Understanding the FSR Calculation

The field stewardship rating is developed from 14 different stewardship indices. Each stewardship index reflects a process occurring within the soil profile, the field or the watershed. Each index also represents a specific parameter (e.g, sediment or soil) and has a weight applied to reflect the quality of the science used to derive the index.

We first developed the 14 raw stewardship index values using quantitative information (e.g., the amount of soil detachment as a result of water sheet and rill erosion). The raw stewardship indices are derived from soil loss and water retention methods using commonly accepted scientific equations. A method called the Revised Universal Soil Loss Equation (RUSLE2) is used to estimate the amount of soil detachment. A method called the "Curve Number" is used to estimate the amount of precipitation, which infiltrates into the soil profile. The input values to these equations are important assumptions affecting the stewardship rating.

The 14 raw stewardship indices are then "adjusted" or "scaled" to ensure each value ranges from 0 to 10. We call these "scaled stewardship indices." A value nearer 10 is "better" than a lower value. The 14 scaled stewardship indices are mathematically combined into a single field stewardship rating. The field stewardship rating is weighted if adjusted by the reliability factor and unweighted if not adjusted by the reliability factor.

Stewardship Index	Report Card Category	Value		Weight Rationale
		Data Quality	Index Weight	
Soil Water Erosion Benchmark Index (SoWaErBeIn)	Soil Management	Low	1	Uncertainty in soil formation rate.
Soil Water Erosion Departure Index for Agriculture (SoWaErDeInAg)	Soil Management	High	3	Use of accepted method to estimate soil erosion (Revised Universal Soil Loss Equation).
Soil Retention Benchmark Index (SoReBeIn)	Soil Management	Moderate	3	Use of accepted method to estimate soil erosion (Revised Universal Soil Loss Equation), but uncertainty surrounding removal of sediment by conservation practices.
Infiltration Benchmark Index (InBeIn)	Water Management	High	3	Use of accepted hydrology model (continuous simulation model estimating daily water terms), based on Natural Resources Curve Number model. Model parameters adjusted for antecedent moisture and

				field specific conditions (soil type, land slope, presence of drainage).
Runoff Departure Index for Agriculture (RuDeInAg)	Water Management	High	3	Use of accepted hydrology model (continuous simulation model estimating daily water terms), based on Natural Resources Curve Number model. Model parameters adjusted for antecedent moisture and field specific conditions (soil type, land slope, presence of drainage)
Irrigation Water Use Efficiency Benchmark In (IrrUseEffBeIn)	Water Management	High	3	Use of accepted hydrology model (continuous simulation model estimating daily water terms), based on Natural Resources Curve Number model. Model parameters adjusted for antecedent moisture and field specific conditions (soil type, land slope, presence of drainage)
Total P Mobilization Index for Agriculture (TPMobInAg)	Nutrient Retention - P	Moderate	2	Use of accepted watershed loading model, where P generated based on crop type and tillage method. Less detailed than hydrology model.
Total P Export Departure Index for Agriculture (TPExDeInAg)	Nutrient Retention - P	Moderate	2	Use of accepted watershed loading model, where P generated based on crop type and tillage method. Less detailed than hydrology model.
Total P Retention Benchmark Index (TPReBeIn)	Nutrient Retention - P	Moderate	2	Use of accepted watershed loading model, where P generated based on crop type and tillage method. Less detailed than hydrology model.
Resource Sediment Goal Index (ReSedGlIn)	Surface Water Quality Risk	Low	1	Use of accepted transport equations, but lack of information about site specific watershed goals and current annual sediment load (from SPARROW model – SPAtially Referenced Regression On Watershed attributes).
Sediment Goal Feasibility Index (ReSedFeasIn)	Surface Water Quality Risk	Low	1	Use of accepted transport equations, but lack of information about site specific watershed goals and current annual sediment load (from SPARROW model – SPAtially Referenced Regression On Watershed attributes)

Resource Phosphorus Goal Index (RePhosGlIn)	Surface Water Quality Risk	Low	1	Use of accepted transport equations, but lack of information about site specific watershed goals and current annual sediment load (from SPARROW model – SPAtially Referenced Regression On Watershed attributes).
Phosphorus Goal Feasibility Index (RePhosFeasIn)	Surface Water Quality Risk	Low	1	Use of accepted transport equations, but lack of information about site specific watershed goals and current annual sediment load (from SPARROW model – SPAtially Referenced Regression On Watershed attributes)
4R Nitrogen Fertilizer Index (NFertIn)	Fertilizer Management	High	3	Performance standard based on actual data collected from the farmer.
4R Phosphorus Fertilizer Index (PFertIn)	Fertilizer Management	High	3	Performance standard based on actual data collected from the farmer.

Stewardship Indices Overview

Explanation

The 4 types of indices developed to describe stewardship quality are unique to the Stewardship Program. Each index is based on quantitative data (e.g., amount of soil loss) and subsequently transformed into a scaled value ranging from 0 to 10. Each index is "weighted" based on "reliability" reflecting the quality of the science supporting the index. The index values are summed and divided by the total number of values to arrive at a final "field stewardship rating." **The field stewardship rating ranges from 0 to 10 (a higher value being more desirable).**

Types of Indices

Each stewardship index is one of the following types (see graphic):

Benchmark—a characteristic of the field and farm operation is compared to a single "known" value (e.g., the rate soil forms) or benchmark.

Agriculture Operation—a characteristic of the field and farm operation is compared to the range for the field in agricultural production. Forage alfalfa and the current rotation in a moldboard plow tillage system is used to represent the range of agriculture production.

Agriculture Operation Departure—a characteristic of the field and farm operation is compared to the midpoint value for the range in agricultural production and normalized by the range for agriculture.

Performance (not illustrated) – based on achieving certain minimum protocols, methods or processes.

Reliability

Each index is rated with regard to the quality of the science information used to estimate the value. Reliability is rated as high, moderate or low:

High (weight 3) – No opinion or bias. Well supported by science and research data. The input data and the spatial scale of the calculations (5 x 5 meter cell) are the same and the benchmark value is "known."

Moderate (weight 2) – Some opinion or bias. Best professional judgment based on moderate to limited science and research data. The input data and the spatial scale of the calculations are not the same OR the benchmark value is based on a moderate amount of science and research data.

Low (weight 1) – Considerable opinion or bias. Best professional judgment based on limited science and research data. The input data and the spatial scale of the calculations (5 x 5 meter cell) are not the same AND the benchmark value is based on a limited amount of science and research data.

Parameters

Each index describes one of the following parameters: soil / sediment, water, nitrogen, phosphorus.

Spatial Scale

Each index describes a physical, chemical or biological process at one of the following spatial scales:

3. Watershed

2. Field

1. Soil Profile

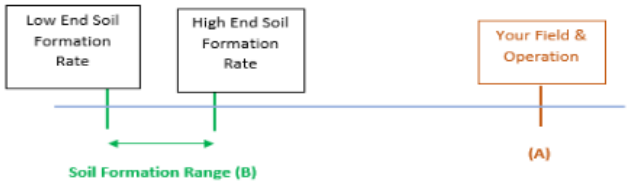
BENCHMARK INDEX

Index Value – A Divided by B

Value is greater than zero

Your operation expected to be greater than the soil formation range

Index value represents # of times greater your operation exceeds rate of soil formation



AGRICULTURAL OPERATION INDEX

Assesses Your Field as a Proportion of the Range for Agriculture

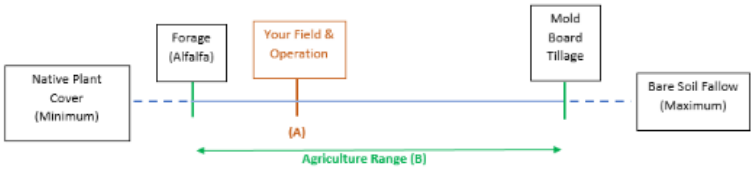
Index Value = A Divided by B

Your field must fall within agricultural range (B)

Index value is between 0 and 1 and positive

Smaller value means closer to low end of range

Larger value means closer to high end of range



AGRICULTURAL OPERATION DEPARTURE INDEX

Assesses How Close Your Field is to the "Middle" of the Agricultural Operation Range

Index Value – A Divided by B

Your operation must fall within agricultural range

Value less than one

Negative value means field and operation is less than the middle value

Positive value means field and operation is greater than middle value

Small value means field and operation is near middle for agricultural range