

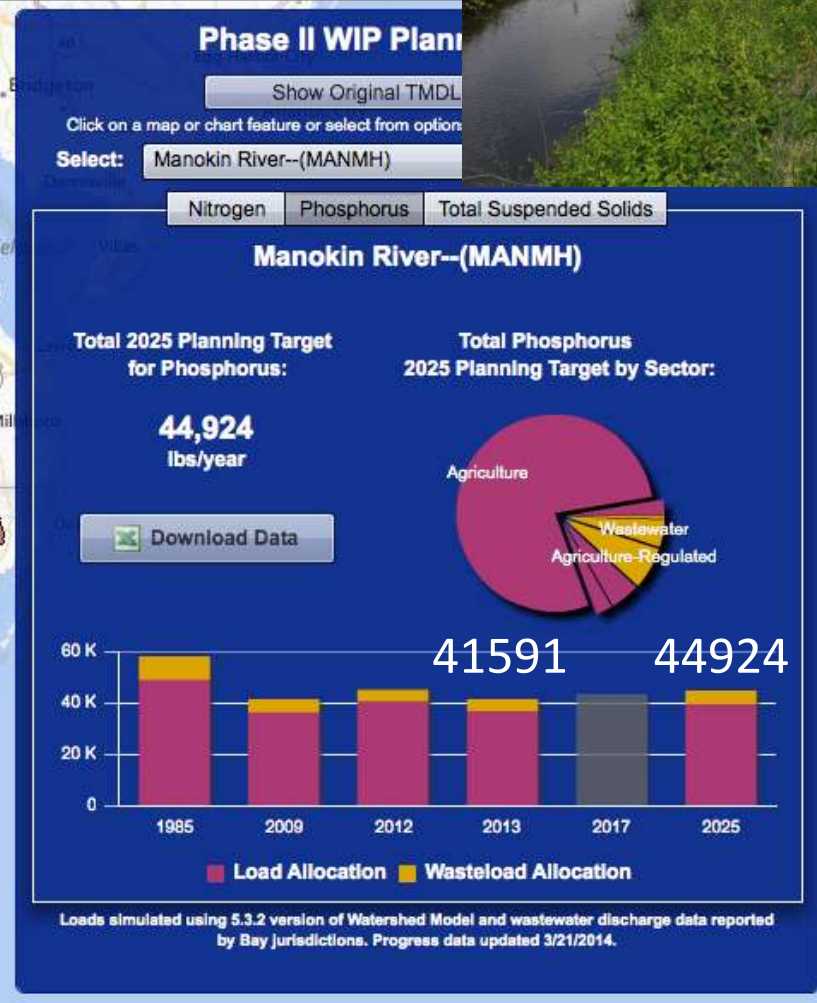
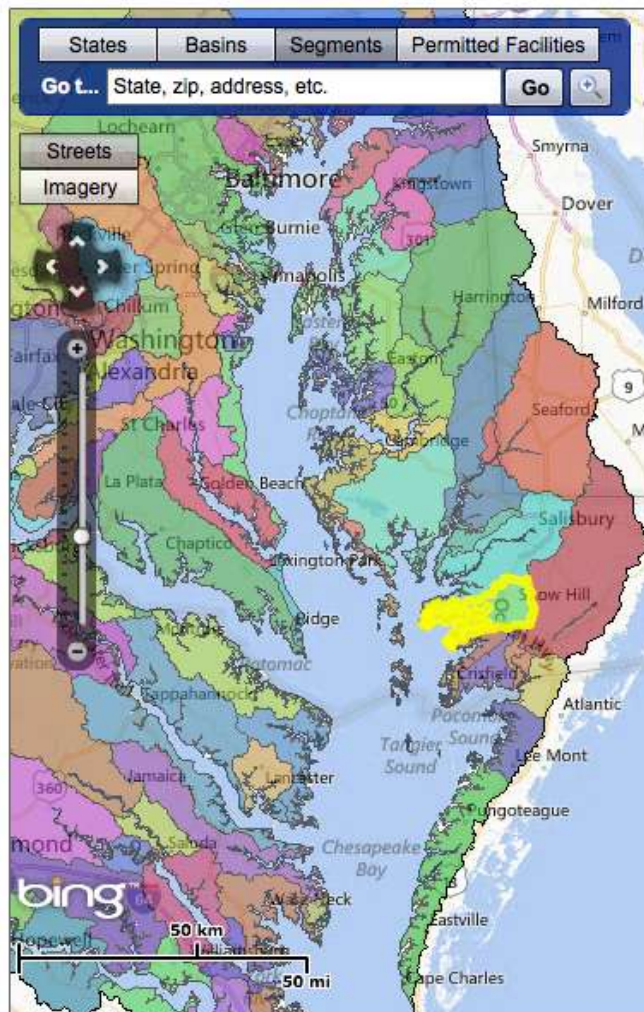
Phosphorus modeling and legacies in the Bay watershed

Pete Kleinman, Amy Collick, Tony Buda and Ray Bryant
(USDA ARS)

Zach Easton and Dan Fuka (Virginia Tech)

Chesapeake Bay TMDL Tracking and Accounting System

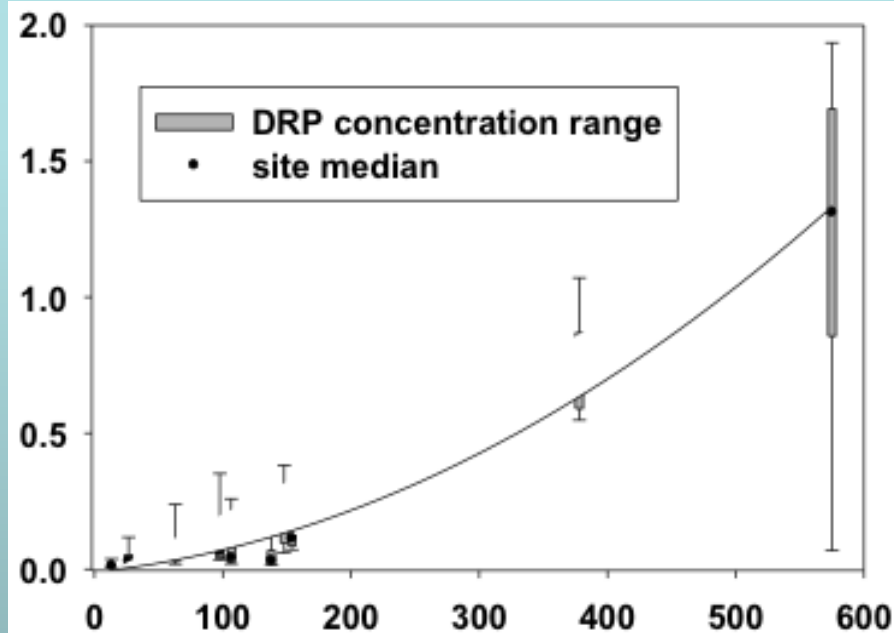
The Chesapeake Bay TMDL Tracking and Accounting System (BayTAS) was developed to inform EF public on progress in implementing the [Bay Total Maximum Daily Load \(Bay TMDL\)](#). BayTAS stores the Watershed Model Phase 5.3.0 and tracks implementation progress (based on the Watershed M jurisdictions' Phase II Watershed Implementation Plans (WIPs)). BayTAS data are displayed through [about BayTAS](#) and the [terminology of the TMDL](#) in the glossary found in Section 13 of the TMDL. [Questions](#) about the Bay TMDL.



Wrapping up last talk

Soil P and drainage pathways

Dissolved P in tile drainage (mg/L)



Soil test P, upper 2 inches (mg/kg)

Courtesy Kevin King, USDA-ARS

Legacy P is just as important
in subsurface flow as it is in
surface runoff



No model correctly simulates
P loss to tile drains and
ditches (currently)

Mahantango Creek Watershed

A rich history of hydrologic research



WE-38 Watershed (7.3 km²)

FD-36 (40 ha)

Mattern (11 ha)



Legacy phosphorus:

Not so obvious loads from little places



Mahantango Creek
Experimental Watershed
Klingerstown, PA
Area = 7.2 km²



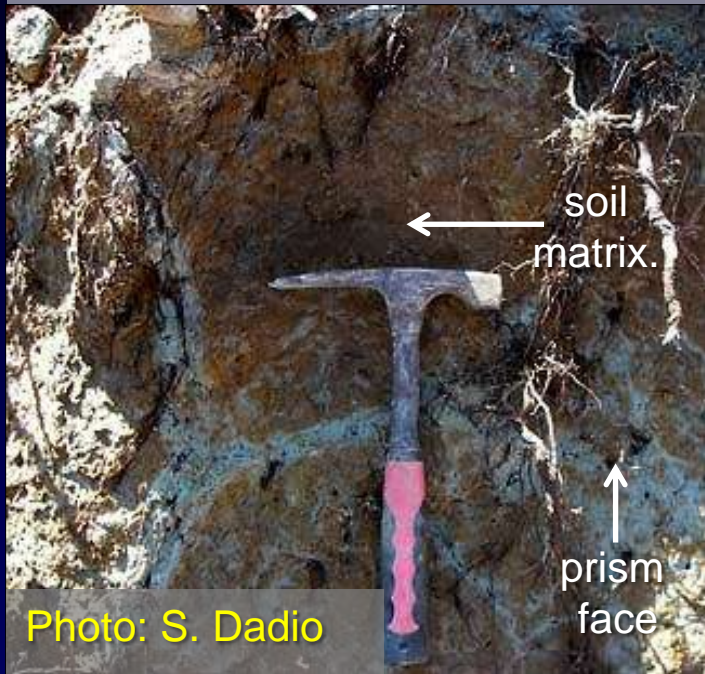
Mattern watershed
hillslope study

The Mattern watershed



The fragipan and saturation excess runoff

Poorly-drained soil
fragipan



Relatively impermeable
(seasonal perched
groundwater)

Well-drained soil
no fragipan



Large interstices allow for
rapid water infiltration

Soil P saturation – soil indicator only

Runoff monitoring (2002-2004)

Hillslope soil

Mehlich-3 P - 177 mg/kg

Psat = 21%

No fragipan, well drained

Mehlich-3 P - 144 mg/kg

Psat = 17%

Mehlich-3 P - 78 mg/kg

Psat = 9%

Riparian soil

Fragipan, poorly drained

Soil P saturation – soil indicator only

Soil P measures were related to runoff P concentration (mg/L), not runoff load (kg/ha)

Total P

8 kg/ha/yr



Psat = 9%

1 kg/ha/yr



Psat = 17%

<1 kg/ha/yr



Psat = 21%

Soil P saturation – soil indicator only

8 kg/ha/yr



4620 L

1 kg/ha/yr

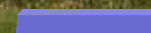


92 L

<1 kg/ha/yr



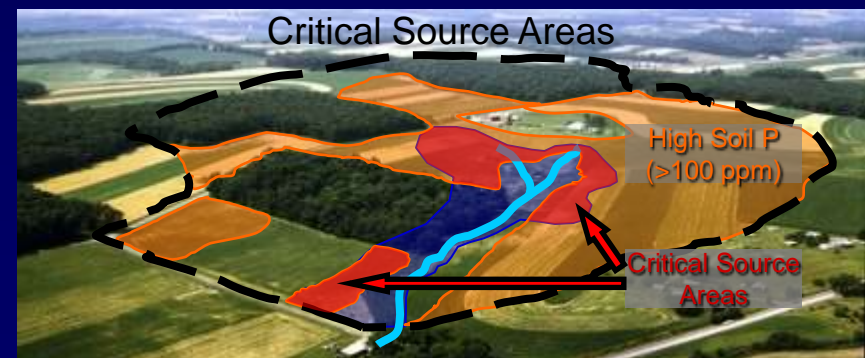
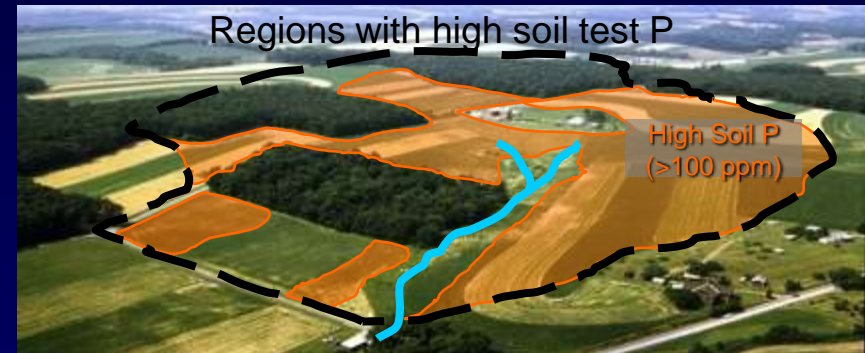
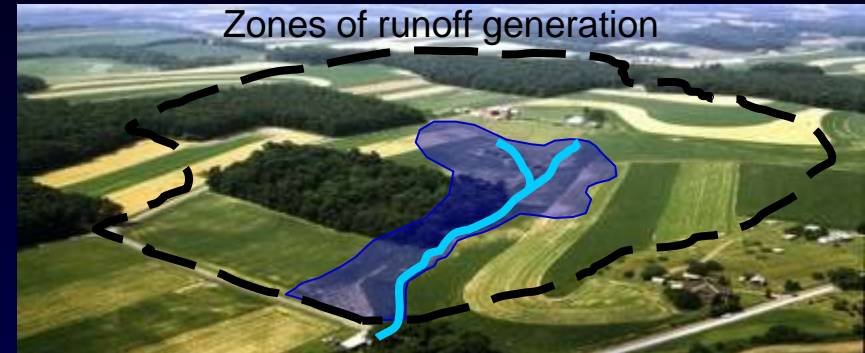
46 L



The FD-36 Watershed

Critical source area concept – P-Index

WE-38 watershed (7.3 km²)



The Mattern Watershed

Identifying zones of saturation

WE-38 watershed (7.3 km²)



Mattern
(11 ha)



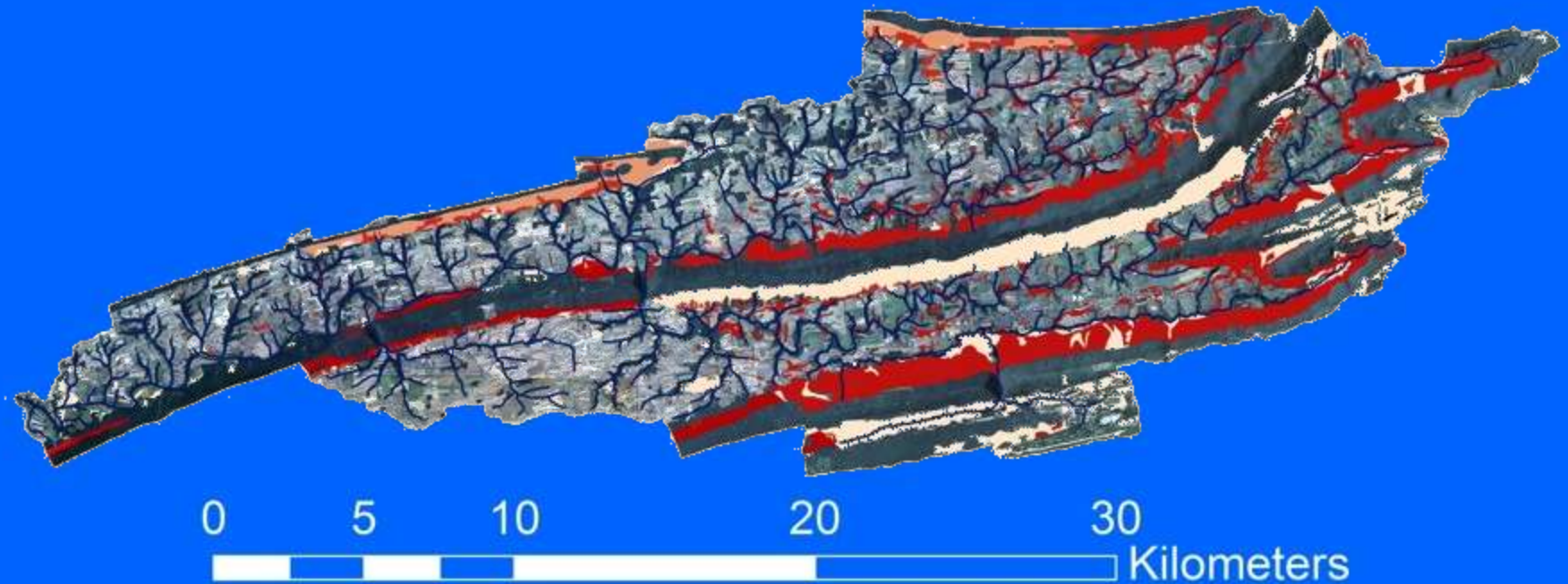
August 2003



October 2003



Extent of fragipan soil horizons in Mahantango Creek

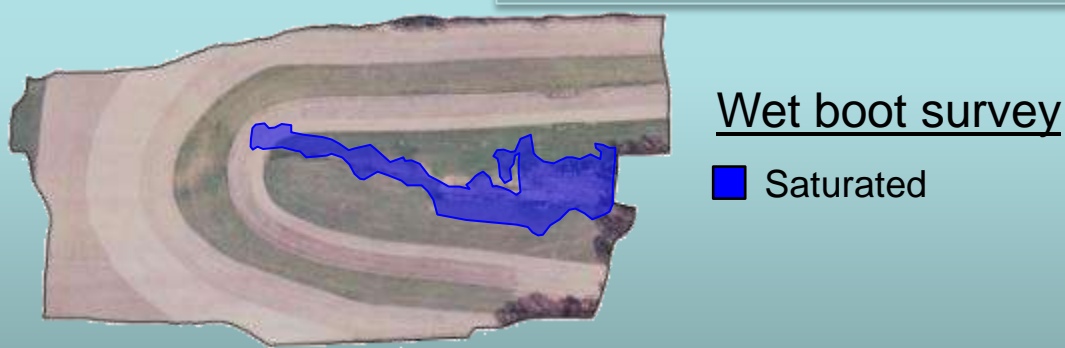
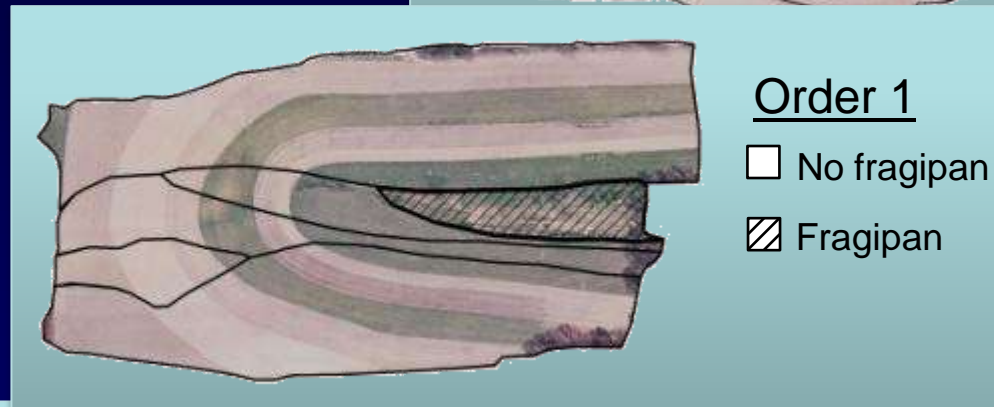


Percent of SSURGO soil map unit mapped as fragipan

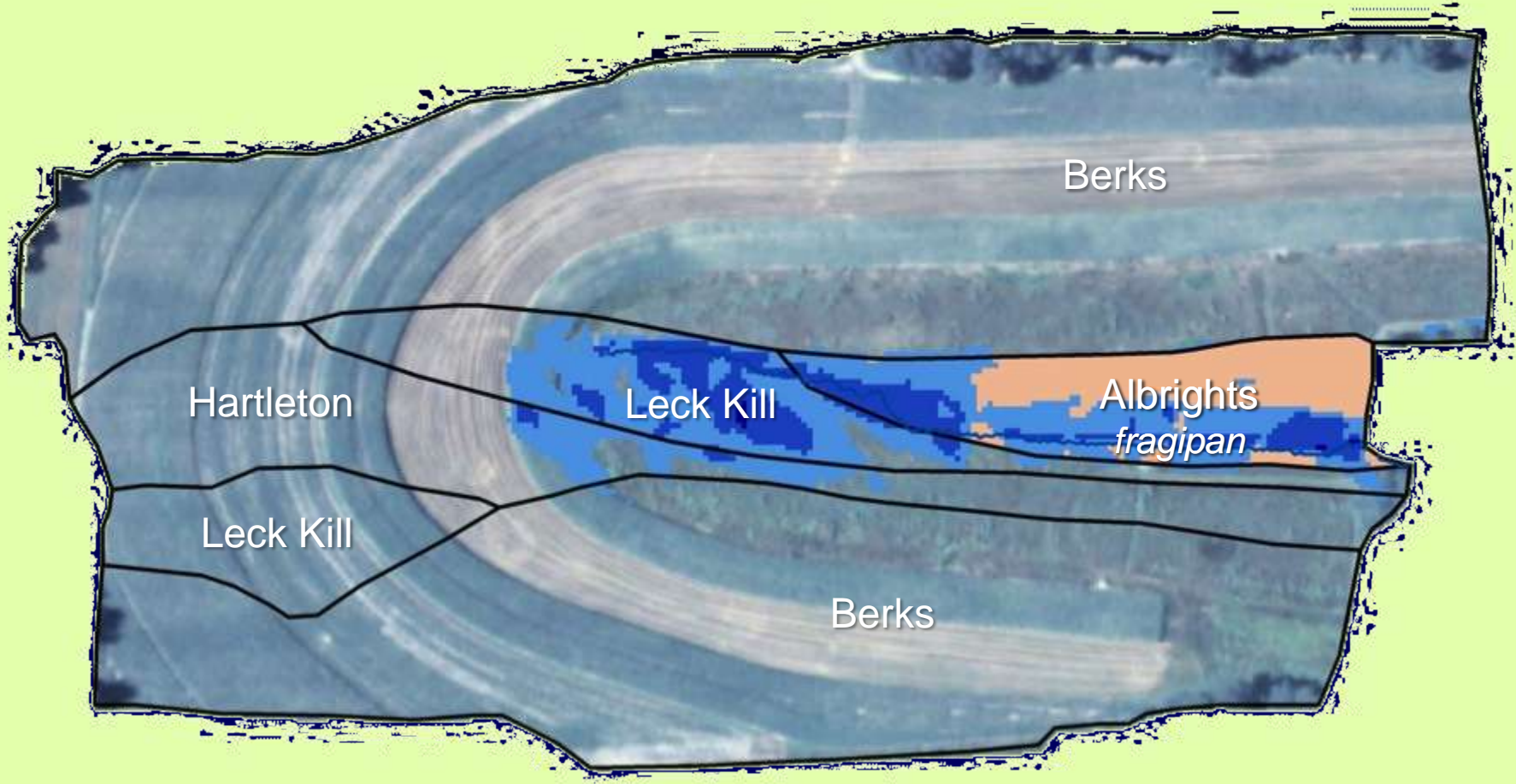


Need for improved mapping to identify “where” runoff is most likely to occur

Lessons from the Mattern watershed:



Mattern fragipan prediction *for lower landscape positions*



Probability of a restrictive layer (%)



1-25



25-50

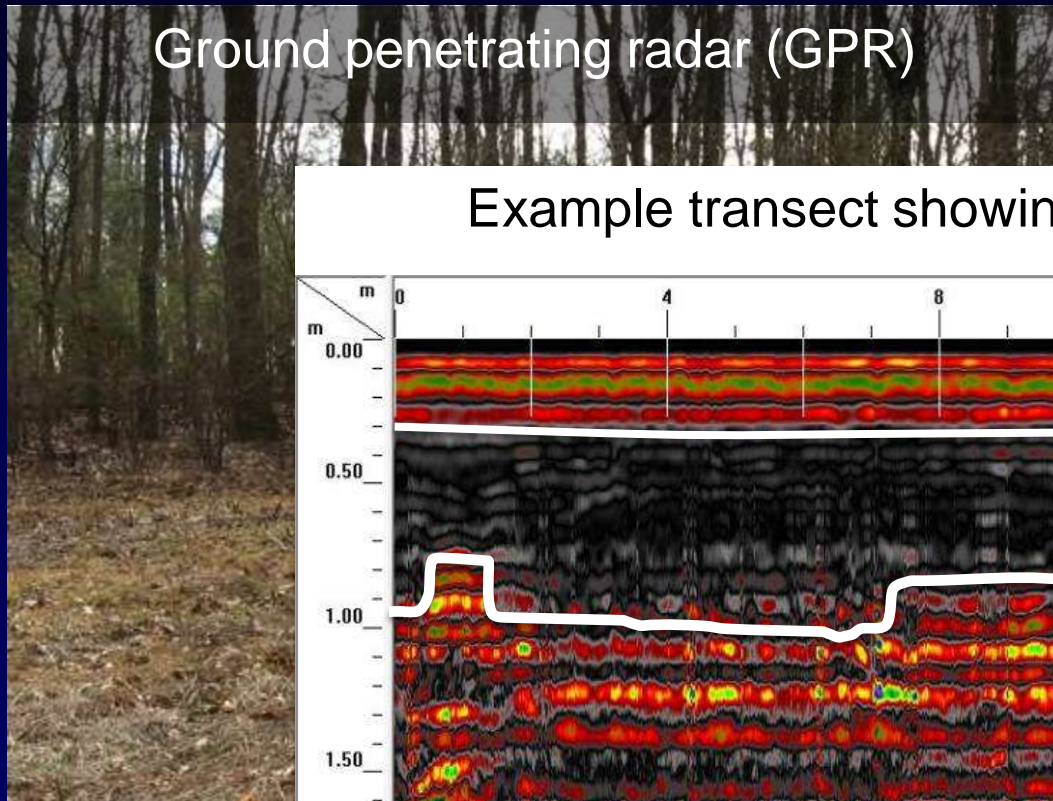


50-75

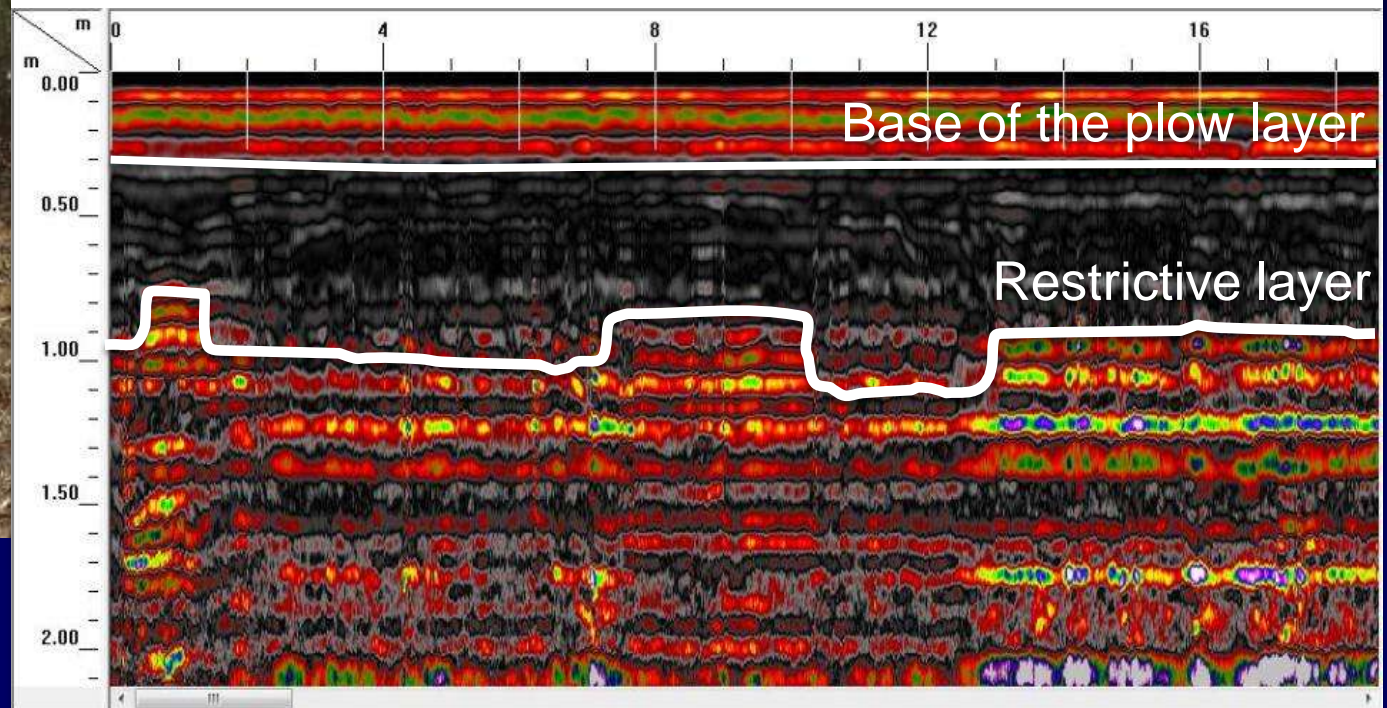


75-100

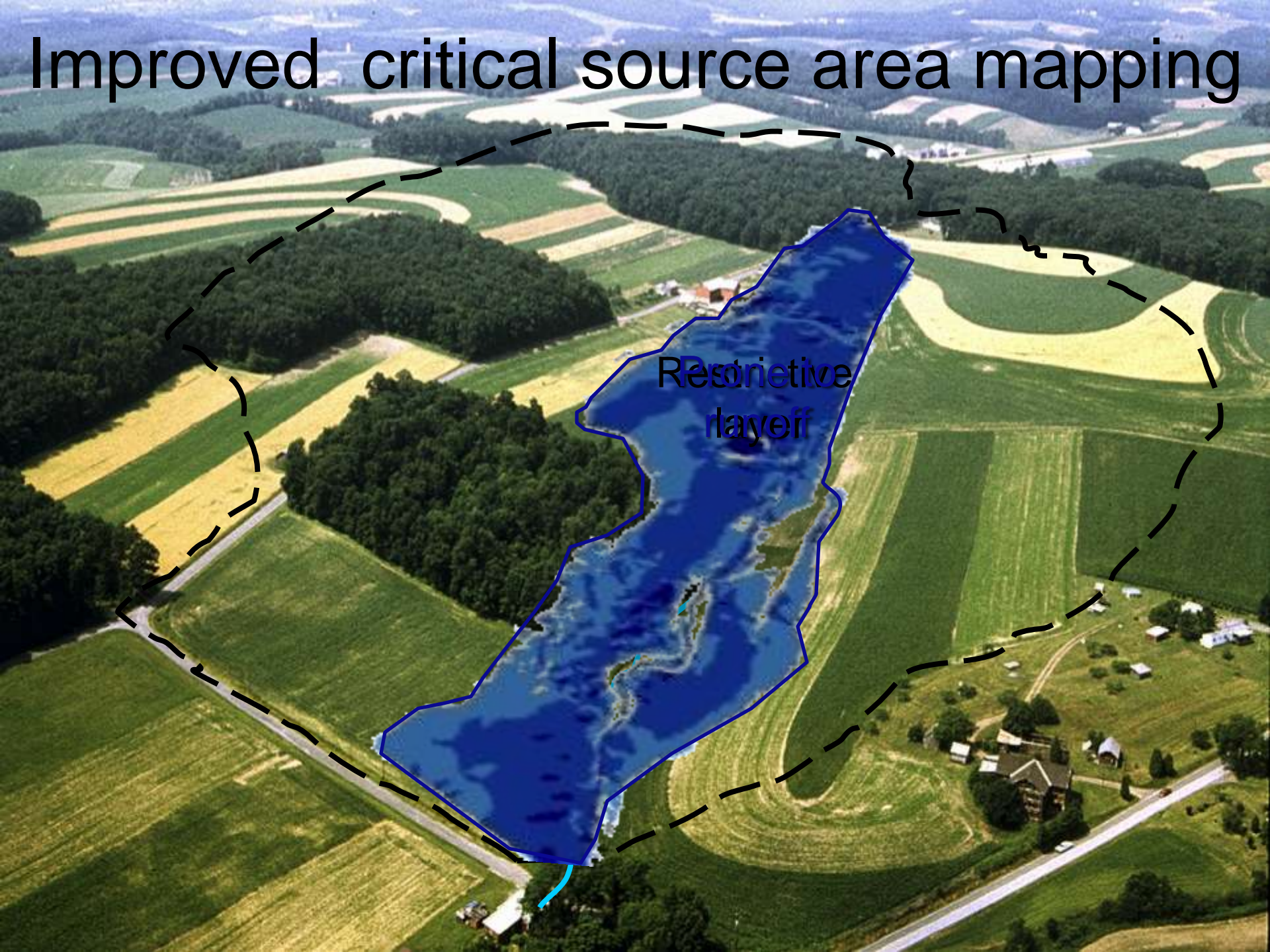
Validation efforts are ongoing



Example transect showing GPR reflectance



Improved critical source area mapping





Thanks

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