

# Reforestation, Nurseries, and Genetics Resources (RNGR)

***NRCS Tribal Advisory Committee Meeting  
28 October 2021***

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United States Department of Agriculture

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# Land Acknowledgment

- Moscow Forestry Sciences Laboratory is located on the homelands of the Nez Perce (Nimiipu)



# What is RNGR?

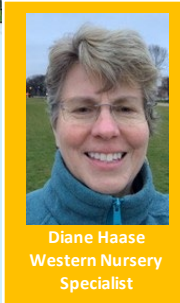
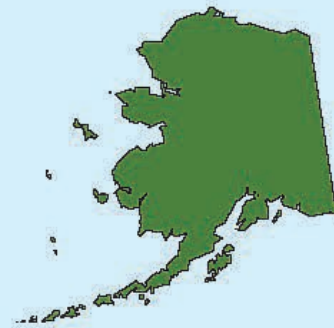
(Reforestation, Nurseries, & Genetic Resources)

- Unique, innovative collaboration across all three Deputy Chief Areas
- Use expertise to develop and deliver resources to improving plant materials
- Technology used worldwide





# The National RNGR Team



Diane Haase  
Western Nursery  
Specialist

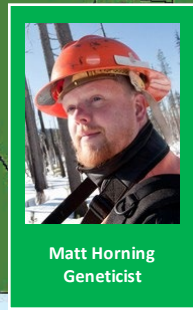


Kas Dumroese  
Researcher/  
National Nursery  
Specialist



Jeremy Pinto  
Researcher/  
Tribal Nursery  
Specialist

## Western Region



Matt Horning  
Geneticist

- Western Territories (Not pictured)
- American Samoa
  - Guam
  - Palau
  - Federated States of Micronesia
  - Northern Mariana Islands
  - Republic of the Marshall Islands

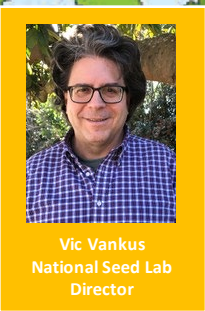
## Northeastern Region



Carrie Pike  
Northeast Nursery  
Specialist



Lindsey Colegrove  
Southern Nursery  
Specialist



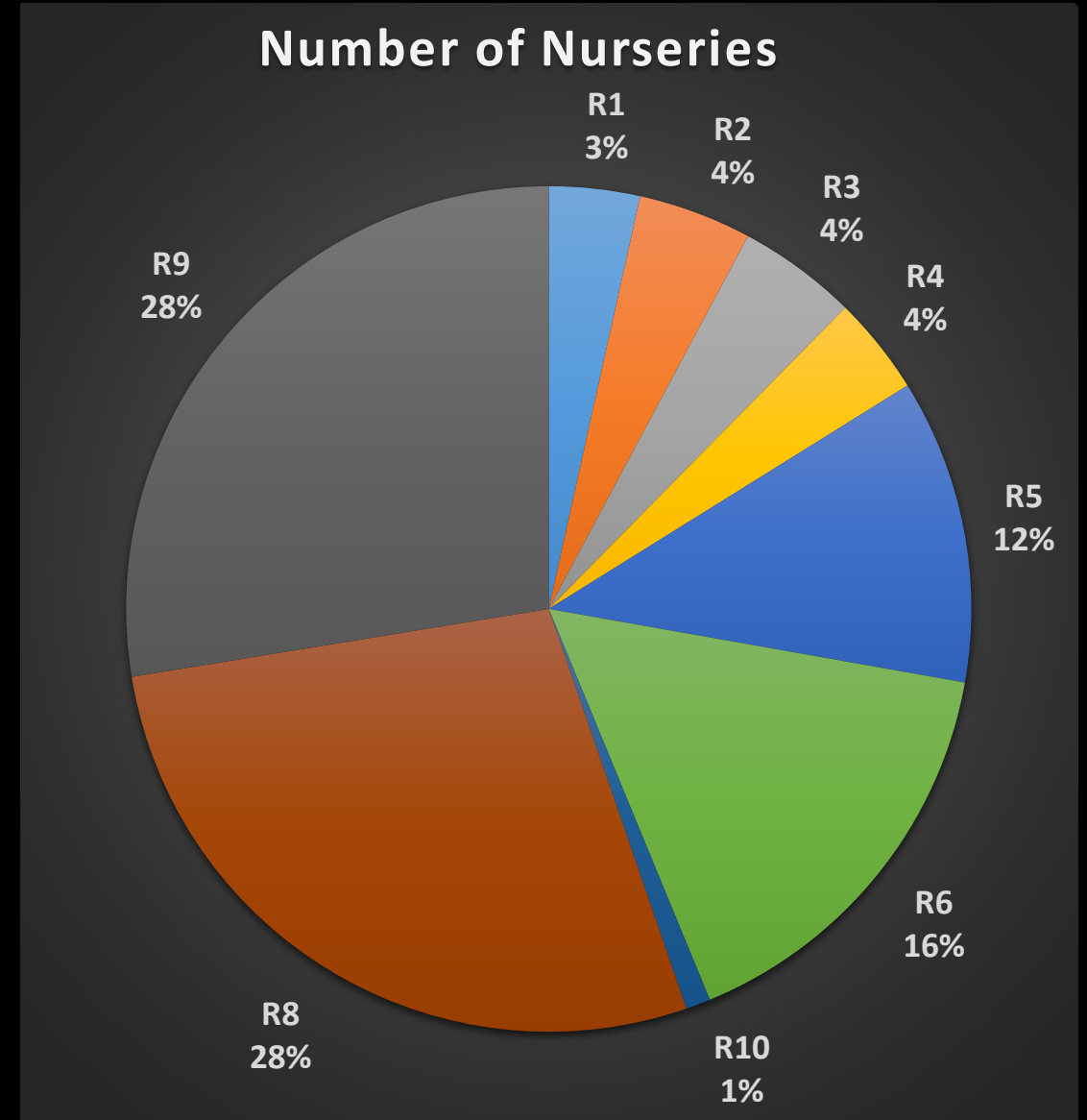
Vic Vankus  
National Seed Lab  
Director

## Southern Region

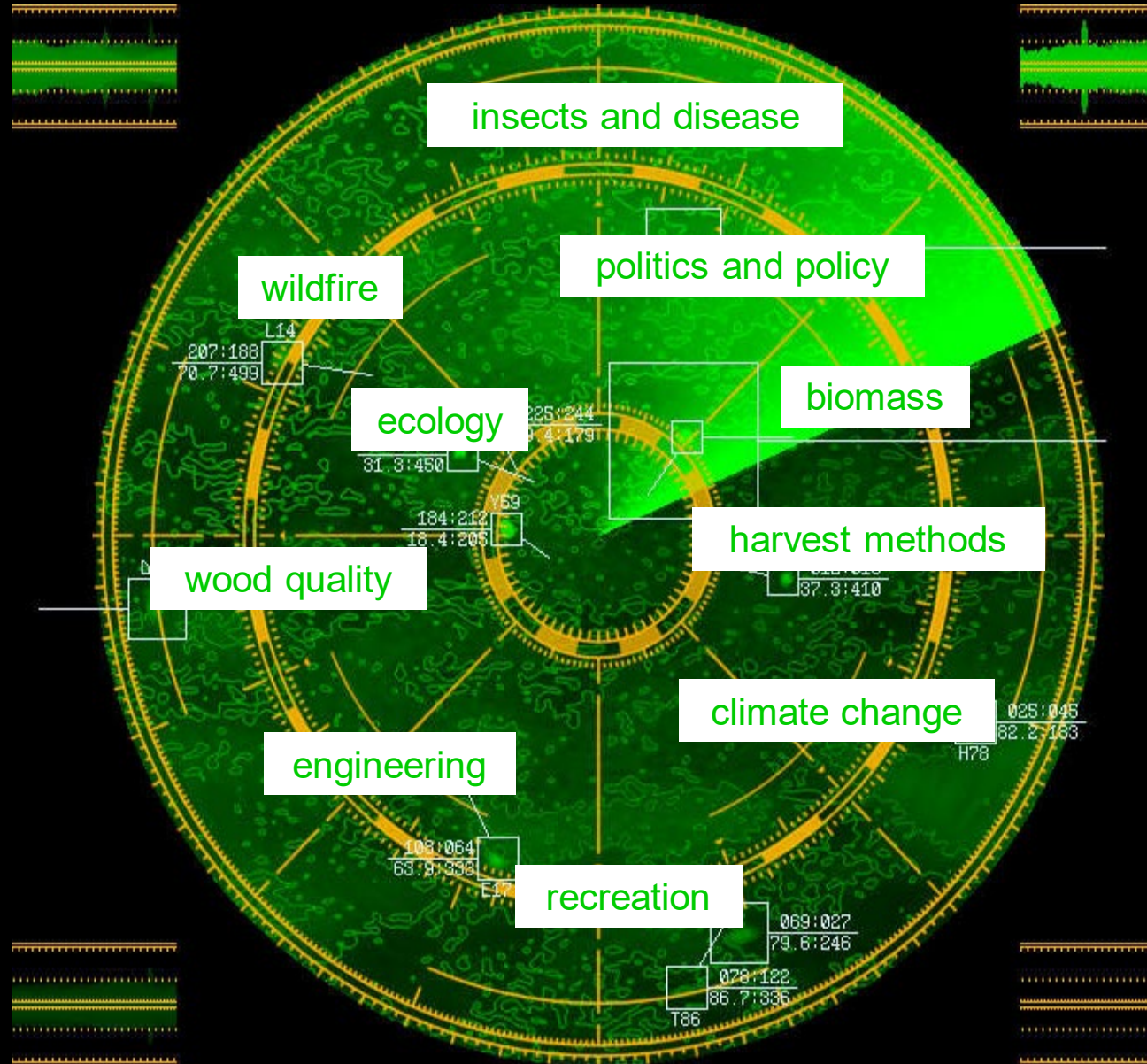
- Southern Territories (Not pictured)
- Puerto Rico
  - Virgin Islands

# Why RNGR?

- Approximately 1500 native plant nurseries in the U.S.
- Produce more than one billion seedlings annually
- Most lack local information resources
- RNGR works to fill the gap



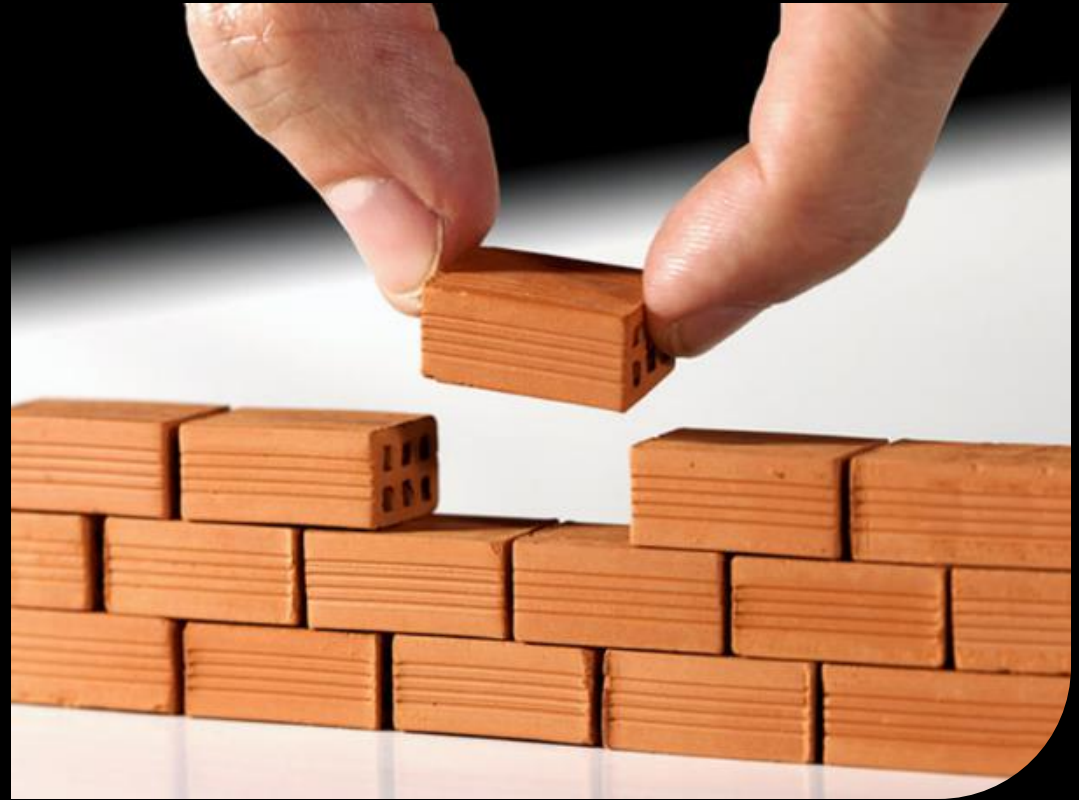
*Estimated from number of listings in the National Nursery and Seed Directory ([www.RNGR.net](http://www.RNGR.net))*



*Nurseries, seed,  
and seedlings*

...much too often off the radar.

Seedlings are the  
building blocks for  
nearly all healthy  
forests and  
landscapes





# Quality Seedling Production Requires Skill and Knowledge

- Plant physiology, morphology, and phenology
- Genetics
- Environment
- Soil quality
- Water management
- Seed technology
- Species characteristics
- Ecotype differences
- Culturing techniques
- Pest Management
- Storage and handling
- Customer relations
- Administration and budgeting





# RNGR Activities

- Technical Assistance
- Publications and Presentations
- Annual Nursery Conferences
- Training and Workshops
- Research
- National Seed Laboratory
- International Assistance
- Online Resources
- Assistance to Tribes



# Native Plants & Land Management in Indigenous Communities

## Historical Management Goals

- Food
- Shelter
- Textiles
- Medicine
- Ceremony



## Contemporary Management Goals

- **Restoration**
- Reforestation
- Wildlife
- Climate change
- Invasive species concerns
- Disturbance



## Contemporary Cultural Goals

- Preservation
- Education
- Food
- Medicine
- Textiles
- Economics







# RNGR Tribal Nursery Emphasis



Since 2001

- Technical Assistance
  - On-site visits, phone, & email
- Intertribal Nursery Council Meetings, Workshops, & Training Sessions
- Publications



2001 Durango, CO  
Southern Ute Tribe



2010 Arlington, WA  
Stillaguamish Tribe



2019 Tulsa, OK  
Muskogee Tribe



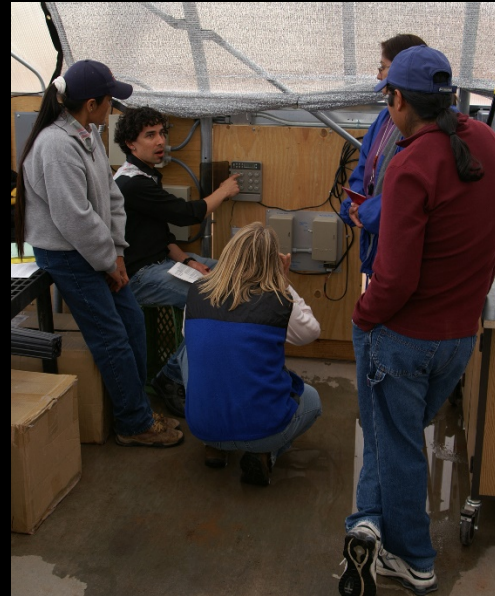
# Technical Assistance to Tribes

## Goal:

- Quality seedlings for the restoration & reforestation of tribal lands

## Outcomes:

- Consultations
- Cultural Plant Propagation Center
- Plant materials programs
- Equipment surplus transfers
- Cooperative agreements
- Plant materials to NFS
- Pollinators
- USDA Climate Hub
- CCAA Program
- Publications



# Publications



## Propagating native Salicaceae for riparian restoration on the HOPI RESERVATION IN ARIZONA

Thomas D Landis, David R Dreessen, Jeremy R Pinto, and R Kasten Dumroese

### ABSTRACT

The USDA Forest Service, USDA Natural Resource Conservation Service (NRCS), and the Hopi Tribe Office of Range Management have been working together on native plant restoration projects in northeastern Arizona. The aggressive exotic plants, Russian olive (*Elaeagnus angustifolia* L. [Elaeagnaceae]) and salt cedar (*Tamarix nemoralis* Ledeb. [Tamaricaceae]), have invaded many wetland and riparian areas on the Hopi Reservation, excluding willows (*Salix* L.), cottonwoods (*Populus* L.), and other native plants. The tribe has been mechanically removing the invasives and has asked for help in propagating native species to plant in these project areas. Although much information is available on how to collect willows and cottonwoods and propagate them, some unique challenges exist on Hopi lands. Some species are common, while others are very rare and in some cases only a few individual plants exist. The scattered locations of streams, wetlands, and seeps must be considered during plant material collections to ensure that both genetic and sexual diversity are adequately represented. Another challenge is the determination of target plant stock types that are appropriate on the diverse hydrologic conditions on the various project sites. Collected plant material was taken to the NRCS Plant Materials Center in Los Lunas, New Mexico, for both seed and vegetative propagation.

**KEY WORDS**  
restoration, culturally significant plants, invasive species, Intertribal Nursery Council, Salt, Populus

**NOMENCLATURE**  
USDA NRCS (2006)

Opposite. Old man cotton, like those on Salt along from the Hopi Reservation in Arizona, can be used to determine the use of direction species during winter dormancy, and ensure that branch collectors collect both sides. Photo by Thomas D Landis.

The Hopi Reservation is located in northeast Arizona (Figure 1A) where the tribe has been working to eradicate exotic salt cedar (*Tamarix nemoralis* Ledeb. [Tamaricaceae]) and Russian olive (*Elaeagnus angustifolia* L. [Elaeagnaceae]) from streams and wetlands. Comprising about 2% of the reservation, these riparian and wetland communities are ecologically and culturally valuable for livestock grazing, wildlife habitat, traditional gathering, and ceremonial use (Lomafalia 2005). Although the initial eradication was successful, the salt cedar are reappearing. At the first intertribal Nursery Council meeting in 2005, the tribe asked the USDA Forest Service for help in propagating willows (*Salix* L. [Salicaceae]) and cottonwoods (*Populus* L. [Salicaceae]) to plant in these areas. During initial visits to project areas on the reservation, we identified the principal riparian trees and shrubs: Fremont cottonwood, Colorado willow, crepe willow, and arroyo willow (Table 1). Tribal members also took us to remote sites where we found small stands of knotted cottonwood and quaking aspen (Table 1). It is important to note that many of the wetland and riparian areas on the Hopi Reservation are geographically isolated and not always contiguous (Figure 1A). In addition, the aggressive invasion of salt cedar and Russian olive (Figure 1B) has severely reduced and separated the remnants of native willows and cottonwoods. From our field observations we expected that several of the existing stands comprised only one sex, and thus only a single individual (Pinto Landis 2006). Our extensive arroyo willow along shaded C (Figure 1C) appeared to contain female plants, while a small gap knotted cottonwood at Deer (Figure 1D) showed both male (Table 1). Removal of the salt cedar and its olive has been completed in some for instance, Polacca Wash (Figure 1E) this area has also been fenced to cattle and is now ready for revegetation.

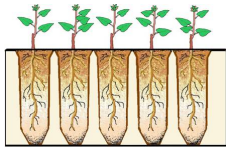
### NATIVE PLANTS

## Case studies

## STACKED PROPAGATION

a new way to grow native plants from root cuttings

David R Dreessen, Thomas D Landis, and Jeremy R Pinto



### ABSTRACT

Stacked propagation is a novel method of growing quaking aspen (*Populus tremuloides* Michx. [Salicaceae]) and other plants that reproduce from underground stems or root cuttings. Because the mother plant is not damaged, it is particularly well suited for rare plants or those that can't be propagated by normal methods. Our initial trials indicate that hundreds of vigorous plants can be produced by this method in each propagation cycle.

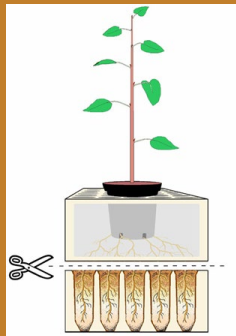
Dreessen DR, Landis TD, Pinto JR. 2004. Stacked propagation: a new way to grow native plants from their root cuttings. *Native Plants Journal* 5(3):286-292.

**KEY WORDS**  
Populus tremuloides, vegetative propagation, restoration

**NOMENCLATURE**  
USDA NRCS (2006)

Quaking aspen with splendid fall color. Photo by Thomas D Landis.

NATIVE PLANTS | FALL 2006



## Establishment and growth of container seedlings for reforestation: A function of stocktype and edaphic conditions

Jeremiah R. Pinto<sup>a,\*</sup>, John D. Marshall<sup>b</sup>, R. Kasten Dumroese<sup>a</sup>, Anthony S. Davis<sup>b</sup>, Douglas R. Cobos<sup>c</sup>

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Volumetric soil moisture content  
Morphology  
Container seedlings  
Seedling establishment and growth

### ABSTRACT

A properly selected stocktype can greatly enhance reforestation success through increased survival and growth following outplanting. Implementing a robust stocktype trial using stocktypes of equal quality can ensure results lead to the best choice. Six container types, differing primarily in depth and volume, were used to evaluate the performance of ponderosa pine (*Pinus ponderosa* Laws. var. *ponderosa*) seedlings out-planted on two sites that varied in volumetric soil moisture content (V), average temperature, and total precipitation (precip and aeric). Seedlings in container types were cultured specifically to achieve uniform seedling quality. After two growing seasons, seedlings planted at the mesic site showed high survival (≥95%) and incremental growth gains of 142, 100, and 745% for height, root-collar diameter (RCD), and stem volume, respectively; container types exhibited differences in total height, RCD, and stem volume with larger containers generally yielding the largest seedlings. Seedlings planted at the xeric site experienced 83% survival, smaller growth gains (25, 46, and 220% for height, RCD, and stem volume, respectively), and also exhibited differences in height, RCD, and stem volume. Regression analysis revealed that for each site, initial seedling morphological characteristics were better at predicting absolute height, RCD and stem volume after the first year than after the second year, with initial seedling height offering the best predictive power ( $R^2 = 0.66$ , mesic site, and  $R^2 = 0.73$ , xeric site). Second-year absolute height prediction was poorest on the mesic site ( $R^2 = 0.21$ ). Regression analysis indicates that initial seedling characteristics best predictive value with time, especially on the mesic site, as seedlings grow out of their initial, container-induced characteristics and become more limited by current environmental and genetic factors. Conversely, on a xeric site, where absolute growth was reduced, traits determined by the container type persisted longer. Selecting stocktypes for mesic site conditions may only be limited by the minimum growth gains desired. Conversely, xeric sites may benefit from deep-planted quality seedlings or carefully planted long-rooted, large container seedlings.

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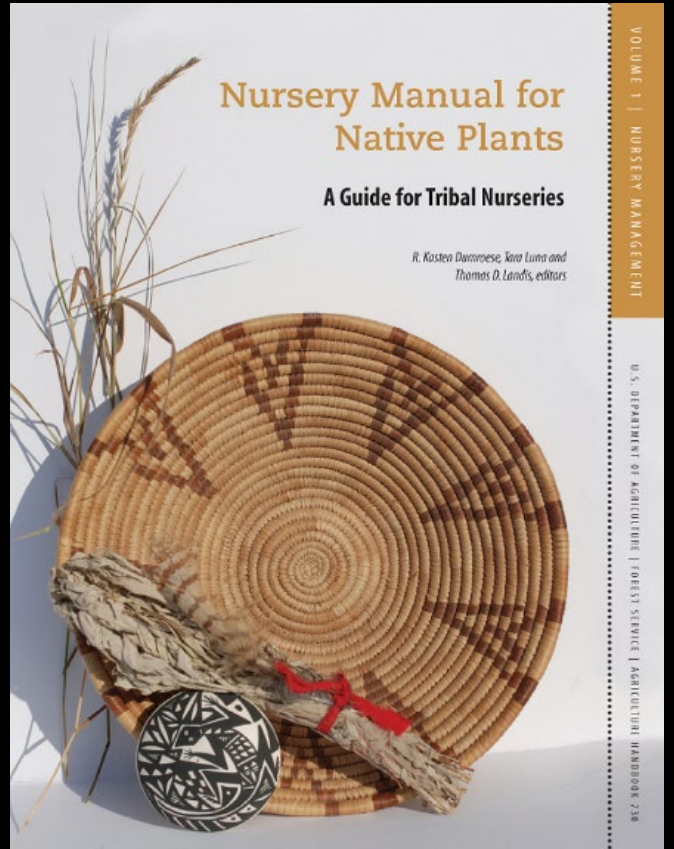
### 1. Introduction

Reforestation using nursery-produced seedlings can be an effective means of ensuring successful establishment and rapid growth following outplanting. Plantation establishment success often hinges on decisions and considerations made prior to planting, such as seedling stocktype, seedling morphology, genetics, site limiting factors, site preparation, the outplanting window, and planting technique (Scapellato et al., 1998). The best seedling stocktype for a particular site may differ depending on how these decisions and considerations are made. To simplify this complex situation, the Target Plant Concept was proposed. This concept provides a

means of overcoming the critical variables of forest establishment by focusing on morphological and physiological seedling characteristics that are linked to outplanting success (Rose et al., 1990; Landis and Dumroese, 2006). The premise behind the Target Plant Concept is that it identifies seedling characteristics that increase outplanting survival and growth under a particular set of site conditions (Rose et al., 1990).

Over the years, the number of available seedling stocktypes has increased dramatically, especially for container seedlings. It is well known that varying container volume, which usually also causes changes in seedling density, modifies seedling phenotype; this occurs even among seedlings of the same seed source grown the same year (Scapellato, 1972; Landis et al., 1990; Scapellato et al., 1998). If a larger phenotype is desired, seedlings are grown in larger containers. Whether these larger containers are deeper or wider, they require more medium, more fertilizer, and more grow-

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## Nursery Manual for Native Plants

A Guide for Tribal Nurseries

R. Kasten Dumroese, Kara Luna and Thomas D. Landis, editors

VOLUME 1 | NURSERY MANAGEMENT

U.S. DEPARTMENT OF AGRICULTURE | FOREST SERVICE | AGRICULTURAL HANDBOOK 738

## Manuals

## Protocols

## Research



# Intertribal Nursery Council

## Forum for:

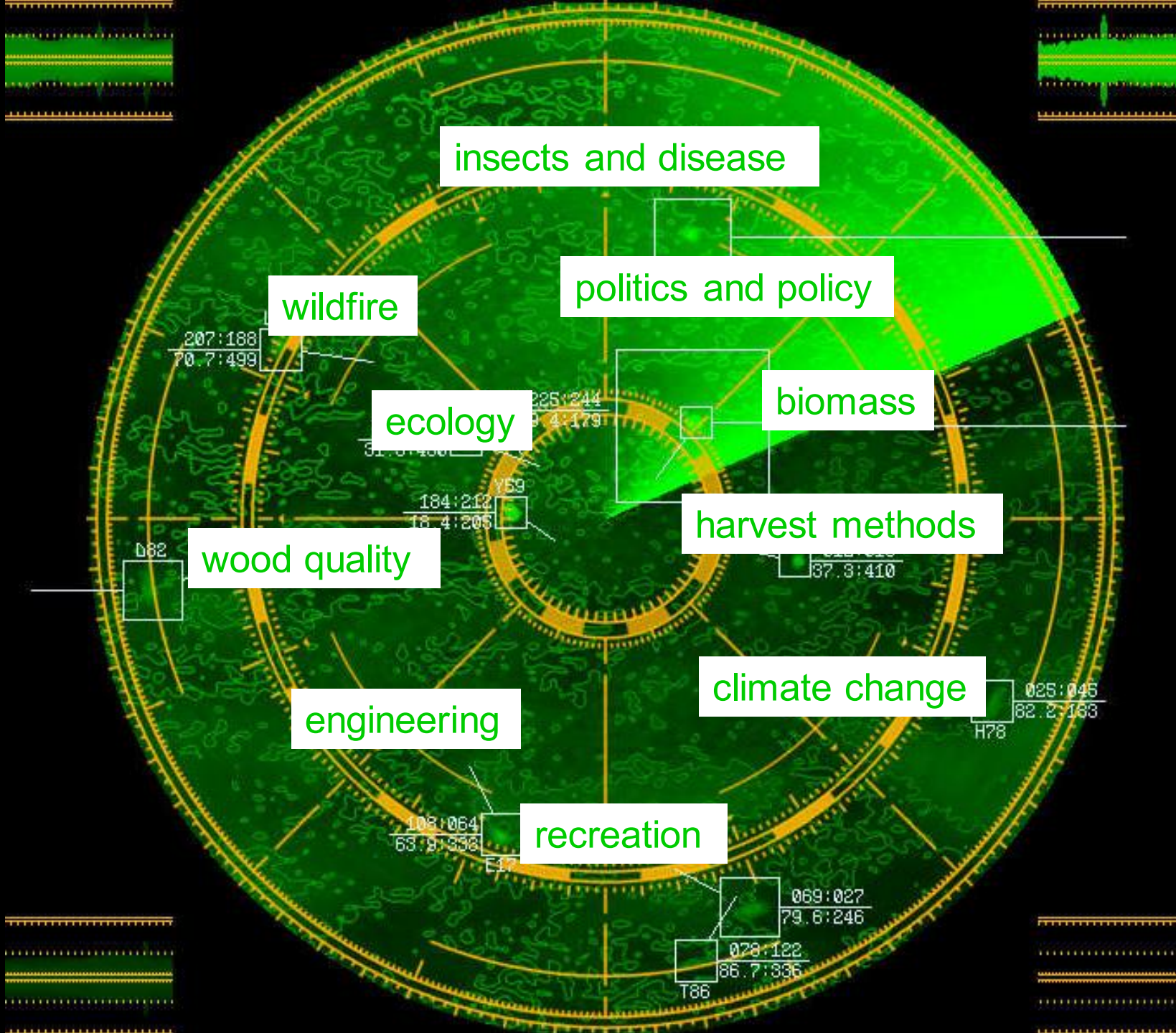
- Technology transfer
- Conservation education
- Reforestation
- Restoration
- Peer-to-peer information sharing

## Impact:

- Providing Tribes with nursery technical knowledge to improve seedling quality and outplanting establishment success



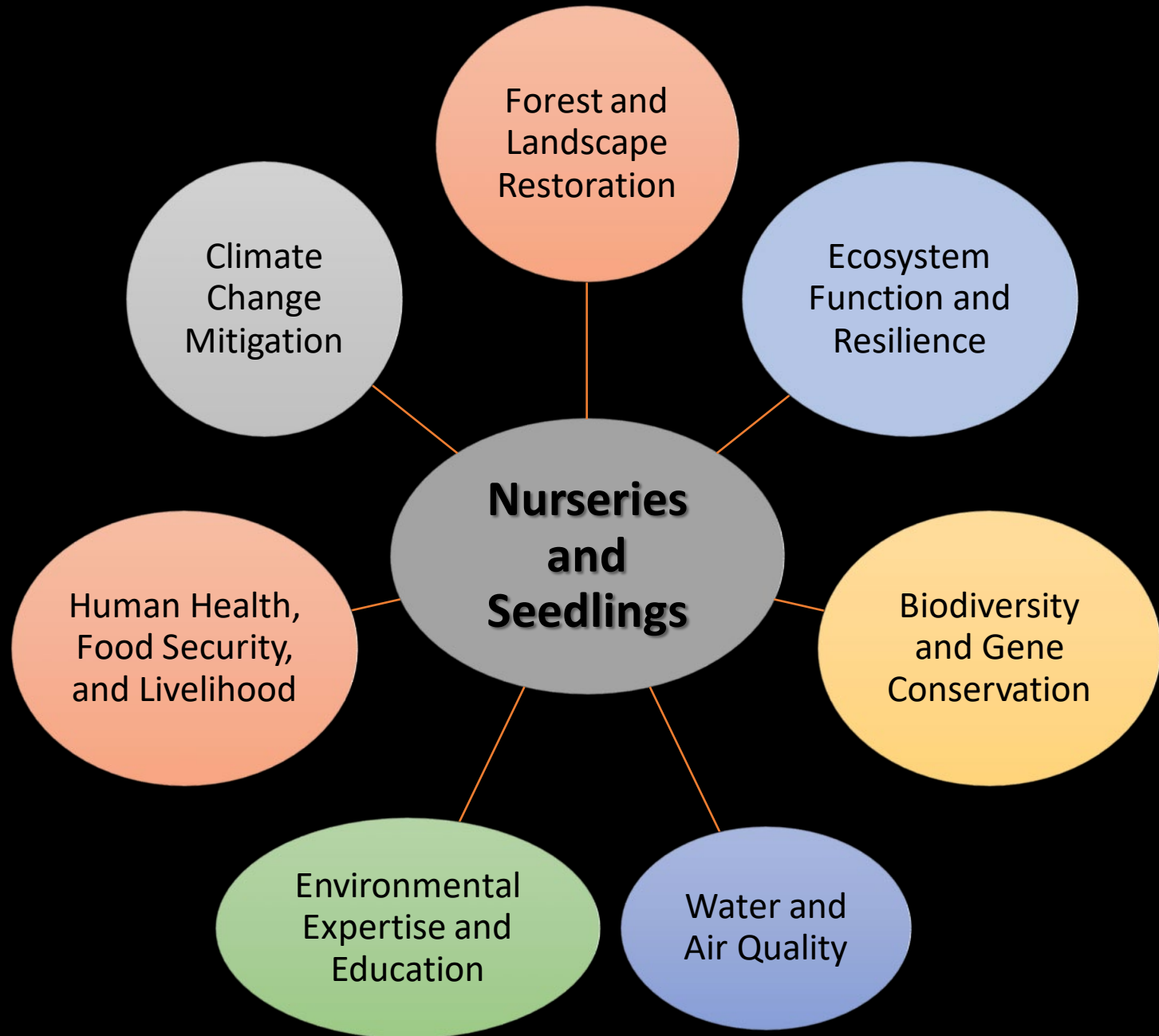




***nurseries & seedlings***

RNGR works to make sure nurseries, seed, and seedlings are not only “on the radar,” but also...


...are recognized  
and functioning as  
a hub for meeting  
ecological,  
economic, and  
social goals.



# Online Resources RNGR.net

- Publications
- Directories
- Calendar
- Links
- RNGR Contact Info
- Discussion Forum
- Native Plant Network

*Averages a visit and a download every 11 minutes!*



REFORESTATION, NURSERIES, & GENETICS RESOURCES

# RNGR



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**RNGR MISSION:**  
To supply people who grow forest and conservation seedlings with the very latest technical information.

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**POPULAR RNGR.net RESOURCES**

- [National Nursery and Seed Directory](#)
- [Intertribal Nursery Council](#)
- [FNN/TPN Subscription Form](#)
- [Native Plant Network](#)
- [Links](#)

### UPCOMING EVENTS

**2019 Joint Intertribal Nursery Council and Tribal Alliance for Pollinators Conference**  
Tulsa, OK  
June 11, 2019 - June 13, 2019  
For more information, [click here](#).





**Cullowhee Native Plant Conference**  
Cullowhee, NC  
July 17 - 20, 2019  
For more information, [click here](#).

**Joint Northeast and Southern Nursery Associations Annual Meeting**  
Atlantic City, NJ  
July 22 - 25, 2019  
For more information, [click here](#).





**5th Biennial Shortleaf Pine Conference**  
Van Buren, MO  
October 1 - 3, 2019  
For more information, [click here](#).

[View More Events...](#)

### PUBLICATIONS

- **Tree Planters' Notes**  
This publication is dedicated to technology transfer and publication of research information relating to nursery production and outplanting of trees, shrubs, and native plants for reforestation, conservation, and restoration.
- **The Container Tree Nursery Manual**  
This seven volume set provides a comprehensive overview of topics concerning the production of tree and woody shrub seedlings in containers.
- **Tropical Nursery Manual**  
*A Guide to Starting and Operating a Nursery for Native and Traditional Plants*  
This comprehensive manual serves people who are starting or operating a nursery for native and traditional species in the tropics. Key concepts, principles, and processes are presented, based on proven practices and the best science available.
- **The Woody Plant Seed Manual**  
General principles such as seed biology, harvesting, storage, testing as well as nursery practices.

*RNGR.net includes a repository of approximately 12,000 searchable and downloadable articles relevant to nursery production, seedling quality, reforestation, tree improvement, germplasm conservation, and native plant restoration. Click [here](#) for more publications.*

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# Thank You! Ahehee'!

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