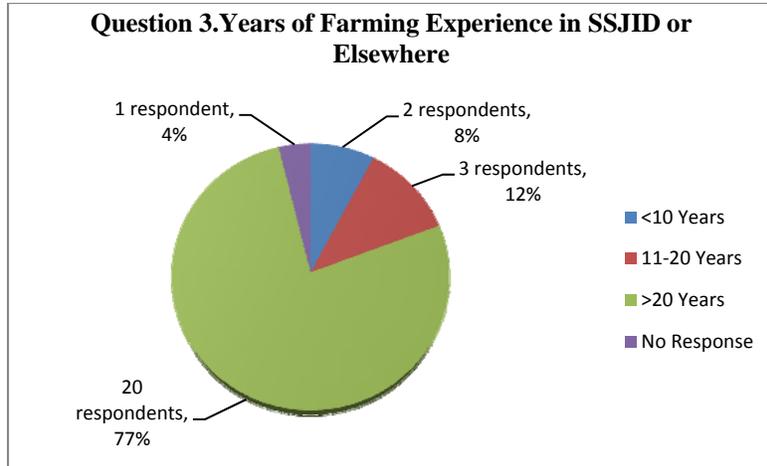
20 respondents (77% of respondents representing 4,577 respondent acres) are full time farmers while 6 respondents (23% of respondents representing 463 respondent acres) indicate that farming is not their full time occupation. All respondents provided an answer to this question.



Question 3. How many years farming experience do you have in SSJID or elsewhere?

- 2 respondents (8% of respondents representing 421 respondent acres) indicated they had less than 10 years farming experience.
- 3 respondents (12% of respondents representing 512 respondent acres) indicated they had between 11 and 20 years of farming experience.

- 20 respondents (77% of respondents representing 3661 respondent acres) indicated they had more than 20 years of farming experience.
- 1 respondent (4% of respondents representing 446 respondent acres) did not provide a response to this question.

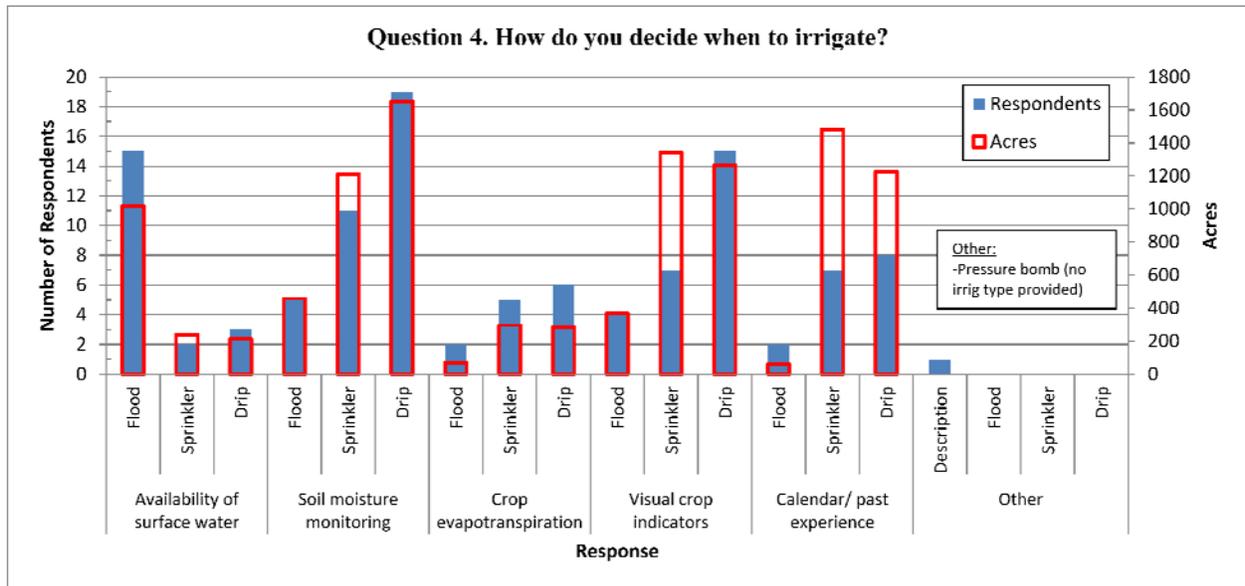


Question 4. How do you decide when to irrigate?

- Flood
 - 15 respondents (58% of respondents representing 1,017 acres) decide when to flood irrigate based on availability of surface water.
 - 5 (19% of respondents representing 458 acres) use soil moisture monitoring.
 - 2 (8% of respondents representing 70 acres) use crop evapotranspiration data.
 - 4 (15% of respondents representing 368 acres) use visual crop indicators.
 - 2 (8% of respondents representing 60 acres) use calendar/past experience.
- Sprinkler
 - 2 respondents (8% of respondents representing 240 acres) decide when to sprinkler irrigate based on availability of surface water.
 - 11 (42% of respondents representing 1,212 acres) use soil moisture monitoring.
 - 5 (19% of respondents representing 296 acres) use crop evapotranspiration data.
 - 7 (27% of respondents representing 1,343 acres) use visual crop indicators.

- 7 (27% of respondents representing 1,483 acres) use calendar/past experience.
- Drip/Micro
 - 3 respondents (12% of respondents representing 213 acres) decide when to drip/micro irrigate based on availability of surface water.
 - 19 (73% of respondents representing 1,654 acres) use soil moisture monitoring.
 - 6 (23% of respondents representing 285 acres) use crop evapotranspiration data.
 - 15 (58% of respondents representing 1,265 acres) use visual crop indicators.
 - 8 (31% of respondents representing 1,228 acres) use calendar/past experience.

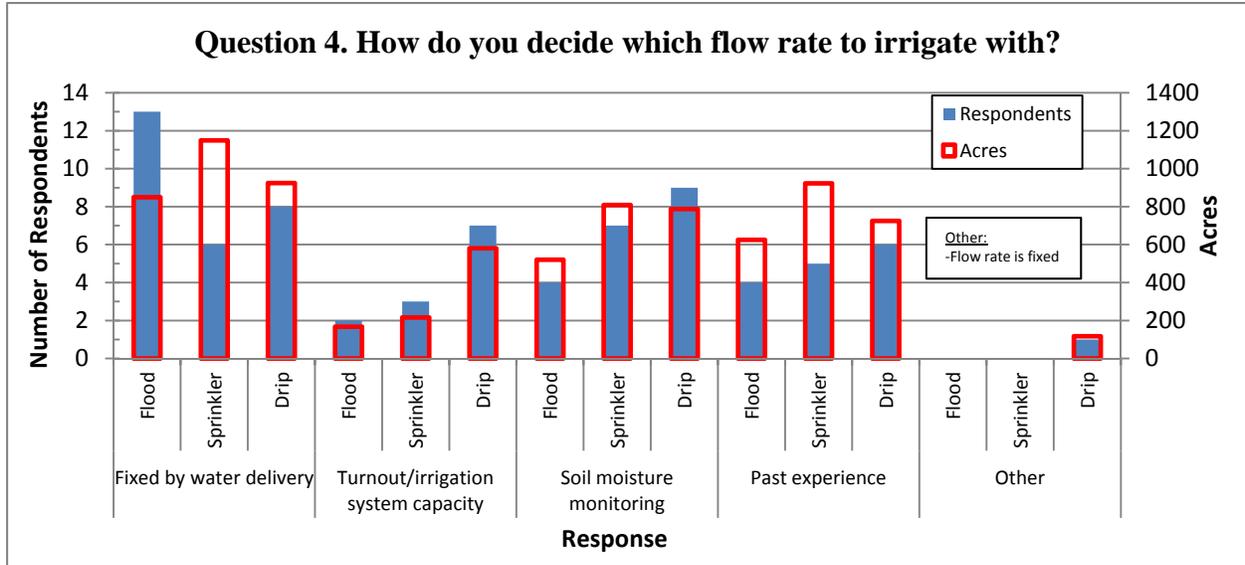
1 respondent indicated using other methods including leaf or stem water potential (e.g. pressure bomb) to decide when to irrigate, but no irrigation type was indicated and so it was not categorized.



Question 5. How do you decide which flow rate to irrigate with?

- Flood
 - 13 respondents (50% of respondents representing 850 acres) decide which flow rate to flood irrigate with based on fixed water delivery system constraints.
 - 2 (8% of respondents representing 167 acres) are limited to turnout/irrigation system capacity.
 - 4 (15% of respondents representing 520 acres) use soil moisture monitoring data.
 - 4 (15% of respondents representing 625 acres) use past experience.
 - 0 (0% of respondents representing 0 acres) decide which flow rate to flood irrigate with based on “other” methods.
- Sprinkler
 - 6 respondents (23% of respondents representing 1149 acres) decide which flow rate to sprinkler irrigate with based on fixed water delivery system constraints.
 - 3 (12% of respondents representing 216 acres) are limited to turnout/irrigation system capacity.
 - 7 (27% of respondents representing 809 acres) use soil moisture monitoring data.
 - 5 (19% of respondents representing 923 acres) use past experience.
 - 0 (0% of respondents representing 0 acres) decide which flow rate to sprinkler irrigate with based on “other” methods.

- Drip/Micro
 - 8 respondents (31% of respondents representing 924 acres) decide which flow rate to drip/micro irrigate with based on fixed water delivery system constraints.
 - 7 (27% of respondents representing 581 acres) are limited to turnout/irrigation system capacity.
 - 9 (35% of respondents representing 788 acres) use soil moisture monitoring data.
 - 6 (23% of respondents representing 725 acres) use past experience.
 - 1 (4% of respondents representing 117 acres) decide which flow rate to drip/micro irrigate with based on “other” methods.



Question 6. How do you decide how long to irrigate?

Flood Irrigation

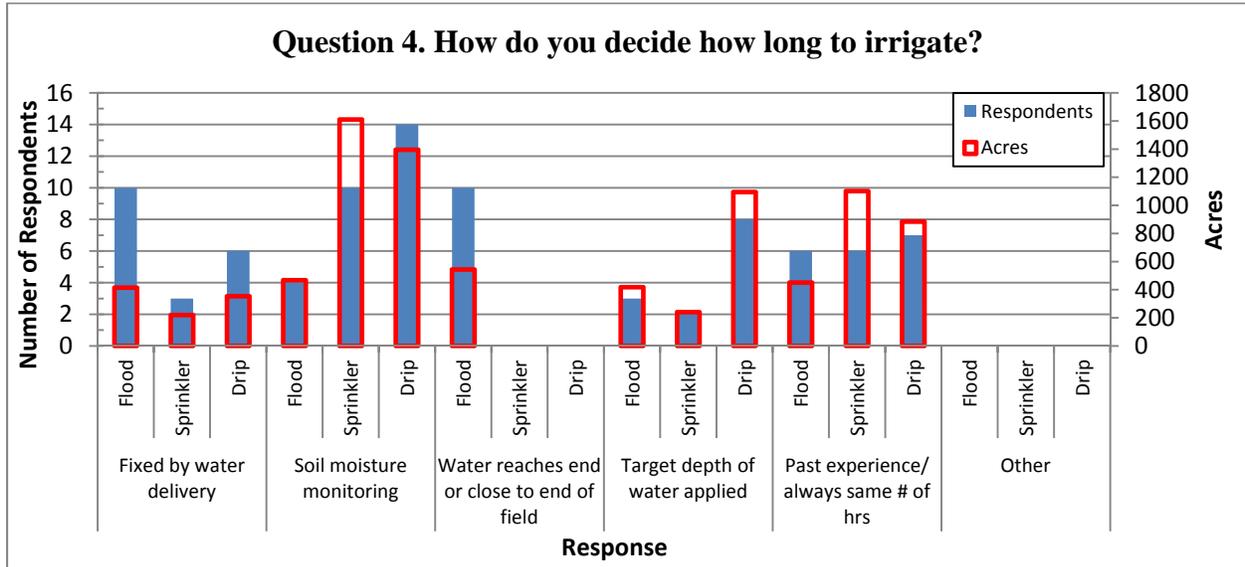
- 10 respondents (38% of respondents representing 415 acres) decide how long to flood irrigate based on water delivery system constraints.
- 4 (15% of respondents representing 468 acres) use soil moisture monitoring.
- 10 (38% of respondents representing 544 acres) finish irrigating when water reaches end of field or close to end.
- 3 (12% of respondents representing 418 acres) finish irrigating when a target depth of applied water is achieved.
- 6 (23% of respondent representing 451 acres) use past experience/always the same # of hours.

Sprinkler Irrigation

- 3 respondents (12% of respondents representing 220 acres) decide how long to sprinkler irrigate based on water delivery system constraints.
- 4 (15% of respondents representing 468 acres) use soil moisture monitoring.
- 2 (8% of respondents representing 240 acres) finish irrigating when a target depth of applied water is achieved.
- 6 (23% of respondent representing 1,101 acres) use past experience/always the same # of hours.

Drip/micro Irrigation

- 6 respondents (23% of respondents representing 353 acres) decide how long to drip/micro irrigate based on water delivery system constraints.
- 14 (54% of respondents representing 1,395 acres) use soil moisture monitoring.
- 8 (31% of respondents representing 1,094 acres) finish irrigating when a target depth of applied water is achieved.
- 7 (27% of respondent representing 884 acres) use past experience/always the same # of hours.



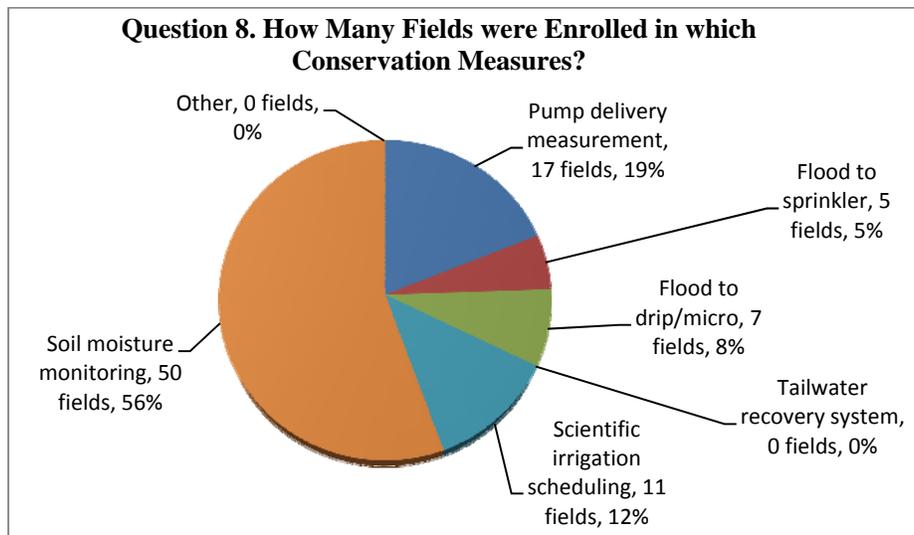
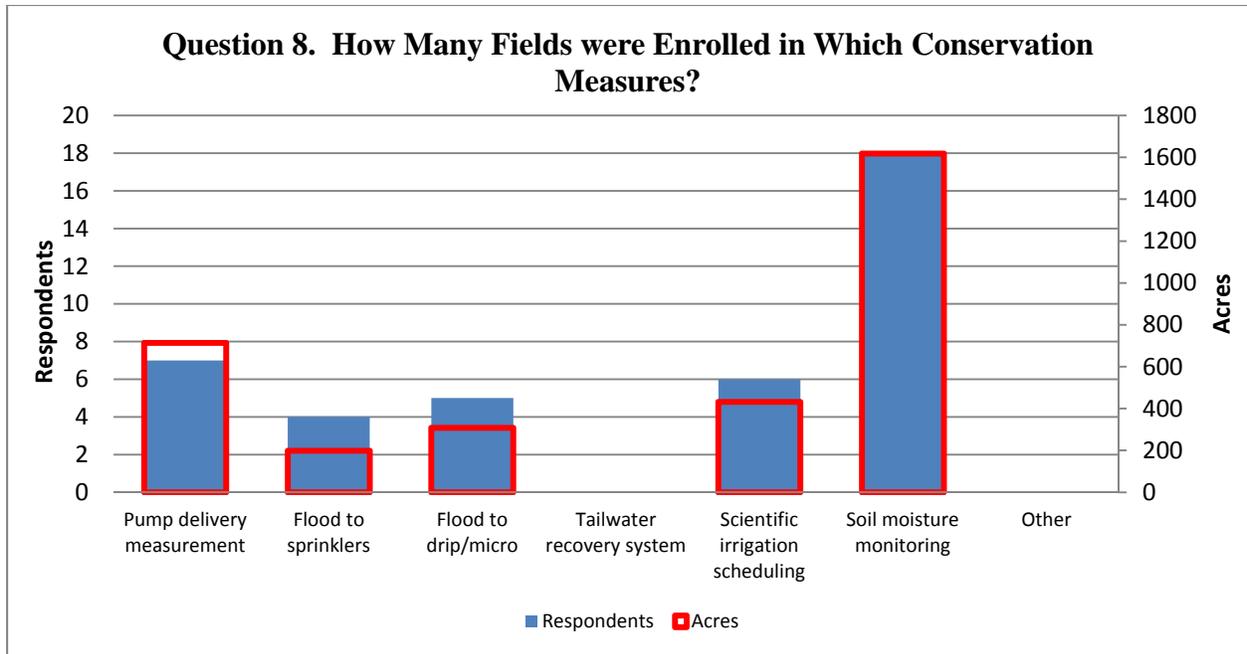
Question 7. Are there steps that SSJID could take to improve its level of service to help you irrigate more effectively or efficiently?

Responses to Question 7 are provided as an attachment to this summary. Key themes regarding steps that SSJID could take to improve its level of service included increased flexibility in irrigation frequency, installation of a District-wide pressurized pipeline system and filtration of District water.

General Program Feedback

Question 8. How many fields did you enroll in the program during 2011, and which conservation measures did you implement?

| Conservation Measure | Fields | % of Fields | Acres | % of Acres | # of Respondents | % of Respondents |
|----------------------------------|--------|-------------|-------|------------|------------------|------------------|
| Pump delivery measurement | 17 | 19% | 714 | 22% | 7 | 27% |
| Flood to sprinklers | 5 | 6% | 198 | 6% | 4 | 15% |
| Flood to drip/micro | 7 | 8% | 308 | 9% | 5 | 19% |
| Tailwater recovery system | 0 | 0% | 0 | 0% | 0 | 0% |
| Scientific irrigation scheduling | 11 | 12% | 432 | 13% | 6 | 23% |
| Soil moisture monitoring | 50 | 56% | 1618 | 49% | 18 | 69% |
| Other | 0 | 0% | 0 | 0% | 0 | 0% |



Question 9. Were you satisfied with the enrollment and selection process?

- 24 respondents (92% of respondents representing 4,822 respondent acres) indicated they were satisfied with the enrollment process.
- No respondents indicated they were dissatisfied with the process
- 2 respondents (8% of respondents representing 218 respondent acres) did not answer this question
- Comments regarding Question 9 are provided as an attachment to this summary.

Question 10. Would you like to see additional conservation measures included?

- 7 respondents (27% of respondents representing 1,388 respondent acres) indicated they would like to see additional conservation measures included

- 11 respondents (42% of respondents representing 2,650 respondent acres) indicated they were satisfied with the current conservation measures included
- 8 respondents (31% of respondents representing 1,002 respondent acres) did not answer this question
- Responses to Question 10 are provided as an attachment to this summary. A common theme amongst suggested additional conservation measures was pressurized pipeline options.

Question 11. Were the payment amounts and limits sufficient and appropriate to encourage your participation?

- 24 respondents (92% of respondents representing 4,723 respondent acres) indicated they were satisfied with the payment amounts and limits.
- No respondents indicated they were dissatisfied with the payment amounts or limits
- 2 respondents (8% of respondents representing 317 respondent acres) did not answer this question
- Responses to Question 11 are provided as an attachment to this summary.

Question 12. If the program continues to be offered, would you enroll/apply again?

- 23 respondents (88% of respondents representing 4,683 respondent acres) indicated that they would enroll in the program again if it were offered.
- 1 respondent (4% of respondents representing 135 respondent acres) indicated that they would not enroll in the program again. Respondent commented that he already had all of his acreage enrolled in the Program.
- 2 respondents (8% of respondents representing 222 respondent acres) did not answer this question
- Responses to Question 12 are provided as an attachment to this summary

Question 13. Please provide suggestions of how to make the program more attractive or effective?

- Responses to Question 13 are provided as an attachment to this summary.

Specific Feedback Regarding Conservation Measure Implementation

Question 14. For the fields that you entered into the program and conservation measures implemented, did you have prior experience with these conservation measure(s) on other of your fields?

- 13 respondents (50% of respondents representing 2,552 respondent acres) indicated that they did have prior experience with the conservation measures implemented during 2011
- 12 respondents (46% of respondents representing 2,371 respondent acres) indicated that they did not have prior experience with the conservation measures they implemented during 2011
- 1 respondent (4% of respondents representing 117 respondent acres) did not answer this question
- Responses to Question 14 are provided as an attachment to this summary

Question 15. Did the timing of Program enrollment and selection allow you to implement the conservation measure(s) in time for the 2011 growing season?

- 23 respondents (88% of respondents representing 4,095 respondent acres) indicated that the Program timing allowed sufficient time to implement the measures for the 2011 growing season.

- 1 respondent (4% of respondents representing 800 respondent acres) indicated that Program timing limited their ability to implement the measures for the 2011 growing season.
- 2 respondents (8% of respondents representing 145 respondent acres) did not answer this question.
- Responses to Question 15 are provided as an attachment to this summary.

Question 16. Did conservation measure implementation result in less water use for the enrolled field(s)?

- 14 respondents (54% of respondents representing 3,742 respondent acres) indicated that implemented measures resulted in less water use on the enrolled field(s).
- 7 respondents (27% of respondents representing 664 respondent acres) indicated that the implemented measures did not result in less water use
- 2 respondents (8% of respondents representing 260 respondent acres) were undecided as to whether the measures resulted in less water use.
- 3 respondents (12% of respondents representing 374 respondent acres) did not answer this question.
- Responses to Question 16 are provided as an attachment to this summary.

Question 17. Were there other benefits from the conservation measure, such as improved yields, labor savings, reduced energy costs, reduced chemical costs, or others?

- 12 respondents (46% of respondents representing 2,465 respondent acres) indicated that implemented measures resulted in additional benefits.
- 6 respondents (23% of respondents representing 1,663 respondent acres) indicated that implemented measures did not result in additional benefits.
- 1 respondent (4% of respondents representing 85 respondent acres) were undecided as to whether the measures resulted in other benefits.
- 7 respondents (27% of respondents representing 827 respondent acres) did not answer this question.
- Responses to Question 17 are provided as an attachment to this summary.

Question 18. Were the benefits less or more than expected?

- 19 respondents (73% of respondents representing 4,116 respondent acres) indicated that the benefits were about as expected.
- No respondents indicated that the benefits were less than expected.
- 5 respondents (19% of respondents representing 744 respondent acres) indicated that the benefits were more than expected.
- 2 respondents (8% of respondents representing 180 respondent acres) did not answer this question.
- Responses to Question 18 are provided as an attachment to this summary.

Question 19. Please describe any unexpected outcomes or implications of participating in the Program.

- Responses to Question 19 are provided as an attachment to this summary.

Question 20. Please share any additional feedback regarding the Program.

- Responses to Question 20 are provided as an attachment to this summary.

Individual Comments from Participant Survey

Responses to Question 7 Regarding Steps that SSJID Could Take to Assist Growers in Irrigating More Effectively or Efficiently

- General satisfaction with existing service
 - Satisfactory at this point
 - Current process has worked for our farms, it has been efficient and service has been good
 - No
 - It's fine
- Provide increased flexibility in irrigation frequency
 - Times to water more flexible
 - Make water available throughout growing season
 - If I could receive SSJID water more frequently I would use it exclusively and not pump ground water
 - Provide water on shorter intervals
 - More flexibility of flood irrigation water
 - We need to break away from the old timing of irrigation (10 or 20 days) and continue to get more into the 21st century w/ the rest of the world
 - Make drip applications have more flexibility in water availability
 - Make flood water available more often, otherwise all works nicely
- Filtration of water by District
 - Make sure water is always clean. They (SSJID) do pretty well except sometimes at beginning and end of irrigation season
- Desire for a pressurized system
 - Division 9's pressure system has been great
 - Pressurized line
 - Pressurized system
 - Fix the soil moisture monitoring devices in Division 9

Comments on Question 9 Regarding the Enrollment and Selection Process of the Program

- Respondents who were content with the process
 - All was fine, ladies in office very helpful and nice to deal with
 - Program is run well, user friendly
 - I feel that it has worked well so far

Comments on Question 10 Regarding the Inclusion of Additional Conservation Measures

- Suggestions of Additional Conservation Measures
 - More pressure lines to switch from flood to drip
 - Pressurized system
 - Pipe the water from the dam to create pressure, not w/ pumps
 - Scientific approaches
 - More flexibility of flood water

Comments on Question 11 Regarding the Payment Amounts and Limits of the Program

- Comments
 - Everything is fine
 - More is always better
 - Very pleased
 - Very good partnership between grower and District

Responses to Question 12 Regarding Growers Continued Enrollment in Program(s)

- Growers who would enroll again
 - It is very important to know the water profile in your soil
 - I would like to talk about removing impact sprinklers and switch to drip on 2 or 3 fields
 - It is a great tool to use and any help to do so is appreciated
 - Micro is much more efficient and help with expense is encouraging
 - Easy to work with
 - Conservation and soil moisture information are important
 - I like free money
 - Very helpful in determining when and how much to water
 - Save water
- Growers who would **not** enroll again
 - No more acreage left in District not already enrolled

Responses to Question 13 Regarding Making the Program more Attractive or Effective

- Responses
 - Free
 - Everything is fine, maybe make less rules. I was going to use SSJID to help with a drip system in 2013 but found it a hassle and switched to a well on that ranch
 - Have water delivery match the performance of the installed system. It should (may) be possible to make some progress by changing the culture. Some will take and develop vision to make it happen
 - Once I implement conservation, make water more available to those that conserve vs. those who do not

Responses to Question 14 Regarding Prior Experience with the Conservation Measures that were Implemented

- Prior experience
 - I have all 3 kinds and that should benefit SSJID also. Anybody else do that for you?
 - I worked with NRCS in 2007 on a system already
 - I have these on the fields with program
 - Micros on almost all trees, much more efficient
 - Micros
 - Neutron probe before it was offered by SSJID
 - Changed from flood to sprinklers
 - Drip...???, couldn't read the rest
 - Farming was done by visual and soil moisture in past
 - NRCS program
 - EQIP program

- Used Jacobsen Pacific in our fields on the west side

Responses to Question 15 Regarding Timing of Program to Allow Implementation of measure(s) in Time for the 2011 Season

- Comments
 - We signed up to monitor early and company was able to install their pipes
 - I was already in the program on my own
 - Got OK late, started project in July so ran system for 2 months
 - Soil moisture monitoring in place from last year
 - System was installed before summer
 - SSJID program is more fluid and works faster than EQUIP program

Responses to Question 16 Regarding the Impact of Conservation Measures on Water Use

- Using less water than before
 - Didn't flood young trees and waste water
 - Newly planted orchard so less water required
- Using more water than before
 - I found I was under watering ~25% so I increased watering to once a week on 1 field of sprinklers
 - I used more water
- Not sure of the impact
 - That is impossible to determine as there was no check
 - Don't know
- Other
 - Not really sure any less, but timing of applications has resulted in healthier orchards
 - Have no idea, no run off on micros vs. flood
 - Energy bill about the same
 - Hard to say how much but with better tools you make better decisions
 - Flood to micros
 - They were new orchards with drip instead of flood, easier to manage amount of water applied
 - Not measurable, but was able to water less often
 - By using scientific irrigation monitoring

Responses to Question 17 Regarding the Other Benefits of Implementing Conservation Measures

- Improved yields and/or crop health
 - Improved yields say it all
 - Yes – trees and crop are improved but my costs went up b/c of more pumping time, also more weed control
 - I also gained improved yields, energy costs went up, also labor
 - I have healthier trees that I believe will be more productive. I also believe that my fertilizer is used more efficiently by keeping it in the root zone
 - Possible improved yields
 - Trees are stronger and healthier, uniform fields
 - I'm hoping for improved yields but yet to be seen

- Operability of system and/or energy use
 - Energy
 - Improved water timing, trees less stressed
 - Easy to turn on sprinklers
 - Less labor and chemicals
 - Better availability of water, better water quality, availability to measure water used

Responses to Question 18 Regarding Whether the Benefits were More or Less than Expected

- Comments
 - As expected now, more than expected later on
 - Benefits have been helpful
 - My crops have been going up since being on the program
 - No run off
 - Irrigation decision before were made by observation and experience, moisture monitoring gave me much more information
 - Uniform growth in fields
 - Trees 1 yr. old

Responses to Question 19 Regarding Unexpected Outcomes or Implications of Participating in the Program

- Comments
 - I think I have healthier orchards and maybe better crops in the future
 - Beginning of season showed District didn't understand difference between various irrigation methods and water use, rain helped management
 - Better appreciation for District staff, better understanding of District
 - Monitoring, more knowledge of what goes on
 - Dealing with 3rd party company a little difficult, will look into other companies associated with program
 - None
 - Water not always available, water should be more accessible to those that conserve
 - Soil moisture testing was and is a disaster (Division 9)

Responses to Question 20 Regarding Additional Feedback for Program

- Comments
 - It's a very good program and all help is very much appreciated
 - I think it's great, no one can say agriculture is wasting water
 - It is impossible to obtain all the benefits of a state of the art irrigation system with a delivery system and philosophy developed in the early 1900s; I appreciate all your help during the 2011 and 2012 programs
 - Good program and good results
 - Very happy with program
 - Again, if I could access your water more often, I would
 - I'm sure the program will help SSJID control its own destiny in the future. It will show we are good stewards of the water we control
 - The whole process was good, good people to work with

Attachment C. Outline for Focused Interviews

Participant Interview Outline

7/2/2012

Overview

SSJID desires to evaluate its On-Farm Water Conservation Program. As part of this evaluation, the District is interested in obtaining feedback from participants regarding their experience with the Program and water conservation and other benefits they have realized as a result of participation. This outline provides a series of topics anticipated for discussion as part of focused participant interviews. These interviews will include visits to fields that have implemented conservation measures as part of the Program.

Background Information

- Crops grown
- Full time or part time farmer
- Age/years in farming
- Number of fields and acres managed
- Irrigation methods used
- Irrigation management practices
 - Basis for irrigation decisions (timing, amount, etc.)
 - Management aids employed (soil moisture sensors, visual indicators, ET calculations, etc.)
- General feedback regarding SSJID (level of service, flexibility, water quality)

General Program Feedback

- Number of fields in program and conservation measures implemented
- Enrollment and selection process
- Conservation measure choices, flexibility and standards
- Payment amounts
- If the program continues to be offered, would you enroll/apply again? Why/why not?
- Do you have any suggestions to making the program more attractive or more effective?

Specific Feedback Regarding Conservation Measure Implementation

- General information for participating field
 - Location and size
 - Crop and irrigation method
 - Conservation measure(s) implemented
 - Payment amount relative to implementation cost
- Experience with conservation measure on other fields
- Timing of implementation relative to the crop growing season

- Changes in irrigation practices before and after implementation. Able to quantify any less water use? Savings in irrigation costs (labor, energy, etc.)?
- Other benefits (yield benefits, less maintenance or labor, less chemicals)? Able to quantify?
- Any unexpected outcomes or implications?
- Less or more benefit than expected? Why?

Attachment D. Photos from Focused Interviews



New Pump and Filter Station and Drip Irrigated Almonds.



New On-Farm regulating Reservoir (approx. 7 acre-feet).



ADCON Soil Moisture and Weather Monitoring Station.



New Drip Irrigation System and Pump and Filter Station.



New Pump and Filter Station and Magnetic Flowmeter.



PureSense Soil Moisture and Irrigation System Operation Sensor.



New Solid Set Sprinkler System and Division 9 Dual Groundwater Surface Water Turnout.

