Leaving The Land Better: Measuring Your Impact

Lisa Schulte Moore, Iowa State University, lschulte@iastate.edu
Department of Natural Resource Ecology & Management

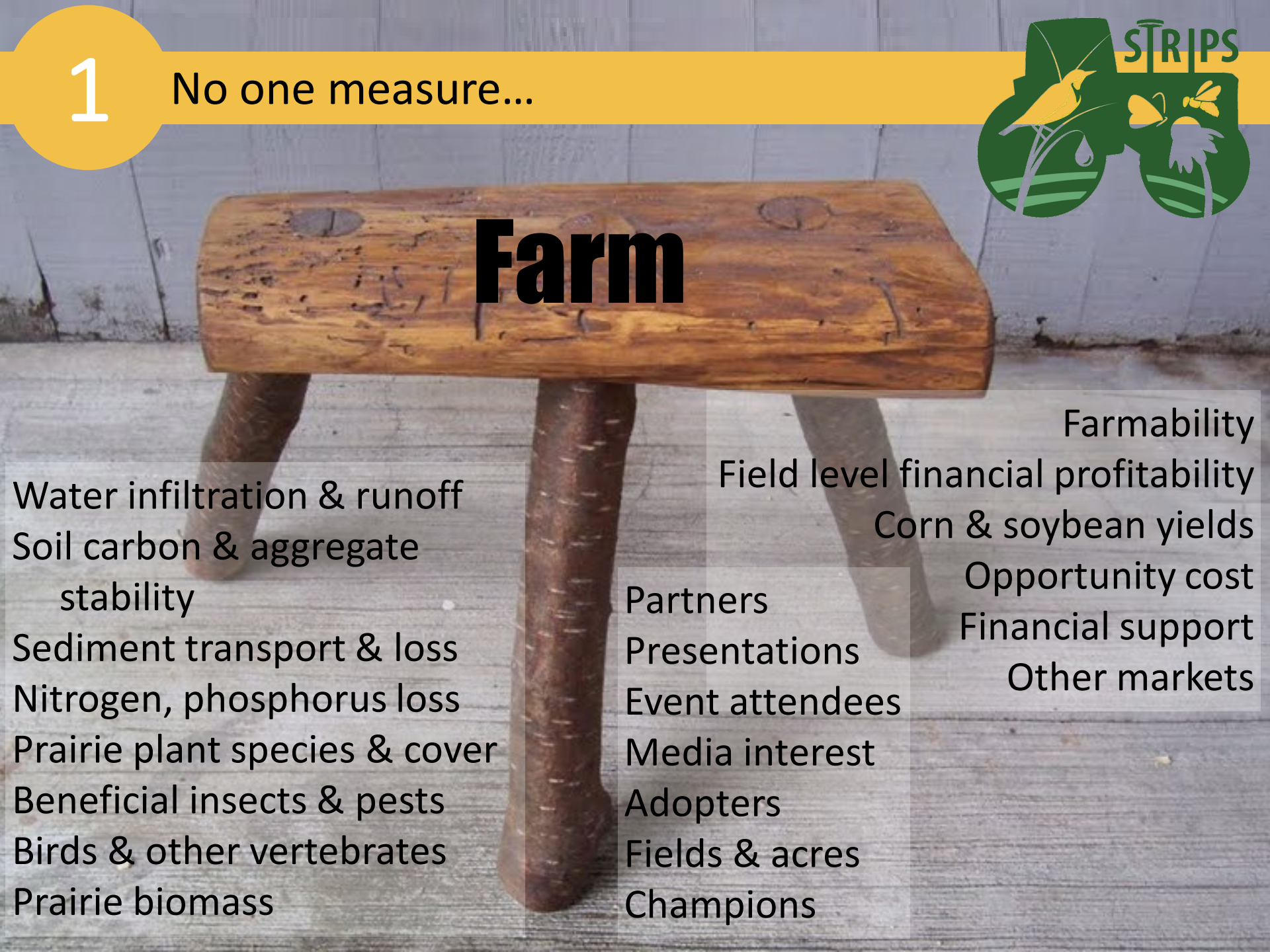
In a Nutshell…

1. No one measure…
2. Determining the right ones for YOUR farm
3. Online tools offer multidimensional planning support
4. PEWI: People in Ecosystems/Watershed Integration

1 No one measure…

Image: Abraham Piper

1 No one measure…



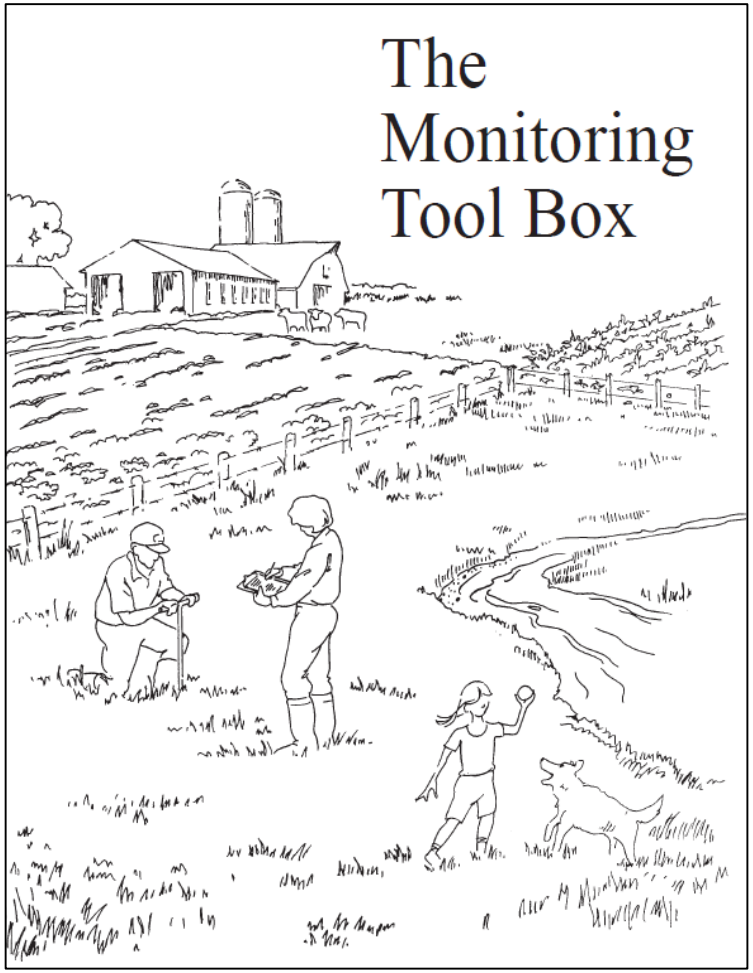
Water infiltration & runoff
Soil carbon & aggregate stability
Sediment transport & loss
Nitrogen, phosphorus loss
Prairie plant species & cover
Beneficial insects & pests
Birds & other vertebrates
Prairie biomass

Partners
Presentations
Event attendees
Media interest
Adopters
Fields & acres
Champions

Farmability
Field level financial profitability
Corn & soybean yields
Opportunity cost
Financial support
Other markets

1 No one measure…

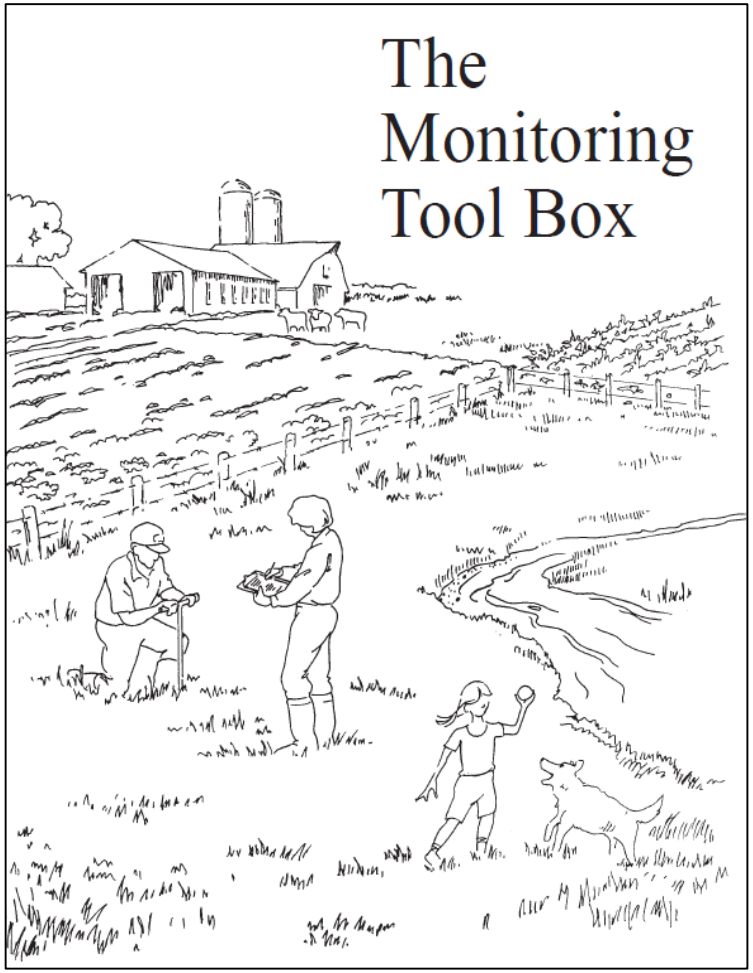
1 No one measure…a practical guide



Land Stewardship Project
https://landstewardshipproject.org/

- Kudos to Margaret Smith
- Developed by farmers, ag advisors, & researchers
- Starts with YOUR goals
- Makes use of YOUR intuition, time, observations, & supplies you already have on the farm
- Helps you consider what's feasible & how often you should measure
- Companion data worksheets

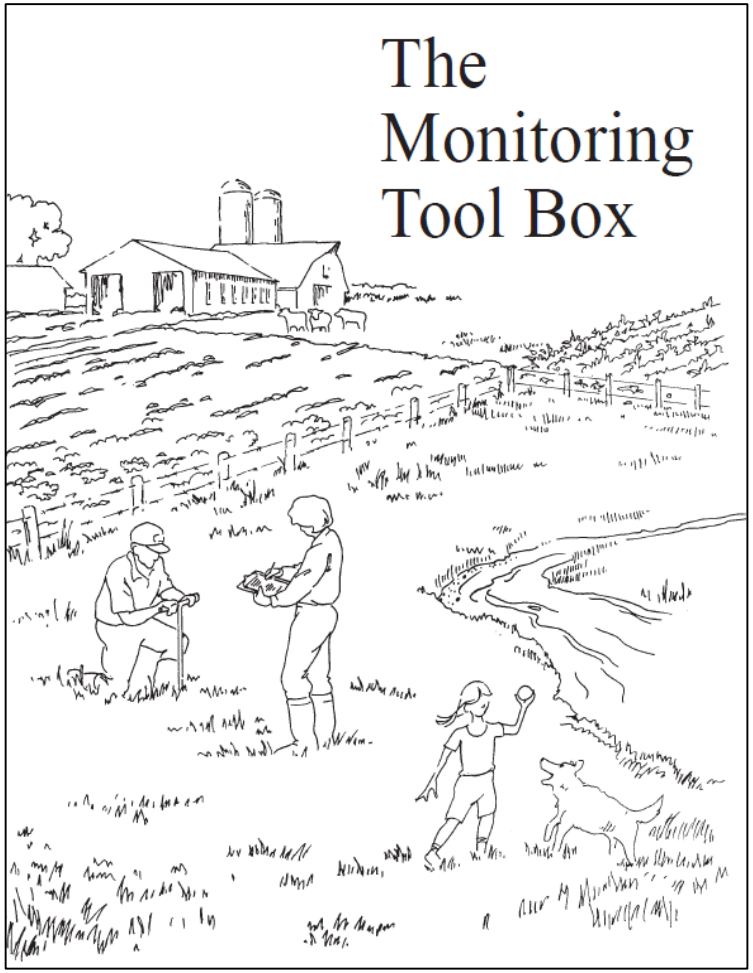
1 No one measure…



Land Stewardship Project
https://landstewardshipproject.org/

- Quality of Life
- Farm Sustainability with Financial Data
- Birds
- Frogs and Toads
- Soil
- Streams
- Pasture Vegetation

1 No one measure…



Land Stewardship Project
https://landstewardshipproject.org/

- Farm Sustainability with Financial Data
  - Farm profits
  - Reliance on government programs
  - Use of equipment, chemicals, and non-renewable energy
  - Creation of jobs
  - Balance between feed use and feed production

1

No one measure…but consider adding this one

Evaluating Soil Health Using Tea Bags

Marshall McDaniel
Teresa Middleton
Stefan Gailans

https://www.youtube.com/watch?reload=9&v=u-I9-pNE46U

1 No one measure…but consider adding this one

https://www.extension.iastate.edu/waterquality/

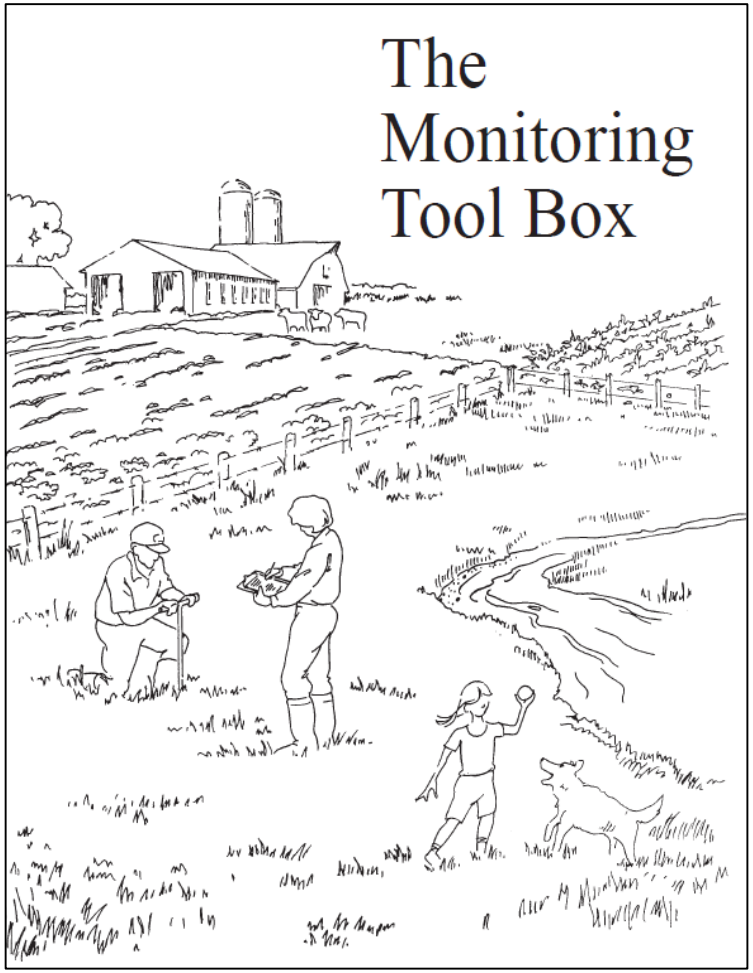
Image: Jamie Benning, ISU

1 No one measure…but consider adding this one

http://www.xerces.org/wp-content/uploads/2009/11/PollinatorHabitatAssessment.pdf

Image: Adam Verenhorst, SDSU

2 Determining the right ones for YOUR farm



Land Stewardship Project
https://landstewardshipproject.org/

A practical guide...

...but you may need some help

- Family New Year's resolution?
- A neighborhood "book club"?
- Next year's PFI Farminars?
- Work with a consultant?

2 Determining the right one for YOUR farm

Image: Abraham Piper

3 Online tools offer multidimensional planning support

Image: Pojcheewin Yaprasert; Freepik

3 Online tools offer multidimensional planning support

- Cool Farm Alliance Cool Farm Tool: https://coolfarmtool.org/
- Field To Market Fieldprint Platform: https://fieldtomarket.org/our-program/fieldprint-platform/
- Iowa State University PEWI: https://www.nrem.iastate.edu/pewi/
- USDA NRCS Resource Stewardship Enhancement Tool: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/?cid=nrcseprd1333421
- University of Illinois IDEALS: https://www.ideals.illinois.edu/handle/2142/13458
- University of Nebraska's Healthy Farm Index: http://extensionpubs.unl.edu/publication/9000016369664/the-healthy-farm-index/
- Commercial tools

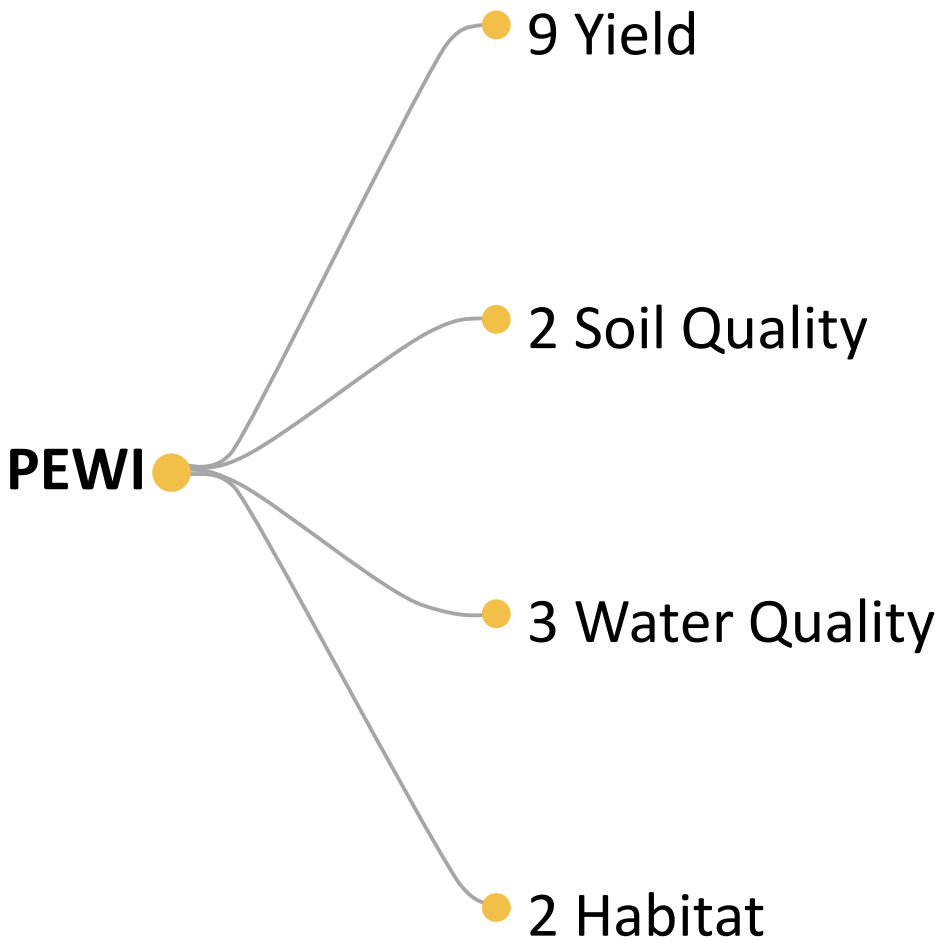
4 PEWI: People in Ecosystems/Watershed Integration

4 PEWI: People in Ecosystems/Watershed Integration

www.nrem.iastate.edu/pewi

4 PEWI measures

4 categories → 16 indicators



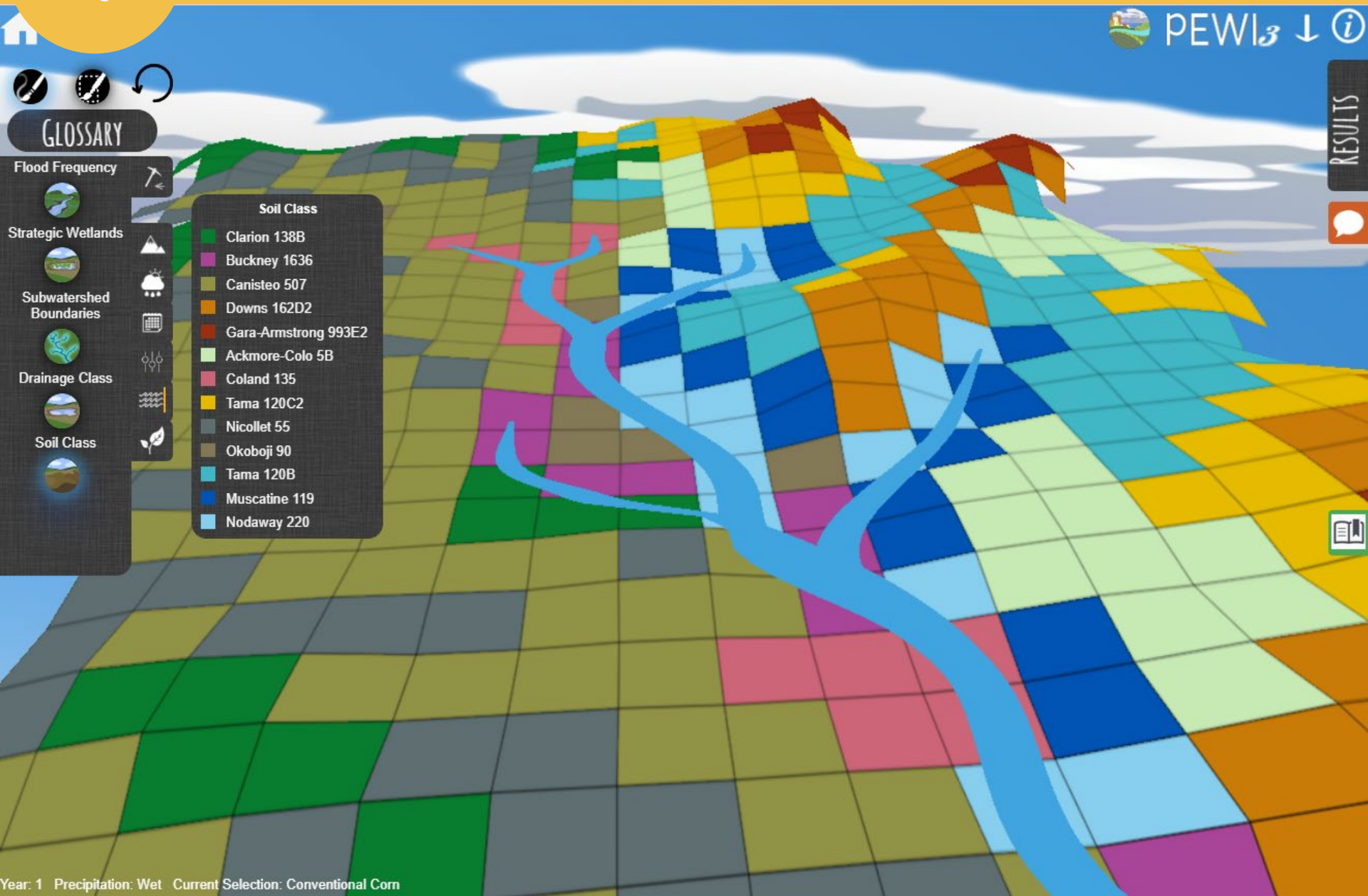
4 PEWI nitrate module

Description	Notation	Rule	Possible Values
Watershed nitrate concentration	N	$\sum_{i=1}^{n}\left[\max\left\{100 * PW_i \sum_{j=1}^{m_i} R_{ij}\, C_{ij}, 2\right\} * \frac{A_{i.}}{A_{..}}\right]$	$2\ mg\ L^{-1} \leq N \leq 29.54\ mg\ L^{-1}$
Subwatershed nitrate percent contribution	PC_i	$\frac{\max\left\{100 * PW_i \sum_{j=1}^{m_i} R_{ij}\, C_{ij}, 2\right\} * \frac{A_{i.}}{A_{..}}}{N}$	$0 - 100\%$
Precipitation multiplier[a]	P	Dry: Precipitation current year ≤ 71.6 cm	0.86
		Normal after dry: Precipitation current year = 77.2 cm, 81.7 cm, or 87.2 cm; and Precipitation prior year ≤ 71.6 cm	1.69
		Wet after dry: Precipitation current year ≥ 92.6; and Precipitation prior year ≤ 71.6 cm	2.11
		Background: All other climate cycles	1.00
Wetland multiplier[bd]	W_i	At least one strategic wetland in the subwatershed with wetland land use type	0.52
		No strategic wetland locations in the subwatershed with wetland land use type	1.00
Row crop multiplier[c]	R_{ij}	Land use types: Conservation corn, Conservation soybean, Conventional corn, Conventional soybean, Mixed fruit and vegetable	$0.14 * \frac{A_{ij}}{A_{i.}}$
		Land use types: Alfalfa, Conservation forest, Conventional forest, Hay, Herbaceous bioenergy, Permanent pasture, Prairie, Rotational grazing, Short-rotation woody bioenergy, Wetland	0.00
Conservation row crop multiplier[d]	C_{ij}	Land use types in Des Moines Lobe: Conservation corn, Conservation soybean	$0.69 * \frac{A_{ij}}{A_{i.}}$
		Land use types in Southern Iowa Drift Plain: Conservation corn, Conservation soybean	$0.62 * \frac{A_{ij}}{A_{i.}}$
		Land use types: Alfalfa, Conservation forest, Conventional corn, Conventional forest, Conventional soybean, Hay, Herbaceous bioenergy, Permanent pasture, Prairie, Rotational grazing, Short-rotation woody bioenergy, Wetland	$1.00 * \frac{A_{ij}}{A_{i.}}$

[a](Randall & Mulla, 2001)
[b](Tom Isenhart, Iowa State University, personal communication, 2013)
[c](Schilling & Libra, 2000)
[d](Iowa, 2013)

4 PEWI 3-D view

4 PEWI physical data layers



4 PEWI land uses

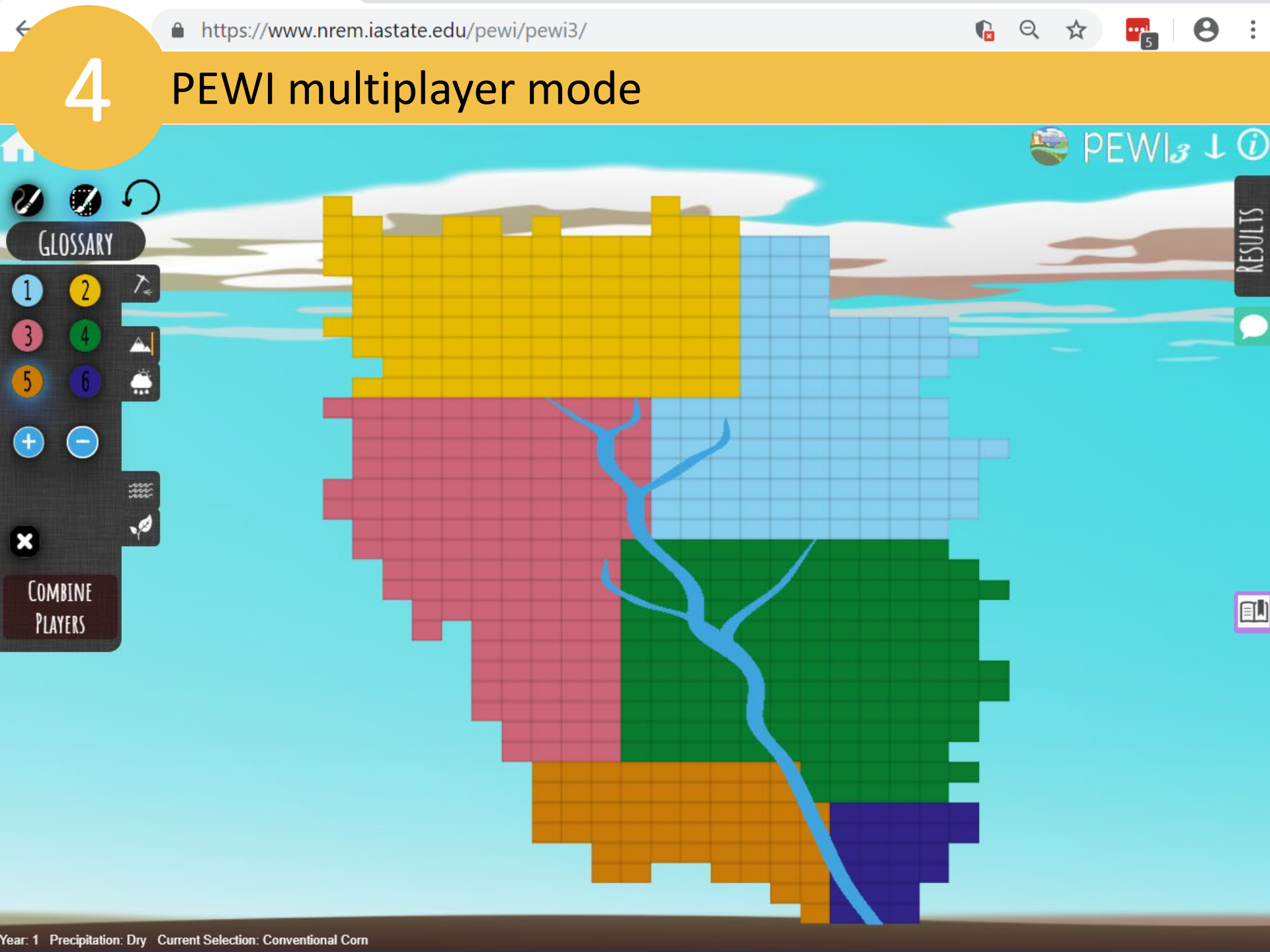
Conventional Corn
Conservation Corn
Conventional Soybean
Conservation Soybean
Alfalfa
Permanent Pasture
Rotational Grazing
Grass Hay
Prairie
Conservation Forest
Conventional Forest
Switchgrass
Woody Bioenergy
Wetland
Mixed Fruits/Vegetables

Hover options

Current Land Cover
Current Precipitation
Tile Soil Type
Overlay Map Raw Score
Subwatershed Number
Flood Frequency
Drainage Level
Strategic Wetlands

4 PEWI precipitation levels

4 PEWI multiplayer mode



4 PEWI results

Land Use Category	Y1	Percentage	Y1	Units (English)	Y1	Units (Metric)
Annual Grain						
Conventional Corn Area	10.9	percent	644.5	acres	260.8	hectares
Conservation Corn Area	5.9	percent	348.5	acres	141	hectares
Annual Legume						
Conventional Soybean Area	6	percent	353.8	acres	143.2	hectares
Conservation Soybean Area	5.3	percent	309.8	acres	125.4	hectares
Mixed Fruits and Vegetables						
Mixed Fruits and Vegetables Area	7.4	percent	436.8	acres	176.8	hectares
Pasture						
Permanent Pasture Area	5.5	percent	326.8	acres	132.2	hectares
Rotational Grazing Area	7.1	percent	417.3	acres	168.9	hectares
Perennial Herbaceous (non-pasture)						
Grass Hay Area	6.4	percent	377.5	acres	152.8	hectares
Switchgrass Area	6.6	percent	389	acres	157.4	hectares
Prairie Area	6.2	percent	367	acres	148.5	hectares
Wetland Area	6.6	percent	386	acres	156.2	hectares
Perennial Legume						
Alfalfa Area	7.3	percent	428.8	acres	173.5	hectares
Perennial Wooded						
Conventional Forest Area	4.9	percent	287.8	acres	116.5	hectares
Conservation Forest Area	7.2	percent	426.3	acres	172.5	hectares
Short Rotation Woody Bioenergy Area	6.6	percent	389.3	acres	157.5	hectares

Ecosystem Service Indicator / Measurement	Y1	Score	Y1	Units (English)	Y1	Units (Metric)
Habitat						
Game Wildlife	70	(out of 100)	7	pts	7	pts
Biodiversity	35	(out of 100)	3.5	pts	3.5	pts

4 Coming soon to PEWI

Coming in 2019

- Separating out practices from land uses
  - Conventional till or no-till
  - Cover crops
  - Terraces, grass water ways, buffers
- More interactive feedback
- Economics module
  - Overview
  - Line item view
- More land use types
  - Apple and chestnut orchards
  - Apple and chestnut with hay alleys

Long Term Goals

- Integrating with Google Maps

4 PEWI: People in Ecosystems/Watershed Integration

PEWI Development Team:

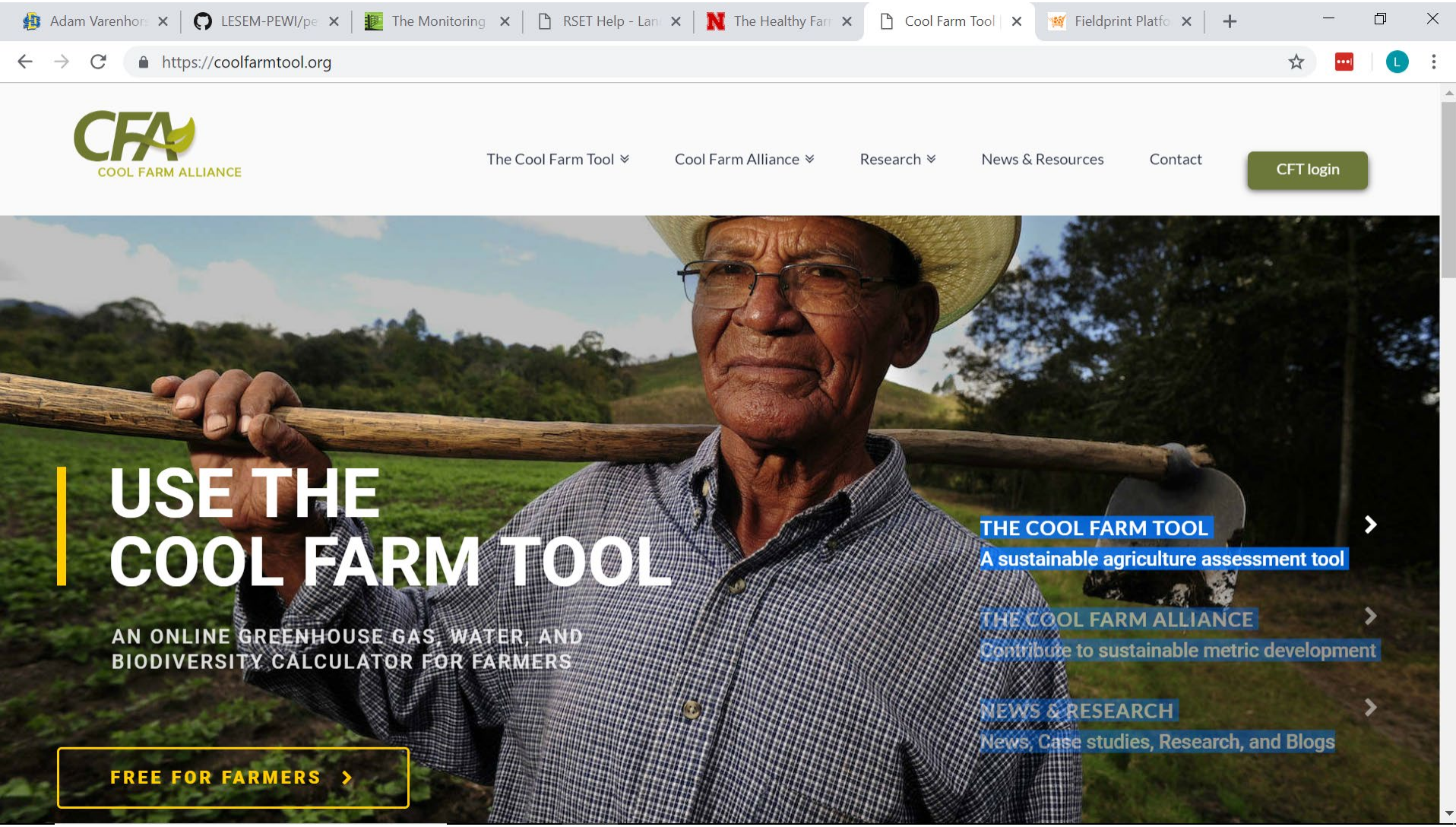
Lisa Schulte Moore, Carrie Chennault, Robert Valek, Nancy Grudens-Schuck, John Tyndall, John VanDyk

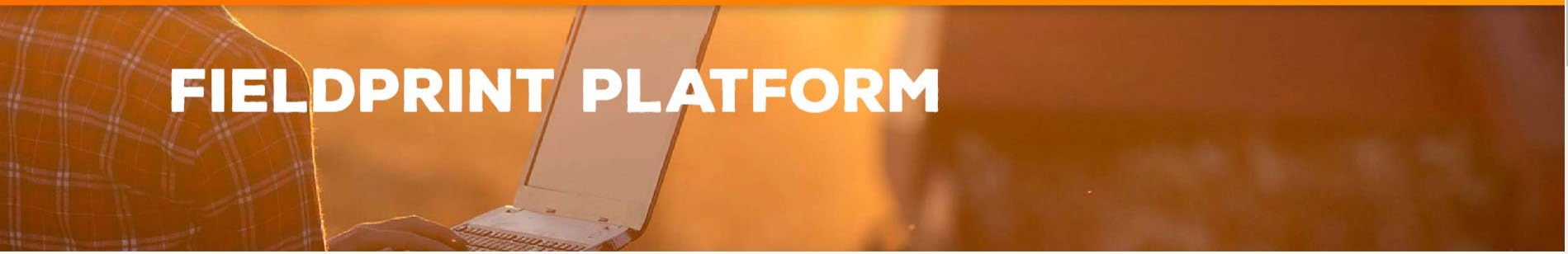
Uma Abu, Katelyn Anderson, Assata Caldwell, Han-Shu Chang, Justin Choe, Nicolas De La Cruz, Ryan Frahm, Noah Hagen, Jacob Hill, Mitchell Kerr, Charlie Labuzzetta, Elizabeth Li, Elise Miller, Md Jawad Mashrur Rahman, Laura Roy, Alexander Schulz, Mehul Shinde, Nancy Shryock, Weijia Zhao

Funding:

IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY
USDA FOREST SERVICE US DEPARTMENT OF AGRICULTURE
NIFA
THE McKNIGHT FOUNDATION

And now back to Lee…


Adam Varenhor
LESEM-PEWI/pe
The Monitoring
RSET Help - Lan
The Healthy Far
Cool Farm Tool
Fieldprint Platfo
https://coolfarmtool.org
CFA
COOL FARM ALLIANCE
The Cool Farm Tool
Cool Farm Alliance
Research
News & Resources
Contact
CFT login
USE THE
COOL FARM TOOL
AN ONLINE GREENHOUSE GAS, WATER, AND
BIODIVERSITY CALCULATOR FOR FARMERS
FREE FOR FARMERS
THE COOL FARM TOOL
A sustainable agriculture assessment tool
THE COOL FARM ALLIANCE
Contribute to sustainable metric development
NEWS & RESEARCH
News, Case studies, Research, and Blogs



FIELDPRINT PLATFORM

The Fieldprint® Platform is a pioneering assessment framework that empowers brands, retailers, suppliers and farmers at every stage in their sustainability journey, to measure the environmental impacts of commodity crop production and identify opportunities for continuous improvement.

Farmers can access this free and confidential tool through our online **Fieldprint® Calculator** or through **associated farm-management software** that integrates the Platform's metrics and algorithms. Brands, retailers and suppliers can access aggregated data from farmers who opt-in to participate in their Fieldprint® Projects.

Introduction

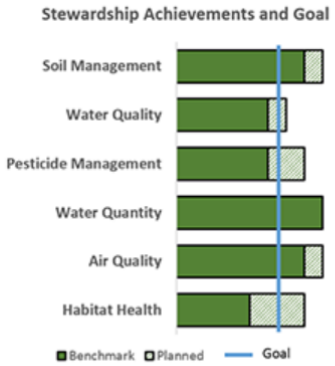
Resource Stewardship (RS) is a voluntary service provided by NRCS through a new evaluation tool. RS enhances conservation planning by benchmarking the level of resource stewardship on the land and helping NRCS clients better identify their conservation goals and improve their outcomes.

RS uses a web-based platform to evaluate the health of soil, water, air and wildlife habitat. RS evaluates a user defined management system against the inherent site characteristics in order to perform this evaluation.

Upon the completion of RS, clients receive a report called the Resource Stewardship Evaluation (RSE) which visually graphs their stewardship achievements and suggests opportunities to improve resource stewardship. Evaluations are available for crop, pasture, range, forest, farmstead, and associated ag land uses.

If you would like a Resource Stewardship Evaluation completed on your operation, please reach out to your local NRCS office. To access Resource Stewardship, visit https://rs.sc.egov.usda.gov/Splash.aspx

The following graph shows an example visual from an RSE report, highlighting where a client's operation scores on each of the criteria listed in comparison to the vertical blue threshold bar. The shaded bars suggest opportunities the client can take to meet or surpass the threshold bar and improve resource stewardship.



Illinois Farm Sustainability Calculator

The Illinois Farm Sustainability Calculator is a spreadsheet-based model capable of quantifying and analyzing some of the most important measures of agricultural sustainability for any farm in the state of Illinois. Users input data from their farm including soil information, the production area of each crop, nutrients added to the fields, tillage methods, the number and type of animals raised, livestock dietary requirements, energy sources used, building energy use, product hauling distances etc. The model takes these inputs, combines them with data concerning crop productivity, carbon sequestration and emissions, energy use for different types of tillage and buildings, alternative energy production, and many other subjects. From these parameters, IFSC produces final balance sheets for animal feed production vs. consumption, energy production vs. consumption, carbon sequestration vs. carbon emission, and nitrate runoff. It also indicates how many people the farm can feed. In other words, IFSC allows its user to discover whether or not their current farm design is sustainable and test it against any number of hypothetical farm designs until a sustainable design is reached. Development of the IFSC was funded by the Dudley Smith Initiative.

Browse by
- Date
- Authors
- Contributors
- Titles
- Subjects
- Issue
- Series/Report

Recent Additions

Illinois Farm Sustainability Calculator 1.4.4 With Orchards and Basic Farm Economics

EXTENSION

Institute of Agriculture and Natural Resources
EC307

The Healthy Farm Index – Including Bird Observations in a Multifactor Assessment

Ron J. Johnson, Professor Emeritus, School of Natural Resources, UNL, and Clemson University
John F. Quinn, Assistant Professor, Biology, Furman University
James R. Brandle, Professor Emeritus, School of Natural Resources, ARDC
Charles A. Shapiro, Extension Soil Specialist, Department of Agronomy and Horticulture
Elizabeth A. Sarno, former Extension Educator / Organic Project Coordinator
Twyla M. Hansen, former Organic Project Assistant

What is farm health? Like our own health, farm health is difficult to define or measure because farms differ in many ways. Many describe a healthy farm as one that is economically viable and ecologically responsible, with clean water and air, green fields, abundant fish and wildlife populations, and with safe places for family recreation and enjoyment. Others might describe a healthy farm as one that is managed in a way to increase the benefits of nature to the farm and local communities. Here, we use "healthy" in a general sense, and ask farmers to define their specific vision of what is healthy for their farm.

Why the Healthy Farm Index (HFI)? As an agricultural state, 93 percent of Nebraska's land use – 45.5 million acres – is devoted to working farms and ranches that provide food and fiber products and play a vital role in soil and water conservation and management, fish and wildlife populations, and natural beauty. Measuring and tracking annual production of food and fiber is common, but few options are available to keep track of other benefits that farms provide. Farm assessment tools that emphasize annual economics or inputs such as fertilizers, pesticides, or irrigation water may not apply to farms that focus on both conservation and long-term profitability for coming generations. There is need for a research-based assessment tool that farmers can use to evaluate how various management styles affect resiliency of both profit and conservation and the broad array of potential benefits to farms and people. And there is need for a tool that appeals to farmers as workable and effective for self-assessment of their unique farming systems.

Together with farmers and others, scientists at the University of Nebraska–Lincoln developed the *Healthy Farm Index* as part of research conducted under a USDA organic farming grant. The goal was to develop a tool to help farmers monitor and improve the long-term health of their farm. Here, the HFI is framed around four major categories of **production** (farm production), **protection** (protection of soil and water), **biodiversity** (variety of crops, livestock, wild birds, and natural habitats), and **family** (satisfaction related to farm, family, community). Birds are included as a measure because their associations with various habitats and insect foods reflect farm health in a variety of ways. They also are colorful, visible, and fairly easy to monitor by observing and listening for them in the various habitats on a farm.

This publication provides an overview of the *Healthy Farm Index* and how farmers can use it to move toward goals they see as important for their farm. It starts with a brief overview of why nature is important to farms and rural communities, and includes a section on how to survey farm birds. Although developed on organic farms, the concepts apply to most farms and could be adapted to ranches or other lands.

Why include nature on your farm?

Benefits from nature, often called "ecosystem services," are valued globally in excess of $125 trillion per year but are provided free of charge and often taken for granted. These immense benefits include suppression of insect and rodent pests, crop pollination, purification of air and water, production of

Nebraska Lincoln

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture.

The Healthy Farm Index

Including Bird Observations in a Multi-factor Assessment

EC307

This publication provides an overview of the Healthy Farm Index and how farmers can use it to move toward goals they see as important for their farm. It includes a section on how to survey farm birds. Although developed on organic farms, the concepts apply to most farms and could be adapted to ranches or other lands.

Free resources

PDF

WEB