Controlling Ephemeral Gully Erosion

NRCS Natural Resources Conservation Service

Nebraska Agronomy Technical Note NE-111
August 2017

What is Ephemeral Gully Erosion?

Simply defined, ephemeral means seasonal or temporary. Ephemeral gully erosion is so named because it tends to occur at the same point on the landscape year after year and is obliterated by annual tillage operations only to re-occur following subsequent rainfall events. Ephemeral gully erosion can also occur in fields where no-till is being practiced due to large drainage areas, excessive slopes, poor crop production resulting in low residue levels and/or poor soil quality.

Why Is this Important?

The Highly Erodible Land Conservation (HELC) provisions of the Farm Bill, require that ephemeral gully erosion be controlled on all highly erodible land used for the production of a commodity crop. Failure to control ephemeral erosion on may result in the loss of USDA Farm Program benefits, which includes FSA loans and financial assistance programs, NRCS and FSA conservation program benefits, and Federal crop insurance premium subsidies.

Typical Ephemeral Gully

Concentrated Flow Areas

Concentrated flow areas are areas in a field where runoff water concentrates and where ephemeral gullies are likely to occur. These areas may require the installation of conservation practices to prevent or treat ephemeral gully erosion. This is especially true if the area has been de-vegetated due to land shaping or farming operations, or if the existing vegetation or residue cover is not adequate to prevent gullying.

What are Treatment Options?

NRCS has developed an Ephemeral Gully Modeling Tool to provide guidance for identifying effective treatment options for areas prone to ephemeral gully erosion.

To use this modeling tool, some information needs to be gathered in the field including; crop rotation, tillage system and residue levels, bed slope at the ephemeral gully location, and the top width for the concentrated flow area with 6 inches of flow depth. In addition, the tool requires the watershed area for ephemeral gully, the hydrologic group for the dominant soil in the contributing watershed, and the soil erodibility at the gully location.

The tool will provide guidance in determining which of the following treatment options may be sufficient to control ephemeral erosion:

- Current cropping system based on crop grown and tillage practices;
- The current cropping system with cover crops planted just in the ephemeral gully area; or
- The current cropping system with cover crops planted in the entire watershed of the ephemeral gully.

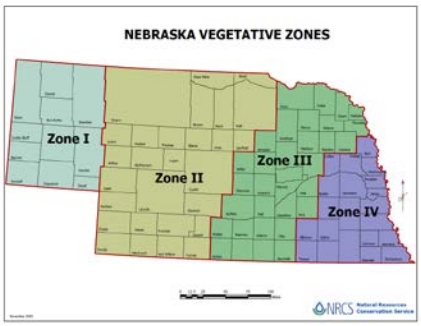
If none of the above will work, either a different cropping system is needed (i.e. one with more high-residue crops, or a perennial crop such as alfalfa or a perennial grass in the crop rotation, or one that uses less tillage) OR one or more of the following practices will need to be installed:

- Grassed Waterways
- Water and Sediment Control Basins
- Terraces
- Contour Buffer Strips

Concentrated flow area treated with a fall seeded cover crop.

Cover Crops

The preferred cover crop for both concentrated flow areas and critical overland flow areas requiring treatment is fall-seeded cereal rye, although winter wheat or triticale will also work. Small grains should be seeded at a rate of at least 75 lbs./acre if drilled over the entire field or watershed, and 90 lbs./acre if drilled only in the concentrated flow areas. They should be seeded no later than October 15th in Vegetative Zones I & II and November 1st in Vegetative Zones III & IV (see map below). Cereal rye may be dormant-seeded if necessary.



If spring cover seeding is required, oats may be used at the same rate and should be planted as soon as possible following the earthwork, but generally not earlier than March 15th.

Cover crops may be chemically destroyed when they have produced adequate growth to stabilize critical areas (at least 6 -8 inches of growth at a minimum, but 12 or more inches of growth is optimal). In some cases, it will be necessary to apply the chemical after the spring crop has been planted. Appropriate crop varieties need to be selected to allow for this scenario.

Cover crops are strongly encouraged as part of any crop rotation containing low or fragile residue producing crops, such as soybeans, to provide additional stability to concentrated flow areas and prevent the necessity of damage repair or maintenance.

USDA is an equal opportunity employer, provider and lender.

Grassed Waterways

Grassed waterways are graded channels seeded to grass or other suitable vegetation to convey runoff water from point to point in a non-erosive manner. The vegetation slows the water and acts as a filter for sediments and other impurities. The grassed waterway conveys the water to a stable outlet.

They are commonly installed in draws between hills and other low-lying areas on slopes where water concentrates as it runs off a field.

Grassed waterways may also be used to convey runoff from terraces or other sources of water concentrations to a stable outlet.

The effectiveness of a grassed waterway is enhanced when row direction leads into the grassed waterway; when vegetation is maintained at the proper height; and when erosion points within the grassed waterway are repaired and reseeded.

Water and Sediment Control Basins

A water and sediment control basin (WASCB) is an earth embankment constructed across the slope of minor water courses to form a sediment trap and water detention basin.

They are generally used where the topography is irregular or a terrace is not a good fit. The purpose of this practice is to reduce erosion while maintaining farmability. WASCBs generally use an underground outlet to slowly release detained runoff via a pipe to a receiving stream or ditch.

Terraces

Terraces are earthen structures constructed along the contour of the landscape. They intercept runoff on moderate to steep slopes. They transform long slopes into a series of shorter slopes, which reduces the likelihood of concentrated flow paths to form and cause erosion. Similar to WASCB's, terraces generally use an underground outlet to release detained runoff via a pipe to a receiving stream or ditch.

Terraces are recommended where there are numerous ephemeral gully channels on a hillside.

Contour Grass Buffer Strips

This practice consists of alternating strips of cropland and grass down the slope. Generally, crop strip widths are 150 feet or less. Grass strips are a minimum of 15 feet wide.

Other Items to Consider

Channel Shaping

Channel shaping to produce a broad, shallow flow condition will reduce the potential for ephemeral erosion.
Care should be taken during channel shaping operations to retain as much top soil as possible and minimize fill placement in concentrated flow areas because un-compacted fill will to be less stable.
Retaining native perennial vegetation, or establishing and maintaining grassed waterways in concentrated flow areas, is preferable to cropping them for the sake of channel stability. When de-vegetation of concentrated flow areas is necessary, as for channel shaping, a close seeded small grain cover crop should be seeded immediately following earthwork activity. Mulching would be another option.

Maintenance

Annual inspection and maintenance of concentrated flow areas is important.

Where erosion has occurred to the extent that it will hinder planting of the next crop, maintenance should be completed immediately after harvest. This should be done with minimal tillage operations no deeper than the erosion which has occurred and no wider than necessary to make planting possible followed immediately by drilling a cover crop (as described above).

Use of a blade with rubber-tire compaction to shape eroded areas is the preferred method to accomplish repair of damage.

If erosion damage is occurring even as the result of normal rainfall events of 2-4 inches, additional conservation treatment is required in order to satisfy the HELC requirements.

More Information

The USDA Natural Resources Conservation Service can assist with planning conservation practices to help control ephemeral erosion on highly erodible land. Conservation programs can also provide funding assistance to install practices. Locate your nearest NRCS office at:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/local/