Streambank Stabilization Methods that are Easy and Effective

Posts

Posts and Brush

Fascines

Brush Matting

Brush Layering

Streamside Management Program For Landowners

Contra Costa County Flood Control and Water Conservation District 2019

California Urban Streams Partnership ▪ 2150 Allston Way, Suite 460 ▪ Berkeley, CA 94704
A project of Earth Island Institute ▪ (510) 292-5095 ▪ CUStreams@gmail.com

Waterways Restoration Institute

Workshop

Common Reasons For Soil Bioengineering Success

- Plant material collected after it is has gone dormant
- Careful transport to the site
- Material planted the same day it is collected
- Plant material soaked in water first
- System watered in immediately after installation, unless site is already wet.
- Plant material not allowed to dry out in first year after installation
- Good coverage and tamping of soil around plant material for good material-soil contact

Common Reasons for Failure

- All of the above are not practiced
- Material is planted in the active channel and drowns
- Too much of the stake or pole is planted above the ground level and not enough buried below the surface. Site conditions or presence of irrigation systems determine depth of planting.
- Stakes or poles are planted upside down
- Systems are planted too high on the project cross-section and don't get enough moisture
- Planting is not dense enough and understory plants expire from too much sun and stress
- Stakes or poles were damaged by mallots when planted
- Plants are trampled because protective fencing not installed
- The plant species are not located correctly on the channel cross-section

Please Do Not Engage in Chaparral Gardening on Creeks

If you are planting species such as ceanothus, manzanita, artemesia, flannel bush, etc. they will be sort- lived and suffer in a wetland environment they did not evolve in.

CALIFORNIA URBAN STREAMS PARTNERSHIP

Installing Soil Bioengineering: How to Succeed

Posts and Stakes

Soil bioengineering is not difficult if you follow these suggestions and installation steps. Not knowing the following can easily lead to project failures, but following these suggestions will mean you will most likely succeed in a planting that will help stabilize streambanks quickly, inexpensively and naturally.

Plant Collection

Soil bioengineering typically uses willow and or cottonwood plant material which will root if planted in soil using a cutting taken from a tree branch. When cutting a branch off a tree to use it for plant material use a saw or loppers and make a point or angled cut . This will help you remember later which part of the branch was facing down toward the trunk or roots of the plant when you start cutting up the branches into smaller pieces.

If you are transporting the collected plant material from another site cover the material in the back of a truck with a tarp or some other cover so the material doesn't dry out during the drive.

Collect the material after it has gone dormant, when the leaves have died and fallen off in the fall. In Northern California this dormancy typically happens around mid to late November. Collecting green material with leaves on will greatly lower the odds of the cuttings and posts to survive and re-root. If you must use the plant material before it has gone dormant, water the plantings frequently to keep the soil very moist around the planted systems until the first rains can take over the irrigation.

Use the plant material within two days of collection if possible. If there needs to be a longer interval between collection and use, prepare the material as stakes and posts and put the butt(rooting ends) ends into buckets with water or the stream , to keep the material hydrated before use. Some practitioners like to hydrate the material this way before use to increase growing rates and survival.

Plant Preparation

Soil bioengineering uses basically three sizes of material cut from tree branches: 1.The small "whips" that are flexible and compose the ends of the branches; 2.) the stake sizes which are branches from 1-2 inches wide and about .5 to 2 feet long; Posts (sometimes referred to as poles)which are about 3 - 5inches thick and 2-10 feet long. The preparation stage of the project cuts up the willow or cottonwood branches into three separate piles representing these three sizes. It is particularly important to put a point on the end of the plant material which is facing downward towards the roots as you are cutting up the material . Why this is important ? One of the most common reasons for project failure is planting stakes or posts with the wrong end in the soil. If the tip of the cut material facing up is planted down in the soil it won't grow roots. It is also helpful for driving the stake or post into the ground if it has a pointed tip.

Plant Installation

Make a planting hole

Installation is best done if a planting hole is prepared first using a piece of rebar or construction stake. Use a mallet to drive the rebar into the ground to make a planting hole. A common mistake: hammering the stake in too far so you can't get it out! Wiggle the rebar around as you hammer it in so that you will make a larger hole and be assured you can pull it out.

A frequent question is : How deep should I plant a stake or a post? The answer, generally, is as deep as you can. The more the plant material is below ground the more it will grow roots to support the sprouting top. Many publications recommend that 2/3 of the material is below ground. For dry sites plant at as much of the material below ground as you can and leave just a few budding nodes above the soil line to start growing when it warms in Spring. If the site is moist or has some shade you can get an "instant" tree by planting several feet of post above ground (4-6 feet) with less below ground for rooting. It's best to irrigate the site if you only have 30% of the plant below ground.

If the soil is dry and hard, pour water from a bucket onto the planting area. Allow the water to seep in and soften the soil, then pound the rebar in to make the planting hole. Pour water into the hole as it gets deeper.

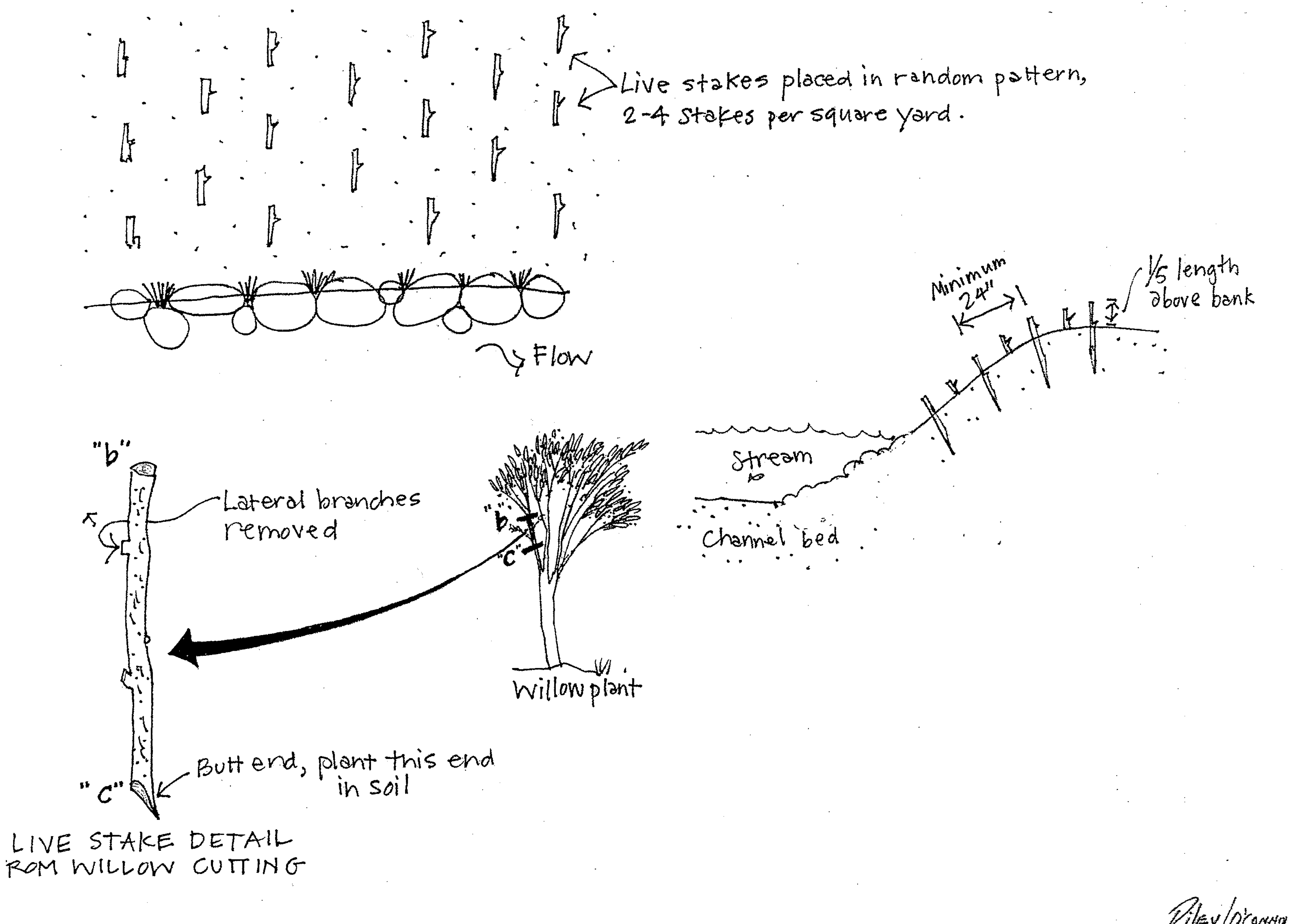
Installing the Material

Put a 2x 4 inch board on top of the plant material to be planted and then hammer the wood on top of the stake or post using a mallet. A conventional hammer is typically too light a tool for the job. Try to avoid damaging the top of the stake or post in this process. After planting the posts or stakes cut off any damaged tops with loppers or a saw . This reduces unnecessary water loss from the plant material.

The most important step is to tamp the soil tightly around the plant material. Air left around the stake or post will stop successful rooting .Pour more water from your bucket around the new planting as the last step. Press the soil around the material again with your feet. You're done!

Caring for the plantings

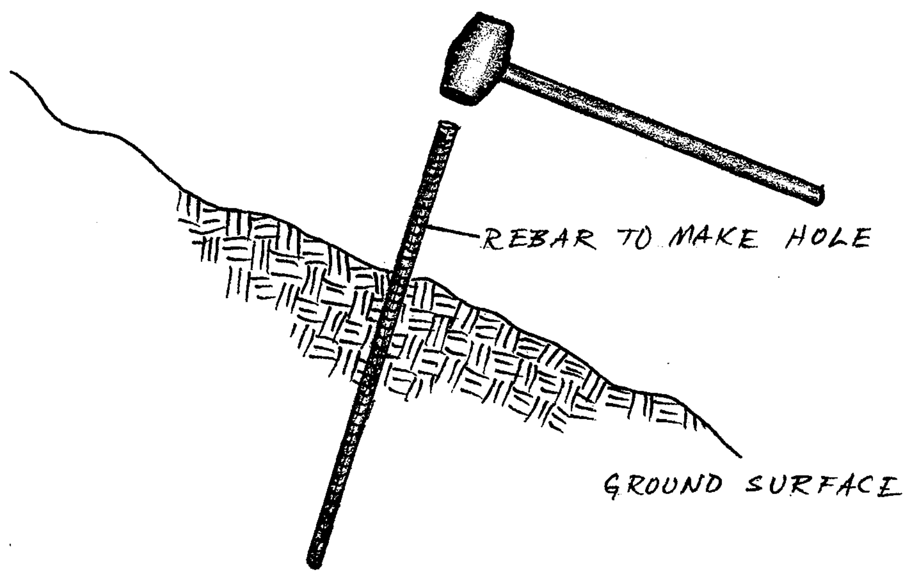
If the planting site doesn't receive expected rainfall , irrigate the plantings if the soil starts to become hard and dry. Some sites need to be protected from deer or beaver grazing the new sprouts. Put wire cages around the plants to protect them if this is an issue.

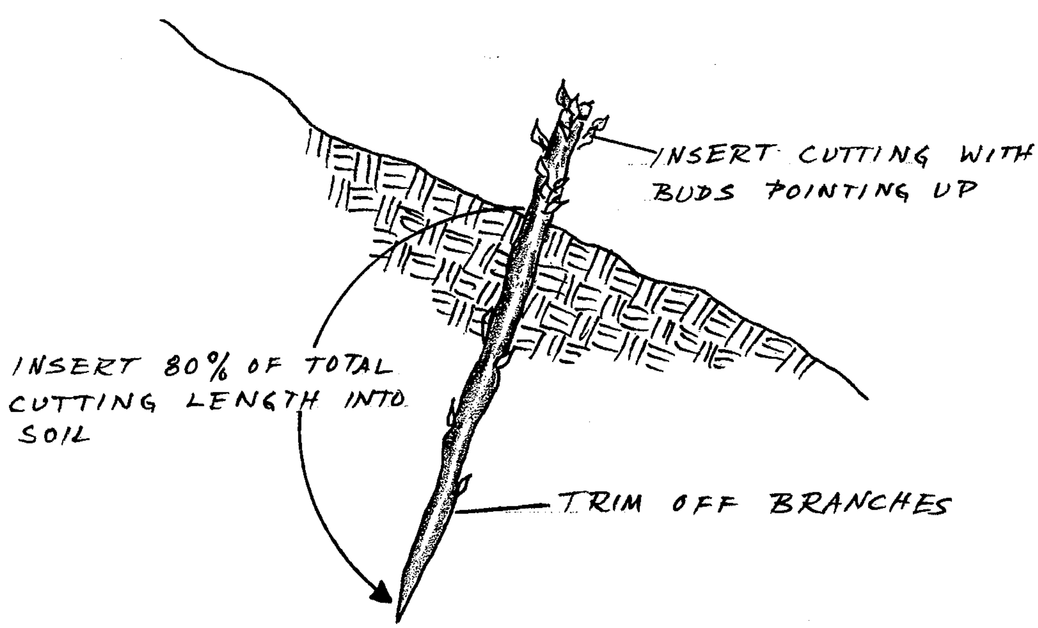


INSTALLATION OF LIVE STAKES SHOWN WITH AN OPTIONAL

CUTTINGS

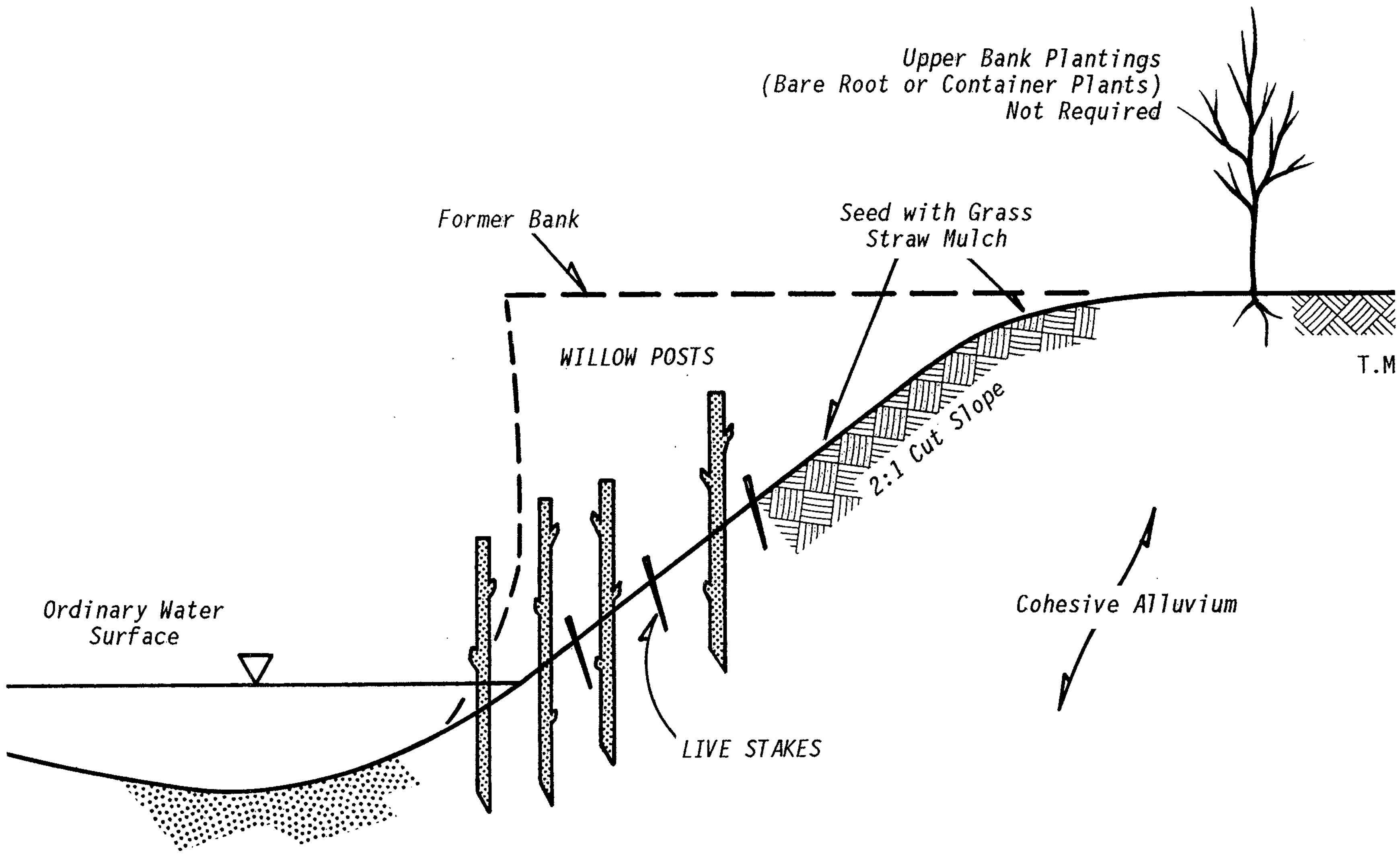
DETAIL FOR PLANTING CUTTINGS

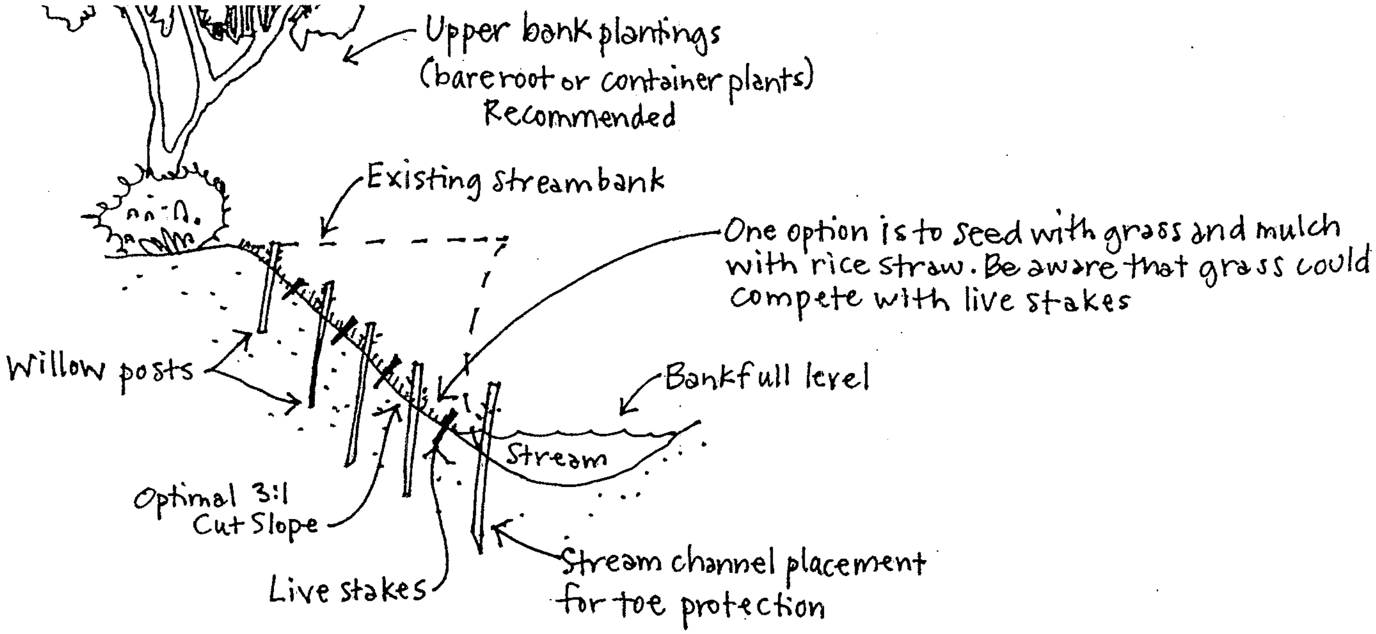




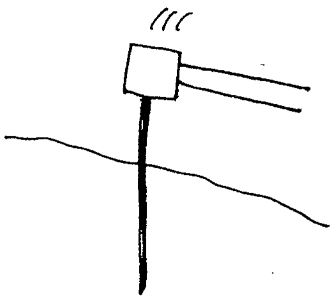
HAMMERED REBAR OR STAKE CAN BE USED TO MAKE A HOLE. THE MOST DESIRABLE WIDTH OF THE CUTTING IS DETERMINED BY THE SPECIES; THE DEPTH OF INSTALLATION IS DETERMINED BY SITE CONDITIONS. <u>TAMP</u> THE LIVE CUTTING CAREFULLY SO AS NOT TO DAMAGE IT.

WILLOW POST TREATMENT FOR COHESIVE BANKS

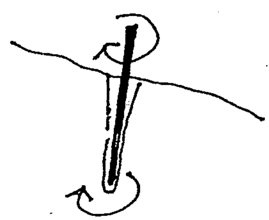




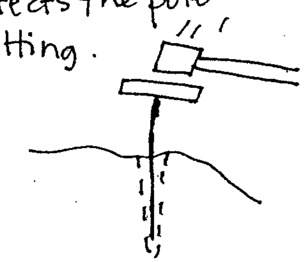
1. Using a substantial sledge hammer and a construction stake (metal pole with a point) make a planting hole.



2. Wiggle stake loose after every few blows of the hammer so you will be able to remove the stake after making as deep a hole as you can.

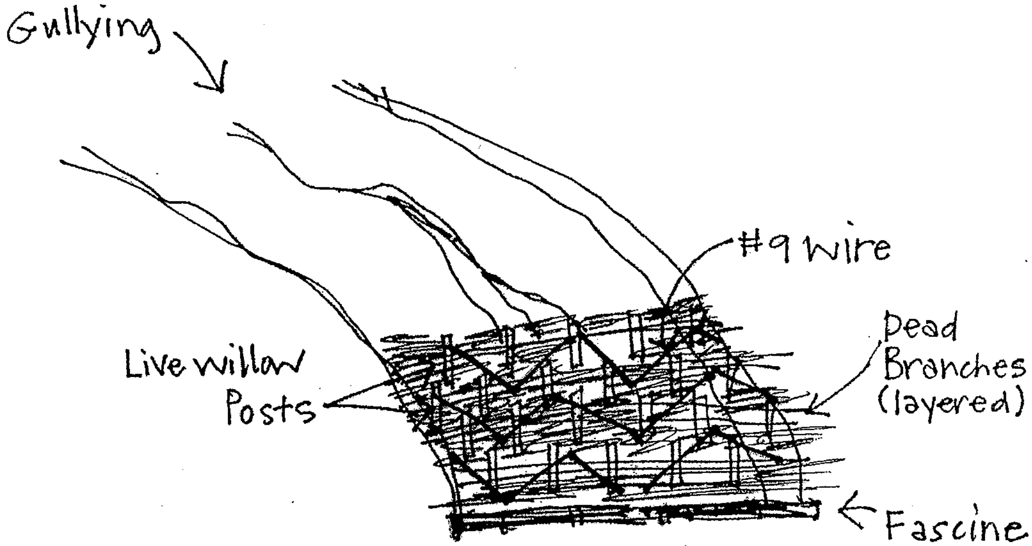


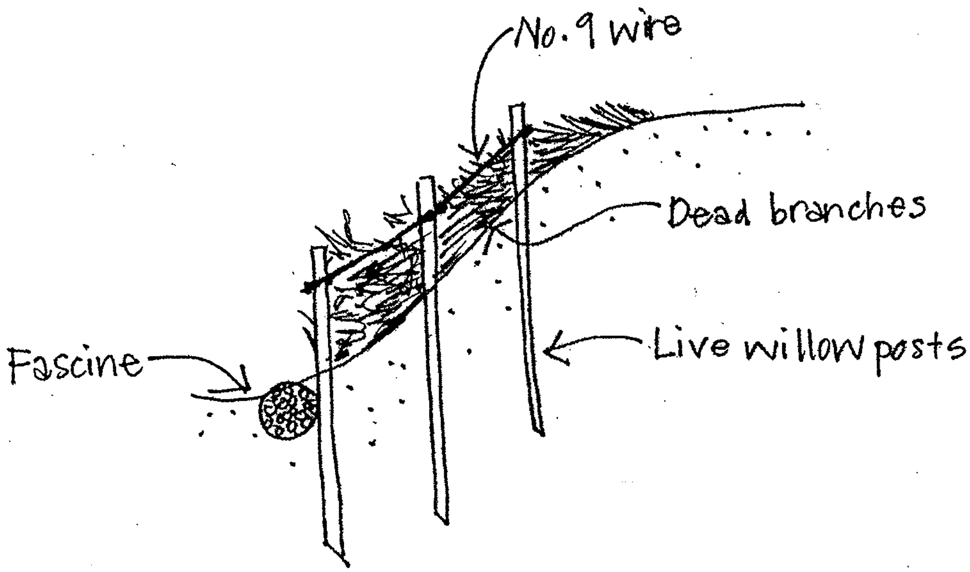
3. Place live pole in hole started by stake. Place a board on top of the pole and then hammer the live pole in. The board protects the pole from splitting.



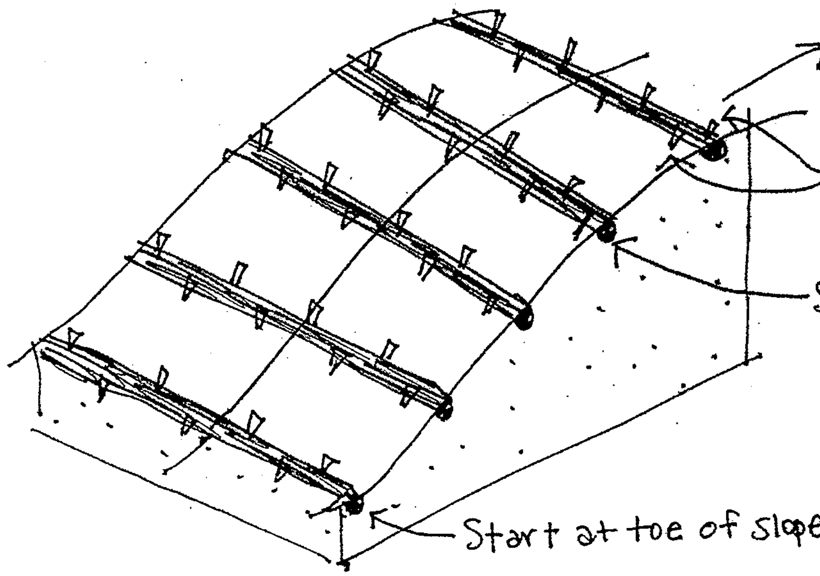
POLE CUTTING TREATMENT FOR STREAM BANKS
(Willows or Cottonwoods recommended)

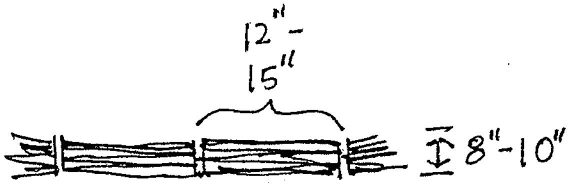
Riley/O'Connor



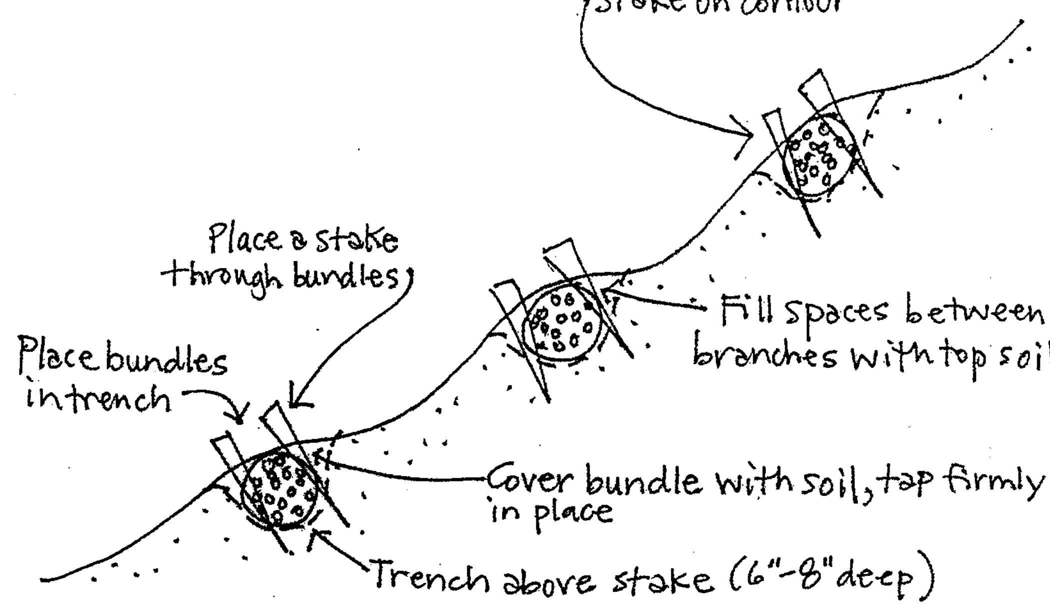


Riley / O'Connor





repare wattling, cigar-shaped bundles f live brush with butts alternating. he wattles are 8"-10" in diameter, tied 2"-15" on center. Species which root asily are preferred.

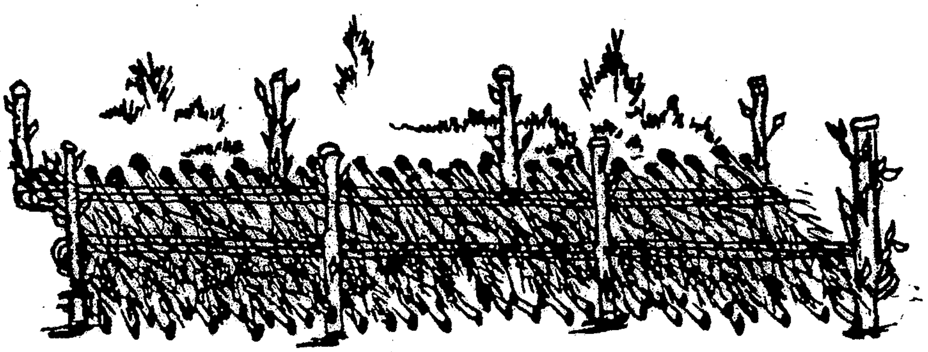


FASCINE BUNDLE (WATTLE)

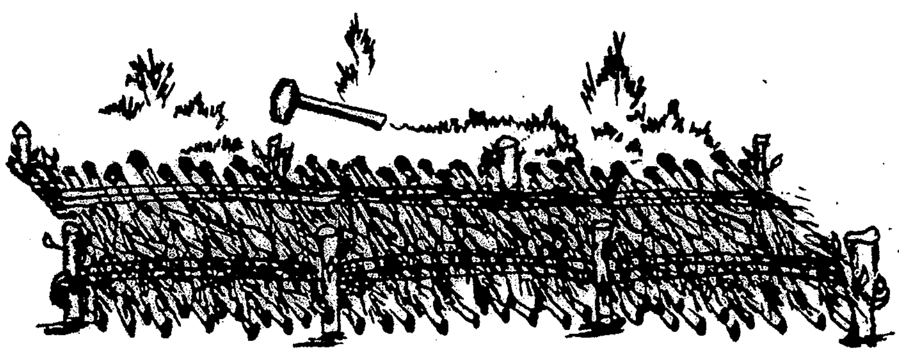
BRUSH MATS - DEAD MATERIAL

(1.) LAYER BRUSH

(2.) ADD LAYERS OF BRUSH - ALTERNATE BRUSH BUTTS



(3.) WIRE THE BRUSH DOWN



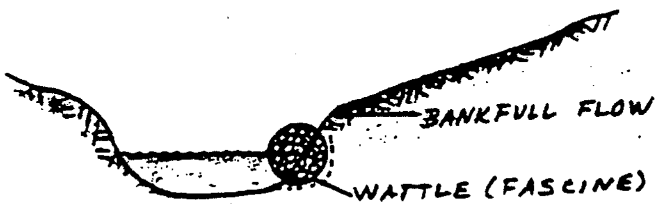
(4.) TAP DOWN STAKES TO TIGHTEN

BRUSHMATTING AND WATTLE (FASCINE) COMBINATION TO STABILIZE A STREAM BANK:

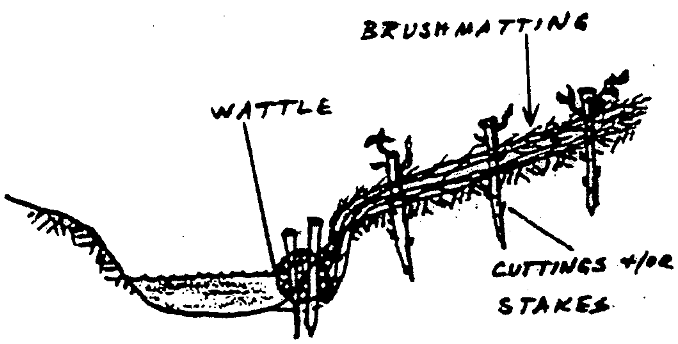
- STEPS FOR CONSTRUCTION:

1. RESLOPE BANK

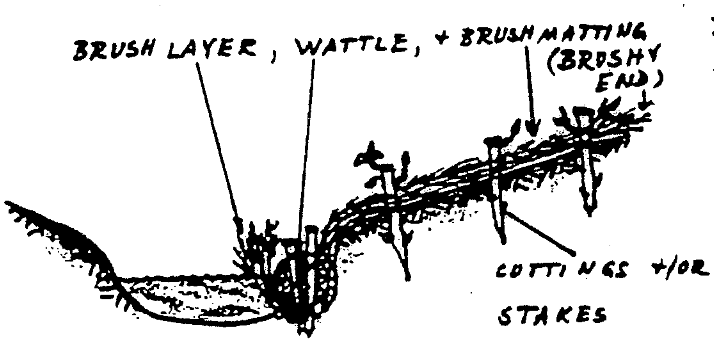
2. DIG A SHALLOW DITCH AND PLACE A WATTLE BUNDLE AT THE TOE OF THE BANK. PLACE IT WHERE IT WILL BE ABOUT HALF-SUBMERGED DURING LOW FLOW PERIODS.

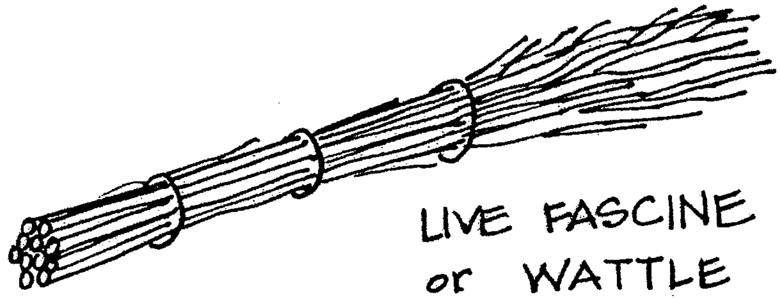


3. BURY THE BUTT END OF LIVE BRUSH UNDER THE WATTLE SO THAT THE WATTLE HELPS ANCHOR AND PROTECT THE BRUSH. STAKE THE BRUSH WITH LIVE CUTTINGS.

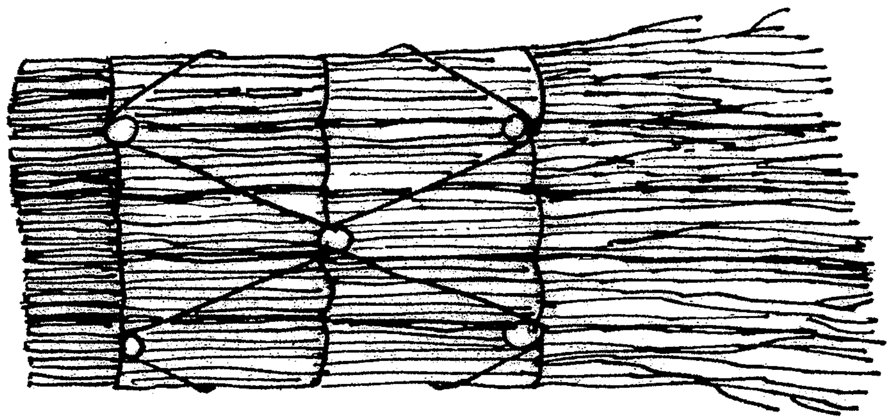


4. ANOTHER VARIATION USES A LAYER OF BRUSH THAT IS BURIED UNDER THE WATTLE BUNDLE TO PROTECT IT FROM HIGH VELOCITY FLOWS. THE BRANCHES OF THE BRUSH LAYERING HELPS SLOW THE VELOCITY OF THE WATER AGAINST THE BANK.

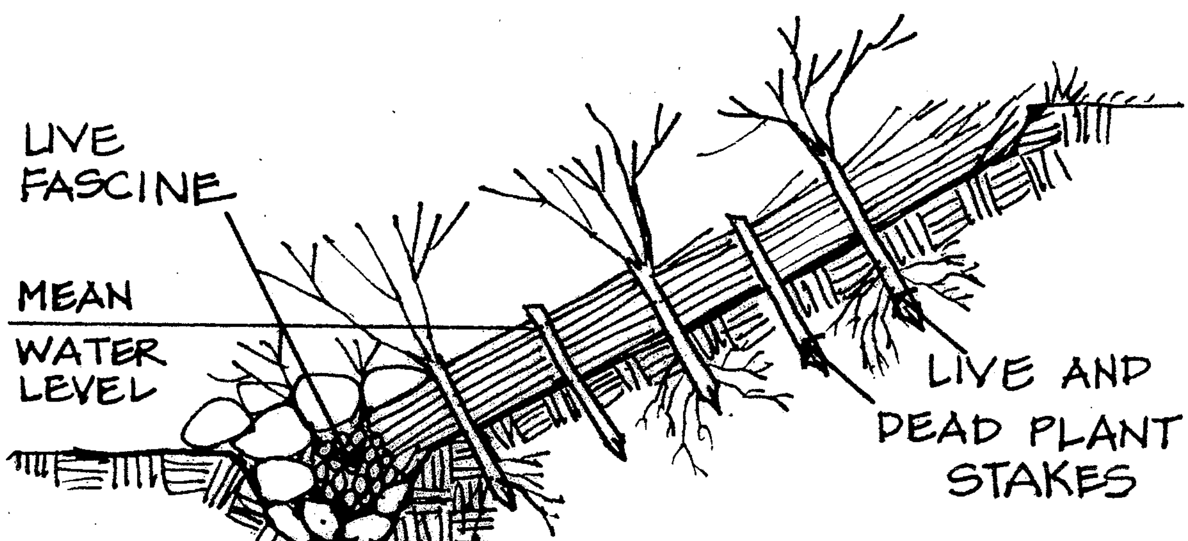




LIVE FASCINE or WATTLE

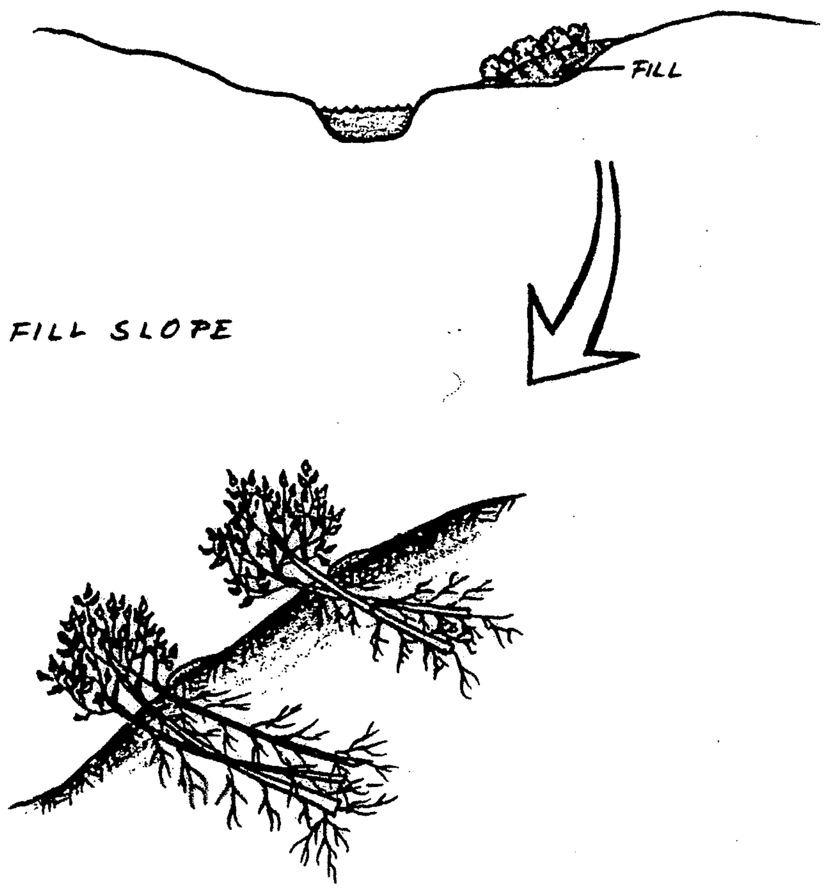


BRUSH MATTING - PLAN VIEW



BRUSH MATTING - SECTION VIEW

BRUSHLAYERING:



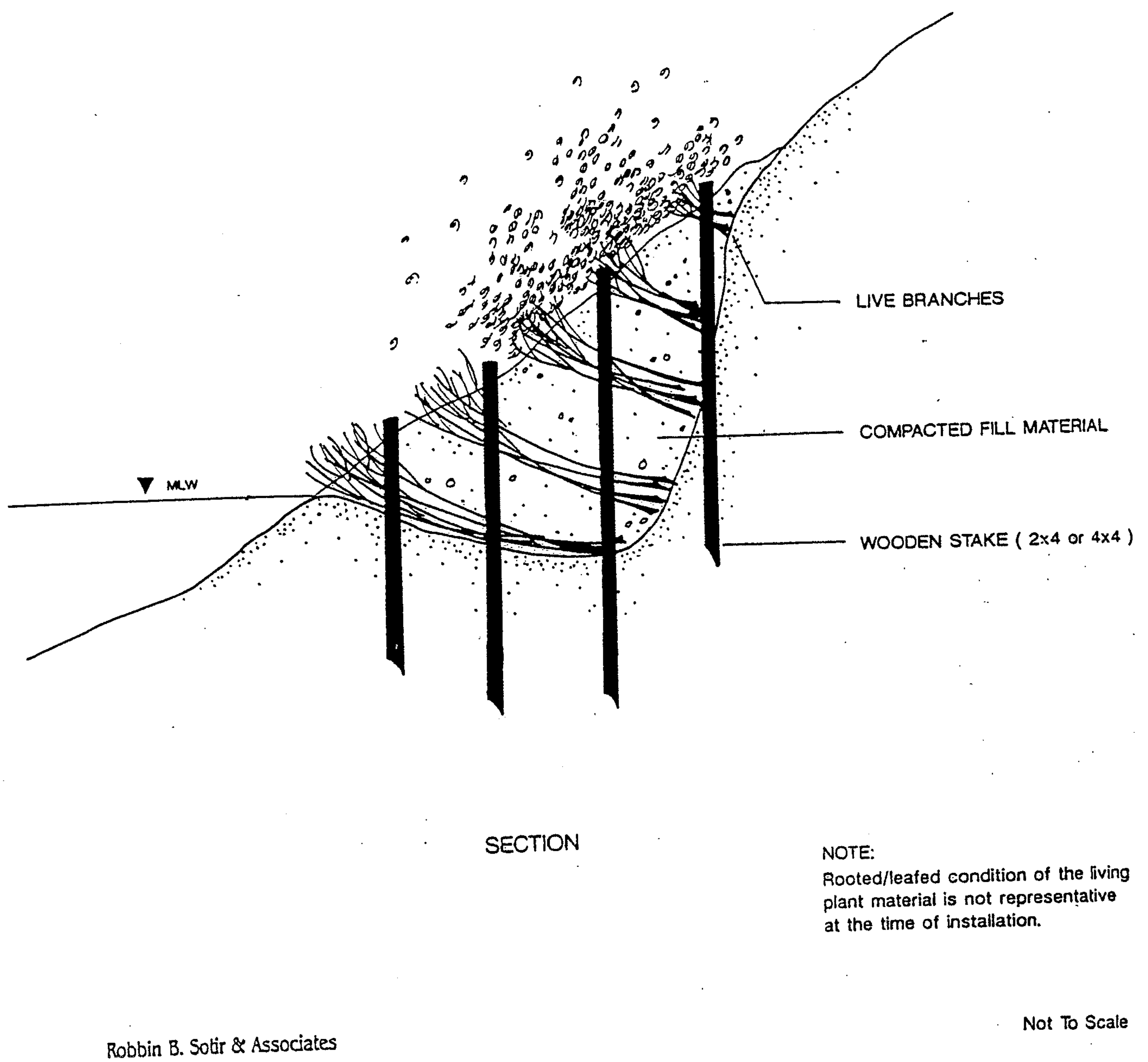
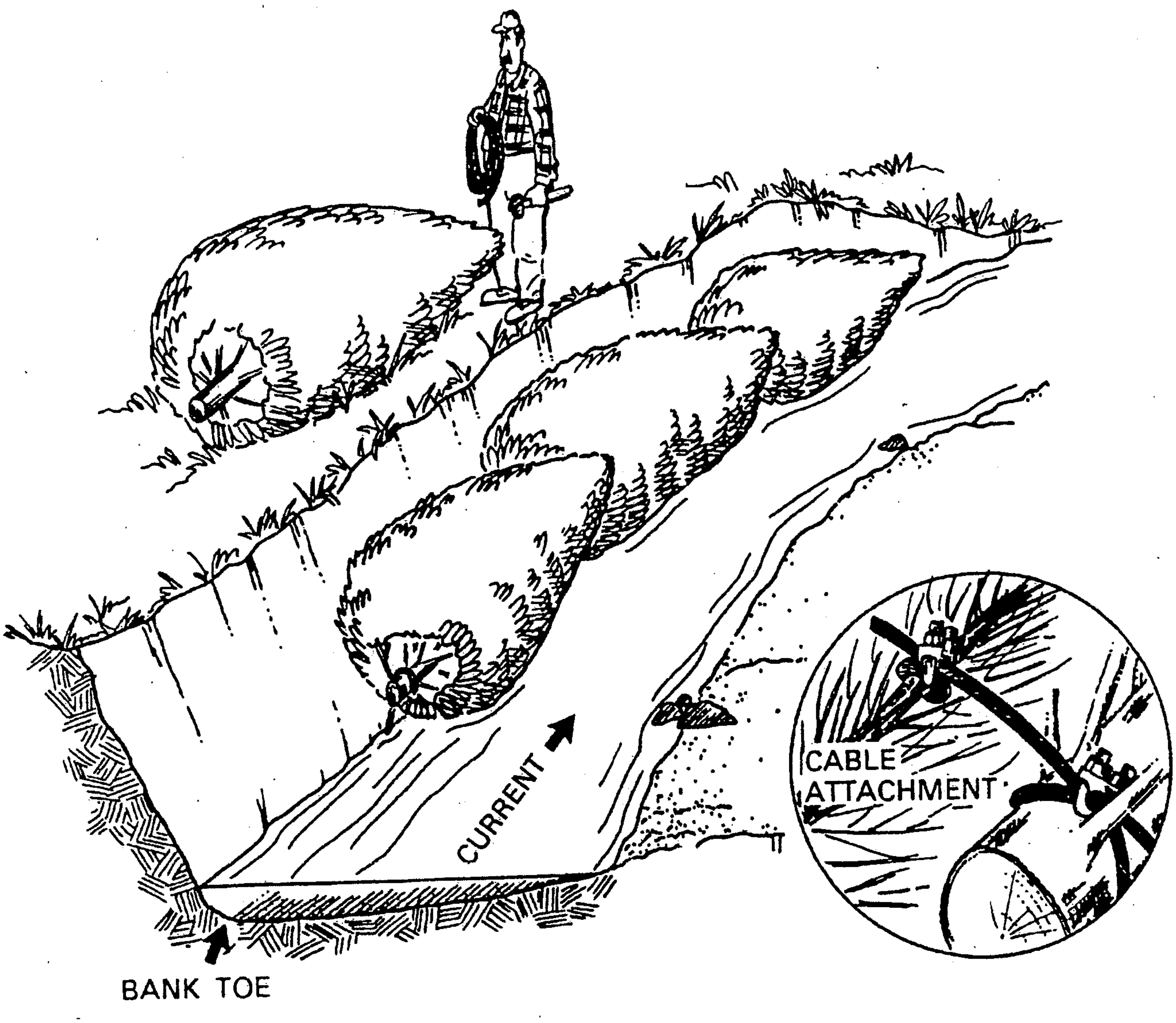
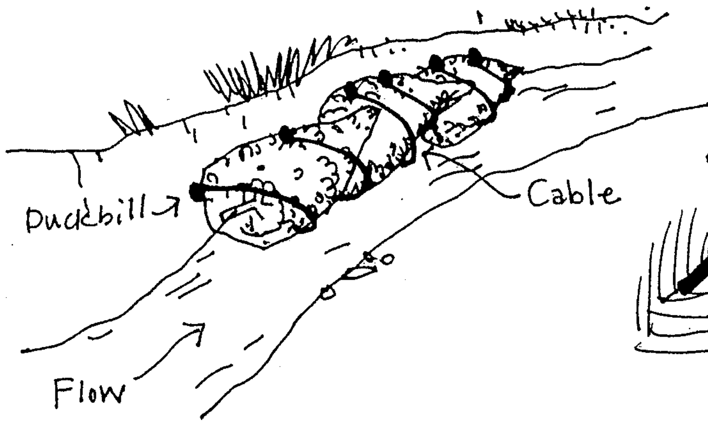


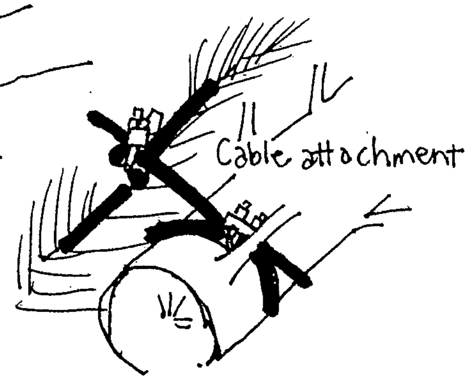
Figure 12 Illustration of a branchpacking installation.


CURRENT
CABLE
ATTACHMENT
BANK TOE

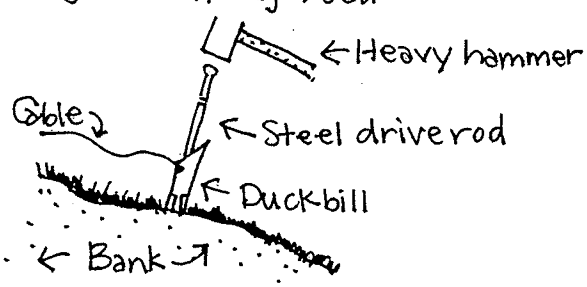
TREE REVETMENTS

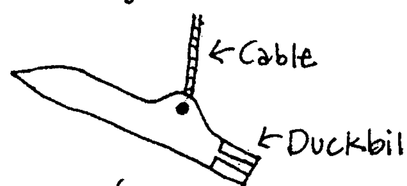
1. Place evergreen trees at the toe of the bank. Face the tree top downstream.





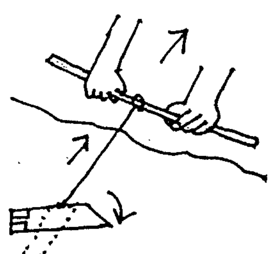
2. Hammer Duckbill + Cable into the bank using a steel rod with a large striking head.





(Duckbills are a product of Foresight Products, Inc. Commerce City, Colorado)

3. Remove rod and pull up on cable. This rotates anchor into load lock position.



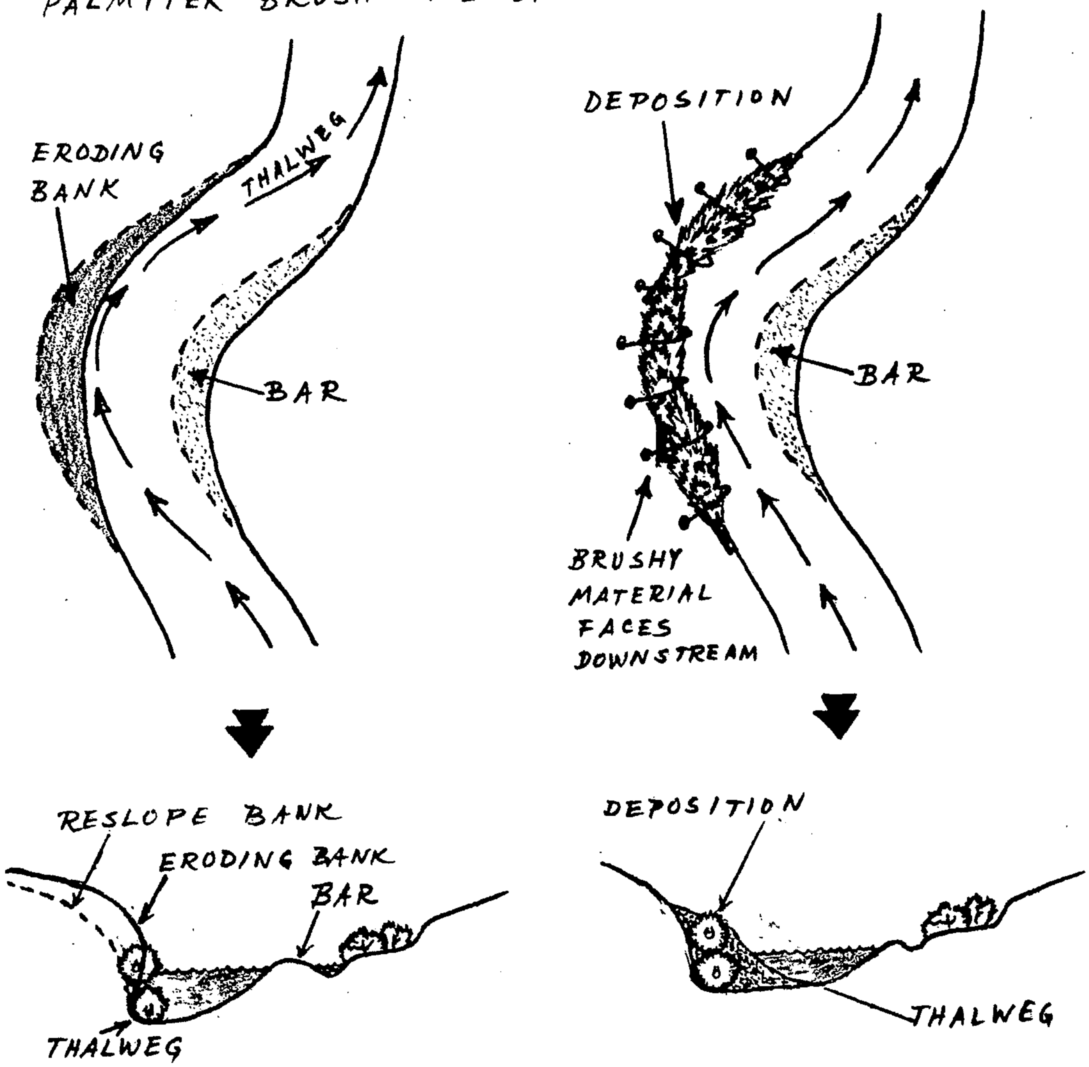
4. Attach the two cables to hold the tree reventments to the bank. (see illustration 1.)

5. Place a second row of trees on top of the bottom row.

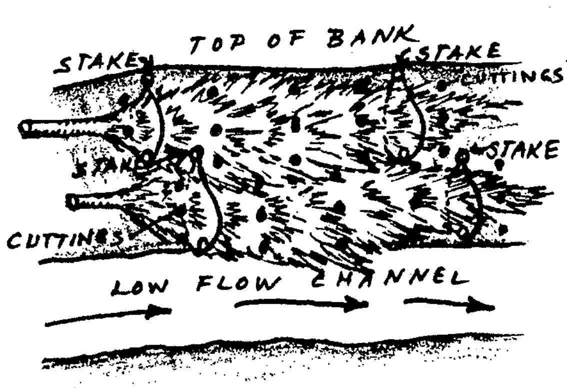
For more information, contact: The Missouri Department of Conservation
P.O. Box 180
Jefferson City, Mo. 65102-0180
(See Videotape Resources)

Riley/O'Connor

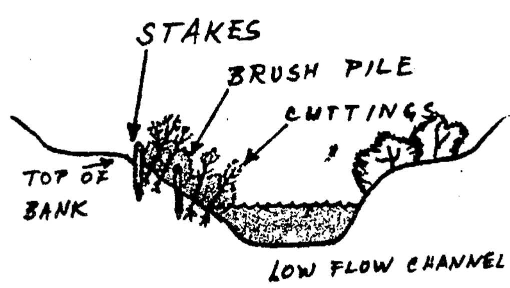
PALMITER BRUSH PILE BANK STABILIZATION:



BIRD'S EYE VIEW OF BRUSH PILE:



SECTION VIEW:



DRIVE FENCE POSTS OR STAKES INTO BANK. WIRE BRUSH PILES TO STAKES. PUT CUTTINGS THROUGH BRUSH INTO BANK.