

**From:** [Peterson, Heidi \(MDA\)](#)  
**To:** [Gallagher, Ashley](#)  
**Cc:** [Herbert, Spencer \(MDA\)](#); [Felix-Gerth, Annie \(MDA\)](#); [Wagner, Margaret \(MDA\)](#); [Sip, Rob \(MDA\)](#); [Redlin, Brad \(MDA\)](#); [VanRyswyk, Bill \(MDA\)](#); [Bruening, Denton \(MDA\)](#)  
**Subject:** RE: Cannon River One Watershed, One Plan Notice  
**Date:** Friday, March 17, 2017 7:47:45 AM  
**Attachments:** [image001.jpg](#)  
[image002.jpg](#)  
[image003.jpg](#)  
[MDA Cannon River fertilizer&pesticide.pdf](#)

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Good Morning Ashley,

On behalf of the Minnesota Department of Agriculture, thank you for the Cannon River 1W1P notification letter. We appreciate the invitation to submit water management issues. As a first step to planning for the 1W1P, we have compiled the following information for use by the team.

### [Minnesota Department of Agriculture Pesticide Water Quality Monitoring](#)

The Minnesota Department of Agriculture (MDA) has been conducting pesticide monitoring in ground water since 1985, and in surface waters since 1991. Annually, the MDA completes approximately 250 sample collection events from ground water and 800 sample collection events from rivers, streams, and lakes across the state. In general, the MDA collects water samples from agriculture and urban areas of Minnesota and analyzes water for up to approximately 140 different pesticide compounds that are widely used and/or pose the greatest risk to water resources. All groundwater monitoring is conducted by MDA staff. Surface water monitoring is conducted by MDA and local organizations. All monitoring is completed following annual work plans and standard operating procedures (SOP's) developed by the MDA.

The purpose of the MDA's pesticide monitoring program is to determine the presence and concentration of pesticides in Minnesota waters, and present long-term trend analysis. Trend analysis requires a long-term investments in monitoring within the MDA's established networks. The MDA releases an annual water quality monitoring report that includes all pesticide water quality data and long term trends available at [www.mda.state.mn.us/monitoirng](http://www.mda.state.mn.us/monitoirng). The MDA will continue to conduct statewide pesticide monitoring in the future and will provide additional information related to the occurrence of pesticides in Minnesota waters.

### [Groundwater](#)

The MDA samples one monitoring well and one spring. The well has been monitored since 2008 and the spring since 2007. Pesticide and nitrate data are available for both the well and the spring. In addition semiannual water level measurements are available from the monitoring well.

The MDA also has pesticide and nitrate data from domestic wells in the watershed. One well has been sampled annually since 2009. A number of other wells have been sampled once in 2016. The chemistry data is available for the wells however, due to privacy rules, the well locations can't be shared.

Monitoring of the monitoring well, spring, and one domestic well in the watershed is expected to continue into the future.

### [Surface Water](#)

The MDA has completed 298 pesticide and/or nutrient water quality sample collection events from

15 locations within the Cannon River Watershed from 1991-2015. The MDA has also completed four pesticide water quality sample collection events from four lakes (2007-2011) and one wetland (2014). There are currently no pesticide water quality impairments in the watershed.

The MDA is actively monitoring at the Little Cannon River at CSAH-24, 3 miles SW of Cannon Falls (S004-512) since 2009 and will continue to collect pesticide water quality samples at this location through at least 2021. The MDA does not have immediate plans to add additional surface water locations in 2017.

#### Agricultural Edge-of-Field

The MDA has conducted edge-of-field (EOF) monitoring at two locations within the Cannon River Watershed from 2013-2015. One location was east of Northfield while the other was west of Goodhue. Both of these monitoring locations were a part of a Conservation Innovation Grant project testing two types of EOF monitoring equipment. No additional EOF monitoring sites are expected to begin in the near future.

#### Nitrogen and Pesticide Use

The MDA surveys farmers through the National Agricultural Statistics Service (NASS). A summary of the data is attached as a PDF to this email. The most recent nitrogen use survey was for the 2014 crop year and the most recent pesticide use survey was for the 2013 crop year. For reference, the University of Minnesota fertilizer recommendations are found here:

<http://www.extension.umn.edu/agriculture/nutrient-management/nutrient-lime-guidelines/fertilizer-recommendations-for-agronomic-crops-in-minnesota/index.html>

The attached nitrogen use information is from the 2014 nitrogen use report, specifically the South Central (SC) and the Southeastern (SE) BMP regions.



The attached pesticide use information is from the 2013 pesticide use report, specifically the South Central (8) and Southeast (9) Pesticide Management areas.

### Township Testing Program

The Cannon River Watershed does have townships which fall within MDA's Township Testing Program. The MDA has identified townships throughout the state that are vulnerable to groundwater contamination and have significant row crop production. More than 70,000 private well owners will be offered nitrate testing in over 300 townships per 2019. The sample schedule can be found on a handout downloadable [here](#), which includes more background information. The Dakota County report, which contains areas within the Cannon River watershed, and additional Township Testing data can be found [here](#).

### Additional MDA Resources

Since there is a significant portion of the watershed in agricultural production, we would like to bring to your attention a couple resources, listed below, that we encourage you to reference during the planning process.

The Ag BMP Handbook (*currently in the process of updating the 2012 edition*) provides a comprehensive summary of BMPs that are practical for Minnesota:

<http://www.mda.state.mn.us/protecting/cleanwaterfund/research/agbmphandbook.aspx>

The 2015 Nitrogen Fertilizer Management Plan (NFMP): <http://www.mda.state.mn.us/nfmp>

### **A couple opportunities for BMP funding or cost-share:**

The Minnesota Agricultural Water Quality Certification Program (MAWQCP) is a voluntary opportunity for farmers and agricultural landowners to take the lead in implementing conservation practices that protect our water. Those who implement and maintain approved farm management practices will be certified and in turn obtain regulatory certainty for a period of ten years. This is a planning program that should be included in the IWIP because it is an opportunity for agricultural producers to evaluate nutrient and field management practices within the Cannon River Watershed to reduce losses. There are currently sixteen (16) certified producers in the Cannon River Watershed. <http://www.mda.state.mn.us/awqcp>

The AgBMP Loan Program is a water quality program that provides low interest loans to farmers,

rural landowners, and agriculture supply businesses. The purpose is to encourage agricultural Best Management Practices that prevent or reduce runoff from feedlots, farm fields and other pollution problems identified by the county in local water plans. <http://www.mda.state.mn.us/agbmploans>

The Nutrient Management Initiative (NMI) assists farmers and crop advisers in evaluating nutrient management practices on their own fields. This is a great opportunity for crop advisers to promote new management strategies and equipment that is available to boost yields and fertilizer efficiency for farmers, which will help reduce unnecessary losses to our water resources.  
<http://www.mda.state.mn.us/nmi>

We look forward to being involved in the 1W1P process. Spencer Herbert will be the MDA representative on the team. If you have any questions please do not hesitate to contact either Spencer or myself.

Thank you for your coordination,  
Heidi

**Heidi Peterson, Ph.D.**

**Research Scientist**

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**From:** Gallagher, Ashley [mailto:Ashley.Gallagher@CO.DAKOTA.MN.US]

**Sent:** Thursday, February 02, 2017 4:26 PM

**Subject:** Cannon River One Watershed, One Plan Notice

This email and the attached letter serve as the official notice for the beginning of the Cannon River One Watershed, One Plan (1W1P) process.

Future updates will be posted to the website at: <http://www.dakotaswcd.org/1w1p.html>

Please forward this email on to those within your organization whose work is relevant to the watershed planning process.

This email is sent on behalf of the Cannon River 1W1P Planning Workgroup, which is comprised of

staff from the 14 Local Government Units within the planning area.

We look forward to working with you!

**Ashley Gallagher**

*Resource Conservationist*

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651-480-7781 | [www.dakotawcd.org](http://www.dakotawcd.org) | [ashley.gallagher@co.dakota.mn.us](mailto:ashley.gallagher@co.dakota.mn.us)

# Cannon River Watershed

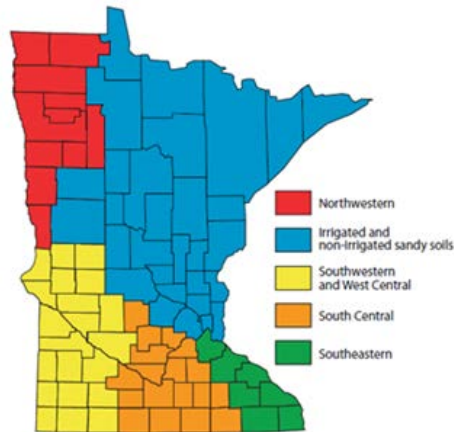
## One Watershed One Plan

Goodhue County – Dakota County – Rice County – LeSueur County –  
Waseca County – Steele County

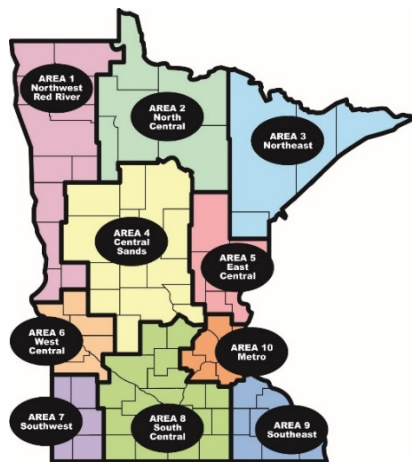
### Minnesota Department of Agriculture Nitrogen and Pesticide Use

The Minnesota Department of Agriculture surveys farmers through the National Agricultural Statistics Service. The most recent nitrogen use survey was for the 2014 crop year and the most recent pesticide use survey was for the 2013 crop year. The following nitrogen use information is from the 2014 nitrogen use report, specifically the South Central (SC) and the Southeastern (SE) BMP regions.

#### Minnesota Nitrogen Best Management Practices Regions



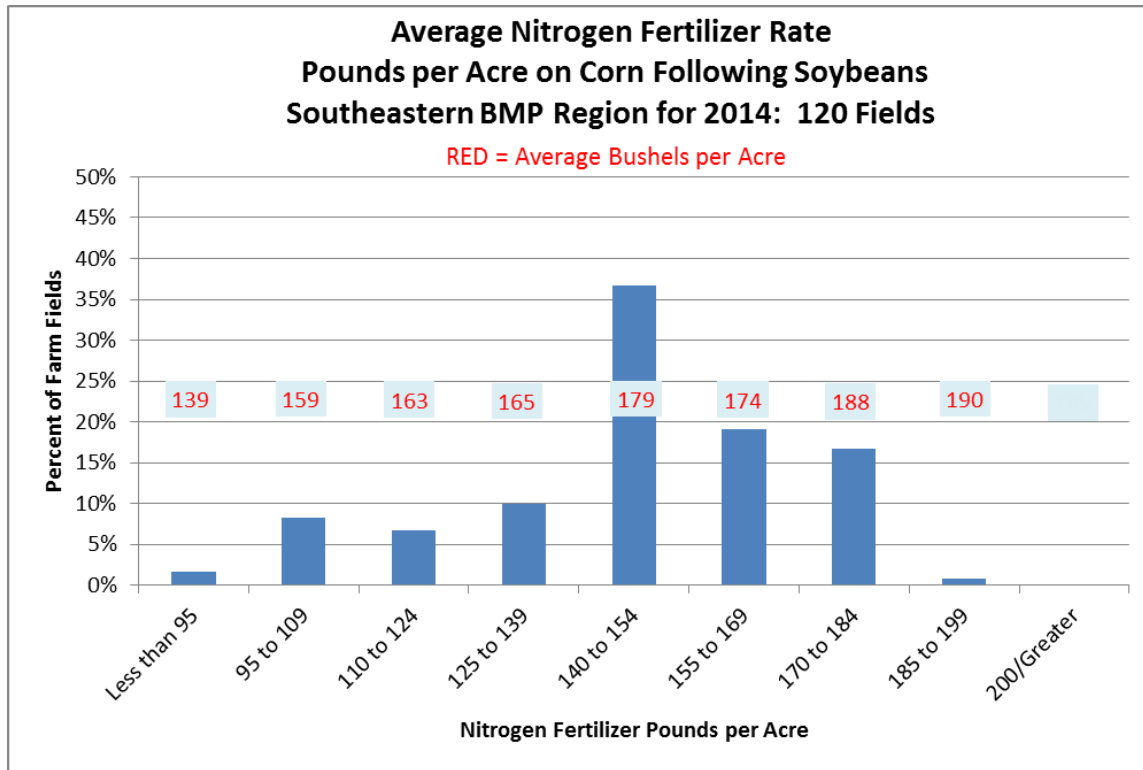
The following pesticide use information is from the 2013 pesticide use report, specifically the South Central (8) and Southeast (9) Pesticide Management areas.



**Nitrogen use in the Cannon River Watershed: 2014 Crop Year**  
**More than five responses are required for any individual category to be reported.**  
**No manure fields are included in the fertilizer section.**

**Fertilizer section**

Figure 1 details the distribution of nitrogen fertilizer rates in the SE BMP region for corn following soybeans; the corresponding corn yields are detailed in red.



**Figure 1. Average nitrogen fertilizer rates and yields on corn following soybeans in the SE BMP region for 2014: 120 fields.**

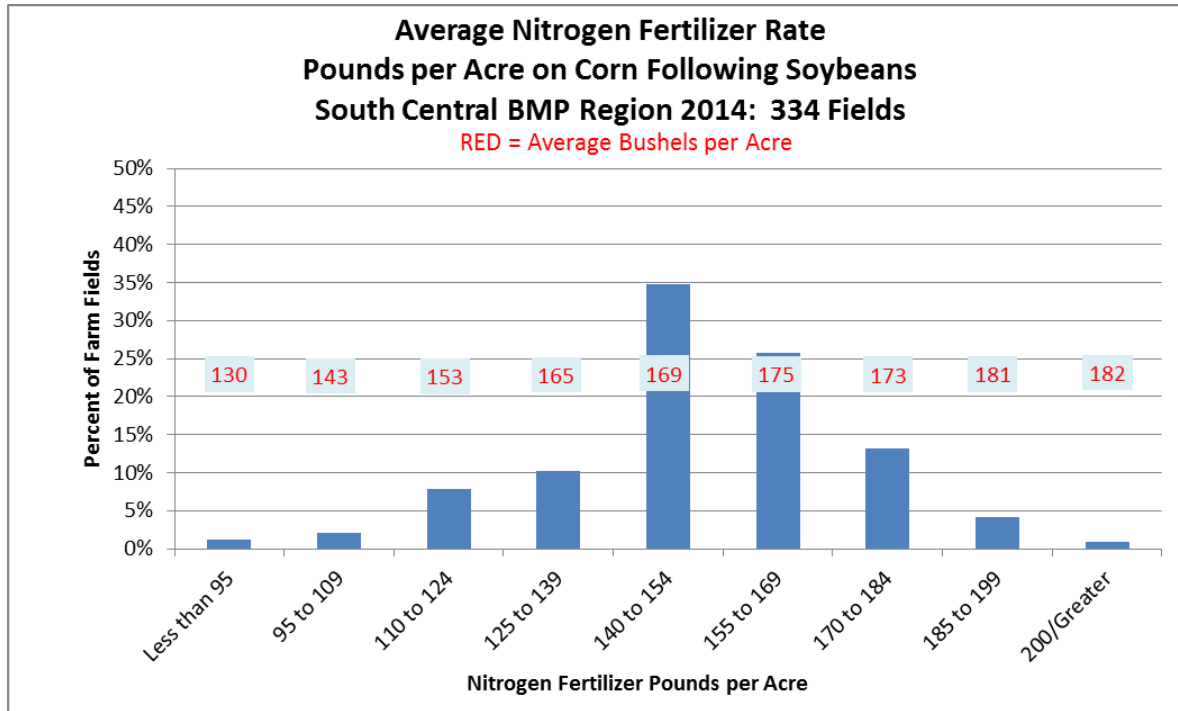
In the SE BMP region, nitrogen fertilizer rates ranged from an average of 136 pounds per acre in Dakota County to 157 pounds per acre in Fillmore County as shown in Table 1.

**Table 1. Average county nitrogen fertilizer rates and corn yields for the SE BMP region for corn following soybeans.**

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Soybeans			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Dakota	7	136	168
Fillmore	20	157	180
Goodhue	31	148	182
Houston	11	140	167

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Soybeans			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Olmsted	15	145	175
Wabasha	15	143	168
Winona	21	145	169

Figure 2 details the distribution of nitrogen fertilizer rates in the SC BMP region for corn following soybeans; the corresponding corn yields are detailed in red.



**Figure 2. Average nitrogen fertilizer rates and yields on corn following soybeans in the SC BMP region for 2014: 334 fields.**

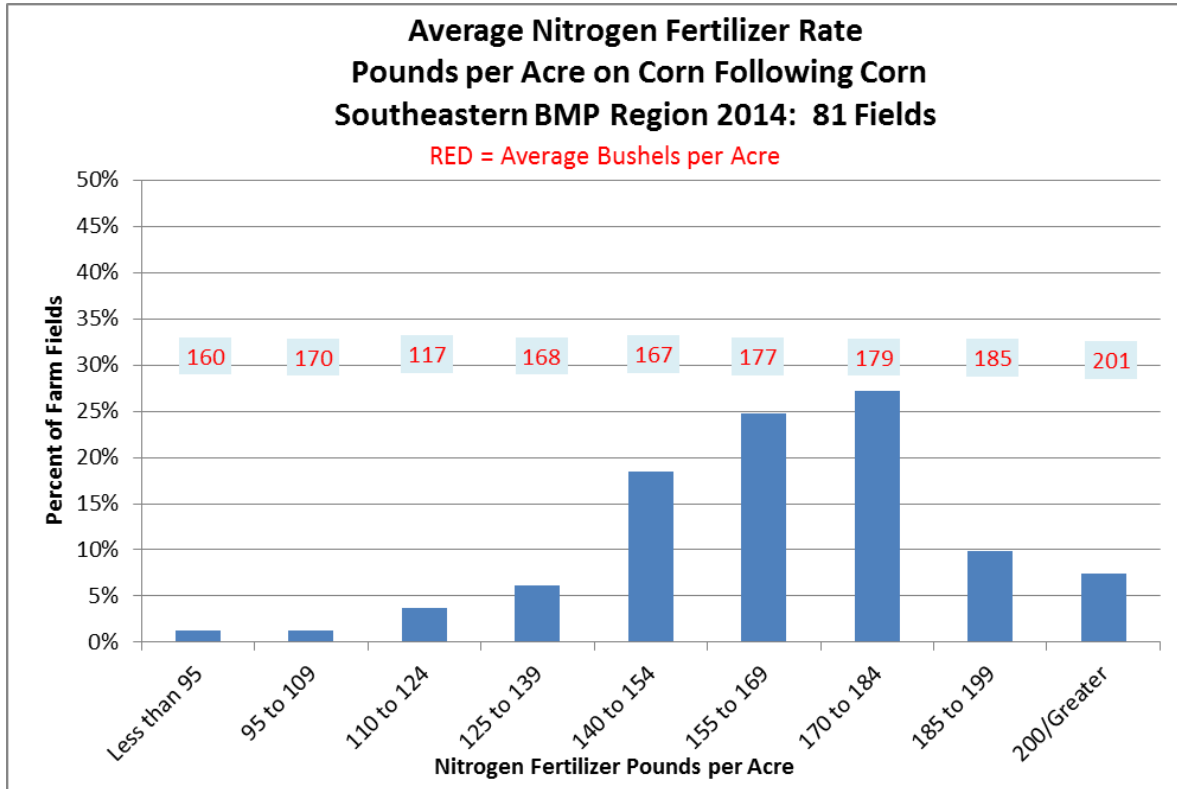


In the SC BMP region, nitrogen fertilizer rates ranged from an average of 140 pounds per acre in Scott County to 163 pounds per acre in Meeker County as shown in Table 2.

**Table 2. Average county nitrogen fertilizer rates and corn yields for the SC BMP region corn following soybeans.**

<b>Average County Nitrogen Fertilizer Rates for the SC BMP Region for Corn Following Soybeans</b>			
<b>County</b>	<b>Number of Farm Fields</b>	<b>Average Nitrogen Rate Pounds per Acre</b>	<b>Average Corn Yield Bushels per Acre</b>
Blue Earth	31	150	172
Brown	25	150	170
Carver	11	141	157
Dodge	9	147	176
Faribault	18	154	179
Freeborn	30	155	173
Le Sueur	14	149	157
Martin	22	152	179
McLeod	16	150	158
Meeker	13	163	170
Mower	17	153	167
Nicollet	24	144	167
Rice	21	141	157
Scott	12	140	169
Sibley	28	146	165
Steele	16	158	178
Waseca	11	159	170
Watonwan	16	155	175

Figure 3 details the distribution of nitrogen fertilizer rates in the SE BMP region for corn following corn; the corresponding corn yields are detailed in red.



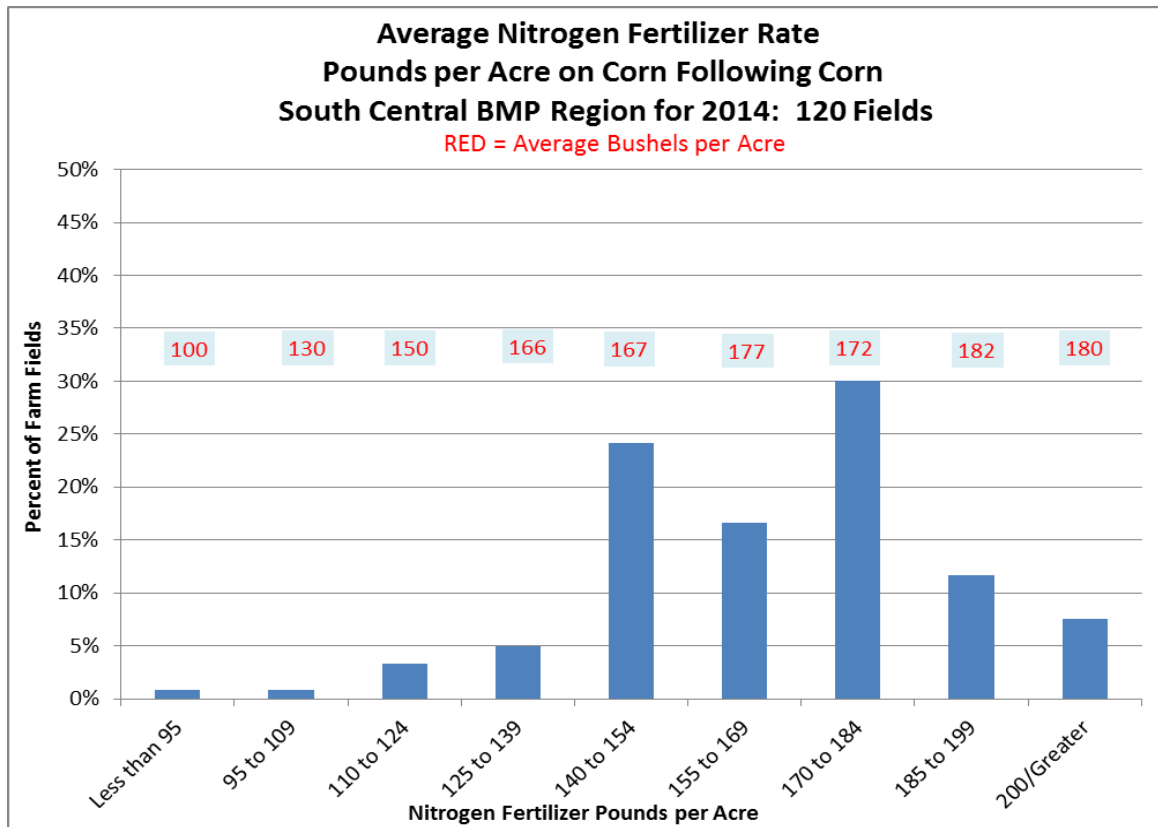
**Figure 3. Average nitrogen fertilizer rates and yields on corn following corn in the SE BMP region for 2014: 81 fields.**

In the SE BMP region, nitrogen fertilizer rates ranged from an average of 151 pounds per acre in Wabasha County to 169 pounds per acre in Fillmore County as shown in Table 3.

**Table 3. Average county nitrogen fertilizer rates and corn yields for the SE BMP region for corn following corn.**

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Corn			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Dakota	7	165	173
Fillmore	15	169	174
Goodhue	19	165	179
Houston	9	165	174
Olmsted	8	169	184
Wabasha	11	151	172
Winona	12	164	172

Figure 4 details the distribution of nitrogen fertilizer rates in the SC BMP region for corn following corn; the corresponding corn yields are detailed in red.



**Figure 4. Average nitrogen fertilizer rates and yields on corn following soybeans in the SC BMP region for 2014: 120 fields.**

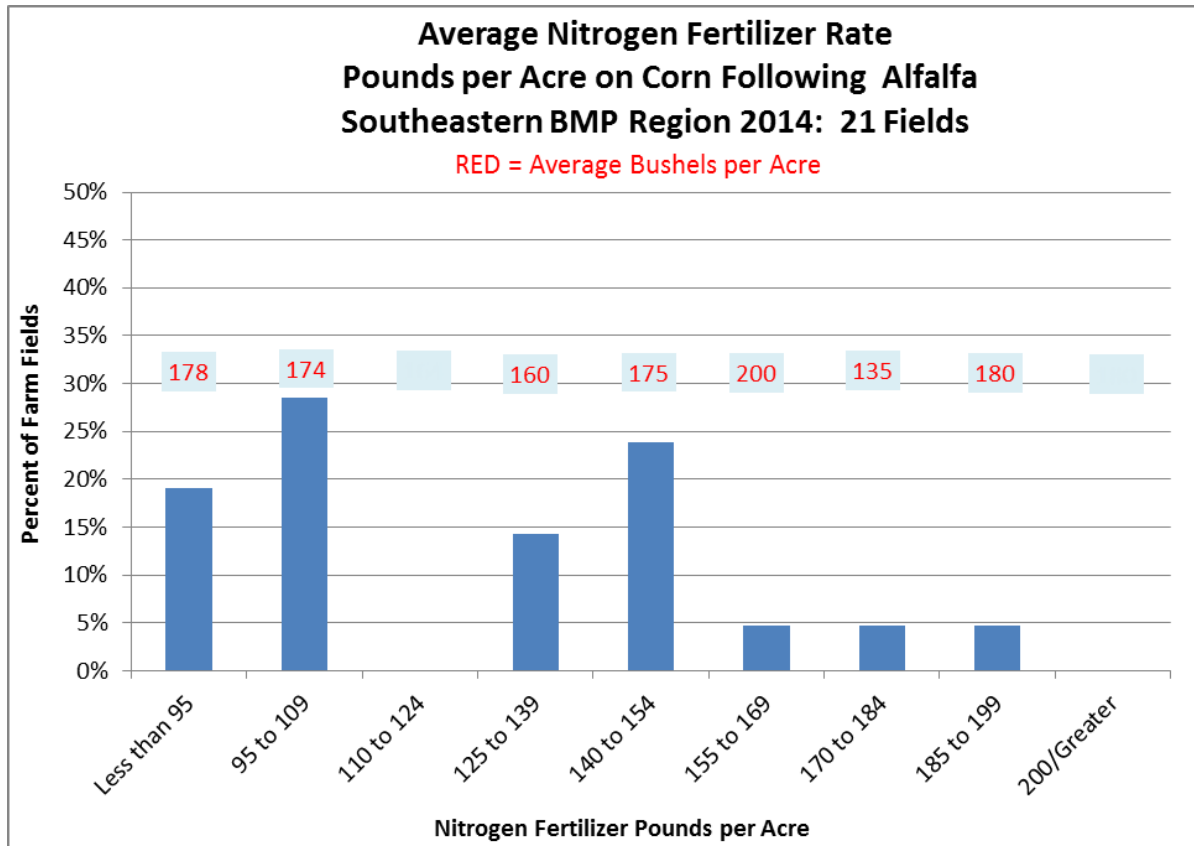
Twelve counties had more than five responses in SC BMP region. Nitrogen fertilizer rates ranged from an average of 153 pounds per acre in Nicollet County to 178 pounds per acre in Sibley County as shown in Table 4.

**Table 4. Average county nitrogen fertilizer rates and corn yields for the SC BMP region for corn following corn.**

<b>Average County Nitrogen Fertilizer Rates for the SC BMP Region for Corn Following Corn</b>			
<b>County</b>	<b>Number of Farm Fields</b>	<b>Average Nitrogen Rate Pounds per Acre</b>	<b>Average Corn Yield Bushels per Acre</b>
Blue Earth	14	167	176
Brown	8	173	178
Carver	**	**	**
Dodge	5	154	184
Faribault	11	159	171
Freeborn	12	167	174
Le Sueur	5	171	157
Martin	11	173	177
McLeod	**	**	**
Meeker	7	164	161
Mower	**	**	**
Nicollet	8	153	173
Rice	9	166	172
Sibley	6	178	173
Steele	5	177	177
Waseca	**	**	**
Watonwan	**	**	**

\*\* Less than five responses.

Figure 5 details the distribution of nitrogen fertilizer rates in the SE BMP region for corn following alfalfa; the corresponding corn yields are detailed in red.



**Figure 5. Average nitrogen fertilizer rates and yields on corn following alfalfa in the SE BMP region for 2014: 21 fields.**

Less than five fields were included in the SC BMP Region for corn following alfalfa analysis, therefore there is no disclosure of information.

Two counties had more than five responses in the SE BMP region. Nitrogen fertilizer rates were an average of 123 pounds per acre in Wabasha and Winona Counties in Table 5.

**Table 5. Average county nitrogen fertilizer rates and corn yields for the SE BMP region for corn following alfalfa.**

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Alfalfa			
County	Number of Farm Fields	Average Nitrogen Rate Pounds per Acre	Average Corn Yield Bushels per Acre
Fillmore	**	**	**
Goodhue	**	**	**
Houston	**	**	**
Olmsted	**	**	**
Wabasha	6	123	169
Winona	6	123	180

\*\* Less than five responses.

### Manure section

Table 6 details the percentage of respondents on if the farmer knew the amount of nitrogen that is in the manure applied for the 2014 corn crop.

**Table 6. The farmers’ knowledge of nitrogen content of manure being applied for the 2014 corn crop.**

BMP Region	Knowledge of the Actual Amount of Nitrogen Applied	Percentage of Respondents
South Central	Yes	38
South Central	No	62
Southeastern	Yes	17
Southeastern	No	83

§ Percent was calculated using only those respondents who answered yes or no to the question.

Table 7 details the nitrogen rates and corn yields in South Central and Southeastern BMP Regions on corn following various crops. These are corn fields applied with manure and commercial nitrogen fertilizer.

**Table 7. Average amount of nitrogen applied from manure and commercial nitrogen fertilizer and corresponding corn yields to previous crops by BMP region.**

<b>BMP Region</b>	<b>Previous Crop</b>	<b>Average Nitrogen Rate From Manure And Commercial Fertilizer Pounds per Acre</b>	<b>Average Corn Yield Bushels per Acre</b>
South Central	Soybeans	186	179
South Central	Corn	190	181
South Central	Corn/Alfalfa	**	**
South Central	Small Grains	**	**
South Central	Other	**	**
Southeastern	Soybeans	203	185
Southeastern	Corn	176	186
Southeastern	Corn/Alfalfa	**	**
Southeastern	Alfalfa	**	**
Southeastern	Other	**	**

Table 8 details the total amount of nitrogen applied to fields from both manure and commercial nitrogen.

**Table 8. Average amount of nitrogen applied to fields from both commercial fertilizer and manure.**

<b>BMP Region</b>	<b>Main Source of Manure</b>	<b>Average Nitrogen Rate From Manure And Commercial Fertilizer Pounds per Acre</b>
South Central	All	188
South Central	Dairy	178
South Central	Beef	185
South Central	Hog	**
South Central	Poultry	208
South Central	Other	180
Southeastern	All	191
Southeastern	Dairy	178
Southeastern	Beef	**
Southeastern	Other	**

## Pesticide Section

Table 9 details the rates and active ingredients from pesticides applied to corn in Pesticide Management Area (PMA) 8.

**Table 9. Pesticide applications and rates for corn – PMA 8**

<b>Agricultural Chemical (a.i.)</b>	<b>Surveyed Area Applied</b>	<b>Average Applications</b>	<b>Average Rate Per Application</b>	<b>Average Rate Per Crop Year</b>	<b>Total Applied Per Crop Year<sup>1</sup></b>
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre (a.i.)</i>	<i>Pounds per Acre (a.i.)</i>	<i>Total Pounds (a.i.)</i>
<b>Herbicides</b>					
Acetochlor	37	1.0	1.25	1.26	65,349
Atrazine	9	1.0	0.52	0.52	6,536
Clopyralid	20	1.0	0.07	0.07	2,055
Dicamba	5	1.0	0.15	0.15	1,081
Diflufenzopyr	5	1.0	0.06	0.06	419
Dimethenamid-p	9	1.0	0.61	0.61	8,193
Flumetsulam	20	1.0	0.03	0.03	835
Glufosinate-ammonium	1	1.0	0.37	0.37	302
Glyphosate	80	1.2	0.93	1.10	123,781
Mesotrione	19	1.0	0.08	0.08	2,053
Nicosulfuron	1	1.0	0.30	0.30	360
Rimsulfuron	1	1.0	0.13	0.13	184
S-metolachlor	14	1.0	0.86	0.87	17,242
Saflufenacil	4	1.0	0.07	0.07	427
Tembotrione	4	1.0	0.08	0.08	379
Topramezone	3	1.0	0.02	0.02	63
<b>Insecticides</b>					
Bifenthrin	11	1.1	0.06	0.07	1,032
Chlorpyrifos	1	1.0	0.40	0.40	696
Cyfluthrin	4	1.0	0.01	0.01	37
Lambda-cyhalothrin	1	1.0	0.02	0.02	18
Phostebupirim	4	1.0	0.13	0.13	742
Tefluthrin	3	1.7	0.11	0.19	931
<b>Fungicides</b>					
Azoxystrobin	1	1.0	0.08	0.08	89
Fluxapyroxad	2	1.0	0.67	0.67	1,488
Metconazole	2	1.1	0.03	0.04	103
Propiconazole	3	1.2	0.04	0.04	198
Prothioconazole	2	1.0	0.09	0.09	212
Pyraclostrobin	8	1.0	0.33	0.33	3,850
Tebuconazole	2	1.0	0.09	0.09	212

<sup>1</sup> Data in this column is calculated from "raw" data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants was not statistically "weighted" in any fashion. Thus, inappropriate extrapolation of the data may over- or underestimate the total pounds of a.i. used at the state, area or sub-area levels.



**Herbicides applied but not published included the following:** 2,4-D, Bromoxynil, Cloransulam, Flumioxazin, Fluroxypyr, Fluthiacet-methyl, Pendimethalin, Primisulfuron, Sethoxydim, and Triencarbazone-methyl.

**Insecticides applied but not published included the following:** Gamma-cyhalothrin and Terbufos.

**Fungicides applied but not published included the following:** Trifloxystrobin.

Table 10 details the rates and active ingredients from pesticides applied to corn in PMA 9.

**Table 10. Pesticide applications and rates for corn – PMA 9**

Agricultural Chemical (a.i.)	Surveyed Area Applied	Average Applications	Average Rate Per Application	Average Rate Per Crop Year	Total Applied Per Crop Year <sup>1</sup>
	Percent	Number	Pounds per Acre (a.i.)	Pounds per Acre (a.i.)	Total Pounds (a.i.)
<b>Herbicides</b>					
Acetochlor	34	1.0	1.20	1.21	16,679
Atrazine	16	1.0	0.65	0.65	4,094
Clopyralid	19	1.0	0.08	0.08	594
Dicamba	19	1.0	0.13	0.13	978
Diflufenzopyr	14	1.0	0.05	0.05	265
Dimethenamid-p	11	1.0	0.44	0.44	1,999
Flumetsulam	19	1.0	0.03	0.03	240
Glyphosate	92	1.1	0.96	1.05	38,872
Mesotrione	13	1.0	0.09	0.09	500
S-metolachlor	15	1.0	1.05	1.05	6,437
Saflufenacil	6	1.0	0.04	0.04	112
Tembotrione	3	1.0	0.07	0.07	96
Triencarbazone-methyl	2	1.0	0.01	0.01	12
<b>Insecticides</b>					
Bifenthrin	13	1.0	0.07	0.07	377
Cyfluthrin	2	1.0	0.01	0.01	5
Phostebupirim	2	1.0	0.12	0.12	99
Tefluthrin	9	1.0	0.11	0.11	373
<b>Fungicides</b>					
Propiconazole	6	1.0	0.04	0.04	96
Pyraclostrobin	6	1.2	0.13	0.16	380

<sup>1</sup> Data in this column is calculated from “raw” data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants was not statistically “weighted” in any fashion. Thus, inappropriate extrapolation of the data may over- or underestimate the total pounds of a.i. used at the state, area or sub-area levels.

**Herbicides applied but not published included the following:** 2,4-D, Bromoxynil, Fluthiacet-methyl, Glufosinate-ammonium, Halosulfuron, Nicosulfuron, Pendimethalin, Primisulfuron, and Thifensulfuron.

**Insecticides applied but not published included the following:** Chlorethoxyfos, Lambda-cyhalothrin, and Terbufos.

**Fungicides applied but not published included the following:** Azoxystrobin, Fluxapyroxad, Metconazole, Prothioconazole, Tebuconazole, and Trifloxystrobin.

Table 11 details the rates and active ingredients from pesticides applied to soybeans in PMA 8.

**Table 11. Pesticide applications and rates for soybean – PMA 8**

<b>Agricultural Chemical (a.i.)</b>	<b>Surveyed Area Applied</b>	<b>Average Applications</b>	<b>Average Rate Per Application</b>	<b>Average Rate Per Crop Year</b>	<b>Total Applied Per Crop Year<sup>1</sup></b>
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre (a.i.)</i>	<i>Pounds per Acre (a.i.)</i>	<i>Total Pounds (a.i.)</i>
<b>Herbicides</b>					
Clethodim	3	1.2	0.05	0.07	210
Cloransulam	13	1.0	0.02	0.02	304
Dimethenamid-p	2	1.0	0.36	0.36	765
Fluazifop	2	1.1	0.09	0.10	220
Flumioxazin	2	1.0	0.13	0.13	301
Fluthiacet-methyl	3	1.0	0.00	0.00	15
Fomesafen	8	1.0	0.18	0.18	1,390
Glufosinate-ammonium	1	1.5	0.36	0.54	549
Glyphosate	92	1.6	0.97	1.52	140,498
Imazethapyr	4	1.0	0.05	0.05	228
Lactofen	2	1.0	0.14	0.14	230
Metribuzin	2	1.0	0.29	0.29	439
S-metolachlor	3	1.0	0.91	0.91	2,683
Saflufenacil	3	1.0	0.03	0.03	101
Sulfentrazone	14	1.0	0.18	0.18	2,546
Thifensulfuron	1	1.0	0.01	0.01	4
Trifluralin	1	1.0	0.50	0.50	310
<b>Insecticides</b>					
Beta-cyfluthrin	3	1.0	0.02	0.02	61
Bifenthrin	9	1.0	0.06	0.06	595
Chlorpyrifos	18	1.0	0.46	0.46	8,191
Esfenvalerate	2	1.0	0.04	0.04	85
Gamma-cyhalothrin	4	1.0	0.01	0.01	36
Imidacloprid	3	1.0	0.05	0.05	123
Lambda-cyhalothrin	19	1.0	0.02	0.02	420
Thiamethoxam	1	1.0	0.03	0.03	30
Zeta-cypermethrin	4	1.0	0.02	0.02	63
<b>Fungicides</b>					
Azoxystrobin	4	1.0	0.11	0.11	512
Propiconazole	4	1.0	0.05	0.05	167
Pyraclostrobin	9	1.0	0.12	0.12	1,111
Tetraconazole	1	1.0	0.06	0.06	72
Trifloxystrobin	3	1.0	0.04	0.04	129

<sup>1</sup> Data in this column is calculated from “raw” data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants

was not statistically "weighted" in any fashion. Thus, inappropriate extrapolation of the data may over- or underestimate the total pounds of a.i. used at the state, area or sub-area levels.

**Herbicides applied but not published included the following:** Acetochlor, Bentazon, Chlorimuron, Dicamba, Fenoxaprop, Flufenacet, Flumiclorac, Imazamox, Pendimethalin, and Phenmedipham.

**Fungicides applied but not published included the following:** Chlorothalonil and Fluoxastrobin.

Table 12 details the rates and active ingredients from pesticides applied to soybeans in PMA 9.

**Table 12. Pesticide applications and rates for soybean – PMA 9**

<b>Agricultural Chemical (a.i.)</b>	<b>Surveyed Area Applied</b>	<b>Average Applications</b>	<b>Average Rate Per Application</b>	<b>Average Rate Per Crop Year</b>	<b>Total Applied Per Crop Year<sup>1</sup></b>
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre (a.i.)</i>	<i>Pounds per Acre (a.i.)</i>	<i>Total Pounds (a.i.)</i>
<b>Herbicides</b>					
Clethodim	7	1.0	0.04	0.04	69
Cloransulam	27	1.0	0.03	0.03	224
Fluazifop	3	1.0	0.11	0.11	74
Glyphosate	95	1.3	0.95	1.22	28,026
Imazethapyr	9	1.0	0.07	0.07	147
Saflufenacil	5	1.0	0.03	0.03	35
Sulfentrazone	27	1.0	0.27	0.27	1,756
<b>Insecticides</b>					
Bifenthrin	8	1.0	0.06	0.06	106
Chlorpyrifos	8	1.0	0.31	0.31	561
Esfenvalerate	2	1.0	0.03	0.03	14
Lambda-cyhalothrin	10	1.0	0.02	0.02	47
Thiamethoxam	4	1.0	0.03	0.03	27
<b>Fungicides</b>					
Azoxystrobin	2	1.0	0.15	0.15	63
Propiconazole	4	1.0	0.06	0.06	53
Pyraclostrobin	31	1.0	0.10	0.10	745
Trifloxystrobin	4	1.0	0.06	0.06	53

<sup>1</sup> Data in this column is calculated from "raw" data and represents the total pounds of active ingredient applied to the indicated crop(s) in 2013 by survey participants in this area. Data in this table and the selection of survey participants was not statistically "weighted" in any fashion. Thus, inappropriate extrapolation of the data may over- or underestimate the total pounds of a.i. used at the state, area or sub-area levels.

**Herbicides applied but not published included the following:** Acetochlor, Dimethenamid-p, Fenoxaprop, Flufenacet, Flumiclorac, Fluthiacet-methyl, Fomesafen, Lactofen, Metribuzin, S-metolachlor, Thifensulfuron, and Trifluralin.

**Insecticides applied but not published included the following:** Gamma-cyhalothrin and Zeta-cypermethrin.

**Fungicides applied but not published included the following:** Chlorothalonil and Tetraconazole.