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SedimentSTOP: Controlling Sediment Migration in Wildfire Affected Forests

Scorched earth as far as the eye can see near Chelan, WA. The fine silty soil and ash that remain are highly erodible.

Fires consumed 7.2 million acres of forest land in the United States in 2002 and cost the American public $1.6 billion in fire fighting efforts, according to the Interagency Fire Center in Boise, Idaho. As of September, the 2003 fire season in the United States has been less severe at just over 3.1 million acres burned, however the northwestern U.S. and southwestern Canada are being heavily impacted during late summer and into the fall with over 600,000 acres ablaze. Even in the heart of the midwestern United States, Kentucky's forests are consumed at a rate of 80,000 acres a year by wildfires. While firefighters do their very best to contain and extinguish wildfires, the heat generated during some wildfires can reach 2700º F just above the forest floor and heat the soil to nearly 200º F, leaving behind vast expanses of land where the ecology has been drastically altered. The ash and fine silt that remain are very erodible. Couple this with steep mountain slopes, as well as increased runoff due to less vegetation, and the threat to water quality in some of the most valued pristine mountain waterways in North America becomes readily evident.

Fire rehabilitation workers in Montana begin installation of a SedimentSTOP filtration roll.

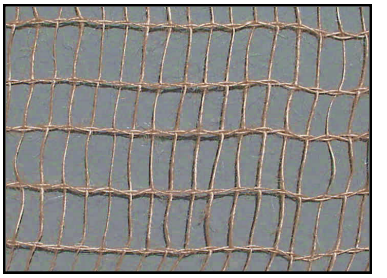
Depending on the duration of fire, soils can maintain their fertility and structure, possibly increasing in fertility with the addition of ash. However, soil erosion and sediment migration must be kept to a minimum in order for vegetation to reestablish as quickly as possible. Runoff volume can increase to 70% in burned areas whereas thickly forested areas have a runoff rate of approximately 2% or less. North American Green's SedimentSTOP™ Biodegradable Filtration System has been designed to limit sediment migration and prevent excessive sediment loads in downslope waterways, protecting water quality while assisting in reforestation efforts.

What is SedimentSTOP?

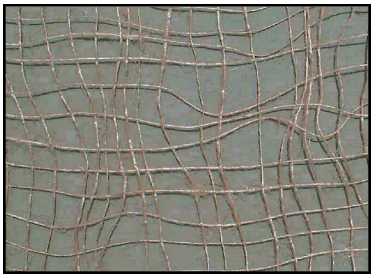
SedimentSTOP rolls are constructed from 100% biodegradable components and designed to remain intact for 2-3 years. Afiber matrix consisting of 50% agricultural straw and 50% coconut fiber is applied at a rate of 1.75 lbs/yd^2 (measured in an unrolled state). This dense fiber matrix is sewn to a single leno woven biodegradable net along with a two foot Splash Apron™ section which uses a leno woven top net extending along one side for the length of the roll. Leno woven nets have more integrity than cross lay nets due to the twisted double strands holding the cross directional strands in place. The fiber matrix and layers of net in a finished roll form the filter medium for sediment laden runoff.

Once in place Sediment STOP will filter sediment from runoff. The Splash Apron will prevent erosion from cascading water.

How Does it Work?



Leno Weave Net



Cross Lay Net

The SedimentSTOP is not your usual sediment control roll in that it is designed to filter sediment from runoff water and not simply act as a barrier. Sediment laden runoff from burned areas is slowed as it flows through the SedimentSTOP and sediment is deposited within the roll as well as upslope of the roll. The short Splash Apron is stapled down in the same way as an erosion control blanket and acts to prevent erosion from water that may over-top the SedimentSTOP roll and cascade down the other side. Proper installation plays a vital part in ensuring the SedimentSTOP performs to its potential. Testing conducted at Utah State University has shown the SedimentSTOP to be up to 97% effective in controlling sediment migration as opposed to a bare soil control and nearly 30% more effective than standard straw wattles.

How is it Installed?

Wooden stakes 18-24 inches in length are used to secure the SedimentSTOP into the anchor trench.

Unlike straw wattles, the SedimentSTOP is constructed on-site into a 50 foot long roll approximately 9 inches in diameter. The roll is easily unrolled from its 6.67 foot packaged condition and offers the opportunity to customize roll diameter by adding straw, hay, bark mulch, leaves, or other organic materials. Seed can also be added to the roll and under the Splash Apron to assist in the formation of vegetated buffer strips that have proven highly successful in limiting sediment migration during forest regrowth. Installation follows a simple 5 step procedure:

1) Excavate an anchor trench 9 inches wide by 3 inches deep perpendicular to the slope
2) Unroll SedimentSTOP, covering the anchor trench with 1 foot of the double-net Splash Apron extending downslope. Staple the apron into the trench and downslope
3) Roll the SedimentSTOP into the anchor trench, ensuring that the roll sits inside the trench
4) Stake the roll into place using wooden stakes

It is important to install the SedimentSTOP using the anchor trench to guard against runoff undermining the roll, otherwise more severe erosion may be caused. As mentioned, it is possible to increase the roll's size by adding organic material. The advantage to this modification is that it increases the roll's filtering capacity and allows more sediment to build behind the roll before requiring maintenance.

Field Applications of SedimentSTOP

Additional straw can be added to increase the diameter of the finished roll. Seed can also be added to encourage a vegetated buffer strip.

Special interest in SedimentSTOP has surfaced from forest management teams due to ease of installation, portability, customization, and overall effectiveness. As of September 2003, SedimentSTOP has been successfully utilized during wildfire recovery efforts at the Beaver Creek Fire on BLM land near Fairfield, ID; the Poison Creek Fire in Wenatchee National Forest near Chelan, WA; the Laird Creek Fire in Bitterroot National Forest near Sula, MT; in fire rehabilitation efforts near Deadwood, SD, and other locations. It is in these types of locations that controlling sediment-laden runoff has had the biggest impact on preserving water quality and aquatic habitat, as well as accelerating the establishment of newly planted seedlings. These benefits can be further improved by seeding the SedimentSTOP and creating a vegetated buffer strip to provide permanent sediemnt filtration. Once installed, the SedimentSTOP does not require removal. All components of the roll are 100% biodegradable and will not leave undesirable residues in the soil. The roll will remain and continue to function while it slowly degrades during the course of a 2-3 year period. This allows forest managers to allocate precious financial and labor resources to more pressing issues instead of maintenance of erosion and sediment control structures.

Resources

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