TECHNICAL NOTE

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Willow Clump Plantings

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Excavator moving a harvested willow clump to planting site on Mary Jane Creek, Manitou, Manitoba, Canada in 2000.

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Introduction:

Willow clump plantings are a streambank soil bioengineering technique that can be used when large stands of willows are available in the project site area. This Streambank Soil Bioengineering technique harvests an entire live willow clump including the above ground stems and roots. This method unlike pole cuttings, already has part of the root system present, so the willow doesn't need to grow as many new roots from scratch. This results in a significant advantage for the plant in terms of shortened establishment period, lower failure rate and faster protection of the problem site.

Another principle that makes this technique desirable is that willows are depositional plants. Willows generally grow in riparian areas and on flood plains that commonly receive sediment from upstream sources. Some of this sediment deposits around the stems when stream flows bring high sediment laidened water that flows through the willow stems, slowing flow velocity and thus dropping sediment.

Willow stem collars (where the stem meets the root material), unlike conifers for example, do not need to be at the soil surface or slightly below the soils surface in order for the plant to survive. When sediment is dropped out of the water column, it accumulates around the stem. As the stems are covered with sediment, the root buds in the stem swell and start to sprout roots. This is one way willows increase their root mass. This also results in more stems and leaves. This ability to adapt to sediment deposition makes willow clump plantings a great Streambank Soil Bioengineering technique especially on channel reconstruction projects, for stabilizing outside meanders, areas where cuttings are difficult to plant, and where soil conditions such as saturation or very fine soils make it difficult for willow cuttings to establish new roots.

Willow clump harvesting and planting methods

- This method should only be used where willows cover extensive areas of the floodplain or meadow areas. In addition, the willow stand should show good regeneration over the area.

- Locate willow clumps that are young and vigorous, about 8-20 feet tall, and about the diameter of the backhoe bucket. Dig straight down and under to the willow clump root mass. Start the hole about 10 inches away from the stems and dig down about the depth of the bucket (approximately 2 feet). Try to get about 70% of the root mass.

- If the planting site is close to the willow clump source, dig the clump and travel to the planting site with it in the bucket. Try to keep as much soil as possible around the root mass.

- If the planting site is a long distance from the harvest site, dig as many willow clumps as you can fit on a flatbed trailer and replant within one hour. Do not allow the clumps to dry out significantly. Transport the clumps to the planting site on the trailer. If it is sunny and hot, consider temporarily tarping the clumps to reduce sun exposure and potential drying during transport. Water the willow clumps when they have arrived at the planting if it will some time before clumps can be planted. Avoid leaving the clumps for long periods in the sun.

- Dig the clumps about 15- 20 feet apart in areas that have lots of willows. Do not harvest willows from critical locations that would be prone to future erosion. The hole that the willow was removed from should be refilled with local, good quality soil materials from off-site locations. Pack the soil firmly in the excavated hole.

- Soil conditions will vary from site to site. In some situations, you will be able to plant the clumps without pre-digging the planting hole by pushing the soil out of the hole with the bottom of the backhoe bucket and then dropping the clump into this hole. Under more difficult soil conditions or where the watertable is deep, you will need to pre-dig the holes to put the willow clumps in. Dig the

holes deep enough so you are just above the standing watertable. Do not dig into the watertable. Ideally you want the root mass of the clump to be in the saturated moisture zone and not in the standing water zone. Dig a hole that is close to the diameter of the clumps. You want to have at least 4-5 feet of the willow stems sticking out of the ground when you are finished planting the clump.

- Pull the clumps off the trailer with a thumb on the backhoe or with the front-end bucket and drop them in the holes. Fill in the hole with soil and water. Muddy-in the willow clumps so there are no air pockets around the root mass.

- The last step is to take a set of loppers and cut off about one third to one half of the willow tops straight across. This decreases the amount of stem that the reduced root mass will have to support. It also stimulates a dense regrowth of stems and leaves that will speed up the photosynthesis process to grow additional roots, stems, and leaves and store energy in the root mass.

- Spacing between the willow clumps should be about 6-15 feet. This depends on the critical streamflow energy you are trying to protect against. If your harvest site does not have enough willows, change to a wider spacing. However, the wider the spacing, the more the potential stream energy can impact the bank area you are trying to protect.

This method is more successful than planting cuttings and more tolerant of droughty conditions.

You should always obtain permission to harvest clumps from the landowner or public land management agency. In addition, state and federal regulators should be consulted to obtain permits if required and to ensure that they concur with the practice.

Case Study Examples

Medicine Lodge Creek, ID

A serious bank erosion problem on the lower end of Medicine Lodge Creek about 15 miles West of Dubois, Idaho on the Jack Webster ranch was designed and treated with rock rip-rap, clumps, stream barbs, fascines, and a brush mattress by Bob Lehman, NRCS AE in 2000. This area is extremely dry and the riparian vegetation is limited to the wetted areas of the stream. The willow clump plantings established extremely well and helped to add aesthetics to the rock rip-rap as well as other functions like wildlife habitat, water quality improvement, and fish habitat.

Figure 1: Eroding bank on the Jack Webster Ranch, lower end of Medicine Lodge Creek about 15 miles West of Dubois, ID in March, 2000.

Figure 1: Willow clumps installed in rip-rap along the lower end of Medicine Lodge Creek about 15 miles West of Dubois, ID in August, 2000.

Figure 2: Willow clump planting on Medicine Lodge Creek after one growing season (August, 2001).

Irving Creek, ID

Irving Creek, a tributary of Medicine Lodge Creek about 25 miles West of Dubois, Idaho near the Montana border, had some major erosion problems because of an improperly installed culvert. The entire stream below the culvert was downcut and the willow community was dying because the watertable was well below the root mass. The steep banks were reshaped and willow clumps were placed at the toe of the bank. Large rocks were placed as toe rock in front of the clumps. The willow clumps were trimmed back so that about 1/3 of the stems remained. New growth was extensive and lush.

Figure 3: Steep cut bank on Irving Creek was being eroded away especially during high water periods. The landowner signed up for a NRCS program called Continuous CRP to restore the stream in exchange for fencing out the cows.

Figure 4: Willow clumps installed on Irving Creek, a tributary of Medicine Lodge Creek, about 25 miles West of Dubois, ID

Corral Creek, ID

Corral Creek, near Fairfield, Idaho in Camas County is a small stream that had major bank erosion. The landowner wanted to restore the willow community and protect adjacent grazing lands. A large willow community was located close to the project site and willow clumps were harvested and brought to the site where the backhoe placed the clump into the bank by pushing the soil out of the hole with the bottom of the backhoe bucket and then dropping the clump straight into the hole. Sod mats from adjacent locations were then placed above the willow clumps to the top of the bank. This was the first willow clump planting project by NRCS in the state of Idaho – installed in 1985.

Figure 5: Willow clump planting with sod mats on a streambank of Corral Creek near Fairfield, Camas County, ID

Figure 6: Corral Creek willow clump planting after a few years of growth. Note sediment deposition and grass growth between willows and stream – most of this deposition occurred the first year following planting as a result of the willow clumps, when above ground willow stems reduced the stream energy-flow rate on the outside meander resulting in sediment deposition in front of the willow clumps. This was quickly followed by natural revegetation of the sediment and permanent relocation of the low flow stream channel.

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