



# Defining Native Species

by  
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## Defining Native Species



Invasive alien species are defined as  
"Those harmful alien species whose introduction  
or spread threatens the environment, the  
economy, or society, including human health"

*Fallopia japonica*  
Japanese Knotweed

# Defining Native Species

## Human evaluations of plants and other organisms



# Defining Native Species

	Native	Alien
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## Defining Native Species



Some species such as Poison Ivy and Riverbank Grape are regarded by some as invasive but they are native

Defining Native Species

	Native		Alien	
Characteristic	Non-invasive	Invasive	Non-invasive	Invasive

Defining Native Species

	Native		Alien	
Characteristic	Non-invasive	Invasive	Non-invasive	Invasive
Classification	Non-invasive	Non-invasive	Non-invasive	Invasive



## Defining Native Species



“**Alien**” species are plants, animals (including fish), and micro-organisms introduced by human action outside of their **natural** past or present **distribution**

- Canada's national invasive species strategy, "**An Alien Invasive Species Strategy for Canada**"

*Phragmites australis*  
Common Reed



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Key Question is

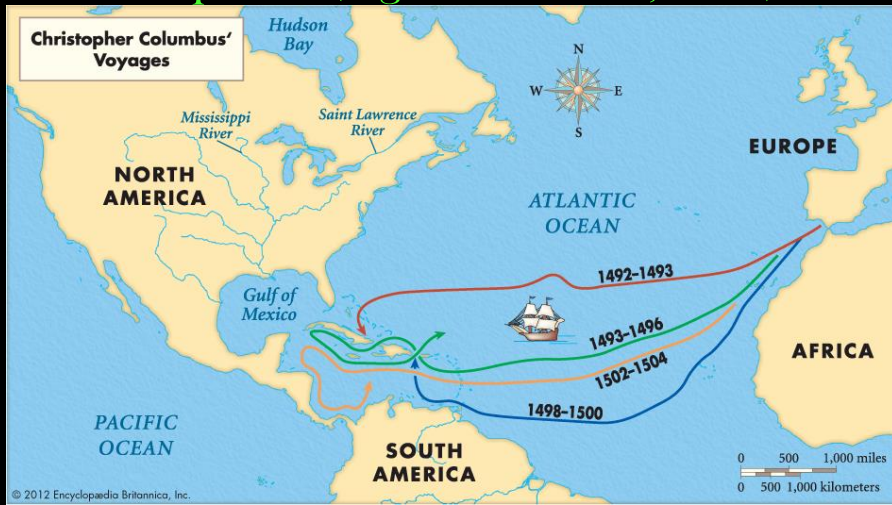
“When did a species arrive?”

*Phragmites australis*  
Common Reed

# Defining Native Species



Stock answer is that species present at the time of the arrival of Europeans (e.g. Columbus, 1492) are native



Map of Americas, 1529 by Diego Ribero



## Defining Native Species

Extent of most recent ice age – the  
Wisconsin Ice Age  
Covered all of Ontario until about  
18,000 years ago

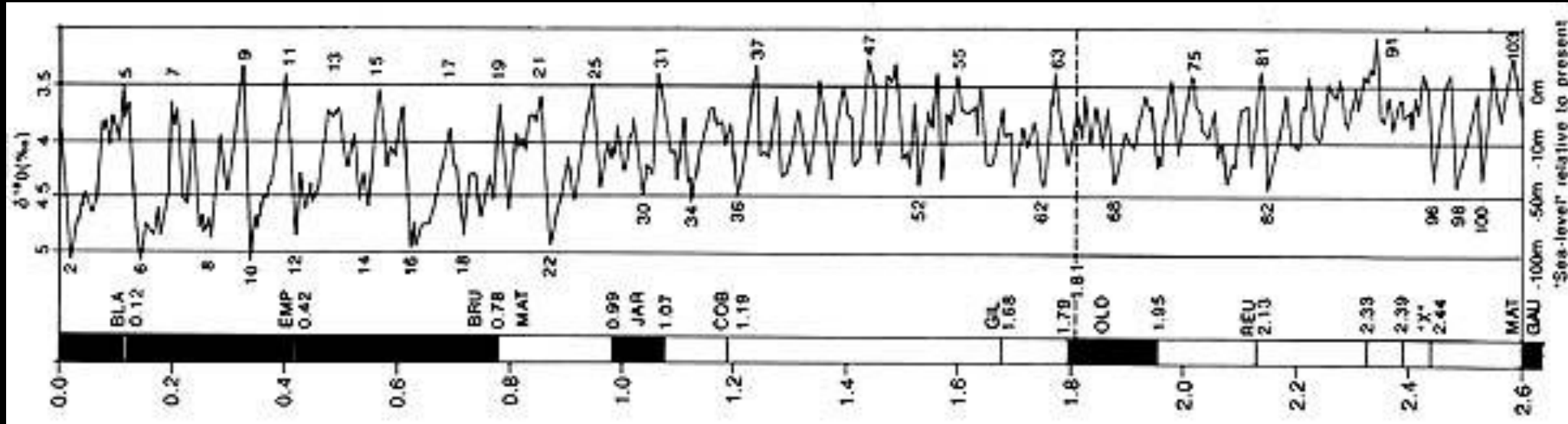
Therefore

“All plants and animals in  
Ontario are introduced!”





## Defining Native Species



Oxygen isotope record for last 2.6 million years

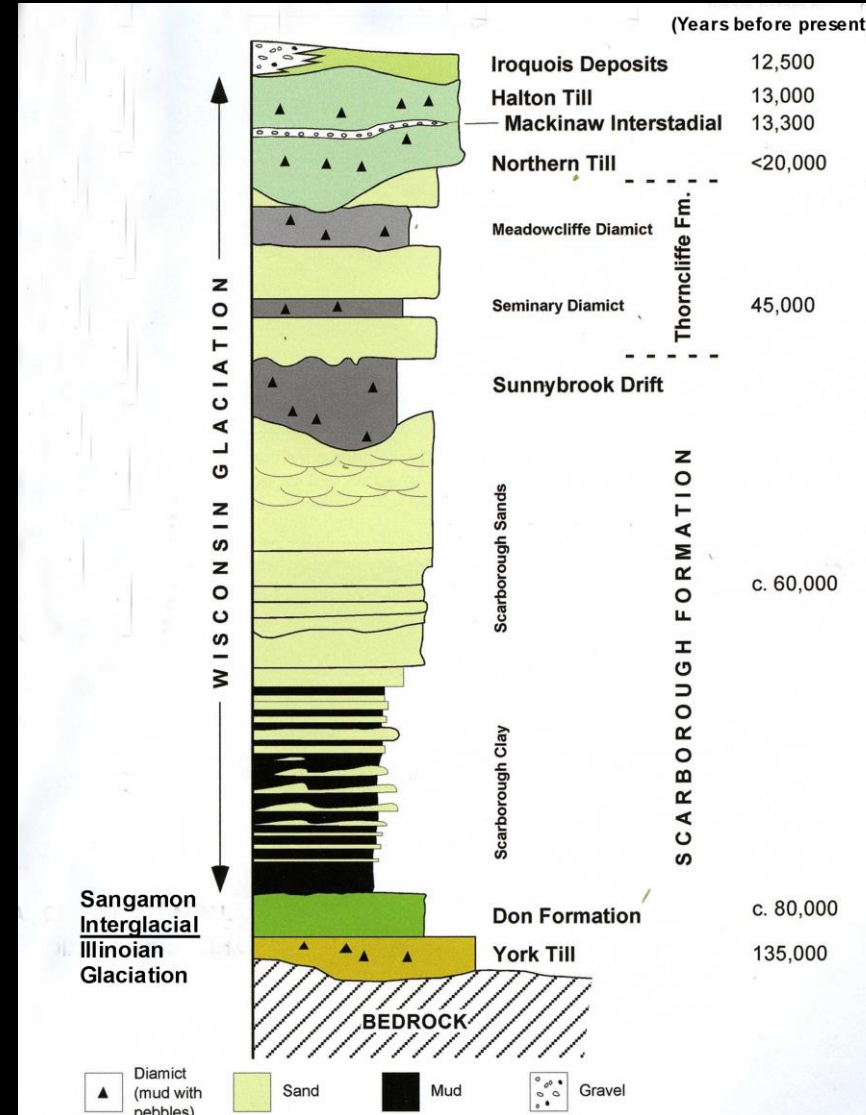
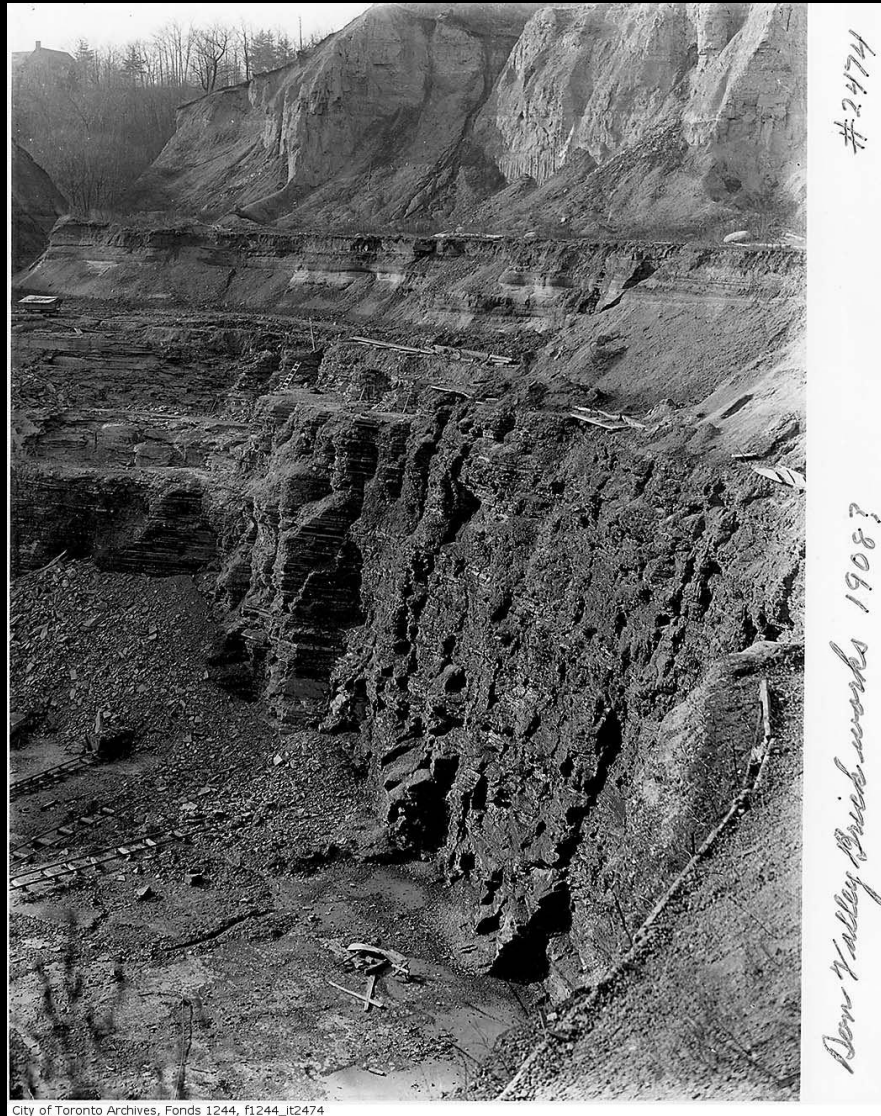
At least 4 major ice ages, some stretching back 2.4-2.1 billion year (predates plants)

Within the most recent ice age (Quaternary period), there have been between 30 and 50 cycles where the earth would have been exposed to ice age conditions

## Defining Native Species

Ice Age	Interglacial Period	Age (YBP)
Wisconsin		110,000-10,000
	Sangamoan	
Illinoian		300,000-130,000
	Yarmouth	These older times and glaciations are under revision based on recent research
Kansan		
	Aftonian	
Nebraskan		

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Sangamon Interglacial Deposits are exposed at the Don Valley Brick Yard, Toronto



# Defining Native Species

## Some unusual species found in Don Valley deposits

Blue Ash (*Fraxinus quadrangulata*)

Pawpaw (*Asimina triloba*)

Atlantic White Cedar (*Chamaecyparis thyoides*)

Summersweet (*Clethra alnifolia*)

Black Locust (*Robinia pseudo-acacia*)

Eastern Redbud (*Cercis canadensis*)

Sweetgum sp. (*Liquidambar*)

Osage-orange (*Maclura pomifera*)

Mexican Blue Oak (*Quercus oblongifolia*)

Bog Blueberry (*Vaccinium uliginosum*)



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Osage Orange (*Maclura pomifera*)



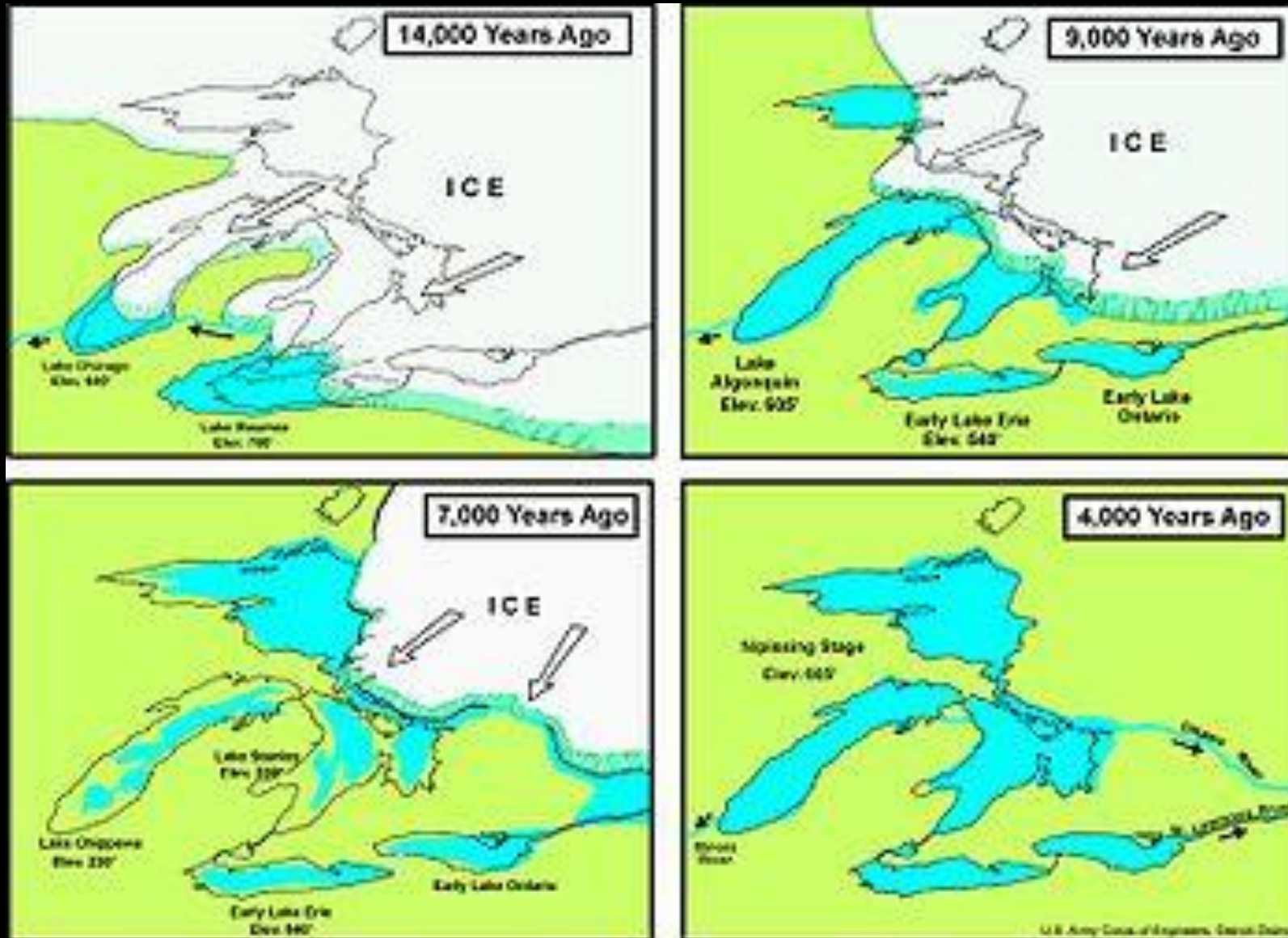
# Defining Native Species



Black Locust (*Robinia pseudo-acacia*)



## Defining Native Species



Retreat of ice following Wisconsin glaciation

The figure consists of four maps illustrating the Laurentide Ice Sheet and Glacial Lake Agassiz.

- Top-left map:** Shows the Laurentide Ice Sheet (blue) covering much of northern North America. Glacial Lake Agassiz is highlighted in yellow. Other features include Hudson's Bay, Lake Nipigon, North Bay, and the Ottawa River.
- Top-right map:** A map of North America showing the retreat of the Laurentide Ice Sheet. Red arrows indicate the direction of ice retreat from the northwest (NW) towards the southeast (SE). Key features include the Athabasca R., Clearwater R., Hudson Bay (HB), and the Keweenaw Peninsula (KIN). The Mississippi R. and Minnesota R. are also shown.
- Bottom-left map:** A detailed topographic map of the Lake Agassiz basin. It shows the extensive lake system (yellow) and its drainage network (blue lines). The map includes labels for various provinces and states, including Saskatchewan, Manitoba, Ontario, and Minnesota. The map is titled "MAP SHOWING THE AREAS OF LAKE AGASSIZ AND OF THE OTHER LAURONTIAN LAKES".
- Bottom-right map:** A map of the Lake Agassiz basin showing the modern political boundaries of the provinces and states. The lake area is colored yellow. The surrounding regions are labeled: MANITOBA, SASKATCHEWAN, ONTARIO, MT, ND, and MN. The map also shows Hudson Bay, Lake Superior, and Lake Huron.

## Varying locations of Lake Agassiz as glacier retreated



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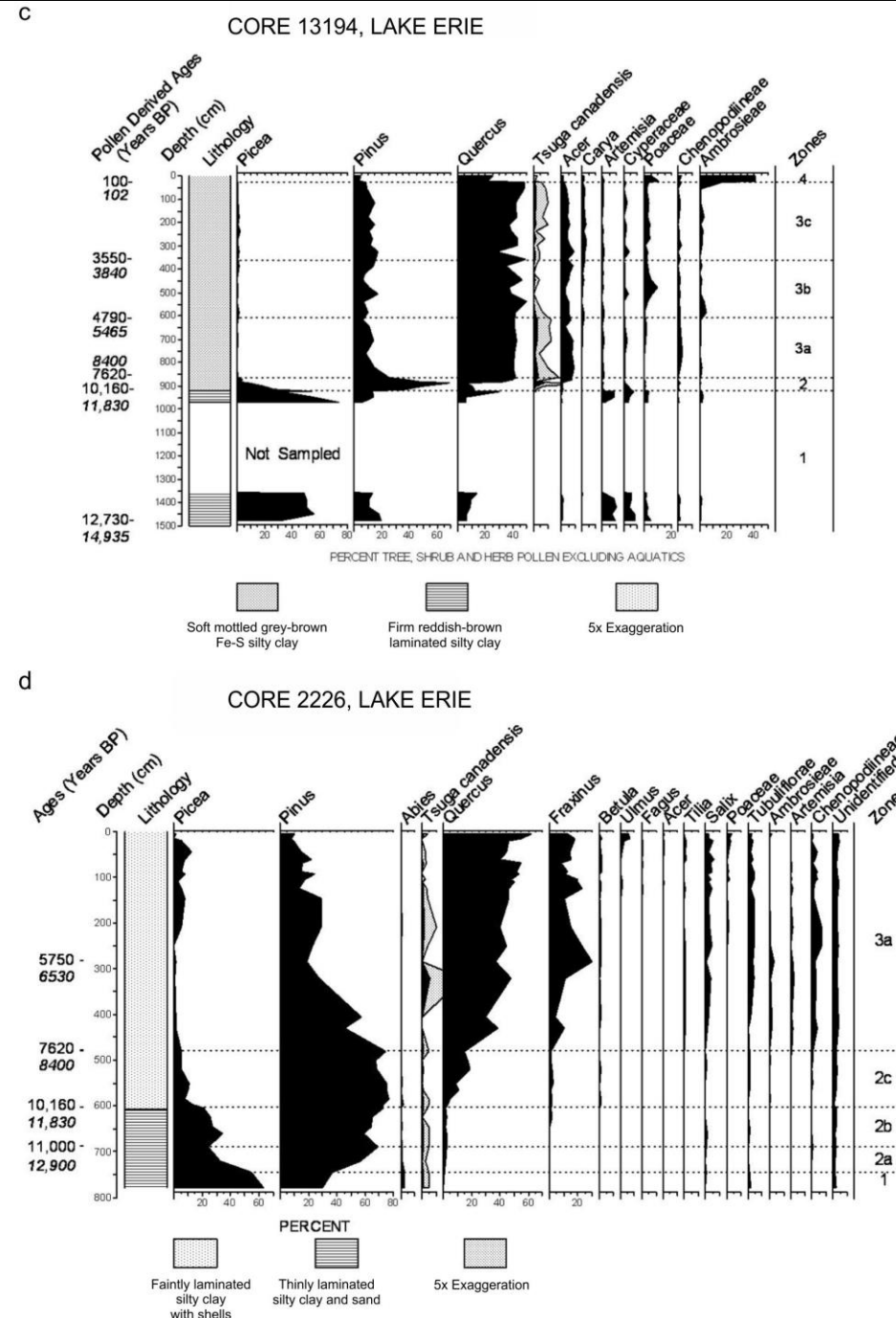
Post-glacial forest  
succession in Ontario



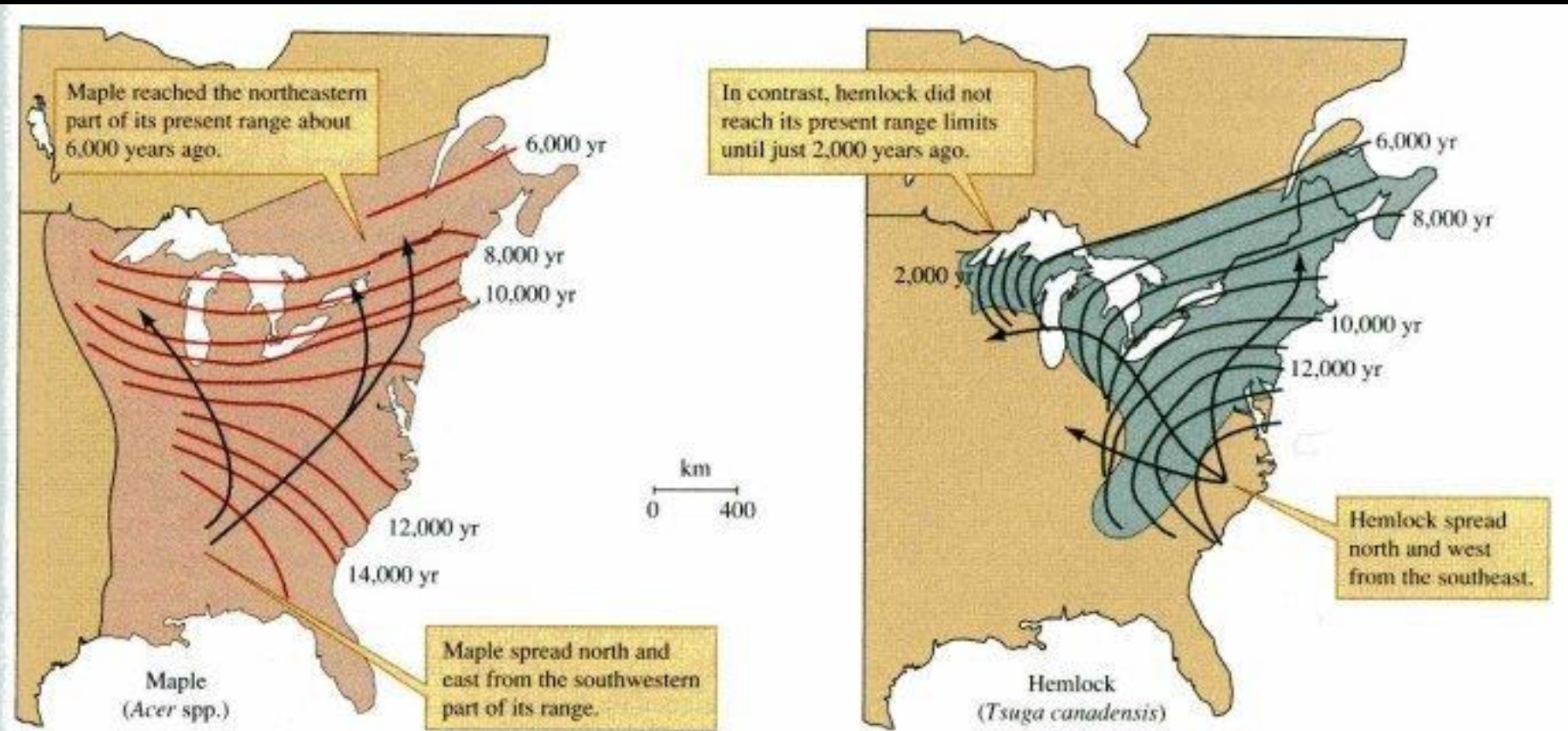


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Successional vegetation cover in Ontario is reflected in pollen sequences in lake and bog sediments



## Defining Native Species



**Figure 10.17** The northward expansion of two tree species in North America following glacial retreat (data from Davis 1981).

Examples of northward spread of plant species into Ontario from refugia in the United States



# Defining Native Species



## First inhabitants of Ontario

- Paleo-Indian 10,000 BC to 7,500 BC
- Archaic 8000 – 800 B.C.
- Woodland 900 B.C. – 1610 A.D.



## Defining Native Species

Corn introduced to cultivation in Ontario about 540AD with Princess Point Cultural Complex

Cultivated crops also include squash, beans, tobacco, and purslane



The Three Sisters

## Defining Native Species



5<sup>th</sup> C – St. Brendan???



## Defining Native Species

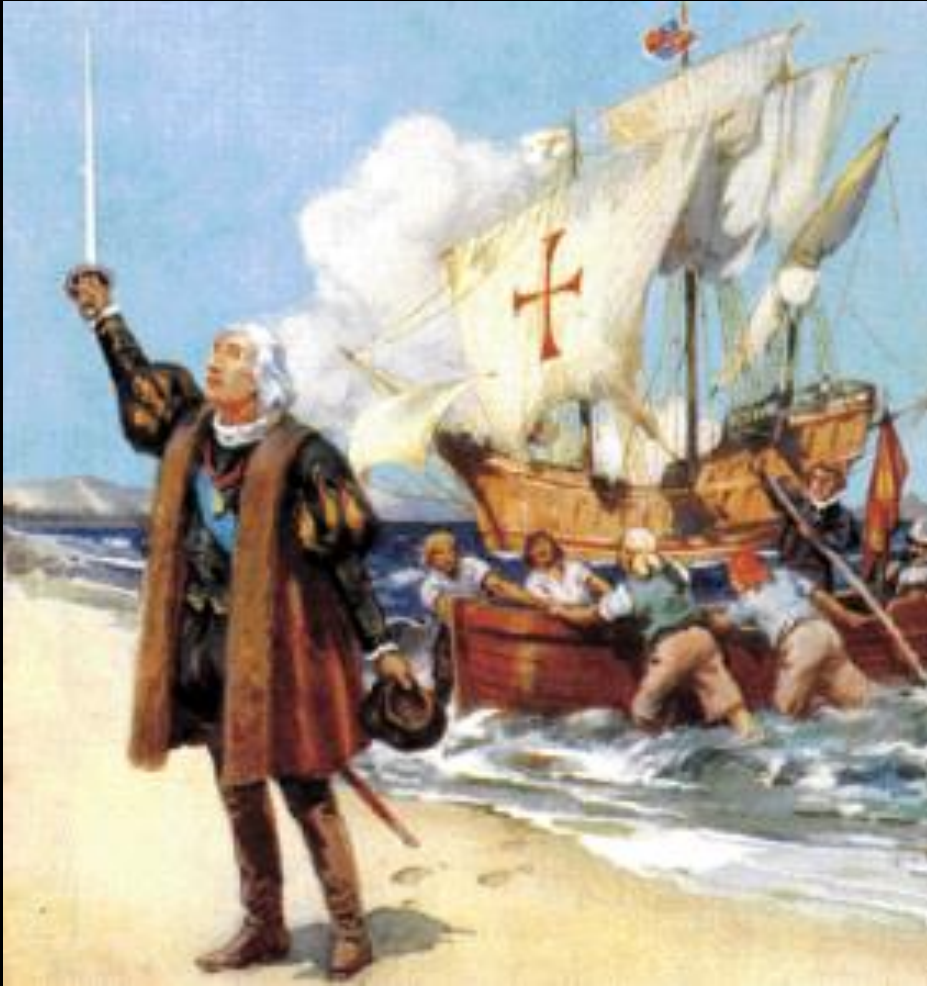
### Vikings in North America

Vikings in North America	
870 AD	Iceland
930 AD	Greenland
986 AD	Labrador
1005 AD	Newfoundland



L'anse aux Meadows

## Defining Native Species



Pre-Columbus – Visits by Portuguese explorers

1492 Christopher Columbus

1497 John Cabot Continental North America

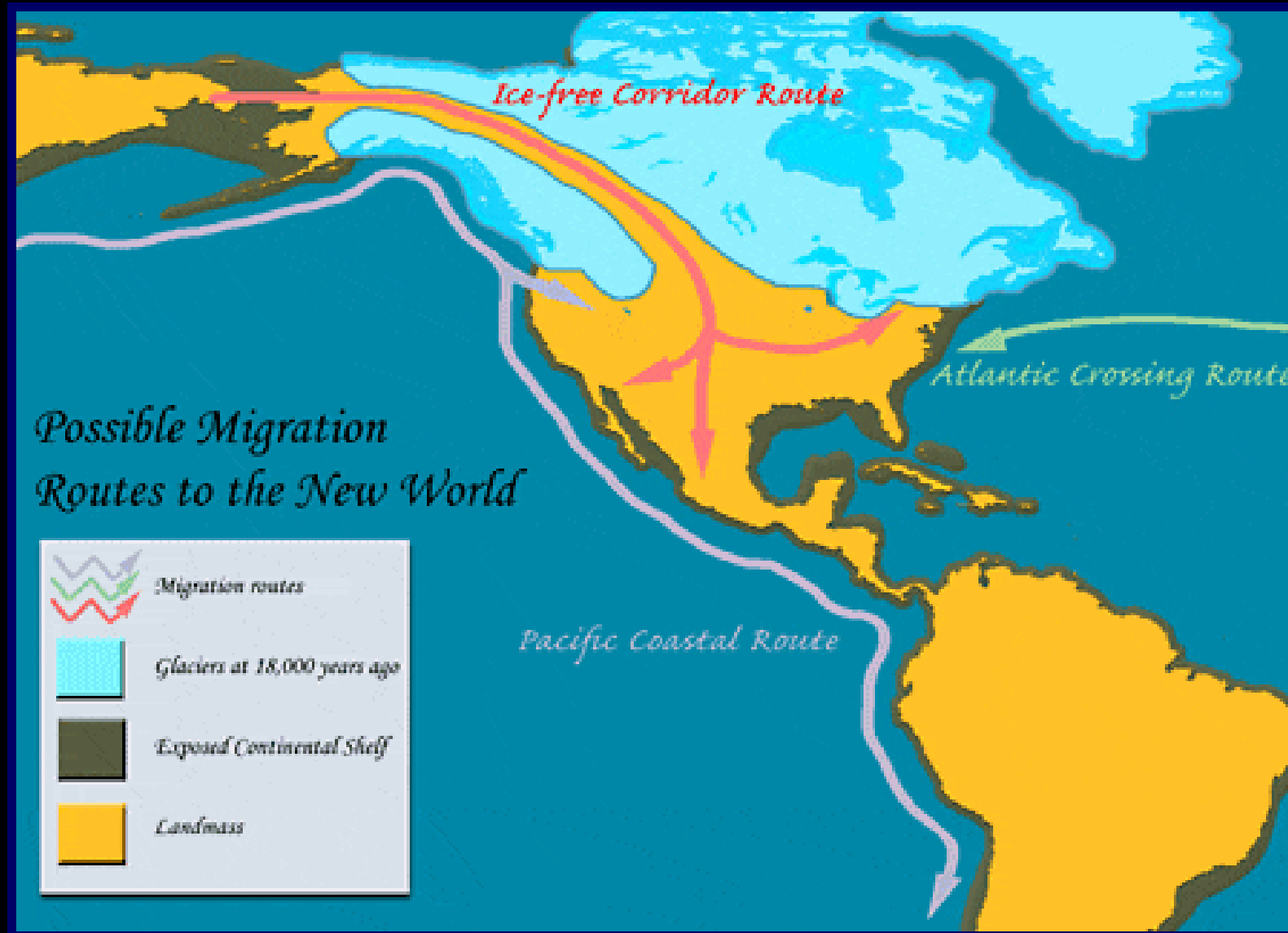
1500 Gaspar Corte Real (Portugal) Labrador

1534 Jacques Cartier

1615 Etienne Brule first European to see Lake Ontario



## Defining Native Species



Routes for human colonization of the Americas

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Routes for human colonization of the Americas

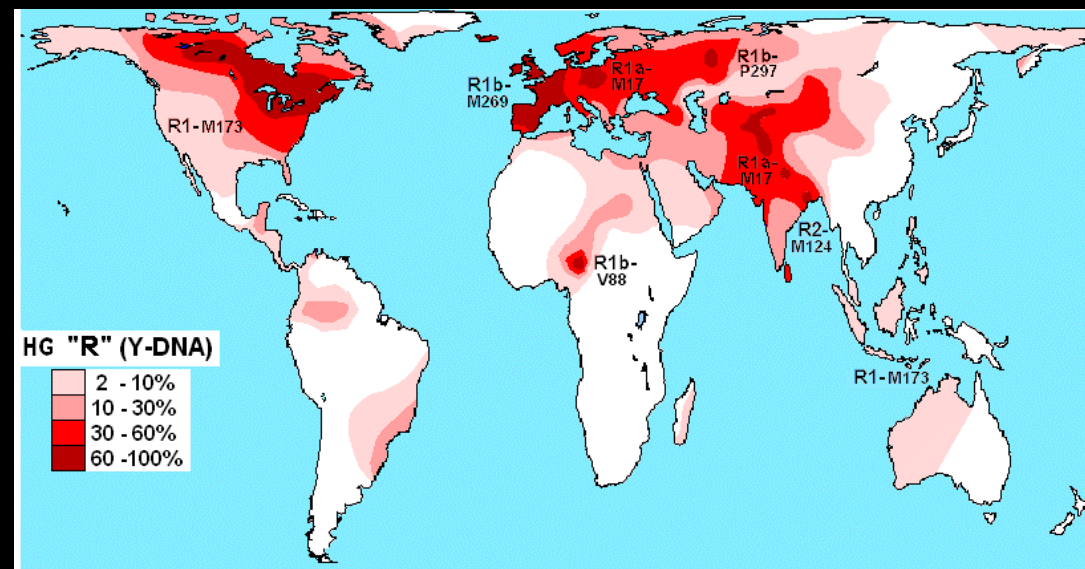
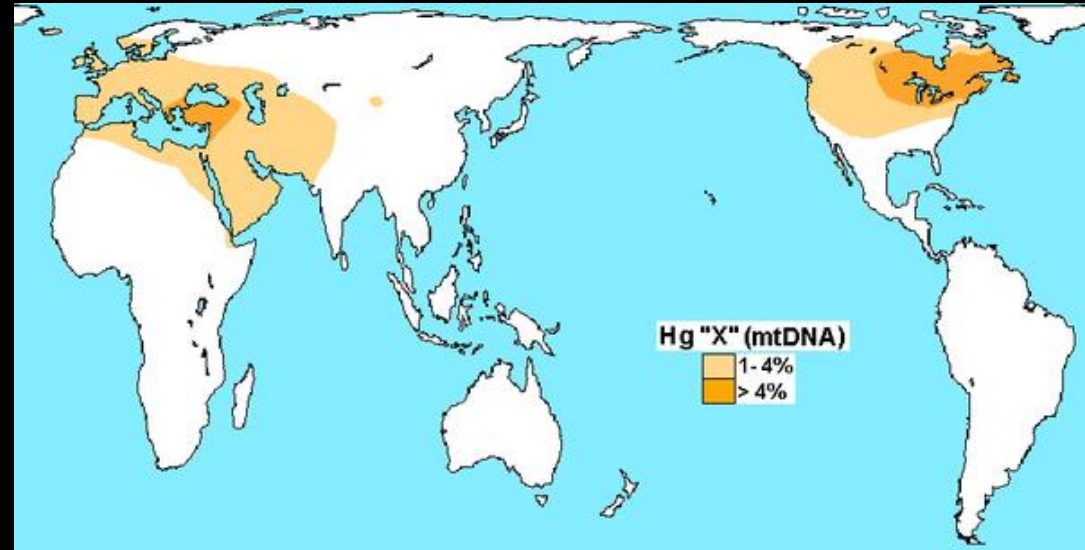


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Solutreans in North America

## Defining Native Species



Distribution of Solutrean genes in western Europe and North America



# Defining Native Species

## Geographic Extent of Ontario

Area = 1.076 million km<sup>2</sup>

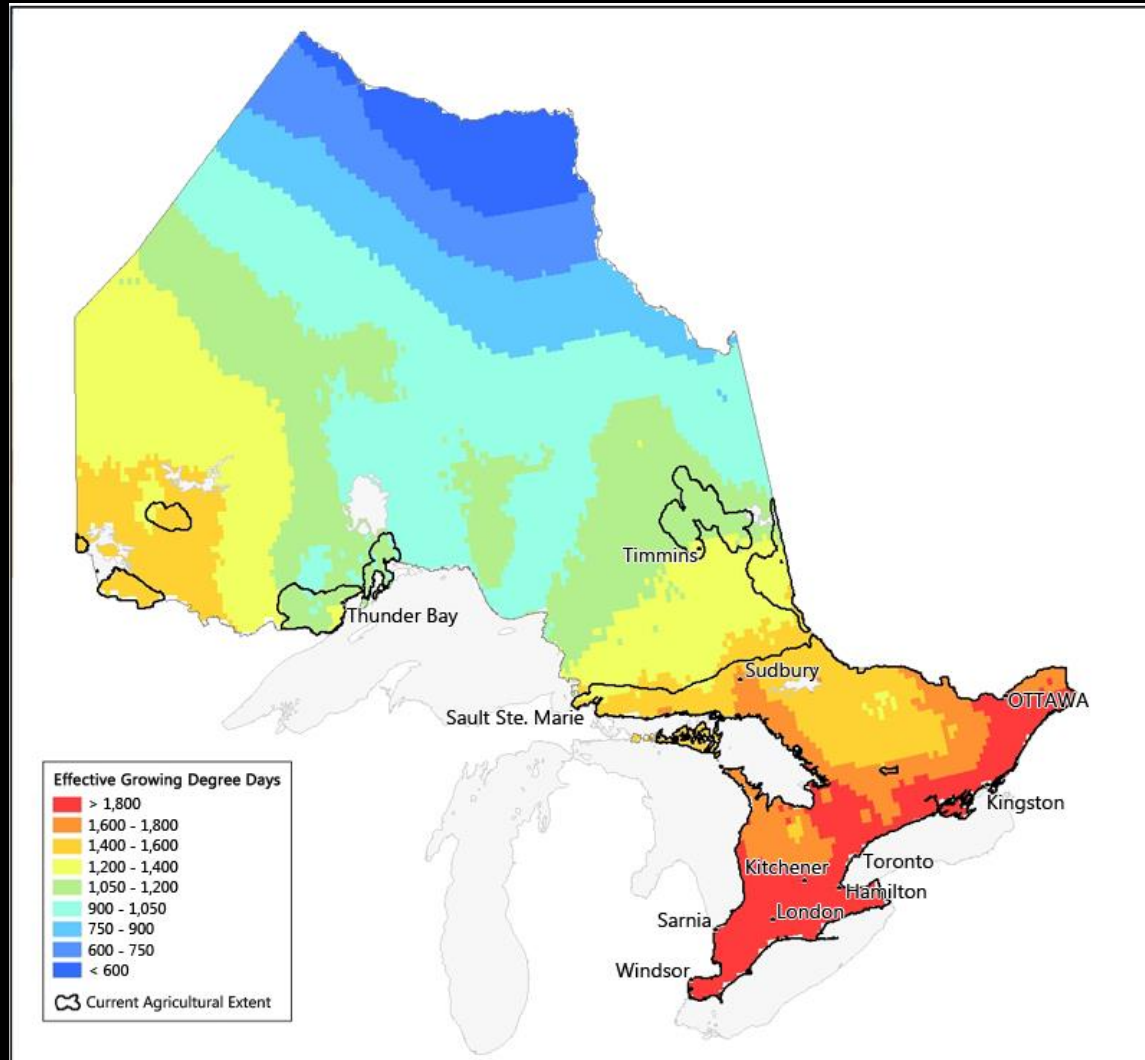
### Distance

North-South = 1691 km

East to West = 1568 km



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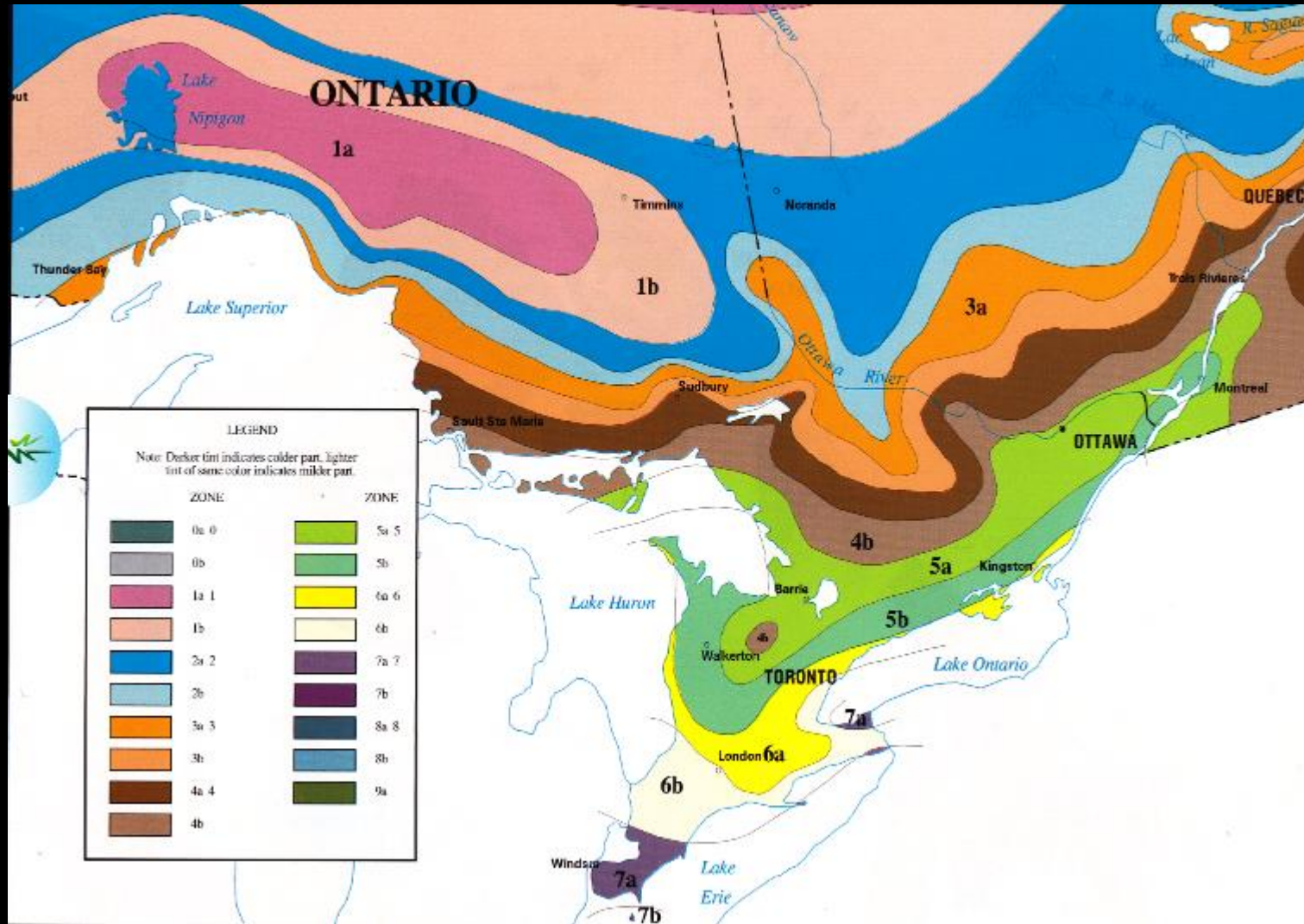
Degree Days in Ontario



Major vegetation zones in Ontario

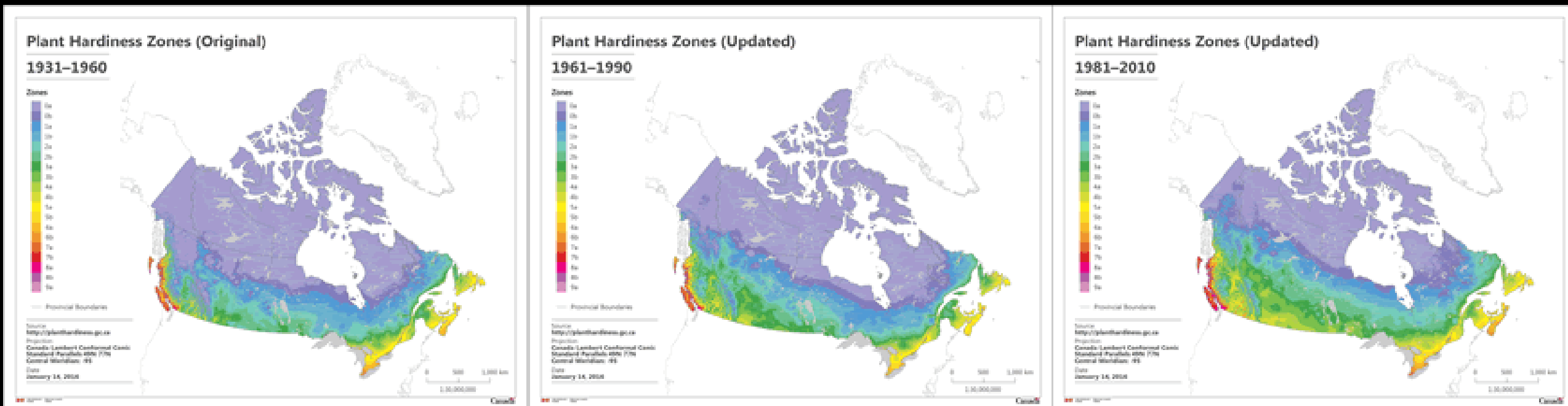


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Plant Hardiness Zones for Ontario

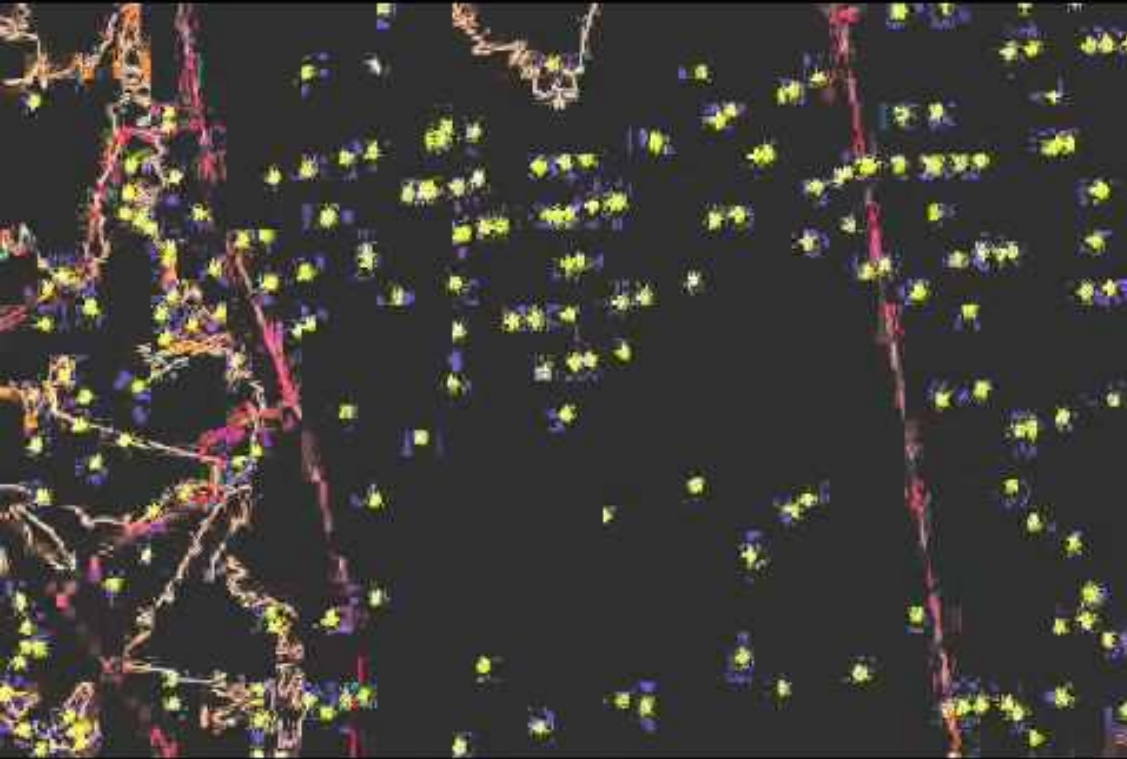
# Defining Native Species



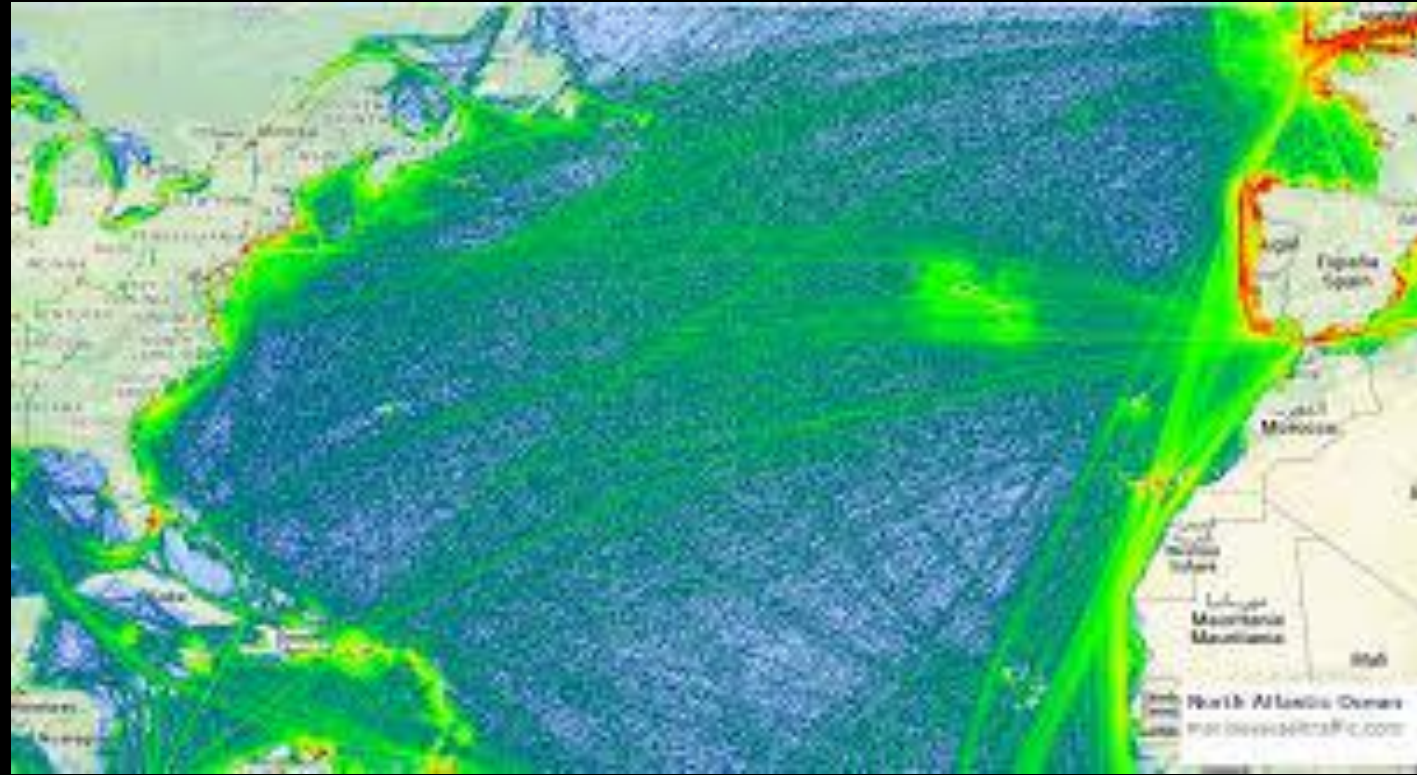
Real shifts in plant hardiness zones 1931 to 2010 based on existing weather records  
(Note different locations of dark purple (Hudson Bay) and dark green Lake Superior)



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Air traffic across North Atlantic Ocean  
(each light = one aircraft)



Ship traffic in North Atlantic Ocean