

# Creating and Analyzing Digital Land Parcelization Histories to Better Understand Landscape Change

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## Abstract

In this research, we sought to document and analyze the rate and spatial pattern of land parcelization in a set of rural Wisconsin communities. Land parcels constitute a fundamental but largely invisible dimension for understanding land ownership, uses, and resulting landscape patterns. Current tax and ownership parcel maps are increasingly available in digital format at a range of scales, but historic parcel maps are largely confined to paper documents and are therefore difficult to employ for sophisticated spatial and temporal analyses common to landscape ecology. To overcome this barrier, we developed a method for accurately reconstructing parcel maps from earlier time periods by employing both paper plat maps and municipal tax rolls. Tax rolls were necessary for mapping small-lot subdivisions that are generally excluded from plat map books. This poster illustrates key steps in our methodology for recreating parcel maps in digital format and communicates some of our findings. Distinct spatial-temporal patterns of parcelization are evident, patterns that a simple count or averaging of parcel sizes would be unable to convey. We conclude by pointing to several lines of research available for integrating parcelization histories with landscape histories to better understand human dimensions of landscape ecology.

## Why Study Tax Parcels?



•Parcel data is becoming more readily available.

•Parcel is the land unit regulated by government.  
•Individual land use decisions are made at the parcel level.

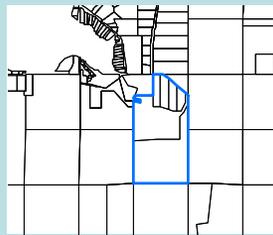
## Ownership Tracts vs. Tax Parcels

### Plat Book



•Plat books display ownership trends, which can include multiple tax parcels under single ownership.

### Tax Parcels



•Tax parcels represent the land owner's true intent.

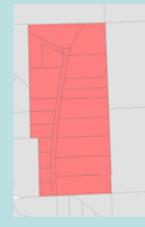
## Parcelization in Hiding - Wis. Stat. § 236.02(12)

### Major Land Division Platted Subdivision



•The platted subdivision on the left required prior review and approval, while the development on the right required no review or approval, and circumvented the subdivision approval process.

### Minor Land Division Certified Survey Map



•Without prior approval, this land owner acted as community planner and developer, leaving the municipality with the added infrastructure maintenance costs and zero design input.

## Methods

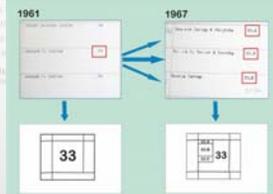
### Case Selection: Comparing Parcelization Across Diverse Landscapes



- Bayfield County represents a highly forested area in northern Wisconsin rich with natural resource amenities.
- Columbia County represents an exurban area with a history of agricultural production. The Wisconsin River and Lake Wisconsin border the western side of the county.

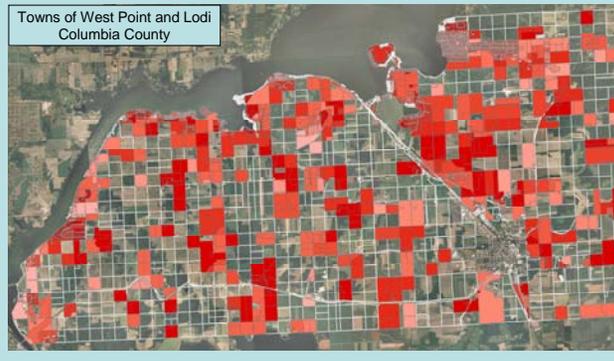
### Data Collection: Using Tax Archives to Reconstruct Parcel Histories

- Historic municipal tax rolls were searched for potential parcel splits.
- Once a parcel split was located, the GIS layer was adjusted accordingly to reflect the parcel status at that time period.



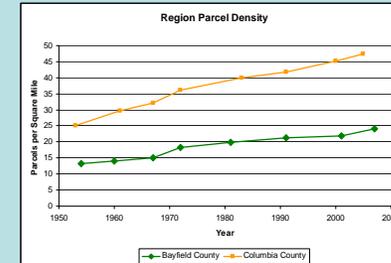
## Results

### New Parcels Per Time Period



## Results

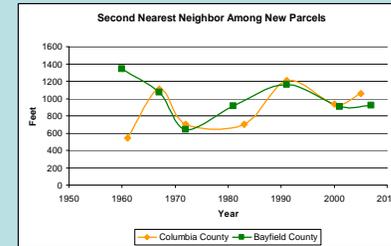
### Comparing Forested and Agricultural Areas



•This graph of descriptive statistics show the parcel density in two rural counties in Wisconsin.

•The agricultural, exurban area exhibits a higher density of parcels compared to the rural forested area.

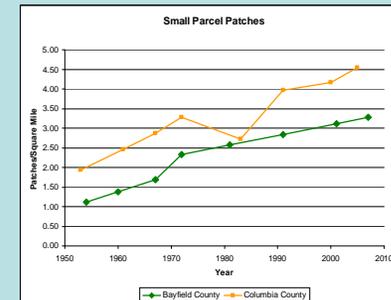
•The agricultural study area is located near a major metropolitan center.



•This graph shows some spatial statistics of the mean second nearest neighbor distance among new parcels.

•The second nearest neighbor distance was chosen to show the dispersal of new parcels to their non-adjacent nearest neighbor.

•Both areas exhibited a similar change among distance in new parcels.



•This graph area normalized, shows the quantity of small parcel patches (0 – 5 acres) in a forested and agricultural region.

•The quantity of smaller patches increased in both areas; however the rate of increase was greater in the forested area.

•Smaller, potentially more fragmented parcel patches occurred in the forested area.

## Future Research

- We are examining the extent of how parcelization spatially and temporally affects subsequent landscape patterns.
- We are investigating the landscape factors affecting parcelization in rural amenity-rich areas.
- We also seek to find out if the spatial and temporal parcelization patterns are different in agricultural vs. forested regions.



FACTORS INFLUENCING LAND PARCELIZATION IN AMENITY RICH RURAL AREAS AND THE POTENTIAL CONSEQUENCES OF PLANNING AND POLICY VARIABLES  
CONTRACT/GRANT AGREEMENT NO. 2005-35401-15924  
PROPOSAL NO. 2005-01593

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