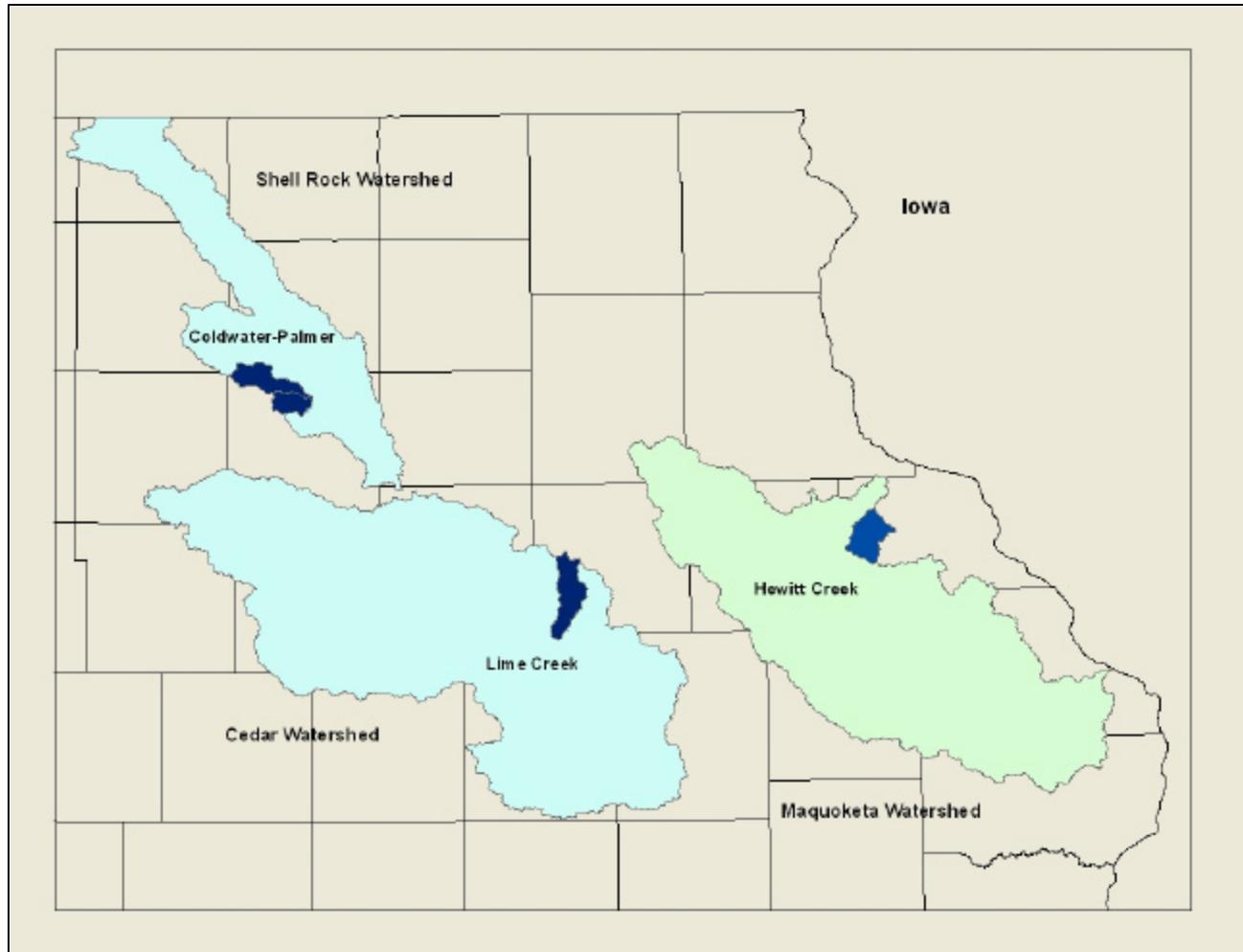


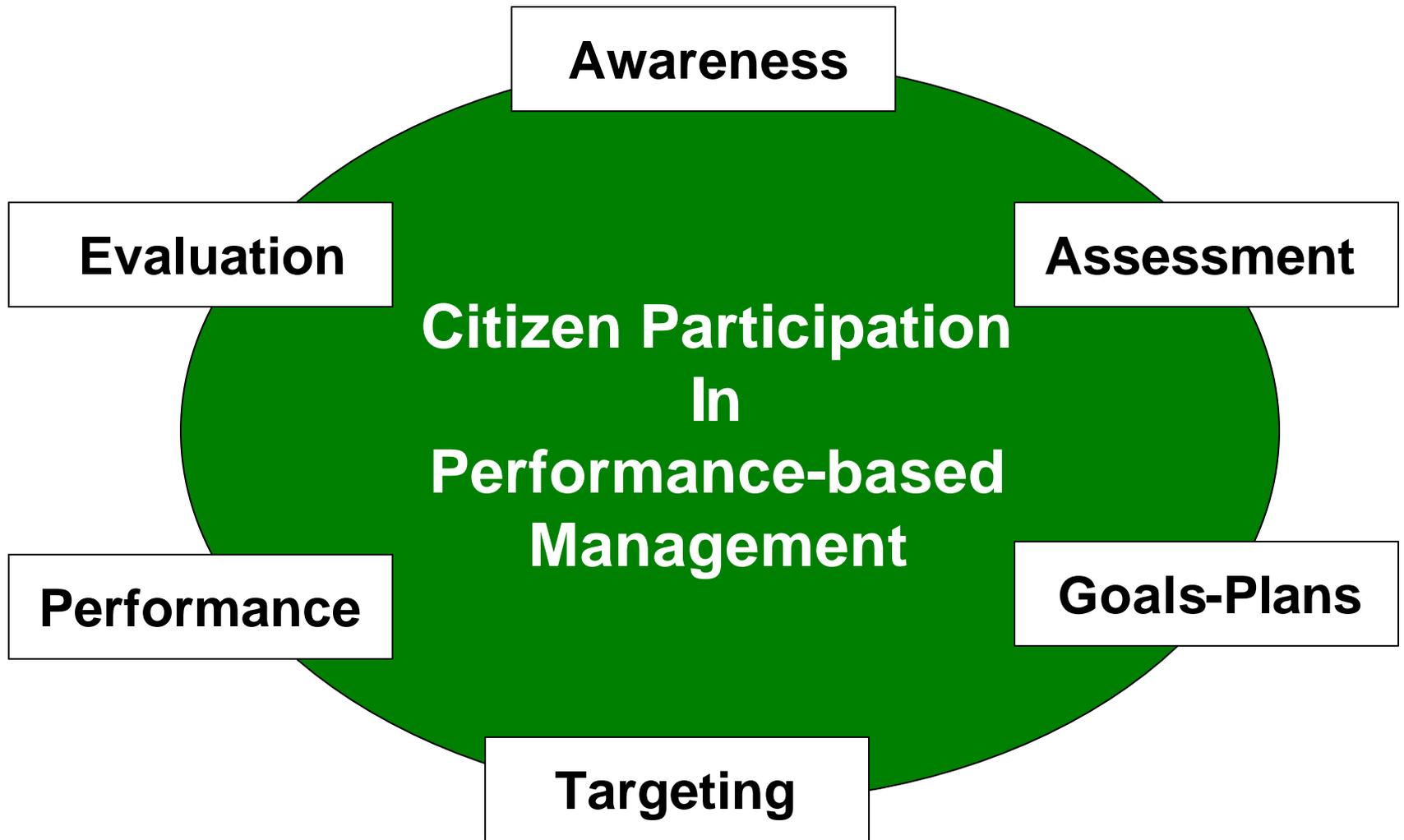
Watershed Resident Determination of Performance-based Environmental Management Incentives

**John Rodecap, Gerald Miller,
Susan Brown, Chad Ingels**

**USDA-CSREES Section 406, ISU-University Extension
Iowa Farm Bureau Federation, Iowa Corn Growers
Association, Iowa Watershed Improvement Fund**

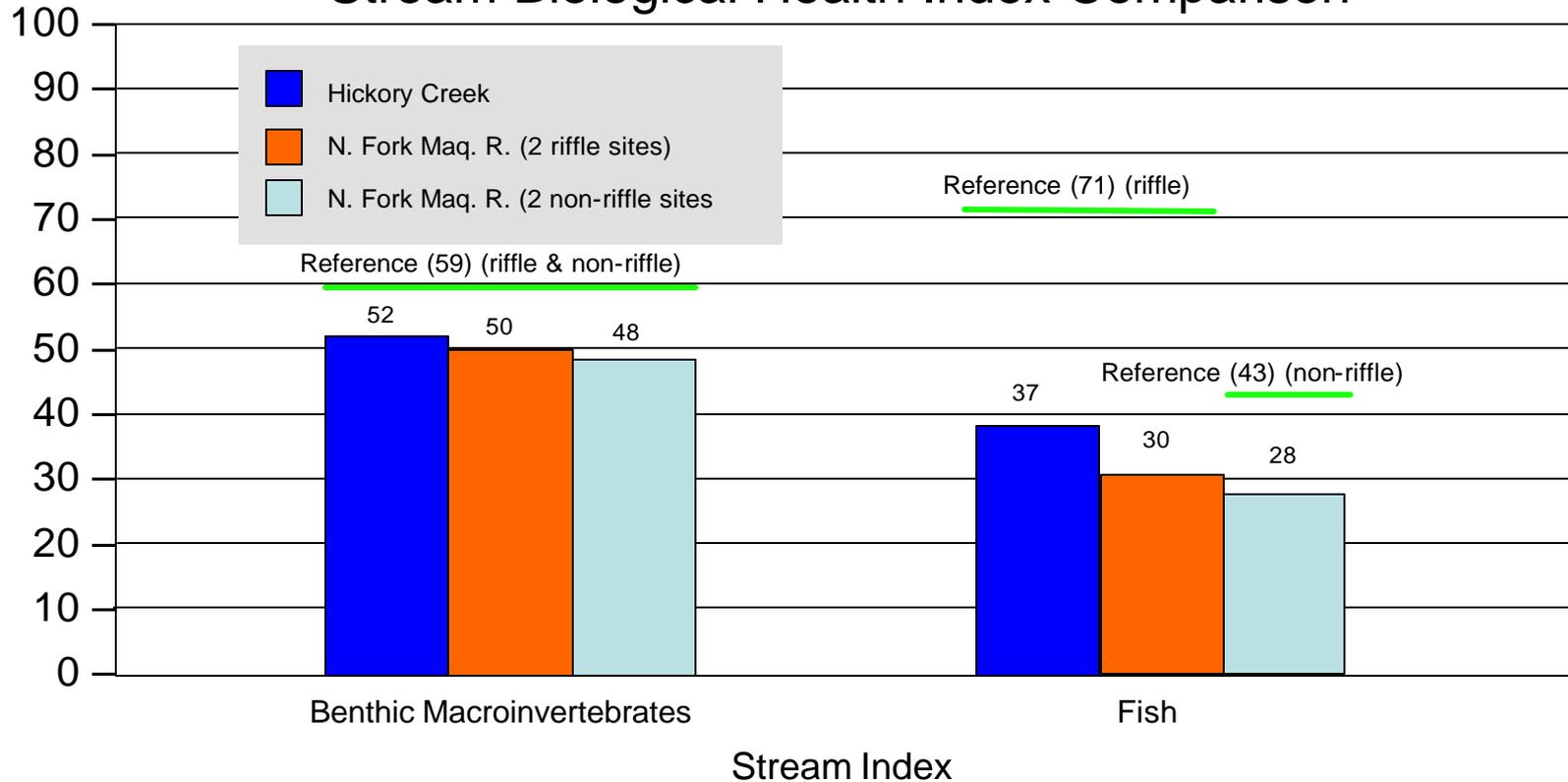
Northeast Iowa Watersheds – 50 to 80 potential cooperators per watershed





- Watershed residents take environmental management ownership of their watershed.

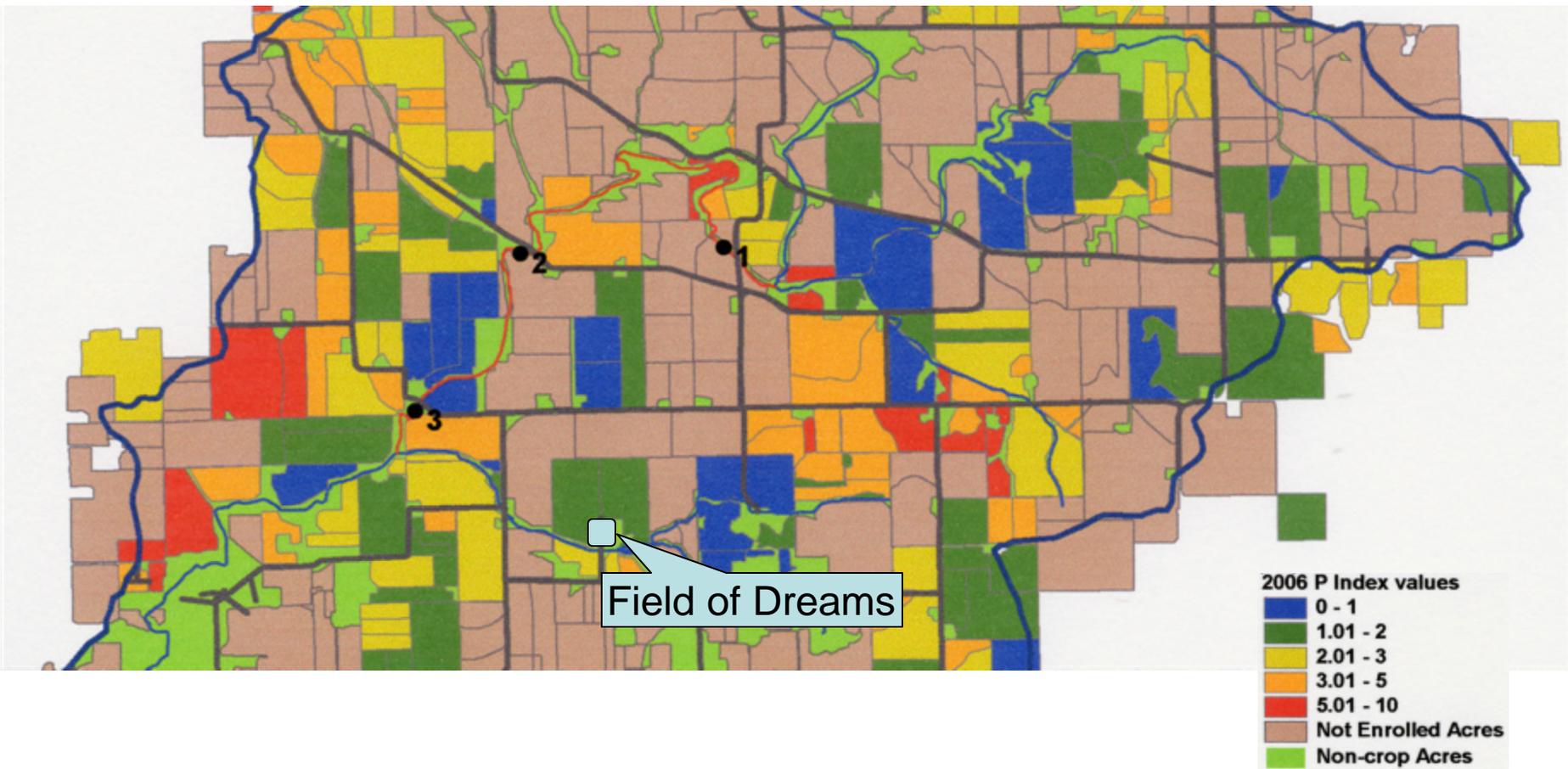
Stream Biological Health Index Comparison



- Watershed residents interpret scientific data to link activities of agriculture production and environmental performance.

- Residents work together as a watershed community on environmental goals.





- Many think of the environment and agriculture as separate – we need to connect the two into compatible outcomes.

Hewitt Creek Cooperator

Field ID

P Index value - wt avg = 3.73

Soil Conditioning Index - wt avg = 0.74

- Performance-based computer modeling indexes provide farmers targeted guidance for creative and innovative strategies to address nonpoint source pollution issues.



HEWITT CREEK CORNSTALK NITRATE TEST RESULTS - 2006

ID	Sample #	Stalk NO3-N (ppm)	Nitrogen Application	Estimated N (lb/a)	Rotation	Yield (bu/a)
34	1	11,600	50# as 28% PP + 50# with Pla + Winter Cow	100+	CC	
31	BLNK	10,514				
10	2	9,889	1/2 Spring & 1/2 Fall 18T/A (6.4-3.2-11.2)	115	HHHC	LSNT 39
18	3	9,210	10 T/Ac dairy bedding dairy pack + 28%	7	HC	
10	1 SE	8,530	Fall manure (6.4-3.2-11.2) 26T/A	166	HHHC	10 B< 10 18&
33	1	8,500	100# as 28% after planting	100	SC	
10	1	7,720	Spring manure (6.4-3.2-11.2) 18T/A	115	HHHC	LSNT 36
37	1	7,548				
34	2	7,400	50# W/Planter + 3,000 fall hog + 6T/A pack	Approx 250+	HHHC	
20	1-H	7,110	150# as Spr 28% + Stab + 15 T/A man	213	CC	
20	2-B	7,020	150# as Spr 28% + Stab + 15 T/A man	213	CC	
9	14	6,500	50# as NH4SO4 + 30 T/A manure	158	H-HCC	
3	1	6,440	65# as Spr 28% + 12 T/A hog cattle pack	Approx 165+	HCC	203
18	4	6,280	10 T/Ac dairy bedding dairy pack + 28%	?	CC	
29	2 field 3	5,950	315# as spring injected liquid dairy	315	CC	
14	1	5,920	100# as 28% after planting	100	SC	
1	2	5,860	140# as 28% pre-emergence, No-til	140	SC	
19	1	5,591	Pk man on H in 2005 + 21 T/A, No N	100	HC	244
26	1	5,010	92# as spring urea plus 10 T/Ac manure	128	HCC	
18	2	5,000	28%	?	HC	
28	2	4,950	80# as 32% No-til plant + 20T/A Dairy Man	175	SC	
32	2	4,570	100# as 28% after planting + bedding pack	195	SC	
28	1	4,470	100# as 32% No-til plant + 20T/A Dairy Ma	195	SC	
19	2	4,395	50# N with herb. + 21 T/A dairy man	150	CC	230
18	1	4,220	4T/Ac dairy bedding dairy pack + 28%	?	CC	
15	3 field 6	4,140	150# as 28% with No-til planter	150	SCC	207
37	2	3,915				
6	1-H	3,770	140# as Spr Urea + 20 T/A Lij Dairy	224	CC	
26	2	3,540	92# as spring urea plus 10 T/Ac manure	128	HCC	
16	2	3,500	170# as 28% no-til plant + 3,000 (Apr150N	320	CC	
3	2	3,290	11T/A hog steer pack spring 2006	Approx 100+	SC	196
5	1	3,070	120# Spring NH3 Late Spring NO3 - 39	120	CC/CSC	195
38	2-D	3,050	170# as Spring Anhydrous	170	CC	
38	1-H	3,010	100# as Side-dress + 4,000 G Lij hog	235	CC	
28	3	3,010	60# as 32% No-til plant + 20T/A Dairy Man	155	SC	
32	1	2,990	100# as 28% after planting + bedding pack	195	SC	
25	2	2,930	100# in June as 28% + 15 T/A man	163	SC	
35	1	2,860	11# as 11-52-0 + 92# as urea	103	SC	
4	1-R	2,770	120# as 32% no-til plant + 3,000 (180# N)	300	SC	213
35	2	2,670	11# as 11-52-0 + 115# as urea	126	CC	
33	2	2,560	100# as 28% after planting	100	SC	
9	11	2,522	50# as NH4SO4 + 10 T/A manure	86	CCCC	
5	3	2,420	90# Sp NH3 + 8 T/A 18-9-15 ma LSNT 43	162	AAACC	204
4	3-H	2,290	120# as 32% with no-til planter	120	SC	178
5	2	2,170	90# Spring NH3 + 15,000 G/A ma LSNT 40	90+	SCCCC	192
5	6	2,140	190# Spring NH3 LSNT 26	190	CCSCC	199
16	1	2,030	170# as 28% with no-til planter	170	SC	
6	2-W	1,840	140# as Spr Urea + 20 T/A Lij Dairy	224	CC	
25	1	1,660	50# preplant + 100# in June as 28%	150	CC	
15	1 field 4	1,530	100# as 28% at planting + heavy man pack	195	CCC	179
4	2-R	1,520	60# as 32% no-til plant + 3,000 (180# N)	240	SC	213
29	1 field 1	1,510	315# as spring injected liquid dairy	315	CC	
15	4 field 7	1,110	30# as 28% with No-til planter	30	H-H-HHC	154
4	2-H	976	60# as 32% with no-til planter	60	SC	209
5	5	977	8,000 G/A 34-23-38 Fall LSNT 29	272	CCCCC	199
12	1	821	90# as 28% after planting no-til	90	SC	
9	16#	798	30 T/A manure, no commercial N	108	H-HHC	
4	1-H	779	80# as 32% with no-til planter	80	SC	201
1	1	708	140# as 28% pre-emergence, No-til	140	CC	
14	2	642	100# as 28% after planting	100	SC	
5	4	561	90# Sp NH3 + 8T/A 18-9-15 ma pk LSNT27	162	CCCCC	220
4	3-R	461	30# as 32% no-til plant + 3,000 (180# N)	210	SC	208
8	1	340	110# urea + 10# 28%	120	SC	
15	2 field 5	133	75# as 28% at planting + bedding pack	170	CCC	160
3	3	95	90# as 28% Spr + 3,000 fall liq hog, No-til	150	SC	209
8	2	45	160# urea + 10# 28% + 20T/A manure	?	CC	
12	2	37	90# as 28% after planting no-til	90	SC	
		3,755		161		201

- Residual nitrogen measured by the corn stalk nitrate nitrogen test declined 21% from 2005 to 2006.
- Sustainable performance is the result of education and applied research on producers' own land.



- Experimentation – cover crops, no-till and N rate and timing demonstrations – have shown net income enhancing yields, 0.8 to 1.0 pounds of N/Bu of corn or 3,500 gallons of swine manure results in economic optimum yields.



- Over 22 miles of buffers and waterways were installed on 36 farms at a project cost of \$0.14/ft vs. NRCS average \$0.78/ft. Producers have flexibility to select low-cost alternatives or may select cost-share practices to improve index scores.



- Low income and/or new farmers can participate using contour farming, altering rotations on targeted fields, using buffer strips and grass waterways or careful nutrient management.

- A survey revealed that neighbor-to-neighbor is the most-used information source. Neighbor-to-neighbor sharing is extensive.





- Operators make the day-to-day decisions that impact environmental performance. Participation moved from farm owners to farm operators.



Desirable Outcomes

Questions may be directed to
staff at:

ISUE Performance-based
Watershed Projects

PO Box 487

Fayette, Iowa 52142

Ph. (563) 425-3233

jrodecap@iastate.edu

PERFORMANCE (outcome)-BASED FARM and WATERSHED
ENVIRONMENTAL MANAGEMENT PROGRAM

Hewitt Creek Watershed 2007 program Rev. 9/5/06
Please check activities you wish to complete. (Deadline April 1/first-come subject to funding).
[Payments near July 1 and early December may be prorated if participation exceeds \$67,000].

PHOSPHORUS INDEX (PI) See explanation of the P-index on back of this page.

- ___ \$300 first year payment if the weighted whole farm P-index is less than a phosphorus loss risk of 3 (2-5 is medium risk). All field scores weighted by the field size and risk of P loss from each field to attain a weighted average farm P-index.
- ___ \$50 paid for annual data and P-index review after the first year.
- ___ \$150 bonus if the P-index is 2 or less (low) or for each 0.3 reduction in P-index.
- ___ \$150 bonus if all fields test within or less than the optimum P University soil test range.
- ___ \$10 per management area or field tested for soil test P, 10 or more acres per sample.

SOIL CONDITIONING INDEX (SCI) See the back of this page for SCI explanation.

- ___ \$200 first year payment per 0.1 SCI above 0. An average of all fields in farming operation. Example: A weighted average farm SCI of 0.4 will provide a payment of \$800.
- ___ \$50 per 0.1 SCI for annual data and SCI review after the first year.
- ___ \$400 paid for each 0.1 improvement in the annual SCI.

NITROGEN PERFORMANCE MANAGEMENT (Corn Stalk Nitrate-Nitrogen analysis)

- ___ \$400 payment if the farm weighted average analyses does not exceed 1,700ppm.
- ___ \$200 bonus if the weighted average (Max. 50 acres/field) is less than 1,300ppm or within 200ppm of the average of all watershed samples analyzed.
- ___ \$80 for the first two NO₃-N samples analyzed and \$30.00 for each additional field.
- ___ \$200 bonus for a wetland impoundment or if drainage tile management of spacing and depth or treatment system is used to reduce N delivery.

OTHER INCENTIVES

- ___ \$200 For first time manure application calibration, and manure analysis.
- ___ \$50 for additional manure analyses taken and results reported by project cooperators.
- ___ \$10 per acre up to 40 acres for fall cover crop on corn silage or soybean stubble.
- ___ \$300 Grid sampling and variable rate fertilizer application (40 acres/year for 3 years).
- ___ \$200 Install a manure settling basin and grass filter or pre-lot water diversion.
- ___ \$200 Livestock Exclusion (stream fencing) (may flash graze 3 times per year).
- ___ \$200 Managed grazing (5 or more paddocks).
- ___ \$200 Septic system up-grade. Low interest revolving fund loans available (515-242-6043).
- ___ \$100 Farmstead Assessment (first time self assessment or changes-improved assessment).
- ___ \$0.50/ft., maximum 1,200 ft., waterways, headlands, or buffers, minimum 30' width.

WATERSHED ENVIRONMENTAL PERFORMANCE (add-on bonus).

- ___ \$100 Bonus for each 10% increase above 20% of the land in the watershed enrolled in this Performance program. Payable to cooperators earning \$1,500 or more (\$1,000 after first year) watershed improvement incentives per farm operation.
- ___ \$500 Three years of monitoring showing evidence of reduced contaminant delivery.

Name

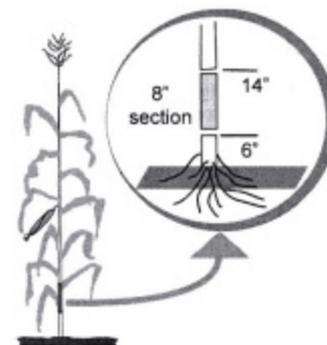
Address

Phone

The PHOSPHORUS (P) INDEX is a computer model used to assess the potential risk of P movement from fields to nearby water bodies. Increasing P concentrations in surface water results in increasing algae growth. The primary components of the P-index are soil loss (erosion), soil test P, rate and method of P application, field distance to water, and tile drainage. Regulations for new confinement feeding operations require (after 8/25/04) manure applications to be planned based on P-index. A one page questionnaire of field-by-field management practices will provide P-index computer modeling input.

The SOIL CONDITIONING INDEX (SCI) is a computer model to predict the effect of cropping systems and tillage practices on Organic Matter (OM) reported on a scale from -1 to +1. The three main components are organic matter returned or removed from the soil, the effect of tillage and field operations on OM decomposition, and effect of predicted soil erosion associated with soil conservation and other field management. Major contributing practices to increase index scores include: Forage or small grains in rotation, reduced tillage and especially no-till planting, and fall cover crop planting following corn silage or soybean harvest. Also Soil Conservation practices and structures including: waterways, contouring, contour buffers, terraces, headland planting, sediment control structures, etc. A negative SCI value predicts declining OM, while a positive value predicts increasing OM. NRCS requires a SCI value of 0 or above to be eligible for the Conservation Security Program.

The CORNSTALK NITRATE-N TEST is a direct performance evaluation of nitrogen and/or manure N management measured by the Nitrate-N concentration in the lower cornstalk. The sample consisting of 15 random 8" cornstalk sections will indicate nitrogen available during grain filling. Inadequate nitrogen is associated with reduced yields. More nitrogen than needed for maximum yields is indicated by nitrate accumulation in the lower cornstalks at the end of the season. Multiple year testing to account for seasonal variability will increase confidence in refining nitrogen management.



Potential Performance Scenarios for years 2 and 3
(Howitt Creek example)

1 Continuous Corn

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	4.24	0.87
H2	1636Z	P=54	27.7	5.05	0.21
6	1632D	P=62	31.7	3.13	0.35
JM1	4862D	P=77	26.8	3.90	0.35
1	3648	P=105	35.2	2.17	0.62
total acres = 153.60					
weighted average P Index = 3.62					
weighted average soil conditioning index = 0.43					

5 Continuous Corn w/field buffer

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	3.62	0.57
H2	1636Z	P=54	27.7	3.57	0.21
6	1632D	P=62	31.7	2.90	0.35
JM1	4862D	P=77	26.8	3.10	0.35
1	3648	P=105	35.2	1.90	0.62
total acres = 153.60					
weighted average P Index = 2.95					
weighted average soil conditioning index = 0.43					

2 Corn/Soybean Rotation

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	4.81	0.28
H2	1636Z	P=54	27.7	5.52	-0.06
6	1632D	P=62	31.7	3.43	0.14
JM1	4862D	P=77	26.8	4.30	0.14
1	3648	P=105	35.2	2.43	0.43
total acres = 153.60					
weighted average P Index = 4.03					
weighted average soil conditioning index = 0.20					

6 Continuous Corn w/75% waterways

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	3.49	0.57
H2	1636Z	P=54	27.7	4.13	0.21
6	1632D	P=62	31.7	2.86	0.35
JM1	4862D	P=77	26.8	3.50	0.35
1	3648	P=105	35.2	1.99	0.62
total acres = 153.60					
weighted average P Index = 3.20					
weighted average soil conditioning index = 0.43					

3 Corn/Corn/Soybean

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	4.55	0.44
H2	1636Z	P=54	27.7	5.21	0.10
6	1632D	P=62	31.7	3.21	0.30
JM1	4862D	P=77	26.8	4.04	0.30
1	3648	P=105	35.2	2.33	0.57
total acres = 153.60					
weighted average P Index = 3.76					
weighted average soil conditioning index = 0.35					

7 Corn/No-Till Soybean

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	4.43	0.46
H2	1636Z	P=54	27.7	4.90	0.16
6	1632D	P=62	31.7	3.99	0.30
JM1	4862D	P=77	26.8	3.85	0.30
1	3648	P=105	35.2	2.22	0.61
total acres = 153.60					
weighted average P Index = 3.64					
weighted average soil conditioning index = 0.40					

4 2Corn, Oat, 3Alfalfa

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	2.66	0.78
H2	1636Z	P=54	27.7	2.79	0.81
6	1632D	P=62	31.7	1.86	0.71
JM1	4862D	P=77	26.8	2.22	0.71
1	3648	P=105	35.2	1.58	0.84
total acres = 153.60					
weighted average P Index = 2.17					
weighted average soil conditioning index = 0.74					

8 No-Till Corn/Soybean

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	2.16	0.76
H2	1636Z	P=54	27.7	1.54	0.68
6	1632D	P=62	31.7	1.01	0.75
JM1	4862D	P=77	26.8	1.11	0.75
1	3648	P=105	35.2	1.35	0.78
total acres = 153.60					
weighted average P Index = 1.44					
weighted average soil conditioning index = 0.75					

1* CC for cellulose

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	5.93	0.17
H2	1636Z	P=54	27.7	6.82	-0.21
6	1632D	P=62	31.7	4.13	-0.06
JM1	4862D	P=77	26.8	4.71	-0.05
1	3648	P=105	35.2	2.43	0.34
total acres = 153.60					
weighted average P Index = 4.43					
weighted average soil conditioning index = 0.08					

1** No-Till CC for cellulose

ID	SMU	Soil P	Acres	P Index	SCI value
3	482C	P=130	32.2	1.96	0.82
H2	1636Z	P=54	27.7	1.46	0.79
6	1632D	P=62	31.7	1.02	0.81
JM1	4862D	P=77	26.8	0.92	0.81
1	3648	P=105	35.2	1.18	0.94
total acres = 153.60					
weighted average P Index = 1.32					
weighted average soil conditioning index = 0.81					

Field Background

3	1360'	center of field to stream
H2	890'	center of field to stream
6	1770'	center of field to stream
JM1	690'	center of field to stream
1	2160'	center of field to stream

Rewards for: Baseline Performance-1st Yr

Scenario #	P Index	SCI	Total
1 - CC (baseline)	18	1800	580
2 - CC	9	468	490
3 - CCB	0	708	700
CCDAAA	306	1480	1780
1 - CC w/buffer	306	960	1180
6 - CC w/waterway	0	960	960
7 - C w/IB	0	600	600
8 - w/IB CB	456	1900	1900
1* - CC for cellulose	0	130	130
1** - w/CC for cell	48	1636	2670

2nd Yr Performance

#	P Index	SCI	Total
1	930	1216	1260
2	89	100	189
3	69	176	225
4	778	1,616	2,388
5	368	216	680
6	268	216	476
7	69	200	269
8	1,148	1,888	2,796
1*	69	30	80
1**	1180	1938	3,070

Coldwater-Palmer Watershed
Phosphorus Index and Soil Conditioning Index examples

1 Corn/Soybean Rotation

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.55	0.36
2	1988	P=17	12.7	1.08	0.45
3	2148	P=60	28.0	1.86	0.37
4	2148	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

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.08	0.71
2	1988	P=17	12.7	0.89	0.74
3	2148	P=60	28.0	1.31	0.70
4	2148	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

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.28	0.71
2	1988	P=17	12.7	0.87	0.74
3	2148	P=60	28.0	1.54	0.70
4	2148	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

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.36	0.36
2	1988	P=17	12.7	0.89	0.45
3	2148	P=60	28.0	1.72	0.37
4	2148	P=45	71.1	1.32	0.37
total acres = 155.80					
weighted average P Index = 1.28					
weighted average soil conditioning index = 0.37					

3 Corn/Soybean Rotation

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.55	0.33
2	1988	P=17	12.7	1.08	0.30
3	2148	P=60	28.0	1.86	0.30
4	2148	P=45	71.1	1.45	0.30
total acres = 155.80					
weighted average P Index = 1.52					
weighted average soil conditioning index = 0.31					

7 Corn/No-till Soybean

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.42	0.55
2	1988	P=17	12.7	0.97	0.59
3	2148	P=60	28.0	1.72	0.53
4	2148	P=45	71.1	1.38	0.53
total acres = 155.80					
weighted average P Index = 1.41					
weighted average soil conditioning index = 0.54					

4 Corn/Corn/Soybean

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.35	0.55
2	1988	P=17	12.7	0.94	0.59
3	2148	P=60	28.0	1.64	0.53
4	2148	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

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.01	0.74
2	1988	P=17	12.7	0.65	0.75
3	2148	P=60	28.0	1.20	0.74
4	2148	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

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	2.25	0.33
2	1988	P=17	12.7	1.00	0.40
3	2148	P=60	28.0	1.86	0.32
4	2148	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

ID	SMU	Soil P	Acres	P Index	SCI value
1	1788	P=52	44.0	1.17	0.74
2	1988	P=17	12.7	0.80	0.76
3	2148	P=60	28.0	1.43	0.72
4	2148	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					

Field Background

1	870'	center of field to stream
2	348'	center of field to stream
3	800'	center of field to stream
4	1130'	center of field to stream

Rewards for: Baseline Performance-1st Yr

Scenario #	P Index	SCI	Total
1 - CB (baseline)	1204	1720	3340
2 - CC	390	1420	1630
3 - CB full IB	390	820	620