The Research Base for the Wisconsin Phosphorus Index

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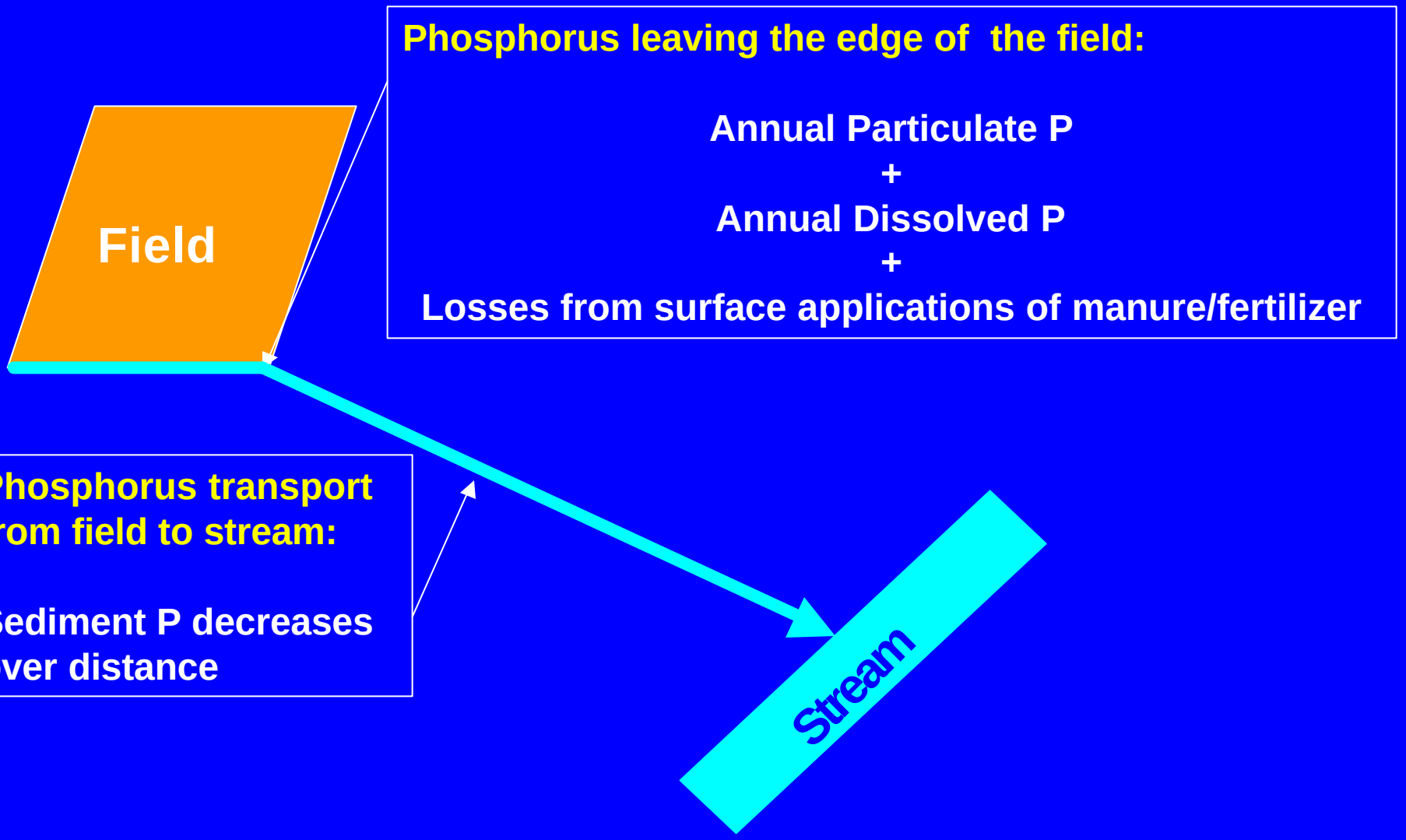
What is the P Index?

- Nutrient management planning tool
- Indicates relative risk of P from a specific field reaching a stream or other water body.
- Evaluates risk by estimating the average annual runoff P for a field under specified management practices

Predicting Phosphorus Movement from Field to Stream



Basis for Field Transport Components

Particulate P Index (Sediment-bound P) =
Annual sediment loss (RUSLE2) x
Avg. sediment P content (WI research)

+

Soluble P Index (Dissolved P) =
Annual runoff volume (modification of NRCS runoff estimation techniques and WI long-term climate data) x
Avg. runoff P content (WI research)

+

Losses from surface applications of manure or fertilizer (WI research)

P Index web site:http://wpindex.soils.wisc.edu/

Wisconsin Research Used for P Index

Under direction of Dr. Larry Bundy, UW-Madison

Simulated rainfall runoff:

Alfalfa – 20 events
Corn – 267 events, 4 sites
Varying: tillage, manure, season, soil test P

Natural rainfall runoff:
Alfalfa – 24 plots
Corn- 36 plots

Research ongoing.
Datasets growing

Research Site Soil Characteristics

Range of soil test P at each site.

Location	Soil Texture			Infiltration
	Sand	Silt	Clay	% of applied rainfall, mean
	----------%----------			
Arlington & Madison	16	62	22	73
Lancaster	11	73	16	87
Fonddu Lac	20	42	38	24

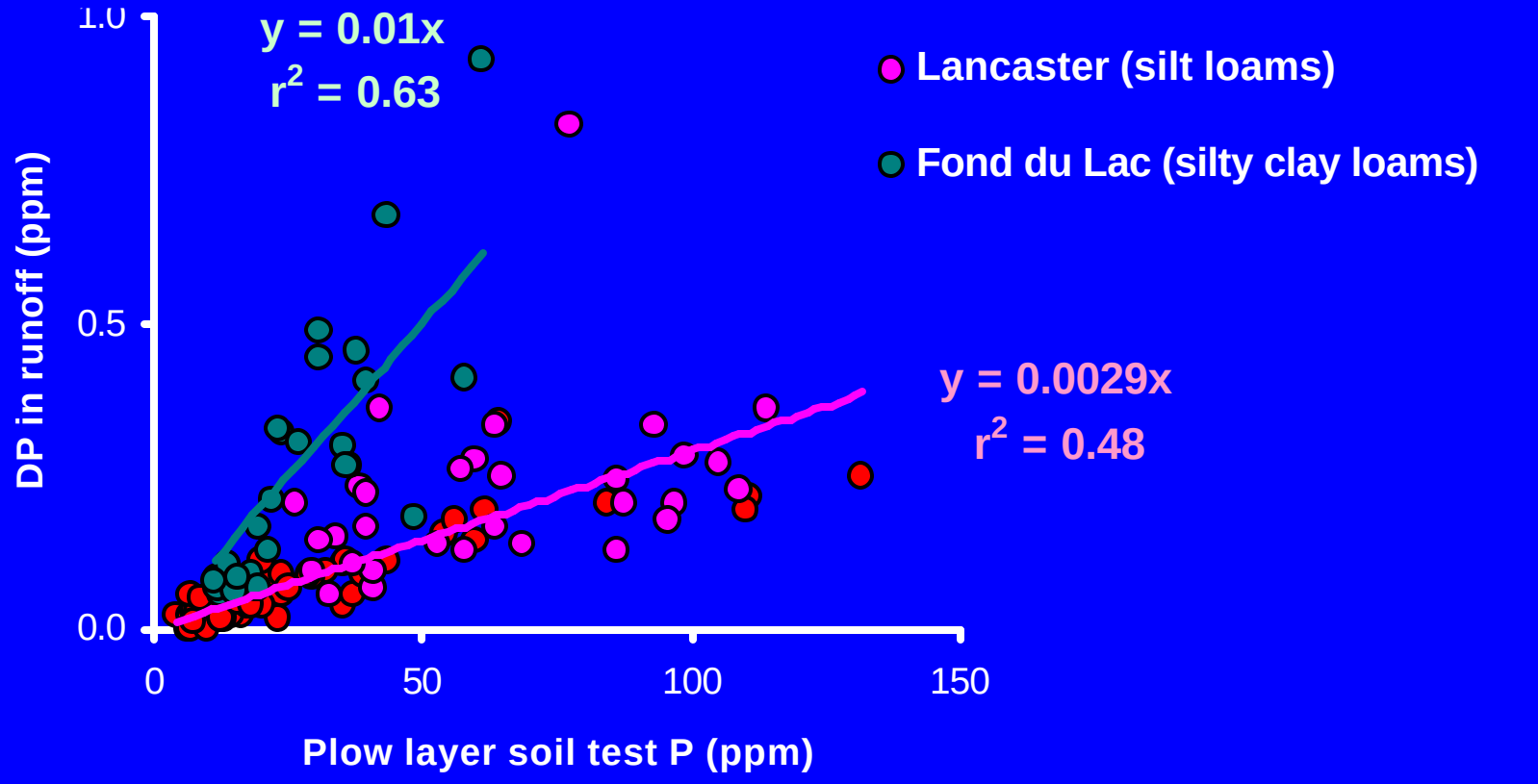
Major findings incorporated in P Index:

❖Tillage influences runoff volume and sediment losses.

❖Dissolved and particulate P concentrations in runoff can be predicted using soil test P.

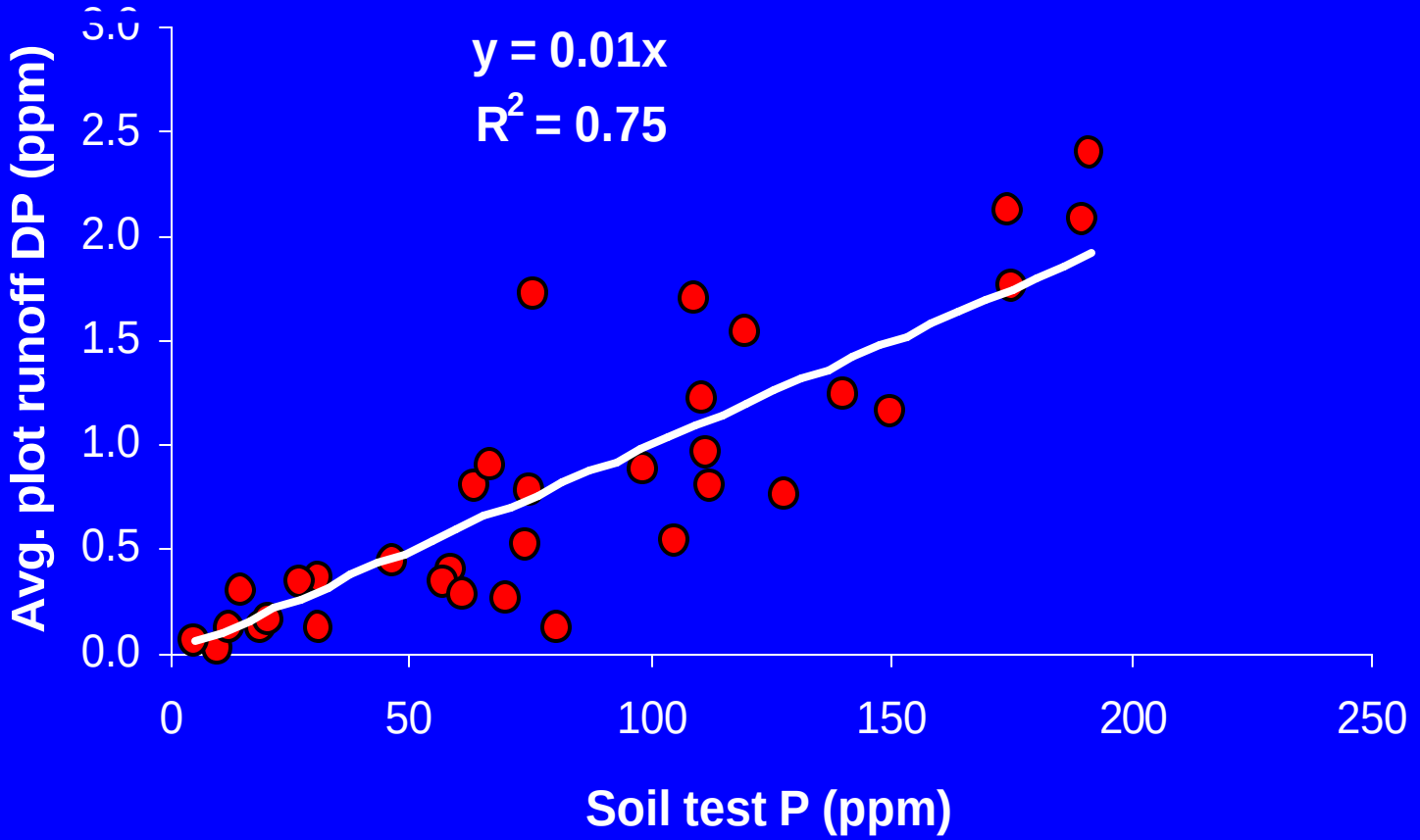
❖Risk of P losses from unincorporated manure varies with soil and soil conditions

Runoff dissolved P can be predicted by soil test P and soil type



Simulated rainfall runoff corn plots without manure applications

Average runoff dissolved P over time can be predicted by soil test P



Natural rainfall runoff at Arlington, April-July, two soils, varying manure histories

Simulated rainfall runoff used to estimate worst-case P loss from unincorporated manure

Example: Comparison of dissolved P and particulate P in simulated rainfall event one week after dairy manure application to silt loam soil in Spring or Fall

Worst-case P losses from manure applications vary with seasonal soil conditions

The additional dissolved P load from

- Spring manure = 0.5 %
- Fall manure = 4 %

of the manure water soluble P.

The additional particulate P load from

- Spring manure = 0
- Fall manure = 3 %

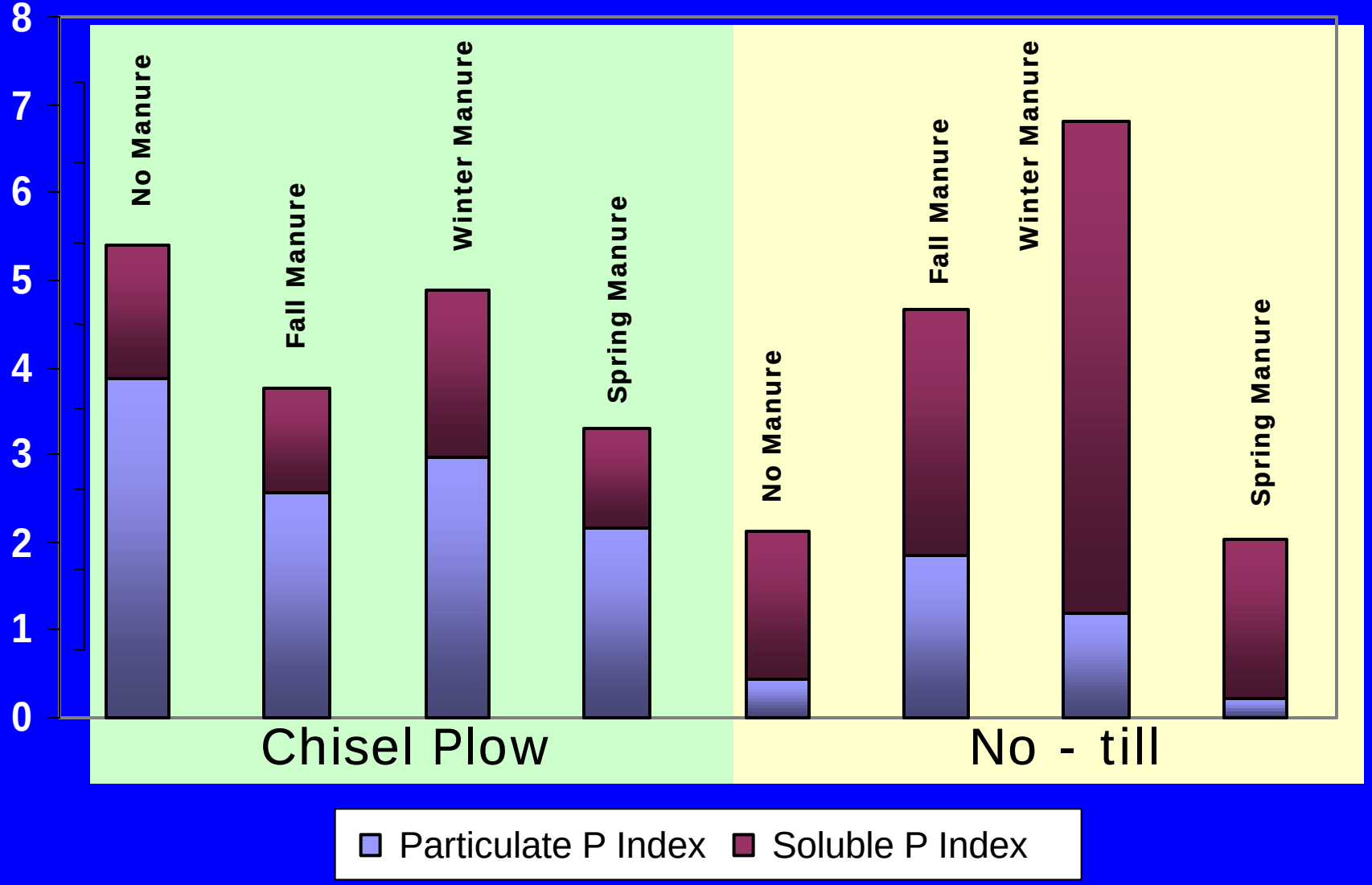
of the manure total P.

Putting it all together:

The P Index shows the relative effects of field management practices on annual P delivery to nearby surface water

P Index Values for Grant County Corn Field

Rozetta silt loam soil, 6% slope, Soil test P 100 ppm,
25 ton/acre dairy manure



The Wisconsin P Index:

- Sums estimated P losses to water from a field by different pathways
- Uses readily available information
- Ongoing research will improve predictive ability
- Will be part of SNAP-Plus

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