Erosion Control

Slope Stabilization

On slopes that are being eroded away, slowing down of surface water is needed. To accomplish this installation of devices meant to slow down the water is needed. These come in two different forms: erosion control blankets and fiber rolls.

Erosion Control Blankets

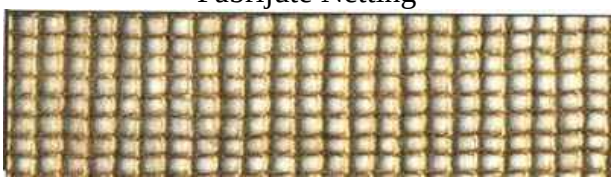
Erosion control blankets are usually woven from a chosen material and are meant to slow down the speed at which water moves across the surface. The material chosen is usually something with lots of ridges and obstructions for the water to slow down on. There are many different types of erosion control blankets, some that are synthetic and some that are natural. There are even a few that are both synthetic and natural. These blankets can be made out of straw, coconut fiber, aspen fiber, jute, and polypropylene (plastic). Most of these blankets can be bought in many sizes. Common ones are 80 to 100 square yards. Most of these are rolled up and cut into widths ranging from 3 to 8 feet wide.

Types of Erosion Control Blankets

Jute Netting

Made from the natural fiber jute, this netting is used as an erosion control device alone or used to hold together other erosion control materials.

Fabrijute Netting



This netting is made entirely from plastic, it mimics natural fibers. Netting like this is used to hold together erosion control blankets or just as erosion control itself.

Straw Single Synthetic

(i)

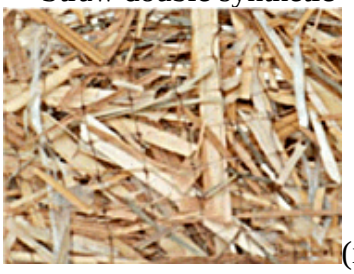
This netting is made from straw and held together by a single layer of synthetic netting

Straw double jute net

(i)

Made from ordinary straw, this is held together by a double layer of jute netting.

Straw double synthetic



(i)

Made from ordinary straw it is held together by a double layer of synthetic netting

Coir Double Jute Blanket

(i)

Made from coconut fiber it is held together by a double layer of jute netting.

Coir Double Synthetic Blanket

(i)

Made from coconut fiber it is held together by a double layer of synthetic netting

Excelsior (Aspen fiber) blanket

(i)

Made from shredded Aspen it is held together by a single plastic net.

Excelsior (Aspen Fiber) Double Synthetic

(i)

Made from Aspen which is then held together by a double layer of synthetic netting

Installation of Erosion Control Blankets

The erosion control blankets are relatively easy to install. The largest concern is making sure the water moves over the top of the blankets. To do this you need to 'key' it into the slope by digging a small trench on the top of the slope. In this trench you lay the top end of the material into the trench to line it. To line it the edge is folded underneath itself and then it is secured using staples. The trench is then filled in to the previous soil level. The end result is pictured in Figure 5. The edge of the blanket that is upwind needs to be overlapped underneath the blanket next to it as shown in the Figure 6.

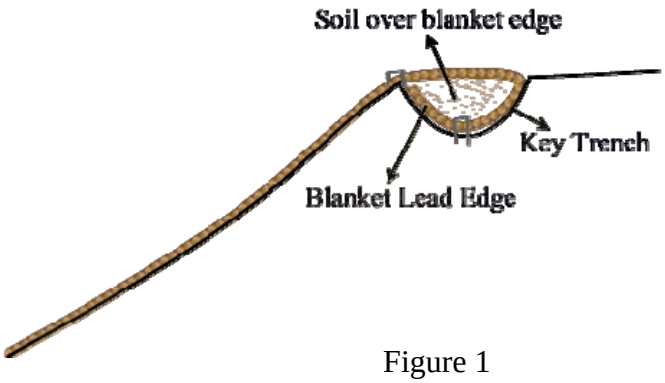


Figure 1

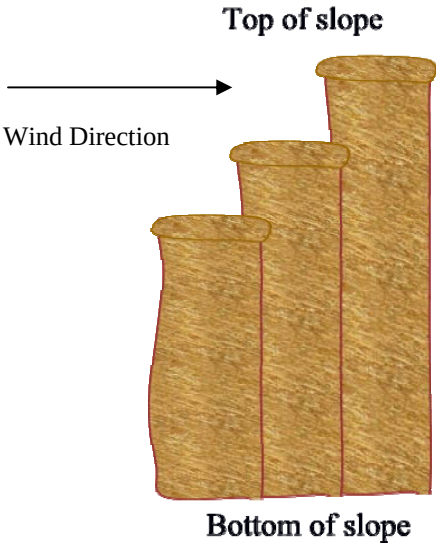


Figure 2

Fiber Rolls

Fiber rolls are the other type of erosion control device. These are usually made of the same materials used in erosion control blankets but are rolled into large diameter "logs." These logs can be made to just about any diameter and are usually incased in some kind of netting sewing into the desired shape. The purpose of these logs is to pool up and slow down water long enough for any sediment that is in the water to settle out. The three major materials used in fiber rolls are coconut fiber, rice wattle and wheat wattle. The concept behind the fiber roll is the same regardless of the material.

Wheat straw rolls being used to stabilize a slope

(i)

These rolls are made from wheat and will slow down water movement long enough for it to drop sediment out.

Rice Straw Wattle on long slope

(iii)

Installed rice straw wattle 1 year after original installation

Straw Wattle Installation

(ii)

Long wooden stakes are placed through the middle of the fiber roll into the ground.

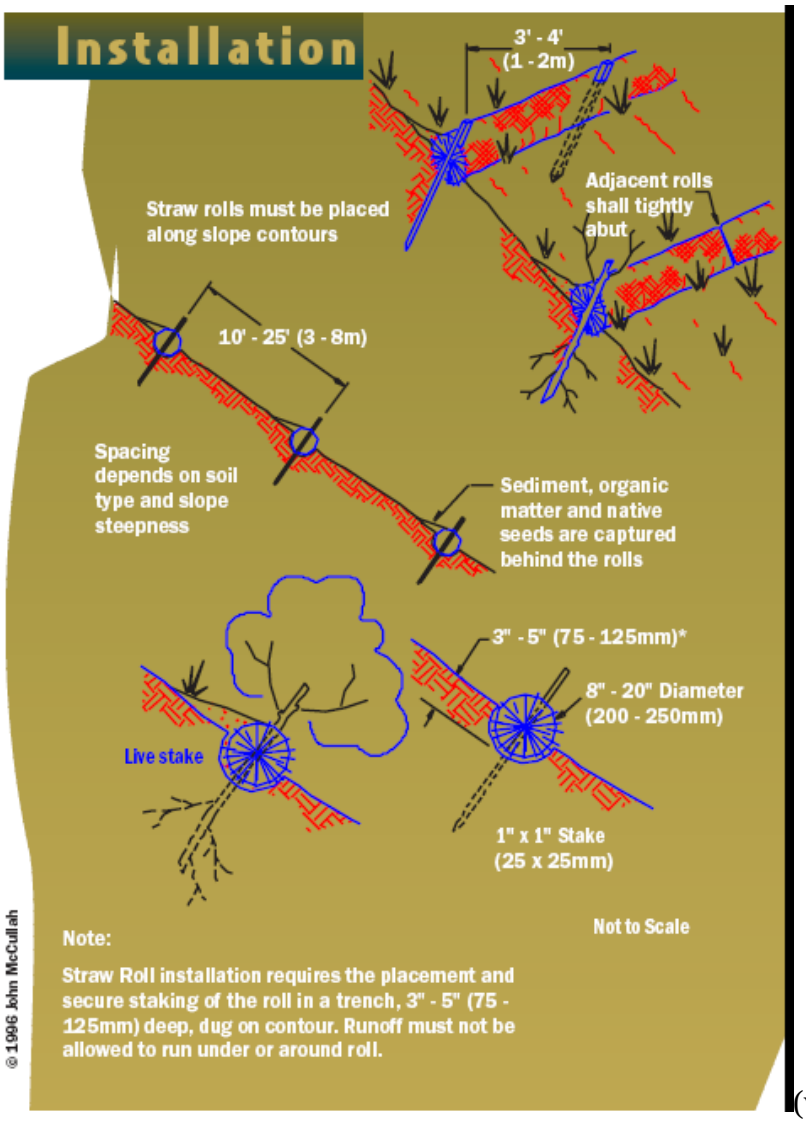
Coir log after Installation

(iv)

Coir logs are the most commonly found throughout the world with rice and wheat following closely behind.

Fiber Log Installation

The installation of the fiber logs does not change based on the material used. The basic concept of a fiber log is to lock it into place so that soil and water cannot remove it from where it is installed. A trench is dug at a depth equal to half of the diameter of the log. This is so that the fiber log can become part of the slope. Wooden stakes are used to hold them in place. They are approximately 2 – 3 feet apart and the type of stake is dependant on the situation. If a species that can be live staked can survive in your location, it is a good idea to use a live stake to hold the log in place and to also to start vegetative establishment. Planting into the fiber log is also a good way to establish plants.



(vi)

Installation diagram from EarthSaver™ Erosion Control Products

Alternatives

Some alternatives to erosion control blankets and coir logs are hydro mulch, temporary silt fencing or using real logs and rocks to create locations for water to settle out. Hydro mulching can be expensive and is not effective during the rainy season, but if the species that colonize the site can be established before the mulch runs off, it can be very successful. The downside is that unless you plant the species you want, invasive species can show up. Temporary silt fences are usually meant to catch any runoff from the construction of the project, but they can be used until the slope re-establishes itself enough to stop any runoff. Once this is accomplished, removal of the fences is required. Finally using the natural material to create runoff catch basins can be a very cheap process if there are available materials on site. Another benefit is that the catchment areas can appear to be natural to the untrained observer. A problem with these natural catchments is that you can only create them in areas that the water funnels to and they cannot be made on a large scale.

Silt Fence

(i)

The silt fence is used as a temporary device to catch any sediment that moves during the construction.

(v)

Run-off trap using hay bales and fallen logs.

Hydro Mulch

(i)

An alternative to using erosion control blankets, hydro mulching consists of organic mulch such as wood fiber or paper cellulose that is mixed with water and sprayed on the slope. There is mulch that contains soil stimulants that encourages the development of mycorryhizal organisms.

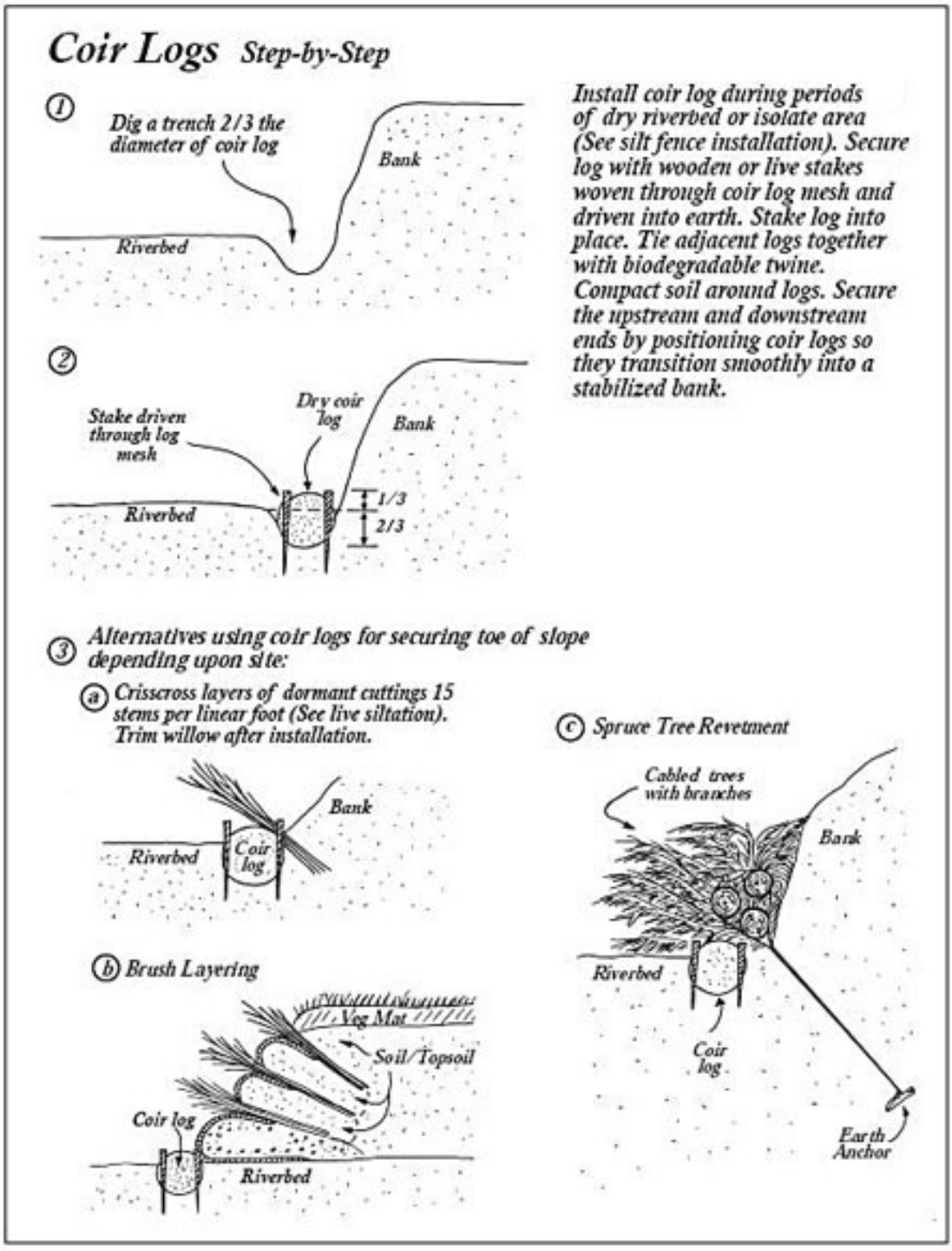
(v)

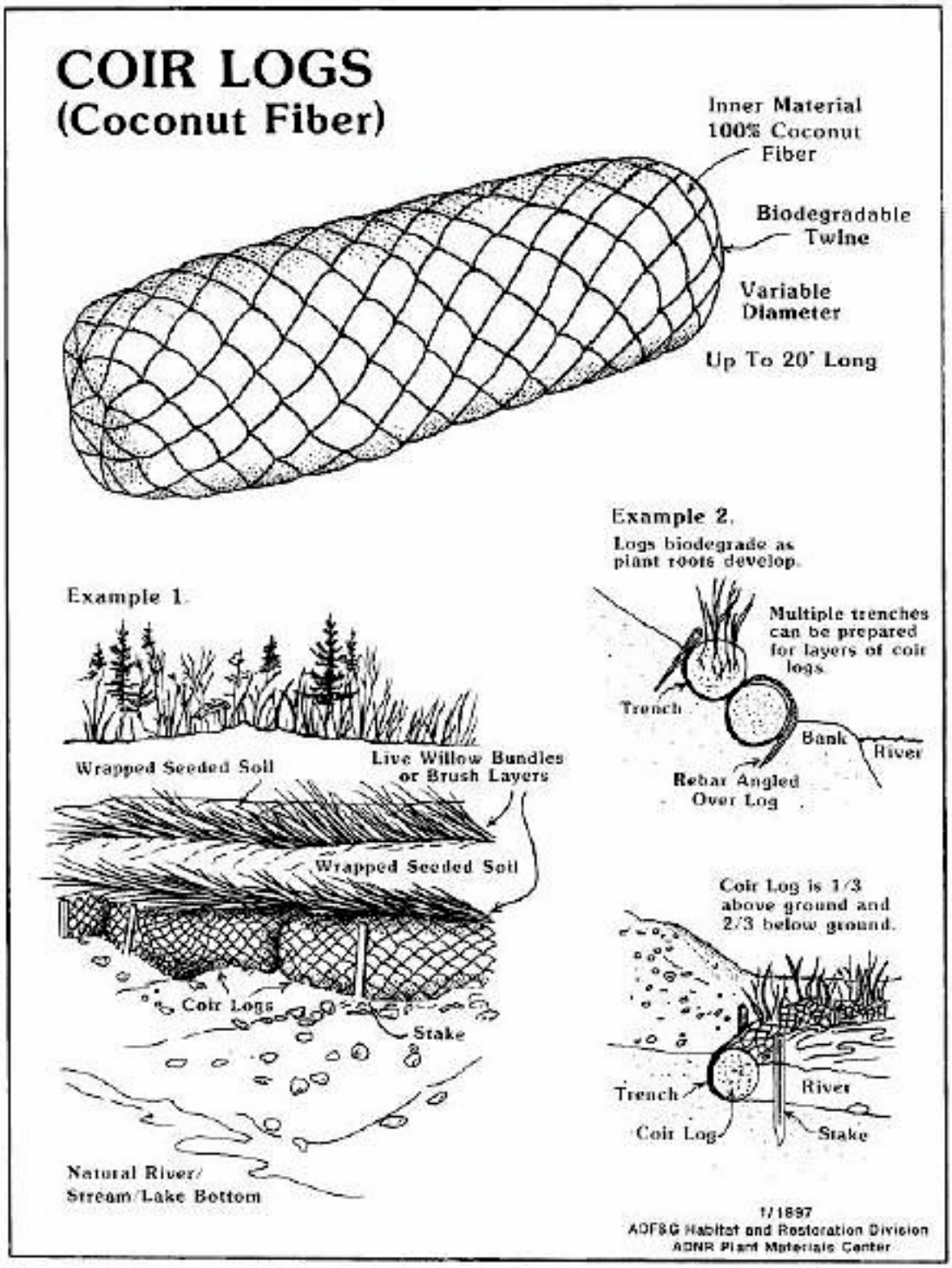
Run-off trap using fallen logs and rocks

Stream-bank Stabilization

Coir Logs

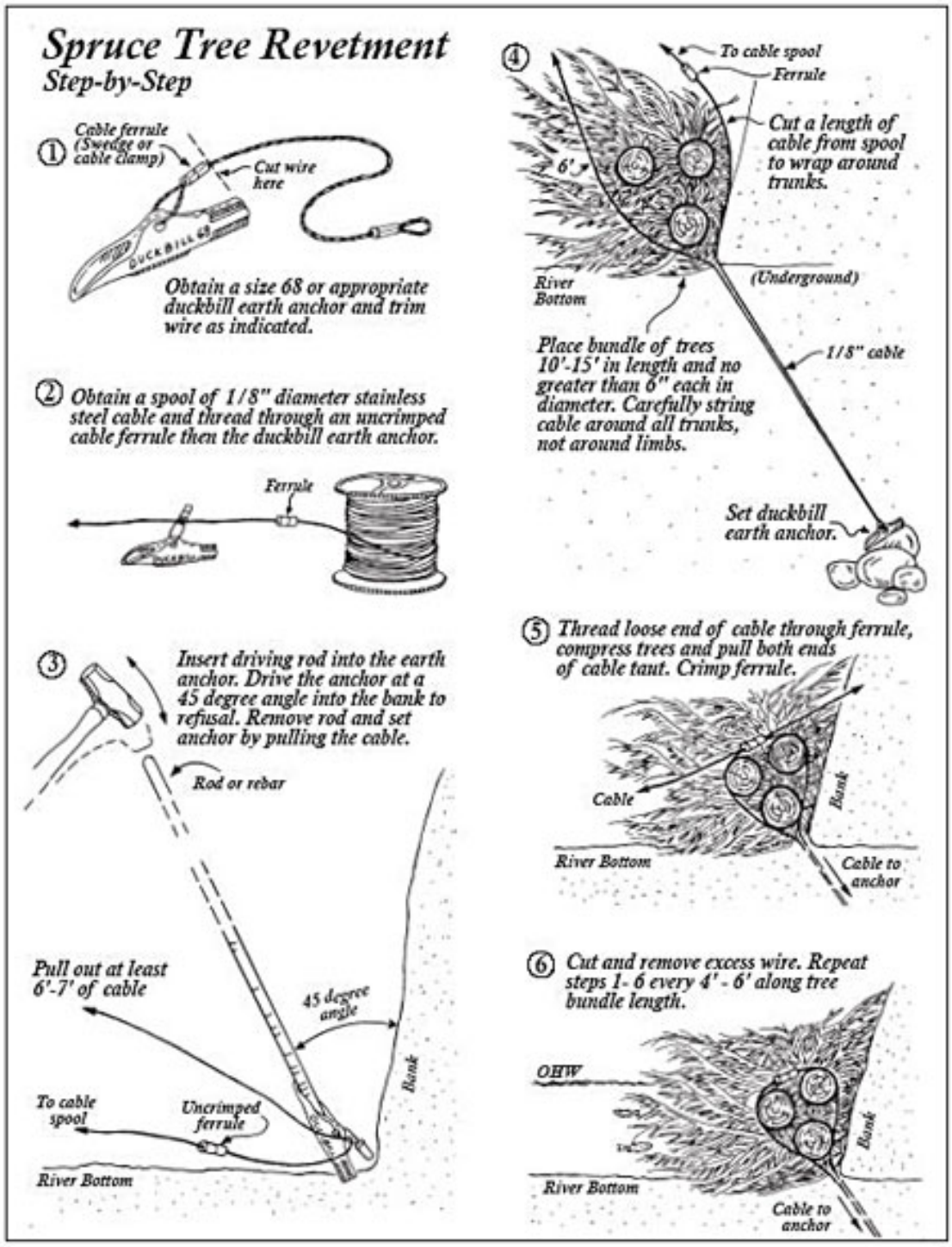
Coir logs supply protection to a stream-bank from erosion in areas with a low-velocity current. They are secured at the toe of the slope using wooden stakes. The logs provide a growing medium for newly installed vegetation. Seeds or cuttings are installed into the log. As the coir log begins to biodegrade, the plants establish their root system into the bank helping to stabilize the stream-bank against erosion.




COIR LOGS
(Coconut Fiber)
Inner Material
100% Coconut
Fiber
Biodegradable
Twine
Variable
Diameter
Up To 20' Long
Example 1.
Wrapped Seeded Soil
Live Willow Bundles
or Brush Layers
Wrapped Seeded Soil
Coir Logs
Stake
Natural River/
Stream/Lake Bottom
Example 2.
Logs biodegrade as
plant roots develop.
Multiple trenches
can be prepared
for layers of coir
logs.
Trench
Bank
River
Rebar Angled
Over Log
Coir Log is 1/3
above ground and
2/3 below ground.
Trench
River
Coir Log
Stake
1/1997
ADF&G Habitat and Restoration Division
ADNR Plant Materials Center

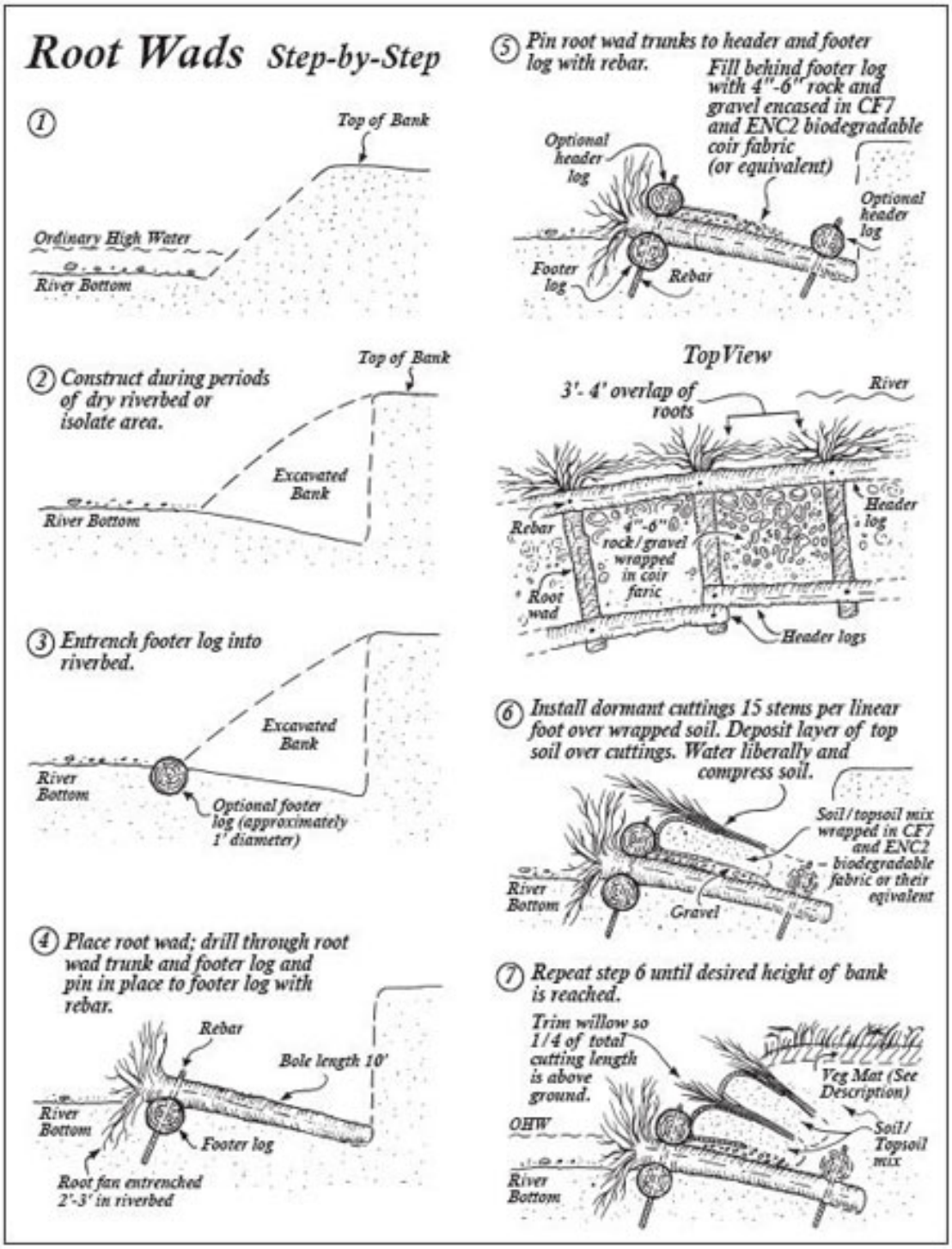
Tree Revetments

Tree revetments are installed into the steam-bank using a cable duckbill anchor system. Layers of trees are criss-crossed together usually using multiple layers. The trees revetments slow the current along stream-bank. This decreases erosion and provides habitat for fish and wildlife. Overtime the tree revetment decays, increasing sediment buildup. This provides a medium for vegetation to establish a seed bank. Eventually, the stream-bank is stabilized by the roots of the newly established vegetation.



Root Wads

Root wads are a portion of the trunk of a tree attached to its root mass. They are driven into the stream-bank and orientated upstream at a 90° angle. They are used to protect a stream-bank by deflecting currents away from the bank. They also provide structural support to the stream-bank, and habitat for fish and wildlife. Overtime sediment builds up around the root wad providing stabilizing the bank. Used for high-velocity streams.



Compiled By: Kelly Sutton and Ryan Williams

Sources:

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(ii) http://www.ieca.org/Resources/Article/ArticleEarthFriendlyRiceStraw.asp
(iii) http://www.earth-savers.com/pages/Intro.html
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