

The Los Lunas Plant Materials Center

(LLPMC) has developed revegetation techniques involving “deep planting” for disturbed riparian areas; these methodologies allow rapid root extension into the capillary fringe which is the permanent soil moisture above the water table. These deep-planting techniques allow the establishment of obligate riparian species (phreatophytes) with little or no need for follow-up irrigation.

Dormant pole cuttings of riparian overstory trees, typically cottonwood and willow stems 12 to 16 feet long, and longstem container stock of understory shrubs have been successfully established by deep planting them into the capillary fringe. The capillary fringe provides moist but unsaturated soil for root proliferation.

Streambanks prone to erosion during high-flow events can be stabilized by establishing a dense, woody cover to armor the banks, and prolific root systems to stabilize the streambank soils.

In lower elevations of the southwestern United States, the following native species frequently serve this role:

- coyote (narrowleaf) willow (*Salix exigua*)
- seepwillow baccharis (mule’s fat) (*Baccharis salicifolia*)
- desert false indigo (*Amorpha fruticosa*)
- occasionally arrowweed (*Pluchea sericea*)

At higher elevations, a variety of shrub willows (*Salix* sp.), redosier dogwood (*Cornus sericea*), thinleaf alder (*Alnus incana*), and occasionally water birch (*Betula occidentalis*) serve the same purpose.

Some of these species will root readily from dormant cuttings including most willows and dogwood. Baccharis and false indigo will root from cuttings but not consistently. The remaining species do not root from cuttings or their rooting propensity is un-

known. Those species that root easily are good candidates for planting as dormant cuttings for streambank stabilization.

The key to successful establishment is to place the base of the dormant cutting into the water table to assure the cutting is well hydrated while it forms adventitious roots that will extend into the capillary fringe. Another crucial factor is that the dormant cutting is planted deep into the alluvium to resist extraction by flood flows.

Attributes of shrub willow and dogwood whip cuttings include small base diameter (less than 1-inch caliber) and relatively short length (5 to 8 feet) compared with dormant pole cuttings. This is the natural growth form of young vigorous shoots (whips) which are the most likely to root readily.

The LLPMC’s typical method of augering the holes to plant dormant whip cuttings is to use a spline drive rotary hammer with a 1-inch diameter bit that is 36 inches long. The 30-inch-plus deep holes have a sufficient diameter to accept most whip cuttings. A portable generator can provide sufficient power for several hammers via extension cords outfitted with ground fault circuit interrupters. A team of two persons, one doing the augering and one planting the cuttings, can plant up to 800 whip cuttings per day provided the soil is cohesive sand with only small amounts gravel or cobble. Heavy soils take much longer to auger because it is often difficult to pull the bit from the wet clay sediments. Rotary hammers can penetrate several inches of frozen surface soil that is frequently encountered during the late-winter or early-spring planting window for dormant cuttings. If cobbles are present in moderate numbers, it is possible through trial and error to auger deep holes if care is taken to not exert excessive lateral force on the bit which may result in breakage.

If the soil contains dense cobble or has a riprap cover, using a long, sharpened rod (referred to as a stinger) attached to a backhoe or excavator arm often can be successful in driving holes of sufficient depth. For



Before and after: Coyote willows “deep planted” along drainage ditch

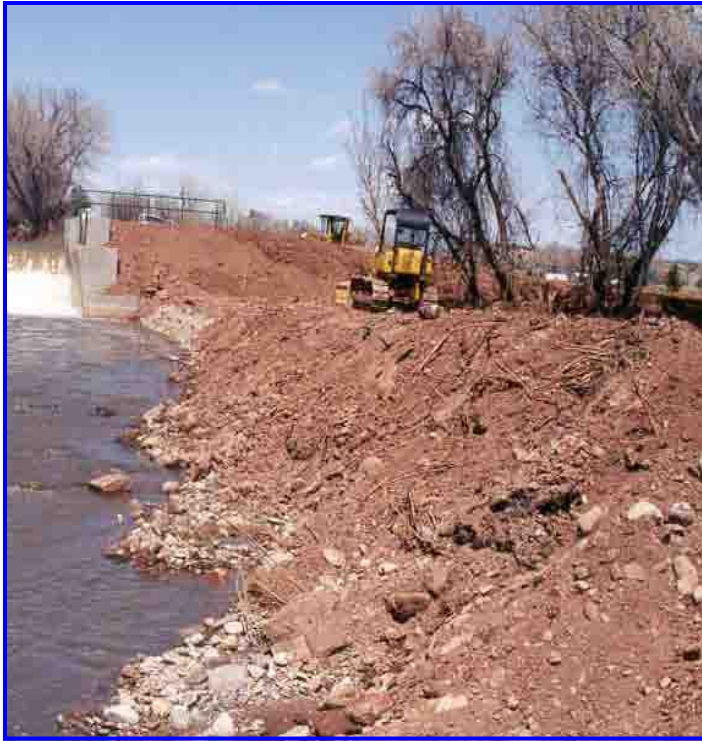
fine-textured soils, you can use a jet of high pressure water to excavate a hole; this method requires a pump and an easily accessible water source because appreciable water is consumed to jet each hole. Another successful method for planting whip cuttings is to use a large diameter auger to reach the water table and place several whips in each hole to assure survival. This produces a clump of plants rather than an individual stem.

The following factors may influence the success of a planting:

- Hydration—As with all dormant cuttings, it is important to keep the whips hydrated by storing newly harvested cuttings in water and minimizing desiccation during transport.
- Beaver damage—Willow whip cuttings can be damaged by beaver predation. Even though the entire aboveground portion of a newly planted whip might be consumed, the below-ground stem often has sufficient reserves to sprout and form new shoots.
- Groundwater fluctuation—In situations where the groundwater depth fluctuates significantly, planting along the streambank at different elevations above the water level may be advisable as long as the base of the cutting is in contact with the capillary fringe or preferably in the saturated zone. Those cuttings close to the water’s edge and inserted into very shallow groundwater may endure if the water level recedes drastically. However, if water levels stay elevated for long periods of time, the higher cuttings may be the only ones to survive.

The density of a planting depends on these factors:

- The urgency of stabilizing the streambank
- The spreading potential of the species planted
- The cost per unit area



Coyote willow can form dense stands from root sprouts. Because low density plantings can fill in rapidly, coyote willow can be very useful for streambank stabilization on lower elevation sites. On higher elevation sites, most willow species are multi-stem shrubs which can resprout from root crowns, but they do not root sprout to form thickets. For this reason, higher density plantings of these willow species may be necessary to rapidly stabilize eroding streambanks in montane environments. One montane species, red osier dogwood, does propagate by stem layering which allows rapid spread on streambanks.

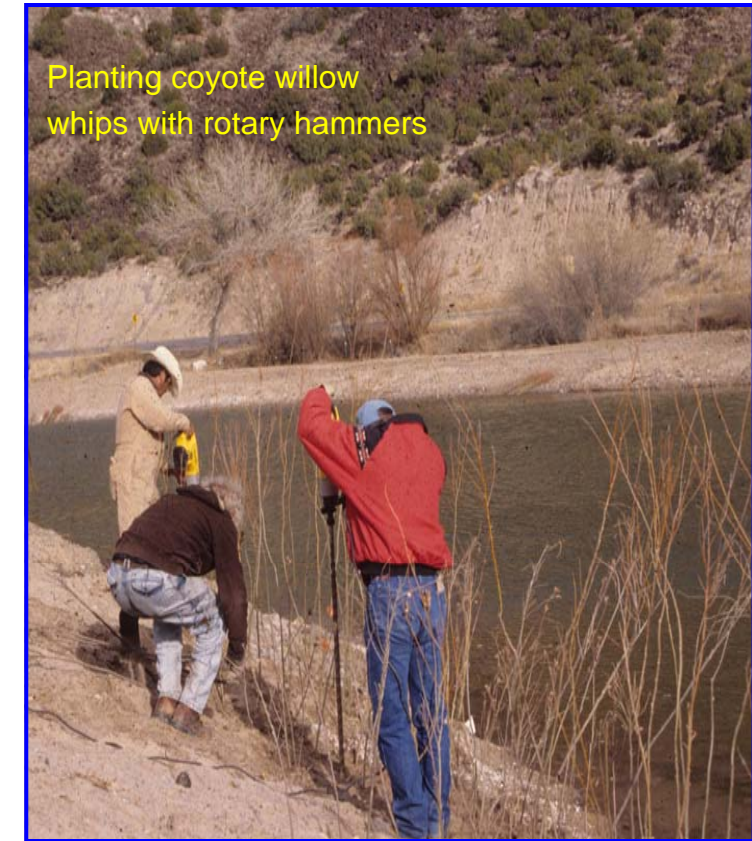
If additional information is needed regarding planting dormant whip cuttings for streambank revegetation, contact the Los Lunas Plant Materials Center at 505-865-4684.



Beaver damage to newly planted coyote willow stand with willows resprouting in the spring after predation

Deep Planting

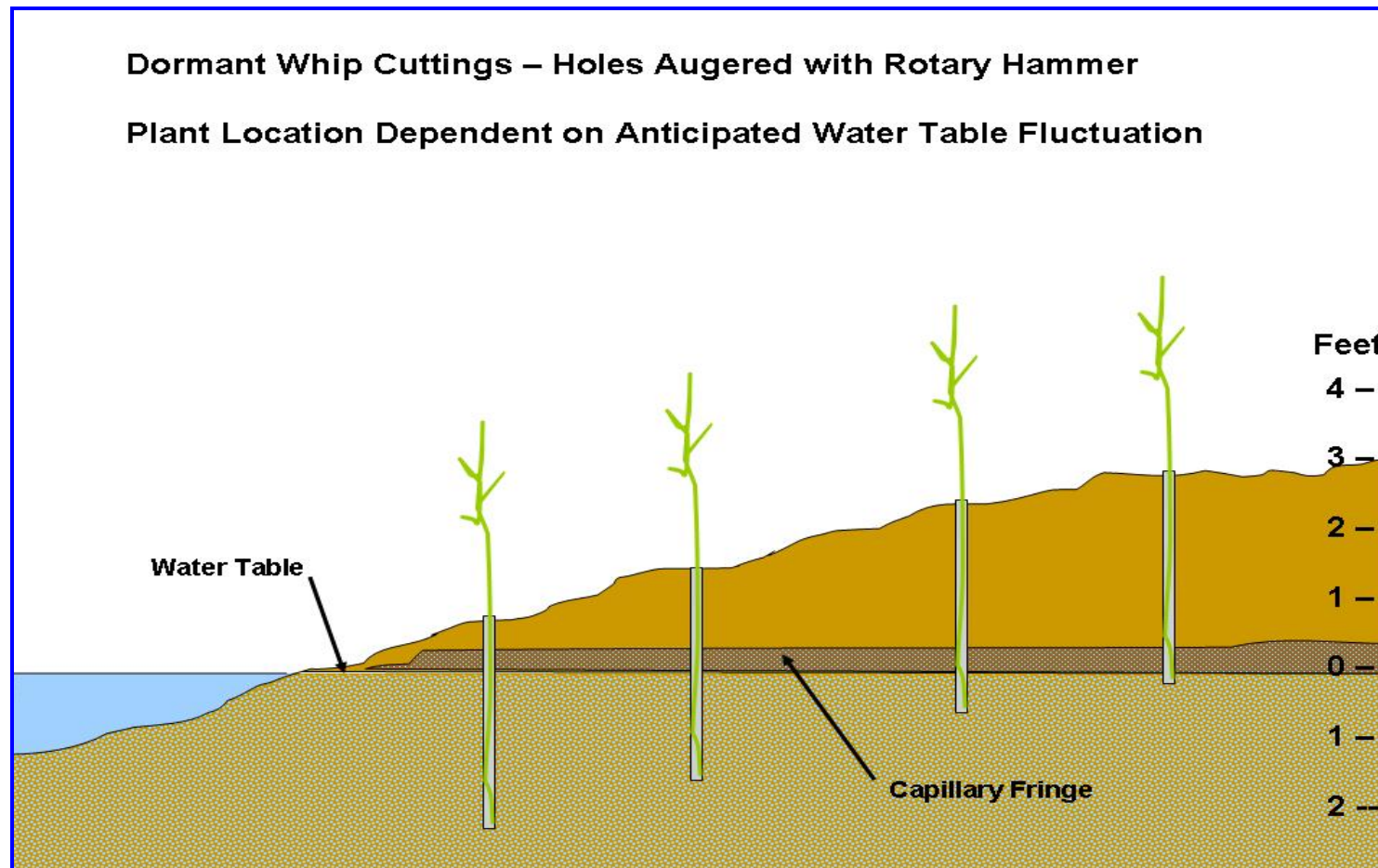
The Ground Water Connection



Planting coyote willow whips with rotary hammers



Before and after: Streambank stabilization is achieved by “deep planting” coyote willow whips; planting holes were augered in the rocky soil by using rotary hammers.



Guidelines for Planting Dormant Whip Cuttings to Revegetate and Stabilize Streambanks



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