Reforestation Challenges
Helping the seed fall farther from the tree?

Climate Change - what can be done?
What can WE do?

Increase Forests by
Planting Strategically

Following Basic Restoration Principles
It’s more important than ever to
1. maintain genetic diversity

Genetic Diversity
= a huge buffer against
all damaging pressures
including climate change

Trees may die - but the species lives on
Species may die - but the forest lives on
To provide us with
services essential to our welfare
2. Define sites now... and how climate change will affect them
   - greater moisture deficits
   - more seasonal flooding

   Then match the species and seed source to the site

And ...

We have to recognize that we are living in an experiment

So it’s also more important than ever to document, record, observe, monitor and report on our activities

Especially since these experiments will outlive those who start them

Outline:

The Purpose of Seed Zones
   = SEED SOURCE matters

Current recognition of Seed Source

Seed Zone Approach and Climate Change

Confounding issues

The Purpose of Seed Zones

A tool to address genetic diversity among populations of a species
   = SEED SOURCE MATTERS

In Ontario (1996) they are based on climate
   - developed to help people determine safe zones for seed movement for most tree species

Seed Zones

They work well... when someone coordinates long term seed and stock needs to ensure there is enough within a zone to meet demand ...

and if your climate doesn't happen to be changing!

BUT, it’s a challenge NOW to ensure sufficient seed of

- native species
- identified by seed zone
- every year
**SeedWhere - Beyond Seed Zones**
A climate based GIS Tool - for known locations

- e.g. planting site - red/orange areas are +/- 5 days GSL = a crude custom seed zone

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**Seed Source Documentation is KEY!**

1. Collect many seed, from many trees in 1 area, in a good year = high quality
2. Bulking not needed so Source is well-defined

**Allows**

1. Best matching to potential sites, possibly beyond a seed zone border
   - important in poor seed years
   - important under climate change!!
2. Tracking of Seedlot Performance

**BUT ...**

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**Current Recognition of Seed Source Is lacking**

We have concerns without climate change!

- Unsophisticated Demand - seed source???
- Little planning & funding means even people in-the-know can’t properly address it
- Hard to match the stock grown on spec 3 yrs before to sites lined up just this year
- Little seed has specific source information

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**The Forest Gene Conservation Association**
**OMNR Tree Seed Plant**
**and Trees Ontario**

are working to

‘make it easy for people to do the right thing’

from collectors to growers to landowners

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**But what’s the ‘right thing’ under Climate Change**

**Many more ?? than answers**

Need local/regional climate predictions
Need species-specific information on
1. climatic variable correlation
   - Temperature?
   - Precipitation?
   - Growing Season?
2. And better site variable correlation
   - pH, soil moisture, depth, texture

Current Zones may not be the answer...

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**But Seed Source is more important than ever**

And allows use of Climate modeling tools
- e.g. SeedWhere
- More helpful than zones

Yet current Best bets are rough at best

- Don’t move northern sources south!
- Move seed from S to N end of a zone
- Consider moving North into next zone
But ‘Move North’ is a very crude strategy

Move what species of what seed source North by how much to what site types and other vegetation communities

We will have to recognize the need for species, not just seed source shifts due to different site aspects: soils, elevation, pests

Climate & Seed Zones - now
Ask for southern sources within a Zone

And hope that Seed Quality is high = buffering capacity, i.e. not clones

Species Shifts & the population diversity reality check

P1 to P6 are different red oak populations adapted, respectively to climates a to f. With climate change, climate a moves to where d is, but within the overall range of red oak so everything’s fine? No - it’s actually P4 red oak and it’s not adapted to ‘a’ climate.

Confounding Issue
General Erosion of Southern Ontario’s forest even without climate change

Forest Loss
Reduced Species Diversity
Loss of Genetic Quality within a species = loss of options for future

“The first rule of intelligent tinkering is to keep all the pieces.”
But pieces have been lost and this reduces our buffer against the pressures of climate change.

For Carolinian Canada’s Big Picture

Review Core areas by what species...
- are showing stress
- are reproducing
- need intervention
- can migrate more readily and are critical sources for northern areas
- Possibly rethink core area priorities

No matter when or why you attempt restoration
Collect seed of high genetic quality
= adapted, diverse
= a better buffer for future pressures
- from many, healthy, OLDER parent trees
- in good seed years = more & better seed
- MATURE - stores, germinates & grows better
- & Handle carefully - IT’S ALIVE
  And Document it
- date, amount and specific LOCATION
So you can make strategic decisions

If and when you decide to push the envelope
Make sure it has a return address!

Red Oak
Large, 100 year old stand
Deep sands of Norfolk County
Seed Zone 37

Deep loamy sands
Oak Ridges Moraine, York Region
Seed Zone 34

Thank you

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