

Grass + Beef = Sustainability



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Full disclosure statement:

I have worked in pasture and grazing management as an academic and now as a custom grazier for 40 years

Take-home messages

- The fate of a toothbrush predicts the fate of agriculture
- Agricultural unsustainability is staring us in the face
- Don't blame the farmers
- The fix is known, the will is weak
- Your guiding influence as a consumer is to reward those who farm sustainably

The toothbrush analogy

- Q. Why does it take 500 years for a toothbrush to decompose in a landfill?
- A. Because toothbrushes were not *designed* to break down any faster. Toothbrushes were engineered to meet **design-drivers**, but *time to decompose* was *not one of them*.



Agriculture is not sustainable

- Q. Why is agriculture floundering in unsustainable inputs causing socially unacceptable outcomes..... ?
- A. Because **sustainability was never a design-driver for agriculture**

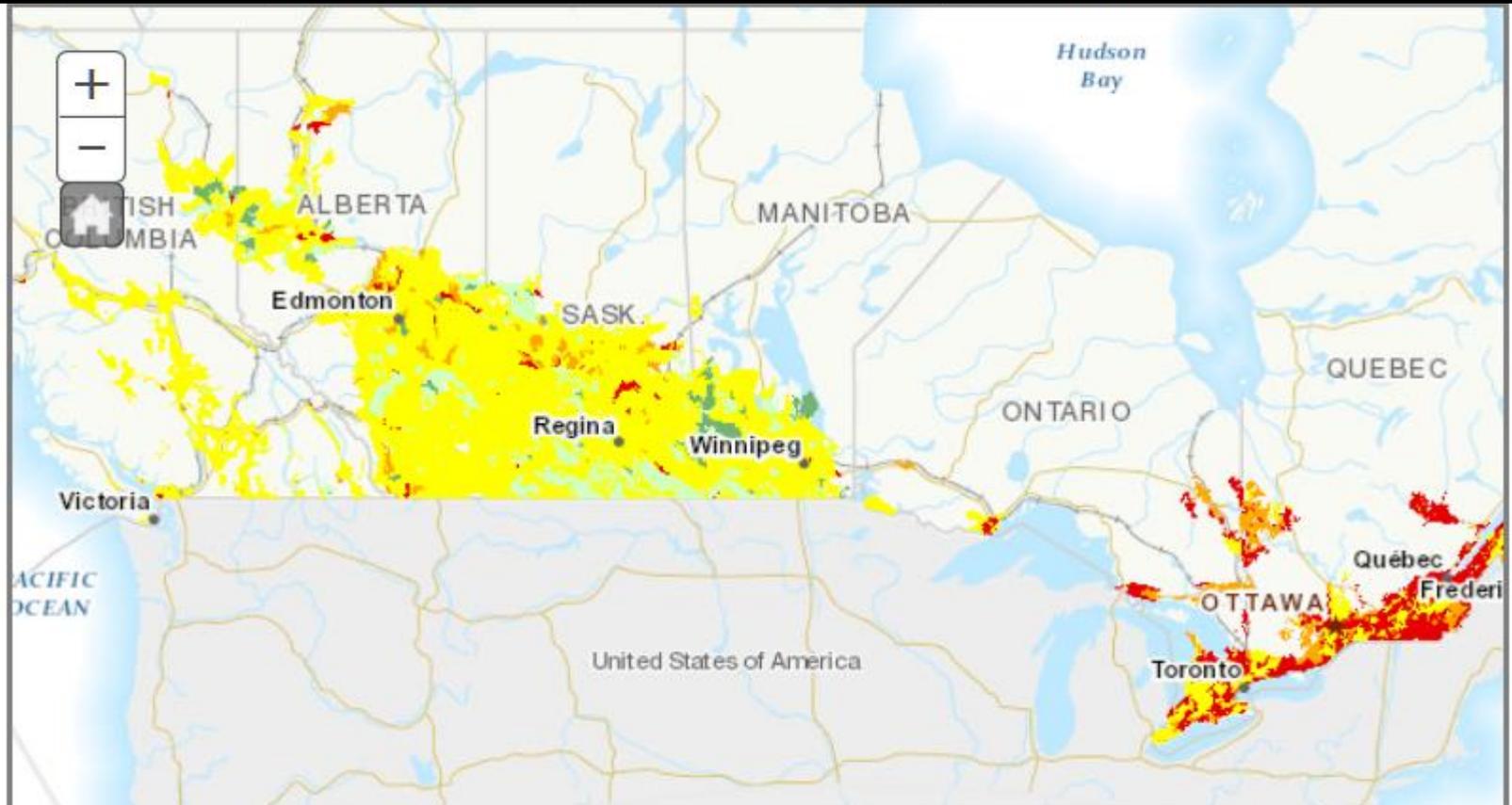
*Agriculture was designed to export cheap, bulk commodities, not for sustainability



Unsustainability is staring us in the face

- Inconvenient evidence of unsustainability:
 - * Eastern Canadian agriculture is burning through soil organic matter (SOM) and pumping GHG to the atmosphere
- Agriculture that destroys SOM and fuels global warming cannot be considered sustainable

Changes to Soil Organic Carbon over 30 years, 1981-2011 - Canada



Gaining More

Gaining

Stable

Losing

Losing More



(> 1 200 kg ha)

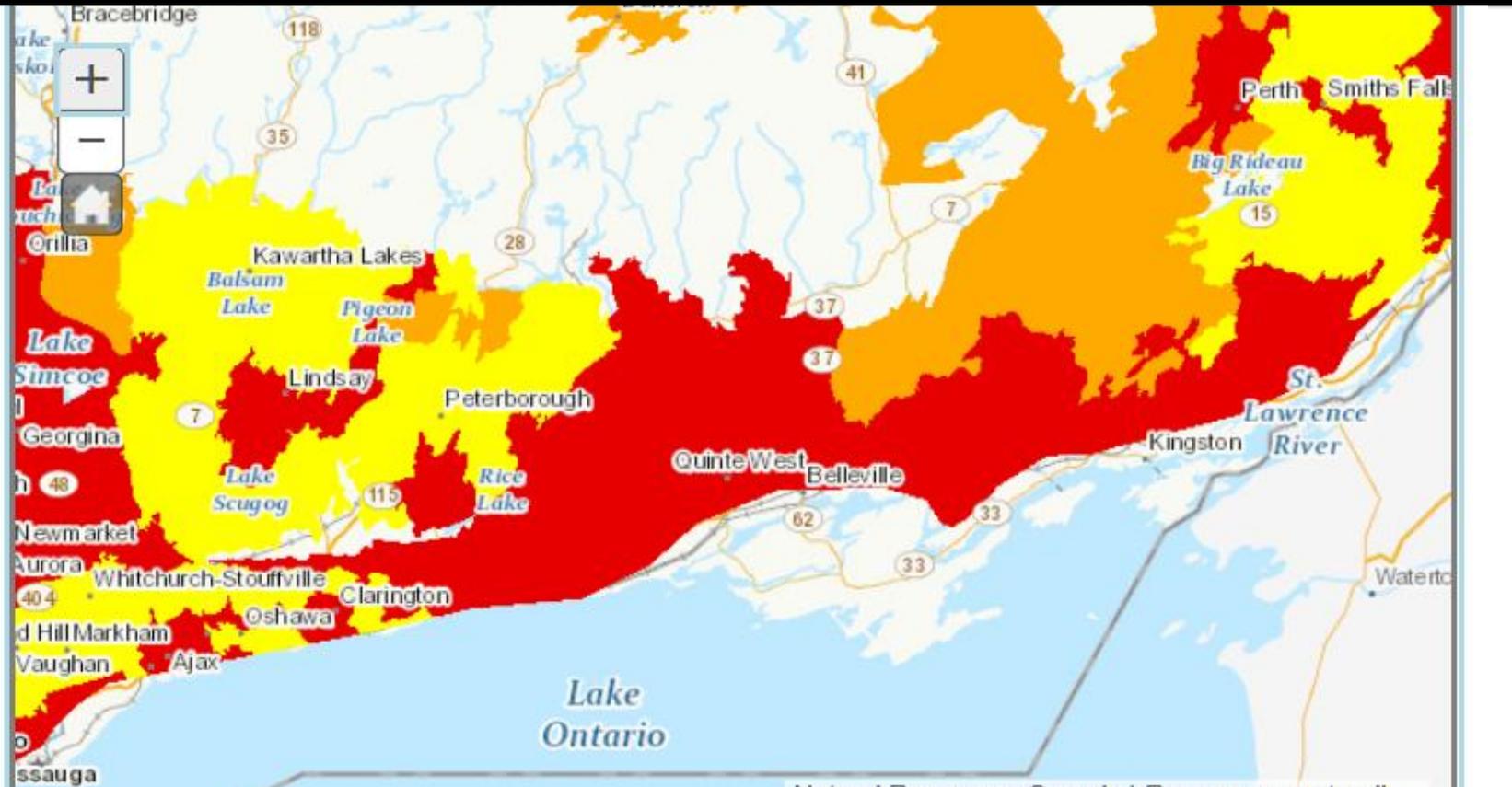
(600 à 1 200 kg ha)

(-600 à 600 kg ha)

(-1 200 à -600 kg ha)

(<-1 200 kg ha) Éléments non évalués

Changes to Soil Organic Carbon over 30 years, 1981-2011 - Central Ontario



Gaining More

Gaining

Stable

Losing

Losing More



(> 1 200 kg ha)

(600 à 1 200 kg ha)

(-600 à 600 kg ha)

(-1 200 à -600 kg ha)

(<-1 200 kg ha)

Élément non évalué

Net GHG emissions (kg CO₂-equiv. per ha) – 2011 - Canada



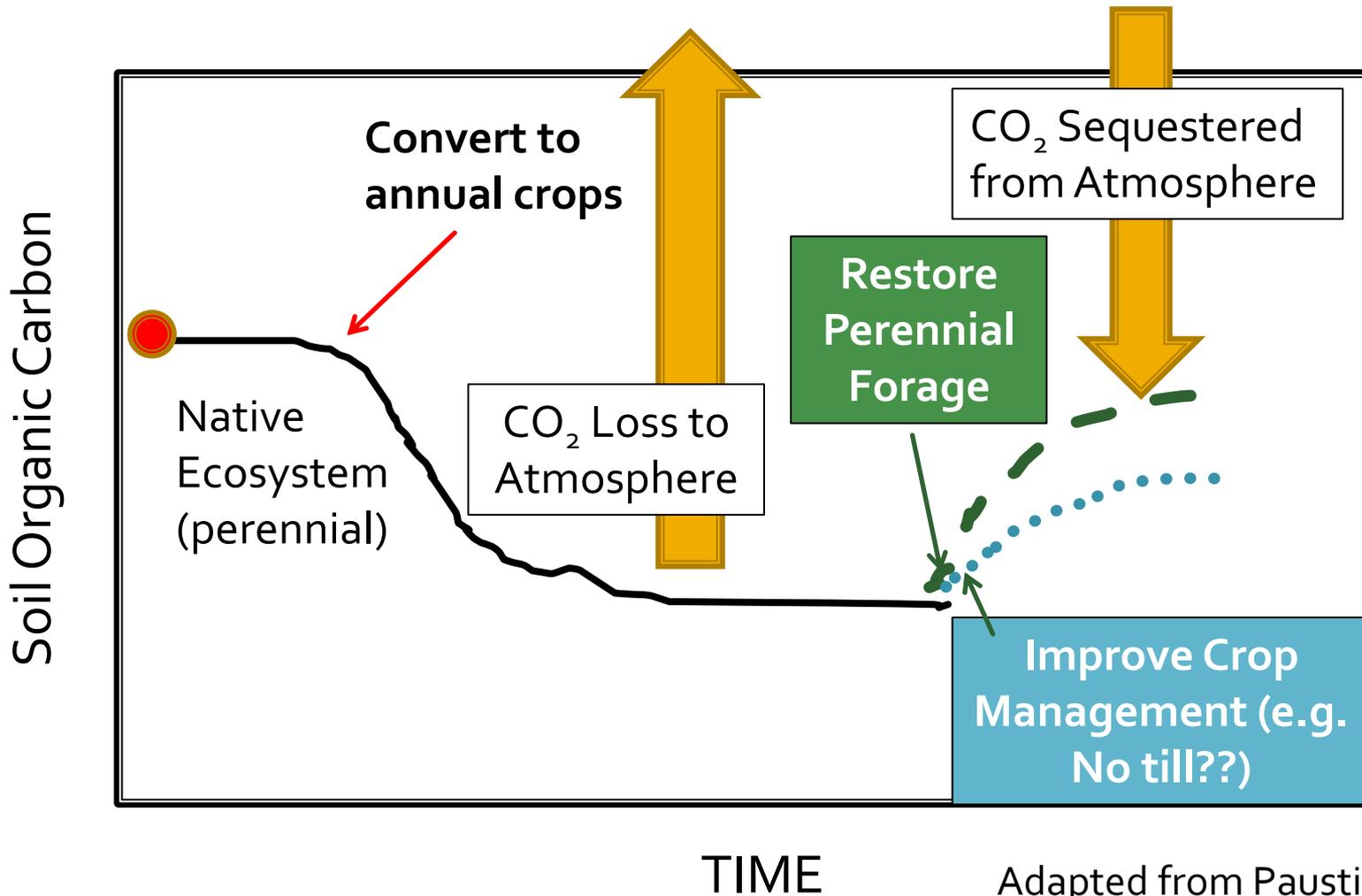
Legend:



OK, but what about no-till?

- **No-till** is intended to place seed in the soil while using herbicides rather than tillage to control weeds
- **Why?** Because disturbing soil through tillage – in order to grow **annual** crops - causes *breakdown* of SOM
- In contrast, **perennials** *build* SOM

SOM is lost when perennials are replaced by tillage to grow annuals

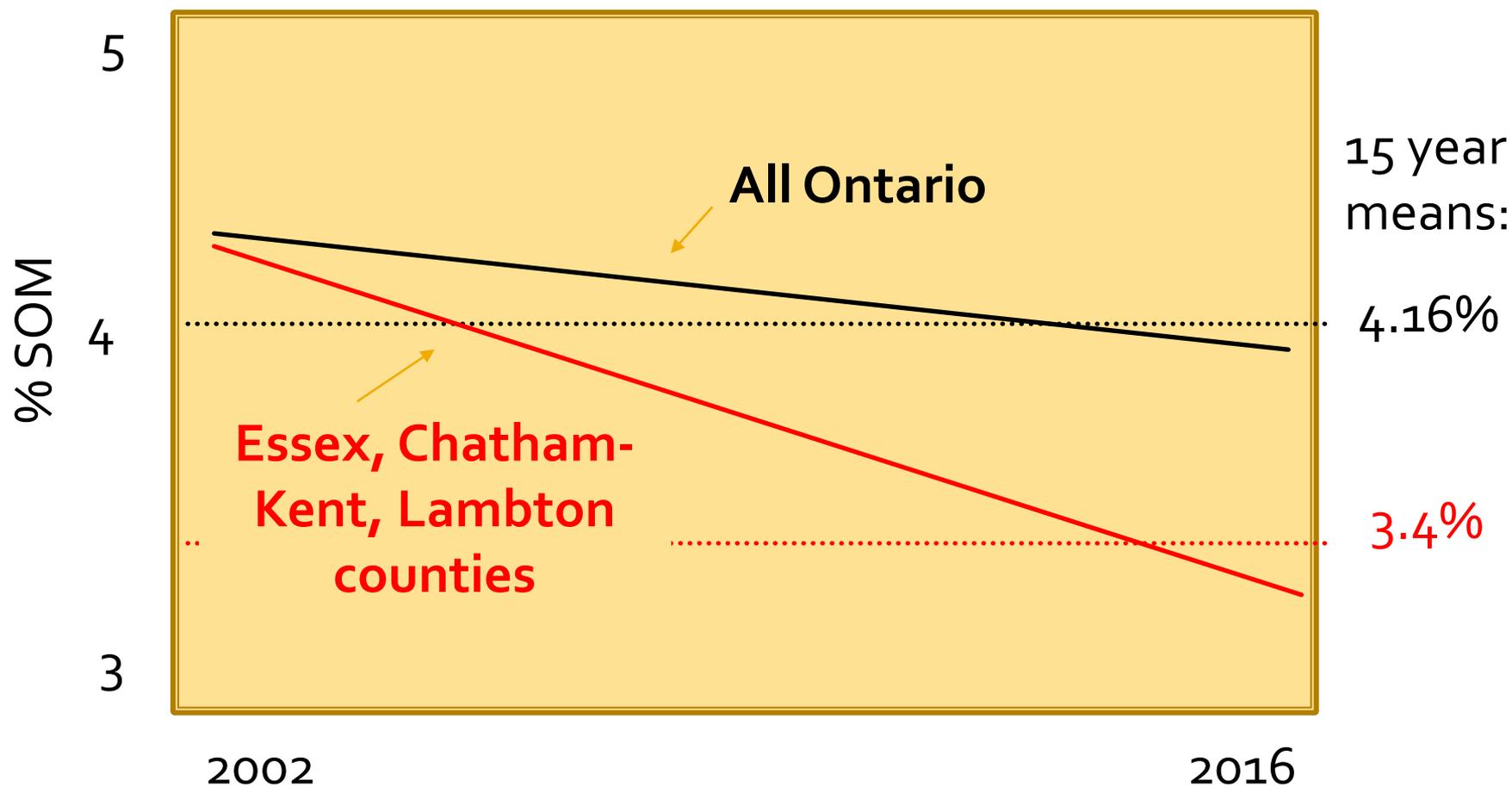


Adapted from Paustian 2014

Can no-till save us?

- No-till (or reduced till) has been studied and promoted in ON for decades
- Can rigorous adoption of no-till reverse these disturbing trends?

No. SOM declined between 2002 and 2016 in ON and especially in SW ON (adapted from Brown, 2017)



We're going the wrong way

- Evidence is undeniable
- Remedial strategies (as no-till) don't work here; SOM decline continues
- Why? Just like a toothbrush
 - **sustainability was not a design-driver for agriculture**
- To claim otherwise is like fitting a square peg in a round hole



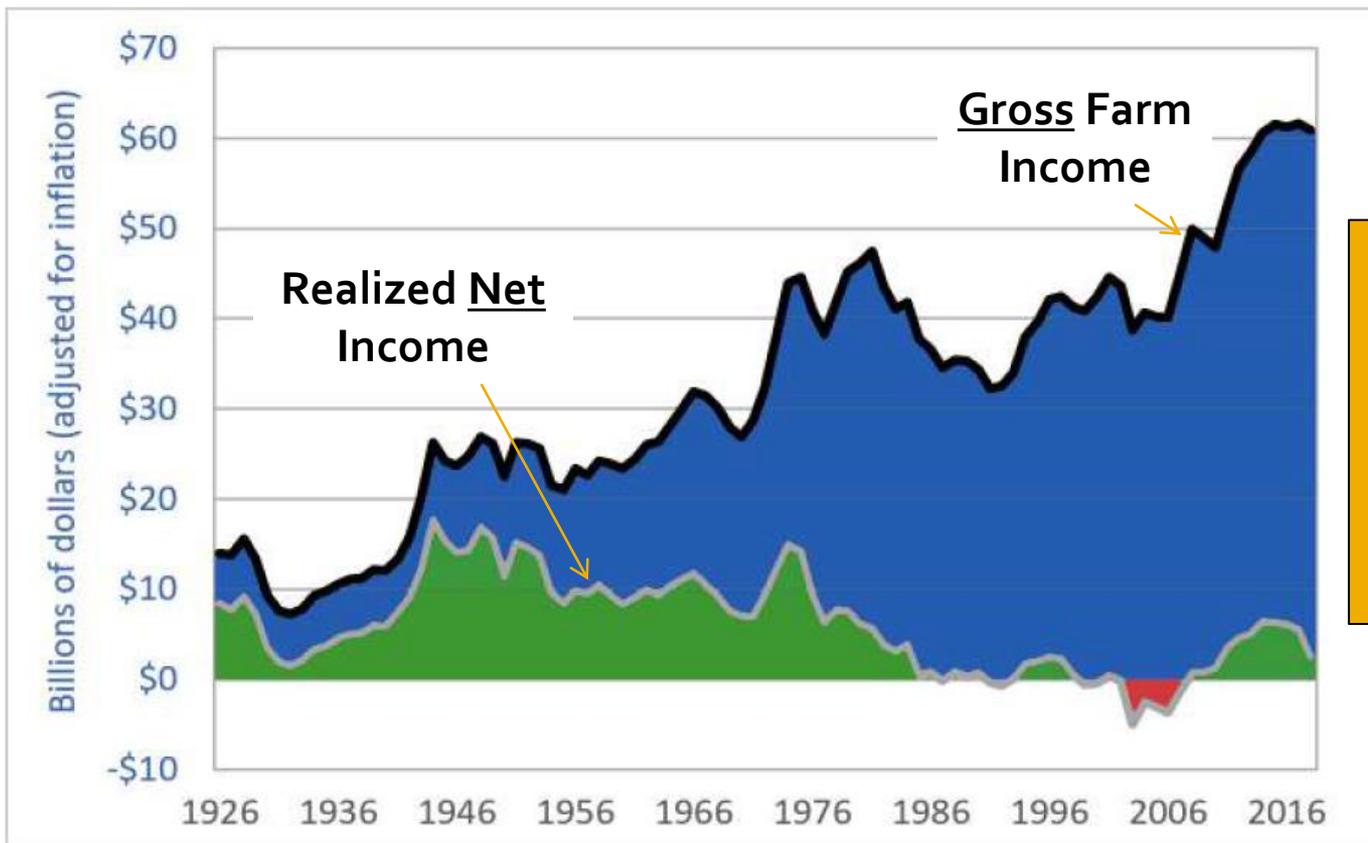
So what do we do – or *not* do – now?

- **Don't blame the farmers**
- Farmers do what they are told, by government policy, academic research, and industry agendas:
 - * ever higher yields
 - * from GM, pesticides, fertilizer, drainage
 - * fewer and larger farms
 - * cheap, bulk grains for industry (feed, ethanol, plastics, oils etc)

So if not farmers, then who?

- Focus your energies on those responsible for the farm policies that direct:
 - * unsustainable on-farm practices
 - * evolution of inputs-dependent production methods and yield goals
 - * publicly funded academics to serve industry agendas, via research funding priorities
 - * research favouring proprietary product sales rather than the public good

Farmers are being driven out of business: retain less than 5% of gross revenue



Farmers do not benefit from increased productivity

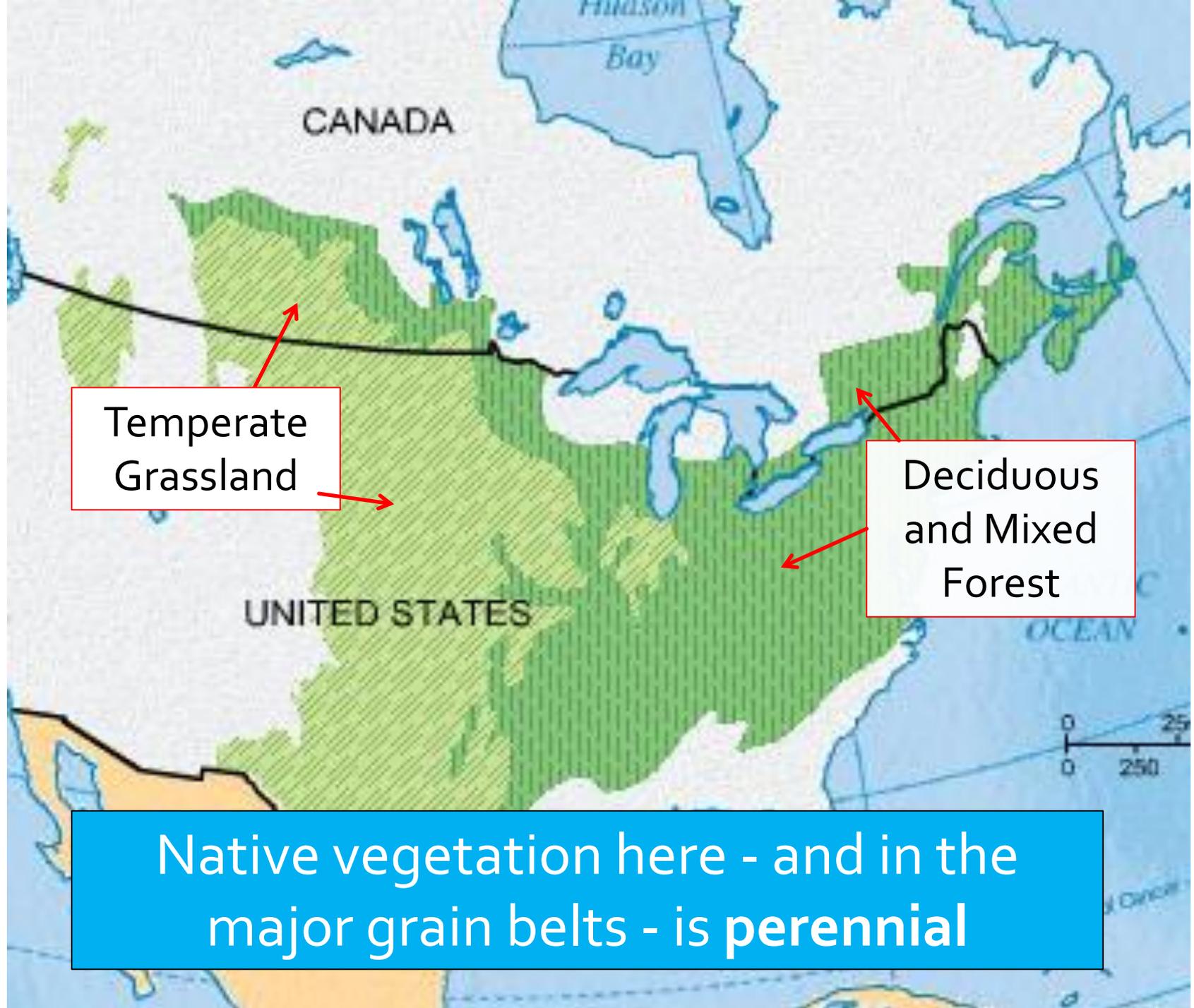
Figure 1-1. Gross farm revenue and realized net income, net of government subsidies, Canada, 1926–2018
Sources: Statistics Canada Tables 32-10-0045-01 (formerly CANSIM 002-0001); 32-10-0052-01 (002-0009); 32-10-01 (002-0076); and 32-10-0153-01 (004-0002)

Farmers are aging

- Despite achieving massive yield increases in designated commodities – corn, soy – farmers are not benefitting.
- Primary agriculture is no longer a reliable source of family-supporting income
- **Mean age of ON farmer has increased from 49 in 1996 to 57 in 2021**
- **Can't sustain farming without farmers**

Good news: we know how to fix this!

- **Q. What would agriculture look like if sustainability was a design-driver?**
- **A. Re-balance the agricultural landscape to include more **perennials**:**
 - *grasslands (and livestock to convert),
 - *trees/orchards/agroforestry,
 - *permaculture
- *Why?*



Temperate
Grassland

Deciduous
and Mixed
Forest

Native vegetation here - and in the major grain belts - is **perennial**

Annuals in a perennial-adapted landscape create unavoidable problems

- Erosion (wind, water)
- Pesticide dependence
- Nutrient and water cycling
- Loss of SOM

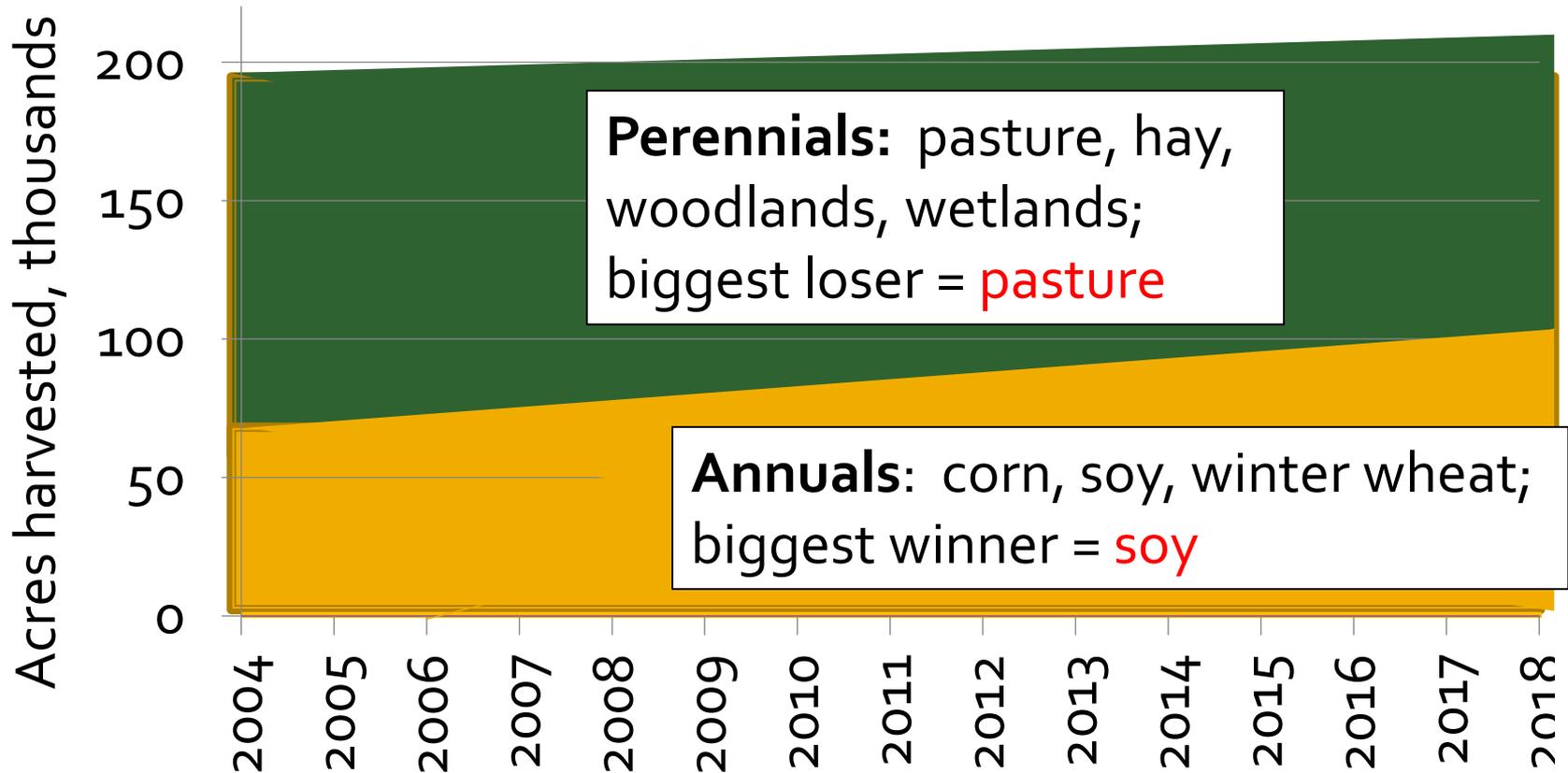
..... = unsustainability

From perennial rainforest to annual soy



But we are doing the same thing

Annuals increased from 30% of Northumberland farm area in 2004 to 50% in 2018



Adapted from OMAFRA, 2016a and b

What *can't* we do?

- Encourage near-retirement age farmers to change what they have spent a lifetime perfecting
- Lobby government to reverse centuries of agricultural development centering on annual grains

So, what *can* we do?

- **Broaden the design-drivers for agriculture** – in your own mind as a consumer (and maybe in those of neighbours and friends?)
- View agriculture not just as a source of raw product to feed industrial applications, but also as a viable tool for environmental management, C-sequestration, nutrient and water retention, and human health.

And that means perennial grass, and grass means livestock

- Grass and the livestock to convert it to human food are essential to sustain agriculture
- Grass-fed beef is scientifically sound, already here and growing, and available for the informed consumer
- Your Role: to reward those farming sustainably, including existing and start-up grass farmers, with your consumer dollars and your vocal support.