

California Coastal Nonpoint Source Program

Water Quality Fact Sheet

Wildlife-Friendly Plastic-Free Netting in Erosion and Sediment Control Products

Note: This factsheet is a summary of information compiled by the Coastal Commission's water quality staff. It is not a finding by the Coastal Commission, and this factsheet may be superseded by site-specific information.

The Problem with Plastic Netting

A variety of manufactured products may be used during construction projects to temporarily protect soil from erosion and facilitate establishment of vegetation (“erosion control”), or to trap eroded sediment and retain it onsite (“sediment control”). Several of these products commonly contain plastic netting or mesh, which functions to: 1) stabilize soil or mulch; 2) bind loose fiber materials into a blanket or roll; or 3) reinforce geotextile fabric. Examples of temporary erosion and sediment control products that may contain plastic netting include mulch control netting, erosion control blankets, fiber rolls (wattles), and reinforced silt fences.



Snake entangled in an erosion control blanket's plastic netting.
(Photo by Mark Backus).

Plastic netting used in these products has been found to entangle wildlife, including reptiles, amphibians, birds, and small mammals. Snake entrapment is of particular concern, as there have been numerous reports of snake injury and mortality due to entanglement in plastic netting used in temporary erosion and sediment control products.

Erosion and sediment control products classified as temporary are designed to degrade after a period of time, ranging from months to years. Some agencies also define these products as temporary if they are removed within two years after installation. However, several temporary erosion and sediment control

products with netting – such as mulch control netting, erosion control blankets, and fiber rolls – are commonly left in place permanently, particularly when used with seeding. Because the new vegetation grows up through the netting, the plants may be damaged if the erosion or sediment control product were to be removed.

The length of time it takes for netting to begin to degrade depends on the netting composition and the environmental conditions. Plastic erosion control netting has been found intact on project sites up to eight years after installation. When plastic netting does eventually fall apart, plastic fragments may be blown or washed into waterways and the ocean, creating an

entanglement and ingestion hazard for marine life, potentially for many years. Due to its durability, buoyancy, and ability to concentrate toxins present in the ocean, plastic can be very harmful to marine life. Fortunately, there are many temporary erosion and sediment control products available that do not contain plastic netting.

Biodegradable vs. Degradable

The netting used in erosion and sediment control products can be made of either natural or synthetic materials. This netting is available in a range of tensile strengths and longevity to meet various needs. Natural-fiber netting is environmentally preferable; choices include jute and coir (coconut husk fibers), which are biodegradable. Synthetic plastics (“polymers”) used to make the netting are most commonly derived from petrochemicals, and include polypropylene, nylon, polyethylene, and polyester. Usually plastic netting is “extruded” (i.e., plastic resin melted and formed into a continuous mesh, with fixed joints between the strands). Alternatively, plastic may be formed into yarn or strands that are woven into netting.

The plastic netting used in *temporary* erosion and sediment control products is designed to be “degradable;” however, degradable is not the same as biodegradable. **Biodegradable** means that the material decomposes into elements found in nature within a reasonably short period of time after customary disposal.¹ In contrast, **degradable** plastics break down into plastic fragments that remain in the environment after degradation.

Degradable plastic netting may be labeled photo-degradable, UV-degradable, oxo-degradable, or oxo-biodegradable (however, it is not truly biodegradable). **Photodegradable or UV-degradable** plastics are designed so that after a certain period of time, ultraviolet (UV) stabilizers in the plastic cease functioning, and where exposed to sunlight the plastic will begin to break down into fragments. The parts of the netting not exposed to light (such as the underside of an erosion control blanket) may take much longer to photodegrade. **Oxo-degradable or oxo-biodegradable** plastic has a chemical additive that helps speed up degradation of the plastic, as long as the necessary elements of oxygen and microorganisms are available, leaving a residue of plastic pellets in the environment,

Although not yet available in netting used in erosion and sediment control products, there are also “bio-plastics” on the market that are made from agricultural crops (such as corn, palm, or bamboo). Some bio-plastics require special industrial composting to biodegrade. Note that some plastics labeled “bio-based plastics” are blends of crop-based and petrochemical-based materials (such as cornstarch and polyester), which leave a plastic residue when they degrade.

¹ U.S. Federal Trade Commission’s Guides for the Use of Environmental Marketing Claims.
<http://www.ftc.gov/bcp/grnrule/guides980427.htm>

Temporary Erosion Control Products with Netting

Temporary Rolled Erosion Control Products (RECPs) are flexible nets, blankets, or mats that are unrolled to cover exposed soil surfaces, typically on slopes. Most temporary RECPs contain netting, either by itself, or binding loose fiber materials to form a blanket or mat. These products are used to reduce erosion from rainfall and wind, hold moisture near the soil surface to promote seed germination, and stabilize soils until vegetation is established. Temporary RECPs are usually used with seeding, but may also be used on exposed soils when seeding would not be successful (such as late in the season).



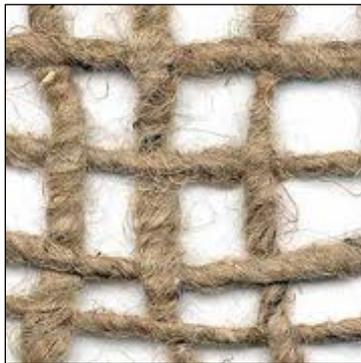
Temporary Rolled Erosion Control Product (RECP)

These products are commonly left in place permanently, but are called “temporary” because they are designed to degrade. Their effective longevity is typically designed to range from six months to five years, depending on the materials used.

Netting by Itself: RECPs composed entirely of netting go by many names, including mulch control netting, erosion control netting, soil netting, erosion control mat, jute mesh or netting, and coir mesh or netting. Because these products are woven with open spaces (apertures) in the netting, they are also classified as open-weave textiles. Mulch control netting is a woven natural-fiber or synthetic plastic mesh used to stabilize a loose mulch layer (such as straw or wood fiber), usually after seeding. Some erosion-control netting products have a more tightly-woven construction, which enables them to provide erosion control without the use of an underlying loose mulch layer. Synthetic netting is commonly made of polypropylene or polyester; natural-fiber netting choices include coir or jute.



Coir mulch control netting



Close-up of jute mulch control netting

Although jute is a natural plant fiber, be aware that some manufacturers use the term “jute” in labeling a variety of synthetic netting products (such as polypropylene “Poly Jute”) that mimic the look of natural fibers, but are actually made of plastic.

Erosion Control Blankets Made with Netting: An erosion control blanket is a manufactured product composed of natural or synthetic fibers bound together to form a continuous matrix, usually with netting on both sides. The most common matrix materials are natural-fibers, such as straw, coir, or excelsior (fine curled wood fibers, usually aspen). Synthetic matrix materials (such as polypropylene) are also available.

Erosion control blankets are available with netting on one or both sides, and there are also net-less blankets (for example, composed of excelsior). The netting may be made of either natural-fibers (usually coir or jute) or synthetic plastic (usually polypropylene or nylon). The plastic netting is much cheaper than the natural-fiber netting. This netting comes in a variety of mesh sizes; ½-inch and 1-inch openings are common sizes.



Coir erosion control blanket with plastic netting



Close-up of extruded plastic netting

These blankets can be composed of all natural-fiber materials, all synthetic materials, or a combination of both. A natural-fiber matrix (such as straw or coir) bound with plastic netting is a very widely-used type of erosion control blanket. The netting is often stitched to the matrix, either with a synthetic thread (such as polypropylene) or a natural-fiber thread (such as cotton). To be considered 100% biodegradable (which is the environmentally preferable option), all components of an erosion control blanket (including netting and thread) must be made of natural-fiber materials, not just the matrix fibers. If a blanket with a straw matrix is used, certified weed-free straw should be used to avoid contributing to the spread of invasive weeds.

Temporary Sediment Control Products with Netting

Temporary sediment control products (such as fiber rolls and silt fences) are used to retain sediment from construction activities onsite. They function by slowing runoff down long enough for any sediment in the water to settle out. Fiber rolls are commonly left in place permanently, and are designed to degrade; silt fences are typically removed after construction is complete. The effective longevity of these products typically ranges from six months to five years, depending on the materials used.

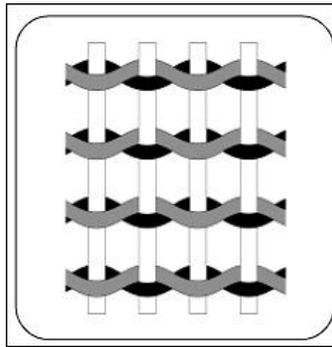
Fiber rolls: Fiber rolls (also called fiber logs or straw wattles) are prefabricated tubular products filled with a natural-fiber material (such as wheat straw, rice straw, coconut fiber, flax, or compost) and wrapped with netting. Fiber rolls may also be rolled tubes of erosion control blankets. They are available in a variety of sizes. The most common type of netting used in fiber rolls is plastic netting (such as UV-degradable polypropylene); biodegradable natural-fiber netting choices include burlap, jute, or coir.

Reinforced Silt Fences: A silt fence is a temporary sediment control product used as a barrier to sediment leaving the site in stormwater runoff. It is constructed of a woven synthetic filter fabric (e.g., polypropylene, nylon, polyester, or polyethylene yarn), commonly referred to as geotextile fabric, stretched between supporting poles and entrenched. Silt fences are sometimes backed by metal or plastic (such as polypropylene or nylon) mesh to provide reinforcement in

the event of a heavy sediment load; these may be referred to as heavy-duty or reinforced silt fences. Snake mortality due to entanglement in the plastic mesh of a reinforced silt fence has been documented; this plastic netting commonly has a mesh size of about one inch square. In addition, if any silt fence, reinforced or not, is left in place until the geotextile fabric begins to fray and develop holes, this may also create a wildlife entanglement hazard.

Wildlife-Friendly Netting Designs & Practices

Loose-weave netting: An important factor in wildlife-safe netting design is to have movable (not fixed or welded) joints between the horizontal and vertical twines, thus allowing the twines to move independently. This design allows each opening (aperture) between the twines in the netting to be stretched as an animal passes through, thus reducing the potential for entrapment. Netting designs with movable joints may be called loose weave, leno weave, or gauze weave.



Leno Weave

Mesh Size: Little research has been done on the optimal mesh size (i.e., aperture size) in netting to avoid wildlife entrapment, which is likely to vary depending on the particular wildlife expected in the area. Snakes may be particularly vulnerable to entanglement in netting if they get stuck partway through, but can't back out because their scales catch on the netting.

Logically, mesh with an aperture that is either too small for wildlife to attempt to pass through, or too large to impede the passage of wildlife, would reduce the threat of entrapment. However, small meshes may still entangle juvenile snakes and other small wildlife, such as frogs. Conversely, large mesh size alone may not be sufficient to eliminate the threat to wildlife, as large-bodied snakes have been found entangled even in netting with relatively large (one inch square) mesh openings. Studies are needed to determine the optimal mesh size for wildlife safety, without compromising the ability of the netting to provide its intended function

One small, unpublished study (sponsored by a netting manufacturer) of snakes tested in captivity found that among plastic netting with fixed joints, the commonly used ½-inch square mesh resulted in several snake entanglements, whereas larger meshes (3 x 3, 3 x 4, or 1.7 x 0.8 inches), or rectangular meshes with a smaller, ¼-inch aperture in one direction (1.25 x 0.25 inches), did not entangle any snakes. A natural-fiber mesh with movable joints (3 x 3 inches) also did not entangle any snakes. The manufacturer thus promotes their plastic netting with fixed joints in a rectangular configuration as “wildlife-friendly.” However, this study did not separately test the effects of mesh size, mesh shape, and whether the mesh joints are movable or fixed.

Natural-Fiber Materials: Biodegradable natural-fiber erosion and sediment control products (including netting, filling, and thread) are more wildlife-friendly than synthetic plastic products. Natural-fiber netting typically has less tensile strength than extruded plastic netting, and thus

may allow entrapped wildlife to break free. Unlike plastic netting, natural-fiber netting will not remain on the site entrapping wildlife long after its erosion or sediment control purpose has been served. In addition, natural-fiber netting will not leave a residue of plastic in the environment after degradation.

Erosion Control Options without Netting: There are several choices of erosion and sediment control products that do not contain netting. These include net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales.

Prompt Removal of Products: “Temporary” erosion and sediment control products are commonly left in place permanently, particularly if vegetation has grown up through the netting. Prompt removal of these products when they are no longer needed is advisable, if it’s possible to do so without damaging the new vegetation.

Conclusion

To minimize wildlife entanglement and plastic debris pollution, choose temporary erosion and sediment control products that either do not contain netting, or that contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber. Degradable, photodegradable, UV-degradable, oxo-degradable, or oxo-biodegradable plastic netting (including polypropylene, nylon, polyethylene, and polyester) are not acceptable alternatives. Netting used in these products should have a loose-weave wildlife-safe design with movable joints between the horizontal and vertical twines, allowing the twines to move independently and thus reducing the potential for wildlife entanglement. Avoid the use of silt fences reinforced with metal or plastic mesh. When no longer required, temporary erosion and sediment control products should be promptly removed.