



The Soil Management Assessment Framework (SMAF)

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Presentation Objectives

- How did the SMAF evolve?
 - For what purpose was the SMAF created?
 - For whom was the SMAF designed?
- How does the SMAF work?
- What product the SMAF was designed to deliver?
- What strengths and weaknesses does the SMAF have soil quality assessment?



**Concern for Soil Resources
is not a NEW concept**

But Our Problems Still Exist!



How Did the SMAF Evolve?

- 1990 - Soil Tilth: Past Perceptions & Future Needs
 - Emphasized the need to examine biological, chemical & physical indicators
- 1991 - Systems Engineering provided a method for combining indicators
- 1993 - John Doran challenged me to interpret a Crop Residue & Tillage Study based on soil quality

Evolution of SMAF ('94-'98)

- National Academy issued report "Soil & Water Quality: An agenda for agriculture"
- Soil Quality Institute was created
- NRI Pilot study conducted to assess soil quality in four MLRAs
- Susan Andrews joins program with background in Ecology & assessment
- Excel spreadsheet of the SMAF was created

Evolution of SMAF ('98-'03)

- The SMAF was proposed as an approach for soil quality assessment
 - In the Central Valley of California
 - For Midwest cropping system studies
 - For winter grazing evaluations
- The SMAF integrated biological, chemical, and physical indicator data
- First attempt to create website and CD versions of the SMAF for easier use

Evolution of SMAF ('04 -)

- 2004 - SSSAJ publication documenting development of the SMAF
- Incorporation of scoring concepts into soil quality assessments - e.g. Cornell soil health program; Great Plains evaluation
- Improved website and CD versions
- New curves added and continued testing for CEAP and REAP programs
- Interface with simulation modeling

What is the SMAF's Purpose?

- A tool to examine biological, chemical, and physical data independently or when combined
- A tool to help quantify soil management effects
- A tool to help guide soil management decision processes

How Does the SMAF Work?

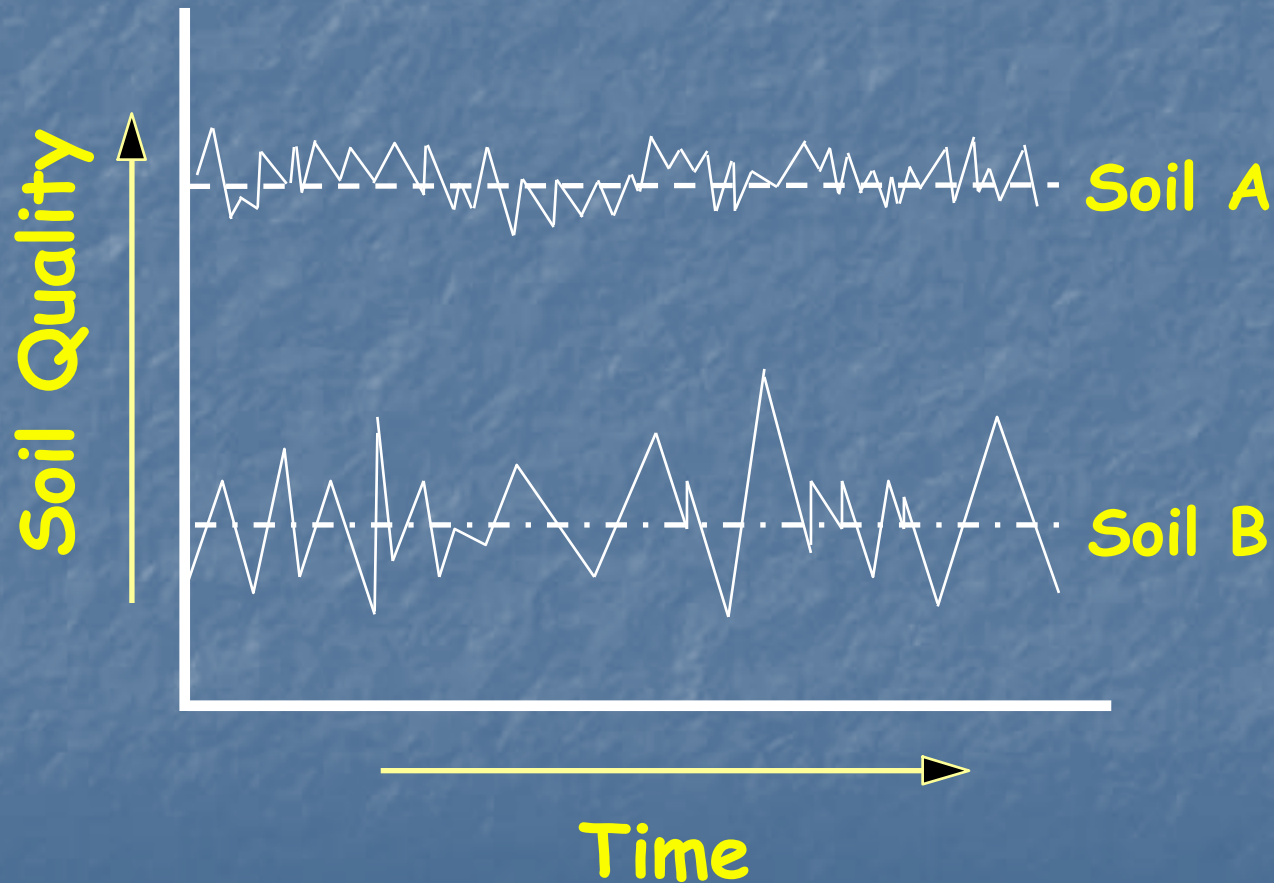
- Complements soil survey, land capability, soil testing, SCI & other programs
- The focus is on dynamic soil properties - those influenced by management
- Biological, chemical, and physical data are scored relative to potential inherent conditions for each specific soil series

Inherent vs. Dynamic Soil Quality

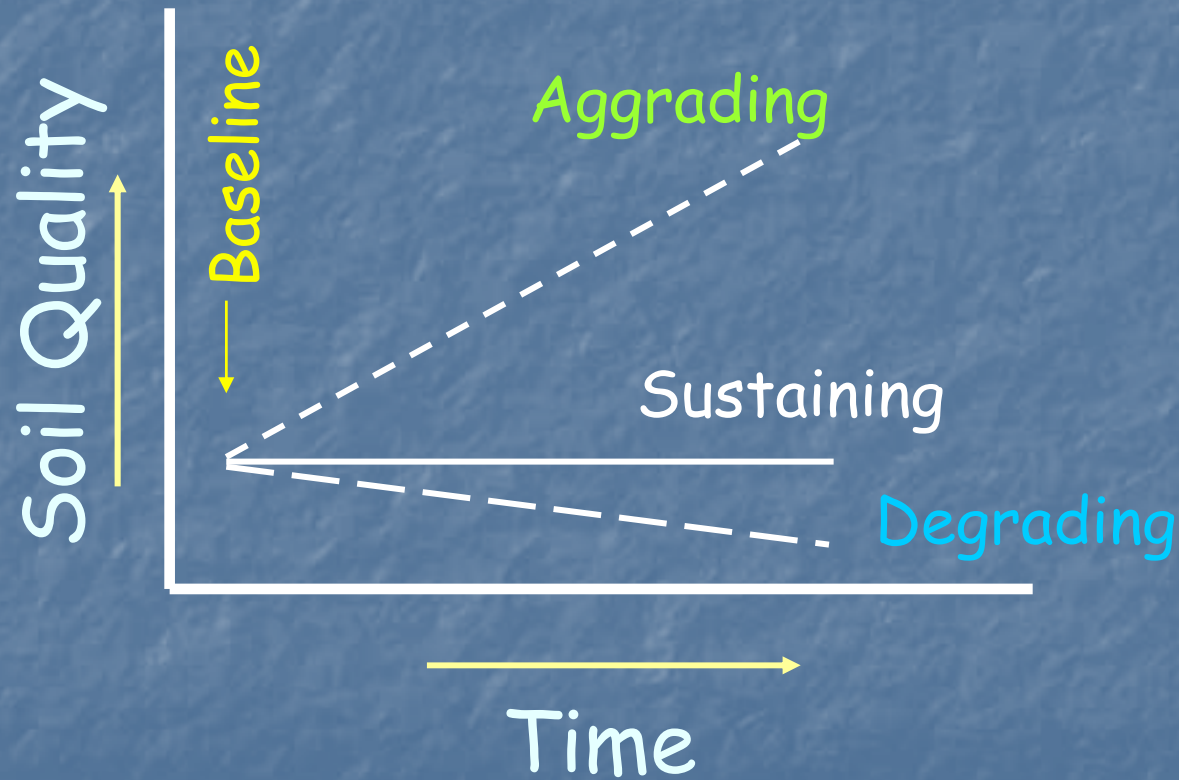
- **Inherent** - reflects basic soil forming factors
 - climate, parent material, time,
 - topography, and vegetation
- (Reflected in Land Capability Classifications)

- **Dynamic** - describes soil status or condition
 - reflects management decisions
 - current or past land uses
- (Reflects sustainability & conservation goals)

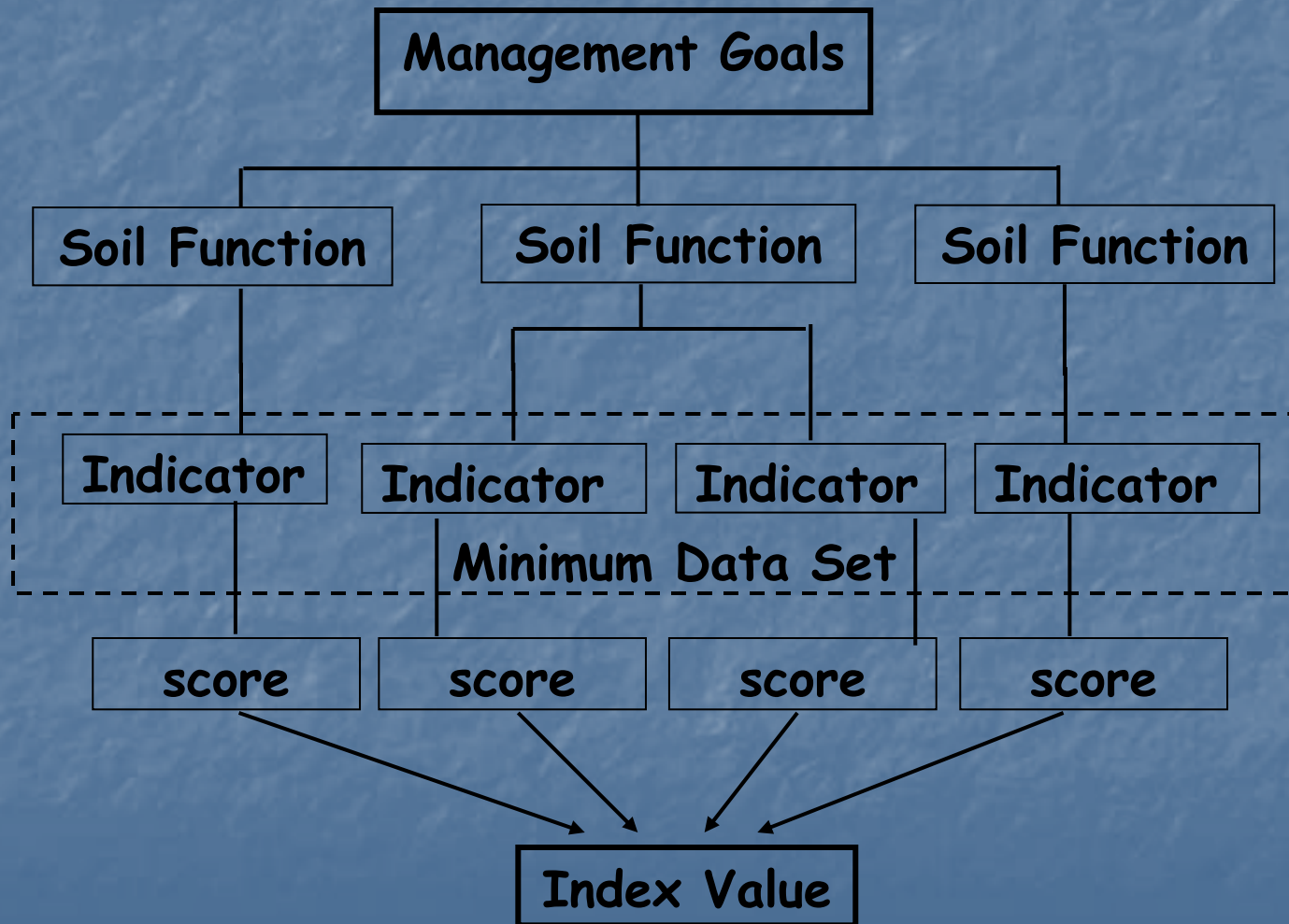
Inherent Soil Quality



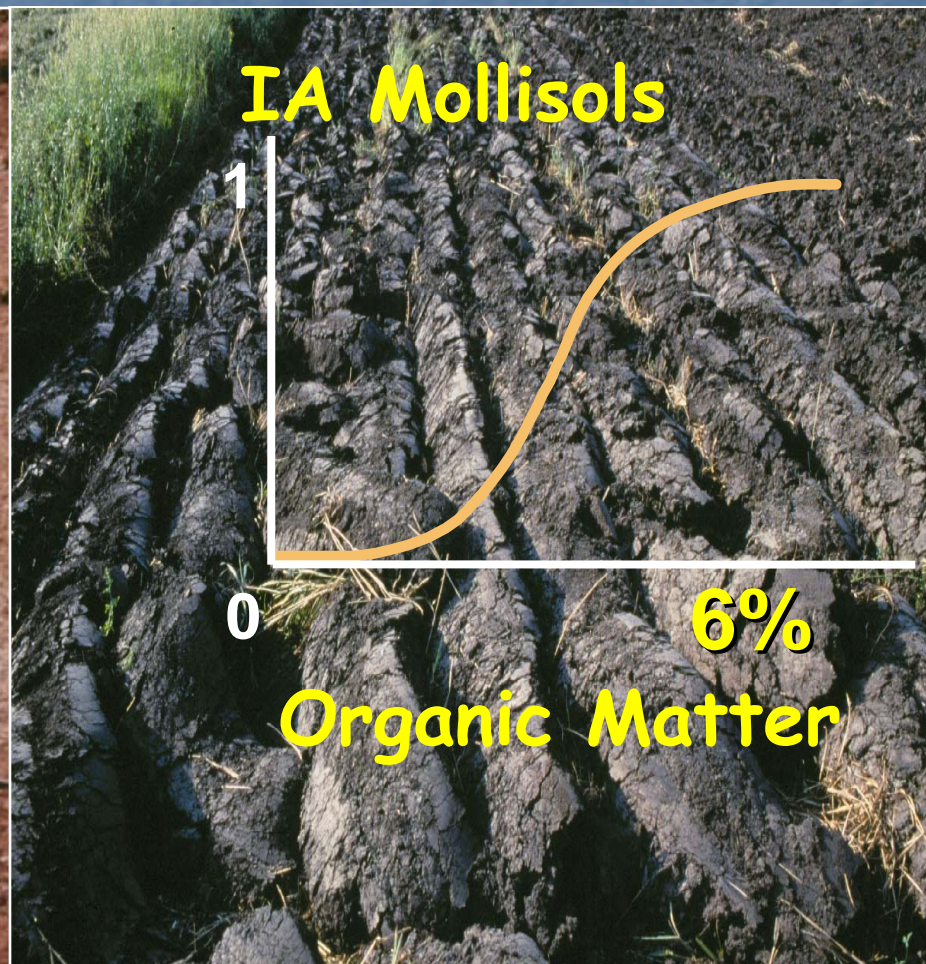
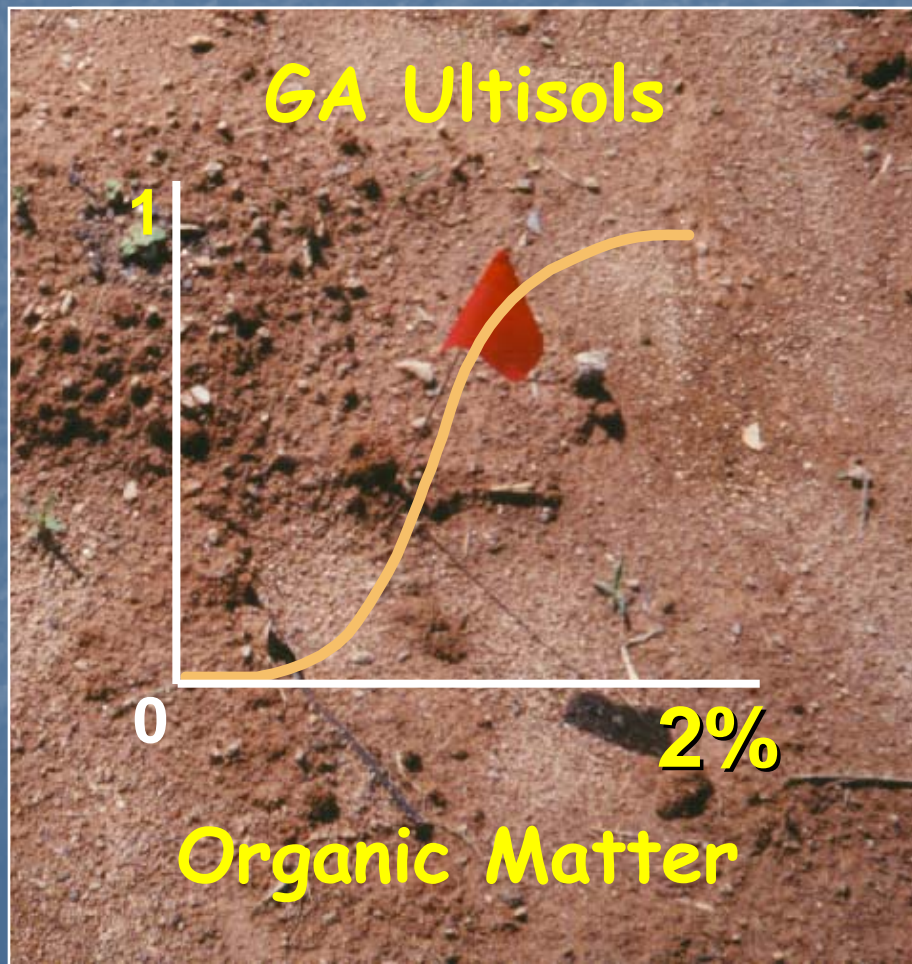
Dynamic Soil Quality



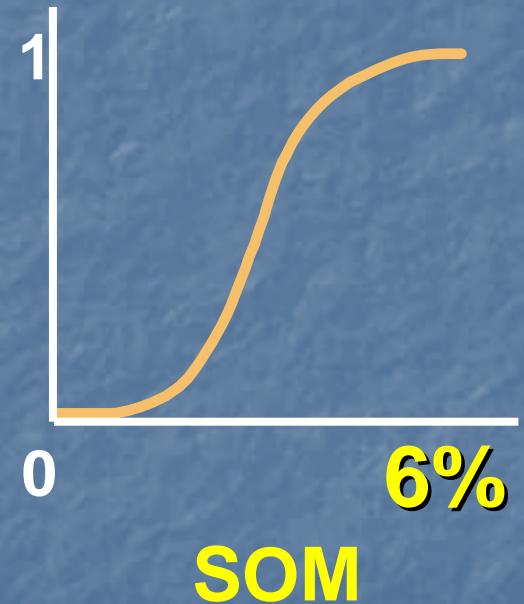
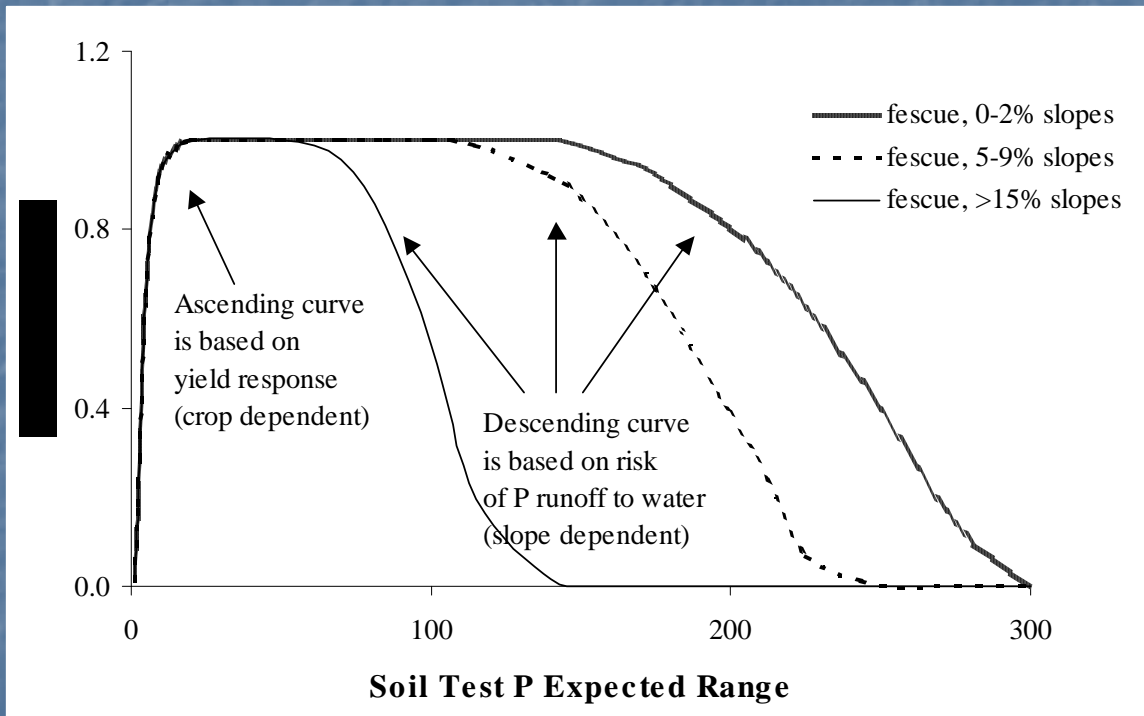
SMAF Assessment Process



Soil Organic Matter



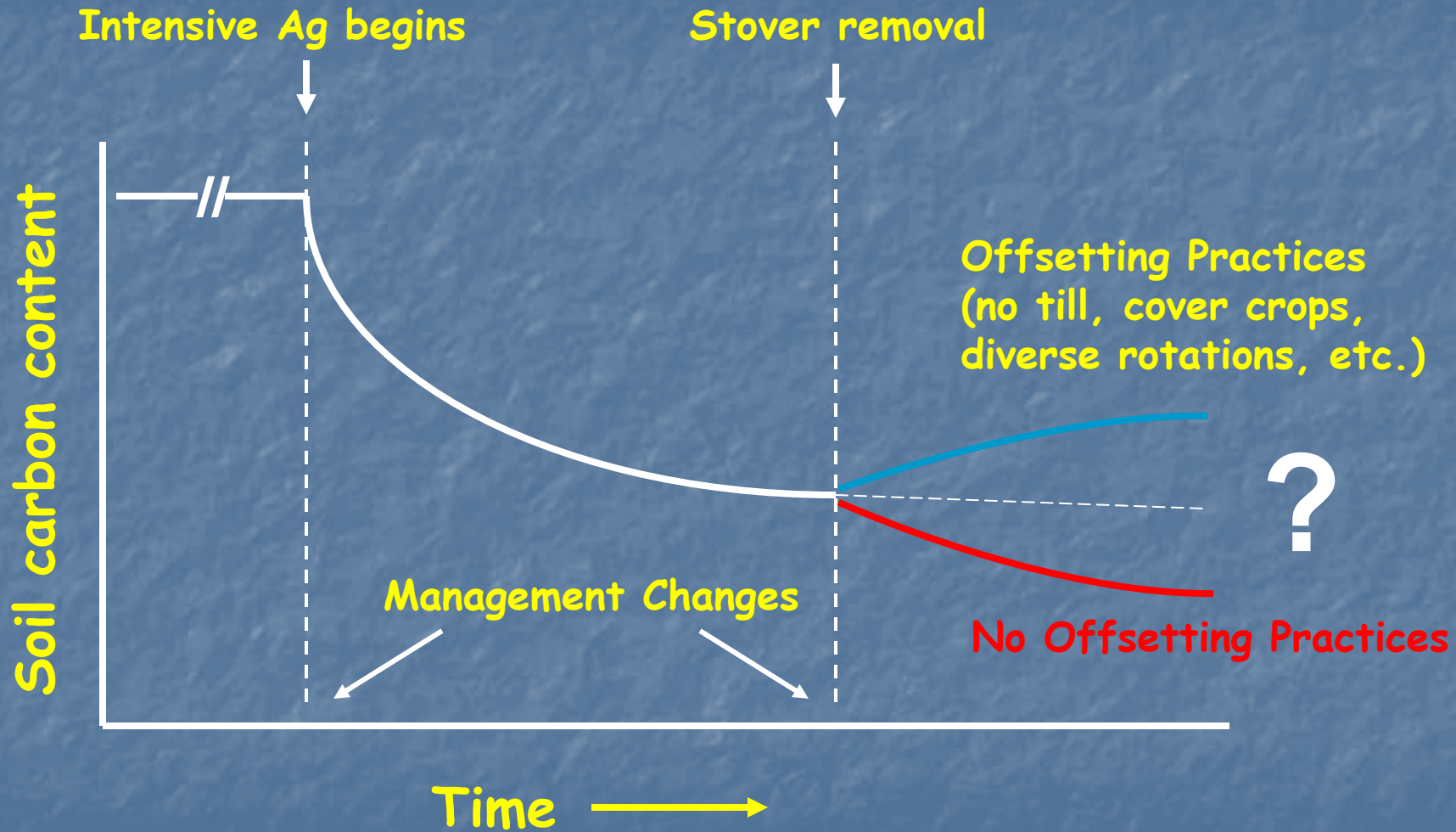
P & SOM Scoring Curves



What Does the SMAF Deliver?

- **INFORMATION** about a specific soil
- Relative ratings for individual indicators and if desired a combined "index" value
- An indication of the most limiting factors
- Web version - suggested management

Stover Removal - A Current SQ Issue



For Whom was SMAF Designed?

- Individuals or consultants helping guide soil management decisions
- Researchers who want to screen for the most limiting soil biological, chemical, or physical factors responding to management
- Action Agency personnel who want to quantify program or practice effects

SMAF Strengths & Weaknesses

- Collecting samples & measuring indicators requires time and money
- Opportunities exist to blend the SMAF with current soil testing operations
- The SMAF is a very flexible framework that can be easily modified to evaluate specific practices or management decisions

SMAF Strengths & Weaknesses

- Indicators can be added or modified and scoring curves can be updated very easily
- Someone will need to provide oversight and maintenance for a SMAF site
- The SMAF can accept simulation model input as well as measured input

Summary

- A prototype SMAF has been developed and tested
 - Excel Spreadsheet, CD, and website versions are available for further development
- The SMAF is continuing to be improved and tested within CEAP and REAP
- The Sustainable Ag Coalition is supporting further development of the SMAF
- The SMAF can complement SCI

Conclusions

- The SMAF is still in its infancy
- The SMAF consistently appears to have great potential as a soil quality assessment tool
- Just as USLE evolved to RUSLE2 and beyond, SMAF too will evolve depending upon who champions and supports it