

2017 LNNRD IMP Annual Report

August 2, 2018

Annually the Lower Niobrara Natural Resource District (LNNRD), the Nebraska Department of Natural Resources (NDNR) and the IMP Stakeholder Committee met to review the data collected and tasks completed to accomplish the goals of the IMP.

The following is an overview of the LNNRD activities to accomplish the goals of the IMP:

Goal 1 is to develop and implement processes for the adequate collection of hydrologic and other related data to assess water resources within the District.

The staff has researched the data available through the United State Geological Survey, Nebraska Conservation and Survey and other sources to determine the information available. The research shows there are five hydrologic areas within the District. These five areas can be further divided into twelve hydrologic sub-areas within the District based on the static water level data. The static water levels were then overlaid onto each of the twelve hydrologic areas. After evaluating the twelve area and overlaying the irrigated acres we determine to best show the static water level changes we combine the twelve into four distinct areas: Keya Papa, Ponca, Middle Niobrara and Lower Niobrara. Included with this report is the Lower Niobrara NRD 2018 Spring Static Water Level Report prepared by the District's Water Coordinator Wade Ellwanger.

The next two goals work hand in hand, because if you maintain sustainability you will minimize conflicts between all users. Goal 2 requires the District to develop systematic approaches for the development and sustainability of water resources within the District, and Goal 3 is to prevent, resolve, and minimize water related conflicts among and between surface water and groundwater users.

The first step to accomplish these goals was to revised rules and regulation of the LNNRD to address development, sustainability and minimization of water related conflicts. The first of these rules and regulations enacted gives the Directors the ability to evaluate the District's groundwater supply along with other factors in June of each year to determine if new irrigated acres should or should not be added within the District boundaries. At the June 4, 2018 the Board decided no new irrigated acres will be added to the LNNRD in 2018-19 fiscal year and no transfers of irrigated acres.

Secondly, the District is certifying all the irrigated acres within its boundary. To date 100% of Boyd County, 99.7% of Holt County, 100% of Keya Paha County, 99.5% of Knox County and 100% of Rock County are completed. The goal was to have all the acres certified by the end of 2016 but do to staffing issues this has been moved to the end of 2017. Of the ones left to be completed the main issue is either proving the acres irrigated with FSA maps or there is a well registration issue. The District's Programs Assistant Connie McCarthy is currently going through all certified acres to make sure the ownership and acres has not changed. If it has changed a form will be sent to the new owner to update. Connie keeps the Board informed of the current breakdown on acres certified—attached as Appendix A is Connie's latest report graph.

The District does allow for the replacement of high capacity wells with the condition they can only be constructed to pump the same GPM as the well being replaced. In 2017, the District received and approved nine well permit applications for irrigation replacement wells. The District also developed rules and regulation for helper/supplemental wells. In 2017 there were only inquiries regarding helper/supplemental well with no application filed.

Flowmeters are required on all new or modified wells in the District. The District also requires a flowmeter on systems which are applying for a supplemental/helper wells. The District had applied for and received an NET Grant in 2009-2011 for flowmeter purchases. Many producers took advantage of the cost-share and installed meters on their system. As a condition of receiving the cost-share the producer is to submit their meter reading annually. At this time flowmeter readings are on a voluntary base, so, not all submit their readings in a timely manner. For the meters which reported readings the District average 13.74 inches of irrigation. Appendix B is a spreadsheet showing the flowmeter usage for those which reported.

The District did receive a variance request this year. The Village of Verdigre had constructed new waste lagoons for the management of human waste coming from the Village. The problem is the engineer which designed the system did not account for increased rain fall averages and the lagoon are not large enough. To fix the problem the Village request a permit to pump up to 7 inches onto the adjacent land. Our rules allow for 3 inches to be pumped for a lagoon. The Board has approved this variance.

In addition to the rules and regulations the District is working with four other Districts and Nebraska Game and Parks Commission to purchase the water appropriation held by Nebraska Public Power District at the Spencer Hydro Facility. There are many reasons this is a win-win but the three main ones are: brings the control of the river back to local control, provides a way to satisfy the National Parks Service desire for a Federal Reserve water right and maintains the river for fish, wildlife, recreation, agriculture and industry. A MOU was signed in September of 2015 and the parties have been working on the details to complete the transfer. The Purchase Agreement is set to be signed September 6, 2018. Work is now underway to secure the fund for the purchase.

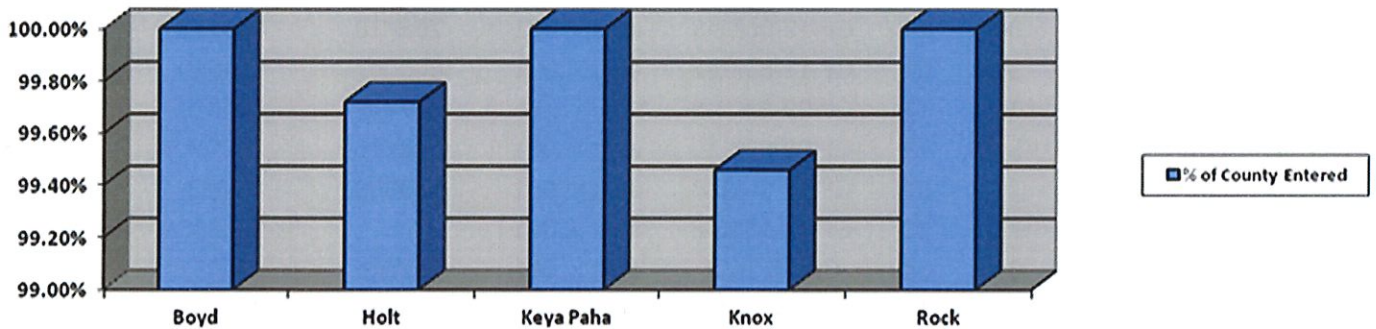
Goal 4 requires the District the Department to develop and provide educational opportunities and outreach materials about hydrologically connected surface water and groundwater, water conservation, and to keep the constituents of the District informed about the IMP as it is implemented. This has been a challenge for the District. With the Acre Certification completed the Programs Assistant will have more time to devote to this issue.

Even though the IMP does not deal with nitrates directly they are a part of the overall water picture in the District. Included with the report is the District's Annual Phase II Report. This report shows the relation between water usage, types of crops and nitrates in the District. This is a useful tool to the District and is considered in the discussion process of to add or not add new irrigated acres.

Appendix A

Acre Certification-

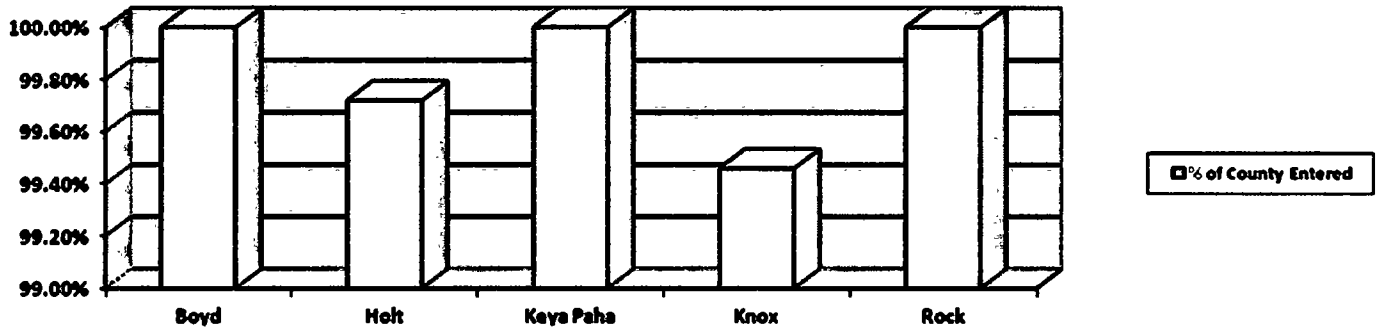
	Certifications Sent (ac.)	Certifications Received (ac.)	Total Acres	% of County Entered	% of District Entered
Boyd	9,186	9,186	9,186	100.00%	3.85%
Holt	181,214	181,099	181,611	99.72%	75.99%
Keya Paha	15,982	15,982	15,982	100.00%	6.71%
Knox	23,627	23,499	23,627	99.46%	9.86%
Rock	7,772	7,908	7,908	100.00%	3.32%
Total	237,781	237,674	238,314		99.73%



Appendix A

Acre Certification

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Total	237,781	237,674	238,314		99.73%



Appendix B – Flow Meter Info

1/4	Sec	Twp	Rng	Model #	Units	Fall 2015	Fall 2016	In./Ac. Applied 2016
NW	30	29	9	GP09-2404-8	ac ft x .001	692940	808016	10.62
NW	7	29	10	GP 10-3574	Gal x 100	327245	798200	13.34
NE	7	29	10	GP 10-3573	Gal x 100		675748	
SE	8	29	11	GP 10-3575	Gal x 100	449615	951858	14.23
NE	10	29	11	GP 10-3572	Gal x 100	967546	454574	13.80
SE	11	29	11	GP 11-3539	Gal x 100		915274	
NE	11	29	11	GP 11-3540	Gal x 100	247874	786726	15.26
SW	11	29	11	GP 11-2478	gal x 100	491388	988671	14.09
NE	17	29	11	GP 10-3568	Gal x 100	426196	900908	13.45
NW	17	29	11	GP 10-3566	gal x 100	713658	990961	7.86
NW	3	30	10	GP 10-3571-8	gal x 100	708019	994906	8.13
NW	9	30	10	GP09-1260-8	Gal x 100	992118	373897	10.82
SE	10	30	10	GP 11-3542	Gal x 100	80920	664138	16.52
NW	11	30	10	GP08-4942-8	Gal x 100	267693	713789	12.64
SW	11	30	10	GP08-4941-8	Gal x 100	426574	891098	13.16
NW	14	30	10	GP 10-0892	gal x 100	801966	203212	11.37
E2 W2	26	30	10	GP 08-8-3667	Gal x 100		810141	
NW	2	30	13	GP 10-1277N	Gal x 1000	373928		
SE	21	30	13	GP 09-1263-8	Gal x 100		64155	
SW	21	30	13	GP 09-2406-8	ac ft x .001	968252	218852	23.13
NE	10	30	14	GP 12-0682-8	ac ft x .001	708728	881139	15.91
SE	10	30	14	GP 11-6030-8	ac ft x .001	660007	814040	14.22
SE	3	31	13	GP 09-1261-8	Gal x 100	227812	247610	0.56
NE	3	31	13	GP 08-8-4210	ac ft x .001	912576	79274	15.39
NE	10	31	13	GP 08-8-4893	ac ft x .001	849300	17483	15.52
SE	29	31	13	GP 12-1816-8	ac ft x .001		300835	
NW	6	31	14	GP 11-2411	ac ft x .001	753805	934451	16.68
NE	6	31	14	GP 11-2413	ac ft x .001	680078	834637	14.27
SW	6	31	14	GP 11-2412	ac ft x .001	727102	895174	15.51
NE	7	31	14	GP 10-3638	ac ft x .001	862715	25247	15.00
SW	8	31	14	GP 10-3911	ac ft x .001	873904	58563	17.05
SW	12	31	14	GP 09-1264-8	Gal x 100	470213	939642	13.30
SW	14	31	14	GP 10-3268	ac ft x .001	849511	48699	18.39
SE	28	31	14	GP 08-8-3651	Gal x 100	510508	535663	29.04
SE	30	31	14	GP08-8-3650	Gal x 100	651396	592647	26.66
SW	30	31	14	GP 07-8-3936	Gal x 100	455841	655940	5.67
NW	31	31	14	GP 07-8-3933	Gal x 100	533389	741942	5.91
SW	31	31	14	GP 12-1183-8	ac ft x .001	820042	55854	21.77
SE	34	31	14	GP04-8-2240	Gal x 100	532190	502656	27.49

NW	34	31	14	GP 08-8-3649	Gal x 100	509817	543064	29.27
SW	1	31	15	GP-10-3515-8	ac ft x .001	845837	986180	12.95
NE	11	31	15	GP 10-3640-8	ac ft x .001	733674	879034	13.42
SW	26	31	15	GP 12-1179-8	ac ft x .001	706092	899765	17.88
NW	26	31	15	GP 11-4751-8	ac ft x .001	413178	560188	13.57
SW	27	31	15	GP 11-6026-8	ac ft x .001	767300	961332	17.91
NW	31	31	15	GP 09-1262-8	Gal x 100	883762	710506	23.42
NE	34	31	15	GP 12-1182-8	ac ft x .001	719056	893363	16.09
SE	34	31	15	GP 12-1180-8	ac ft x .001	734757	931040	18.12
SW	34	31	15	GP 12-0681-8	ac ft x .001		13527	
NE	27	29	6	GP 09-2505-6	Gal x 100	694753	779800	2.41
SE	8	29	8	GP10-1296-8	ac ft x .001			
SW	8	29	8	GP10-1260-8	ac ft x .001			
SW	33	29	8	GP 08-8-3669	Gal x 100			
NE	24	32	7	GP 08-8-3671	Gal x 100	609042	772351	4.63
SE	24	32	7	GP 08-8-3668	Gal x 100	791763	998373	5.85
NE	19	33	19	GP 12-2158-8	gal x 1000		54720	
SW	19	33	19	GP 06-8-2651	gal x 1000		46135	
NW	35	33	20	GP 09-1820-6	Gal x 100		925215	
NE	20	33	21	GP 10-1968-8	Gal x 100		57884.8	
NW	20	33	21	GP 10-1963-8	Gal x 100		69202.7	
SE	20	33	21	GP 10-1020-8	Gal x 100		54097	
SE	21	33	21	GP 10-1967-8	Gal x 100		59874.8	
NE	21	33	21	GP 10-1962-8	Gal x 100		59549.8	
NW	21	33	21	GP 10-1966-8	Gal x 100		54860.8	
SW	24	33	21	GP 10-1965-8	Gal x 100		50393	
NESE	31	34	16	GP 11-4213-8	gal x 1000			
NE	36	34	16	872353	gal x 100			
NW	5	31	13	GP 12-2378-6	gal x 100	921320	209865	8.17
NE	15	31	13	GP 12-2375	gal x 100	854112	64153	5.95
S1/2 SE	29	31	13	GP 12-1748-8	ac ft x .001			
NE	29	31	13	GP 12-0680	liters/second	236791		
SE	32	31	13	GP 12-2374-6	ac ft x .001			
SE	7	31	14	SN 05122136	gal x 100	303276	9409	20.00
SW	7	31	14	GP 11-4750-8	ac ft x .001	165955	13.9	
E1/2	8	31	14	GP 12-2377	gal x 100		3760	
E1/2								
NE	8	31	14	GP 10-3565	gal x 100	583319		
NW	18	31	14	GP 12-1745-8	ac ft x .001	526229		
SWSW	30	31	14	GP 12-3543-8	gal x 100			
NE	33	31	14	GP 12-2376-6	ac ft x .001	110413	12.2	
NE	1	31	15	GP 12-0943-8	ac ft x .001	808797		
SW	2	31	15	GP 12-1747-8	ac ft x .001	63624		

SE	14	31	15	GP 12-2098	gal x 1000			
SE	18	31	15	GP 11-6230-8	gal x 100	842219	569821	20.61
SE	15	32	12	GP 11-3547	gal x 100		66132	
E1/2								
NE	21	32	12	GP 12-1876-8	gal x 100	192705	247295	1.55
NW	21	32	12	GP 11-5039-8	gal x 100	640587		
NE	32	32	12		gal x 100		726272	
E 1/2	13	33	14	GP 11-4207-8	galx10,000			
SE	28	33	20	GP 12-2072-8	ac ft x .001		629588	
NW	31	34	15	872187	gal x 100			
SW	32	34	16	no #	gal x 1000			
NW	32	34	16	09-20846	gal x 1000			
SE	32	34	16	872295	gal x 1000			
NE	32	34	16	872270	gal X 1000			
SE	36	34	16	GP 11-4208-8	gal x 100			
SW	25	35	16	GP 11-2769-8	gal x 100	432539	760402	9.29
NW	33	31	13	GP 11-5653-8	ac ft x .001	639175	823159	16.98
E1/2	9	31	14	GP 07-8-3936	gal x 100			
E1/2	16	31	14	GP 12-2371-6	gal x 100			
S1/2	16	31	14	GP 12-2373-6	gal x 100			
NE	22	31	14	GP 12-2152-8	gal x 100	352902		
NE	33	31	14	GP 12-0680-8	ac ft x .001			
SW	14	31	15	no #	gal x 1000			
SW	14	31	15	no #	gal x 1000			
SW	14	31	15	no #	gal x 1000			
SW	14	31	15	no #	gal x 1000			
SE	15	31	15	Master Meter	ac ft x .001		80861	
NE	18	31	15	GP 11-6231-8	gal x 100	283284	786426	14.25
NE	23	31	15	GP 11-4210	gal x 100	89484		
NE	16	31	16	GP 12-0369	ac ft x .001	503824		
NW	19	33	19	GP 07-8-3386	gal x 1000		69521	
NE	28	33	19	no #	gal x 1000		274637	
NW	25	33	20	GP 12-2147-8	gal x 1000		272371	
NE	25	33	20	no #	gal x 1000		298425	
SE	26	33	20	GP 12-2162-8	gal x 100		42415	
SW	26	33	20	GP 12-2149-8	gal x 1000		253995	
NW	26	33	20	GP 12-2156-8	gal x 1000		331995	
SE	4	33	21		ac ft x .001	12		
SE	8	33	21	GP 12-1727-8	ac in x .01	763987	986772	
NE	5	33	16				224845	
	3	33	16				364023	
SW	25	34	16					
S 1/2	25	34	16					

NW	22	30	14			168709	702965	
SW	28	31	13		gal x 100	193303	254431	1.73
NE	31	31	13	GP 12-5359-8	ac ft x .001	443840	568367	11.49
Ct	33	31	13		gal x 100	980137	337804	10.13
NE	1	31	14		gal x 100			
SE	1	31	14		gal x 100			
NE	17	31	14			325248		
NW	29	31	14				10871	
NE	30	31	14			331626	40593	
SW	18	31	15					
SE	20	32	12	GP 11-5039-8	gal x 100	479070	748870	7.64
NE	30	32	14					
SE	18	33	14		ac ft x .001	650820	836432	17.13
NE	18	33	14		ac ft x .001	677110	880728	18.80
SW	12	33	15		ac ft x .001			
SE	12	33	15		ac ft x .001			
NE	28	33	19					
NW	32	33	19					
NW	32	33	19					
E 1/2	32	33	19				113985	
SW	25	33	20				67525	
SE	28	33	20	GP 12-2072	ac ft x .001		629588	
NW	34	33	20					
NE	25	35	17		gal. x 1000		135858	
SE	25	35	17		gal. x 1000		120287	
N 1/2								
NW 1/4	4	31	17		gal x 100	627980	244049	17.45
S1/2								
NW	4	31	17		gal x 100	225899	516860	8.24
N1/2								
NW	4	31	17			143804	111079	
SW	10	29	10					New for 17
NE	15	34	17					New for 17
NE	25	30	12					New for 17
SW	27	30	14					New for 17
SW	13	29	11					New for 17
SE	34	32	9					New for 17
SE	21	31	11					New for 17
NW	19	30	8					New for 17
SW	4	30	10					New for 17



Lower Niobrara Natural Resources District
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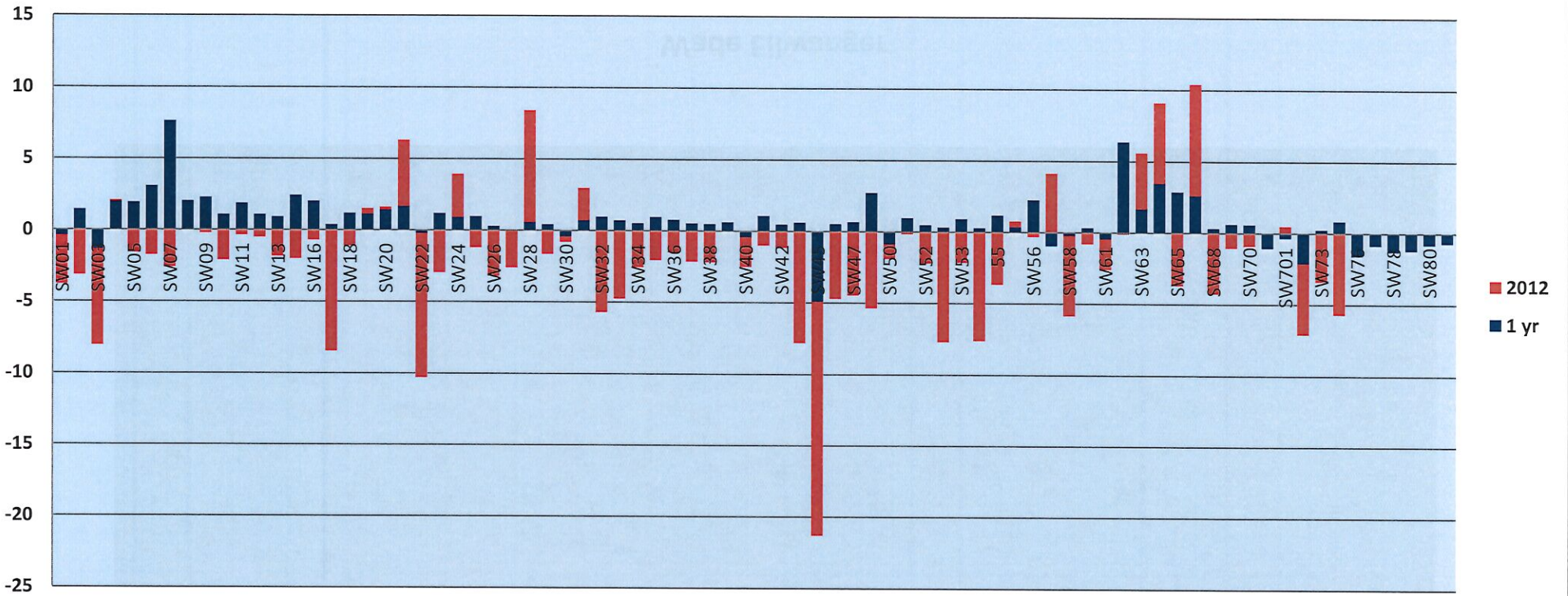


2018 Spring Static Water Level Report



Wade Ellwanger
Water Resources Coordinator

Individual Well SWL Changes



The **blue** line for each well indicates the change from 2017.
 The **red** line for each well indicates the change from 2012.

Well changes from 2017

- 58 wells increased SWL
- 19 wells decreased SWL
- 1 well had no change in SWL

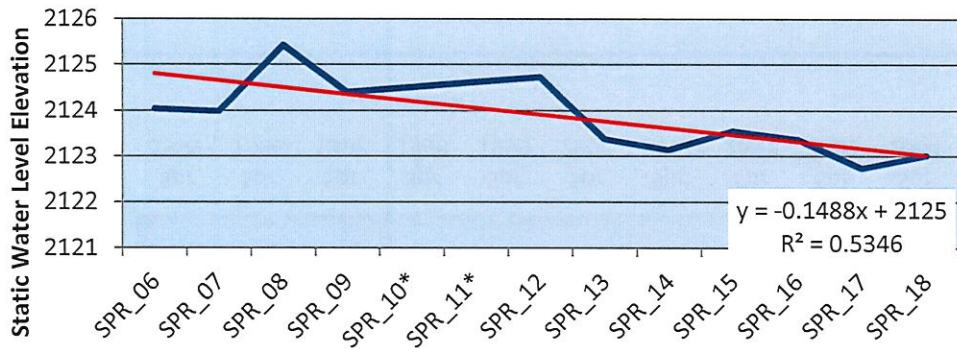
Range of SWL change = **-4.9' to +7.6'**
 Average change in SWL = **+0.77'**

Well changes from 2012

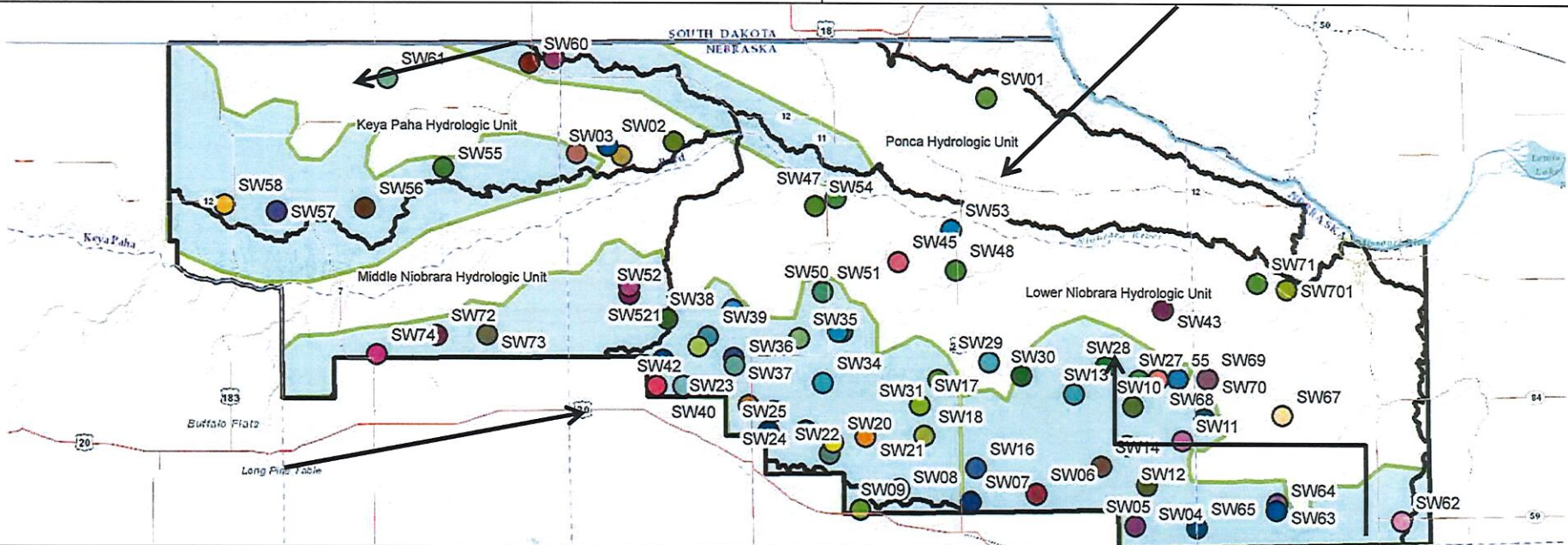
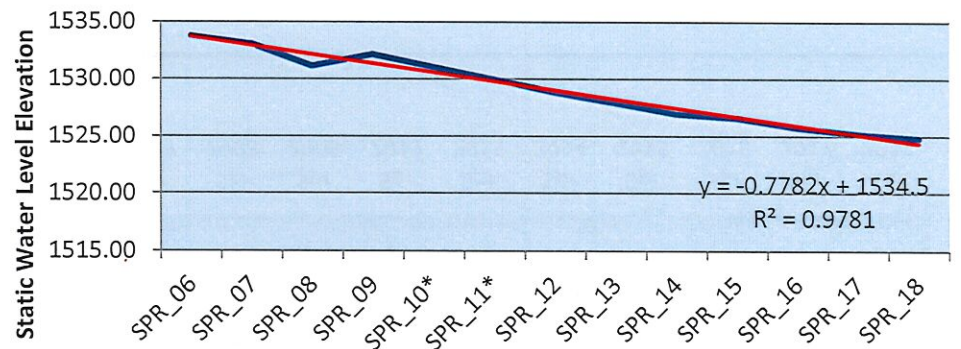
- 13 wells increased SWL
- 57 wells decreased SWL
- 2 wells had no change in SWL

Range of SWL change = **-16.4' to +7.75'**
 Average change in SWL = **-1.93'**

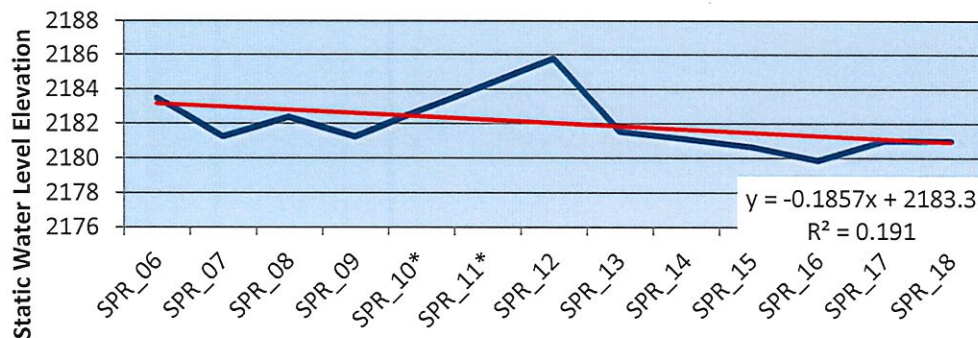
Keya Paha Hydrologic Unit



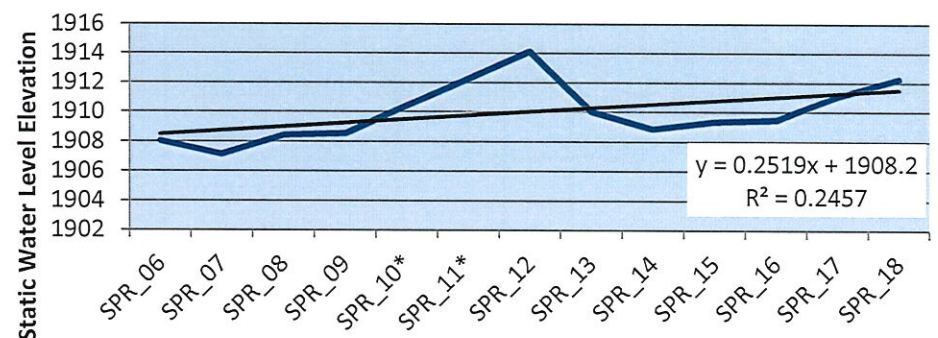
Ponca Hydrologic Unit



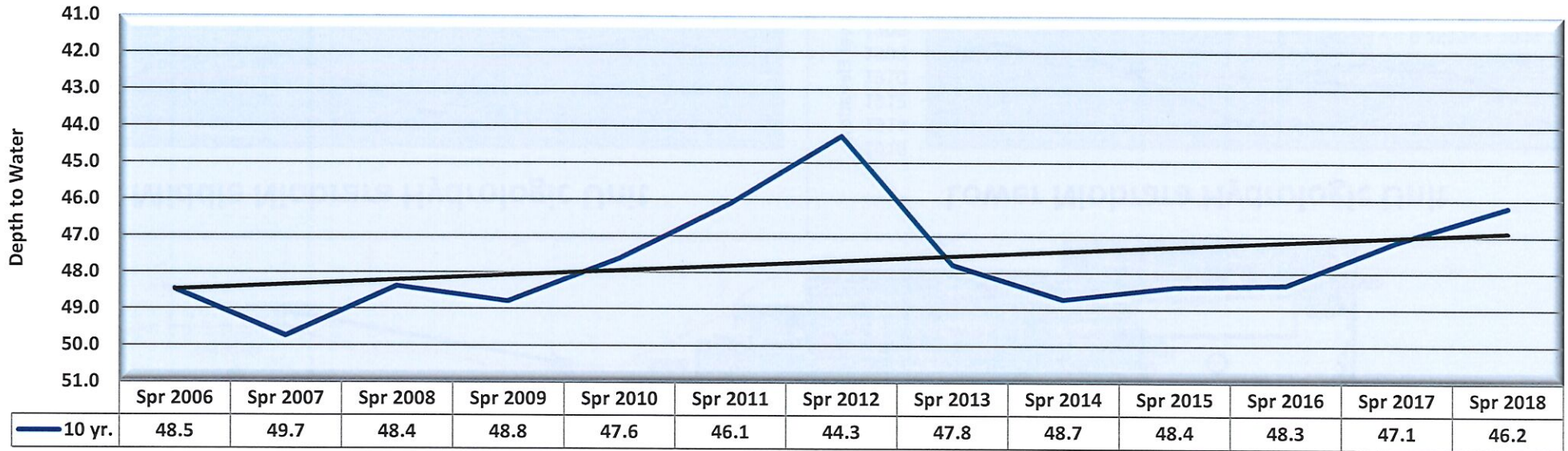
Middle Niobrara Hydrologic Unit



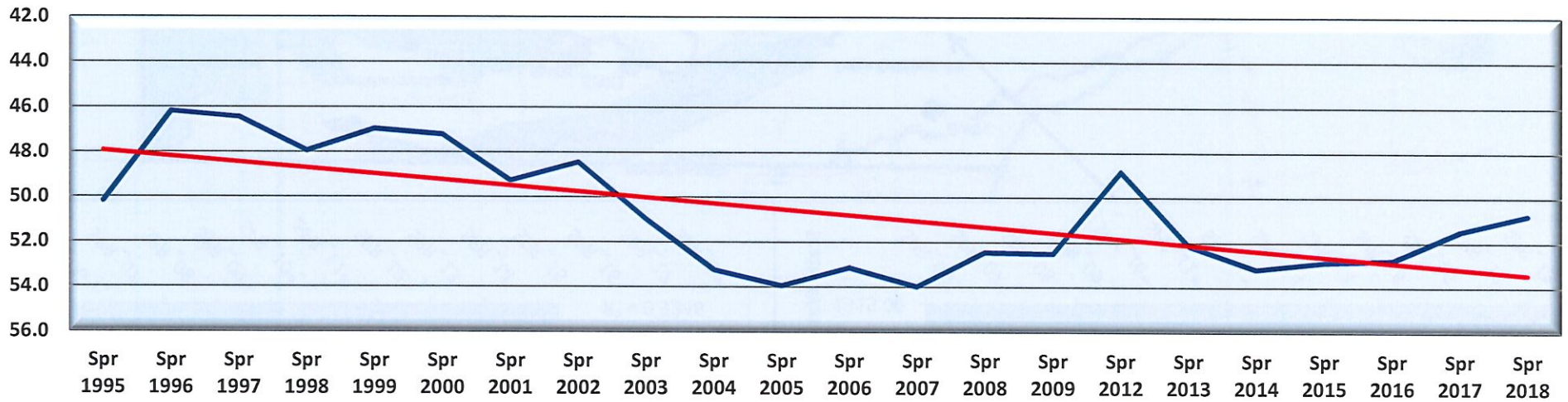
Lower Niobrara Hydrologic Unit



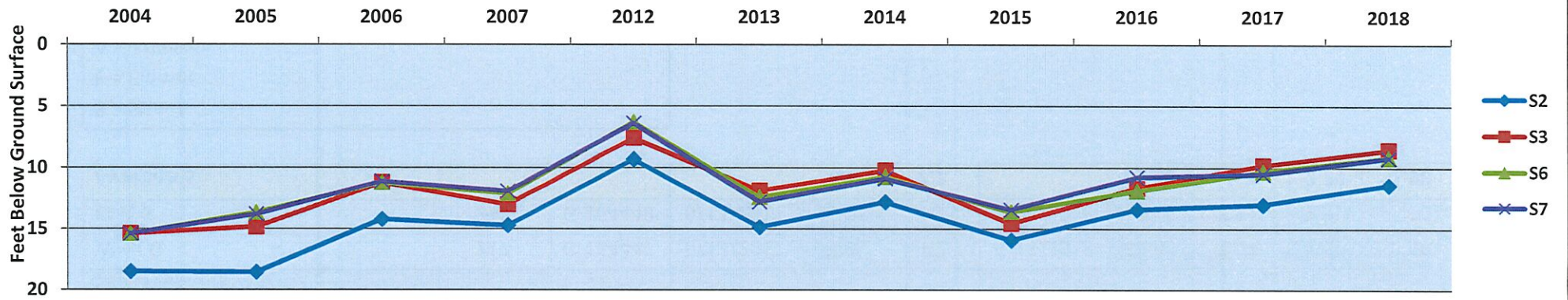
LNNRD Spring SWL Averages - 13 yr.



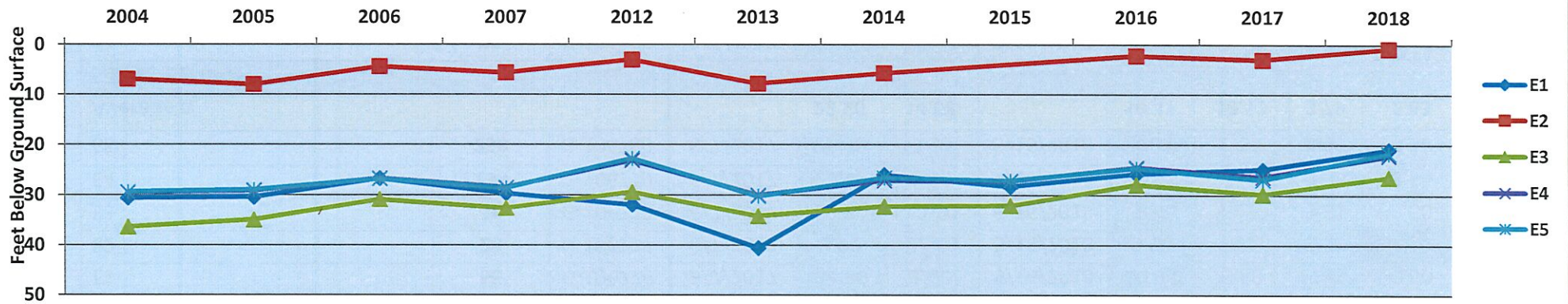
LNNRD Spring SWL Averages - 22 yr.



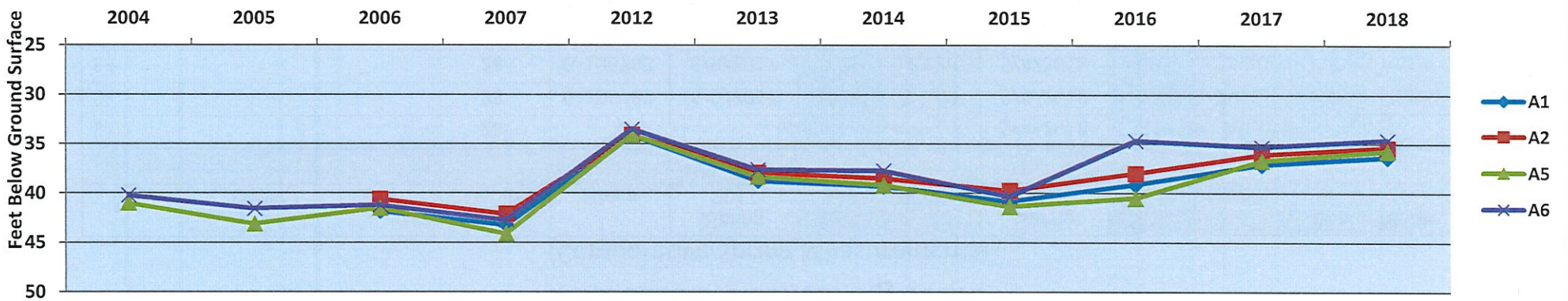
Static Water Level - North of Stuart



Static Water Level - North of Emmet



Static Water Level - North of Atkinson



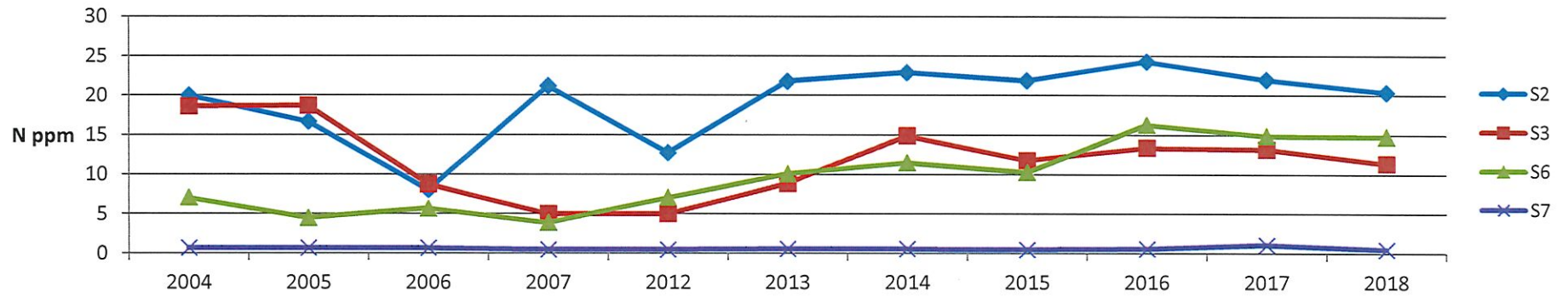
Dedicated Monitoring Wells

(Comparative Spring Measurements)

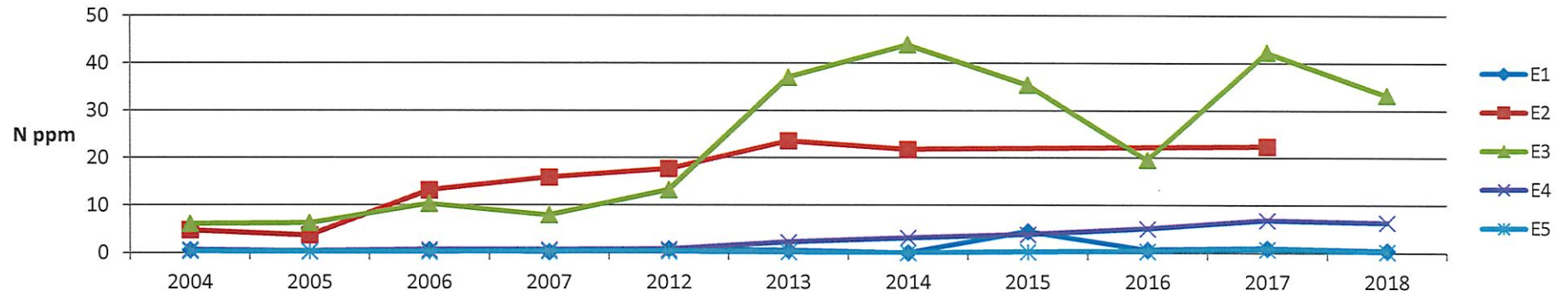
DMW	Well Depth	Reg #	Spring 2017	SWL in ft	Nitrates	Spring 2018	SWL in ft	Nitrates	SWL Δ	Nitrate Δ	
Sec. 20-31-15											
S1	28					5/4/2018	11	21.5			
S2	28	G-106782	6/9/2017	12.95	22.00	5/4/2018	11.40	20.40	1.55	-1.60	
S3	28	G-106783	6/9/2017	9.75	13.20	5/4/2018	8.55	11.40	1.20	-1.80	
S5	28		6/9/2017	15.40		5/4/2018	14.65	11.10	0.75		
S6	73	G-106786	6/9/2017	10.30	14.90	5/4/2018	9.15	14.80	1.15	-0.10	
S7	144	G-106787	6/9/2017	10.50	1.10	5/4/2018	9.20	0.50	1.30	-0.60	
Average Δ					11.78	12.80		10.66	11.64	1.19	-1.16
Sec. 31-30-12											
E1	55	G-106776	6/7/2017	24.90	1.00	5/16/2018	20.95	0.50	3.95	-0.50	
E2	28	G-106777	6/7/2017	3.00	22.40	5/16/2018	0.80	NS	2.20		
E3	48	G-106778	6/7/2017	29.80	42.30	5/16/2018	26.45	33.30	3.35	-9.00	
E4	134	G-106779	6/7/2017	26.40	6.90	5/16/2018	22.15	6.40	4.25	-0.50	
E5	258	G-106780	6/7/2017	26.90	0.80	5/16/2018	21.70	0.30	5.20	-0.50	
Average Δ					22.20	14.68		18.41	10.13	3.79	-2.63
Sec. 21-31-14											
A1	55	G-081465	6/7/2017	37.10	26.80	5/16/2018	36.35	23.40	0.75	-3.40	
A2	55	G-081464	6/7/2017	36.10	35.20	5/16/2018	35.40	32.30	0.70	-2.90	
A5	140	G-088812	6/7/2017	36.70	19.80	5/16/2018	35.75	18.20	0.95	-1.60	
A6	80	G-088812	6/7/2017	35.30	26.60	5/16/2018	34.60	29.90	0.70	3.30	
Average Δ					36.30	27.10		35.53	25.95	0.78	-1.15
Sec. 31-29-6											
West G	217	G-164447	6/13/2017	83.95	1.2	5/23/2018	82.35	0.70	1.60	-0.50	
East G	230	G-164448	6/13/2017	86.05	4.2	5/23/2018	82.95	0.90	3.10	-3.30	
Average Δ					85	2.7		82.65	0.8	2.35	-1.90

S = Stuart
E = Emmet
A = Atkinson
G = Glazer, South West of NRD 80

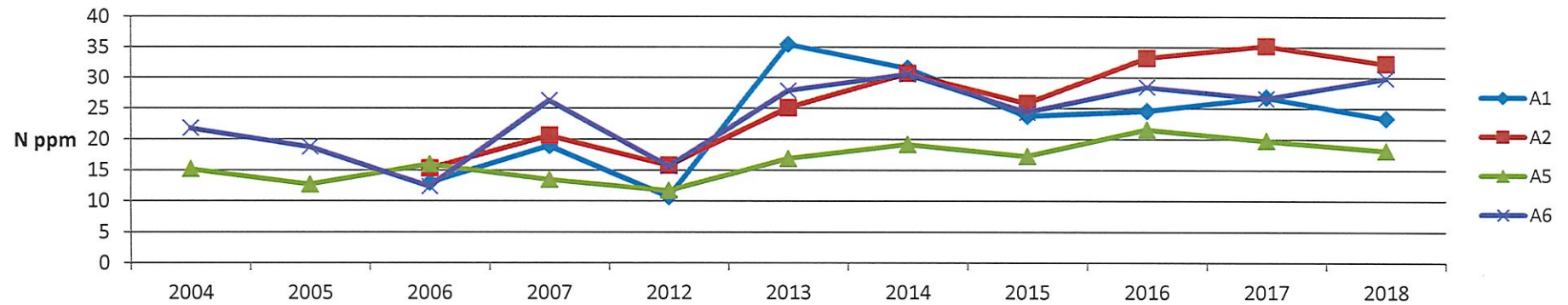
Nitrate ppm - North of Stuart



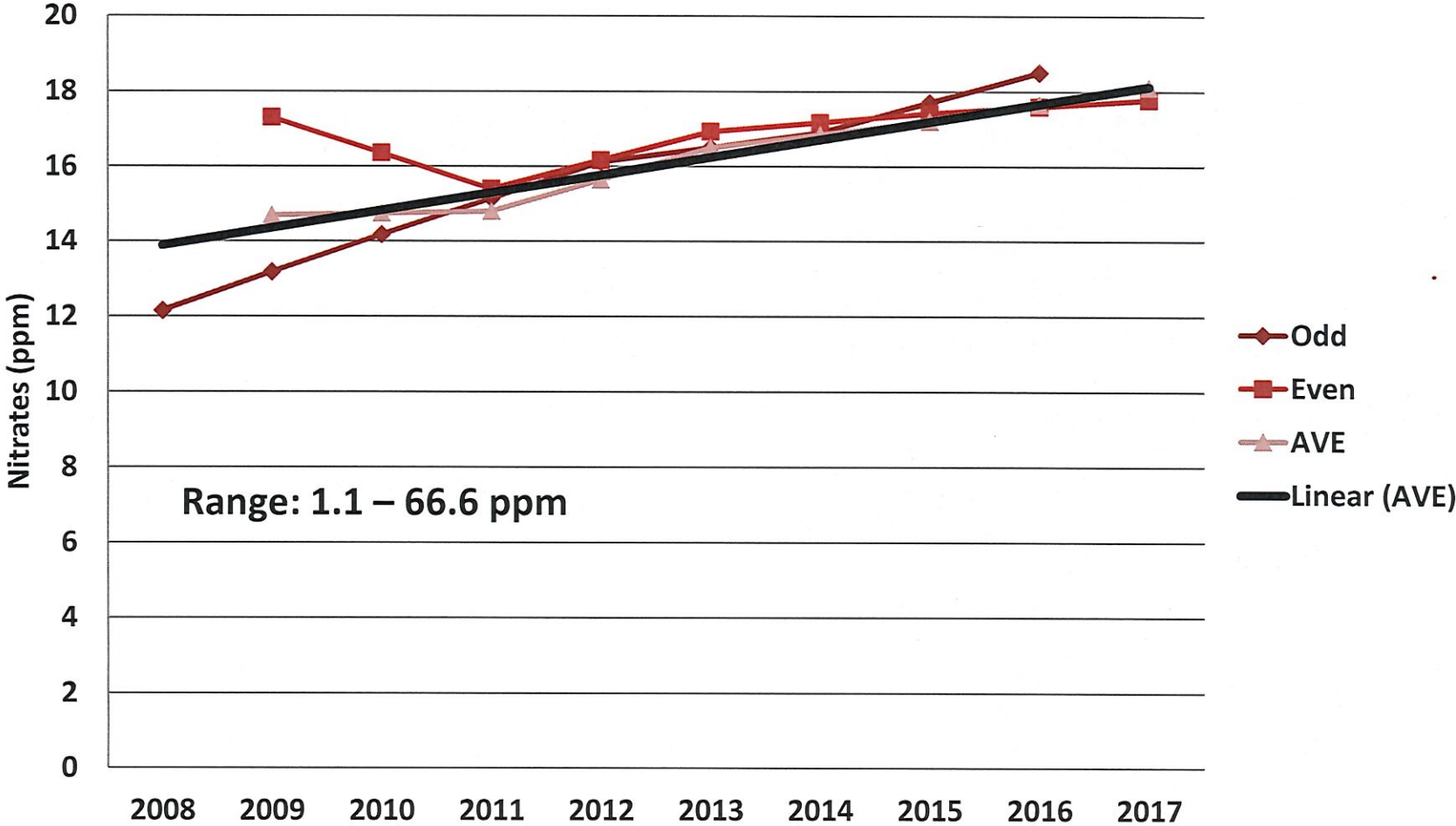
Nitrate ppm - North of Emmet



Nitrate ppm - North of Atkinson



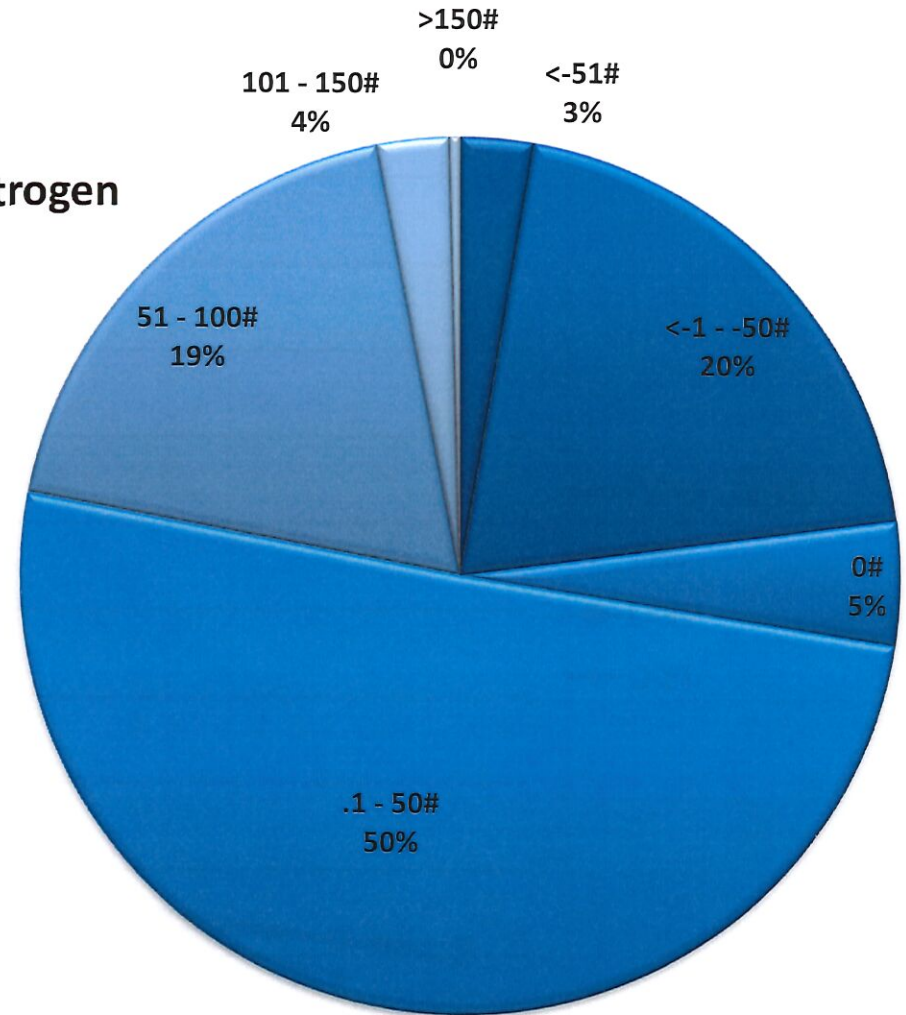
LNNRD Sampled Nitrate Levels



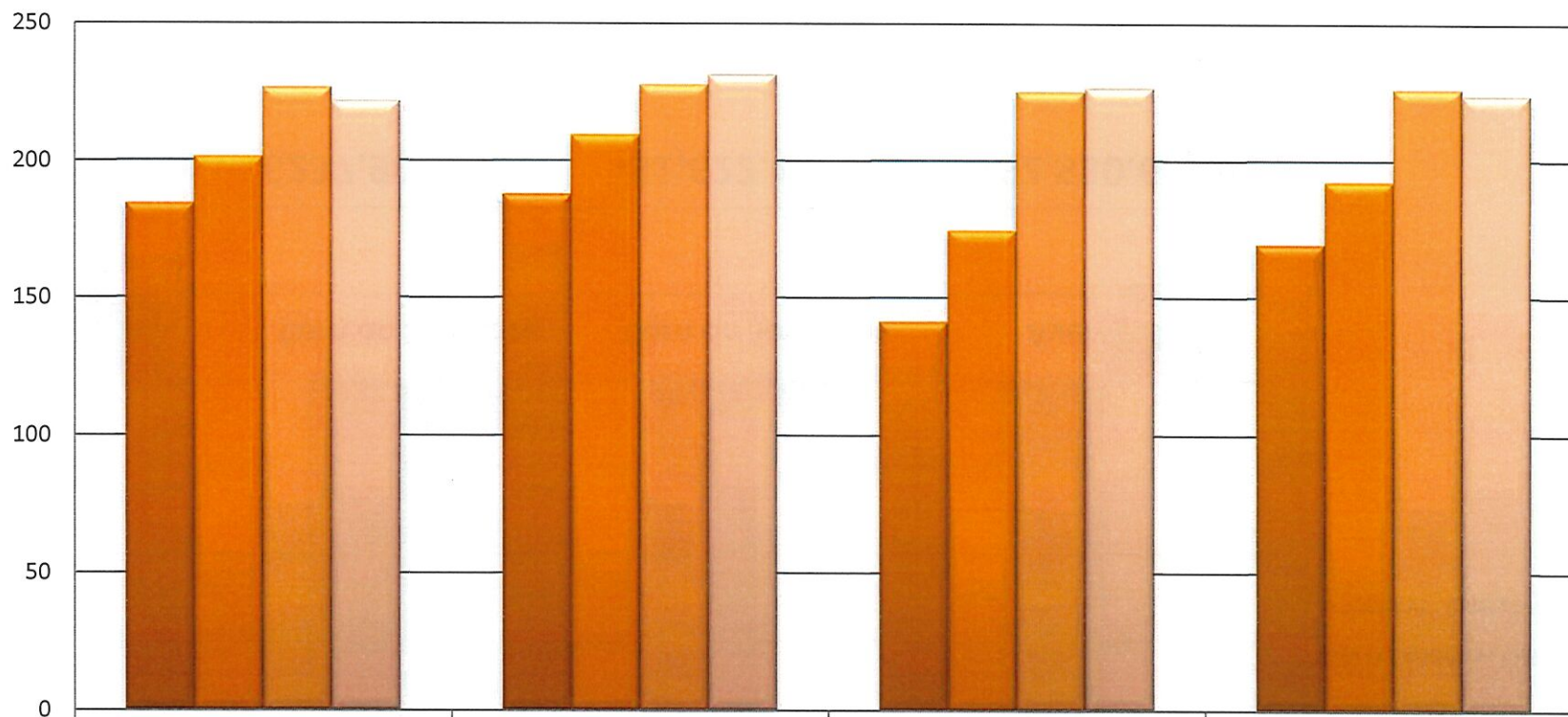
Represents well over 2200 water samples

Percent of Producers Over or Under UNL

- In 2015 thru 2017, 73% of corn fields had Nitrogen applied over the UNL recommended amount
- Down from 91% in 2013



Actual Nitrogen and Yields

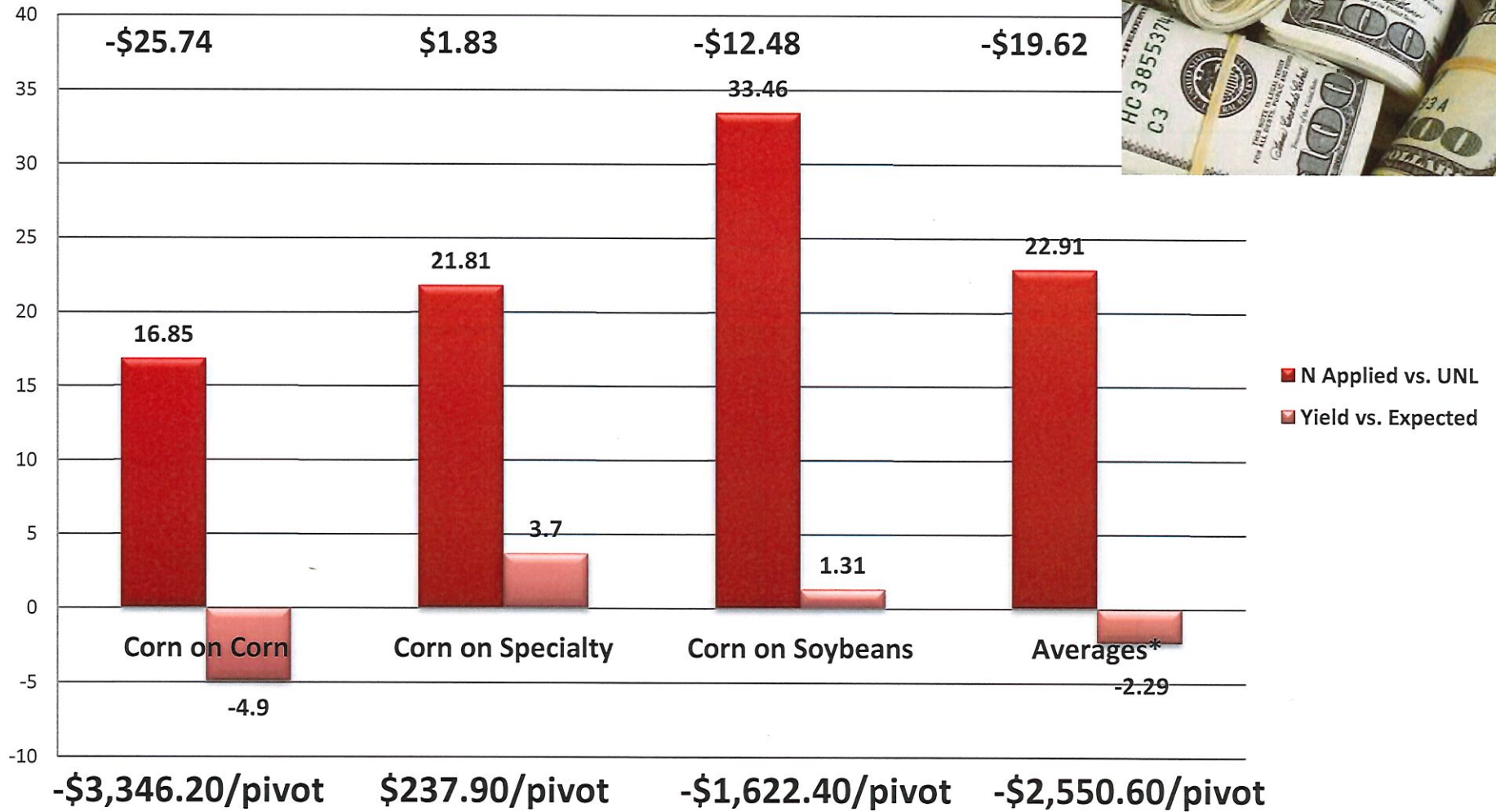


	Corn on Corn	Corn on Specialty	Corn on Soybeans	Averages*
N Recommended	184.42	187.7	141.15	169.44
N Applied	201.27	209.51	174.61	192.35
Expected Yield	226.53	227.61	225.24	226.13
Actual Yield	221.63	231.31	226.55	223.84



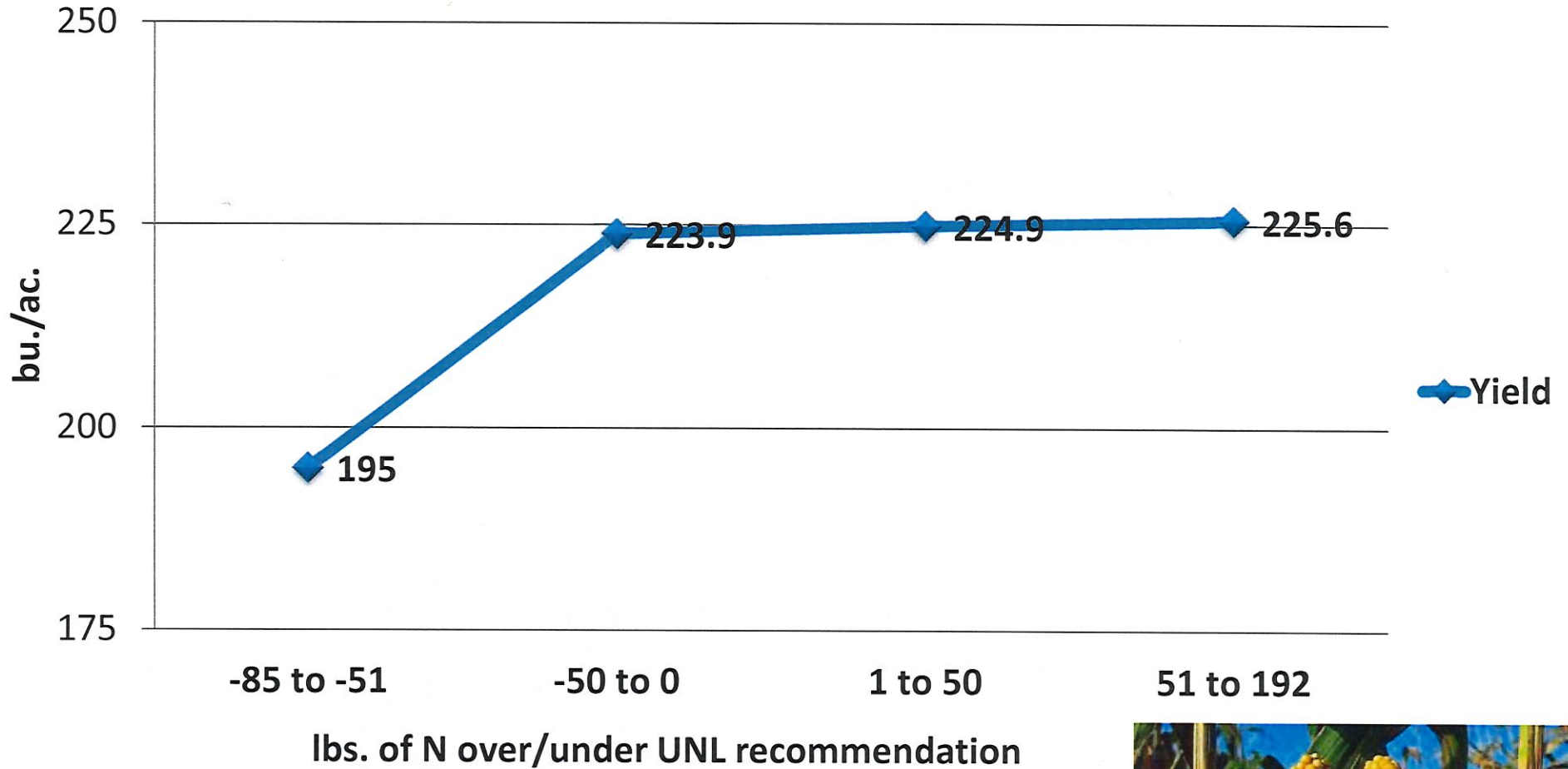
2015-2017 LNNRD Phase II Crop Reporting Data. Represents 190,000 corn acres.

Lbs. of N over UNL Recommended vs. Yield



2015-2017 LNNRD Phase II Crop Reporting Data. Represents 190,000 corn acres.

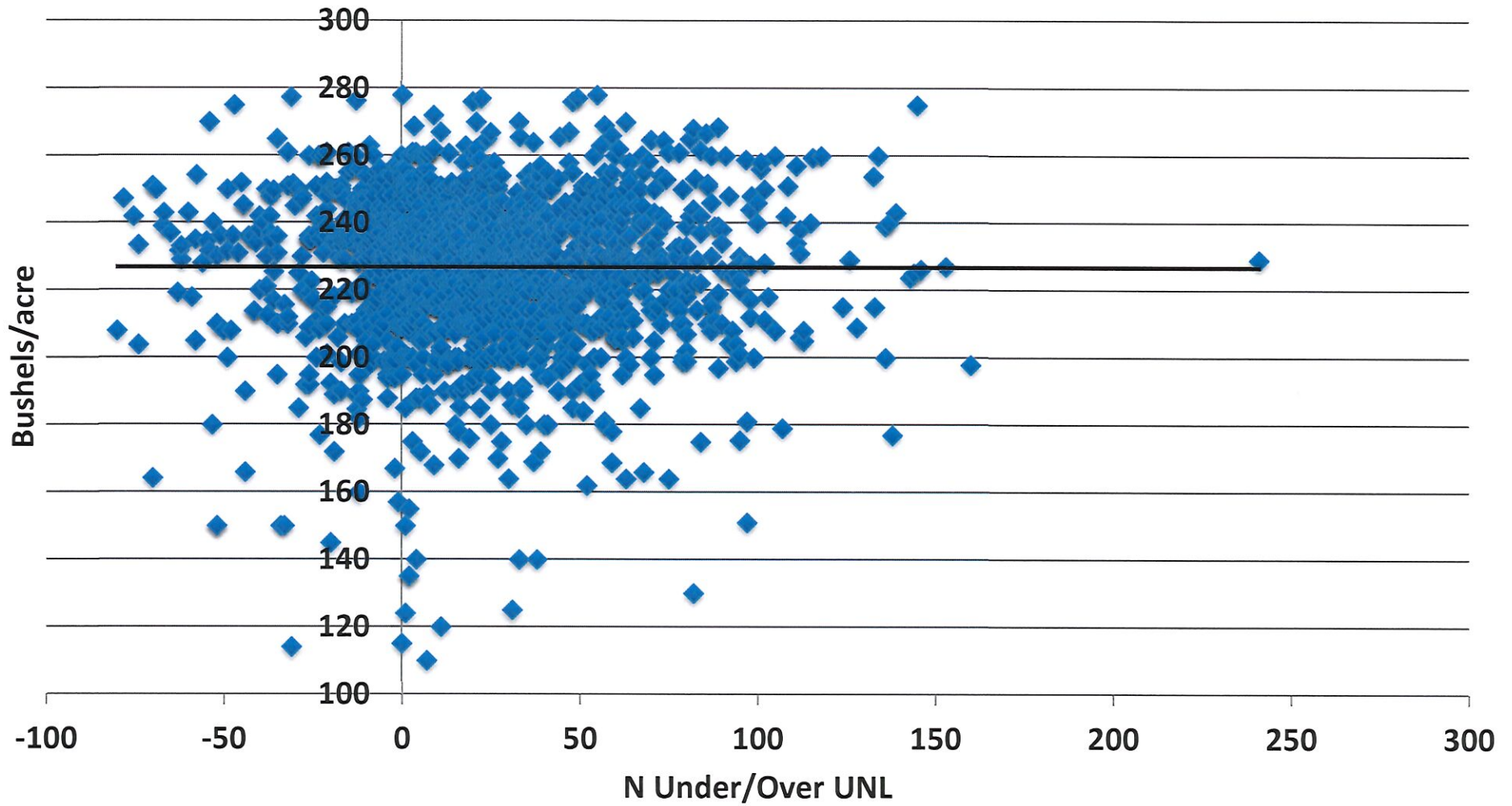
2015-2017 Phase II Average Yields



2015-2017 LNNRD Phase II Crop Reporting Data. Represents 190,000 corn acres.

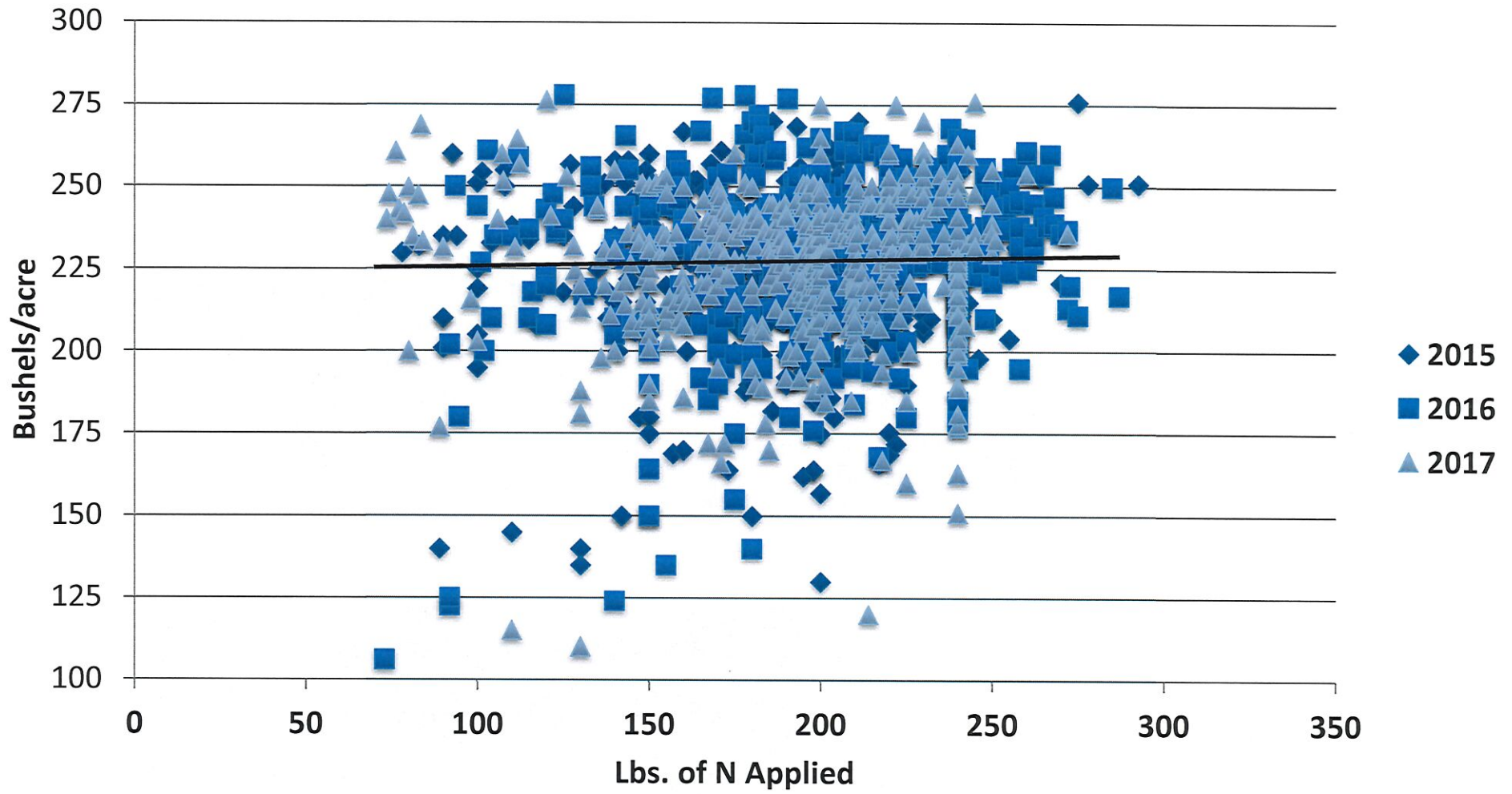


Corn Yield vs. Over/Under UNL Recommendation



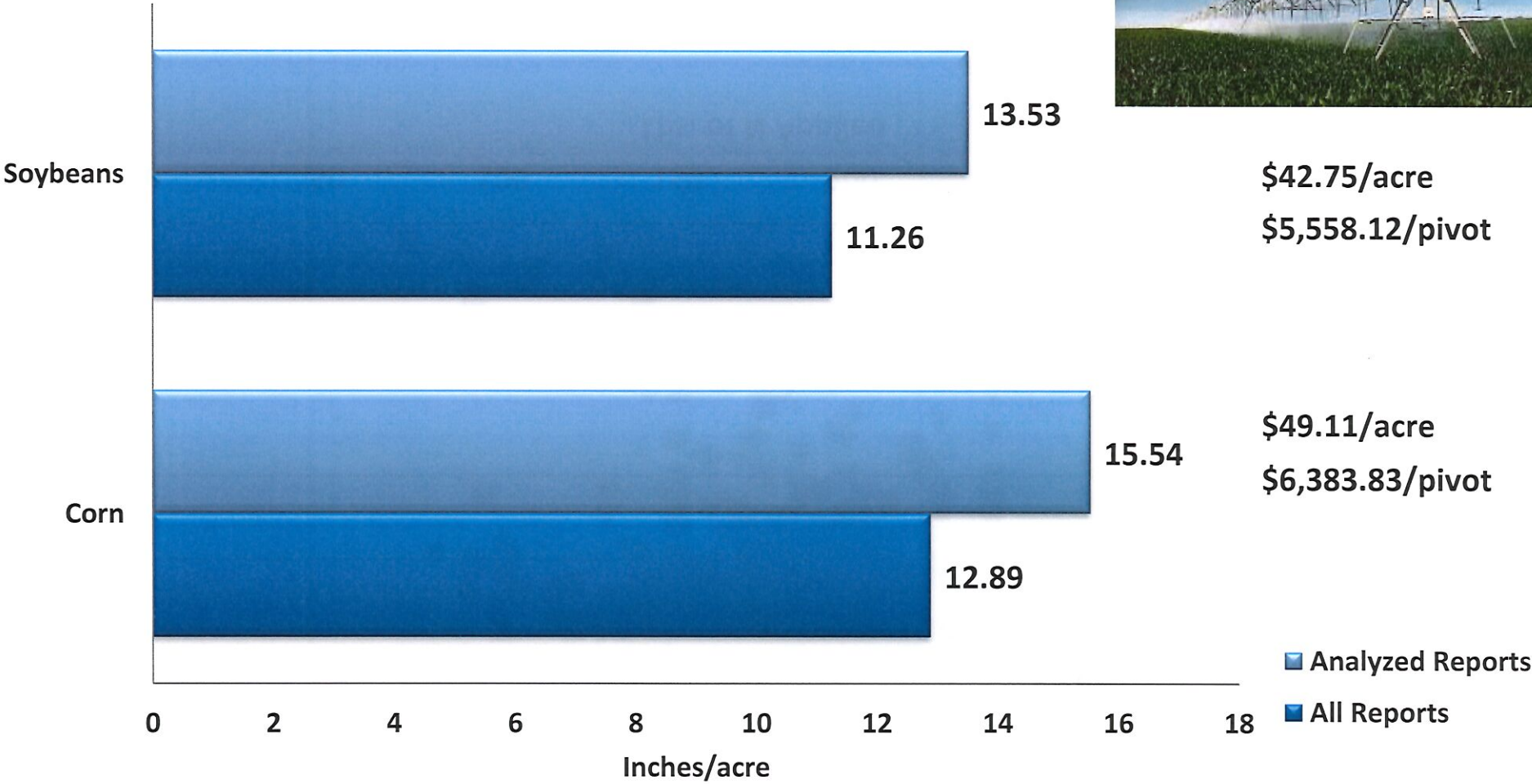
2015-2017 LNNRD Phase II Crop Reporting Data. Represents 190,000 corn acres.

Corn Yield vs. Total N Applied

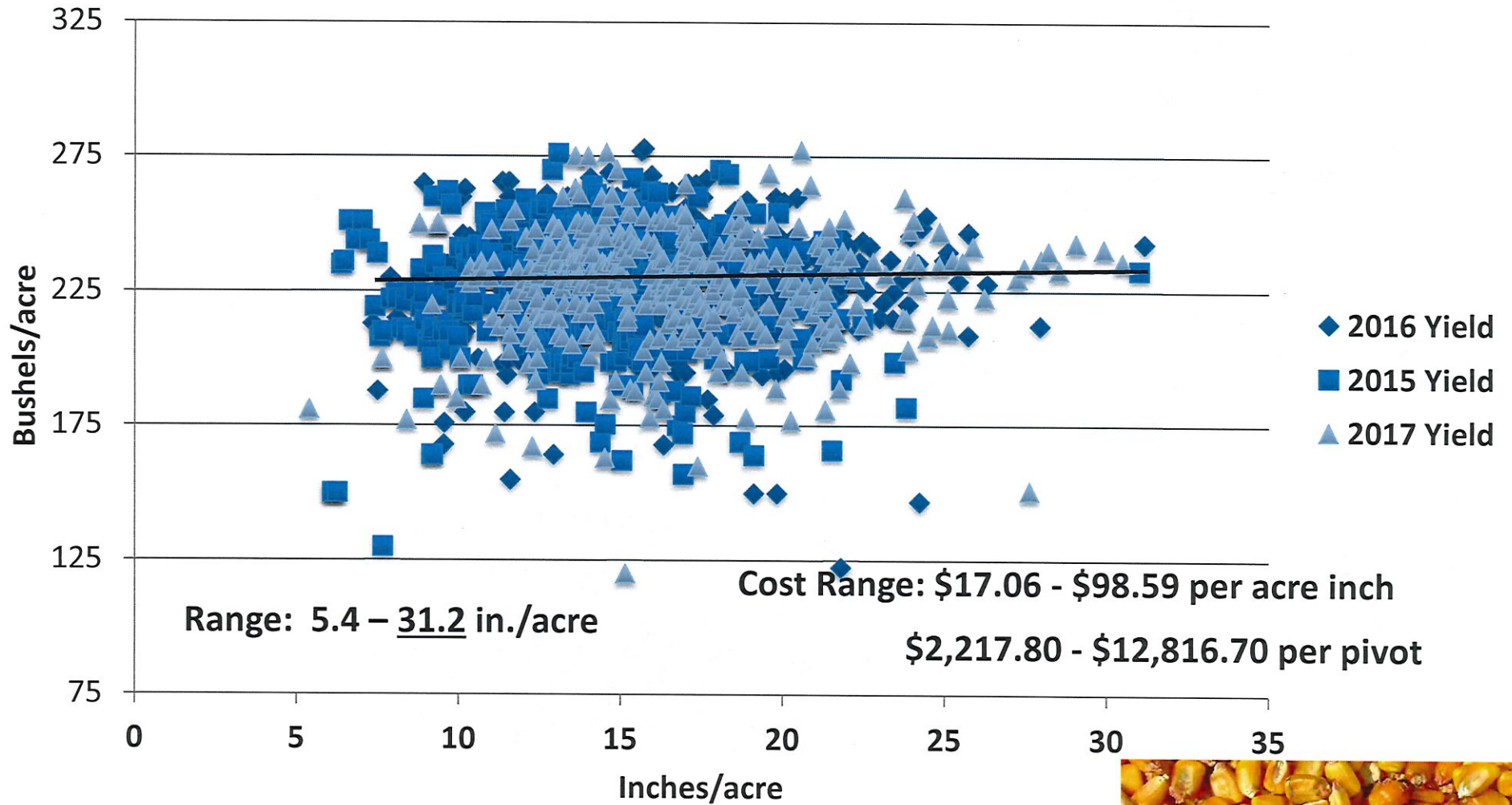


2015-2017 LNNRD Phase II Crop Reporting Data. Represents 190,000 corn acres.

Average Amount of Water Applied



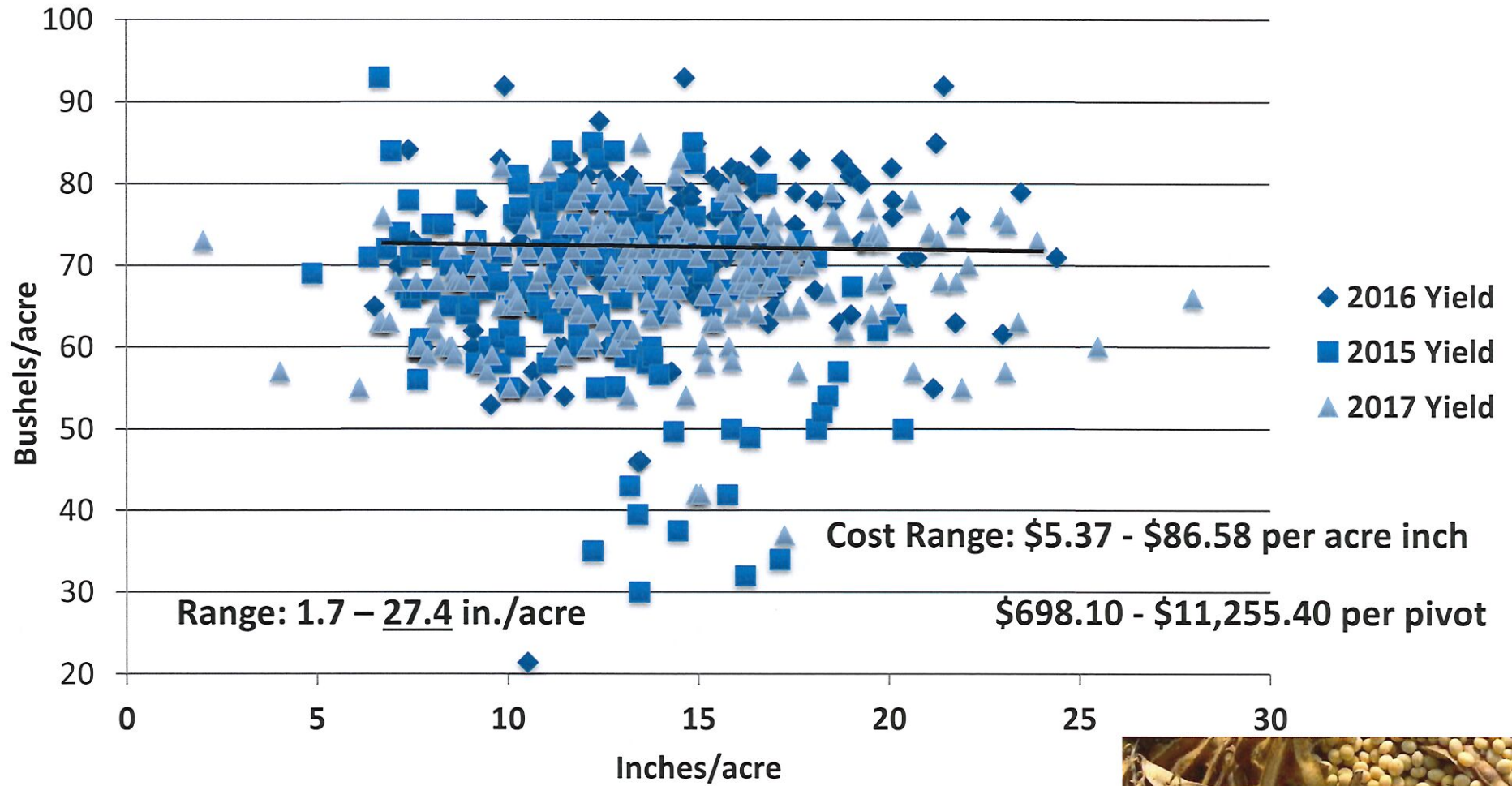
Corn Yield vs. Water Applied



2015-2017 LNNRD Phase II Crop Reporting Data.



Soybean Yield vs. Water Applied



2015-2017 LNNRD Phase II Crop Reporting Data.



Corn Yield vs. Organic Matter

