TECHNICAL NOTES

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TRANSPLANTING WILLOW ROOT WADS FOR STREAM RESTORATION IN THE CENTRAL SIERRA NEVADA MOUNTAINS

The success of meadow and stream restoration projects can be greatly improved by the utilization of suitable plant materials that may be available onsite. Stream channel construction or restoration projects which require the excavation of mature clumps of willow (Salix spp.), or where opportunity exists for nearby offsite willow harvesting, should incorporate this practice as a project component. This practice serves not only to maintain the genetic integrity and species composition of the site, it also provides a soft engineering means for immediate armoring and long term stability of regraded streambanks. A California Interim Construction Specification, Root Wad is available from the State Conservation Engineer. This practice can be used in conjunction with sod placement (see TN-Plant Materials-43) or Rock Rip Rap.

This practice was developed and utilized by the NRCS in the Lake Tahoe Basin for geomorphic stream restoration. Species selected for use were Lemmon Willow (Salix lemmonii) and Scouler Willow (S. scouleriana). Root wad survival after one year averaged 71 percent, with the majority of loss attributed to out of bank flows of extraordinary duration and intensity.

Root wads are an assemblage of living stems, root crown and roots excavated as a contiguous unit. Soil bound by the roots is considered a component of the root wad. Willows which are considered for harvesting are preferably shrub like, mature and have multiple stems emerging from the root crown. To reduce the shock of transplanting, dormant willows are preferred. Dormancy typically lasts from late fall to early spring. When site conditions such as snowpack or seasonal flooding restrict activities to the summer months, non-dormant materials may be used. In this instance irrigation may be required to maintain adequate soil moisture until late fall

Prior to excavating and lifting the root wad, the stems should be lopped 12 to 18 inches above the root crown and have at least 2 buds remaining. Lopping should be performed square across the stem using sharp, clean tools.

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Due to the weight of a root wad, a backhoe is the preferred means of lifting. The backhoe should have a bucket with a minimum width of 24 inches. As excavation proceeds, the soil bound by the root mass shall be excavated from the original ground as a contiguous mass with a minimum surface area of 24 inches by 24 inches. The depth of the excavation should not be less than 18 inches as measured from the top of the root crown. The plant should be lifted from the original ground in such a manner as to minimize the disturbance of the soil bound by the roots. The backhoe may then convey the root wad to the desired placement location.

If the root wad is to be placed in temporary storage, or if transfer to an offsite location is required, the root wad should be wrapped in a single layer of wetted burlap immediately after harvest to prevent desiccation of the roots.

Temporary storage of root wads may be necessary due to construction constraints. If this is so, the burlap wrapped root wads should be placed in a shady location. Root wads should be placed, root side down with edges snugly adjoining adjacent wads. Root wads should not be stacked. A water source should be available for wetting the root wads to maintain adequate soil moisture. Root wads should be stored for no longer than 72 hours.

Spacing between root wads, and their placement location should be determined according to their intended function. Root wads may for example be utilized for streambank protection, creating surface roughness in flood zones, and wildlife habitat improvement. For streambank protection, root wads should be placed along the entire radius of either inside or outside curves, and above the high water mark of the stream, or at the top of the bank where seasonal overbank flows are expected. Spacing should be determined according to the size of the willow at maturity. For the Lemmon and Scouler willow, placement on 8 foot centers is adequate.

For final placement, the excavated root wad should be placed in a prepared planting hole. The sides of the planting hole should be vertical, lightly scarified, and the bottom loosened to an additional depth of 6 inches. The planting hole should be filled with water at least 1 hour but not more than 2 hours before final root wad placement.

The highest level of willow establishment success is achieved when root wads are installed within 30 minutes of harvest. Place root wads, with burlap removed, into the prepared hole and adjust to the final grade. Backfill the planting hole halfway and fill with water to eliminate air pockets.

Continue to add soil and water until the saturated backfill material covers the top of the root crown to a maximum depth of 2 inches. After the free water has drained, backfill the planting hole to finish grade.

In most applications, it will be necessary to utilize heavy equipment for harvesting and transport of materials. The environmental impacts that such equipment can exert on sensitive meadow and stream environments can be minimized by utilization of either constructed haul roads or military style, heavy steel landing mats for use as temporary access roads. Both methods have been used successfully in the Lake Tahoe Basin.

Haul road construction requirements are specific to the type of soil material used and require the assistance of the NRCS State Conservation Engineer. Haul roads are constructed by placing lifts of soil material over an appropriate filter fabric. After construction, these materials are then removed and disposed of properly. Depending on the length of time or season during which this activity takes place, existing vegetation may recover sufficiently so that additional vegetative restoration in the haulroad footprint may not be necessary. Should reseeding become necessary, a well established cover of grass may be expected by the end of the second growing season, depending on climate and local growing conditions.

Landing mats come in a variety of configurations and are available through the Department of Defense or GSA surplus property programs. Landing mats are heavy steel interlocking panels which, once assembled, can support the weight of equipment. The use of two types in the Lake Tahoe Basin suggests that the non-perforated style performs best. Since individual panel dimensions vary, it will be necessary to locate the source and type available as a part of the planning process.