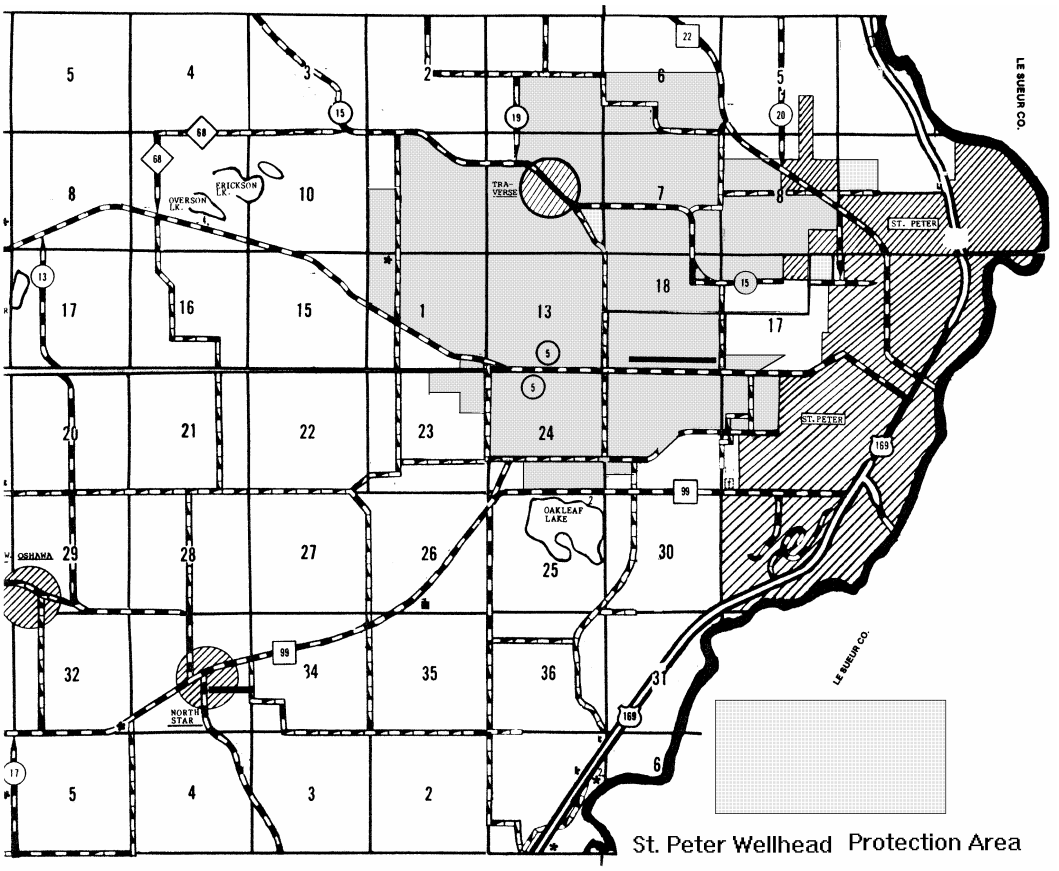
Saint Peter Survey of Farmers

within the

Wellhead Protection Area 1996



For additional information, contact:
Denton Bruening at 612-297-4400
Minnesota Department of Agriculture

Errata 11/04/2002

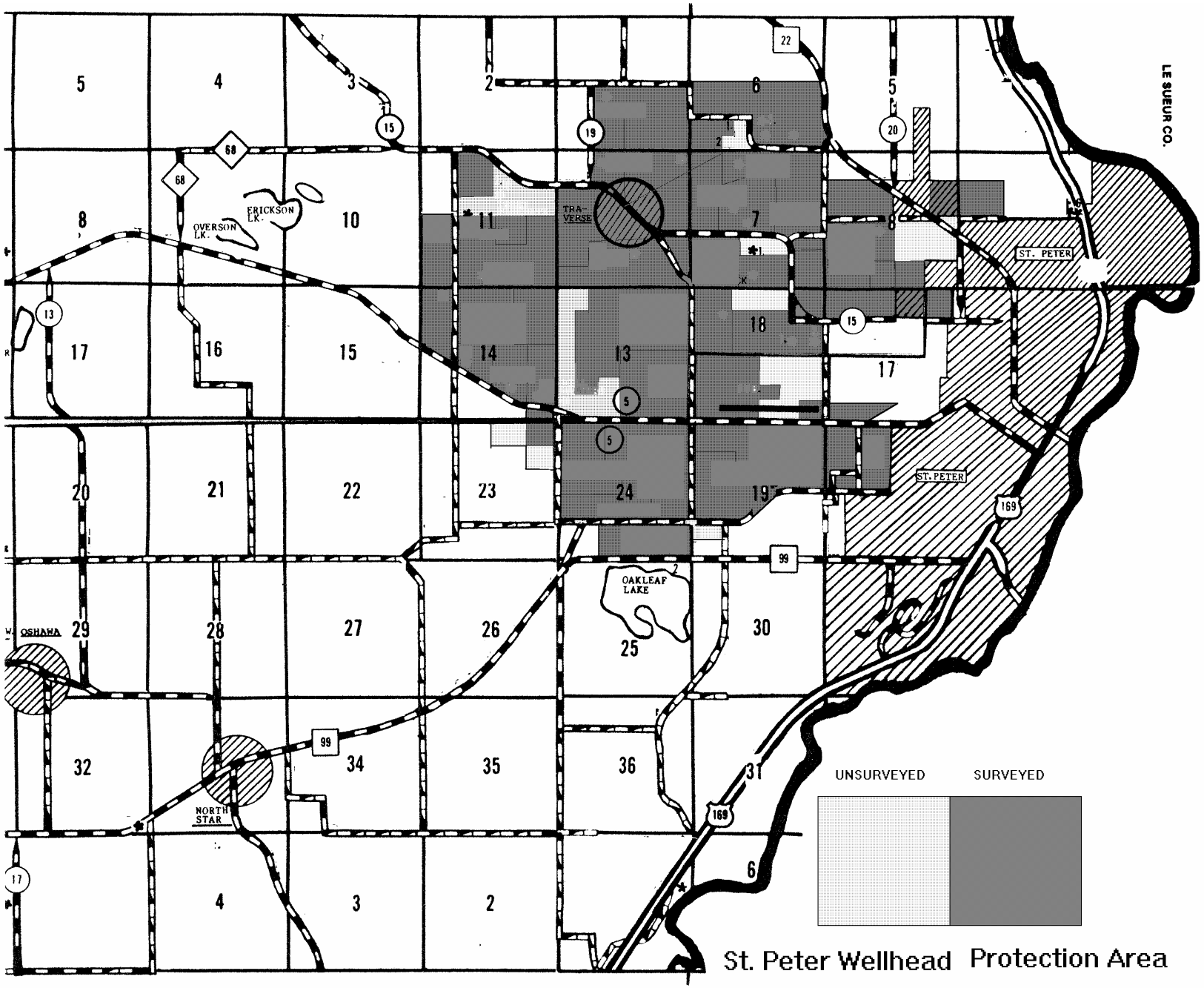
Amounts of pesticide applied shown in Table 16 on page 19 for several Active ingredients have been changed to reflect a calculation mistake during the generation of the table.

General information: Farmers in the St. Peter Wellhead Protection Area.

Water quality in the St. Peter Wellhead protection area is a concern to the citizens of St. Peter and the surrounding area. St. Peter water supply is obtained from seven wells ranging in depth from 130 feet to 800 feet. The wellhead protection area is the area where the wells for St. Peter could be affected by contamination from surface activities. This study focuses on the farming aspect of the wellhead protection area.

A list of farmers in the St. Peter wellhead protection area was obtained from the Brown/ Nicollet/Cottonwood Clean Water Partnership (BNCCWP). The county extension agent, St. Peter water foreman and the BNCCWP were contacted to inform them of the specifics of the project and overall goals. Introduction letters signed by the Commissioner of Agriculture were mailed out to the farmers in January of 1997. The letter's intent was to identify: the overall project; the purpose of the nutrient assessment; why they were selected; and what types of information and amount of their time would be necessary to successfully complete the project. A total of 21 farmers were interviewed and approximately 90% of the farmland in the St. Peter wellhead protection area was included in the survey (Figure 1).

The Minnesota Department of Agriculture has developed the Farm Nutrient/Pesticide Management Assessment Program (FANMAP) to get a thorough understanding of current farm practices regarding agricultural inputs. This information will be used to design effective water quality educational programs and serve as baseline data to determine program effectiveness over time. In the past four years, over 300 farmers have volunteered two to four hours of their time to share information about their farming operations. This previous information was collected as a result of funding through the Legislative Commission on Minnesota Resources or from Clean Water Partnership Programs.



St. Peter Wellhead Protection Area

Nutrient Management Data Collection

Inventory forms and database design were patterned after a previous successful project[1]. Timing, rates, and method of applications were collected for all nitrogen (N), phosphate (P_2O_5), and potassium (K_2O) inputs (fertilizers, manures, and legumes) on **a field-by-field basis for all acres within the watershed.** Timing, rates, and method of applications were also collected for all pesticides applied on crop acres. Soil and manure testing results were also collected if available. Nutrient and pesticide inputs, and yields, were specific for the 1996 cropping season. Crop types and manure applications (starting in the fall of 1995) were also collected from the 1995 season for purposes of 1996 nitrogen crediting. Long term yield data generally reflected the past three to five years. Livestock census and other specifics for the entire farm (i.e. types of manure storage systems, total farm sizes) were also recorded.

Farm Size, Crop and Livestock Characteristics of the Selected Farms in St. Peter Wellhead Protection Area

Twenty-one farmers were interviewed in January of 1997. Some of the "farmers" were actually a combination of farmers such as a father and son who farmed together. These combinations resulted in fourteen operations within the St. Peter Wellhead Protection Area. The average age of a farmer interviewed was 49 years. Only two farming operations applied any manure to crop acres.

A total of 4,534 acres of farmland were inventoried in the St. Peter Wellhead Protection Area. Farm interviews covered over 90% of all agricultural acres in the watershed. Livestock appears to play a limited role in the St. Peter Wellhead Protection Area. Two operations applied beef manure on a total of 92 acres. Approximately 7,500 lbs of nitrogen (N) was applied through broadcast with 2,500 lbs/N available for the 1996 growing season. The manure was spread on a variety of crops including 20 acres of corn, 17 acres of sweetcorn, 22 acres of soybeans and 33 acres of small grain. All manure was spring applied except 20 acres of small grain was summer applied.

Table 1 lists each type of crop and the number of acres of the crop surveyed in the St. Peter Wellhead Protection Area. Corn acres dominated the crops with 51% of the acres planted to corn and an additional 40% of the acres planted to soybeans. Corn following soybeans was the most common rotation and 95% of corn acres were planted to soybeans in 1995.

[1]Effective Nitrogen and Water Management for Water Quality Sensitive Regions of Minnesota, LCMR 1991-93

Table 1. Crop Type and Acres in the St. Peter Wellhead Protection Area.	
Crop	**Acres**
Corn	2,328
Soybean	1,836
Sweet Corn	210
Alfalfa	17
Peas	105
Small Grains	38
Total Acres	4,534

Commercial Fertilizer Use Characteristics on Selected Farms: St. Peter Wellhead Protection Area:

Field corn accounted for 91% of the total N commercial fertilizer use. All corn acreage received commercial N fertilizer (Table 2). Average fertilizer N rate on corn acres with commercial fertilizer was 152 lb/A. This rate is calculated as the means across all commercially N fertilized corn acres regardless of past manure or legume N credits. Total N inputs will be discussed later in the "Nitrogen Balances and Economic Considerations" section. All sweet corn acreage received N fertilizer. The average N rate on sweet corn was 132 lb/A (Table 2).

Table 2. Distribution Of Commercial Nitrogen Applications On Cropland - 1996.

Crop	Acres Receiving N Fertilizer	Total N Applied	Average Rate of N on Fertilized Acres
Corn	2,328	353,735	152
Sweet Corn	210	27,725	132
Peas	75	1,730	23
Alfalfa	13	130	10
Small Grains	18	1,170	65
TOTALS	**2,835**	**384,491**	**------**

Only 316 acres(14%) of the 2,206 acres planted with crops other than corn were applied with N fertilizer. Sweet corn accounted for 82% of “non-corn” commercial N.

Timing of N fertilizer applications is an important consideration in maximizing fertilizer use efficiency and minimizing environmental effects. Spring preplant applications of nitrogen in the form of anhydrous ammonia or urea are recommended for South-Central Minnesota[2]. Approximately 45% of commercial nitrogen fertilizer was applied as a spring preplant in the form of anhydrous ammonia or urea on acres planted to corn (Table 3).

Table 3. Timing of fertilizer applications for nitrogen on fertilized corn acres.

Growth Stage	Average Date of N Application	Total Acres Applied	Total N Applied	Percentage of Total N
Fall	11/3/95	2,115	189,617	54%
Spring Plant/Preplant	4/26/96	1,786	160,729	45%
Sidedress	6/25/96	63	3,390	1%
TOTALS	**-------**	**---------**	**353,735**	**100%**

Fall application of nitrogen for corn in Central Minnesota is recommended if the proper source (anhydrous ammonia) is selected and proper soil temperature is reached. Research indicates anhydrous ammonia is the most efficient source of nitrogen when used for fall fertilization in South-Central Minnesota[3]. Producers applied 54% of the total nitrogen for corn during fall applications of 1995 for the 1996 growing season. In this survey, 77% of fall-applied nitrogen for corn was in the form of anhydrous ammonia and 69% of the fall applied anhydrous ammonia was applied with a nitrification inhibitor. Fall-applied anhydrous ammonia accounted for 44% of the total commercial N applications on acres planted to corn.

Fall applications of anhydrous ammonia should be delayed until the soil temperature is below 50° F at the 6-inch depth. Long-term climatic data from the Waseca Experiment Station indicate that soil temperature will generally remain below 50° F after October 29. Twenty-nine percent of fields fertilized with anhydrous ammonia were applied nitrogen before October 29. Delaying fall application of anhydrous ammonia fertilizer until after October 29 may reduce leaching of nitrogen.

Fall fertilization is not recommended on coarse-textured (sandy) soils. A large area of the St. Peter Wellhead Protection Area does have sandy soils. Approximately one-fourth of the St. Peter Wellhead Protection Area has soils in the sandy, sandy loam or loamy sand series. These soils are very prone to leaching, especially in regard to nitrogen. Spring applications and or sidedress applications of N are recommended for these soils. Assuming the soils with less than 3% organic matter are the sandy soils, it appears there

[2] M.A. Schmitt and G.W. Randall 1993. Best Management Practices for Nitrogen Use in South-Central MN. AG-FO-6127-B.

[3] M.A. Schmitt and G.W. Randall 1993. Best Management Practices for Nitrogen Use in South-Central MN. AG-FO-6127-B.

are approximately 200 acres on sandy soils in the St. Peter Wellhead Protection Area. Only 20 acres (10%) of the corn on sandy soils are currently fall applied with nitrogen.

Anhydrous ammonia supplied 44% of the total amount of commercial N applied to corn. Urea accounted for 47% of all nitrogen while UAN solutions, ammonium based and combination fertilizers (9%) accounted for the rest.

Relative Importance of N Sources on the Selected Farms: St. Peter Wellhead Protection Area:

University of Minnesota recommendations for nitrogen provide N credits from legumes. Alfalfa was assumed to have 2-3 plants per square foot when tilled for the following corn crop. First year alfalfa provided a 75 lb/A credit, and second year alfalfa provided a 50 lb/A credit. Soybeans provided a 40 lb/A credit. These N credits will later be compared to the reductions in nitrogen on corn acres with no legume N credits to those corn acres with legume N credits. In the St. Peter survey, soybeans were by far the most important source of legume N, supplying approximately 90% of all legume N. Alfalfa (first and second year credits) supplied the balance.

Commercial fertilizer (69%), manure (< 1%), and legume (31%) contributed a total of 515,000 pounds of "first year available N" to **corn acres** (Figure 2). This is an average N rate of 218 lb/A across all corn acres. Proper crediting for these sources is critical in maintaining economic and environmental balances.

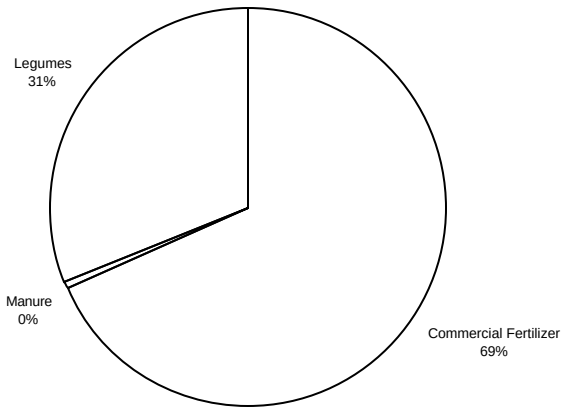


Figure 2. Relative N contributions from fertilizers, manures and legumes across all corn acres. N inputs totaled 515,000 for all sources. N contributions averaged 218 lb/A across all corn acres.

Nitrogen Balances and Economic Considerations: St. Peter Wellhead Protection Area:

The corn yield goal across all 21 farms in the five counties averaged 152 bushels/A. University of Minnesota N recommendations (based on yield goal, crop history, and soil organic matter level) were compared to actual amounts of fertilizer and manure applied to each field. The average yield goal for all corn acres was 152 bushels/A. Approximately 3,500 acres had soil tests with soil organic matter data and 88% of those acres were in the medium and high range. University of Minnesota (UM) N recommendations to fulfill this goal averaged 102 lb/N/A (Figure 3). Actual amounts of N applied from fertilizer and manure averaged 155 lb/A respectively across all corn acres. Factoring in all appropriate credits from fertilizer, legumes and manures, there was an over-application rate of 53 lb/N/A.

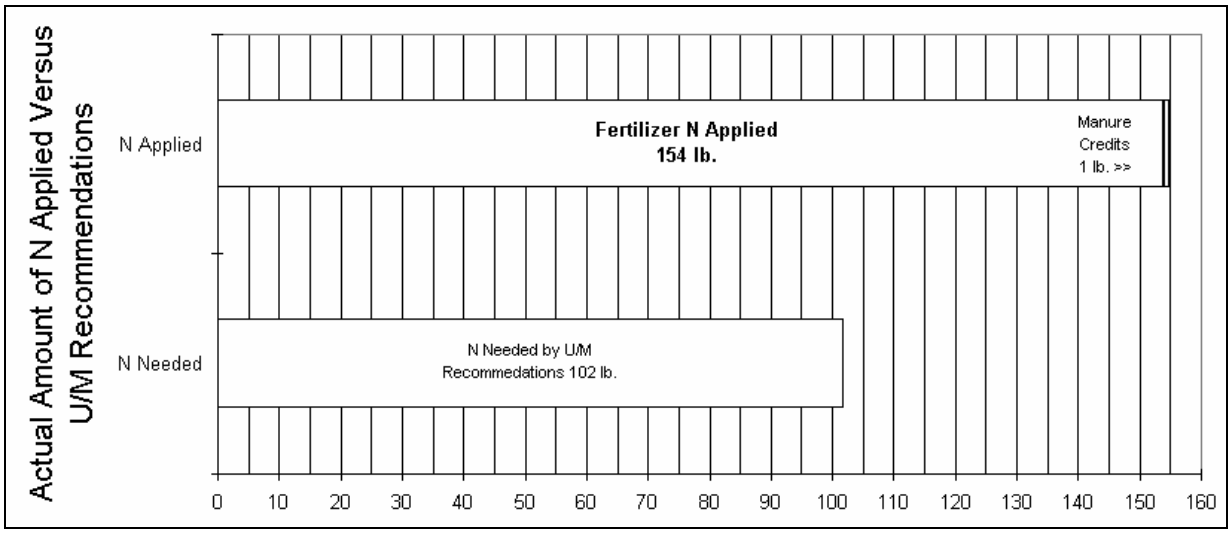


Figure 3. Crop N requirements based on University of MN recommendations in comparison to actual N inputs (fertilizer, and manure) across all corn acres. Total corn area in this analysis was 2,328 acres. Legumes grown in 1995 also provided 35 lb/A N across all corn acres and is already reflected in the UM recommendations.

Over 96% of the corn acres were a corn/soybean rotation in the St. Peter Wellhead Protection Area. Figure 4 details the rotation of corn acres.

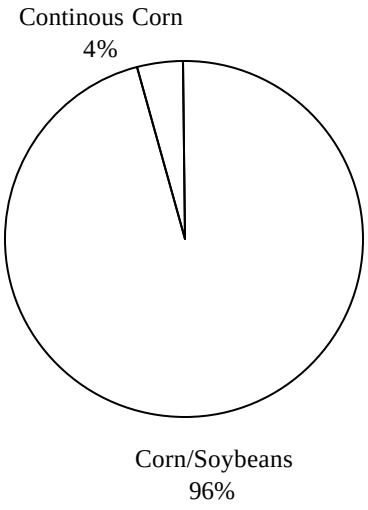


Figure 4. Rotation on Corn acres in the St. Peter Wellhead Protection Area.

Factoring in legume N credits and manure N inputs into the process on a field-by-field basis, the amounts in excess of 1996 UM recommendations are illustrated in Table 6. One of the huge advantages of the technique developed through the nutrient assessment process is the ability to examine in great detail the nutrient balances and make some inferences on where the biggest gains in water quality can be obtained through focused educational programs.

Table 6. Excess Nitrogen on Corn Acres

Crop Rotation	Total Acres	Excess N[4] Acres (>30 lb/N/A)	Excess N Average lb/A (On All Acres)	Excess N Total lbs.
Corn/Soybeans	2,230	2,145	56	124,362
Continuos Corn	98	0	3	294
Totals/(Averages)	2,328	2,145	(54)	124,656

[4] Acres where the nitrogen applied exceeded the amount recommended from the UM by more than 30 lbs. an acre.

Ninety-six percent (96%) of the corn acres in a corn/soybean rotation were classified into the Excess category. Over-application of N averaged 56 lb/A across all acres in this category. All manured corn acres were in a corn/soybean rotation. Over-application of N on 20 manured acres averaged 35 lb/N/A. Reduction of nitrogen on all acres to the maximum recommended by the UM would reduce 124,000 of lbs nitrogen from the farmers interviewed. Including a possible 200 acres of corn not in the survey process, an additional 11,000 lbs of nitrogen could be reduced for a total of 135,000 lb reduction of nitrogen for St. Peter Wellhead Protection Area. UM recommendations are based on economic factors, so the reductions in N should lead to substantial savings with little or no yield loss to many of the farmers in the St. Peter Wellhead Protection Area.

Farmers were asked how they determined the amount of fertilizer to apply. Nine (64%) of farmers relied on the fertilizer companies to determine the amount. Five (36%) farmers used crop consultants or added input from their knowledge to determine the amount of fertilizer to apply. Those farmers who relied only on the fertilizer dealers for application amounts were over-applying nitrogen by 58 lbs./acre compared to 49 lbs./acre over-application for those farmers who did not rely strictly on the fertilizer dealers.

Pesticide Applications:
St. Peter Wellhead Protection Area:

Pesticide use was gathered on all crop acres. Pesticides were used on all crop acres except alfalfa (Table 7). Pesticide use on the St. Peter Wellhead Protection Area included herbicides and insecticides. Insecticide use was limited to 8% of corn acres.

Table 7. Crop Acreage And Percentage Treated With Pesticides.

Crop Grown	Total Acres	Treated for Control of:			
		Weeds		Insects	
		Acres	Percent	Acres	Percent
Corn	2,328	2,328	100%	182	8%
Soybeans	1,836	1,836	100%	0	0%
Sweet Corn	210	210	100%	0	0%
Alfalfa	17	0	0%	0	0%
Peas	105	105	100%	0	0%
Small Grains	38	38	100%	0	0%
Total Acres	4,534	4,517	99%	182	4%

Pesticide use on all acres consisted of 36 different formulas of which 34 were herbicide formulas and two were insecticides. Table 8 details all formulas of herbicides used and the number of acres covered with each herbicide.

All herbicides were broadcast. Table 9 details the method of application by herbicide. Spot applications indicate just portions of the field with weed infestations were applied with herbicides.

Seventy-eight percent (78%) of all herbicides were applied by the farmer who purchased the herbicides (Table 10).

Table 8. Herbicide Use And Acres Covered.

Name Of Pesticide	EPA Number	Acres Covered
Accent	352-560	152
Amine 2-4-D	34704-120	156
Banvil	55947-1	821
Basagran	7969-45	277
Broadstrike + Dual	62719-239	107
Broadstrike + Treflan	62719-222	37
Butyrac	264-105	32
Cobra	59639-34	35
Command	279-3053	301
Double Play	10182-388	820
Dual	100-673	155
Dual II	100-711	57
Dual II	100-712	298
Eradicane 6.7E	10182-223	35
Exceed	100-774	30
Freedom	524-422	42
Fusilade DX	10182-367	35
Galaxie	7969-77	246
Harness	524-473	79
Laddock	7969-100	35
Marksman	55947-39	234
Pinnacle	352-525	47
Poast +	7969-88	96
Prowl	241-337	447
Pursuit	241-310	578
Pursuit	241-350	414
Reflex	101-82-83	34
Resource	59639-82	35
Scorpion III	62719-264	546
Shotgun	34704-728	671
Sonalan HFP	62719-188	246
Status	7969-79-241	116
Surpass EC	10182-325	919
Tri 4 HF	241-343	1,011

Table 9. Method of Application.

Name Of Pesticide	EPA Number	Acres Covered	Method of Application (Percentage of Total Acres)	
			Broadcast	Spot
Accent	352-560	152	100%	0%
Amine 2-4-D	34704-120	156	100%	0%
Banvil	55947-1	821	100%	0%
Basagran	7969-45	277	57%	43%
Broadstrike + Dual	62719-239	107	100%	0%
Broadstrike + Treflan	62719-222	37	100%	0%
Butyrac	264-105	32	100%	0%
Cobra	59639-34	35	86%	14%
Command	279-3053	301	100%	0%
Double Play	10182-388	820	100%	0%
Dual	100-673	155	100%	0%
Dual II	100-711	57	100%	0%
Dual II	100-712	298	100%	0%
Eradicane 6.7E	10182-223	35	100%	0%
Exceed	100-774	30	100%	0%
Freedom	524-422	42	100%	0%
Fusilade DX	10182-367	35	100%	0%
Galaxie	7969-77	246	100%	0%
Harness	524-473	79	100%	0%
Laddock	7969-100	35	100%	0%
Marksman	55947-39	234	100%	0%
Pinnacle	352-525	47	69%	31%
Poast +	7969-88	96	100%	0%
Prowl	241-337	447	100%	0%
Pursuit	241-310	578	100%	0%
Pursuit	241-350	414	100%	0%
Reflex	101-82-83	34	100%	0%
Resource	59639-82	35	100%	0%
Scorpion III	62719-264	546	100%	0%
Shotgun	34704-728	671	100%	0%
Sonalan HFP	62719-188	246	100%	0%
Status	7969-79-241	116	100%	0%
Surpass EC	10182-325	919	100%	0%
Tri 4 HF	241-343	1,011	100%	0%
Totals	**------**	**9,144**	**99%**	**1%**

Table 10. Person Who Applied Herbicide.

Name Of Herbicide	EPA Number	Acres Covered	Person Who Applied the Herbicide	
			Self	Custom
Accent	352-560	152	0%	100%
Amine 2-4-D	34704-120	156	76%	24%
Banvil	55947-1	821	100%	0%
Basagran	7969-45	277	100%	0%
Broadstrike + Dual	62719-239	107	0%	100%
Broadstrike + Treflan	62719-222	37	0%	100%
Butyrac	264-105	32	100%	0%
Cobra	59639-34	35	100%	0%
Command	279-3053	301	52%	48%
Double Play	10182-388	820	95%	5%
Dual	100-673	155	0%	100%
Dual II	100-711	57	100%	0%
Dual II	100-712	298	0%	100%
Eradicane 6.7E	10182-223	35	0%	100%
Exceed	100-774	30	0%	100%
Freedom	524-422	42	0%	100%
Fusilade DX	10182-367	35	100%	0%
Galaxie	7969-77	246	100%	0%
Harness	524-473	79	100%	0%
Laddock	7969-100	35	100%	0%
Marksman	55947-39	234	48%	52%
Pinnacle	352-525	47	%	100%
Poast +	7969-88	96	65%	35%
Prowl	241-337	447	45%	55%
Pursuit	241-310	578	66%	34%
Pursuit	241-350	414	100%	0%
Reflex	101-82-83	34	0%	100%
Resource	59639-82	35	100%	0%
Scorpion III	62719-264	546	100%	0%
Shotgun	34704-728	671	100%	0%
Sonalan HFP	62719-188	246	100%	0%
Status	7969-79-241	116	0%	100%
Surpass EC	10182-325	919	81%	19%
Tri 4 HF	241-343	1,011	100%	0%
Totals	**-----**	**9,144**	**78%**	**22%**

Herbicide use on corn acres consisted of 13 separate formulas. Table 11 details each formula used and the number of acres covered by each herbicide.

Table 11. Herbicide Use on Corn Acres.

Name Of Pesticide	EPA Number	Average Date of Application	Acres Covered	Percent of Total Crop Acres
Accent	352-560	6/4/96	152	7%
Banvil	55947-1	6/4/96	821	35%
Broadstrike + Dual	62719-239	4/20/96	107	5%
Double Play	10182-388	4/27/96	820	35%
Dual	100-673	4/26/96	155	7%
Dual II	100-712	3/22/96	180	8%
Exceed	100-774	6/12/96	30	1%
Harness	524-473	4/27/96	79	3%
Marksman	55947-39	5/27/96	234	10%
Prowl	241-337	6/1/96	209	9%
Scorpion III	62719-264	5/20/96	546	23%
Shotgun	34704-728	6/9/96	671	29%
Surpass EC	10182-325	4/26/96	919	39%

There were 16 separate formulations of herbicides used on soybean acres. Table 12 details each formula used and the number of acres covered by each herbicide.

There were five separate formulations of herbicides used on sweet corn acres. Table 13 details each formula used and the number of acres covered by each herbicide.

There was four separate formulation of herbicides used on pea acres. Table 14 details each formula used and the number of acres covered by each herbicide.

There was one herbicide formulation used on small grains acres. Table 15 details the formula used and the number of acres covered the herbicide.

Table 12. Herbicide Use on Soybean Acres.

Name Of Pesticide	EPA Number	Average Date of Application	Acres Covered	Percent of Total Crop Acres
Basagran	7969-45	6/27/96	277	15%
Broadstrike + Treflan	62719-222	5/23/96	37	2%
Butyrac	264-105	7/6/96	32	2%
Cobra	59639-34	6/27/96	35	2%
Command	279-3053	5/8/96	301	16%
Freedom	524-422	5/15/96	42	2%
Galaxie	7969-77	6/15/96	246	13%
Pinnacle	352-525	6/22/96	47	3%
Poast +	7969-88	6/22/96	96	5%
Prowl	241-337	4/24/96	163	9%
Pursuit	241-310	6/26/96	578	31%
Pursuit	241-350	6/25/96	414	22%
Reflex	101-82-83	7/11/96	34	2%
Sonalan HFP	62719-188	4/20/96	246	13%
Status	7969-79-241	6/29/96	116	6%
Tri 4 HF	241-343	5/11/96	981	53%

Table 13. Herbicide Use on Sweet Corn Acres.

Name Of Pesticide	EPA Number	Average Date of Application	Acres Covered	Percent of Total Crop Acres
Amine 2-4-D	34704-120	6/12/96	118	56%
Dual II	100-711	5/17/96	57	27%
Dual II	100-712	5/18/96	118	56%
Eradicane 6.7E	10182-223	4/24/96	35	16%
Laddock	7969-100	6/13/96	35	16%

Table 14. Herbicide Use on Pea Acres

Name Of Pesticide	EPA Number	Average Date of Application	Acres Covered	Percent of Total Crop Acres
Fusilade DX	10182-367	7/25/96	35	33%
Prowl	241-337	4/21/96	75	71%
Resource	59639-82	7/25/96	35	33%
Tri 4 HF	241-343	5/1/96	30	29%

Table 15. Herbicide Use on Small Grains Acres

Name Of Pesticide	EPA Number	Average Date of Application	Acres Covered	Percent of Total Crop Acres
Amine 2-4-D	34704-120	6/10/96	38	100%

Insecticide use was limited to two insecticides on 182 corn acres. Pounce 3.2 EC (EPA # 279-3014) was used on 16 acres while Warrior (EPA # 101182-96) was used on 166 acres. Both insecticides were applied on July 10, 1996. The Pounce 3.2 EC was custom aerial applied and the Warrior was self applied broadcast.

Application rates were also gathered on an active ingredient basis. Table 16 lists the active ingredients, average amount per application, and total amount for the farms surveyed.

Table 16. Active Ingredients of all Pesticides Used By Farmers In Survey.

Active Ingredient	Average Lbs. Per Acre	Total Lbs. Applied For 1996 Crops	Total Acres Covered For 1996
2,4-D	0.23	273.45	1,208
Acetochlor	1.66	2,721.36	1,638
Acifluorfen	0.18	56.90	362
Alachlor	2.67	112.14	42
Atrazine	0.70	584.26	839
Bentazon	0.74	411.44	558
Clomazone	0.94	284.03	301
Clopyralid	0.06	34.13	546
Dicamba	0.47	544.05	1,164
Eptc	4.09	2,763.46	675
Ethalfluralin	0.68	166.05	246
Fluazifop-p-butyl	0.13	4.55	35
Flumetsulam	0.07	51.66	690
Flumiclorac	0.05	1.75	35
Fomesafen	0.25	8.50	34
Imazethapyr	0.05	54.10	1,022
Lactofen	0.12	4.30	35
Lambda-cyhalothrin	0.01	1.33	166
Metolachlor	2.63	1,622.58	617
Nicosulfuron	.02	4.34	248
Pendimethalin	1.12	512.59	456
Permethrin	0.14	7.48	52
Primisulfuron	0.02	0.60	30
Prosulfuron	0.02	0.60	30
Sethoxydim	0.14	13.46	96
Thifensulfuron	0.01	0.06	47
Trifluralin	0.75	825.42	1,090

Only 52 acres (2%) of Bt. corn were planted in the 1996 crop year. Conventional cultivation was done on 493 acres (21%) of corn and 123 acres (5%) were covered with a rotary hoe.

Twenty-one percent (21%) of the pesticides were generally loaded into the sprayer at an off-farm facility while the other 79% were loaded at the field. Fifty percent (50%) of the farmers did not formally estimate weed intensity but regularly applied pesticides. Approximately 70% of the farmers who do estimate weed pressure do it informally, such as a drive by sighting of weed infestation. Farmers were asked where they received information that determines the application rate. Most farmers relied on the agrochemical dealer followed by the pesticide company or label and also some input from the crop consultant.

Conclusions and Summary of the Current Nutrient Management Practices for the St. Peter Wellhead Protection Area.

Twenty-one farms, covering over 4,500 acres, participated in the FArm Nutrient/ pesticide Management Assessment Program (FANMAP) with staff from the Minnesota Department of Agriculture. Producers volunteered two to four hours of their time to share information about their farming operation. The overall purpose of the program was to develop a clear understanding of current farm practices regarding agricultural nutrients and utilize this knowledge for future water quality educational programs.

Over 54% of commercial N used on corn was applied in the fall and anhydrous ammonia was the dominant source of N for **all** applications (44%). Manure (first year available) accounted for less than 1% of the N while legumes and commercial N accounted for 31% and 69%, respectively. Soybeans was the dominate source of legume N credits. Less than one percent (1%) of corn acres received applications of manure leaving ample land available for manure application, if based on N inputs.

Producers appeared to be applying approximately 50 lbs/A of nitrogen above recommendations that were made by UM on corn acres on average. Corn following soybean acres accounted for most of the excess N in this survey. Reducing the average amount of N applied and accounting for soybean credits could save farmers approximately $10 per acre.

Thirty-six formulations of pesticides were used on the farms in the survey. Most of the pesticides were broadcast and applied by the farmer who purchased the pesticide.

There were some very positive findings from this study. There is strong evidence that producers are voluntarily adopting the educational materials and strategies developed by the UM. It is also evident that promotional activities need to continue and be specifically targeted to deliver the most recent technology and recommendations. Soybeans crediting is an area where there is a strong need for more education in this study area. Strong similarities exist in all existing FANMAP projects: producers are generally managing commercial N inputs successfully (although frequently using outdated recommendations) but continually under-estimate the N credits associated with manure and legume inputs.