

Approved by:

/s/ Forrest Boe

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Minnesota Department of Natural Resources, Division of Forestry



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### Nursery Seed Source Control

|                                |   |
|--------------------------------|---|
| Division Policy.....           | 5   |
| Supersedes .....               | Circular Letter 3421-2 dated January 9, 1996  |
| Policy Owner .....             | Deb Pitt, Coordinator, Tree Improvement Program   |
| Related Department Policies .. | Operational Order 124 – Plant Material Standards for Native Plant Community Restoration (May 3, 2013) |
| Effective Date .....           | April 21, 2016  |
| Last Update .....              | April 21, 2016  |
| Review Date .....              | April 2021  |
| Keywords .....                 | climate change; silviculture; state forest management; state forest nursery                           |

### Policy Statement

The goal of the DNR nursery and tree improvement programs is to economically produce forest regeneration material of the highest genetic and biologic quality in the quantity needed for forest regeneration projects. DNR has recognized for many years that seed source control is the cornerstone of a successful reforestation program. The use of properly adapted seed sources is the necessary first step in forest regeneration. Usually, seed sources nearest the intended planting zone are best.

### Purpose and Scope

The purpose of this policy is to establish control of forest tree seed sources utilized by the state forest nurseries, such that identity of seed is maintained from collection through to redeployment as seed or seedlings. This policy is intended to promote the practice of returning seed and seedlings back to their zone of origin, regardless of land ownership. This intent may need to be revisited if strategies evolve that more clearly define the need for changes in seed sourcing to help forests adapt to a changing climate.

## **Procedures**

### **SEED ZONES**

Based on prevailing climatic conditions, the state of Minnesota has been divided into six seed zones. These seed zones follow county boundaries. A map of the seed zones is in Appendix A. A description of how the seed zones were developed is in Appendix B. Because of documented poor performance, North Shore tree seed sources should be avoided for use in forest plantations. The North Shore is an area bounded, roughly, by the shore line and the north shore ridge that runs from Two Harbors to the US – Canada border.

### **SEED SOURCE CONTROL AT THE POINT OF ORIGIN**

Areas will be responsible for locating and recording forest tree stands having potential for good seed production, for species identified by the state forest nursery. Seed collection and production areas should be located on state lands where possible. Formal cooperative agreements can be considered for other ownerships.

Seed collection and production areas should be reserved for seed production. Currently there are 17 seed orchards and 10 recognized seed production areas distributed across the state. It is likely there are additional collection sites known locally. The areas should prepare a management plan for seed production areas in cooperation with the division's Tree Improvement Coordinator to indicate how the stand will be managed and how seeds or cones will be harvested. The Tree Improvement Coordinator is responsible for seed orchard management plans and strategic orchard planning that identifies the need for establishing new orchards to replace orchards that are no longer productive. Each year, the areas will estimate the seed or cone crop in seed collection areas, seed production areas, and seed orchards, reporting these estimates to the state forest nursery no later than July 1.

Seed collection goals will be set by the state forest nursery with input from the local area to reflect current seed and cone crops. The area will be responsible for meeting assigned seed collection goals. Seed and cone collection should be directed toward existing seed collection and production areas. Seed and cones may be obtained by direct purchase from individuals, contracts awarded by competitive bidding, or collections by division of Forestry personnel. Expanded contract purchasing and vendor development can be investigated through nursery and area cooperation. Areas should direct collectors to sites of known good seed production.

The areas should inspect samples of seed and cones for maturity and seed set. Seeds or cones that have insect damage, fungi damage, immature seeds, or cones with seed set below established standards for the species should not be purchased. Seeds and cones should be free of debris. Areas should encourage collectors to bring in samples for inspection prior to collecting large quantities of seed or cones.

The area should measure, sack, and tag all seed and cones purchased in their area. At a minimum, tags should include the species name, measured volume, seed zone and collection county, and date collected (if known). If seed and cones cannot be shipped to the state forest nursery immediately, the area should store seed and cones under conditions appropriate for each species to prevent molding, heating, rodent depredation, and other problems that may affect seed quality. If storage and hauling becomes a problem for the local area, the nursery should be contacted for pickup.

## SEED SOURCE CONTROL AT THE STATE FOREST NURSERIES

Upon receipt at the state forest nursery, an accurate record of seed and cones received will be maintained. Seed and cones should be properly stored until processing. Accurate and precise seed source records will be kept from extraction through storage of cleaned seed. Seed storage containers should contain the seed zone number and any other information that describes the origin of the seed.

When seed is sown in the state forest nursery, accurate and precise records will be kept including seed zone number, where it was sown in the nursery, and the date of sowing. Records should be sufficient so that any seedling can be identified by seed zone at all times.

When seedlings are lifted, sorted, packed, and shipped, they should be returned to their seed zone of origin whenever possible. If seedlings are requested for a seed zone from which no seed was either produced or available, an appropriate seed source may be substituted. Appropriate substitute seed sources should be determined prior to the packing season. Seed or seedlings shipped for state land seeding/planting must include the seed zone number on the shipping container. On state land planting or seeding sites, the seed zone should be recorded in the Silviculture and Roads Module (SRM).

### Roles and Responsibilities

**Nursery Supervisor:** Develops and explains seed procurement, collection, and marking procedures and works with the tree improvement program coordinator to develop seed production sites. Provides seed species and quantity collection needs to areas based on seed and cone crops observations and demand. Ensures compliance with seed source control measures at the nursery. Develops a seed collection plan for each season based on area's expected crop levels.

**Area Supervisor:** Allows area staff adequate time to monitor seed and cone development in the field, run the seed procurement procedures in their area; ensures compliance with seed source control measures at the area.

**Tree Improvement Coordinator:** Works closely with the silviculture program coordinator to estimate seed and seedling needs; works closely with the nursery program supervisor to manage seed collection, seed production areas, and seed orchards and to coordinate seed collection

**Silviculture Program Coordinator:** Estimates annual seed and seedling needs and communicates this to the Nursery Supervisor and Tree Improvement Coordinator.

**Area Staff:** Develop seed collection areas, seed production areas, and seed orchards maintenance plan; monitor seed development and report findings to the nursery program supervisor; coordinate seed purchasing, direct seed collectors to quality seed production areas, encouraging them to provide samples for inspection prior to collecting large quantities, and properly inspect, bag, tag, store, and transport seed.

**Nursery Staff:** Tracks seed source during extraction, storage, planting, and redeployment.

## Contacts

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## Definitions

**Forest Regeneration** – Planting of seedlings, aerial seeding or ground direct seeding of a forest site for the purposes of reestablishing a forest cover.

**Planting Zone** – The seed zone (see Appendix A) where seed or seedlings are to be used for forest regeneration.

**Seed** – Seed from cones, nuts, or other forms of fruiting bodies from trees or shrubs used for forest regeneration.

**Seed Collection Area** - A forest stand designated for collection of seed. Area staff identifies seed collection areas based on tree performance, seed production and site accessibility.

**Seed Orchard** – A stand of trees from a known parent specifically planted for seed production. The orchard site is tended for access and ease of seed collection.

**Seed Production Area** – A seed collection area that has been tended to improve seed production and ease of seed collection.

**Seed Source** – The geographical location from which seed is collected.

**Seed Zone** – Geographical areas of similar climatic conditions (temperature and precipitation) from which seed is collected. Seed zone boundaries fall along county lines (except in across St. Louis & Lake counties). The goal is to regenerate forests with seed collected from the same seed zone, and to document the seed zone of origin on all forest regeneration sites. Seed from other seed zones may be used for forest regeneration in response to the effects of climate change.

**Silviculture & Roads Module (SRM)** – The division of Forestry’s silviculture and roads program planning and project tracking system established in 2004.

## Forms and Instructions

- Appendix A – MNDNR Seed Source Control Seed Zone Map
- Appendix B – Seed zone delineation explanation
- Appendix C – Seed bag tag form and instructions. Tags are available from the State Forest Nursery at Badoura.

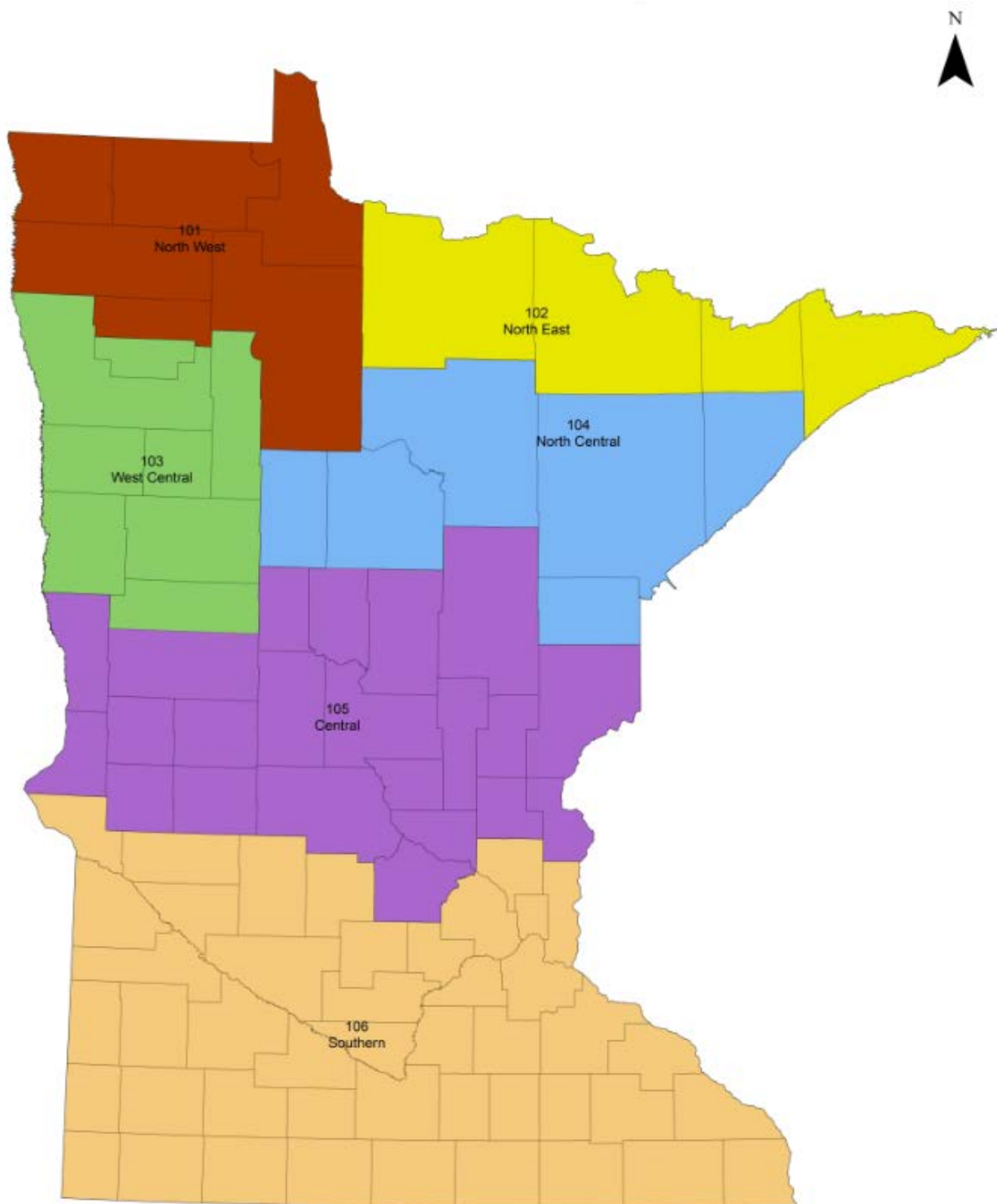
## History

### Maintenance:

### Amended:

- 06/27/1983: Original circular letter defining seed source control based on USDA Hardiness Zones.
- 01/09/1996: Revised circular letter defining seed zones and responsibilities.
- 04/21/2016: Updated division policy based on 1996 circular letter. Better defines roles and responsibilities.

## Appendix A – MNDNR Seed Source Control Seed Zone Map



This map is available in Quick Layers under:

Administrative Features>DNR Administrative Areas and Districts>MNDNR Seed Source Control Seed Zones

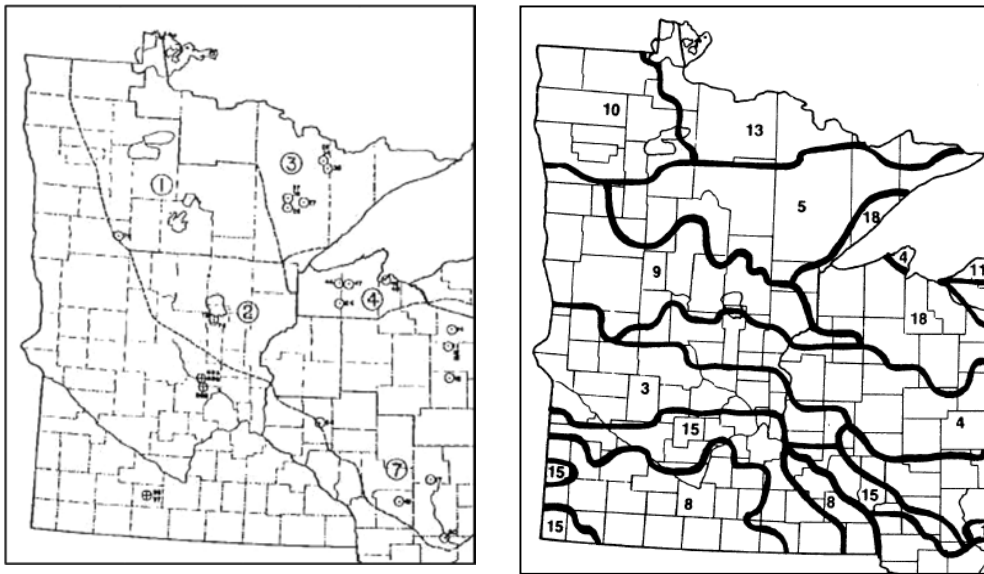
## Appendix B – Seed Zone Delineation Explanation

### Minnesota DNR Division of Forestry Seed Source Control

#### Seed source control

- Is the operational process of returning reproductive materials - seeds, seedlings, cuttings, or transplants - to an environment that closely resembles the ones from which they originated.
- Prevents losses by avoiding the use of non-adapted materials in artificial regeneration.
- Is necessary in both afforestation and reforestation.
- Establishes collection and deployment zones based on climate homogeneity.

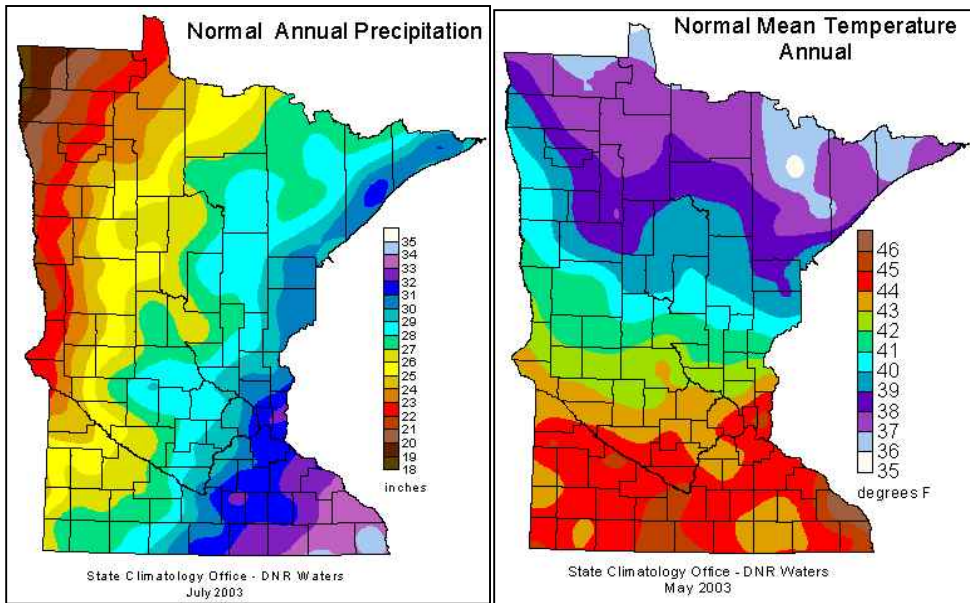
#### Establishment of Seed Zones



Some of the earliest seed source control work in Minnesota was documented by P. Rudolph at the University of Minnesota in the 1950s. Dr. Rudolph developed zones throughout the Lake States based on the combination of annual degree days and mean January temperatures (map above, left). It was Dr. Rudolph's intention that this map become the foundation for further work and expected agencies to develop local zones.

In 1984, USDA Forest Service published definitions and maps of homoclimes in the Lake States (Rauscher). The homoclimes were defined based on temperature and precipitation (map above, right).

In Minnesota, elevational differences are minimal. In contrast, east-west precipitation and north-south temperature gradients are quite marked (maps below).



Based on the climatic data summarized above, six seed zones were determined appropriate and adequate for Minnesota. These zones are shown in Appendix A. An area of special concern is the north shore area of Lake Superior. Several studies have shown this region to consistently produce trees with slower growth. Unless there is some compelling local need, seed should not be collected from this area.

#### Operational Seed Source Control

Division of Forestry adopted a seed source control policy in 1959. This policy was updated in 1983, creating 16 seed zones following administrative area boundaries. Although using area boundaries simplifies the logistics of seed source control, there is little, if any biological justification for 16 seed zones. Accordingly, the most recent version of the policy was filed in 1996 and recognizes the six seed zones defined in the map (Appendix A). Included in this revision are steps designed to better track seed from its origin (seed zone), to the nursery, and back again as seedlings to be planted.

In addition to the provisions in the circular letter, the Division – including the State Forest Nursery Program – follows guidelines developed by the Minnesota Crop Improvement Association (MCIA). In 1955, the Minnesota Seed Law was amended to officially recognize MCIA as the official seed certifying agency of Minnesota. In 1996, MCIA adopted certification standards for forest reproductive materials.

The MCIA guidelines outline procedures designed to insure that the proper identity of forest reproductive materials is maintained through all phases of collection; from seed collection, seed conditioning, and deployment of reproductive materials (seedlings). Certification does not guarantee physiologic quality or expected performance. Certification is designed with inspections and checks to minimize carelessness and deception.



## Appendix C – Seed Bag Tag

| MINNESOTA STATE FOREST TREE NURSERY PROGRAM |       |
|---|-------|
| SPP:  |       |
| ZONE/SOURCE:                                |       |
| COUNTY/TWP:                                 |       |
| AREA:                                       | DATE: |

Seed is to be bagged by species and a seed bag tag attached to each bag. The tag is to be completed with species, seed zone (from the seed zone map – Appendix A), source (collection area, orchard name), county name, township, forestry administrative area name, and date seed is collected.