

**MINUTES OF THE APRIL 12, 2016  
BOARD OF DIRECTORS MEETING OF  
NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT**

The Board of Directors of North Plains Groundwater Conservation District met in regular session April 12, 2016, at 9:00 a.m. in the Conference Room of the North Plains Water Conservation Center, 6045 County Road E., Etter, Texas. The following persons were present:

**Members Present at 9:08 a.m.:**

Danny Krienke, Secretary;  
Gene Born, Director;  
Harold Grall, Vice-President;  
Justin Crownover, Director;  
Mark Howard, Director; and  
Zac Yoder, Director.

**Staff Present during part or all of the meeting:**

Steve Walthour, General Manager;  
Dale Hallmark, Assistant General Manager/Hydrologist;  
Kirk Welch, Assistant General Manager/Outreach;  
Kristen Lane, Executive Assistant;  
Casey Tice, Compliance Coordinator;  
Odell Ward, GIS and Natural Resources Tech Lead;  
Paul Sigle, Agriculture Engineer; and,  
Curtis Schwertner, Natural Resource Specialist.

**Others present during part or all of the meeting:**

C. C. Sysombath;  
Jonathan Gresham;  
Leon New;  
Shawn Carter;  
F. Keith Good, Attorney; and,  
Ellen Orr, Paralegal.

Harold Grall, Vice-President, declared a quorum present and called the meeting to order at 9:08 a.m. Director Mark Howard gave the invocation. Vice-President Grall led the pledge.

**1 – Public Comment**

Vice-President Grall asked if there were persons present who desired to make public comments. No public comments were received.

**2 – Consent Agenda**

The Consent Agenda was discussed by the Board and consisted of: the review and approval of the Minutes of the regular March 8, 2016 Board Meeting; the review and approval of un-audited District expenditures for March 1, 2016 through March 31, 2016, including the General Manager's expense and activity report; the review and approval of payment to Lemon, Shearer, Phillips & Good, P.C. for professional services and out-of-pocket expenses from March 1, 2016 through March 31, 2016 in the amount of \$5,888.25; and the review and approval of Moore County Appraisal District and Hansford County Appraisal District collection contracts. Danny Krienke moved to



approve the Consent Agenda. Mark Howard seconded the motion and it was unanimously approved by the Board.

***Action Agenda 3a - Consider Bank of America Leasing and Capital, LLC request for the District to refund 2015 Tax Penalty and Interest Paid on Properties in Moore County.***

In March, the District received a request from Bank of America Leasing and Capital, LLC (BOA) to waive the tax penalty and interest on delinquent taxes and refund BOA \$435.47 related to two Moore County Properties. BOA claims that they did not receive their 2015 tax statement and they made several attempts to obtain the statement. From the correspondence, BOA knew the amount of the taxes before January 26, 2016, because they had recovered the information off of the Moore County website. Moore County sent the tax statements out in November of 2015.

Under Section 31.01(g) of the Tax Code, except as provided by Section 31.01(f), failure to send or receive the tax bill required by Section 31.01, including a tax bill that has been requested to be sent by electronic means under Section 31.01(k), does not affect the validity of the tax, penalty, or interest, the due date, the existence of a tax lien, or any procedure instituted to collect a tax.

The General Manager requested that Caroline Prempeh of BOA provide documentary evidence to the District to show that Section 31.01(g) does not apply to BOA and why BOA could not pay the tax by the due date.

The General Manager recommended that the Board deny BOA's request to refund the tax penalty and interest on delinquent taxes for Property IDs 81519 and 21411 in Moore County.

Danny Krienke moved that the Board deny BOA's request to refund the tax penalty and interest on delinquent taxes for Property IDs 81519 and 21411 in Moore County. Zac Yoder seconded the motion and it was unanimously approved by the Board.

***Action Agenda 3b - Board review and determination that wells constructed during 150-day construction period, but not equipped to produce water are properly located and constructed according to the permit.***

In April 2015, the District modified District Rule 2.3.2 to provide: if a proposed Well is constructed, as defined above, within the 150-day (or extended) construction period, but not equipped to produce Water, the General Manager shall, after termination of the construction period, submit the Well Permit to the Board for review and determination by formal vote if the Well is properly located and constructed according to the Permit and these Rules. Thereafter, when the Well is equipped to produce Water, the Permit shall then be reviewed by the Board to determine if the Well, as equipped, complies with the Rules.

The General Manager reported that since April 2015, District staff has worked to complete the Well approval process under the old program and is now implementing District Rule 2.3.2 that the Board approved in 2015.

The General Manager provided the schedule of Well permits listed below to the Board for review and determination by formal vote, if the Wells are properly located and constructed according to the Permit and the District's Rules:



District Well Number	Date Expired	Well Class	Permitted Location		Location Drilled		Owner
DA-3239	7/15/2009	C	-102.55005	36.4507	-102.549962	36.451138	Lesley Smith
DA-4433	11/21/2011	C	-102.573389	36.087056	-102.574028	36.086883	Winings Family LTD
DA-6401	10/6/2013	B	-102.985893	36.301872	-102.985887	36.301877	RLF Alpha Farm LLC
DA-7053	1/27/2014	C	-102.982525	36.146612	-102.982548	36.146557	Froese Custom Harvest
DA-8354	12/27/2014	C	-102.358808	36.154543	-102.358841	36.154492	John Martens
HA-4717	3/26/2012	C	-102.88999	36.0213	-102.890020	36.021280	Natural Prairie Land LLC
HA-5359	4/13/2013	C	-102.40235	35.97955	-102.402367	35.979595	Hartley Farms LLC
HA-5774	7/20/2013	C	-102.795222	35.924167	-102.79514	35.924171	Four Star Middlewater Ltd
HN-4285	9/26/2011	C	-101.50985	36.344066	-101.509938	36.344123	Jerry Williams
HN-4512	1/16/2012	B	-101.623028	36.178722	-101.623788	36.175322	Royce Mathews
HN-5504	5/10/2013	D	-101.49931	36.19474	-101.49933	36.194723	Ag Partners
HU-6938	12/21/2013	C	101.463775	35.89661	-101.4638	35.896555	WC Womble
HU-8269	12/14/2014	B	-101.57357	35.825418	-101.57369	35.825325	City of Borger
LI-5076	4/28/2013	D	-100.21259	36.318815	-100.212425	36.318837	C T Duke Family Trust
SH-5326	3/29/2013	B	-101.88476	36.30038	-101.884835	36.300403	Kenquint LLC
SH-5410	4/29/2013	C	-101.72333	36.15967	-101.723372	36.159657	Montecarlo Inc
SH-6700	11/4/2013	C	-101.90225	36.497139	-101.90231	36.497038	Joyce Allard
SH-6864	12/7/2013	C	-101.991222	36.061556	-101.99116	36.061575	Meil Family Living Trust
SH-7677	6/29/2014	C	-101.991582	36.27056	-101.9916	36.270552	Johnny Ewers

Danny Krienke moved that the Board approve the Well Permits listed above because each Well is properly located and constructed according to the Permit and District Rules. Zac Yoder seconded the motion and it was unanimously approved by the Board.

***Action Agenda 3c - Consider final compliance approval of Water Well Permits as active and complete Wells.***

According to District Rule 2.13, after the site inspection is complete and it is determined that the Well (and all Wells within the Groundwater Production Unit) are in compliance with the Rules of the District and the Well Permit application, the General Manager shall submit the Well Permit to the Board for final compliance approval.

The General Manager reported that the District staff had processed 20 Water Well Permits which are ready for Board consideration and approval. These permits, listed in the table below, represent completed Wells that have been inspected and are in compliance with District Rules. The inspections verify that the Wells were completed as required by the respective Permits, including proper Well location, Well classification, maximum yield, and proper installations of check valves and flow meters. The yellow highlighted permits are Wells which were permitted prior to January 15, 2013, and unless it was drilled on breakout ground, may be metered at the Well, or at the pivot. Copies of the individual permits were presented to the Board.

Well	Class	Sec	Blk	Sur	NS	EW
HA-5773	C	36	12	CSS	450 N	445 E
HA-7581	C	Joseph Beaty	NONE	NONE	953 S	165 W
HA-8292	D	6	1	WCRR	732 S	799 W
HA-8499	D	1	A-6	PSL	962 N	58 E
HA-8598	D	1	ME Cole	NONE	751 N	784 E
HA-8599	C	MWhitley	NONE	NONE	149 N	272 W



HA-8631	C	MWhitley	NONE	NONE	952 N	1592 W
HA-8706	D	Joseph Beaty	NONE	NONE	444 S	447 E
HA-8907	C	6	A-2	PFS	517 N	103 E
HA-9197	C				67 N	17 W
HU-6901	D	David Luce	NONE	NONE	1178 N	1242 W
HU-8266	C	David Luce	NONE	NONE	1511 N	1644 W
HU-8267	B	WM Cole	NONE	NONE	1412 S	2148 W
HU-8268	B	WM Cole	NONE	NONE	768 S	2318 E
LI-6668	B	28	10	HT&B	800 S	728 E
MO-5603	B	330	44	H&TC	428 S	416 W
MO-5604	B	330	44	H&TC	462 S	457 E
OC-5407	A	212	43	H&TC	342 S	606 E
SH-6569	C	54	1-C	GH&H	225 N	126 W
SH-8391	B	310	1-T	T&NO	538 N	629 W

Justin Crownover moved to remove Well Permit HA-9197 from the Well Permit Schedule and to approve the remaining Well Permits on the above schedule noting that the Wells are properly equipped and otherwise comply with District Rules. Mark Howard seconded the motion and it was unanimously approved by the Board.

President Bob Zimmer arrived to participate in the meeting at 9:22 a.m.

***Action Agenda 3d - Receive report regarding groundwater production reporting for 2015.***

Well owners had until March 1, 2016, at 5:00 p.m. to hand-deliver or mail their 2015 Annual Production Reports to the District. On or about April 6, 2016, the District had fully processed and checked the amounts of all but 60 outstanding reports. Groundwater production for 2015 appears to be at least 25 percent lower than 2014 production and about 33 percent lower than 2011 production.

County	Production Reported	GPU Acres	Average Production	Average GPU Acres	GPU Count(1)
DALLAM	291,248	431,676	504	747	578
HANSFORD	148,419	228,265	370	569	401
HARTLEY	330,798	417,470	698	881	474
HUTCHINSON	56,447	90,427	467	747	121
LIPSCOMB	39,332	73,401	351	655	112
MOORE	155,803	221,157	421	598	370
OCHILTREE	76,385	134,638	283	499	270
SHERMAN	250,017	343,315	466	639	537
<b>Subtotal</b>	<b>1,348,448</b>	<b>1,940,350</b>	<b>471</b>	<b>678</b>	<b>2,863</b>
Non Reported	28,260	40,680	471	678	60
<b>Estimated Total</b>	<b>1,376,708</b>	<b>1,981,030</b>	<b>471</b>	<b>678</b>	<b>2,923</b>

- 1) GPUs that are in multiple counties are counted in each county.
- 2) Non Reported Estimate is based on the average District-wide Production Reports for 60 outstanding reports and is subject to change.



Below is a table of groundwater withdrawals from the Ogallala, Dockum and Rita Blanca aquifers within the District from 2007 to 2014. The data for Dallam County from 2007 to 2012 is skewed because a portion of the county (PGMA Areas) was not within the District's jurisdiction before 2012.

County	Year							
	2007	2008	2009	2010	2011	2012	2013	2014
Dallam	268,667	313,451	317,441	302,561	374,733	371,965	399,272	393,624
Hansford	106,887	142,694	152,686	129,984	234,903	218,793	201,914	211,634
Hartley	312,449	364,560	387,305	401,506	519,684	458,696	458,998	442,058
Hutchinson	34,973	52,846	53,869	42,023	73,747	72,230	69,716	73,992
Lipscomb	32,710	30,832	30,242	33,826	52,003	55,572	42,519	48,791
Moore	148,159	191,409	200,220	178,336	271,684	234,688	228,297	209,907
Ochiltree	53,658	75,527	65,840	62,269	114,392	109,213	98,280	106,278
Sherman	220,530	275,128	285,571	261,608	407,265	348,012	346,685	361,336
<b>Total</b>	<b>1,178,033</b>	<b>1,446,447</b>	<b>1,493,174</b>	<b>1,412,113</b>	<b>2,048,411</b>	<b>1,869,169</b>	<b>1,845,681</b>	<b>1,847,620</b>

District staff is currently drafting invoices for those areas that were previously in the Dallam County Priority Groundwater Management Area. Those invoices are scheduled to be mailed by May 1<sup>st</sup>. For 2015, the Board has set the Production Fee amount for \$1.00 per acre-foot for agricultural producers and \$5.00 per acre-foot for all other producers within these areas.

***Action Agenda 3e - Receive report and consider action regarding Groundwater Management Area 1 and Panhandle Regional Water Planning.***

### **Groundwater Management Area 1**

The General Manager reported that the GMA-1 Joint Planning Committee (JPC) is scheduled to meet on April 20 and April 28 to consider the DFC options in regard to the nine factors required under Section 36.108 of the Texas Water Code. It is anticipated that the JPC will propose a DFC for adoption and develop a DFC summary for public review and input. A public comment period of 90 days begins once the DFC proposal, the summary, and supporting documentation is delivered to the four GMA-1 districts. Each district will review the DFC proposal, the summary and supporting documentation and hold a public hearing to receive additional public comment. Each district will prepare a summary of its hearing process and findings for consideration by the GMA-1 JPC. The JPC can adopt the DFC, or propose a different DFC after it has considered the district summaries and any additional comments. Final adoption of a DFC may occur in September, 2016, if the JPC adopts the initial DFC proposals. The JPC will prepare an Explanatory Report and submit the same and the newly adopted DFCs to the Texas Water Development Board within sixty days after adoption. The General Manager also discussed the GAM run with the Board.

### **Panhandle Regional Water Planning**

The General Manager reported that the 2016 Panhandle Regional Water Plan has been approved by the Texas Water Development Board and will be included in the 2017 State Water Plan which should be adopted later this summer. The Panhandle Regional Water Planning Committee is releasing a request for qualifications to firms to begin the next round of water planning that will culminate in the 2022 State Water Plan.



**Agenda 3f -**

***Receive report regarding webinar Texas High Plains Initiative for Innovative Irrigation Management and Conservation – Northern Plains Results.***

On March 24th at 1:00 p.m. Central Time, the Natural Resources Conservation Service (NRCS), in partnership with the North Plains Groundwater Conservation District, broadcasted a webinar on the Texas High Plains Initiative for Innovative Irrigation Management and Conservation - Northern Plains Results. The NRCS and the Texas Water Development Board partnered with the District to fund the agriculture irrigation water conservation demonstrations from 2011 through 2014, which included 11 farms in the District. Participants learned about experiences, results, and lessons reaped from the on-farm, field-scale demonstrations in which farmers examined different cropping systems, plant genetics, soil moisture monitoring equipment, crop physiology monitoring techniques, and irrigation system control and monitoring equipment.

Director Krienke, Director Grall, and Leon New participated in the Northern Plains portion of the Texas High Plains Initiative Conservation Innovation Grant (CIG) 69-3A75-11-184 and discussed the results of the project during this webinar. The purpose of the CIG project was to demonstrate strategic irrigation system and crop system management technologies and practices that would result in water savings and best practices that are applicable nationwide to regions facing similar groundwater resource issues. The webinar was a part of a series that highlights activities and results of expiring Conservation Innovation Grants.

**Agenda 3g -**

***Receive report regarding Master Irrigator Program.***

It was reported that after more than a year of planning and preparation, the first class of the Master Irrigator Program is scheduled to convene on April 13, 2016. The District staff has been working closely with project coordinator, Steve Amosson and the Project Advisory Committee, to make final preparations. During the last few weeks, District staff, and Steve Amosson, have finalized all speakers and developed a flyer/brochure for the program. District staff has been marketing the project through mailings, press releases and social media. As of April 12, 2016, 24 parties had applied. District staff has also finalized presentation materials and acquired sponsorships for food, refreshments and materials. The Natural Resource Conservation Service will provide \$400,000 per year for four years to support the program. Graduates of the Master Irrigator Program will receive priority consideration for those funds through a special Environmental Quality Improvement Program (EQIP).

**Master Irrigator Session Dates:**

April 13, 2016;  
April 20, 2016;  
July 13 and 14, 2016; and,  
July 20, 2016.

**Master Irrigator Project Advisory Committee**

The following individuals comprise the Committee:

Danny Krienke, North Plains Groundwater Conservation District; Leon New, Irrigation Engineer; Steve Amosson, Texas A&M AgriLife; Charles Hillyer, Texas A&M AgriLife; Scott Strawn, Texas A&M AgriLife; Shawn Carter, Crop Production Services; Cameron Turner, Texas Water Development Board; Keith Sides, USDA NRCS; David Reinart, Better Harvest; Stan Spain, Spain Farms; Bryce Howard, Farmer.



**Agenda 3h -**

***Receive report regarding District 3-4-5 Irrigation Demonstration Program.***

Leon New presented a report to the Board on 3, 4, 5 GPM Production Maximization Corn Demonstration Project 2015 which is attached hereto as Exhibit "A" and incorporated herein for all purposes.

**Agenda 3i -**

***Receive report regarding Installation of Drip Irrigation at the Water Conservation Center.***

In March, the District and its cooperating producer began installing 40 acres of subsurface drip irrigation (SDI) at the North Plains Water Conservation Center located southeast of Etter, Texas. The District selected Professional Water Management Associates (PWMA) through a competitive proposal process to install the SDI based on specifications developed by irrigation engineer, Leon New. Jerry Funck of PWMA supervised the installation of the project. Both Mr. Funck and Mr. New are recognized throughout the Texas High Plains and nationally for their expertise in agriculture irrigation delivery systems. The District shared the costs of the SDI installation with grants from the USDA NRCS; the Texas Water Development Board; and a loan and the income from its partners that hold the irrigation lease at the Center. The addition of SDI to the two center pivots already in use at the Center expands the District's capabilities to demonstrate agriculture conservation management practices.

It was further reported that as of April 6th, the drip tape was plowed into the ground and the filter station was connected to the main line. Jerry Funck has some more work to complete on the filter station and a subcontractor will complete the tie-in from the filter station to the drip. NRCS agents have been on site to check the installation. On April 5th, NRCS engineers conducted a review of the current work.

**Agenda 3j -**

***Plan Dedication of the Richard S. Bowers Water Conservation Learning Center.***

In March, the North Plains District Board of Directors voted unanimously to dedicate the District's office and learning center at the North Plains Water Conservation Center to Richard S. Bowers. The Richard S. Bowers Conservation Learning Center dedication is planned for June 14, 2016 at the North Plains Water Conservation Center about 9 miles north of Dumas, Texas. Mr. Bowers passed away on November 14, 2015, leaving a distinguished career dedicated to public service and leadership in water conservation for over 35 years. Mr. Bowers became the general manager of the Panhandle Groundwater Conservation District, located in White Deer in 1979. He accepted the general manager's position at North Plains Groundwater Conservation District in 1987. That same year the District purchased the property where the current North Plains Water Conservation Center operates today. Mr. Bowers managed, lived and raised his family in the District for twenty years before moving to Burnet to assume the general manager position at the Central Texas Groundwater Conservation District in 2007. In August 2011, he officially retired. Even after his retirement, in 2014 he served as interim general manager for the Upper Trinity Groundwater Conservation District in Springtown, Texas.

Richard Bowers served as president of numerous organizations throughout his career including the Texas Water Conservation Association, Texas Alliance of Groundwater Districts, and National Groundwater Management Districts Association, as well as chairing the Tarleton State University Hydrology Advisory Council.

The General Manager has divided responsibility for the dedication with each of the three teams of the District's staff. The Administration Team is responsible for the invitations and developing the agenda, the Conservation Outreach Team will be



responsible for all publicity and Water Conservation Center tours, and the Aquifer Science Team will provide information on the District's data-collection programs, as well as support for the event. District staff anticipates inviting all local and state legislators, stakeholders, NRCS, TWDB, TCEQ, the Texas Alliance of Groundwater Districts, the Groundwater Management Districts Association and any other parties or entities.

***Agenda 3k - Schedule District Budget Process for 2016-2017 Fiscal Year.***

The General Manager reported to the Board that a preliminary budget for the 2016-2017 fiscal year should be prepared in May and will be reviewed by the Budget Committee prior to the Board's regular meeting in June.

***Agenda 3l - Consider Legal and Compliance Matters before the District.***

As of April 5, 2016, there were twenty (20) 2015 Production Reports not filed by thirteen (13) producers that District Staff has been unable to contact or has left messages by phone and/or email with no response. Letters were sent to non-reporting producers with a due date of April 8, 2016 to resolve Production Report filing.

As of April 5, 2016, there were sixty (60) potentially late filed 2015 Production Reports associated with thirty-two (32) producers. District Staff will verify and send out late filing letters next week with fees of \$50 per day for each report filed after March 1, 2016 up to \$500, as previously approved by the Board.

As of April 5, 2016, there were fourteen (14) potentially overproduced GPU's for the 2015 Production reporting. District Staff will verify and send any required notices and overproduction fee invoices.

The General Manager provided the Board with an updated list of Producers who have not filed their Production Reports.

***Executive Session - Section 551.071 of the Texas Government Code.***

At 11:38 a.m., Gene Born moved to go into Executive Session in compliance with the Texas Open Meetings Act, Chapter 551 of the Texas Government Code, §551.071 to obtain legal advice from its attorney. Zac Yoder seconded the motion and it was unanimously approved by the Board.

Executive Session: At 11:39 a.m., the Board went into Executive Session. At 12:42 p.m., Director Harold Grall moved that the Board reconvene into regular session. Justin Crownover seconded the motion and it was unanimously approved by the Board.

The Board reconvened into regular session at 12:42 p.m.

Danny Krienke moved to Order a Show Cause Hearing for Robert Spielman, Dennis Thompson and Joe Knosby for failure to file 2015 Annual Production Reports with the District for 9:00 a.m. on July 19, 2016. Harold Grall seconded the motion and it was unanimously approved by the Board.

***Discussion Agenda 4c - General Manager's Report.***

Steve Walthour presented the General Manager's Report, which included information concerning upcoming meetings and conferences, the General Manager's activity summary and the District activity summary.

***Discussion Agenda 4a - Director Reports.***



District Directors reported to the Board regarding meetings and/or seminars attended, weather conditions and economic development in each Director's precinct.

***Discussion Agenda 4b - Committee Reports.***

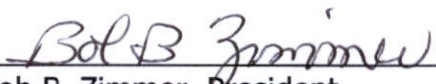
None.

***Agenda 5 - Discuss Items for Future Board Meeting Agendas and Set Next Meeting Date and Time.***

By consensus, the Board set its next regular Board meeting on June 14, 2016 at 9:00 a.m.

***Agenda 6 - Adjournment.***

There being no further business to come before the meeting, President Zimmer declared the meeting adjourned at 1:10 p.m.

  
\_\_\_\_\_  
Bob B. Zimmer, President

  
\_\_\_\_\_  
Daniel L. Krienke, Secretary



In **2015**, the District planned and initiated a field demonstration project, identified as the “3, 4, 5 GPM Project,” that would use the latest water conservation technologies, management tools and practices to grow corn irrigated at three different amounts weekly as needed. The project is based on applying 1.10 inches of irrigation weekly using an irrigation capacity of three (3) gallons per minute (GPM) per acre, 1.49 inches using four (4 GPM) and 1.85 inches from five (5 GPM) irrigation capacity. These weekly amounts of irrigation represent one 120 acre center pivot correctly nozzled and pressured to apply 360 gallons per minute (3GPM), 480 (4GPM) and 600 gallons (5GPM) as managed by any grower. And similarly, a 500 acre half mile center pivot nozzled to apply 1500 (3 GPM) gallons per minute (gpm), 2000 gallons (4 GPM) and 2500 (5GPM). The 3, 4, 5 GPM Project is planned for a three year period. Following results and data from the previous five year 200-12 project, the 3, 4, 5 Project was established to provide information on “where to put your groundwater” to provide its’ most profitable use. Field data collected and tabulated from grower’s fields in the 200-12 project show promising optimum corn yields and profitability where center pivot irrigation systems are nozzled for 3.0 & 4.0 gpm per acre. That data shows some 200-12 project fields were overwatered managing 4.0 gpm per acre, especially when excessive pre-water was pumped. Where center pivots were nozzled for 5.0 gpm per acre, some corn production fields were significantly overwatered, for which advanced technology can be conveniently utilized for both 4.0 and 5.0 gpm per acre corn production. The 3, 4, 5 GPM Project is a three year on-farm, field scale project that demonstrates how water conservation technologies and irrigation management practice adjustments can reduce groundwater use and allow agricultural irrigation producers to remain profitable and financially viable with limited and/or diminishing groundwater resources.

In **2015**, the “3, 4, 5 GPM” Projects’ first year, five cooperating growers committed 700 acres to achieve initial field demonstration results. **Harold Grall** dedicated 360 acres in Moore county, **Danny Krienke** used 120 acres in Ochiltree county, **Zac Yoder** 105 acres in Dallam county, **Dennis Buss** 60 acres in Hartley county and **Stan Spain** 55 acres in Moore county. Two of Grall’s 120 acre fields demonstrated the use of high efficiency water application center pivot systems. **Appendix A** is a summary of demonstration results that describes water and corn yield for each cooperator growers’ field. **Appendix B** shows corn yield per inch of irrigation applied by each cooperating grower and 3, 4, 5 field. **Appendix C** describes net return from each inch of irrigation by grower and 3, 4, 5 GPM field, **Appendix D** lists net return from each inch of irrigation by grower and 3,4, 5 GPM Field, **Appendix E** shows net return from each inch of total water by grower and 3, 4, 5 GPM field, **Appendix F** lists net return per inch of total water by grower and 3, 4, 5 GPM field, **Appendix G** describes net return per acre by grower and 3, 4, 5 GPM field. **Appendix H** is a summary of corn hybrids, seeding rates, planting dates and irrigation systems selected by the five cooperators. **Appendix I** describes corn yield vs net return per acre for all 3, 4, 5 GPM fields. **Appendix J** describes yield response to irrigation for all 3, 4, 5 GPM fields. Results from the 2015 cooperating producer fields follow.

**Stan Spain**, in Moore County, produced 12 more bushels per acre in his 4 GPM field than the 3 GPM field. Irrigation was 1.95 inches more. The 5 GPM field produced 33 more bushels per acre



than the 3 GPM with 3.85 more inches of irrigation. The 5 GPM yield was 21 more bushels per acre than that from 4 GPM field with 1.90 additional inches of irrigation. Corn production was 23.26 bushels (1302lbs) per inch of irrigation in the 3 GPM field compared to 20.41 bushels (1143lbs) in the 4 GPM and 19.10 bushels (1070lbs) from the 5 GPM field. The 4 GPM field's net gain is \$23.04 per acre with 1.95 inches more irrigation used compared to production from the 3 GPM field. The 5 GPM fields' net gain compared to the 3 GPM field is \$71.38 per acre with 3.85 additional inches of irrigation. Net gain for the 5 GPM field is \$48.34 per acre more than the 4 GPM with 1.90 inches more irrigation. Net return from each inch of irrigation is \$47.59 for the 3 GPM field compared to \$41.64 from the 4 GPM and \$39.37 for the 5 GPM field. Net return from each inch of total water is \$17.64 for the 3 GPM field, \$18.20 for the 4 GPM and \$19.78 for the 5 GPM field.

**Danny Krienke**, in Ochiltree County, produced 6 more bushels per acre in the 4 GPM field than the 3 GPM field and irrigation was 1.88 inches more. The 5 GPM field produced 16 more bushels per acre than the 3 GPM with 3.89 more inches of irrigation. The 5 GPM yield was 10 more bushels per acre than that from 4 GPM field with 2.01 additional inches of irrigation. Corn production was 23.04 bushels (1290lbs) per inch of irrigation in the 3 GPM field compared to 19.55 bushels (1095lbs) in the 4 GPM and 17.24 bushels (965lbs) from the 5 GPM field. The 4 GPM field's net gain is \$3.13 per acre with 1.89 inches more irrigation used compared to production from the 3 GPM field. The 5 GPM fields' net gain compared to the 3 GPM field is \$16.69 per acre with 3.89 additional inches of irrigation. Net gain for the 5 GPM field compared to the 4 GPM is \$13.56 per acre with 2.01 inches more irrigation. Net return from each inch of irrigation is \$48.16 for the 3 GPM field compared to \$39.99 from the 4 GPM and \$34.73 for the 5 GPM field. Net return from each inch of total water is \$18.48 for his 3 GPM field, \$17.00 for the 4 GPM and \$16.88 for the 5 GPM field.

**Zac Yoder**, in Dallam County, produced 25 more bushels per acre in his 4 GPM field than the 3 GPM and irrigation was 4.11 inches more. The 5 GPM field produced 56 more bushels per acre than the 3 GPM with 8.28 more inches of irrigation. The 5 GPM yield was 31 more bushels per acre than that from 4 GPM field with 4.17 additional inches of irrigation. Corn production was 18.58 bushels (1040lbs) per inch of irrigation in the 3 GPM field compared to 15.66 bushels (877lbs) in the 4 GPM and 14.09 bushels (789lbs) from the 5 GPM field. The 4 GPM field's net gain is \$47.65 per acre with 4.11 inches more irrigation used compared to production from the 3 GPM field. The 5 GPM fields' net gain compared to the 3 GPM field is \$111.98 per acre with 8.28 additional inches of irrigation. Net gain for the 5 GPM field is \$64.33 per acre more than the 4 GPM with 4.17 inches more irrigation. Net return from each inch of irrigation is \$37.84 for the 3 GPM field compared to \$31.72 from the 4 GPM and \$28.60 for the 5 GPM field. Net return from each inch of irrigation, rainfall and net soil water is \$18.21 for the 3 GPM field, \$18.19 from the 4 GPM and \$17.87 for the 5 GPM field.

**Harold Grall**, in Hartley County, produced 8 more bushels per acre in his 4 GPM field than the 3 GPM field and irrigation was 2.75 inches more. The 5 GPM field produced 11 more bushels per acre than the 3 GPM with 5.36 more inches of irrigation. The 5 GPM yield was 3 more bushels per acre than that from 4 GPM field with 2.61 additional inches of irrigation. Corn



production was 15.34 bushels (859lbs) per inch of irrigation in the 3 GPM field compared to 13.35 bushels (747lbs) in the 4 GPM and 11.75 bushels (658lbs) from the 5 GPM field. The 4 GPM field's net gain is \$7.68 per acre with 2.75 inches more irrigation used compared to production from the 3 GPM field. The 5 GPM fields' net gain compared to the 3 GPM field is \$2.19 per acre with 5.36 additional inches of irrigation. Net gain for the 5 GPM field compared to the 4 GPM is minus \$5.49 (lost \$5.49) per acre with 2.61 inches more irrigation. Net return from each inch of irrigation is \$30.90 for the 3 GPM field compared to \$26.41 from the 4 GPM and \$22.66 for the 5 GPM field. Net return from each inch of total water is \$14.88 for Grall's 3 GPM, \$14.83 for the 4 GPM and \$13.26 for his 5 GPM field.

**Harold Grall's Irrigation Systems**, in Moore County, his production was 21.07 bushels (1180lbs) per inch of irrigation in both the LEPA Shroud and T-L PMDI fields. Net return from each inch of irrigation is \$43.98 for both systems and fields. Net return from each inch of irrigation, rainfall and net soil water that totaled 26.18 inches is \$19.45 per inch for the LEPA Shroud and T-L PMDI fields.

**Harold Grall's PMDI drag line Irrigation Sytems**, in Moore County, produced 12.61 bushels (706 lbs) from each inch of irrigation. Net return from each inch of irrigation is \$22.66. Net return from each inch of irrigation, rainfall and net soil water that totaled 26.08 inches is \$12.40. Corn yield was less than anticipated without a clear reason why. There was sufficient available water throughout the growing season. The yield monitor indicates normal uniform yield within the circle. One speculation is that the 58, 54 and 56 degree overnight temperatures on July 7, 8 and 9 stopped plant growth at the 3 to 4 leaf stage at a previous fast rate. It then required too much time for plants to recover resulting in reduced corn yields.



## Conclusion

**Summary:** Corn production averaged 20.06 bushels (1123lbs) per acre inch of irrigation in the 3 GPM fields compared to 17.24 bushels (965lbs) in the 4 GPM and 15.55 bushels (871lbs) per inch in the 5 GPM fields. Net return from each inch of irrigation averaged \$41.12 in the 3 GPM fields, \$34.93 in the 4 GPM and \$31.30 per inch in the 5 GPM fields. Irrigation averaged 11.16 inches in the 3 GPM fields compared to 13.64 inches in the 4 GPM and 16.02 inches in the 5 GPM. Corn production averaged 226 bushels (12642lbs) per acre in the 3 GPM fields, 238 bushels (13356lbs) in the 4 GPM and 255 bushels (14266lbs) per acre in the 5 GPM fields. Net return averaged \$461.83 per acre from the 3 GPM fields, \$482.21 from the 4 GPM and \$512.39 per acre from the 5 GPM. Average net return from the additional 2.48 inches of irrigation applied to the 4 GPM fields than the 3 GPM is \$8.21 per inch. Average net return from the additional 4.86 inches of irrigation applied to the 5 GPM fields than the 3 GPM is \$10.40 per inch. Average net return from the additional 2.38 inches of irrigation applied to the 5 GPM fields than the 4 GPM is \$12.68 per inch. Average net return from the 4 GPM fields than the 3 GPM with 2.48 inches more irrigation is \$20.38 per acre. Average net return from the 5 GPM fields where irrigation was 4.86 inches more than the 3 GPM is \$50.56 per acre. Average net return from the 5 GPM fields than the 4 GPM where irrigation was 2.38 inches more is \$30.18 per acre. Net return per acre averaged \$461.83 for the 3 GPM fields, \$482.21 for the 4 GPM and \$512.39 for the 5 GPM fields. Irrigation, rainfall plus net soil water averaged 26.23 inches in the 3 GPM fields, 27.87 inches in the 4 GPM and 29.84 for the 5 GPM fields. Rainfall averaged 13.24 inches at the 3 GPM fields, 13.57 inches at the 4 GPM and 13.36 inches at the 5 GPM fields. Average net soil water used by the crop is 2.28 inches in the 3 GPM fields, .83 inches in the 4 GPM and .57 inches in the 5 GPM fields. Average net return from each inch of irrigation, rainfall and net soil water is \$17.30 for the 3 GPM field, \$17.06 for the 4 GPM and \$16.95 for the 5 GPM field. **Appendix A** is a summary of demonstration water and harvest results. **Appendix B** shows corn yield per inch of irrigation applied by all cooperating growers in each 3, 4, 5 field. **Appendix C** describes net return from each inch of irrigation for 3, 4, 5 fields and by grower. **Appendix D** lists water and harvest data and net return from each inch of irrigation by grower and 3, 4, 5 GPM field. **Appendix E** describes net return from each inch of irrigation, rainfall and soil water for all growers and for the 3, 4, 5 GPM fields. **Appendix F** is a water and yield summary for each 3, 4, 5 GPM field that lists net return from each inch of irrigation, rainfall and soil water for each grower. **Appendix G** describes net return per acre for each grower and 3,4,5 field. **Appendix H** lists corn hybrids, seeding rates, planting dates, irrigation systems and other demonstration site information for each grower and 3, 4, 5 GPM field. **Appendix I** is a graph that shows corn yield vs net return per acre for all 3, 4 5 GPM fields. **Appendix J** describes corn yield vs total inches of irrigation, rainfall and net soil water for each 3, 4, 5 GPM field (total water).

**The 3, 4, 5, Project:** In Stan Spain's demonstration 3,4,5 GPM fields, irrigation totaled 9.76 inches per acre in the 3 GPM field, 11.71 inches in the 4 GPM and 13.61 inches in the 5 GPM field. There was 1.31 inches of pre-season irrigation, primarily to germinate volunteer corn and penetrate herbicide. Net return from each inch of irrigation is \$47.59 for the 3 GPM field



compared to \$41.64 for the 4 GPM and \$39.37 for the 5 GPM field. Irrigation, rainfall and net soil water totaled 26.33 inches per acre in the 3 GPM field, 26.79 inches in the 4 GPM and 27.09 inches in the 5 GPM field. Net return from each inch of total water is \$17.64 for his 3 GPM field, \$18.20 for the 4 GPM and \$19.78 for the 5 GPM field. Net return from the 3 GPM field was \$464.46 per acre compared to \$487.50 from the 4 GPM field and \$535.84 from the 5 GPM field.

For **Danny Krienke**, irrigation totaled 8.81 inches per acre in the 3 GPM field, 10.69 inches for the 4 GPM field and 12.70 inches in his 5 GPM field. There was no pre-season irrigation. Net return from each inch of irrigation is \$48.16 for the 3 GPM field compared to \$39.99 from the 4 GPM and \$34.73 for the 5 GPM field. Irrigation, rainfall and net soil water totaled 22.96 inches per acre in the 3 GPM field, 25.14 inches in the 4 GPM field and 26.12 inches of total water for his 5 GPM field. Net return from each inch is \$18.48 for the 3 GPM field, \$17.00 for the 4 GPM and \$16.88 for his 5 GPM field. Net return from the 3 GPM field was \$424.34 per acre compared to \$427.47 from the 4 GPM field and \$441.03 from the 5 GPM field.

In **Zac Yoder's** demonstration fields, irrigation totaled 13.51 inches per acre in his 3 GPM field, 17.62 inches in the 4 GPM and 21.79 inches in the 5 GPM field. Total irrigation includes 1.22 inches of pre-season irrigation in each field prior to beginning the 3, 4, 5 GPM variable rate irrigation (VRI). Net return from each inch of irrigation is \$37.84 for the 3 GPM field compared to \$31.72 from the 4 GPM and \$28.60 for the 5 GPM field. Irrigation, rainfall and net soil water totaled 28.07 inches per acre in the 3 GPM field, 30.72 inches in the 4 GPM field and 34.87 inches of total water in the 5 GPM field. Net return from each inch of irrigation, rainfall and net soil water is \$18.21 for the 3 GPM field, \$18.19 from the 4 GPM and \$17.87 for the 5 GPM field. Net return from the 3 GPM field was \$511.34 per acre compared to \$558.99 from the 4 GPM field and \$623.32 from the 5 GPM field.

For **Harold Grall**, irrigation totaled 14.47 inches per acre in his 3 GPM field 17.22 inches in the 4 GPM and 19.83 inches for his 5 GPM field. There was 2.63 inches of pre-season irrigation on all fields. Net return from each inch of irrigation is \$30.90 for the 3 GPM field compared to \$26.41 from the 4 GPM and \$22.66 for the 5 GPM field. Irrigation, rainfall and net soil water totaled 30.05 inches per acre in the 3 GPM field, 30.66 inches in the 4 GPM field, and 33.89 inches in the 5 GPM field. Net return from each inch of irrigation, rainfall and net soil water is \$14.88 per acre for the 3 GPM field, \$14.83 for the 4 GPM and \$13.26 per acre for his 5 GPM field. Net return from the 3 GPM field was \$447.19 per acre compared to \$454.87 from the 4 GPM field and \$449.38 from the 5 GPM field.

**Irrigation Systems:** In **Harold Grall's** LEPA Shroud vs T-L PMDI drag line irrigation systems demonstration fields, irrigation was 11.58 inches in each field. There was no pre-season irrigation. Net return was \$43.98 from each inch for both the LEPA Shroud and T-L PMDI drag line fields. Irrigation, rainfall and net soil water totaled 26.18 inches per acre in each field. Net return per acre is \$509.30 for the LEPA Shroud and T-L PMDI drag line field. The demonstration fully shows that 240 to 250 bushels of corn per acre can be produced with 26 inches of total water.



For **Harold Grall's** SW 414 T-L PMDI drag line demonstration, irrigation is 14.27 inches per acre, including .89 inches of pre-water. Net return from each inch of irrigation is \$22.68. Irrigation, rainfall and net soil water totaled 26.08 inches. Net return from each inch of total water is \$12.40. Net return for the PMDI field is \$323.33 per acre. Corn yield was less than anticipated and disappointing without a clear reason why. There was sufficient available water throughout the growing season.

The NPWD's 3,4,5 GPM Project demonstrates how water conservation technologies, irrigation management strategies combined with high efficiency irrigation systems and improved plant genetics can reduce groundwater use and allow agricultural irrigation producers to remain financially viable with both restricted and diminishing groundwater resources.

**We learned** that adjustments can be made to existing center pivots, especially in conjunction with NRCS cost share funding, to improve water application efficiency that gets more of the water pumped to the crop. Also, that soil health is improved from crop residue and strip or no till practices. We learned it is easy to over water corn with 4 and especially 5.0 gpm per acre when rainfall is more normal and that soil moisture sensors can help manage that. Also, we learned that drought tolerant hybrids were commonly planted, mostly in May and early June, performed well and reduced seasonal irrigation. 2015 was a much improved corn production year with more rainfall and cooler temperatures. Beginning soil moisture was superior following abundant rainfall in April and May.

When the **technologies and methods** utilized by the 3,4,5 GPM demonstrations provide can be translated to three inches of reduced irrigation over the one million acres of corn and other crops in the District, groundwater savings will be 250,000 acre-feet of water per year. This water savings can prolong the viability of agriculture irrigation in the area.



## Appendix A: Summary of Water and Yield Demonstration Results

Producer	Field	Planted	Pre-Water (in.)	Irrigation (in.)	Total Irrigation (in.)	Rainfall (in.)	Total Rainfall & Irrigation (in.)	Net Soil Water (in.)	Total Water (in.)	Yield (bu/ac)	bu/ac-in of Irrigation	bu/ac-in of Total Water	Net Return (\$/ac)	Net Return Per Ac-In of Irrigation (\$)
Danny Krienke	3 gpm	May 31	0.00	8.81	8.81	10.77	19.58	3.38	22.96	203.00	23.04	8.84	\$ 424.34	\$ 48.16
	4 gpm	May 31	0.00	10.69	10.69	11.79	22.48	2.66	25.14	209.00	19.55	8.31	\$ 427.47	\$ 39.99
	5 gpm	May 31	0.00	12.70	12.70	10.77	23.47	2.65	26.12	219.00	17.24	8.38	\$ 441.03	\$ 34.53
Stan Spain	3 gpm	May 29	1.31	8.45	9.76	12.77	22.53	3.80	26.33	227.00	23.26	8.62	\$ 464.46	\$ 47.59
	4 gpm	May 29	1.31	10.40	11.71	12.77	23.31	2.31	26.79	239.00	20.41	8.92	\$ 487.50	\$ 41.63
	5 gpm	May 29	1.31	12.30	13.61	12.77	26.38	0.71	27.09	260.00	19.10	9.59	\$ 535.84	\$ 39.37
Zac Yoder	3 gpm	May 12	1.22	12.29	13.51	16.60	30.11	-2.04	28.07	251.00	18.58	8.94	\$ 511.34	\$ 37.84
	4 gpm	May 12	1.22	16.40	17.62	16.60	34.22	-3.50	30.72	276.00	15.66	8.98	\$ 558.99	\$ 31.68
	5 gpm	May 12	1.22	20.57	21.79	16.60	38.39	-3.52	34.87	307.00	14.09	8.80	\$ 623.32	\$ 28.63
Harold Grall	3 gpm	May 12	2.63	11.84	14.47	11.61	26.08	3.97	30.05	222.00	15.34	7.38	\$ 447.19	\$ 30.90
	4 gpm	May 12	2.63	14.59	17.22	11.61	28.83	1.83	30.66	230.00	13.35	7.50	\$ 454.87	\$ 26.41
	5 gpm	May 12	2.63	17.20	19.83	11.61	31.44	2.45	33.89	233.00	11.75	6.87	\$ 449.38	\$ 22.66
Hartley Feeders †	3 gpm	Jun 18	0.00	9.27	9.27	14.47	23.74	0.00	23.74	-	-	-	-	-
	4 gpm	Jun 18	0.00	10.97	10.97	15.07	26.04	0.00	26.04	-	-	-	-	-
	5 gpm	Jun 18	0.00	12.18	12.18	15.07	27.25	0.00	27.25	-	-	-	-	-
Average ‡	3 gpm	May 26	1.03	10.13	11.16	13.24	24.41	1.82	26.23	225.75	20.06	8.45	\$ 461.83	\$ 41.12
	4 gpm	May 26	1.03	12.61	13.64	13.57	26.98	0.66	27.87	238.50	17.24	8.43	\$ 482.21	\$ 34.93
	5 gpm	May 26	1.03	14.99	16.02	13.36	29.39	0.46	29.84	254.75	15.55	8.41	\$ 512.39	\$ 31.30
<b>Irrigation Systems</b>														
Harold Grall	LEPA	May 27	0.00	11.58	11.58	14.60	26.18	0.00	26.18	244.00	21.07	9.32	\$ 509.30	\$ 43.98
	Drag Drip	May 27	0.00	11.58	11.58	14.60	26.18	0.00	26.18	244.00	21.07	9.32	\$ 509.30	\$ 43.98
	Drag Drip	Jun 05	0.89	13.38	14.27	11.81	26.08	0.00	26.08	180.00	12.61	6.90	\$ 323.33	\$ 22.66

Notes:

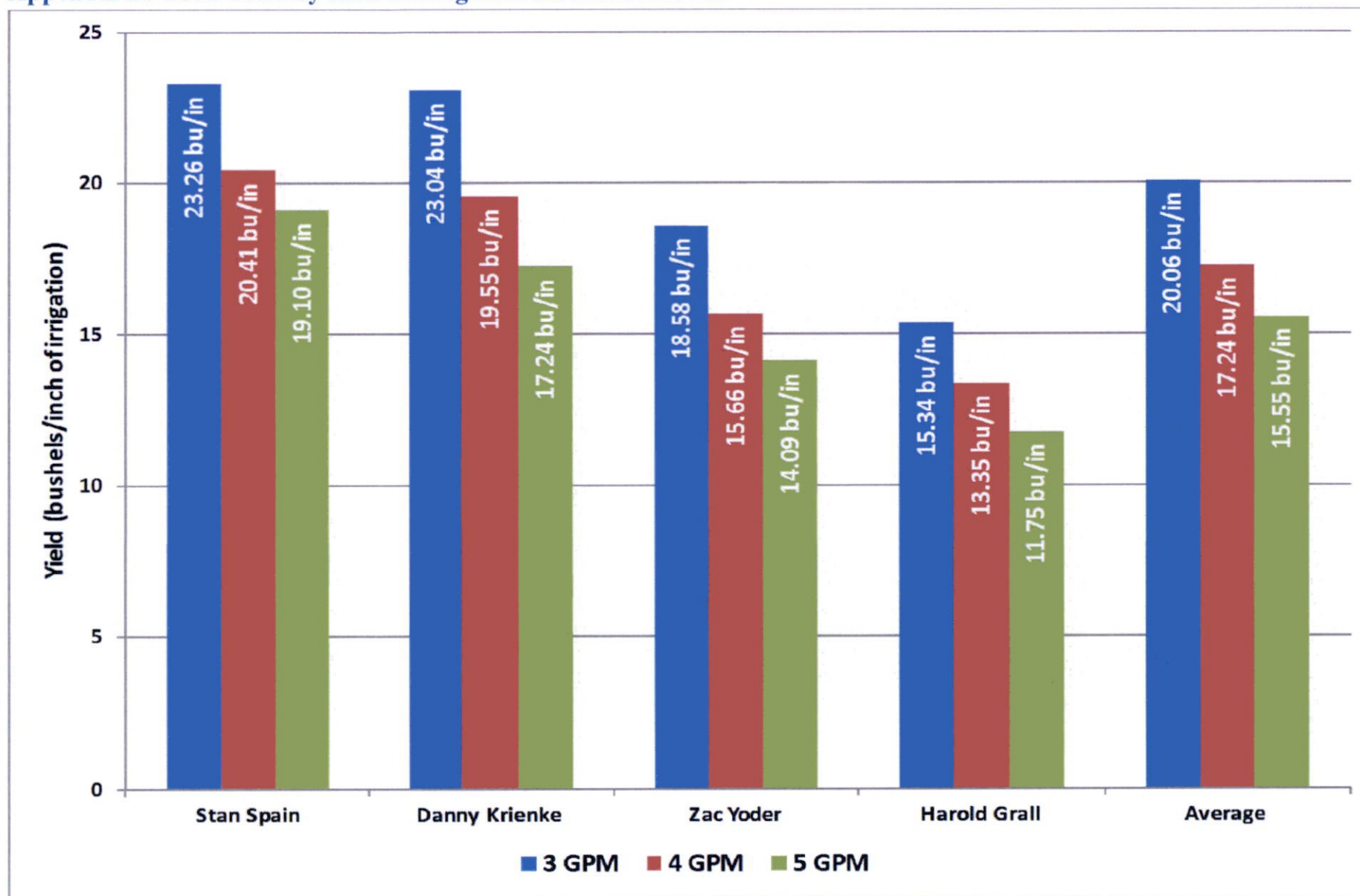
The producer order is from highest to lowest net return per acre inch of irrigation for the producer's 3 GPM field.

† Hartley Feeders' yields were not viable due to multiple factors that include volunteer corn, poor emergence, poor stand and wet soils.

‡ All average yield and net return results were based on the four producers with viable yields.

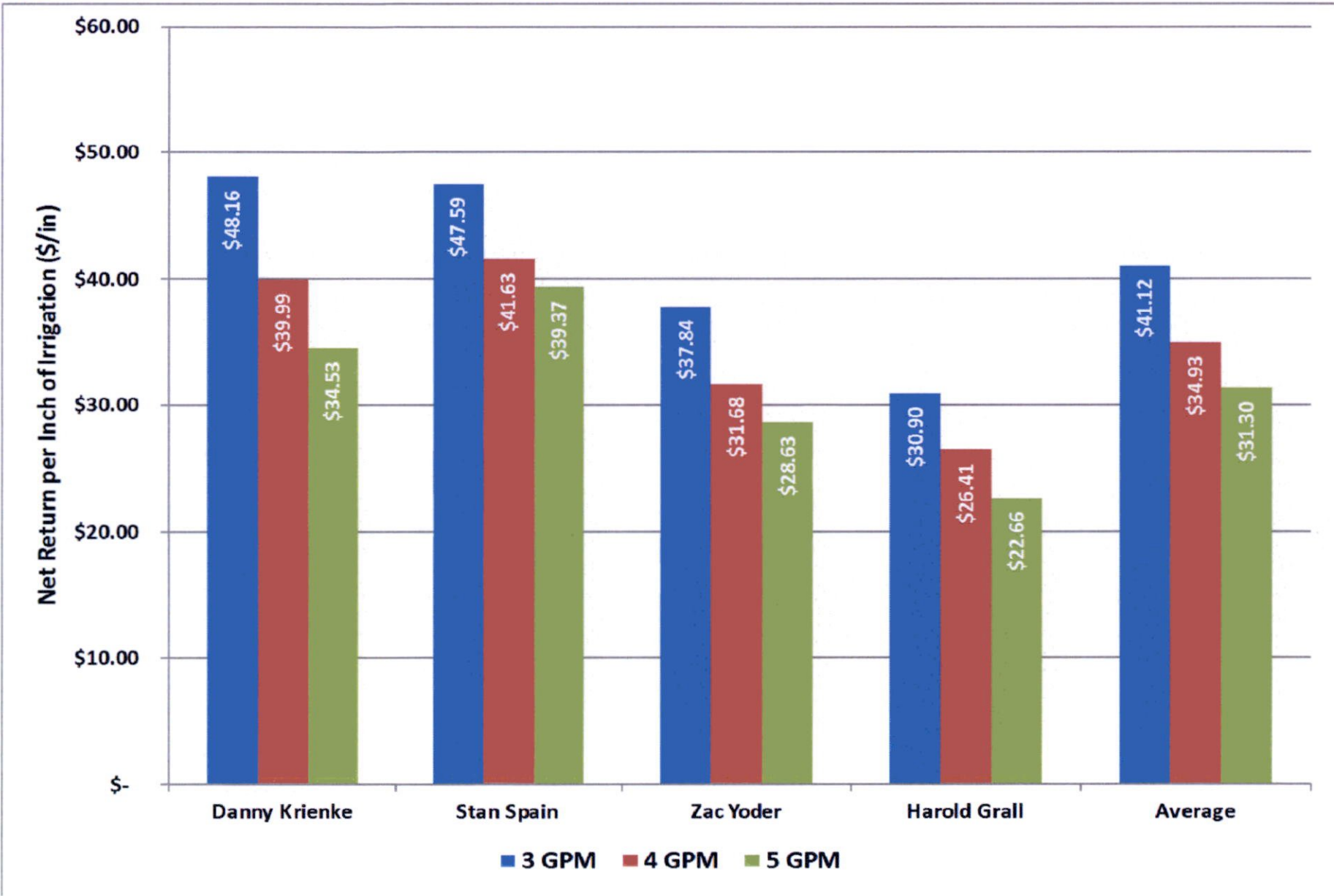


Appendix B: Corn Yield by Inch of Irrigation for Each Grower





Appendix C: Net Return from Each Inch of Irrigation by Grower





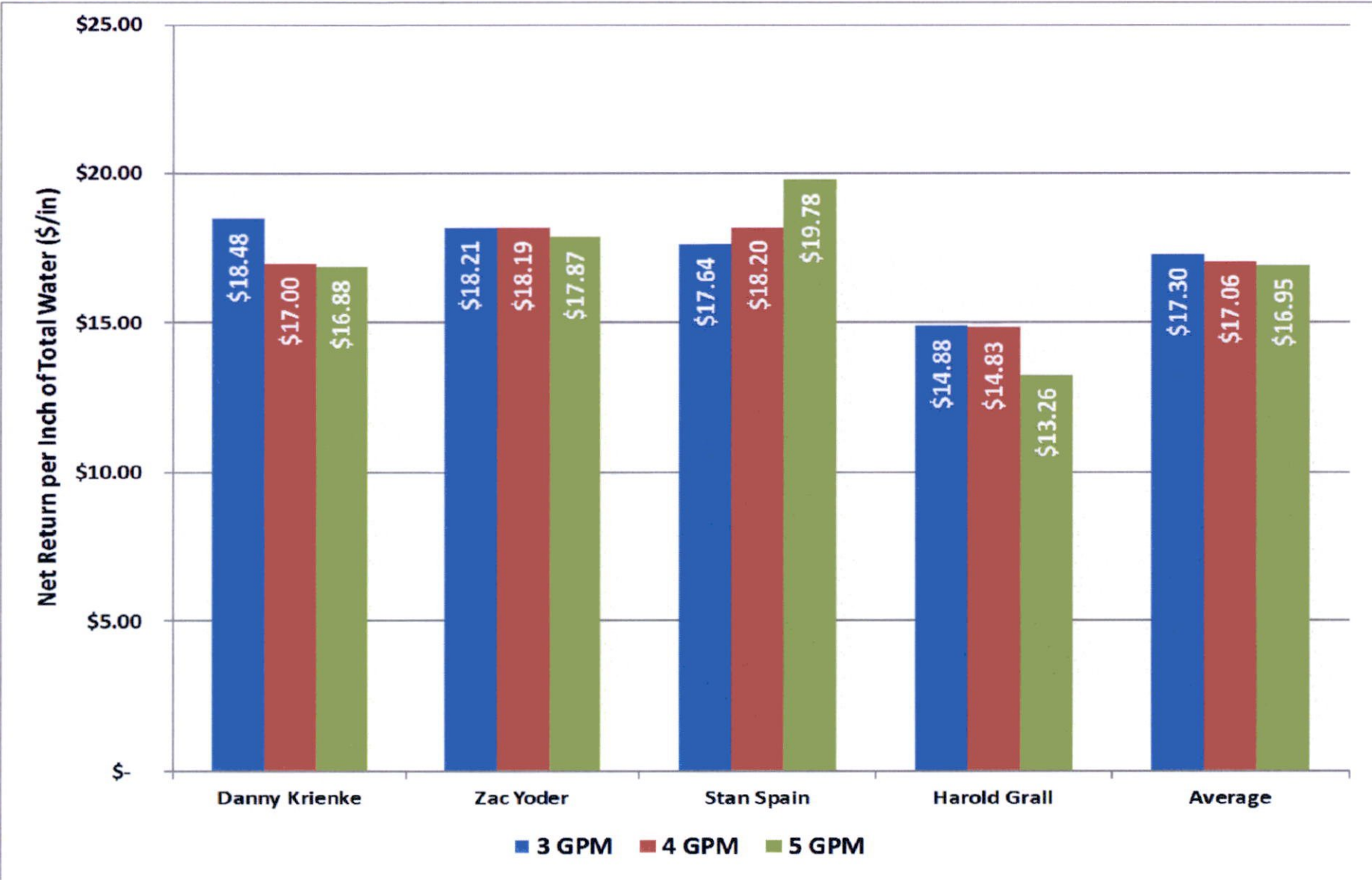
## Appendix D: Summary of the 2015 Demonstration Results, Ranked by Net Return from Each Inch of Irrigation by Grower and 3, 4, 5 Fields

Producer	Field	Planted	Pre-Water (in.)	Irrigation (in.)	Total Irrigation (in.)	Rainfall (in.)	Total Rainfall & Irrigation (in.)	Net Soil Water (in.)	Total Water (in.)	Yield (bu/ac)	bu/ac-in of Irrigation	bu/ac-in of Total Water	Net Return (\$/ac)	Net Return Per Ac-In of Irrigation (\$)
Danny	3 gpm	May 31	0.00	8.81	8.81	10.77	19.58	3.38	22.96	203.00	23.04	8.84	\$ 424.34	\$ 48.16
Stan	3 gpm	May 29	1.31	8.45	9.76	12.77	22.53	3.80	26.33	227.00	23.26	8.62	\$ 464.46	\$ 47.59
Stan	4 gpm	May 29	1.31	10.40	11.71	12.77	23.31	2.31	26.79	239.00	20.41	8.92	\$ 487.50	\$ 41.63
Danny	4 gpm	May 31	0.00	10.69	10.69	11.79	22.48	2.66	25.14	209.00	19.55	8.31	\$ 427.47	\$ 39.99
Stan	5 gpm	May 29	1.31	12.30	13.61	12.77	26.38	0.71	27.09	260.00	19.10	9.59	\$ 535.84	\$ 39.37
Zac	3 gpm	May 12	1.22	12.29	13.51	16.60	30.11	-2.04	28.07	251.00	18.58	8.94	\$ 511.34	\$ 37.84
Danny	5 gpm	May 31	0.00	12.70	12.70	10.77	23.47	2.65	26.12	219.00	17.24	8.38	\$ 441.03	\$ 34.53
Zac	4 gpm	May 12	1.22	16.40	17.62	16.60	34.22	-3.50	30.72	276.00	15.66	8.98	\$ 558.99	\$ 31.68
Harold	3 gpm	May 12	2.63	11.84	14.47	11.61	26.08	3.97	30.05	222.00	15.34	7.38	\$ 447.19	\$ 30.90
Zac	5 gpm	May 12	1.22	20.57	21.79	16.60	38.39	-3.52	34.87	307.00	14.01	8.80	\$ 623.32	\$ 28.63
Harold	4 gpm	May 12	2.63	14.59	17.22	11.61	28.83	1.83	30.66	230.00	13.35	7.50	\$ 454.87	\$ 26.41
Harold	5 gpm	May 12	2.63	17.20	19.83	11.61	31.44	2.45	33.89	233.00	11.75	6.87	\$ 449.38	\$ 22.66
Average	3 gpm	May 21	1.29	10.35	11.64	12.94	24.58	2.28	26.85	225.75	20.06	8.45	\$ 461.83	\$ 41.12
	4 gpm	May 21	1.29	13.02	14.31	13.19	27.21	0.83	28.33	238.50	17.24	8.43	\$ 482.21	\$ 34.93
	5 gpm	May 21	1.29	15.69	16.98	12.94	29.92	0.57	30.49	254.75	15.53	8.41	\$ 512.39	\$ 31.30
<b>Irrigation Systems</b>														
Harold	LEPA	May 27	0.00	11.58	11.58	14.60	26.18	0.00	26.18	244.00	21.07	9.32	\$ 509.30	\$ 43.98
Harold	Drag Drip	May 27	0.00	11.58	11.58	14.60	26.18	0.00	26.18	244.00	21.07	9.32	\$ 509.30	\$ 43.98
Harold	Drag Drip	Jun 05	0.89	13.38	14.27	11.81	26.08	0.00	26.08	180.00	12.61	6.90	\$ 323.33	\$ 22.66

Note: The producer order is ranked highest to lowest by net return per acre-inch of irrigation.



Appendix E: Net Return from each Inch of Total Water by Grower





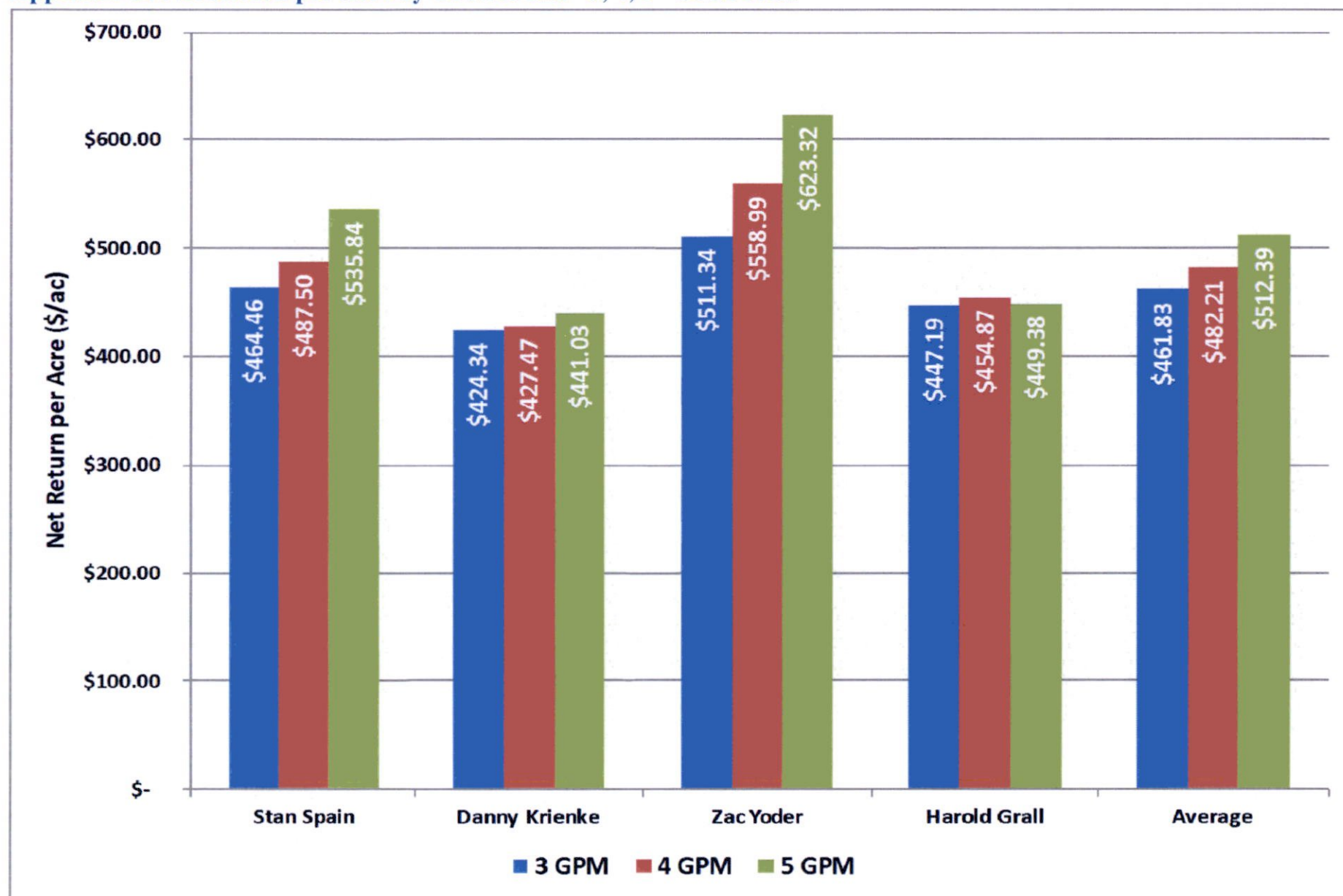
## Appendix F: Summary of Net Return from Each Inch of Total Water by Grower and 3, 4, 5 Field

Producer	Field	Planted	Pre-Water (in.)	Irrigation (in.)	Total Irrigation (in.)	Rainfall (in.)	Net Soil Water (in.)	Total Water (in.)	Yield (bu/ac)	bu/ac-in of Irrigation	bu/ac-in of Total Water	Net Return (\$/ac)	Net Return Per Ac-In of Irrigation (\$)	Net Return Per Ac-In of Total Water (\$)
Stan	5 gpm	May 29	1.31	12.30	13.61	12.77	0.71	27.09	260	19.10	9.59	\$ 535.84	\$ 39.37	\$ 19.78
Danny	3 gpm	May 31	0.00	8.81	8.81	10.77	3.38	22.96	203	23.04	8.84	\$ 424.34	\$ 48.16	\$ 18.48
Zac	3 gpm	May 12	1.22	12.29	13.51	16.60	-2.04	28.07	251	18.58	8.94	\$ 511.34	\$ 37.84	\$ 18.21
Stan	4 gpm	May 29	1.31	10.40	11.71	12.77	2.31	26.79	239	20.41	8.92	\$ 487.50	\$ 41.63	\$ 18.20
Zac	4gpm	May 12	1.22	16.40	17.62	16.60	-3.50	30.72	276	15.66	8.98	\$ 558.99	\$ 31.68	\$ 18.19
Zac	5gpm	May 12	1.22	20.57	21.79	16.60	-3.52	34.87	307	14.09	8.80	\$ 623.32	\$ 28.63	\$ 17.87
Stan	3 gpm	May 29	1.31	8.45	9.76	12.77	3.80	26.33	227	23.26	8.62	\$ 464.46	\$ 47.59	\$ 17.64
Danny	4 gpm	May 31	0.00	10.69	10.69	11.79	2.66	25.14	209	19.55	8.31	\$ 427.47	\$ 39.99	\$ 17.00
Danny	5 gpm	May 31	0.00	12.70	12.70	10.77	2.65	26.12	219	17.24	8.38	\$ 441.03	\$ 34.53	\$ 16.88
Harold	3 gpm	May 12	2.63	11.84	14.47	11.61	3.97	30.05	222	15.34	7.38	\$ 447.19	\$ 30.90	\$ 14.88
Harold	4 gpm	May 12	2.63	14.59	17.22	11.61	1.83	30.66	230	13.35	7.50	\$ 454.87	\$ 26.41	\$ 14.83
Harold	5 gpm	May 12	2.63	17.20	19.83	11.61	2.45	33.89	233	11.75	6.87	\$ 449.38	\$ 22.66	\$ 13.26
Average	3 gpm	May 21	1.29	10.35	11.64	12.94	2.28	26.85	226	20.06	8.45	\$ 461.83	\$ 41.12	\$ 17.30
	4 gpm	May 21	1.29	13.02	14.31	13.19	0.83	28.33	239	17.24	8.43	\$ 482.21	\$ 34.93	\$ 17.06
	5 gpm	May 21	1.29	15.69	16.98	12.94	0.57	30.49	255	15.55	8.41	\$ 512.39	\$ 31.30	\$ 16.95
<b>Irrigation Systems</b>														
Harold	LEPA	May 27	0.00	11.58	11.58	14.60	0.00	26.18	244	21.07	9.32	\$ 509.30	\$ 43.98	\$ 19.45
Harold	Drag Drip	May 27	0.00	11.58	11.58	14.60	0.00	26.18	244	21.07	9.32	\$ 509.30	\$ 43.98	\$ 19.45
Harold	Drag Drip	Jun 05	0.89	13.38	14.27	11.81	0.00	26.08	180	12.61	6.90	\$ 323.33	\$ 22.66	\$ 12.40

Note: The producer order is ranked highest to lowest by net return per acre-inch of total water.



Appendix G: Net Return per Acre by Grower and “3, 4, 5” GPM Field





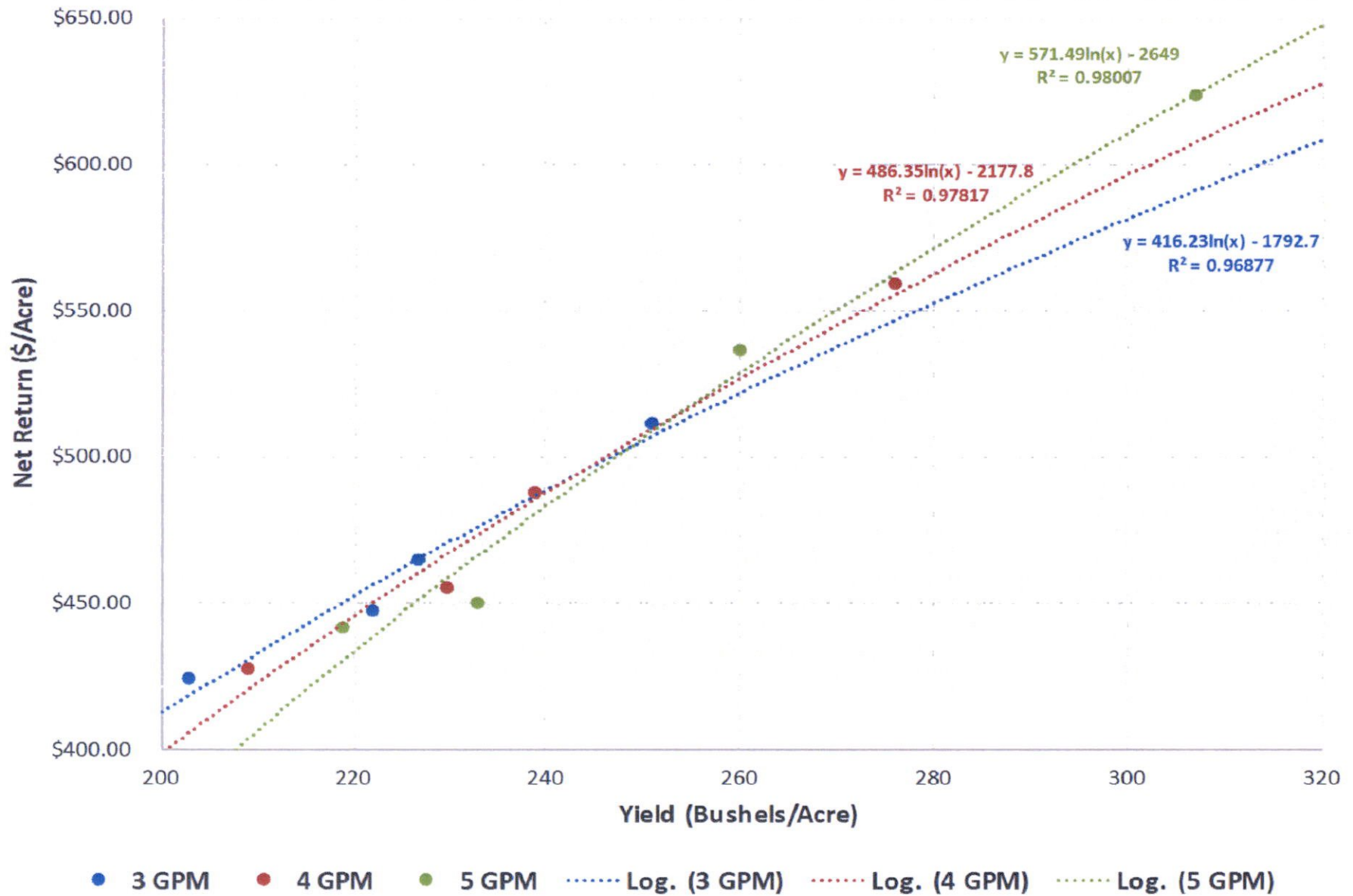
## Appendix H: Corn Hybrid and Planting Information for the 2015 “3, 4, 5” Project

Producer	County	Field	Planted	Corn Hybrid	Seeding Rate	Yield (bu/ac)	Total Irrigation (in.)	bu/ac-in of Irrigation	Acres	Previous Crop	Irrigation by
<b>Stan Spain</b>	Moore	3 gpm	29-May	D55VP77	32,000	227	9.76	23.26	18.3	Corn	LEPA
		4 gpm	29-May	D55VP77	32,000	239	11.71	20.41	18.3	Corn	LEPA
		5 gpm	29-May	D55VP77	32,000	260	13.61	19.10	18.3	Corn	LEPA
<b>Danny Krienke</b>	Ochiltree	3 gpm	31-May	P33B54	26,000	203	8.81	23.04	40.0	Wheat	LEPA
		4 gpm	31-May	P33B54	27,000	209	10.69	19.55	40.0	Wheat	LEPA
		5 gpm	31-May	P33B54	28,000	219	12.70	17.24	40.0	Wheat	LEPA
<b>Zac Yoder</b>	Dallam	3 gpm	12-May	P33Y74	32,000	251	13.51	18.58	13.3	Corn	LESA
		4 gpm	12-May	P33Y74	32,000	276	17.62	15.66	9.1	Corn	LESA
		5 gpm	12-May	P33Y74	32,000	307	21.79	14.09	6.5	Corn	LESA
<b>Harold Grall</b>	Hartley	3 gpm	12-May	P33B54	26,000	222	14.47	15.34	30.3	Corn	LESA
		4 gpm	12-May	P33B54	26,000	230	17.22	13.35	60.6	Corn	LESA
		5 gpm	12-May	P33B54	26,000	233	19.83	11.75	30.3	Corn	LESA
<b>Harold Grall</b>	Moore	LEPA	27-May	P1151AM	30,000	244	11.58	21.07	101.2	Milo	LEPA
		PMDI	27-May	P1151AM	30,000	244	11.58	21.07	20.3	Milo	Drag Drip
<b>Harold Grall</b>	Moore	PMDI	5-Jun	P1151AM	28,000	180	14.27	12.61	120.0	Corn	Drag Drip

Note: The producer order is ranked highest to lowest by bushels per acre-inch of irrigation for the producer's three gallon per minute field. LEPA with Senninger Shroud and Bubble, LESA with LDN and Drag Drip with T-L System.

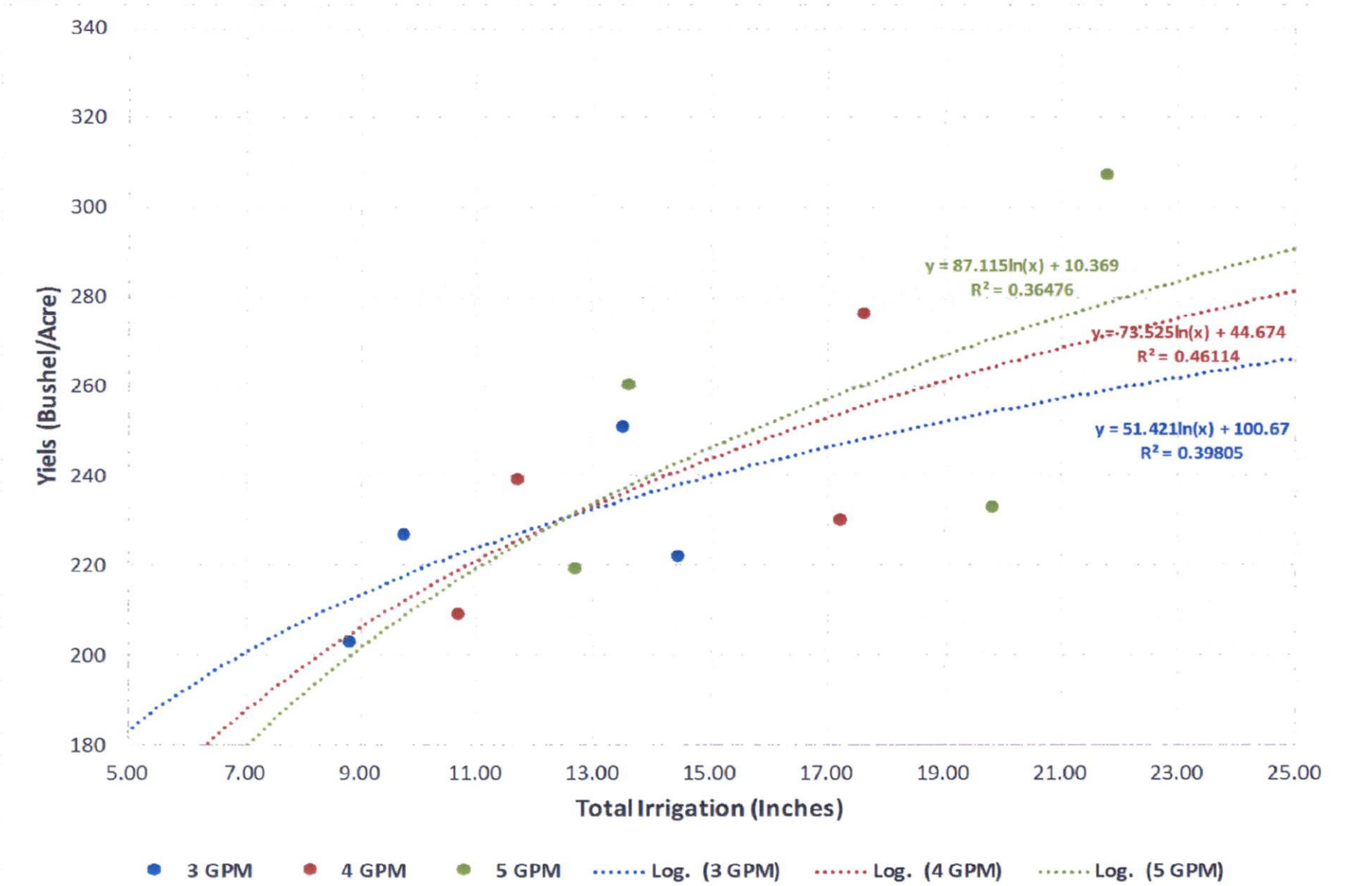


## Appendix I: Corn Yield vs. Net Return per Acre





Appendix J: Total Irrigation vs. Corn Yield





1:11 PM

06/13/16

**Groundwater Management Districts Association**  
**Reconciliation Summary**  
Groundwater Mgmt Districts Assn, Period Ending 05/29/2016

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	<b>May 29, 16</b>	
Beginning Balance		73,761.61
Cleared Transactions		
Checks and Payments - 2 items	-12,509.00	
Total Cleared Transactions	-12,509.00	
Cleared Balance		<b>61,252.61</b>
Uncleared Transactions		
Deposits and Credits - 1 item	250.00	
Total Uncleared Transactions	250.00	
Register Balance as of 05/29/2016		<b>61,502.61</b>
New Transactions		
Checks and Payments - 1 item	-125.00	
Total New Transactions	-125.00	
Ending Balance		<b>61,377.61</b>