Riparian Rehabilitation in Vehicle-Inaccessible Sites at Imperial National Wildlife Refuge

Photo by: Jenny and Oliver Davis

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Fish and Wildlife Biologist

Imperial NWR

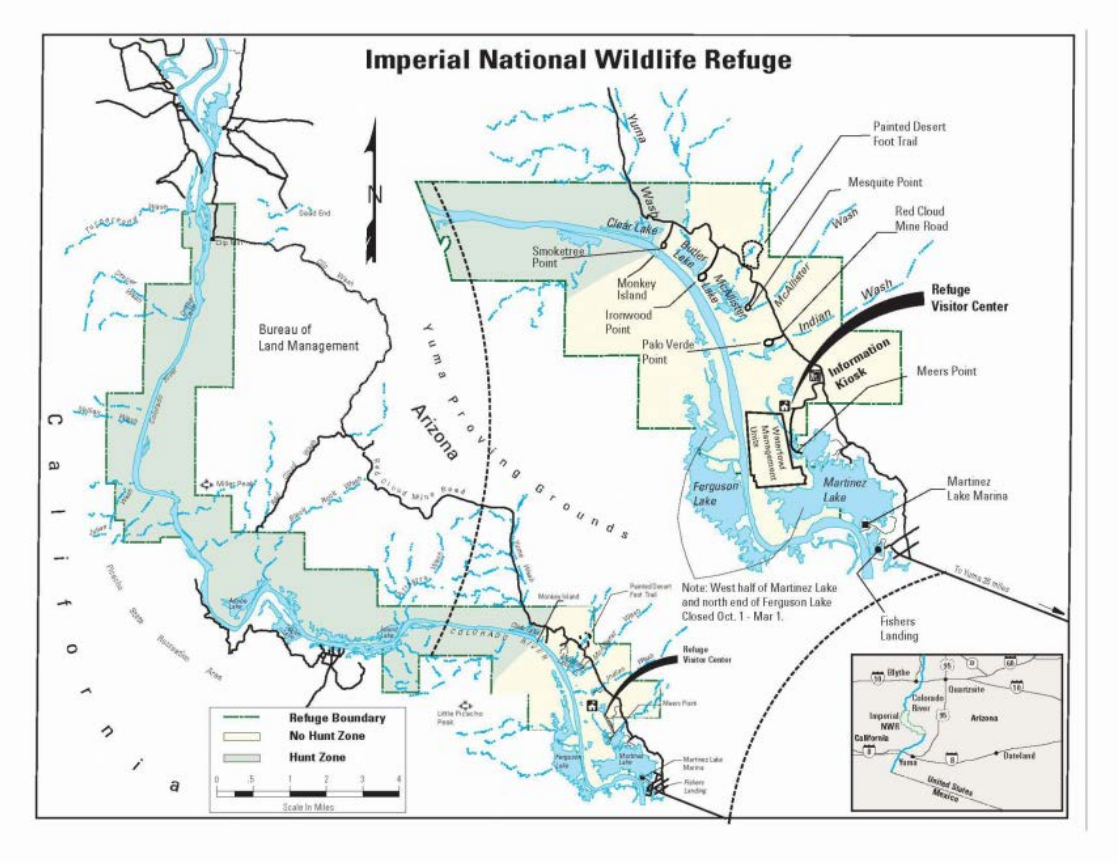
Yuma, AZ 85365

Key points:

- Difficulties
- Changes to goals
- Results

Imperial National Wildlife Refuge

- 25,768 acres along 30 river miles
- Backwaters, marshes, mesquite woodland
- Habitat for:
  - migratory birds
  - listed marshbirds
  - endangered fish



Island Lake Fire

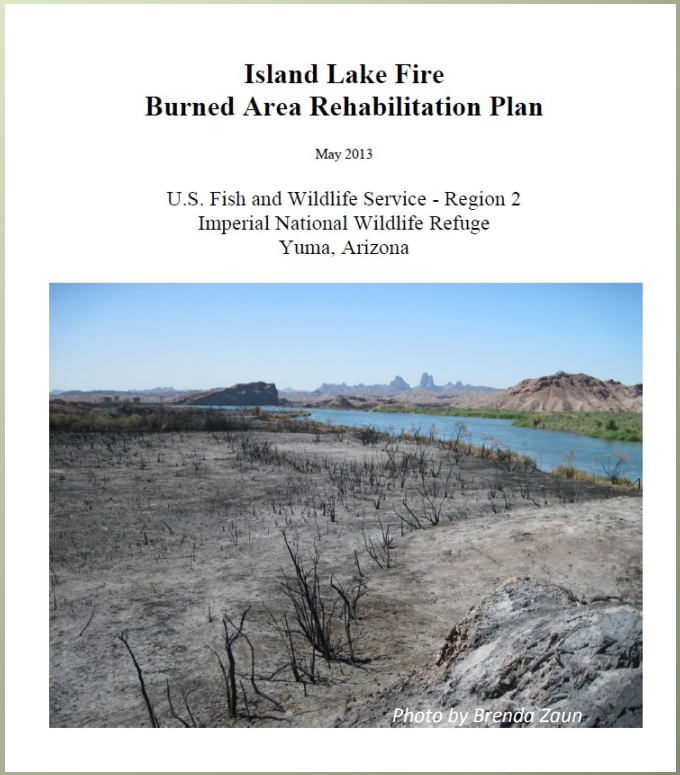
- May 2013
- Fire perimeter 3,304 acres
- Burned variety of riparian habitats
- No road access

Burned Area Rehabilitation Plan

- 141 acres of mesquite woodland
- 45 acres of cottonwood/willow forest
- 4 locations

Funding

- 1 BAR Implementation Leader and an SCA intern
- 20 weeks work crew
- Herbicide and misc. expenses
- No additional money for equipment



Island Lake Fire
Burned Area Rehabilitation Plan

May 2013

U.S. Fish and Wildlife Service - Region 2
Imperial National Wildlife Refuge
Yuma, Arizona

Photo by Brenda Zaun

Time Constraints

- Not funded until one year after fire
- Only funded for 3 years
- Designed to establish self-sufficient plant communities

Previous rehabilitation efforts

- INWR forest
- Fields 15 and 20
- Successes intensively managed

- Three Slashes fire at Cibola NWR

Overall Plan

- Clear invasives by hand
- Collect and scatter mesquite seeds
- Plant cottonwood and willow poles
- Flood irrigate sites

Challenges

- Sites accessible by boat only
  - No heavy equipment
  - Limitation on how many people and how much equipment can work
  - Ability to work dependent on boat condition
- Two growing seasons had passed

Photo by Yuma Correctional Wildland Fire Crew

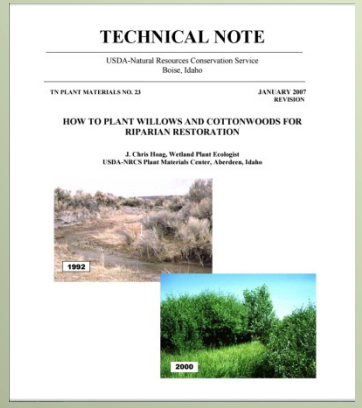
Photo by Brenda Zaun

Site selection

EXTRA IMPORTANT

- Previous vegetation
- Water table
- Salinity
- Accessibility

Pole Planting Guides



TECHNICAL NOTE

USDA-Natural Resources Conservation Service
Boise, Idaho

TN PLANT MATERIALS NO. 23 — JANUARY 2007 REVISION

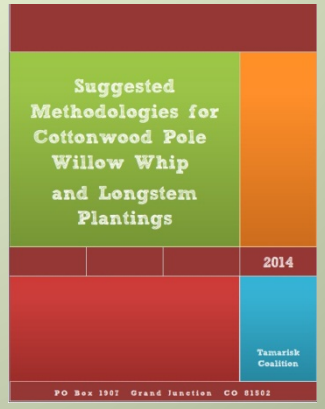
HOW TO PLANT WILLOWS AND COTTONWOODS FOR RIPARIAN RESTORATION

J. Chris Hoag, Wetland Plant Ecologist
USDA-NRCS Plant Materials Center, Aberdeen, Idaho

1992

2000

Hoag 2007



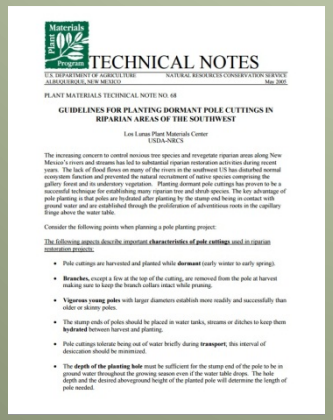
Suggested Methodologies for Cottonwood Pole Willow Whip and Longstem Plantings

2014

Tamarisk Coalition

PO Box 1907 Grand Junction CO 81502

Tamarisk 2014



Plant Materials Program

TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE — NATURAL RESOURCES CONSERVATION SERVICE
ALBUQUERQUE, NEW MEXICO — May 2005

PLANT MATERIALS TECHNICAL NOTE NO. 68

GUIDELINES FOR PLANTING DORMANT POLE CUTTINGS IN RIPARIAN AREAS OF THE SOUTHWEST

Los Lunas Plant Materials Center
USDA-NRCS

The increasing concern to control noxious tree species and revegetate riparian areas along New Mexico's rivers and streams has led to substantial riparian restoration activities during recent years. The lack of flood flows on many of the rivers in the southwest US has disturbed normal ecosystem function and prevented the natural recruitment of native species comprising the gallery forest and its understory vegetation. Planting dormant pole cuttings has proven to be a successful technique for establishing many riparian tree and shrub species. The key advantage of pole planting is that poles are hydrated after planting by the stump end being in contact with ground water and are established through the proliferation of adventitious roots in the capillary fringe above the water table.

Consider the following points when planning a pole planting project:

The following aspects describe important **characteristics of pole cuttings** used in riparian restoration projects.

- Pole cuttings are harvested and planted while **dormant** (early winter to early spring).
- **Branches**, except a few at the top of the cutting, are removed from the pole at harvest making sure to keep the branch collars intact while pruning.
- **Vigorous young poles** with larger diameters establish more readily and successfully than older or skinny poles.
- The stump ends of poles should be placed in water tanks, streams or ditches to keep them **hydrated** between harvest and planting.
- Pole cuttings tolerate being out of water briefly during **transport**, this interval of desiccation should be minimized.
- The **depth of the planting hole** must be sufficient for the stump end of the pole to be in ground water throughout the growing season even if the water table drops. The hole depth and the desired aboveground height of the planted pole will determine the length of pole needed.

Los Lunes 2005

Deep-planting techniques to establish riparian vegetation in arid and semiarid regions.

Native Plants Journal 11(1):
David B Dreesen and Gregory A Finchel. 2010.

Invasion by exotic woody species and disruption of natural hydrologic conditions require the restoration of native riparian plant communities along rivers and streams in the Southwest. Successful establishment of phreatophytic riparian plant species has been accomplished using deep planting techniques that involve the immediate exploitation of capillary fringe moisture by the existing root system of nursery stock or the adventitious root system of a cutting. These techniques, which require minimal or no post-planting irrigation in arid and semiarid regions, include the planting of dormant pole cuttings, dormant whip cuttings, tallpots with long root systems, as well as long-stem nursery stock whose root crowns are deeply buried.

KEY WORDS
root crown, dormant pole cuttings, dormant whip cuttings, long-stem, capillary fringe, groundwater, phreatophyte, tallpot

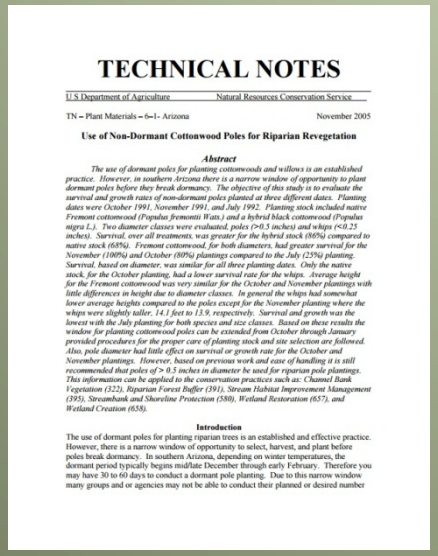
Many of the common overstory trees and understory shrubs in riparian areas are phreatophytes and also obligate riparian species. *Phreatophytes* have been described as plants whose "roots are in the water table or its capillary fringe during all or most of the growing season" (Dick-Peddie 1993) or as plants that "habitually send their roots to the capillary fringe and feed on ground water" as stated by Meinzer (1923) who coined the word "phreatophyte." Thecapillary fringe has been described as "the zone immediately above the water table" where the water is held "by interfacial forces (surface tension)" and "is typically saturated to some distance above its base at the water table; upward from the saturated part only progressively smaller pores are filled and the upper limit is indistinct" (Lohman and others 1972). Thus, the capillary fringe serves as a constant water supply with sufficient aeration for roots of phreatophytic species to flourish. In dry climates, the natural regeneration of riparian species is dependent on overbank flooding, but the persistence of this vegetation is dependent on the appropriate groundwater level (Hupp and Osterkamp 1996) and the associated capillary fringe.

On lower elevation floodplain sites in the Southwest, cottonwood species of the Salicaceae family (Rio Grande [*Populus deltoides* Bartram ex Marsh. ssp. *wislizenii* (S. Watson) Eckenwalder], plains [*Populus deltoides* Bartram ex Marsh. ssp. *monilifera* (Aiton) Eckenwalder], Fremont [*Populus fremontii* S. Watson], and Goodding's willow [*Salix gooddingii* C.R. Ball]) are common obligate riparian overstory species and phreatophytes. An assortment of common understory shrubs on these sites in New Mexico are obligate riparian species including desert false indigo (*Amorpha fruticosa* L. [Fabaceae]), screwbean mesquite (*Prosopis pubescens* Benth. [Fabaceae]), *Baccharis* L. species (Asteraceae),

Dreesen and Finchel 2010

Conflicting Opinions

	Keep Branches	Complete Inundation	Length of soak
Dreesen & Finchel 2010	Y	Y	?
Tamarisk Coalition 2014	Y	N	Minimum 1 day, up to 90
Hoag 2007	N	Y	Minimum 1 day, up to 14
Los Lunes 2005	Y	N	?



TECHNICAL NOTES

U S Department of Agriculture — Natural Resources Conservation Service

TN – Plant Materials – 6–1- Arizona — November 2005

Use of Non-Dormant Cottonwood Poles for Riparian Revegetation

Abstract

The use of dormant poles for planting cottonwoods and willows is an established practice. However, in southern Arizona there is a narrow window of opportunity to plant dormant poles before they break dormancy. The objective of this study is to evaluate the survival and growth rates of non-dormant poles planted at three different dates. Planting dates were October 1991, November 1991, and July 1992. Planting stock included native Fremont cottonwood (Populus fremontii Wats.) and a hybrid black cottonwood (Populus nigra L.). Two diameter classes were evaluated, poles (>0.5 inches) and whips (<0.25 inches). Survival, over all treatments, was greater for the hybrid stock (86%) compared to native stock (68%). Fremont cottonwood, for both diameters, had greater survival for the November (100%) and October (80%) plantings compared to the July (25%) planting. Survival, based on diameter, was similar for all three planting dates. Only the native stock, for the October planting, had a lower survival rate for the whips. Average height for the Fremont cottonwood was very similar for the October and November plantings with little differences in height due to diameter classes. In general the whips had somewhat lower average heights compared to the poles except for the November planting where the whips were slightly taller. 14.1 feet to 13.9, respectively. Survival and growth was the lowest with the July planting for both species and size classes. Based on these results the window for planting cottonwood poles can be extended from October through January provided procedures for the proper care of planting stock and site selection are followed. Also, pole diameter had little effect on survival or growth rate for the October and November plantings. However, based on previous work and ease of handling it is still recommended that poles of > 0.5 inches in diameter be used for riparian pole plantings. This information can be applied to the conservation practices such as: Channel Bank Vegetation (322), Riparian Forest Buffer (391), Stream Habitat Improvement Management (395), Streambank and Shoreline Protection (580), Wetland Restoration (657), and Wetland Creation (658).

Introduction

The use of dormant poles for planting riparian trees is an established and effective practice. However, there is a narrow window of opportunity to select, harvest, and plant before poles break dormancy. In southern Arizona, depending on winter temperatures, the dormant period typically begins mid/late December through early February. Therefore you may have 30 to 60 days to conduct a dormant pole planting. Due to this narrow window many groups and or agencies may not be able to conduct their planned or desired number

Munda *et al*. 2005
Non-dormant cottonwoods in Arizona

Pole collection

- 5-12ft. in length, 1-2in. in diameter
- Transported ~2.5 hours to Imperial NWR, wrapped in plastic tarp in back of truck
- Stored in backwater of Colorado for 1-3 weeks

AND

- 4-6ft. Long, 0.5-1in. In diameter
- From mature trees
- Planted within a day

Oct 2014-Feb 2015

- Cleared 21 acres of common reed and saltcedar at 2 sites
- Planted 1879 poles
- By May, only 506 had green leaves
- By July, only 24 were still alive

Mar-Sep 2015

- Sprayed and mowed common reed and saltcedar
- Ordered:
  - 1000, 1-gallon honey mesquites
  - 1000, 19” deep pot honey mesquites
  - 500, 19” deep pot screwbean mesquites

New challenges

- Herbicide inactivity

Photo by Thomas Tymon

- Mesquite pods

New challenges (cont.)

- Flooding impractical

Photos by Christopher Reddin

- Water table changes

New challenges (cont.)

- Pole transportation, storage, and planting

Photo by Christopher Reddin

- Invasive removal around plantings

Photo by Yuma Correctional Wildland Fire Crew

Natural Regeneration and Survival

- ~ 1 acre of coyote willow
- Dozens of honey mesquite resprouts
- A handful of living willow, mesquite, cottonwood, and palo verde
- Various herbaceous plants

Photos by Christopher Reddin

Oct 2015-Dec 2015

- Cleared additional 10 acres at 2 new sites
- Planted:
  - 797, 1-gallon honey mesquite
  - 780 honey mesquite seedlings
  - 28 cottonwood poles

Plan Moving Forward

- Fewer, straighter, wetter poles
- More mesquite
- No new sites
- No seeding

Remember:

- Match digging implement to poles
- Treat invasives BEFORE planting
- Know the water you're going to use for herbicides
- Water table
- Minimize transport damage

Questions?