USDA Natural Resources Conservation Service
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TECHNICAL NOTE

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Erosion Prediction Tools

Purpose

Soil erosion is a process where the land surface is worn away through the detachment and transport of soil and rock by water, wind, and other geologic actions. There are natural processes that contribute to soil erosion, but some human activities have increased soil erosion on agricultural lands creating resource concerns that the Agricultural Research Service, Natural Resources Conservation Service, U.S. Forest Service, and Bureau of Land Management have developed tools to assess.

NRCS recognizes several forms of wind erosion and water erosion. This technical note is intended for NRCS conservation planners and partners working with agricultural producers and public land managers to facilitate the understanding of contributing factors to soil erosion and appropriate tools to assess the different forms of erosion on varying land uses.

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Cover Photos

Photo 1: View of sheet erosion occurring in a newly planted soybean field. Chris Coreil, National Erosion Specialist, NRCS CNTSC.

Photo 2: View of grade stabilization structure, located on the edge of a newly planted soybean field, discharging water into a surface water body after a recent rain. The discharge is brown and cloudy, indicating that a significant amount of sediment is leaving the field. Chris Coreil, National Erosion Specialist, NRCS CNTSC.

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Introduction

The purpose of this technical note is to provide guidance on erosion and hydrology tool selection during conservation planning to assess interrill (splash-sheet), rill, wind, concentrated flow (ephemeral and classic gully), and streambank erosion potential for various land uses and management systems. This technical note does not replace the General Manual or National Resource Concern List and Planning Criteria policy, but rather provides a summary of the tools in one document for easy information and comparison.

Erosion prediction tools available to conservation planners vary considerably and are different for various land uses. Most of the tools mentioned in this technical note were designed by the Agricultural Research Service (USDA-ARS), some in collaboration with the Natural Resources Conservation Service and/or other agencies and university partners.

The tools discussed in this technical note generally serve two purposes: 1) to determine whether a management system is sustainable and/or identify if resource concerns are present on a land unit, and 2) to provide an assessment of conservation practice impacts by comparing the current management system to alternative potential management systems.

All of the tools evaluated focus on detailed field scale or small watershed assessments. Landscape-scale tools, such as the Soil and Water Assessment Tool (SWAT), Agricultural Policy Environmental Extender (APEX), and Environmental Policy Integrated Climate (EPIC) models, are not covered by this technical note.

There are three types of tools included in this technical note:

Qualitative assessments like Conservation Assessment Ranking Tool (CART), Pasture Condition Score (PCS), Interpreting Indicators of Rangeland Health (IIRH), Determining Indicators of Pasture Health (DIPH), and Stream Visual Assessment Protocol (SVAP2) that rely on visual indicators and estimates.

Field-based tools like the Revised Universal Soil Loss Equation (RUSLE2), Rangeland Hydrology and Erosion Model (RHEM), and Wind Erosion Prediction System (WEPS) are models intended for use at the field scale typical in conservation planning.

Watershed-based tools like the Kinematic Runoff and Erosion Model (KINEROS2) and Automated Geospatial Watershed Assessment (AGWA) are models capable of assessing small watershed scale and complex topography.

Soil Loss Tolerance Concept

Estimated runoff and erosion for some of the USDA models are based on long-term average inputs, including annual precipitation and wind energy. The soil loss tolerance (T value) concept often provides a baseline loss threshold reference. The T value is assigned to soil map units and is defined by the NRCS Soil Survey Manual as "The maximum rate of annual soil erosion that will permit crop productivity to be sustained economically and indefinitely." The T value ranges from one to five tons/acre/year. The factor of 1 ton per acre per year is for shallow or otherwise fragile soils and 5 tons per acre per year is for deep soils that are least subject to damage by erosion. Soil loss tolerance T value is a basis for judging whether average annual erosion will result in sustained site fertility. The T value is also used, due to the lack of a better site-specific threshold, to estimate the potential for downstream over-sedimentation, nutrient losses and eutrophication, and air quality impacts. [1]

Dominant Critical Soil for Site Assessment Concept

When assessing erosion using the assessment tools below, a single dominant critical soil map unit is chosen that serves as a proxy for the entire field, i.e., the most erodible soil (critical) that is also a significant enough area or portion of the field (dominant) on which to base the conservation plan. Using this dominant critical soil map unit for general conservation planning assessments ensure that the conservation plan will address the resource concerns in the field while minimizing overtreatment of less at-risk parts of the field. Dominant critical soil selection does not apply to Highly Erodible Land (HEL) planning.

Primary Tools

Primary tools are used by NRCS conservation planners and partners to conduct official resource concern evaluations. These tools are specifically identified in NRCS policy.

Conservation Assessment and Ranking Tool (CART)

Description

The Conservation Assessment and Ranking Tool (CART) exists within the Conservation Desktop (CD) environment. CD was built specifically for NRCS as a stand-alone web-based conservation planning and program management platform. Conservation planners can use CART to conduct a

[1] Li, L., Du, S., Wu, L., & Liu, G. (2009). An overview of soil loss tolerance. *Catena*, *78*(2), 93-99.

simplified resource concern assessment of all resource concerns (i.e., Soil, Water, Air, Plant, Animal, Human, and Energy - SWAPA+H&E).

URL (Website)

Only conservation planners, with appropriate permission, are able to access CD and CART tools. A description of these tools can be found here: https://www.nationalconservationplanningpartnership.com/wp-content/uploads/2019/10/NCPP-Briefer-CART-Update-1.pdf

Platform

Web Application

Functionality

CART is designed to be a preliminary NRCS resource concern assessment tool for some resource concerns and a platform to document conservation planner resource assessments and best professional judgment for other resource concerns. The qualitative outputs are acknowledged as credible and are supported by General Manual policy.

If any questions arise regarding CART outputs, planners are encouraged to conduct further assessments using the tools and sustainability metrics outlined in the National Resource Concern List and Planning Criteria document. The tools listed below are part of this more detailed and assessment process.

CART does not generate Implementation Requirements (IR), or the specific instructions or designs on implementing conservation practices. The reason for this is because producers' IR plans require a higher level of detail and site-specific information to successfully design, install, and implement. CART is also not used for the creation or evaluation of HEL plans or systems.

Revised Universal Soil Loss Equation (RUSLE2)

Description

The RUSLE2 (Revised Universal Soil Loss Equation version 2) is a second-generation model of the Universal Soil Loss Equation (USLE). RUSLE2 was designed to predict interrill (splash and sheet) erosion, rill erosion, and related sediment delivery on cropland. RUSLE2 uses six factors; climatic erosivity, soil erodibility, slope length, slope steepness, cover management, and support practices to compute soil loss (RUSLE2 User's Guide). The basis of RUSLE2 is empirical or based on observation and experience and was developed by the USDA-ARS. It uses an interface created collaboratively with NRCS with conservation planners in mind. This interface is flexible and allows conservation planners, partners, and researchers to adjust and scale the inputs and information presented to suit specific needs.

URL (Website)

https://www.nrcs.usda.gov/resources/tech-tools/water-erosion-rusle2

Platform

Desktop (Web application under development)

Functionality

RUSLE2 is the official interrill, rill, and sediment delivery assessment tool. RUSLE2 is used to:

- Develop conservation practice IR plans;
- Provide additional information to CART assessments that need further investigation; and
- Calculate interrill and rill erosion for HEL compliance plans or systems.

Estimated average annual soil erosion is compared to the soil loss tolerance (T) when assessing the interrill and rill resource concerns. Crop interval erosion predicted, or the erosion that takes place from the harvest of one crop to another crop, is commonly used to assess vulnerabilities in management and find the most efficient parts of a crop rotation to apply conservation practices. The sediment delivery value, or amount of sediment estimated to be leaving the hillslope, is used as an indicator of conservation practice effectiveness. Aside from these absolute values, relative changes in predicted values, from the baseline management to alternatives, are also used to assess the effectiveness of conservation practices.

The combination of the baseline management and producer-selected alternative management outputs is the cornerstone of the producer's IR and is part of an overall conservation plan.

RUSLE2 also calculates several additional management system metrics:

- Soil Conditioning Index (SCI)
- Soil Tillage Intensity Rating (STIR)
- Fuel Use
- Leaching Index

The Soil Conditioning Index (SCI) is a model that can predict the consequences of cropping systems and tillage practices on the status of soil organic matter in a field. Soil organic matter is a primary indicator of soil quality, health, and carbon sequestration. SCI is used to assess the management system's potential to drive soil health and has three main components: 1) the amount of organic material (OM) returned to or removed from the soil, 2) the effects of tillage and field operations (FO) on organic matter decomposition, and 3) the effect of predicted soil erosion (ER) associated with the management system. A value of zero or less is an indication that the management system and soil organic matter are declining. A value greater than zero is an indication that a management system is at equilibrium or trending in a positive direction. The SCI value should be used, along with other soil health indicators, as part of a wholistic management system review.

The Soil Tillage Intensity Rating (STIR) is an estimate of soil disturbance intensity. The STIR value is unitless. It takes into account factors, such as surface area disturbed, operational speed of tillage equipment, tillage type, and depth of tillage. STIR ratings range from 0 to 200. A low STIR value indicates less overall soil disturbance and would be associated with a cropping system that has a reduced risk of sheet, rill, and wind erosion, an increasing amount of soil organic matter, improved water infiltration rates, and lower soil carbon losses. A low STIR generally will have better soil health (USDA Soil Tillage Intensity Rating reference).

STIR is used for the FO component in the SCI.

RUSLE provides economic information related to fuel use and costs associated with crop implement and tillage use. Average fuel use, by year, is presented as a key output.

A leaching potential rating (Leaching Index) is presented in RUSLE2. This rating requires state and regional interpretation of the RUSLE2 Nitrogen Leaching Index.

Wind Erosion Prediction System (WEPS)

Description

Wind Erosion Prediction System (WEPS) was designed to predict erosion by wind on cropland. The science was developed by ARS as a replacement for the empirical Wind Erosion Equation (WEQ). WEPS predicts many forms of soil erosion by wind, such as saltation-creep and suspension, including PM-10 and PM-2.5, using a process-based, continuous, daily time-step model that simulates weather, field conditions, crop growth, and hydrology.

URL (Website)

https://www.nrcs.usda.gov/resources/tech-tools/wind-erosion-prediction-system

Platform

Desktop and Web Application (under development)

Functionality

WEPS serves as the official wind erosion assessment tool used to:

- Develop conservation practice IR plans;
- Assess CART assessments that need further investigation; and
- Calculate wind erosion for HEL compliance plans or systems.

Average annual erosion under the current management system is compared to the soil loss tolerance (T). Predicted crop interval erosion, or the erosion that takes place from the harvest of one crop to another crop, is commonly used to assess vulnerabilities in management and find the most efficient parts of a crop rotation to apply conservation practices.

WEPS provides erosion and other output extremes. Tables and graphs help planners better understand the year-to-year risk of experiencing above- or below-average erosion, crop failures, and other related outcomes.

WEPS can be used to assess other management system metrics:

- Soil Condition Index (SCI)
- Soil Tillage Intensity Rating (STIR)
- Fuel Use
- Potential Seedling Damage (from wind)
- Water Fate

Potential seedling damage is assessed in WEPS by comparing soil erosion totals for each crop to plant tolerance values in Table 502-1 of the National Agronomy Manual. If erosion levels are at or exceed plant tolerance values, then there is a high probability that plants will experience economic damage.

Water fate is presented in WEPS. Average water inputs (rainfall and irrigation) and outputs (plant usage and losses) are presented. This information is primarily used to assess water use efficiency of the producer's baseline management to potential alternative management systems.

Rangeland Hydrology and Erosion Model (RHEM)

Description

The Rangeland Hydrology and Erosion Model (RHEM) was developed as a coordinated project between three United States Department of Agriculture (USDA) agencies: Agricultural Research Service (ARS), Natural Resources Conservation Service (NRCS), and the United States Forest Service (USFS). RHEM is designed for government agencies, land managers, and conservationists who need science-based technology to model and predict runoff and erosion rates on rangelands and to assist in assessing rangeland conservation practice effects.

RHEM is a process-based erosion prediction tool and is based on fundamentals of infiltration, hydrology, plant science, hydraulics, and erosion mechanics. RHEM is designed to estimate runoff, erosion, and sediment yield on hillslopes that do not receive runoff and sediment from upslope of the hillslope being modeled by RHEM.

URL (Website)

https://apps.tucson.ars.ag.gov/rhem/

Platform

Web Application

Functionality

When planning on rangeland, if the Interpreting Indicator of Rangeland Health (IIRH) preponderance of evidence summary indicates any departure rating except "None to Slight" for the Soil/Site Stability and/or Hydrologic Function attributes, then RHEM will be used to further determine the extent and risks of potential erosion (NRCS National Range and Pasture Manual).

- Inputs: RHEM takes in crucial data, such as climate, soil, cover, and slope information, to accurately predict hydrological processes. It estimates infiltration, runoff, and erosion parameters based on these inputs and can consider saline conditions with an optional Sodium Absorption Ratio (SAR).
- Outputs: RHEM provides essential information for conservation planning. It calculates annual average values for runoff, erosion rates, soil loss, sediment yield (delivery), and salt load, giving insight into typical hydrological patterns. Additionally, it predicts outcomes for extreme events, such as high-intensity rainfall with return period assessments, which could aid in planning proactive conservation measures.

RHEM can be used to evaluate runoff and erosion as a consequence of plant species and growth form changes from disturbances, such as fire, brush management, and climate change. RHEM does not employ the concept of soil loss tolerance (T) that is more appropriate for cultivated cropland. RHEM employs a risk-based approach as it will also evaluate the statistical risk from various storm events (2, 5, 10, 25, 50, 75, and 100 year). Outputs of RHEM include average precipitation, number of storms producing runoff, runoff, soil loss, and hydrology and erosion risks for the design storm events.

Benefits for conservation planning:

- Provide a quantitative tool for evaluating the effectiveness of conservation practices.
- Model and predict rangeland hydrology and erosion for current and future conditions.
- Identify hydrologic thresholds where erosion rates abruptly increase with degrading conditions.
- Training tool to teach interactions between climate-soils-plants management.
- RHEM outputs can be linked with other NRCS web-based technologies.

Benefits for program delivery:

- All items above and for use in developing Implementation Requirements for practices, Ecological Site Descriptions (ESD), and Rangeland Health Reference Sheet.
- RHEM can be used in many NRCS programs and planning activities (i.e., predict rangeland hydrology and erosion at the field and at the watershed level scale when RHEM is embedded within a watershed model, such as KINEROS2 noted below).
- Conservation program evaluation and evaluating conservation priorities.

- National Resource Inventory and conservation benefits analysis. RHEM can be used to support activities across all missions in the Agency Strategic Plan and carrying out Farm Bill initiatives.

Pasture Condition Score Sheet (PCSS[2])

Description

Pasture Condition Score Sheet (PCSS); USDA-NRCS 2020 Guide to Pasture Condition Scoring provides the visual evaluation of 10 indicators, which rate pasture vegetation and soils. Visual ratings of sheet and rill, wind, and streambank erosion are included in this assessment. Each indicator or factor has five possible ratings, ranging from lowest (poorest) condition (1) to highest (best) condition (5). The indicators are tallied into an overall score (50) for the pasture unit or utilized as individual scores and compared with the other nine indicators. Indicators receiving the lowest scores can be targeted for corrective action.

URL (Download)

https://www.nrcs.usda.gov/sites/default/files/2023-06/Guide_To_Pasture_Condition_Scoring_JAN2020.pdf

Platform

- Digital Workbook
- Hardcopy

Functionality

Pasture condition scoring (PCS) is a qualitative way to assess how well a pasture is being managed and to identify resource concerns. A pasture rated with a high score is well-managed with productivity (plant and animal) being sustained or enhanced. By rating 10 key indicators common to all pastures, pasture condition can be evaluated and the primary reasons for a low condition score can be identified. A low rating typically means the pasture has one or more challenges, such as poor plant growth, weedy species invasion, poor animal performance (low forage quantity and quality), visible soil loss, increased runoff, and impaired water quality in or adjacent to the pasture.

[2] USDA-NRCS. 2020. Natural Resources Conservation Service. Guide to Pasture Condition Scoring. Washington D.C.

The PCS should be performed several times a year during critical management periods throughout the grazing season. The PCSS dated January 2020 (or newer versions if available) should be used to rate individual pastures. The PCS should be performed:

- As a benchmark condition of the pasture.
- Early in the growing season before grazing events occur.
- At peak forage supply periods.
- At low forage supply periods.
- At plant stress periods, such as drought or very wet conditions.
- When conservation practices (management) have been fully applied.

Determining Indicators of Pasture Health (DIPH)

Description

Determining Indicators of Pasture Health (DIPH) is an assessment tool for pastureland and includes a matrix of 22 indicators that can be used to determine the preponderance of evidence for three separate pastureland ecosystem attributes: biotic integrity, soil and site stability, and hydrologic function. DIPH is a similar methodology to Interpreting Indicators of Rangeland Health (IIRH) Version 5 (Pellant et al. 2020), although there are specific indicators that are relevant to pastureland systems. DIPH may be used as a standardized approach similar to IIRH to conduct a comprehensive pasture assessment.

URL (Download)

https://directives.sc.egov.usda.gov/landingpage/2a0b7879-1b23-4e37-ae38-5dc82b19ec88

Platform

- Digital Workbook
- Hardcopy

Functionality

Three health attributes are evaluated in both IIRH and DIPH and are designed to provide information about how well ecological processes – such as the water cycle, energy flow, and nutrient cycling – are functioning at a site. The three ecosystem attributes (biotic integrity, soil and site stability, and hydrologic function) are determined from specific indicators (some indicators are used for one or more of the three attributes). Eleven of the 22 visual indicators considered in DIPH pertain to the Soil and Site Stability attribute.

DIPH is centric to the dynamics of the ecological site (ES). Various soil and plant variables may be different across the continuum of pasturelands in the U.S. Some pasture environments are capable of sustaining high species diversity and many different adapted forage species (including legumes) and soil biota, such as earthworms, etc., while some pasture systems are limited in

these respects by various environmental constraints. For example, a wide variety of cool season grasses and legumes may be grown and maintained successfully in humid cold temperate climates in New England, whereas a semiarid subtropical climate in Louisiana may only support a maximum diversity of two warm season pasture grasses (bermudagrass and Bahia grass), with no inherent introduced long-term sustainability of nontoxic legumes (which act as annuals). Therefore, rating these indicators should be evaluated with the ecological constraints associated with the ES.

Interpreting Indicators of Rangeland Health (IIRH) Version 5

Description

Rangeland health is a concept developed in the mid-1990s in response to ongoing discussions within the rangeland management profession about evaluating rangeland resources. The Interpreting Indicators of Rangeland Heath (IIRH) protocol is primarily a qualitative assessment using 17 observable indicators to assess ecological processes on a site, most of which can be supported by appropriate quantitative measures. A well-developed ESD and a reference sheet are needed as a guide to rate and evaluate each indicator. The reference sheet includes a description of what is expected for each of the 17 indicators in the reference state that collectively are used to assess 3 ecosystem attributes (soil and site stability, hydrologic function, and biotic integrity):

- Soil and site stability is the capacity of the site to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind or water.
- Hydrologic function characterizes the capacity of the site to capture, store, and safely release water from rainfall, run-on, and snowmelt (where relevant) to resist a reduction in this capacity and to recover this capacity following degradation.
- Integrity of the Biotic Community is defined as the capacity of the site to support characteristic functional and structural plant communities in the context of normal variability, to resist loss of this function and structure caused by disturbance, and to recover following each disturbance.

URL

https://www.nrcs.usda.gov/sites/default/files/2022-06/Interpreting_Indicators_1734-6_ver5_08272020%20%281%29.pdf

Platform

- Digital Workbook
- Hardcopy

Functionality

IIRH is intended to be used at the ES scale or equivalent landscape unit. Using ESDs with state and transitions models and the associated reference sheets, range health assessment can give

departure ratings from the reference or the "best" a site may be. IIRH requires a reference sheet and knowledgeable evaluators to provide an evaluation of the 17 indicators that collectively provide a rating of the three attributes. IIRH can be used to communicate ecological concepts, improve communications on critical ecosystem properties and processes, assist in identifying monitoring priorities and sites, assist in identifying areas that are at risk of degradation, and help determine whether resource concerns exist, and be used as a tool for prioritizing areas of restoration. IIRH is also used in collecting data for the National Resources Inventory (NRI).

Stream Visual Assessment Protocol Version 2 (SVAP2)

Description

Stream Visual Assessment Protocol Version 2 (SVAP2) is an easy-to-use tool for qualitatively evaluating the condition of aquatic ecosystems associated with wadeable streams, that is, those shallow enough to be sampled without use of a boat. This protocol takes a visual look at all aspects of stream condition (chemical, physical, and biological). This assessment can be used to prioritize the needs for assistance within a watershed.

This SVAP2 protocol can be successfully applied by conservationists with limited training in biology, geomorphology, or hydrology. Erosion is visually assessed as part of the SVAP2 process.

URL (Document)

https://www.nrcs.usda.gov/sites/default/files/2022-10/Stream-Visual-Assessment-Protocol-Version-2.pdf

Platform

- Digital Workbook
- Hardcopy

Functionality

A synthesis of information gathered during the preliminary SVAP2 assessment and field assessment portions of the protocol can be used to provide general guidance to landowners on how watershed features and practices they employ are reflected in the quality of their stream ecosystems.

The SVAP2 is a preliminary qualitative assessment tool to evaluate features that affect overall stream conditions at the property level. The tool assesses visually apparent physical, chemical, and biological features within a specified reach of a stream corridor.

Erosion is part of the physical assessment. Erosion indicators are documented when reviewing channel condition, bank condition, and water appearance.

Assessment of Ephemeral Gully Erosion

There is no official NRCS tool that calculates quantitative soil loss from ephemeral gullies. Note: IIRH and DIPH assess gullies based on a qualitative assessment with guidance from an Ecological Reference Sheet and/or assessment matrix. Assessment of ephemeral gullies, and the determination of whether this type of erosion constitutes a resource concern, relies on a variety of inputs. These include:

- Historical aerial photography.
- Producer knowledge and management system history.
- LiDAR data.
- Conservation planner onsite observations.

There are many NRCS state-specific documents used to guide planners in assessing ephemeral gullies. These tools usually consider unique soil, management, and climate dynamics in assessing whether a gully constitutes a resource concern.

There are multiple ongoing efforts to develop ephemeral gully assessment models. Soon, these models will become available to conservation planners as qualitative assessment instruments.

Secondary Tools

Secondary tools are used by NRCS conservation planners and partners to conduct supplemental resource concern evaluations. These tools are not identified in NRCS policy but serve specialty purposes and add clarity to overall resource assessments.

Kinematic Runoff and Erosion Model (KINEROS2)

Description

The Kinematic Runoff and Erosion Model (KINEROS2) is an event-oriented, physically based model describing the processes of precipitation interception, infiltration, surface runoff, and erosion from small agricultural and urban watersheds. The watershed is represented by a cascade of overland flow elements (planar or curvilinear) and channels. The partial differential equations describing overland flow, channel flow, erosion, and sediment transport are solved by finite difference techniques. The spatial variation of rainfall, infiltration, runoff, and erosion parameters can be accommodated. KINEROS2 may be used to determine the effects of various artificial features, such as urban developments, small detention reservoirs, or lined channels on flood hydrographs and sediment yield. KINEROS2 has the option to select RHEM as the hillslope infiltration and erosion engine.

URL (Website)
https://www.tucson.ars.ag.gov/kineros

Platform
Desktop CLI Application

Automated Geospatial Watershed Assessment (AGWA)

Description
The Automated Geospatial Watershed Assessment (AGWA) tool is a Geographic Information System (GIS)-based hydrologic modeling tool that uses commonly available GIS data layers to fully parameterize, execute, and spatially visualize results for RHEM, KINEROS2, SWAT2000, and SWAT2005 watershed runoff and erosion models. Accommodating novice to expert GIS users, it is designed to be used by watershed, water resource, land use, and resource managers and scientists investigating the hydrologic impacts of land cover/land use change occurring in small watershed to basin-scale studies. AGWA is currently available as an add-in ArcGIS 10.8 and previous version. An ArcGIS Pro version is under development.

URL (Website)
https://www.tucson.ars.ag.gov/agwa

Platform
Desktop Application

Water Erosion Prediction Project (WEPP) – NRCS Web Application

Description
The Water Erosion Prediction Project (WEPP) model and interface represent a new erosion prediction technology based on fundamentals of stochastic weather generation, infiltration theory, hydrology, soil physics, plant science, hydraulics, and erosion mechanics.

WEPP serves as an important supplemental planning tool for assessing interrill and rill erosion, complementing RUSLE2 science and outputs. Output variability and crop management system risk can be assessed. WEPP can also track water use fate and assess how crop managements change water use efficiency. Since WEPP is process-based, it can be extrapolated to a broad range of conditions that may not be practical or economical to field test.

URL (Website)
https://www.nrcs.usda.gov/resources/tech-tools/water-erosion-prediction-project

Platform
Web Application

Water Erosion Prediction Project (WEPP) – Forest Service Web Applications

Description
The Forest Service has developed multiple web applications that access the science of the WEPP model. These interfaces allow planners to assess pre- and post-fire conservation practice effectiveness in reducing erosion, sediment delivery, and ash delivery on forest, rangeland, and chaparral. Average outputs, along with extreme event probabilities, are provided.

Forest Service implementations of WEPP allow planners, focusing on forest, rangeland, or chaparral, to assess sites with streamlined inputs and custom outputs.

Forest Service WEPP interfaces allow planners to assess:

- Pre- and Post-Fire Scenarios (WEPPcloud)
- Site Disturbance (Disturbed WEPP)
- Road Construction (WEPP:Road)
- Fuel Loads (FuME Fuel Management)
- Sediment and Ash Delivery (ERMiT)
- Independent Use of CLIGEN and Runoff

URL (Website)
https://forest.moscowfsl.wsu.edu/fswepp/

Platform
Web Applications

Erosion Tools Decision Matrix

The table below is to help conservation planners select the most appropriate tool(s).

Primary Assessment Tools	Tool Type	Sheet and Rill	Streambank	Ephemeral Gully	Classic Gully	Wind
CART	Qualitative assessment	All	All	All	All	All
RUSLE2	Field based	Cropland, Pastureland, Disturbed				
PCS2	Qualitative assessment	Pastureland	Pastureland	Pastureland	Pastureland	Pastureland
RHEM	Field based	Rangeland				
WEPS	Field based					Cropland, Pastureland, Disturbed
DIPH	Qualitative assessment	Pastureland	Pastureland	Pastureland	Pastureland	Pastureland
IIRH	Qualitative assessment	Rangeland			Rangeland	Rangeland
SVAP2	Qualitative assessment		All			

Secondary Assessment Tools	Tool Type	Sheet and Rill	Streambank	Ephemeral Gully	Classic Gully	Wind
KINEROS	Watershed based	Rangland, Cropland, Disturbed (Urban-Rural Interface)				
AGWA	Watershed based	Rangeland, Cropland				
WEPP – NRCS Web Application	Field based	Cropland, Pastureland, Disturbed				
WEPP – Forest Service Web Applications	Field and watershed based models	Forestland, Rangeland				