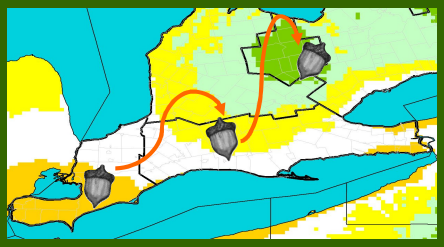
Reforestation Challenges
Helping the seed fall farther from the tree?

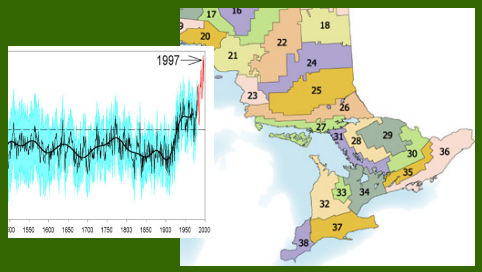


Barb Boysen

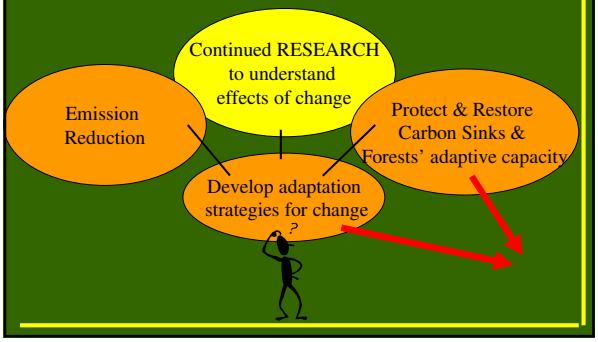
Forest Gene Conservation Association

Ontario Ministry of Natural Resources

or … Climate Change and Seed Zones



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



Increase Forests by Planting Strategically

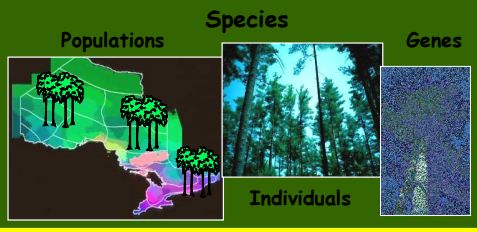
with

Strategically Selected Species and Seed Sources

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

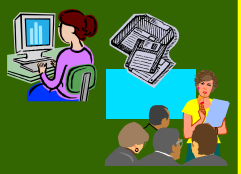
To provide us with services essential to our welfare

….more important than ever to

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

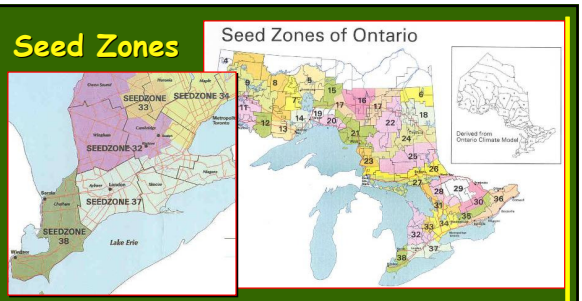
The Purpose of Seed Zones

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!

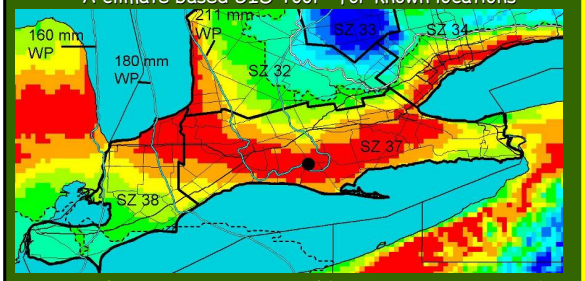
BUT, it's a challenge NOW

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

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 …

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

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

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…

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

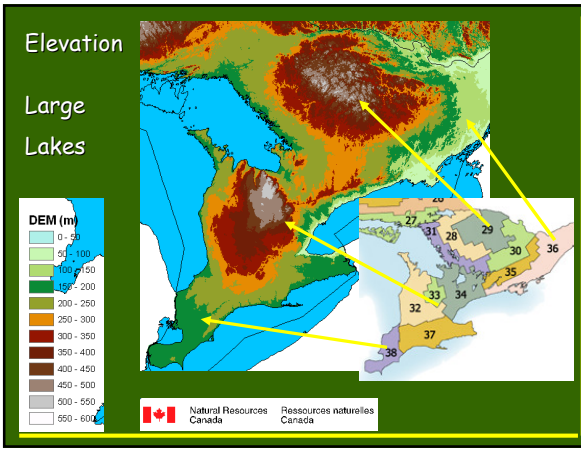
Move
what species of what seed source
North by how much
to what site types and
other vegetation communities

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

Elevation

Large

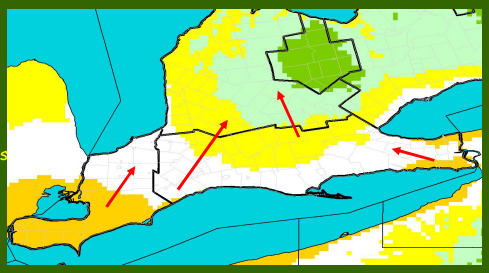
Lakes



Climate & Seed Zones - now

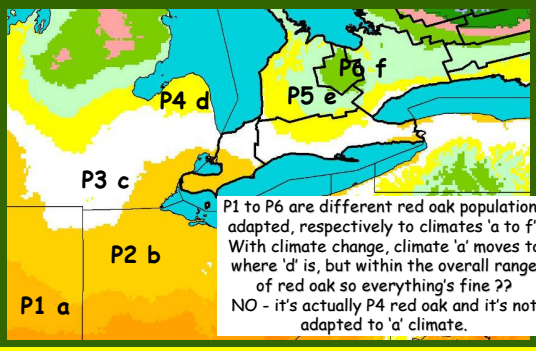
Ask for southern sources within a Zone

GSL
8 day
classes



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

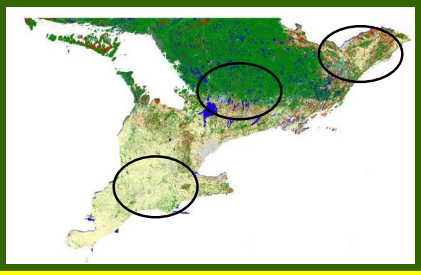
Forest Loss

Reduced Species Diversity

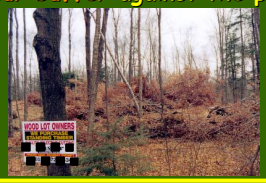
Loss of Genetic Quality within a species

= 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

For Carolinian Canada's Big Picture

Proposed restoration areas

- Will they be forest sites in the future or savannahs or grasslands

- Are other areas better ecologically, if harder to restore socially/economically

- Are there viable sources in the USA to bring here?

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

And Many Thanks to
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Dan McKenney, NRCAN
OFRI, OMNR