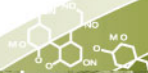


# Regional monitoring with plot network

## Methodology for long-term monitoring of forest soils in Quebec, Canada

Rock Ouimet



$$P'(t) = \frac{r}{k} P(t)(b - P(t))$$
$$V_{AE,ik} = \beta_1 d h p_{ik}^{\beta_2} H_{ik}^{\beta_3} + \varepsilon_{2,ik}$$



Ministère des Ressources naturelles et de la Faune  
Direction de la recherche forestière

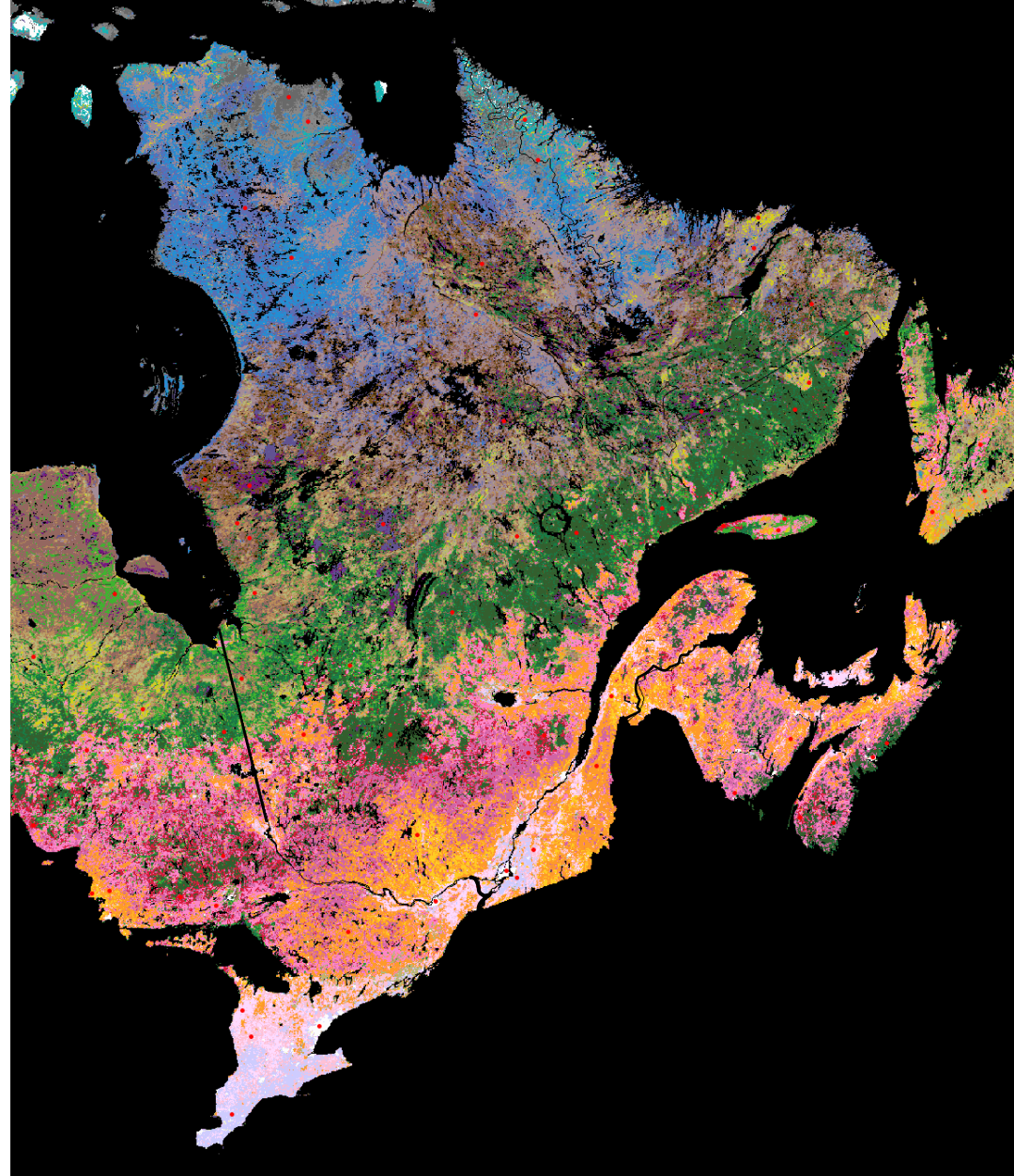
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Québec



# Quebec forests

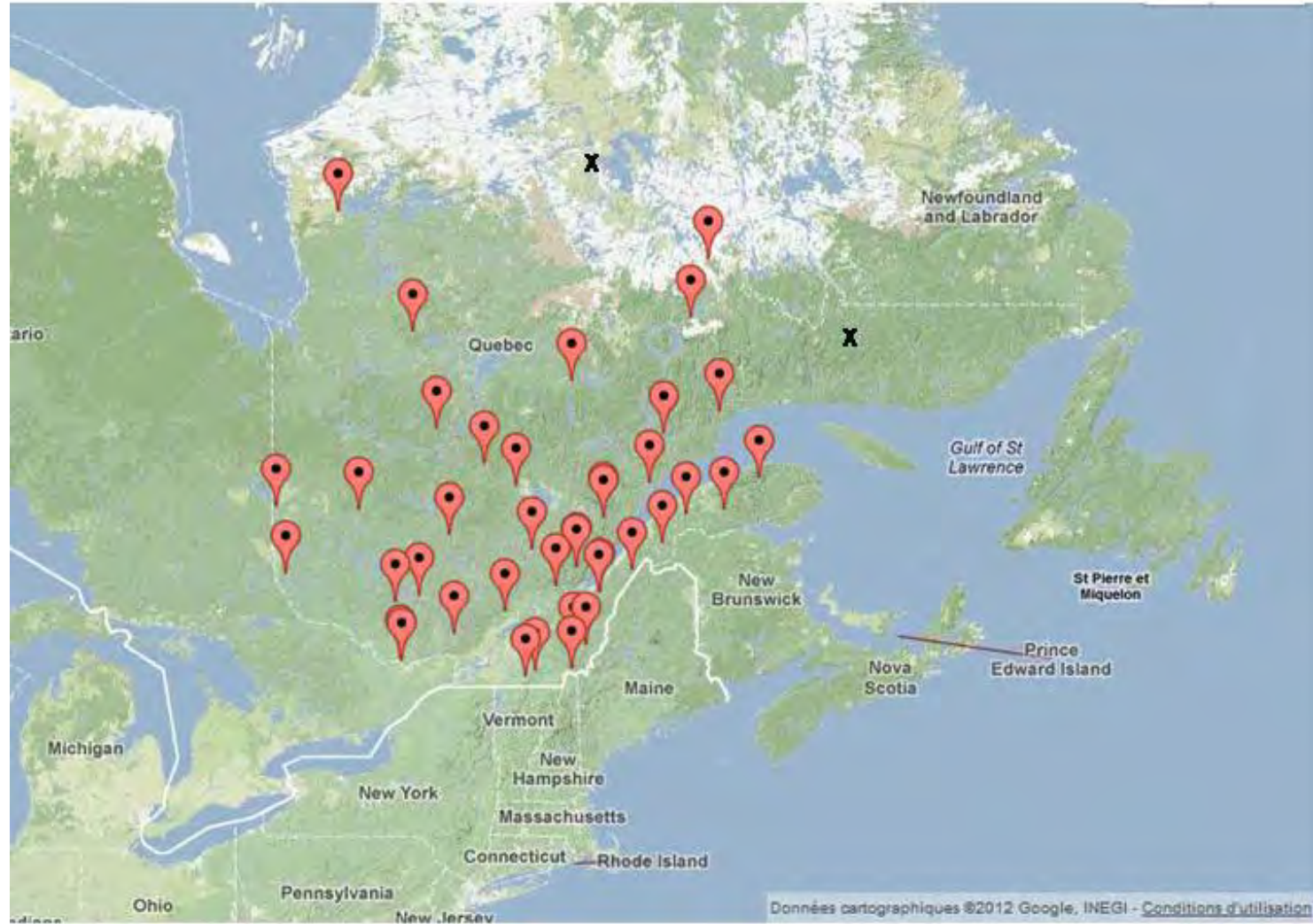
- Quebec forest
  - = 750 300 km<sup>2</sup>
    - Broadleaved, mixed, and coniferous ecosystems
    - > 2 880 plant sp.
    - > 1 440 animal sp.



# Long-term forest monitoring in Quebec

Network plots	n	Objective
Temporary survey	102,644	Volume
Permanent survey (FPS)	12,938	Growth, dynamics, 10 yr turnover
“Effective effects”	5,364	Stand response to silvicultural treatment
Pests and disease	1,123	Pests, diseases, outbreaks, 1 yr turnover
<b>RESEF</b>	<b>40</b>	Growth, soils, dynamics, atmospheric inputs, nutrient cycling, $\leq 10$ yr turnover
RESEF (watersheds)	3	Input - output analysis, growth, soil, dynamics, atmospheric inputs, nutrient cycling, 1 wk turnover

# The Quebec Forest Monitoring Network (RESEF)



As in 2012

# Concerns addressed by RESEF

- Long-term regional impacts
  - Stand health, productivity, and dynamics
  - Acid deposition
  - Climate change
  - Soil fertility
  - Natural and anthropic processes











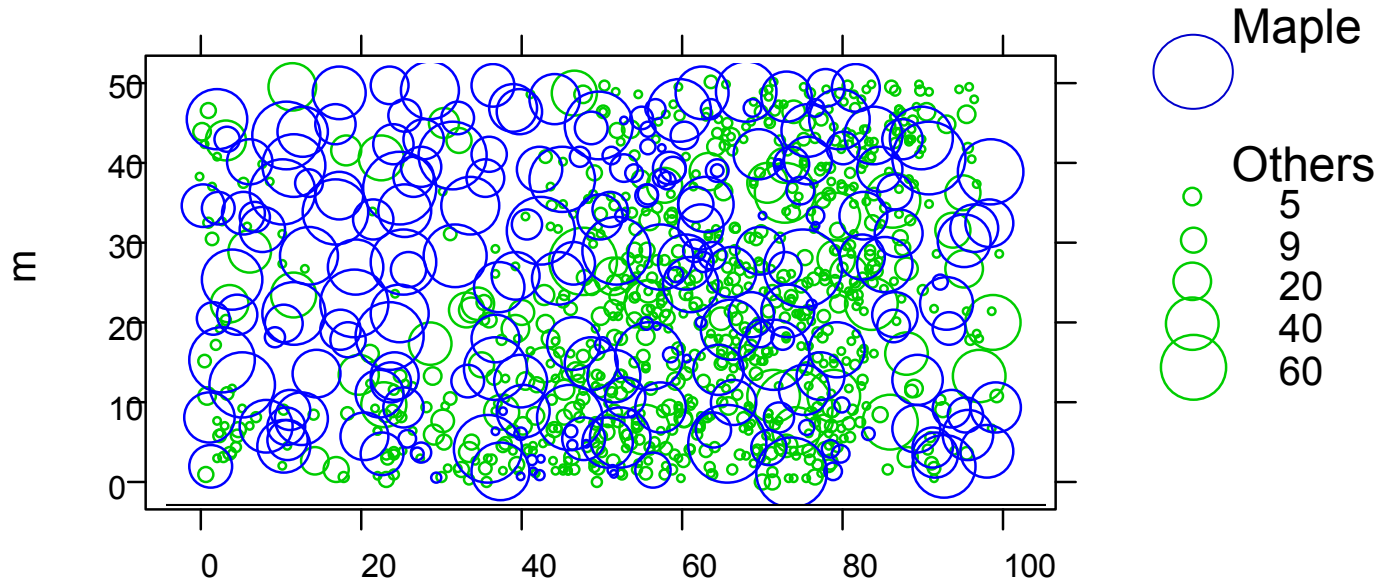
# Forest health and dynamics

## Station 301

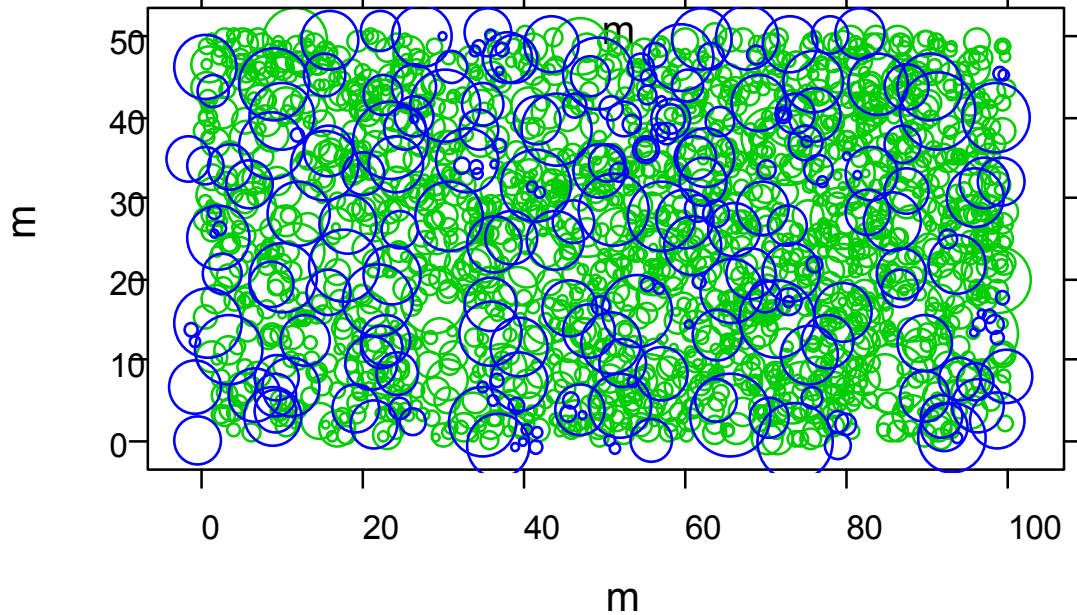
- Established in 1986
- Typical northern hardwoods
- Some dieback



# Station 301 - DBH(cm) in 1986...



in 2006...

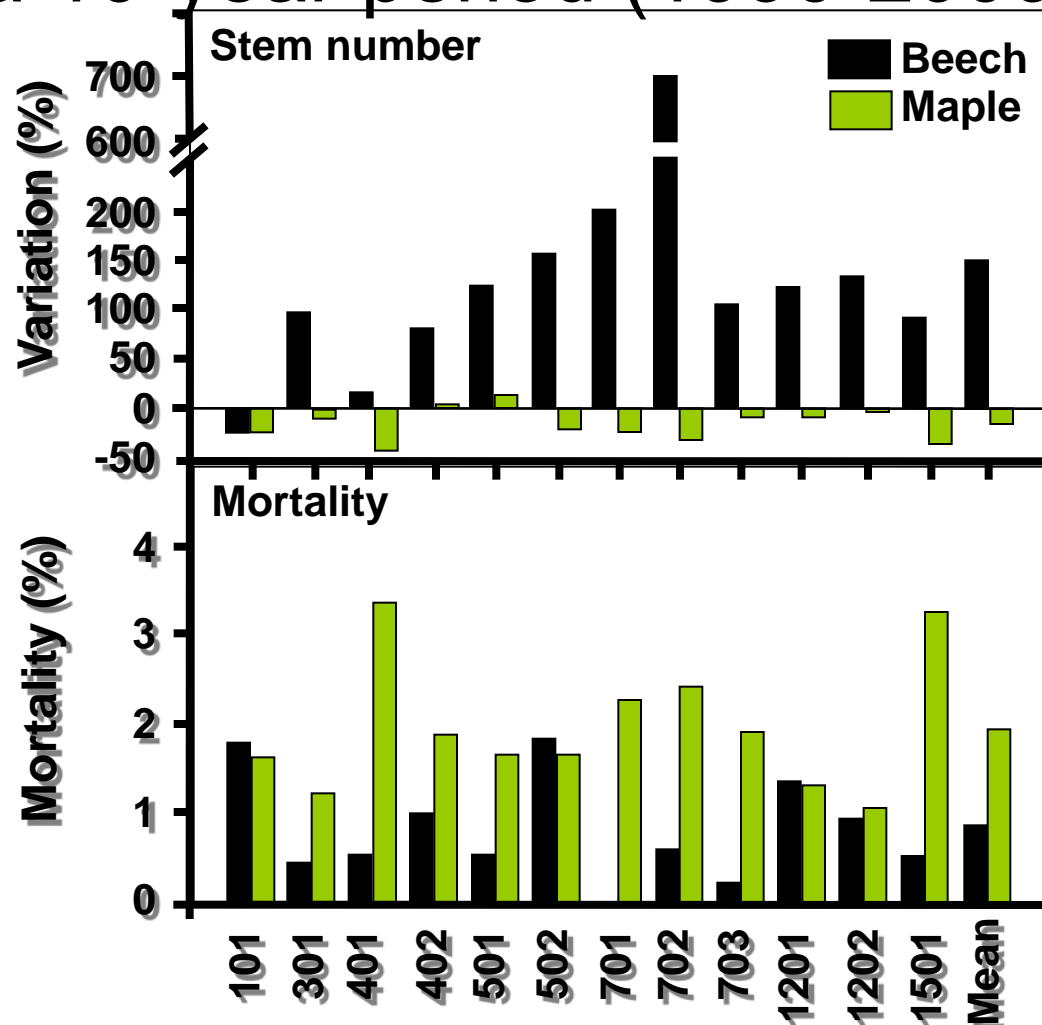






# Forest dynamics

Over a 10-year period (1990-2000):



# Long term forest soil monitoring:

- Early detection
- Provides data on key forest ecosystems for the research and decision-making communities
- Identify research hypotheses
- Essential part of the scientific research process

# Forest soil monitoring methodology

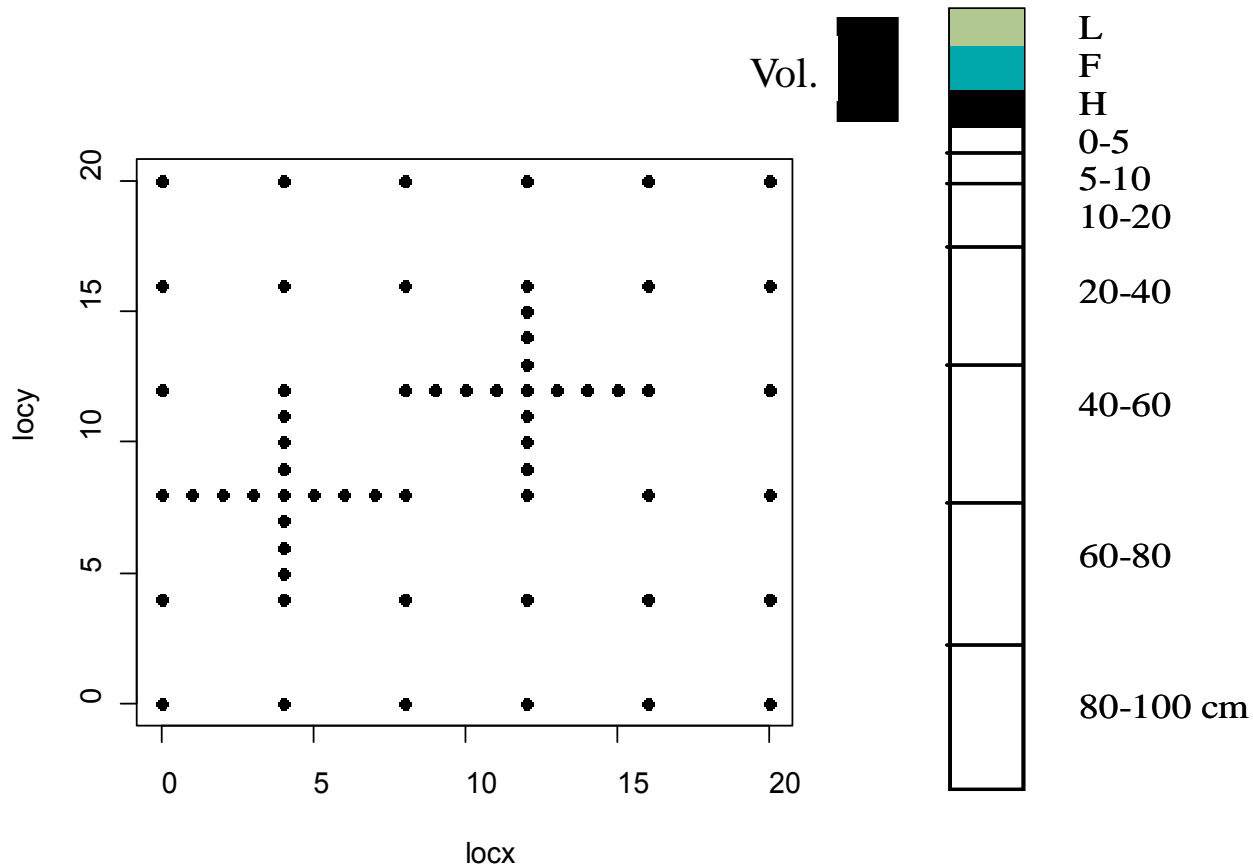


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# Since 2002... Forest soil monitoring network in Quebec

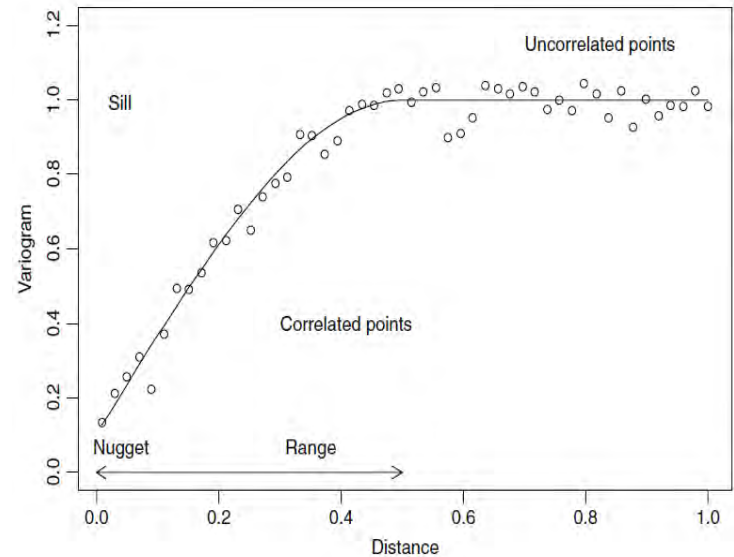


Model-based  
design

Duration: 300 yrs

# Better control of sources of variation

- Advantages
  - Control on spatial variability
  - Sampling distance from trees
- Disadvantages
  - Intensive sampling at the first time (60 points)
  - However, next sampling: 10 points







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WHIRL PAK



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Red handle with a wooden grip and a red band.

Blue tarp.





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