Pay-for-Performance Conservation to Implement Cost-Effective BMPs

Kristin Fisher, PhD

Agronomy

Water Quality

Pay-for-Practice

- Share the cost of implementing a BMP
- Established and accepted programs
- …but, ag land is far from homogeneous
- Unknown technical and cost-effectiveness

The issue

- Chesapeake Bay TMDL and WIP goals
- Limited funding
- How to maximize BMP implementation and water quality improvement with limited money?
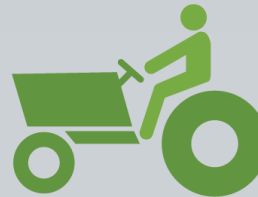
Pay-for-Performance Conservation

1

Meet with farmers to gather soil tests, field info, management history, etc.

2

Model P loss from each field under baseline and several conservation scenarios

3

Farmer chooses and implements best conservation practices for his/her fields

4

After verification, farmer is paid per unit P reduced

Pay-for-Performance

- Use nutrient modeling to identify "hot spots"
- Use economic modeling to determine cost to the farmer to implement a given BMP
- Pay farmers for pounds of nutrient reduction achieved by implementing a chosen BMP

USDA Economic Research Service: The Pay-for-Performance approach could be twice as effective at the same program cost as a Pay-for-Practice approach.

Process

1. Set a price per pound nutrient reduced
2. Model baseline losses from farm
3. Model losses under different BMP scenarios
4. Calculate cost-effectiveness

Process

5. Discuss scenarios with farmer
6. Farmers choose scenarios and execute contract
7. Verify implementation and issue payments

Example: W. Branch of Milwaukee River

1. Set a Price Per Pound Nutrient Reduced

- What are nutrient reduction goals?
- How much funding is there?
- Run test scenarios through model to estimate potential reductions and costs associated with those BMPs

Cost-Effectiveness of Phosphorus Loss Reduction Actions on Wisconsin Farms
($/lb P Loss Reduction /Year)

$25/lb P

Cover Crop	Tillage	Contouring	Nutrient Management	Filter Strip	Crop Rotation
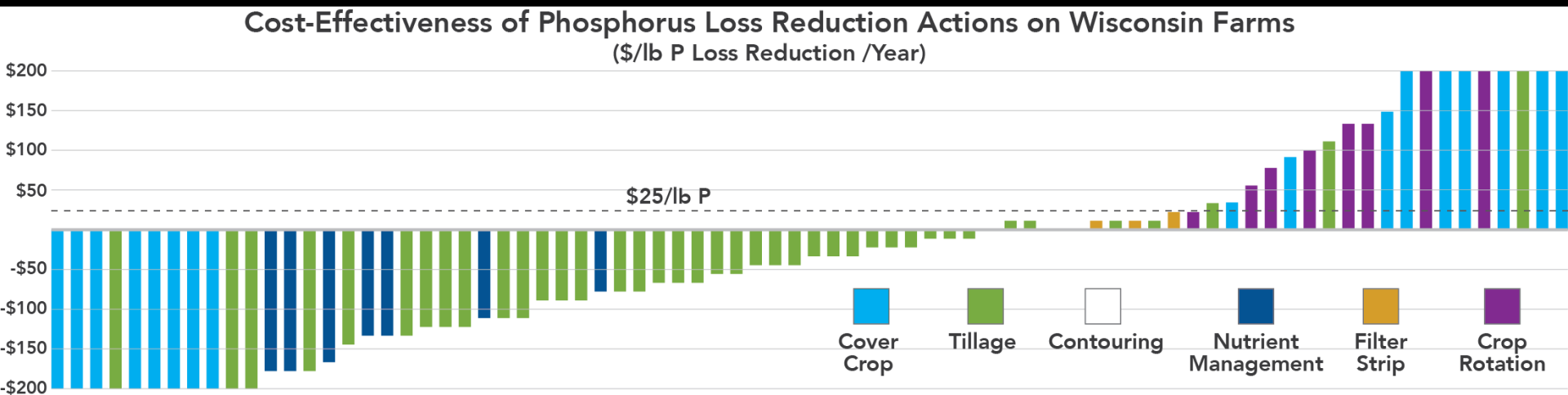
2 & 3. Model Baseline and BMP Scenarios

4. Calculate Cost-Effectiveness

ANNUAL P LOSS REDUCTION PER ACRE

All scenarios are cost-effective because all cost <$25/lb P incentive

COST PER LB P LOSS REDUCTION

LBS P LOSS REDUCTION/AC

COST/LB P LOSS REDUCTION

FALL TO SPRING CHISEL | FALL TO SPRING CHISEL, NO DISK | FALL CHISEL TO SPRING CULTIVATION | FALL CHISEL TO SPRING CULTIVATION, ROTATION | FALL CHISEL TO SPRING CULTIVATION, SEED ALFALFA | CONTOURING | 30 FT GRASS BUFFER
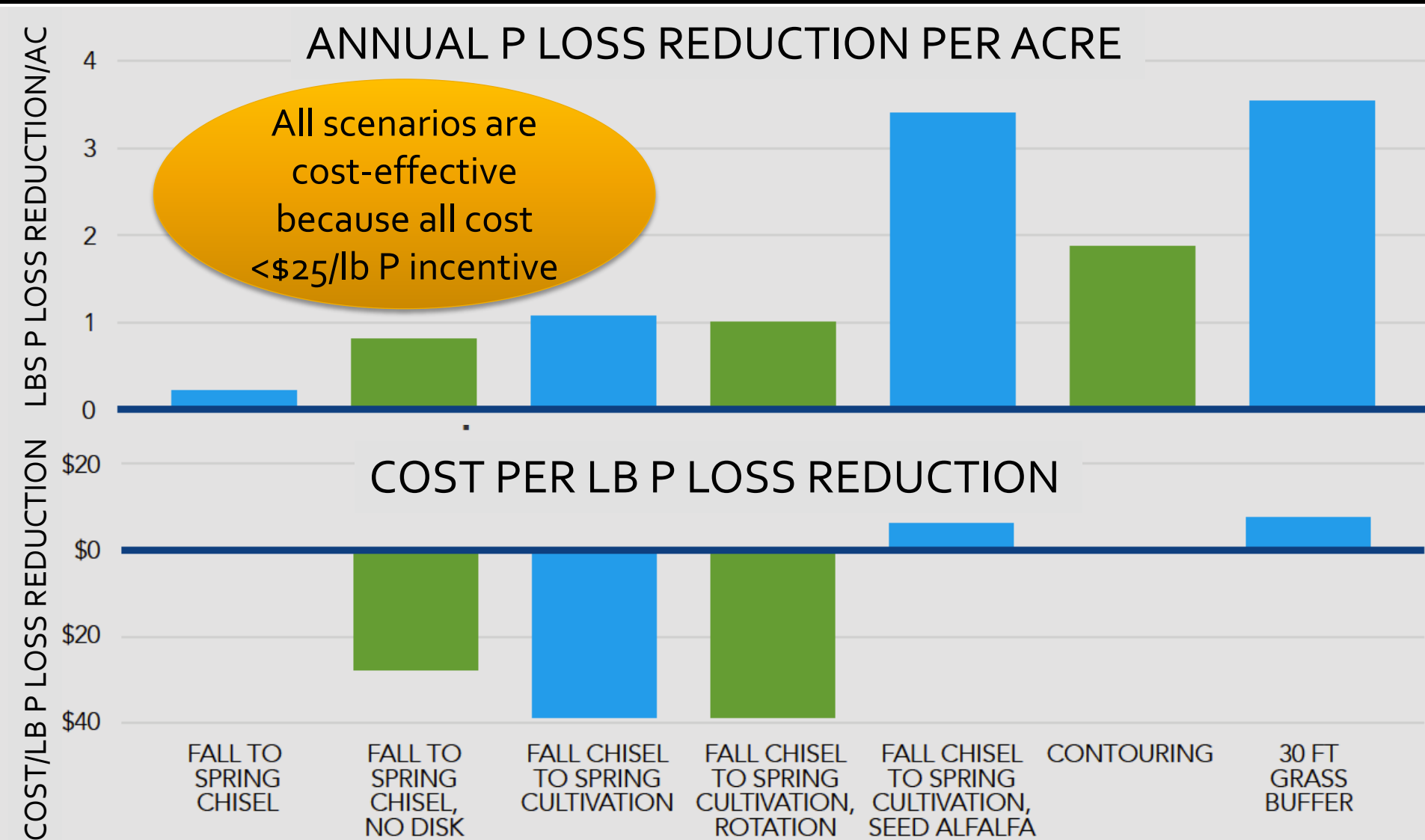
5. Discuss Scenarios with Farmer

6. Farmers Choose Scenarios and Execute Contracts

7. Verify Implementation and Issue Payments

Year: 2016
Farm: PfP8
Option #: 1
Description of option: Install filter strip
Category: Filter strip

Field	Acres	Lbs P loss abated using option	Potential Payment based on this option only	Farmer certification	Verifier certification	Acres under this option	Lbs P loss abated using option	Payment based on this option only
10	11.9	14.2	$356.19	1	1	11.9	14.20	$356.19
B-5A	4.4	1.2	$30.42	1	1	4.4	1.20	$30.42
B-5B	4.4	2.5	$63.54	1	1	4.4	2.50	$65.54
B-6	3.5	2	$50.10	1	1	3.5	2.00	$50.10
B-7	9.8	501	$127.27	1	1	9.8	5.10	$127.27
B-8	5.5	2.6	$64.93	1	1	5.5	2.60	$64.93
TOTAL	39.50	27.60	692.45	6.00	6.00	36.50	27.60	$692.45

W. Branch Milwaukee River Results

- Focused on P at payment of $25/lb
- 13 farmers signed up, 11 implemented changes
- 96 P loss reduction scenarios modeled for technical and cost effectiveness
- 46 BMPs implemented covering 1,175 acres
- Goal: Reduction of 1 lb TP/ac/yr
- Accomplished: Reduction of 0.54 lbs TP/ac/yr
- Total of 953 lbs P retained on the landscape

Pay-for-Performance: Pros

- Quantifiable estimates of nutrient reductions
- Maximize "bang for the buck" for conservation dollars spent on nutrient reductions
- Potential to engage/empower farmers

Pay-for-Performance: Cons

- Would require significant change to policy and how conservation is delivered
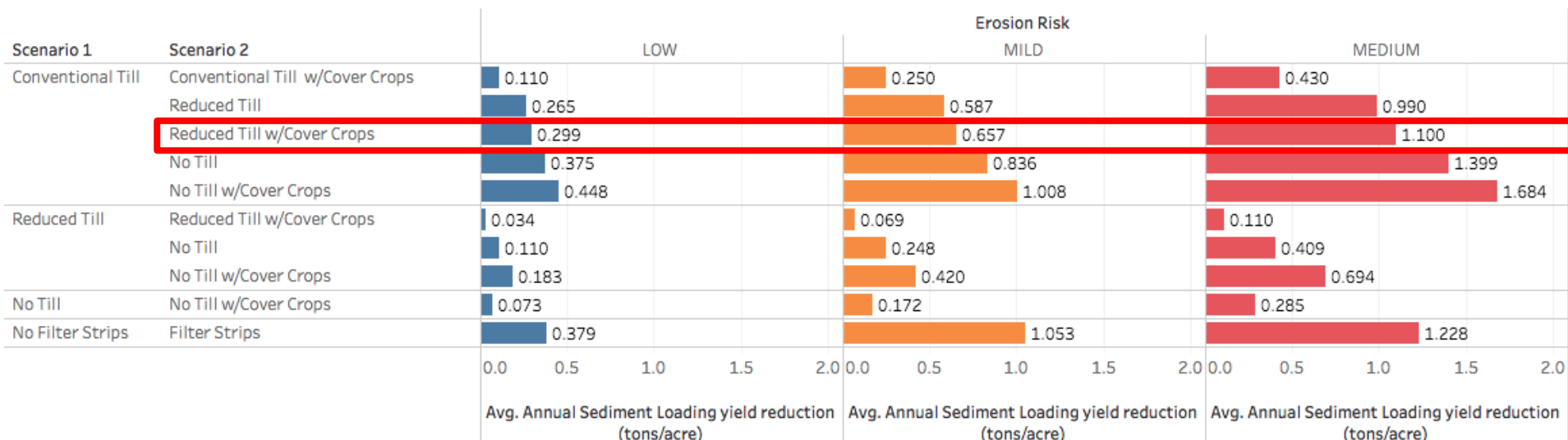- Reliable model and technical skills required
- Information-intensive

Example: Rabbit River Watershed

- Focused on sediment loss reductions
- Funding available for cover crops, conservation tillage, livestock exclusion fencing, and filter strips
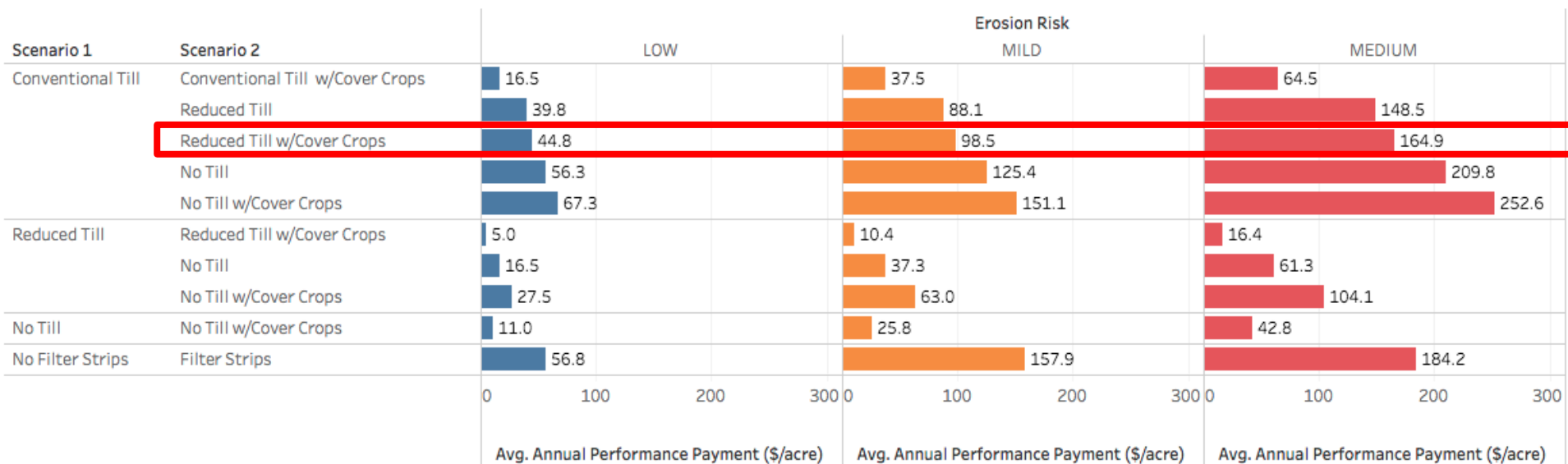- Payment of $150/ton sediment loss reduction

Rabbit River Visualization Tool

Sediment Reductions

Scenario 1	Scenario 2	Erosion Risk LOW	Erosion Risk MILD	Erosion Risk MEDIUM
Conventional Till	Conventional Till w/Cover Crops	0.110	0.250	0.430
	Reduced Till	0.265	0.587	0.990
	Reduced Till w/Cover Crops	0.299	0.657	1.100
	No Till	0.375	0.836	1.399
	No Till w/Cover Crops	0.448	1.008	1.684
Reduced Till	Reduced Till w/Cover Crops	0.034	0.069	0.110
	No Till	0.110	0.248	0.409
	No Till w/Cover Crops	0.183	0.420	0.694
No Till	No Till w/Cover Crops	0.073	0.172	0.285
No Filter Strips	Filter Strips	0.379	1.053	1.228

Avg. Annual Sediment Loading yield reduction (tons/acre)

Performance Payment

Scenario 1	Scenario 2	Erosion Risk LOW	Erosion Risk MILD	Erosion Risk MEDIUM
Conventional Till	Conventional Till w/Cover Crops	16.5	37.5	64.5
	Reduced Till	39.8	88.1	148.5
	Reduced Till w/Cover Crops	44.8	98.5	164.9
	No Till	56.3	125.4	209.8
	No Till w/Cover Crops	67.3	151.1	252.6
Reduced Till	Reduced Till w/Cover Crops	5.0	10.4	16.4
	No Till	16.5	37.3	61.3
	No Till w/Cover Crops	27.5	63.0	104.1
No Till	No Till w/Cover Crops	11.0	25.8	42.8
No Filter Strips	Filter Strips	56.8	157.9	184.2

Avg. Annual Performance Payment ($/acre)

Hybrid Pay-for-Performance?

1. Use a national model like RUSLE2?

   - Sediment-focused, but P associated

2. Use index approach like Maryland's PMT?

   - Reduce risk category of field by implementing BMPs
   - Payment associated with shift to a lower risk category
   - Reduced accuracy of estimates of technical efficiency…
   - ….but targeting efforts to improve "performance" still rewarded

Questions/Comments?