

Facilitating Social and Environmental Successes in Performance-based Environmental Management

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ISU Extension Watershed Projects**

**Sponsors: Iowa WIRB, Iowa Farm Bureau,
Iowa Corn Growers, CSREES, EPA Region 7**

Agricultural-Environmental Performance Issues

- Ninety percent of Iowa water contaminants have been attributed to agriculture.
- Farm operators have never been asked to organize and collectively address water quality.
- Watershed residents have demonstrated aggressive local leadership for water improvement.
- Farm operators will change to practices that yield higher water quality.
- Participants find the performance program structure to be practical and profitable, and to have a positive effect on the environment.

Watershed Councils

Residents work together as a watershed community on environmental goals.



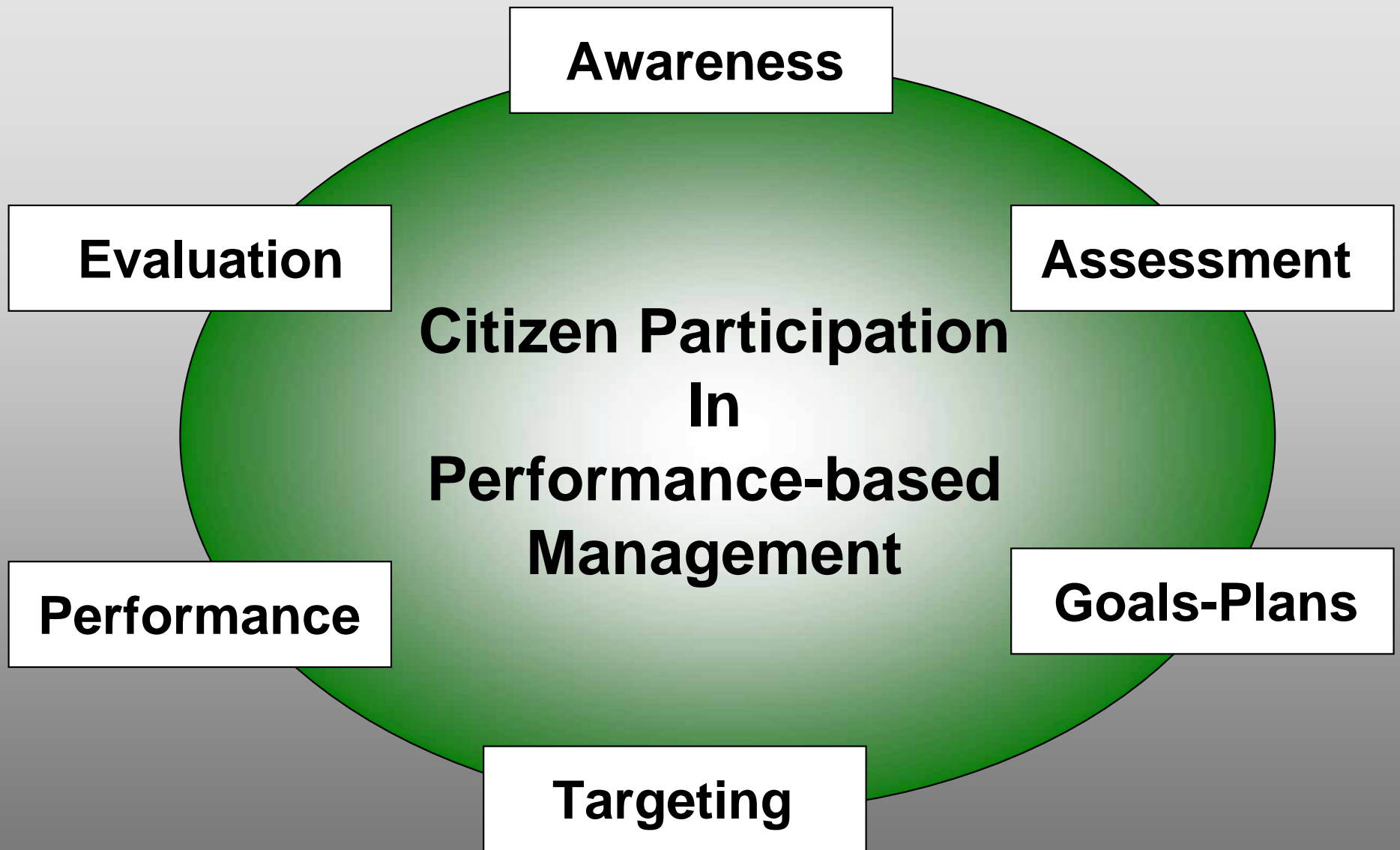
- Non-profit status
- Regular meetings
- Establish water monitoring
- Use outside information and gather local data
- Develop incentive structure

Watershed Cooperators

- Primarily operators
- Voluntary participation
- Invited by watershed executive council and through neighbor-to-neighbor discussion
- Single-sided enrollment form
- Provide field and farm data to Extension specialist
- Supply N management information to project contractor

Performance Tools

- Iowa Phosphorus Index
 - Developed by ISU, Soil Tilth Lab, NRCS
 - Used in Iowa DNR MMPs
 - Incorporates soil loss, distance to stream, soil test P, management practices, P application
- Soil Conditioning Index
 - Product of RUSLE2 calculation
 - Eligibility standard for CSP enrollment
- Cornstalk Nitrate Test
 - Developed at ISU
 - Testing available at many Iowa labs
 - Recognized for use with CSP N management enhancements



Indicators of Success

Goals identified in Developing Social Indicators for NPS Management (Genskow and Prokopy, 2008)

- Increase awareness among target audience
- Attitudes among target audience supportive of NPS management actions
- Reduced constraints for using appropriate practices
- Increased capacity to address NPS management issues in the project area
- Increase adoption of NPS management practices by a target audience

GOAL: Increase awareness among target audience

Awareness of pollutants

- Impaired waters list
- Identified further need for monitoring
- Allocated funds to do monitoring
- Reviewed field, farm and watershed results

Awareness of appropriate practices

- Developed incentives
- Reviewed incentive structure annually
- Analyzed management scenarios
- Hosted fields day where cooperators led discussion

GOAL: Increase awareness among target audience

Phosphorus Index listing

PRODUCER_ID	FIELD_ID	FIELD_ACRES	P_INDEX	SCI	SOILTEST_P	STALK_N	STREAM_DIS	ROTATION	CONTOUR	NOTILL
9	12	7.9	9.85	0.54	311	0	320	CCOHH	Y	
33	b2	17.6	9.56	0.46	399	0	570	CS	Y	
9	11	4.4	8.88	0.82	535	0	200	CCOHH	N	
19	H6	10.0	8.84	0.14	248	0	3230	CCCOMMM	N	
25	2	8.2	7.51	0.23	217	0	560	CCB	N	
41	4A	20.3	7.20	-0.04	145	0	800	CC	Y	
45	V-1	20.8	7.19	-0.31	23	0	260	CS	Y	
25	3	18.4	6.86	-0.11	130	0	1360	CCB	N	
44	H-2	36.5	6.65	-0.02	125	0	940	CS	Y	
25	4	64.7	6.61	-0.11	111	0	860	CCB	N	
9	13	13.8	6.52	0.54	201	0	440	CCOHH	Y	
44	K-3	7.9	6.51	-0.76	23	0	1610	CS	Y	
9	10	1.1	6.36	0.72	224	0	630	CCOHH	N	
13	1	38.3	5.90	0.25	105	0	330	CC	N	
31	5	6.6	5.84	0.56	148	0	480	CCOMMM	Y	
41	4B	9.5	5.82	0.42	145	0	185	CC	Y	
12	2	36.6	5.56	0.17	126	0	2120	CS	Y	
12	4	18.4	5.55	0.17	93	0	1075	CS	Y	
26	2	8.8	5.55	0.14	46	0	380	CCCOHHH	Y	
33	b1	12.7	5.43	0.66	399	0	300	CS	Y	
26	8	5.8	5.42	0.49	45	0	280	CCCOHHH	N	
30	N4	20.7	5.26	0.06	22	0	220	CS	Y	
43	1	32.4	5.24	-0.23	32	0	1080	CC	Y	
6	B4	11.4	5.20	-0.02	73	0	740	CC	Y	
23	H-east	67.6	5.14	0.43	277	0	1550	CC	N	
35	W4	12.4	5.09	0.23	58	0	670	CCCOHHH	Y	
13	2	117.0	4.99	0.24	145	0	1090	CC	N	
26	7	8.4	4.96	0.35	58	0	990	CCCOHHH	N	
6	R3	19.9	4.92	0.49	99	0	600	CCCOHHH	Y	

21	6	5.4	0.44	1.00	21	0	500	RGraze	N	Y
14	a5	5.6	0.38	0.85	23	0	240	CS	N	Y
21	1	32.3	0.20	1.10	19	0	730	RGraze	N	Y
5	14	52.6	0.00	0.46	0	0	4200	CCCCS	Y	
38	P-fs	3.0	0.00	0.64	0	0	380	CS	N	Y
38	H-fsw	3.2	0.00	0.63	0	0	720	CS	N	Y

PI Category	# of fields	total acres	avg. PI	avg. SCI	avg. soil P	avg N	avg. distance	% hay/graze	% contour	% no till
>5	26	513	6.24	0.13	150	0	958	35	62	0
3 to 5	98	2236	3.83	0.34	79	0	1488	52	48	2
2 to 3	112	3039	2.51	0.50	55	0	1693	65	57	5
1 to 2	83	2351	1.54	0.62	48	0	2534	34	48	30
0 to 1	50	1319	0.74	0.79	26	0	1569	28	22	80
No PI	3	59	0.00	0.48	0	0	3816			
	372	9516								
2007 Watershed Weighted Average			2.54	0.51	60	0	1785	47	48	19
>5	20	413	6.62	0.15	181	0	1054	45	40	0
3 to 5	84	1692	3.72	0.41	86	0	1661	58	52	1
2 to 3	106	2828	2.48	0.54	57	0	1572	67	57	7
1 to 2	70	2169	1.61	0.59	49	0	2336	47	50	27
0 to 1	36	1085	0.72	0.76	29	0	1380	24	26	91
	316	8187								
2006 Watershed Weighted Average			2.48	0.54	63	0	1741	54	50	19

Phosphorus Index



Soil Conditioning Index



Aerial Photos

GOAL: Increase awareness among target audience

Hewitt Creek P Index performance incentives

2005	2006	2007	2008
\$80 for completing PI on 2 fields	\$400 first year payment if PI < 3	\$300 first year payment if PI is < 3	\$300 first year payment if PI is < 3
		\$50 for annual review	\$50 for annual review
	\$200 bonus if PI is < 2 OR \$200 for each 0.3 reduction in PI	\$150 bonus if PI is < 2 OR \$150 for each 0.3 reduction in PI	\$150 bonus if PI is < 2 OR \$150 for each 0.3 reduction in PI
\$50 for P soil testing	\$10 per management area or field tested for soil test P	\$10 per management area or field tested for soil test P	\$10 per management area or field tested for soil test P
	\$200 bonus if all fields test optimum (16-20 ppm) or less for soil test P	\$150 bonus if all fields test optimum (16-20 ppm) or less for soil test P	

“We had some other neighboring farmers who said, “How come you only spread fertilizer on half of that field, and you didn’t spread fertilizer on the other half? We noticed when you were out there” And I then explained to them what I did then as a test. You know what? They all come back and wanted to know what I found out.”

GOAL: Increase awareness among target audience

Coldwater-Palmer Watershed Phosphorus Index and Soil Conditioning Index Examples

1 Corn/Soybean Rotation fall chisel after corn, field cultivate, manure

		Acres	P Index	SCI value
1	178B P=52	44.0	1.55	0.36
2	198B P=17	12.7	1.08	0.45
3	214B P=60	28.0	1.86	0.37
4	214B P=45	71.1	1.45	0.37
total acres =		155.80		
weighted average P Index =			1.52	
weighted average soil conditioning index =				0.37

5 Continuous Corn w/buffer

		Acres	P Index	SCI value
1	178B P=52	44.0	1.08	0.71
2	198B P=17	12.7	0.73	0.74
3	214B P=60	28.0	1.31	0.70
4	214B P=45	71.1	1.06	0.70
total acres =		155.80		
weighted average P Index =			1.08	
weighted average soil conditioning index =				0.71

2 Continuous Corn fall chisel, field cultivate, annual manure

		Acres	P Index	SCI value
1	178B P=52	44.0	1.26	0.71
2	198B P=17	12.7	0.87	0.74
3	214B P=60	28.0	1.54	0.70
4	214B P=45	71.1	1.24	0.70
total acres =		155.80		
weighted average P Index =			1.27	
weighted average soil conditioning index =				0.71

6 Corn/Soybean Rotation w/buffer

		Acres	P Index	SCI value
1	178B P=52	44.0	1.30	0.36
2	198B P=17	12.7	0.89	0.45
3	214B P=60	28.0	1.55	0.37
4	214B P=45	71.1	1.22	0.37
total acres =		155.80		
weighted average P Index =			1.28	
weighted average soil conditioning index =				0.37

4 Corn/Corn/Soybean fall chisel after corn, field cultivate, manure for 2nd corn

		Acres	P Index	SCI value
1	178B P=52	44.0	1.35	0.55
2	198B P=17	12.7	0.94	0.59
3	214B P=60	28.0	1.64	0.53
4	214B P=45	71.1	1.31	0.53
total acres =		155.80		
weighted average P Index =			1.35	
weighted average soil conditioning index =				0.54

8 No-till Corn/Soybean low disturbance manure prior to corn

		Acres	P Index	SCI value
1	178B P=52	44.0	1.01	0.74
2	198B P=17	12.7	0.65	0.75
3	214B P=60	28.0	1.20	0.74
4	214B P=45	71.1	1.03	0.74
total acres =		155.80		
weighted average P Index =			1.02	
weighted average soil conditioning index =				0.74

2* CC for cellulose fall chisel, field cultivate, annual manure, cellulose

		Acres	P Index	SCI value
1	178B P=52	44.0	1.55	0.35
2	198B P=17	12.7	1.08	0.40
3	214B P=60	28.0	1.86	0.32
4	214B P=45	71.1	1.45	0.32
total acres =		155.80		
weighted average P Index =			1.52	
weighted average soil conditioning index =				0.33

2** No-till CC for cellulose low disturbance manure, cellulose

		Acres	P Index	SCI value
1	178B P=52	44.0	1.17	0.74
2	198B P=17	12.7	0.80	0.76
3	214B P=60	28.0	1.43	0.72
4	214B P=45	71.1	1.11	0.72
total acres =		155.80		
weighted average P Index =			1.16	
weighted average soil conditioning index =				0.73

GOAL: Attitudes among target audience supportive of NPS management actions

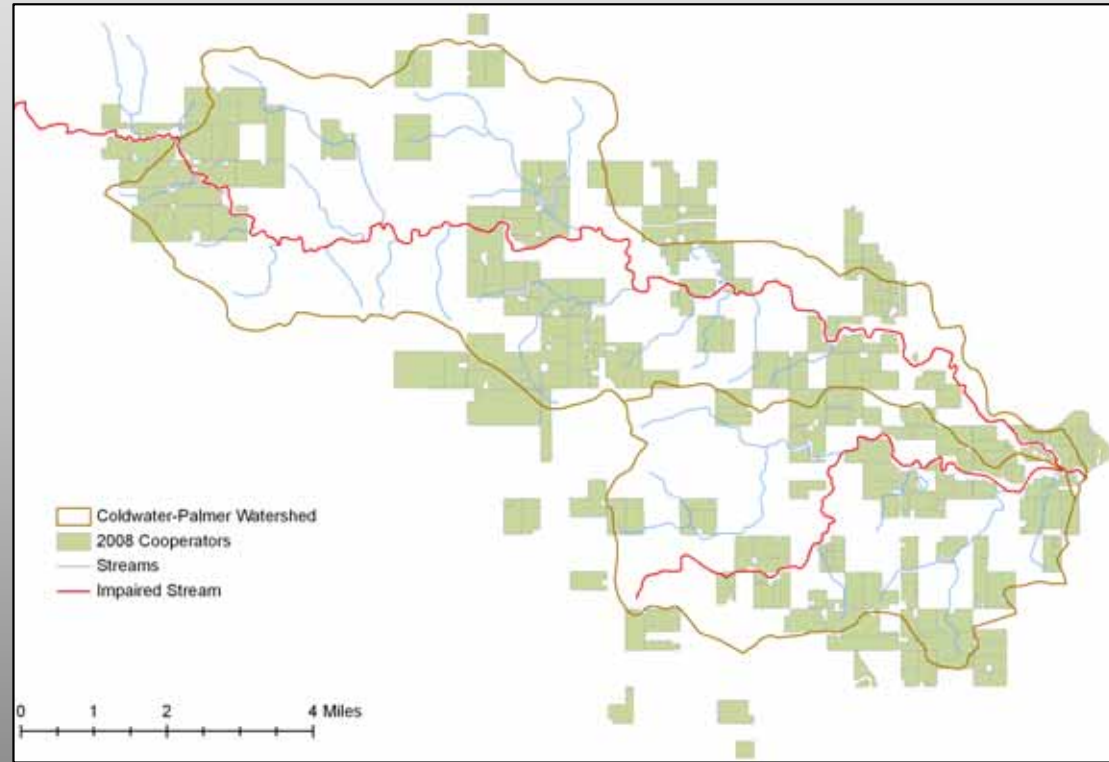
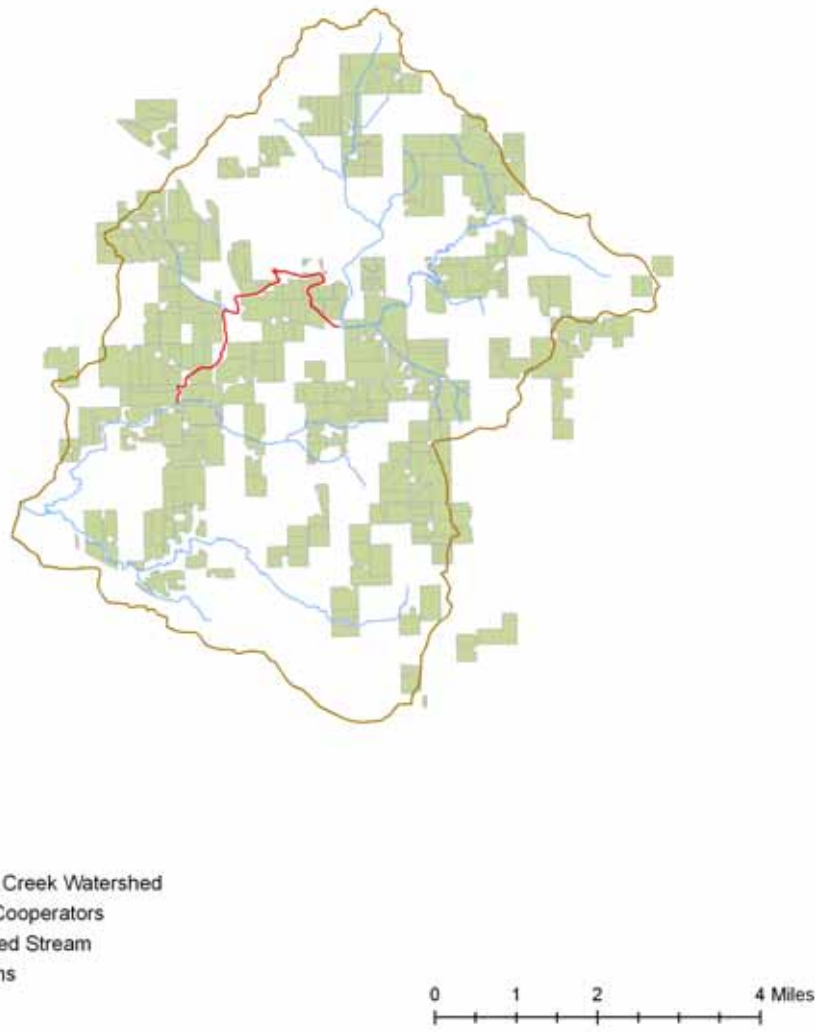
General water quality related attitudes

- Coldwater-Palmer – 70% participation
- Hewitt Creek – 66% participation
- Lime Creek – 45% participation
- New cooperators each year

Willingness to take action

- Leadership roles
- Leaders have promoted process at regional and state levels
- Discussion of local demonstration results

GOAL: Attitudes among target audience supportive of NPS management actions

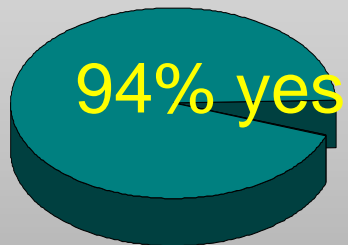


“I’m very glad I got involved. I was hesitant at first, but I’m more than overwhelmed with and glad I got involved because it was very well worth my time.”

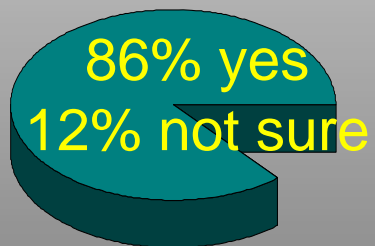
GOAL: Reduced constraints for using appropriate practices



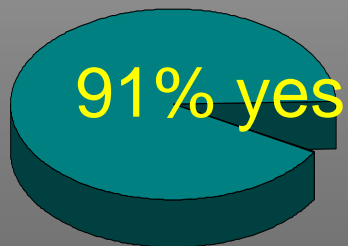
The performance-incentive program rewards a conservation systems approach.



Program encourages management changes.



86% – program has a positive effect on the environment – 12% not sure yet.



Program helped make their operation somewhat or more profitable.

GOAL: Increased capacity to address nonpoint source management issues

Watershed councils applied for and received grants

- WIRB - \$978,000 for 3 watersheds
- CIG - partnership with Winrock, U of Vermont
- In-kind support - \$400,000

Partnerships with local colleges for water monitoring

Hired individuals and FFA to collect stalk samples

Accessed conservation programs

- EQIP
- Continuous CRP
- ECP

“If you go down to my neighbor and try and teach him something, he’s not gonna believe you. If I go down and tell him and he saw it on my farm last year, he’ll believe me.”

GOAL: Increased adoption of NPS management practices by a target audience

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26	7	8.4	4.96	0.35	58	0	990	CCCOHHH	N	
6	R3	19.9	4.92	0.49	99	0	600	CCCOHHH	Y	

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21	1	32.3	0.20	1.10	19	0	730	RGraze	N	Y
5	14	52.6	0.00	0.46	0	0	4200	CCCCS	Y	
38	P-fs	3.0	0.00	0.64	0	0	380	CS	N	Y
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3 to 5	98	2236	3.83	0.34	79	0	1488	52	48	2
2 to 3	112	3039	2.51	0.50	55	0	1693	65	57	5
1 to 2	83	2351	1.54	0.62	48	0	2534	34	48	30
0 to 1	50	1319	0.74	0.79	26	0	1569	28	22	80
No PI	3	59	0.00	0.48	0	0	3816			
	372	9516								
2007 Watershed Weighted Average			2.54	0.51	60	0	1785	47	48	19
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2 to 3	106	2828	2.48	0.54	57	0	1572	67	57	7
1 to 2	70	2169	1.61	0.59	49	0	2336	47	50	27
0 to 1	36	1085	0.72	0.76	29	0	1380	24	26	91
	316	8187								
2006 Watershed Weighted Average			2.48	0.54	63	0	1741	54	50	19

Targeting P Index

- 25% of cooperators received no 1st year P Index incentive
- 21 fields with P Index > 5

Improvement

- 8 of 9 cooperators improved average farm P Index 22%
- 16 of 21 fields > 5 improved P Index 39%
- 8 of 9 cooperators improved average farm SCI 114%
- 16 of 21 fields > 5 PI improved SCI 91%

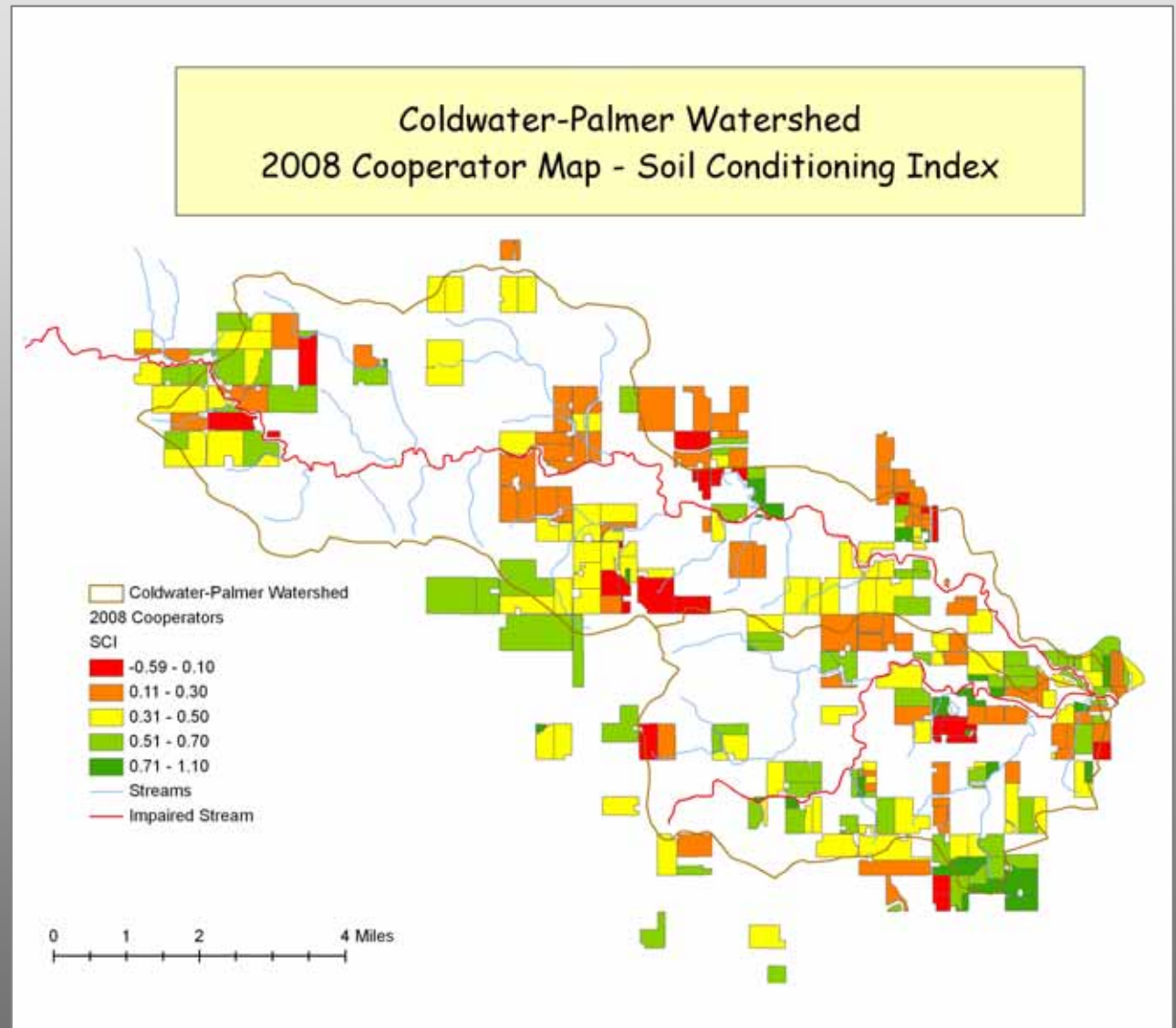
GOAL: Increased adoption of NPS management practices by a target audience

Council Priorities

- Encourage no-till and strip-till of corn into soybean stubble

Targeting SCI

- 3 year cooperators changing to no-till soybean in rotation with corn improved SCI 134%
- 200+% increase in SCI when no-till planting beans on low CSR soils
- 3 year cooperators improved SCI 31%



GOAL: Increased adoption of NPS management practices by a target audience

COLDWATER/PALMER CREEK CORNSTALK NITRATE TEST RESULTS - 2007

ID	Sample #	Stalk NO3-N (ppm)	Nitrogen application	Estimated N (lb/a)	Rotation	Yield (bu/a)
3	1	4,670	Ostrander - 394 soil			210
17	2 (B)	4,131	Spring - 130# as urea + Spring-Fall cattle manure	130 +	C-B-C	174
22	1	3,627	Side-dress 25# as 28% + Fall manure	Tiled 25 + manure	B-C-C	134
17	1 (S)	3,418	Spring - 130# as urea	130	C-B-C	161
22	2	2,935	Spring - 100# as 28% + Fall manure	130	C-B-C	178
17	3 (3)	2,935	Spring - 130# as urea	130	C-B-C	121
25	4	2,813	Spring - 190# as 32%	Tiled 190	C-C-C	188
21	1	2,626				227
14	2	2,437	Fall - 150# NH3	Tiled 156	C-B-C	139
4	2	2,281	Spring - 125# as urea	Rockton - 213 soil No tile 125	C-B-C	197
17	4 (7)	2,030	Spring - 185 as urea + Spring-Fall cattle manure	130 +	C-C-C	231
5	1	2,028	Sp 49# as 28%+27# as DAP+77#as 28%SD 783,399.64 soil	153	C-B-C	204
14	1	1,890	Fall - 150# NH3	Tiled 156	C-B-C	154
12	1	1,735	Spring - 190# as urea	No tile 180	C-C-C	190
23	1	1,683	Spring - 140# + Fall-Spring 2-4T/A manure	Some tile 140 +	C-B-C	209
25	3	1,324	Fall - 190# NH3 + 3,000 gal liquid hog manure	Tiled 306	C-B-C	201
4	1	1,239	Spring - 125# as urea	Baseth - 171 soil Tiled 125	C-B-C	176
23	4	1,203	Spring - 140# as liquid	Some tile 140 +	C-B-C	163
23	3	1,172	Spring - 140# as liquid	Some tile 140 +	C-B-C	184
20	2	1,003	Side-dress - 155# as 28% + Cattle man. Heavy soil, some tile	155 +	B-C-C	128
8	3 S	961				155
1	2	932	Sp 35# as 32% + 3,000gal(50-32-36); 213, 178, 174; Tiled	204	C-C-C	180
8	3	810				157
23	2	711	Spring - 140# as liquid + Fall-Sp-2-4T/A manure	Some tile 140 +	C-B-C	207
8	4	706	Sp - 105# as NH3 + 40 as 28% over top; Ostrander soil, tile	145	C-B-C	195
15	2	691	Fall - 120# NH3 + 17A Dayton 30	No tile 120 +	C-B-C	179
1	3	682	Sp 35# as 32% + 3,000gal(50-32-36); 213, 178, 174; Tiled	204	C-C-C	133
8	3	681	Sp - 105# NH3 + 40 as 28%; Ostrander - 394 soil	Tiled 145	C-B-C	128
20	1	593	Side-dress - 130# as 28% + Fall 13#; Light to dark soil, Tiled	143	C-B-C	144
5	2	590	Sp 49# as 28%+27# as DAP+77#as 28%SD 783,399.64 soil	153	C-B-C	194
3	2	522	Waukegan - 178 soil			248
8	1	493	Sp - 105# NH3 + 40# as 28% over top; Floyd - 198 soil; Tiled	145	C-B-C	206
8	2	396				187
12	2	381	Spring - 200# as urea	No tile 200	C-C-C	169
8	2	321	Sp - 105# NH3 + 40# as 28% over top; Cresco-793 soil; Tile	145	C-B-C	175
15	1	262	Fall - 120# NH3 + 17A Dayton 30	No tile 120 +	C-B-C	175
1	1	163	Sp 35# as 32% + 3,000gal(50-32-36); 213, 178, 174; Tiled	204	C-C-C	158
8	1	151				217
38		1,504	38 samples from 2006 & 2007 cooperators	165		177
28	3	7,275				155
28	2	7,015				145
34	1 (M2)	5,999	Spring - 130#NH3 + Fall cattle Manure; Kanyon-83 soil; Tile	130 + manure	C-B-C	174
28	2	4,763	150# as NH3	150	B-C	151
24	1	4,735				214
24	2	4,670				169
28	4	4,085				157
30	1	3,929				163
36	1 (RP)	3,710	183# N	183		156
28	1	3,432				189
31	1	3,059				199
36	3 (NE C)	3,052	183# N	183		203
31	4	2,975				128
30	2	2,727				147
26	1	2,611	150# as NH3	150	B-C	211
36	2 (NE)	2,586	183# N	183		143
31	3	2,216				160
34	3 (MS)	2,096	170# as NH3	Downan - 782 soil Tiled 170	C-C-C	142
31	2	2,081				185
34	2 (M7)	1,664	130# as NH3	Rockton - 213 soil No tile 130	C-B-C	181
31	2	1,288				7 ears
27	3-E	1,171	Sp - 110# as NH3 + 21A cattle manure; Kanyon-83	Tiled 134	C-B-C	180
34	4 (N2)	1,149	170# as NH3	Downan - 782 soil Tiled 170	B-C-C	152
37	3	940				219
26	1	863	Fall - 160 as NH3 + Spring 30# liquid; Ken-83, Cly-84 Tiled	190	C-C-C	186
27	1-W	809	Spring - 110# as NH3	Kanyon-83 Tiled 110	C-B-C	131
37	2	798				172
26	2	732	Fall - 160 as NH3 + Spring 30# liquid; Ken-83, Cly-84 Tiled	190	C-C-C	152
33	1	586				7 ears
37	1	393				219
11	1	187	Spring - 100# as 32%	Tiled 100	C-B-C	204
		2,697	31 samples from new 2007 cooperators	167		171
			89 samples average 2,041ppm ; average yield - 174 Bu/a			

Council Priorities

- Emphasize N management
- Move N application from fall to spring
- Side-dress N application
- LSNT sampling

Nitrogen Management

- 76% of cooperators enrolled in stalk testing program
- 2007 - 44% improvement in stalk sampling results when comparing yr 2 cooperators vs yr 1 cooperators
- Yr 2 cooperators: 1506 ppm – 177 bu/a
- Yr 1 cooperators: 2697 ppm – 171 bu/a

Questions?

“We’re not doing these practices for the money. We’re doing this to better the land, to be more friendly – that’s probably one of the most things we learned, is we have to be more land friendly.”

“The nice thing about it – other farmers were doing some other things, so you don’t have to be the guinea pig on everything by yourself. And then so everybody did something a little different, and all this information was gathered.”

“I think about Hewitt Creek...it didn’t happen overnight, and it’s not gonna get changed overnight. But if we keep going, keep trying we’ll get things done.”

Hewitt Creek farmers, December 2008