The Value of Accurate, Field-Scale, Soil Carbon Assessment Technology: Conservation Tillage in Iowa

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Paper presented at USDA Symposium on Natural Resource Management to Offset Greenhouse Gas Emissions, Raleigh, NC, November 2002

Background

- Agricultural practices can sequester carbon
- Lots of excitement about potential
  - To lower atmospheric concentrations of Carbon
  - To provide an additional revenue source for farmers

Policy Possibilities

- Carbon markets
  - Voluntary, small scale
  - US Mandate, akin to SO_2 cap & trade
- Direct payments of subsidies
  - Conservation Security Program
  - CRP

Subsidy Programs

- Practice – Based
  - Pay for adopting new practices
  - Easy to observe, but ignores heterogeneity in land and potential C storage
- Performance – Based (like a C market)
  - Pay for C sequestered
  - Either expected or measured
- Hybrid: Can target land that yields most C benefits, but pay for practice

Role of Soil Carbon Measurement Technology in Policy Design and Implementation

- Carbon Market
  - Accurate, field-scale measures of incremental C storage to verify legitimacy of trades
- Subsidy Programs
  - Practice-based (no targeting) demands less accuracy
  - Targeted or performance-based requires more accuracy

Our Paper: What are Cost Savings from Accurate Field Scale Measurements?

- Use conservation tillage adoption model combined with EPIC to empirically study alternative targeting strategies in Iowa
- Questions:
  - What is the marginal cost of sequestering C if adoption occurs in most cost-effective locations first?
  - What are the cost savings of having the information needed to identify the cost-effective locations? How much more would a straight practice-based system cost to get the same benefits?
  - What are the cost savings of targeting at crop reporting districts, or counties, but not field-level?

Problem Facing Program Designer

- Wants to minimize costs of achieving a given level of carbon sequestration

  c^n = cost of enrolling farm n (bids)

  $X = \Sigma X^n$ = total amount of carbon from n farms

- Which bids should be accepted? Compute c^n/X^n = cost per ton of carbon sequestered
- Rank order c^n/X^n lowest to highest, enroll fields until you get your desired level of carbon
- Performance-based subsidy or C market can achieve this

Simple Numerical Example

Region1	Cost/Ton	Region 2	Cost/Ton
Point A	4	Point C	5
Point B	2	Point D	2
Mean	3		3.5

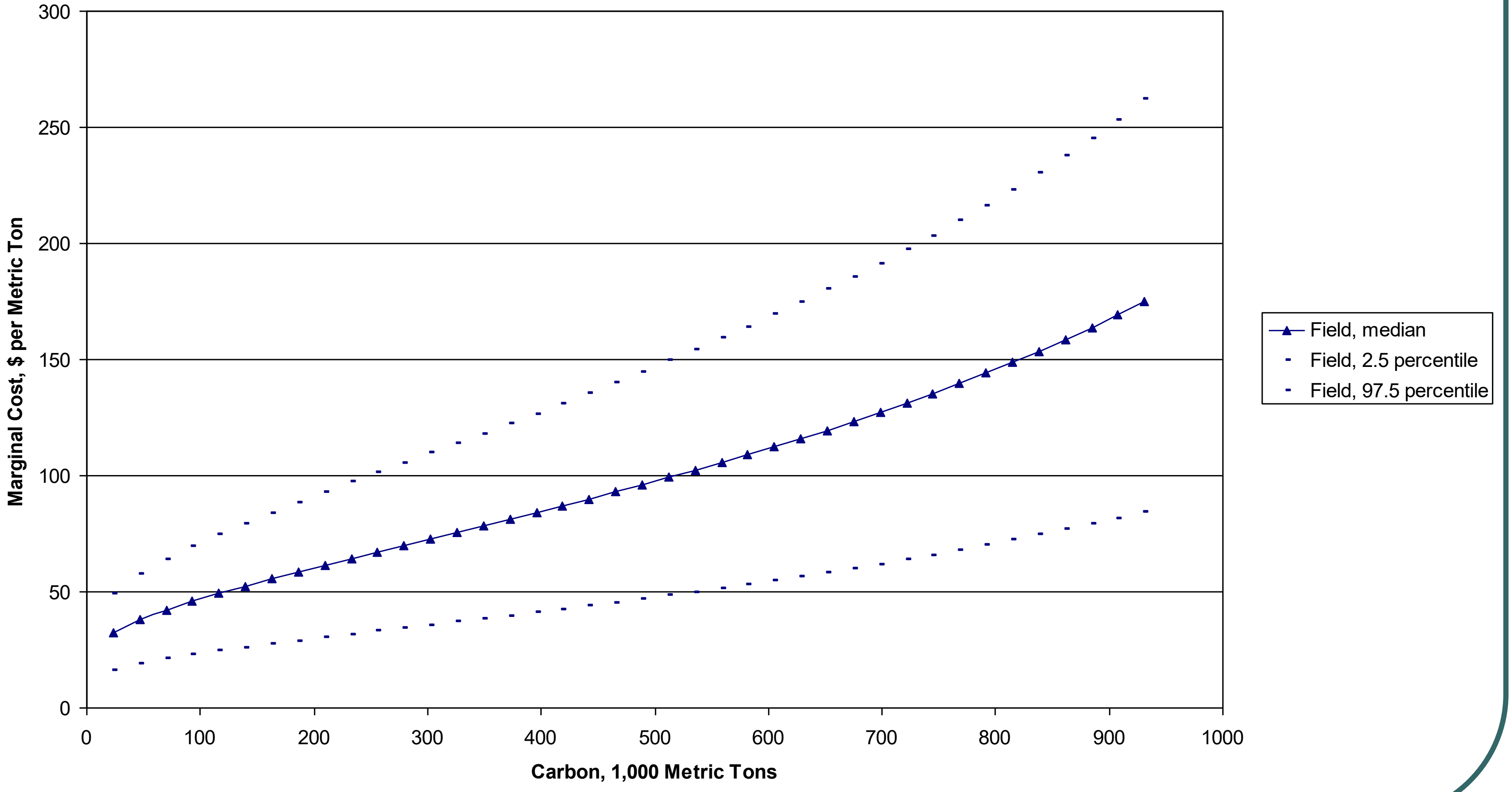
Least Cost to Achieve 2 tons: Pt B, Pt D = $4

Cost with only means: Pt A, Pt B = $6

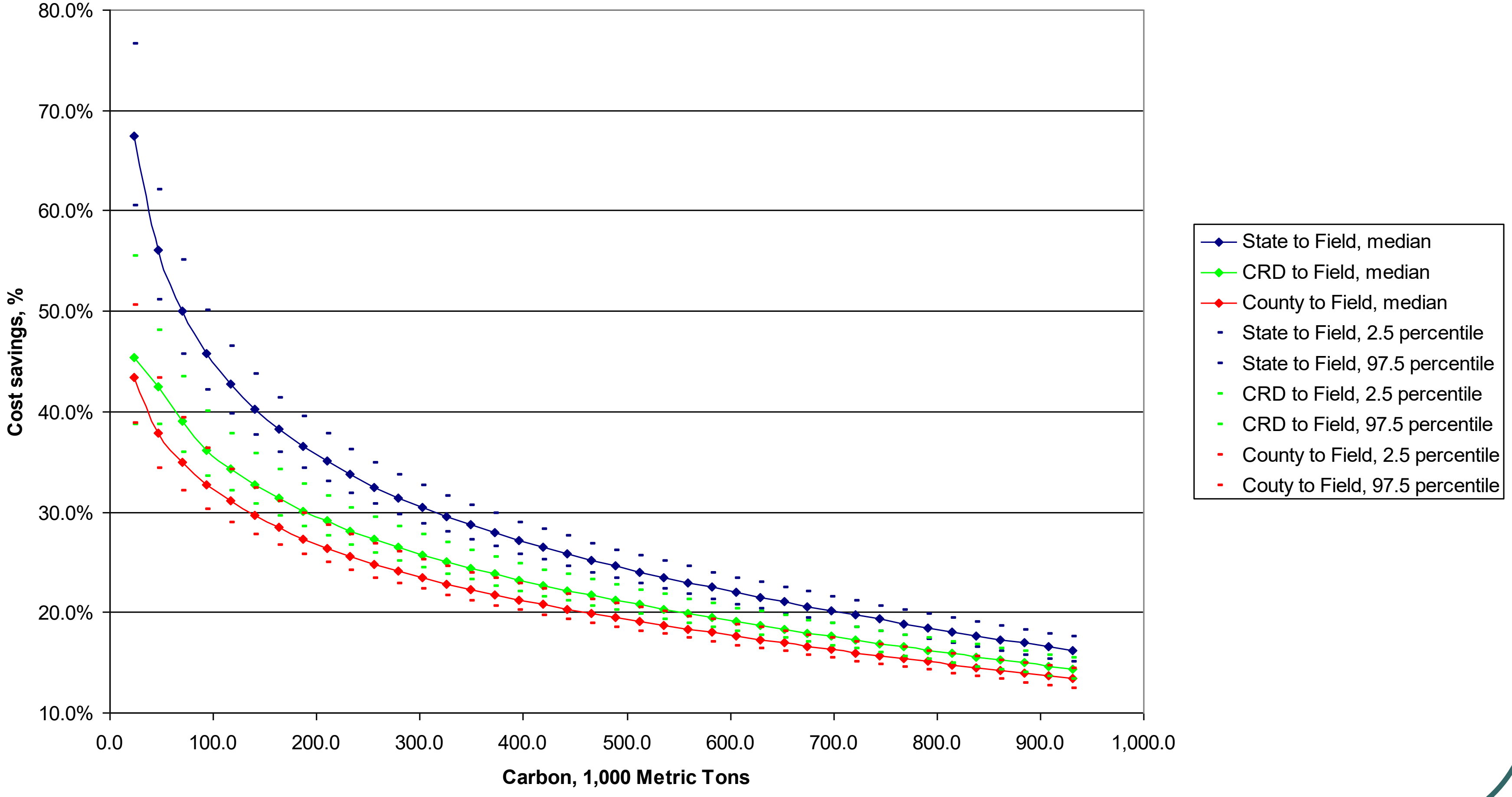
Conservation Tillage in Iowa

- Econometric model of adoption of conservation till
- EPIC for environmental indicators, including Carbon,
- Adoption model and EPIC runs predict at NRI points (~13,000 points in Iowa)

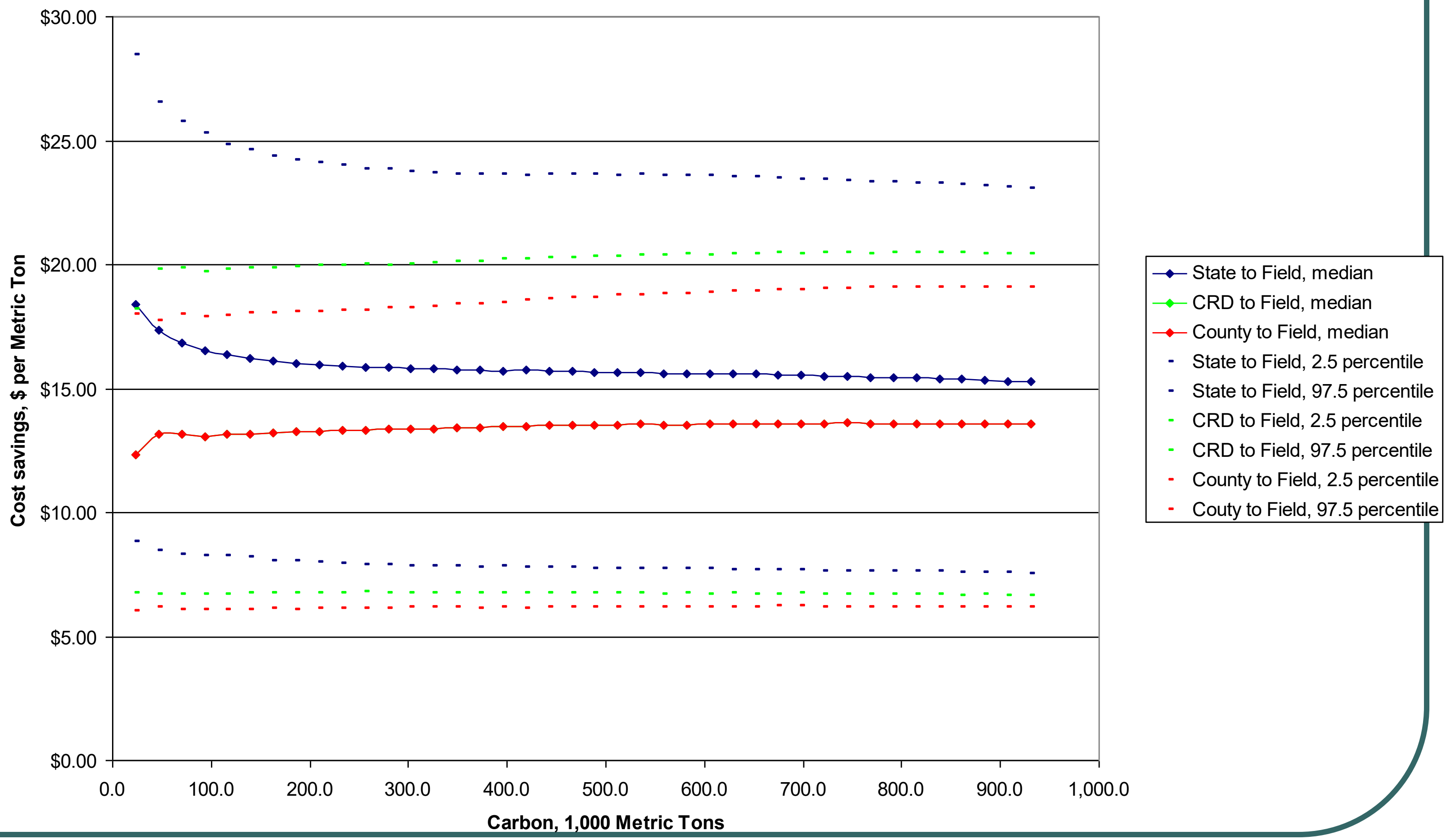
Marginal Cost Under Field-Level Targeting



Cost Savings: From State -, CRD -, and County - Level to Field - Level Targeting



Cost savings per ton of Improved Targeting



Final Remarks

- Accurate field-scale measurement technology key for policy implementation
- Value is high for field-scale measurement