Best practices for revegetation along the Jordan River (Utah, USA) following control of invasive plant species

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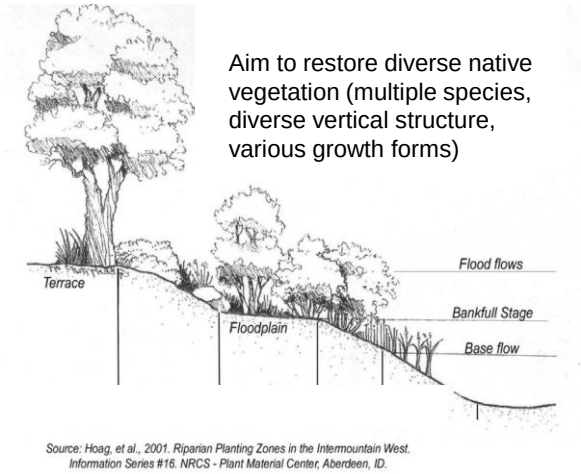
This document was informed by the experience of practitioners working in wetland and riparian areas in the region, including those working with the Jordan River Commission and Division of Forestry, Fire and State Lands.

Introduction

A common goal for land managers along the Jordan River is to control Phragmites (*Phragmites australis* subsp. *australis*), Russian olive (*Elaeagnus angustifolia*), tamarisk (*Tamarix* species), and puncturevine (*Tribulus terrestris*) and restore diverse plant communities (with numerous native tree, shrub, grass, and forb species). We summarize best practices for revegetation from our experience and those of practitioners working on the Jordan River in UT.

Why pursue active revegetation

Removing large populations of invasive species may result in the loss of important ecosystem functions (e.g., temperature regulation/shade, nutrient cycling, bank stabilization, habitat). Ideally this loss is temporary and diverse native plants replace (and improve) these ecosystem functions. But often native plants fail to quickly recover, especially if environmental conditions are not favorable, secondary invasions threaten the restoration site, or surrounding native plant populations (in the seedbank and adjacent areas) are insufficient. **Active revegetation can accelerate native species establishment and prevent reinvasion of invasive species.**



Source: Hoag, et al., 2001. Riparian Planting Zones in the Intermountain West. Information Series #16. NRCS - Plant Material Center, Aberdeen, ID.

When to revegetate

Revegetation can be implemented at a restoration site before, during, or after invasive plant control, depending on the site. The timing of revegetation will depend on restoration goals, the extent of the invasion, and how well the species has been controlled. Multiple years of revegetation may be necessary to achieve the desired cover or density of species.

Revegetation prior to invasive species control

Example: Planting trees earlier in the restoration process gives planted trees a "head start". Caution— be sure not to plant or seed in areas that will be in the way of future invasive species control treatments.

Revegetation during invasive species control

Example: If removing Russian olive and tamarisk trees patch by patch at a site, consider revegetating newly barren patches using a phased approach.

Revegetation after effective invasive species control

Example: When revegetating an area that was previously occupied by a dense Phragmites stand, be sure Phragmites cover and biomass is minimal (after many years of treatment) before proceeding with revegetation.

Revegetation after a disturbance of earth (e.g., utilities, trails, boat ramps)

Revegetate within two weeks of the disturbance, no matter the time of year. Follow up with additional revegetation treatments in the fall and spring.

Important considerations

- The quick recovery of native plant cover to an area will provide resistance to future reinvasion.
- Mark and protect revegetation areas. Do not let herbicide drift damage native plant communities. Be sure to protect revegetation areas from herbivory (e.g., use at least 14-gauge welded wire fencing around trees).
- Invasive plant seeds are transported on shoes and equipment. Be sure to properly clean equipment before moving to a new site.

Revegetation methods

Moisture is key to successful revegetation, especially in the first few years following planting or seeding. Knowledge of water availability at your site (e.g., depth to ground water, timing and duration of inundation) will be valuable to your restoration planning. Supplemental irrigation or selection of drought-tolerant species may be required for drier sites. Generally, revegetation should take place in the fall or spring to capitalize on favorable conditions. Below are short descriptions of revegetation methods that may be useful along the Jordan River.

Plant materials	Brief methods and equipment	Notes
 Seed	• Sow a species-diverse seed mix (the species in the mix will depend on your restoration goals) • Use a handheld seed spreader and rake, Argo or UTV with hopper and harrow, or hydroseeder	• Harrow or rake seeds into soil to ensure good seed to soil contact. • Many species exhibit dormancy. Fall seedings will allow for greater seed dormancy break. If seeding in the spring, consider a cold stratification treatment. • Reach out to the Jordan River Commission for seed mix examples and guidance.
 Potted plants (i.e., plugs, containerized plants of all sizes)	• Use shovels or machine-powered augers for digging holes • Water the hole prior to planting • When planting the tree, create a shallow depression around the tree at the soil surface • Water the tree immediately after planting	• Deep-rooted plants (e.g., 30” tall potted plants) may do better than plants with shallower roots when ground water is less available. • Knowledge of site hydrology is key. Supplemental irrigation may be needed in the first two to three years.
 Cuttings/pole plantings	• Some wetland plants (e.g., willows, cottonwoods) can be propagated from cuttings. • See “A Guide for Harvesting, Storing and Planting Dormant Willow Cuttings” (Wildlands Restoration Volunteers, 2008) for more information.	• Soak cuttings in water for 2-10 days prior to a dormant planting. • Rebar, an auger, or a water stinger can be used to create deep holes (a majority of the cutting will be buried).
 Sod mats	• Use stakes to secure mats to the ground • If hydrology is insufficient to keep roots wet, supplemental irrigation may be needed following installation	• Sod mats may be useful in areas with consistent hydrology and a 3:1 slope or less. • Native plant nurseries usually need a long lead time to grow sod mats for projects.

Plant material source — It is best practice to source local plant materials (e.g., from within the watershed, state, region) whenever possible. However, sourcing materials from further away (but still within the West) is acceptable for species that have a high degree of plasticity (e.g., many bulrushes, rushes, sedges) or those that are not available otherwise.

Species to consider for revegetation

Functional group	Common name	Scientific name	Wetland indicator status*
Riparian trees	Box elder	*Acer negundo*	FACW
	Black hawthorn	*Crataegus douglasii*	FAC
	Fremont cottonwood	*Populus fremontii*	FACW
	Peachleaf willow	*Salix amygdaloides*	FACW
	Whiplash willow	*Salix lasiandra*	FACW
Shrubs	Big sagebrush	*Artemisia tridentata*	FACU
	Fourwing saltbush	*Atriplex canescens*	UPL
	Rubber rabbitbrush	*Ericameria nauseosa*	UPL
	Broom snakeweed	*Gutierrezia sarothrae*	NI
	Chokecherry	*Prunus virginiana*	FAC
	Skunkbush sumac	*Rhus trilobata*	FACU
	Golden currant	*Ribes aureum*	FAC
	Woods' rose	*Rosa woodsii*	FACU
	Sandbar/coyote willow	*Salix exigua*	FACW
	Greasewood	*Sarcobatus vermiculatus*	FAC
	Silver buffaloberry	*Shepherdia argentea*	FACU
Forbs (flowering herbaceous species)	Common yarrow	*Achillea millefolium*	NI
	White sagebrush	*Artemisia ludoviciana*	FACU
	Swamp milkweed	*Asclepias incarnata*	OBL
	Showy milkweed	*Asclepias speciosa*	FAC
	Hairy false goldenaster	*Chrysopsis villosa*	NI
	Rocky Mountain beeplant	*Cleome serrulata*	FACU
	Blanket flower species	*Gaillardia spp.*	FACU
	Curly cup gumweed	*Grindelia squarrosa*	FACU
	Annual sunflower	*Helianthus annuus*	FACU
	Nuttall's sunflower	*Helianthus nuttallii*	FACW
	Lewis flax	*Linum lewisii*	NI
	Canada goldenrod	*Solidago canadensis*	FACU
Graminoids (grasses and grass-like species)	Saltgrass	*Distichlis spicata*	FAC
	Nebraska sedge	*Carex nebrascensis*	OBL
	Common spikerush	*Eleocharis palustris*	OBL
	Common field sedge	*Carex praegracilis*	FACW
	Arctic rush	*Juncus arcticus*	FACW
	Torrey's rush	*Juncus torreyi*	FACW
	Western wheatgrass	*Pascopyrum smithii*	FAC
	Sandberg bluegrass	*Poa secunda*	FACU
	Nuttall's alkaligrass	*Puccinellia nuttalliana*	FACW
	Hardstem bulrush	*Schoenoplectus acutus*	OBL
	Chairmaker's bulrush	*Schoenoplectus americanus*	OBL
	Common threesquare bulrush	*Schoenoplectus pungens*	OBL
	Alkali sacaton	*Sporobolus airoides*	FAC
	Sand dropseed	*Sporobolus cryptandrus*	FACU

*** Wetland indicator status abbreviations**

UPL = upland (almost never occur in wetlands)
FACU = facultative upland (usually occur in non-wetlands, but may occur in wetlands)
FAC = facultative (occur in wetlands and non-wetlands)
FACW = facultative wetland (usually occur in wetlands, but may occur in non-wetlands)
OBL = obligate (almost always occur in wetlands)
NI = non-indicator

Note: Some of the species in this table may not be commercially available. Local collection of seed or cuttings may be possible by some nurseries, seed collectors, students, or volunteers.

For more information about the Jordan River Cooperative Weed Management Area please contact Rae Robinson, Jordan River Vegetation Project Coordinator, at raerobinson@utah.gov.