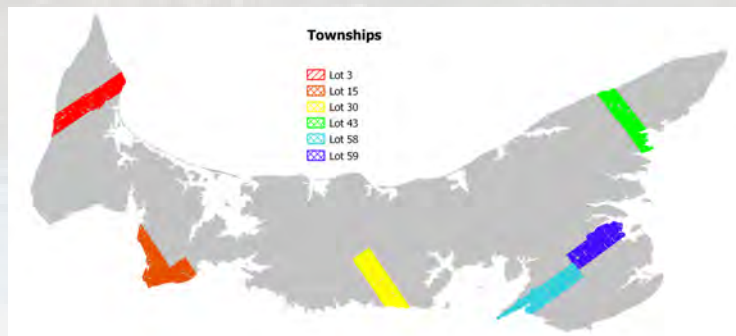


A Geospatial Analysis of Land Use and Cover Change on PEI, 1968-2010

Introduction & Context

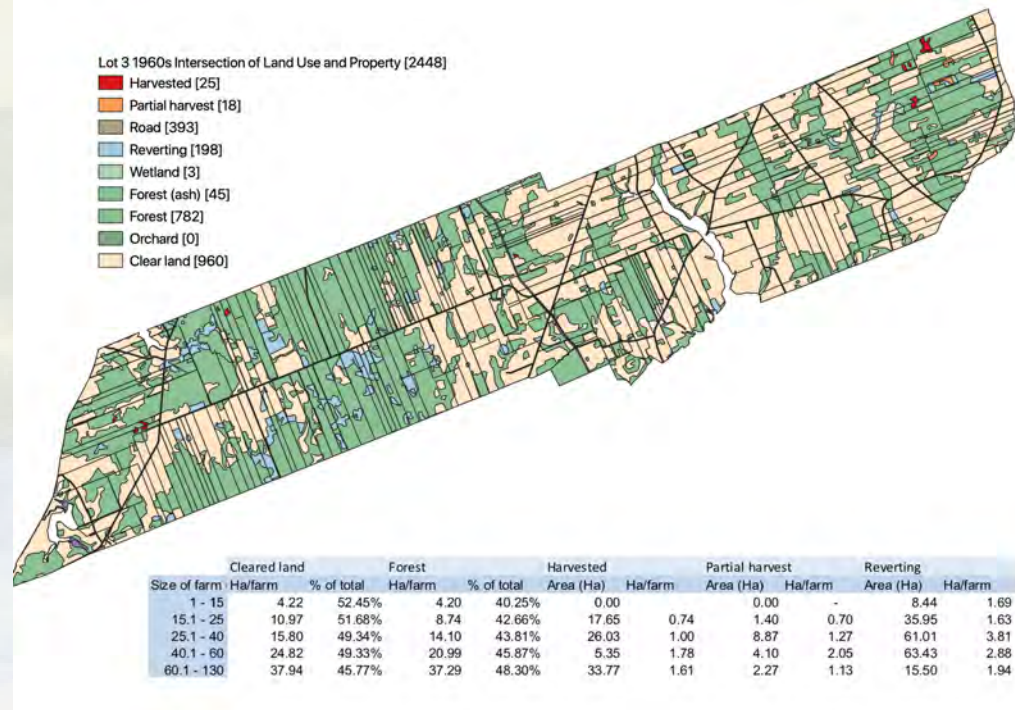
- As late as the 1970s, PEI was considered by a the Federal government to be too traditional and rural in nature to optimize agricultural production and contribute to Canada.⁷
- The Federal government created the Comprehensive Development Plan (CDP).^{7,8}
- The goal of the CDP was to reduce the number of farms and farmers (from ~12,000 to ~3,000), and for the remaining farms to industrialize and scale up productions.^{7,8}
- One of the results was the Beaulieu Map, which itself was the result of a survey of ~15,000 properties and ~3,500 farmers.⁷
- The properties shown on the map are 5 or more acres in size.¹
- The goal of this research is to study land use and cover change (LUCC) on PEI, using properties to understand the context of ownership and land use.^{7,8,9}
- Prince Edward Island (PEI) has been chosen as a case study location due to multiple factors:
 - Its islandness
 - Its manageable size
 - Its location (re: the GeoREACH Lab)
- 6 townships were chosen as case study sites.



A map of PEI illustrating the location of the six of the case study sites. Township 3 is in red; 15 in orange; 30 in yellow; 43 in green; 58 in blue, and; 59 in purple. Townships 3 and 15 are located in Prince County, 30 and 59 in Queens County, and 43 and 59 in Kings County. ⁵

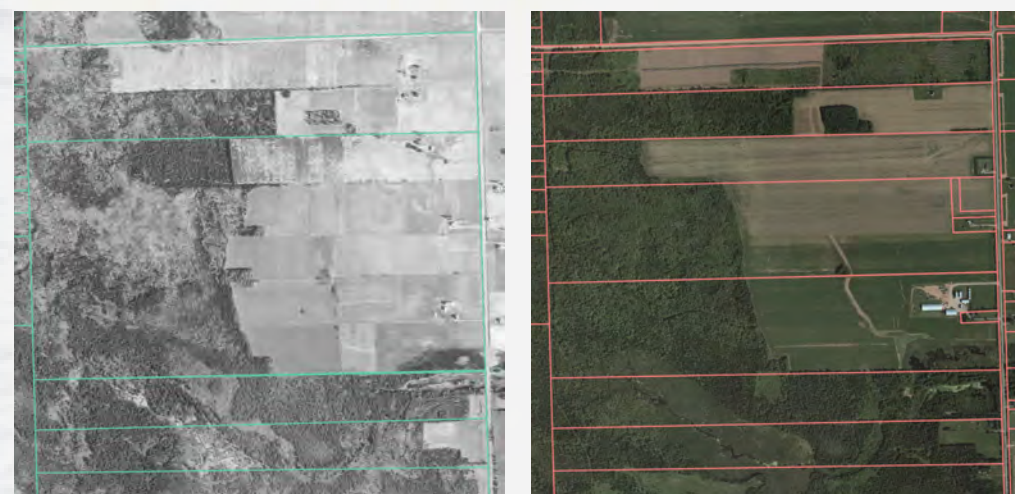
Results & Conclusions

- The result in the case studies is different than the expected patterns of cleared land in some parts of the province.
- Based on historical trends, Prince Country was expected to have the largest amount of cleared land, and Kings County the least amount.⁷



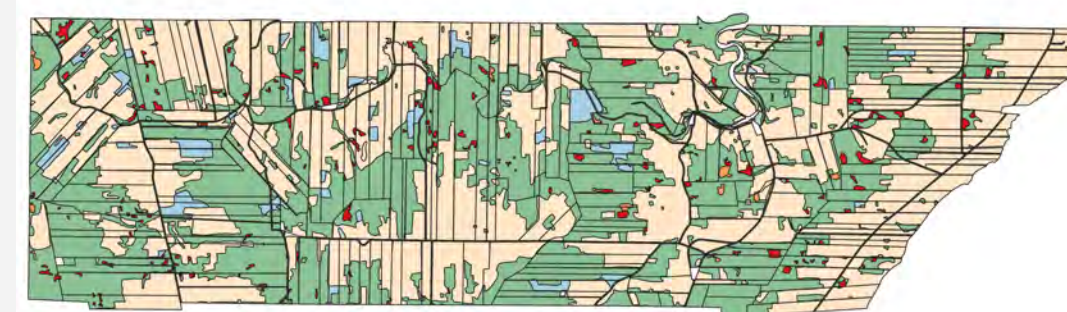
Land Use and Parcels, Township 3, 1960s ⁵

- The least amount of harvested clear cuts occurred in Township 3, though the distribution is uneven.



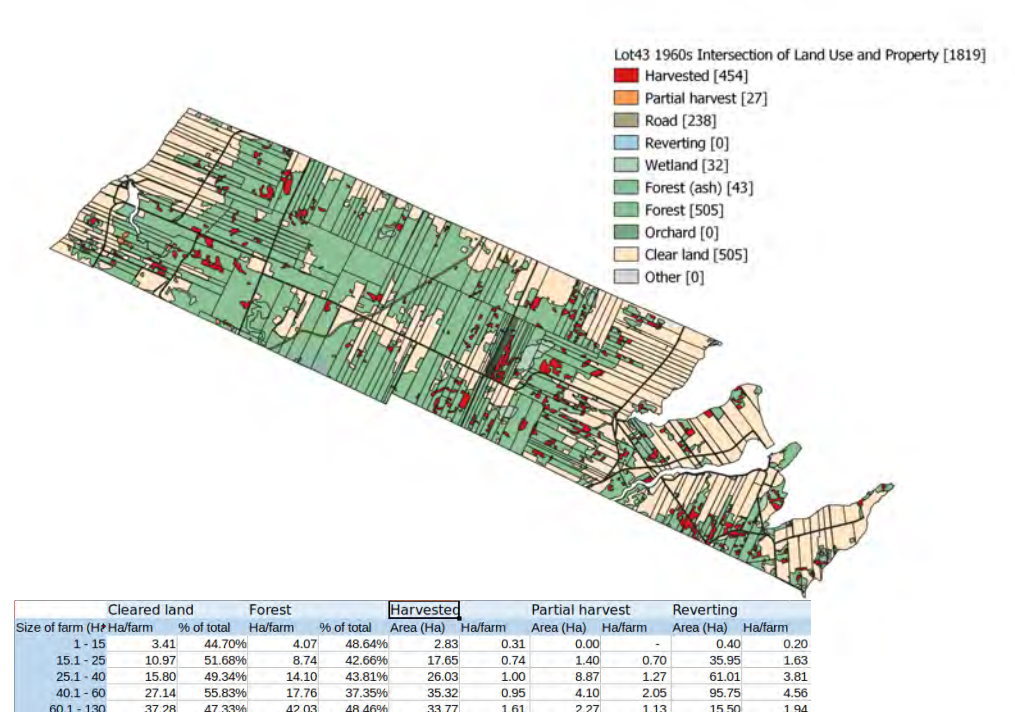
Aerial photos of farm parcels in Township 30, 1968 & 2010 ⁴

- Township 30 had one of the least amounts of forest coverage at the time.

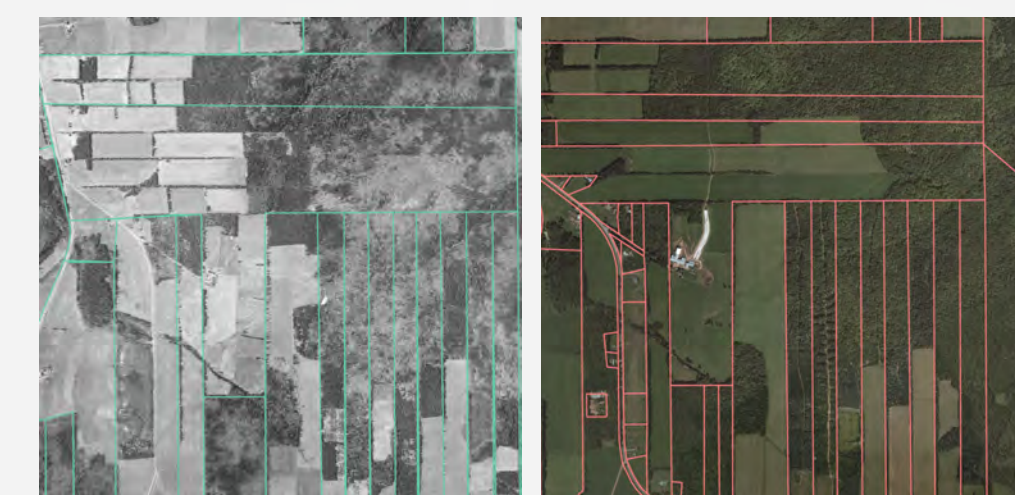


Land Use and Parcels, Township 30, 1960s ⁵

- It also had one of the largest amounts of cleared land reverting back to forest.



Land Use and Parcels, Township 43, 1960s ⁵



- An abundant cover of forest was present in Township 43, as was expected.
- Township 43 also had the greatest amount of harvested clear-cuts, likely produced for the lumber mill in nearby Georgetown.

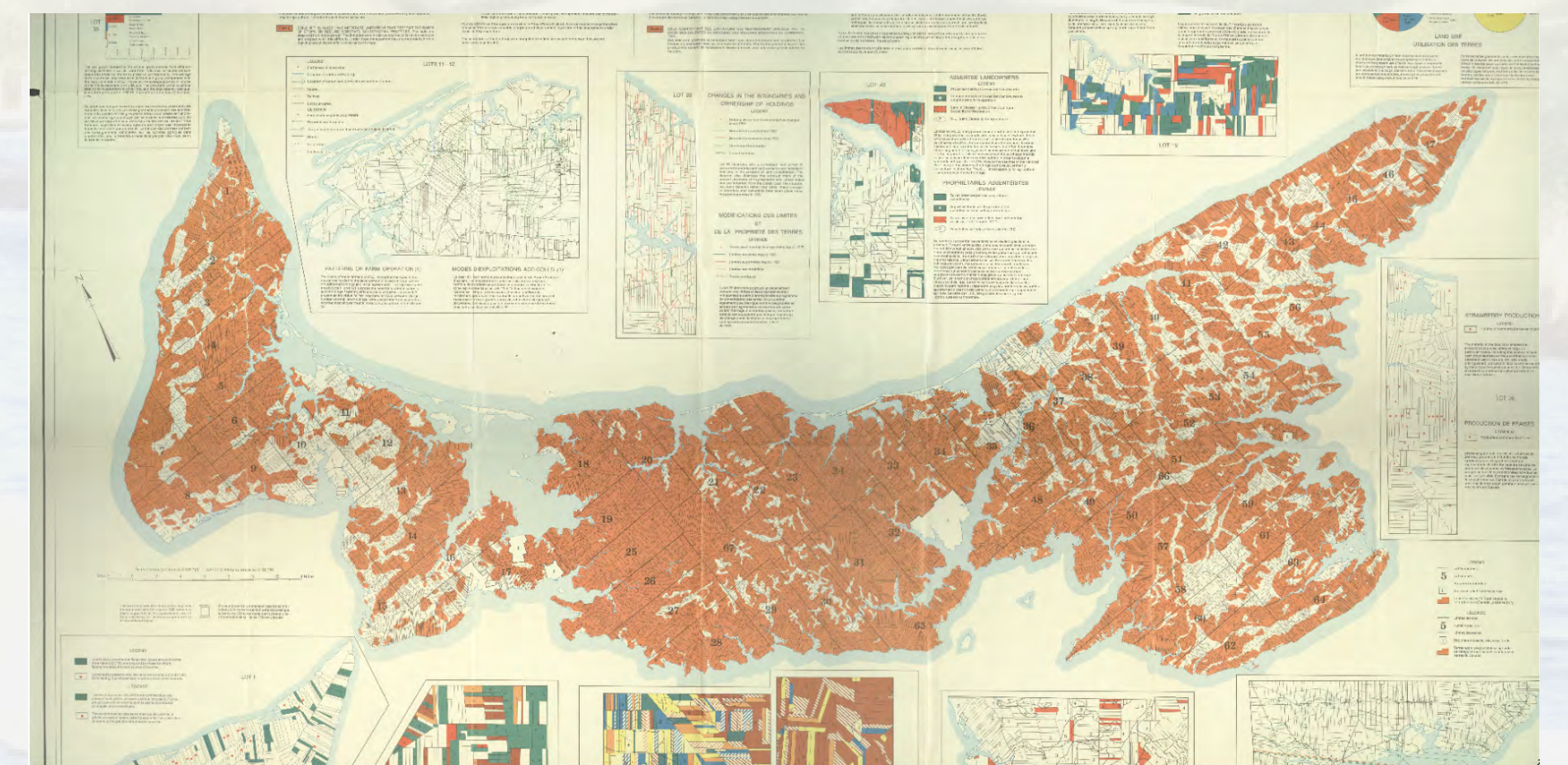
Land Use on Farm Parcels in all Case Study Townships, 1960s (n 1,669)												
Size of farm parcel (Ha)	Cleared Land			% of total	Harvested			% of total	Partial Harvest			# of farm parcels
	Ha/farm	% of total	Ha/farm		Area (Ha)	Ha/farm	% of total		Area (Ha)	Ha/farm	% of total	
1 - 15	5.9	50.9%	5.4	41.9%	100.1	1.0	16.3	0.6	141.8	1.8	446	
15.1 - 25	9.4	44.5%	9.6	47.6%	208.1	1.2	66.2	1.2	284.0	2.6	421	
25.1 - 40	15.7	47.4%	14.4	44.4%	228.5	1.3	89.9	1.5	396.0	3.5	340	
40.1 - 60	22.5	45.1%	21.7	46.2%	243.4	1.5	78.5	2.0	507.0	12.5	284	
60.1 - 130	34.7	42.8%	41.4	50.0%	205.2	2.1	70.3	1.8	276.4	2.1	178	

This table outlines the five most important land cover types in all six study sites, categorized by farm size. Cleared Land is land that is used for agriculture or housing; Forest is standing forest cover; Harvested refers to clear-cut parcels; Partial Harvest indicates partial cuts, and Reverting is farm land that is returning to forest. Note: The Cleared Land and Forest data represent the average number of hectares per farm in each size class and the percentage of total land use for farms in that class on average. Harvested, Partial Harvest, and Reverting data represent the total amount in each size class, and the average amount per farm.

- Overall, the smallest farms and mid-size farms tended to have a larger percentage of their land cleared for agriculture.
- Conversely, the largest farms tended to have the largest amount of forest coverage.
- Harvested land, partially harvested land, and reverting land was most common on mid-size farms, particularly in the 25-60 hectare categories.
- Aerial photos of 1968 and 2010 help confirm that, although some properties have shrunk in size due to development, many small fields have been consolidated into large fields.
- Some of the results can be explain simply by case study site: Township 15, for example, is known to have soils unfit for agriculture of most types. However, cases like townships 30 and 43 need to be further explored.

Potential for Future Research

- Digitizing all of PEI to expand the study.
- Additional Case Studies.
- Analyse the implications of LUCC in property boundaries by county, watershed, and topographic features.
- Study the soil quality of PEI based on land use cover change.



The Beaulieu Map, a Map published in 1970 depicting farms of 5 acres or more in size, to demonstrate the "inefficient" agricultural landscape of PEI to the federal government. Some areas were excluded, including Charlottetown, Summerside, Georgetown, and national parks!

Literature

The informative precursors to the project was *Canada Between the Photograph and the Map: Aerial Photography, Geographical Vision and the State* by M Dyce and *Tools for Rational Development: The Canada Land Inventory and the Canada Geographic Information System in Mid-Twentieth Century Canada* by S Stunden Bower.^{5,8}

Historical GIS Research in Canada by J Bonnell & M Fortin and *Historical Geographic Information Systems and Social Science History* by AK Knowles informed the qualitative analysis and the problematic behind the project.^{2,6}

The literature used as the basis for this work was *A Time and a Place*, by I Novaczek, E MacDonald and J MacFadyen.⁷

UPEI GeoREACH Lab

The UPEI GeoREACH Lab analyzes the land use and cover changes of Atlantic Canada using geospatial analysis techniques. Geographic Information Systems is a common tool for analysis in the lab.

Special thanks for this project goes to: Nick Scott, for locating and scanning the map; Catherine Kennedy and Juliana Granzoti for aerial imagery and analysis; Dr. Joshua MacFadyen, the team lead for helping with workflow and debugging; Dr. Xander Wang of the Adaptation to Climate Change program, for debugging help.

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