

BCWA Field Method

Adopted by Board: February 18, 2016



ME07 – Erosion Pin Methods

Contents

Soil Erosion Problem In Watershed	1
Soil Erosion Monitoring Sites	1
Erosion Pin Methods	2
<i>Sheet Erosion</i>	2
<i>Bank erosion (cut)</i>	2
<i>Bank erosion (slope)</i>	3
<i>Gully erosion</i>	3

Soil Erosion Problem In Watershed

Soil erosion is an important environmental concern in mountainous watersheds. There are numerous types of soil erosion caused by either water flow or wind that can affect a watershed: sheet erosion, gully erosion, landslides and stream bank erosion. Over both a short and longer time-periods any of these soil erosion factors can significantly alter water quality and change the landscape. Quantifying soil erosion under field conditions can be a challenge.

Major storm events have the potential to move and deposit vast amounts of sediment and rock in short period of time. The deposition of sediments in lake and reservoirs in the watershed is a known environmental and water quality concern. Sediment deposition in water supply reservoirs can cause significant economic hardships (e.g., dredging, contamination), since it can diminish the capacity of these systems. Stream bank erosion is common in mountainous watersheds and occurs under both typical hydrological conditions and storm events. Single runoff events can alter stream channels by as much as 30 feet with extensive bank erosion.

There are numerous locations in the watershed where gully erosion has become problematic. The total suspended sediment measurements taken by the BCWA during typical watershed monitoring indicates a considerable amount of sheet erosion is occurring on forested lands. Sediment runoff from the many miles of dirt roads is also a constant source of sediment erosion. Generally, landslides have not been a major problem in the watershed, but do occur on some steep slopes. The BCWA has not previously quantified soil erosion in the watershed.

Soil Erosion Monitoring Sites

The BCWA will identify erosion monitoring sites within the watershed for longer-term monitoring. The BCWA will locate erosion areas in the watershed that represent bank erosion, sheet erosion, and gully erosion. An erosion monitoring site should generally have a minimum of 10 pins. A series of sites (8-9) may be located within the upper part of the middle Bear Creek Watershed (MBCW), which is generally above Evergreen Lake:

- Bank erosion and sheet erosion in a primarily non-urban forested area (near site 58),
- Bank erosion and sheet erosion in a meadow complex
- Gully erosion along Vance Creek or near the outdoor lab
- Gully erosion and sheet erosion near Evergreen Lake
- Bank erosion near Key on the Green

Other sites within the MBCW for erosion pin sites may include:

- Kerr Gulch for gully, bank and sheet erosion near the confluence of Swede Gulch and Kerr Gulch
- North and South Turkey Creek for gully and sheet erosion

P1 sites near Bear Creek Reservoir

- BCLP for gully and bank erosion

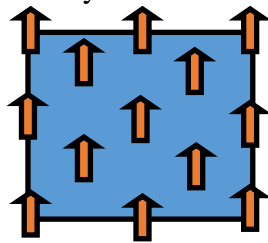
Erosion Pin Methods

A common reconnaissance level method of measuring active soil loss is with *erosion pins*. One general method consists of driving a pin(s) (many types of material are used) into the soil so that the top of the pin gives a datum from which changes in the soil surface level can be measured (sheet erosion). The pins can be driven into an actively eroding stream bank and/or above the bank in a pattern so the change in erosion can be quantified on the eroding surface and away from the stream (bank erosion). To determine bank loss or change, a reference pin(s) is placed a sufficient distance away from the bank (e.g. 5 feet) and measured periodically and after any major runoff event. Similarly, a series of pins can be placed at intervals along the sides of eroding gullies and at the top of the feature to determine the amount and rate of the gully erosion.

The BCWA pins are a 2-foot length of 3/8-inch rebar that can be pushed or driven into the soil/substrate to give a firm stable datum: 2-3-foot length for a shallow soil or rocker bank, or may be longer length for more loose soil. A 3/8-inch small diameter should minimize surface flow disturbance or cause scour. Top of rebar will be spray painted blue.

Sheet Erosion

Typically, a pin will have a minimal exposure (one to four inches). The top exposure of the pin is measured to within 1/8 inch in order to estimate sheet erosion. A minimum of 9 pins (full grid is 13 pins) should be used for a sheet erosion site. The selected site should be about 10 sq.-ft. The pin pattern will be measured and photographed for a log of each site. Site should be visited after major runoff events and at least bi-annually.



Bank erosion (cut)

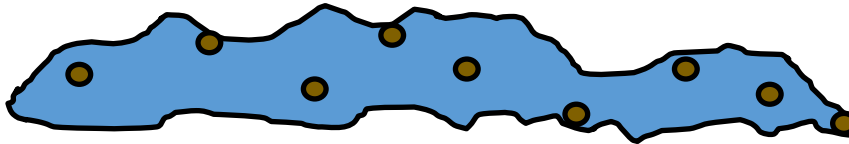
The distance of pins from an eroding bank will be measured by having one pin driven into the edge of the eroded bank and a second reference pin located above the predicted high water mark. An actively eroding bank should have no less than 5 measuring pin pairs. Distance measurements will be taken

within $\frac{1}{4}$ inch. The pin pattern will be measured and photographed for a log of each site. Site should be visited after major runoff events and at least bi-annually.



Bank erosion (slope)

In the eroding bank, a set of 5-10 pins will be placed in a grid or random pattern into the erosion feature. The pins should have an exposure of only an inch. The top exposure of the pin is measured to within $\frac{1}{8}$ inch in order to estimate bank slope erosion or failure. The pin pattern will be measured and photographed for a log of each site. Site should be visited after major runoff events and at least bi-annually.



Gully erosion

An actively eroding gully will be monitored. A series of 5-10 paired pins will be placed on both sides of the gully. The distance of pins from an eroding bank will be measured by having one pin driven into the edge of the eroded bank and a second reference pin located above the predicted erosion zone. Distance measurements will be taken within $\frac{1}{4}$ inch. The pin pattern will be measured and photographed for a log of each site. Site should be visited after major runoff events and at least bi-annually.

