UNDERSTANDING THE URBAN FOREST OF MIAMI-DADE COUNTY:

AN EXPLORATORY STUDY OF URBAN SOCIO – ECOLOGICAL TRANSFORMATIONS

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OUTLINE

- Urban Forest Research Importance
- Review of literature
- Our Research
- Research Site and Problem Statement
- Research Question
- Non-exclusive Hypothesis
- Data & Methods
- Analysis & Results
- Conclusions

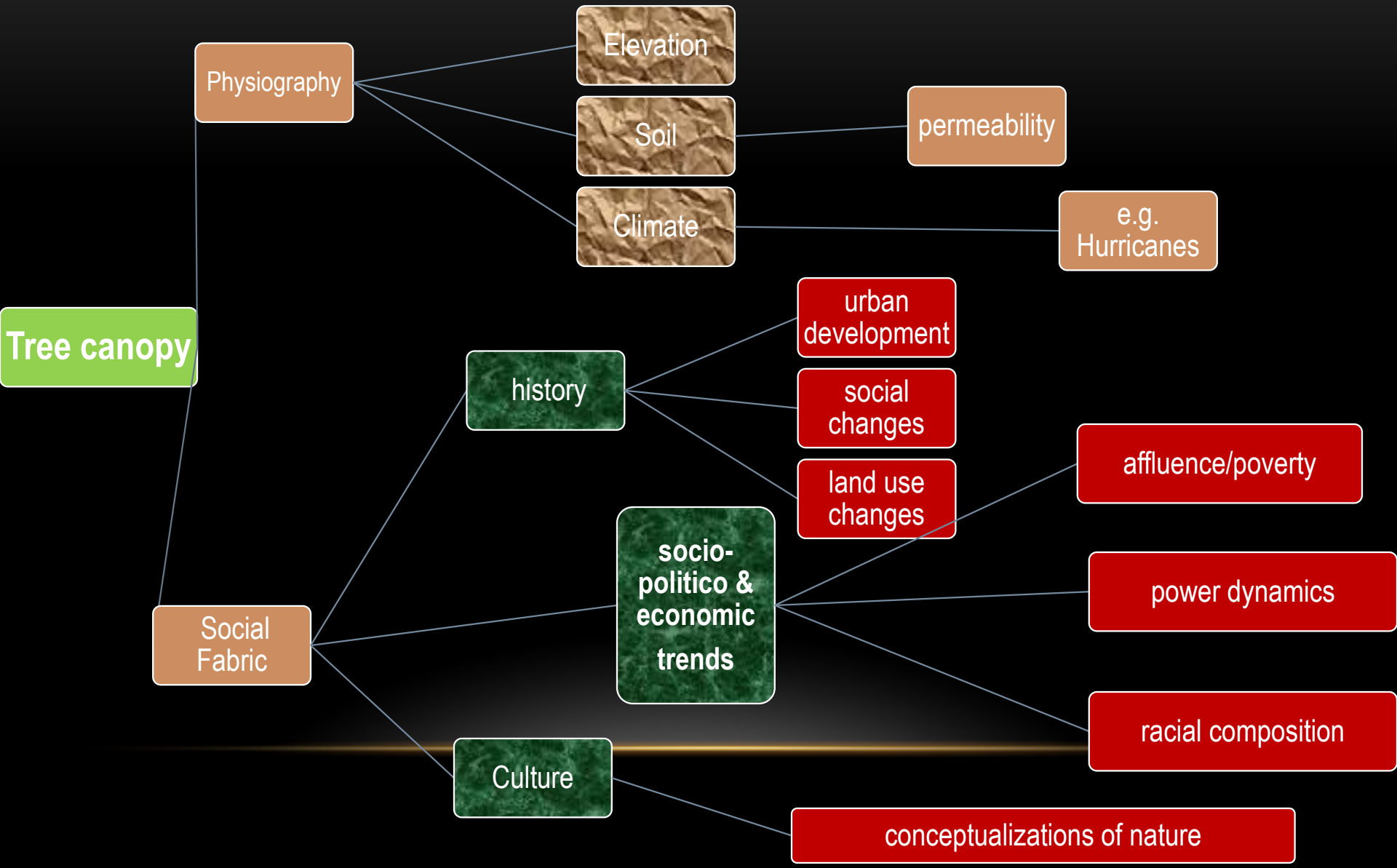
importance

DIFFERENT PATTERNS

- Decrease electricity use
  - Shade → less AC
  - Less wind → less heating
  - Reduce GHG
- Reduce pollution
  - CO_2
  - Other GHG
- Mitigate Hurricane
  - Stop debris
  - Reduce flood waters
- Increase property $$
  - Beautification
  - Relaxation
  - All the above

CURRENT RESEARCH

BALTIMORE, MILWAUKEE, SEATTLE, TAMPA, GAINESVILLE, MIAMI



OUR RESEARCH:

Baltimore

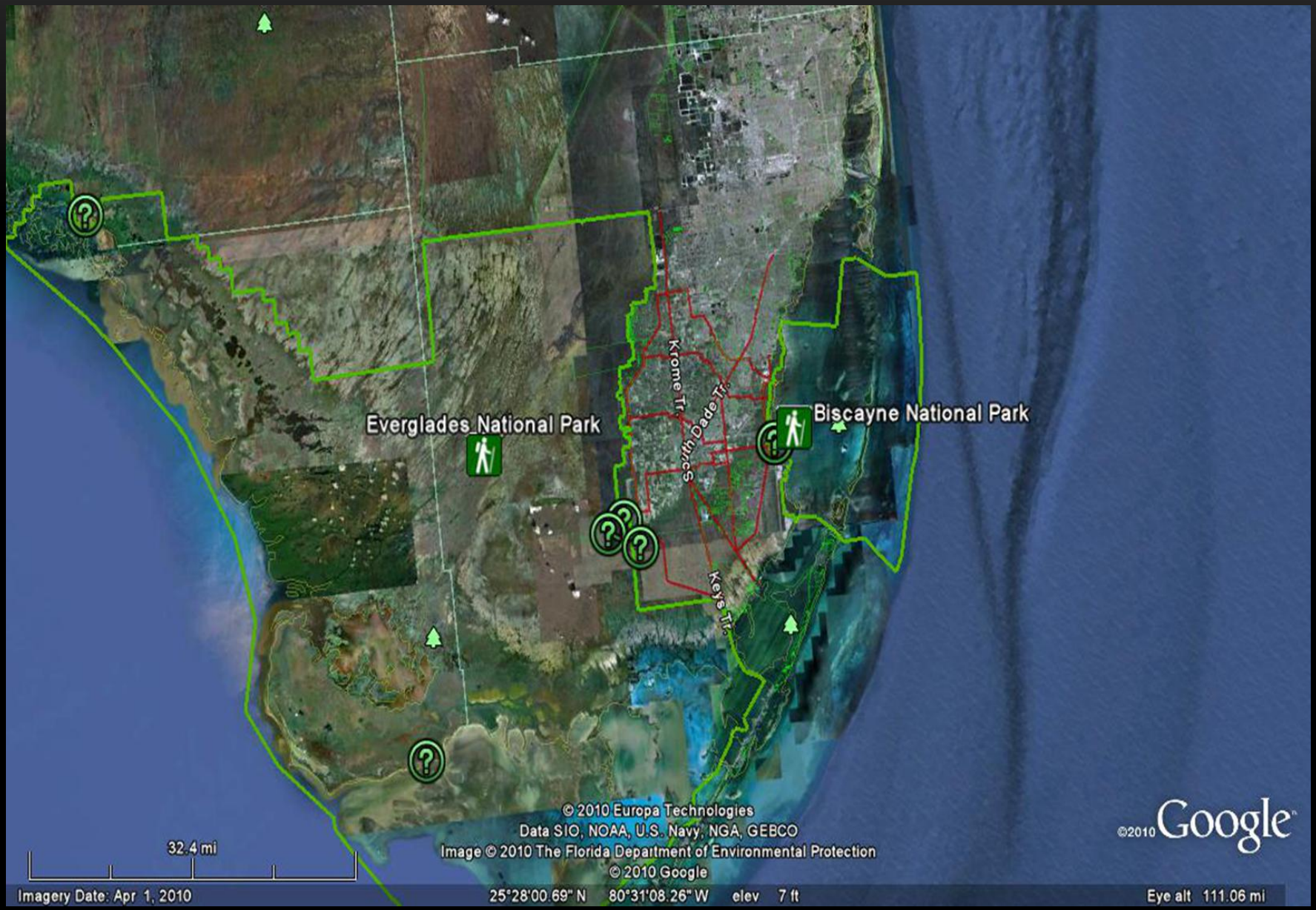
historic legacies

Miami – Dade:

Comprehensive approach

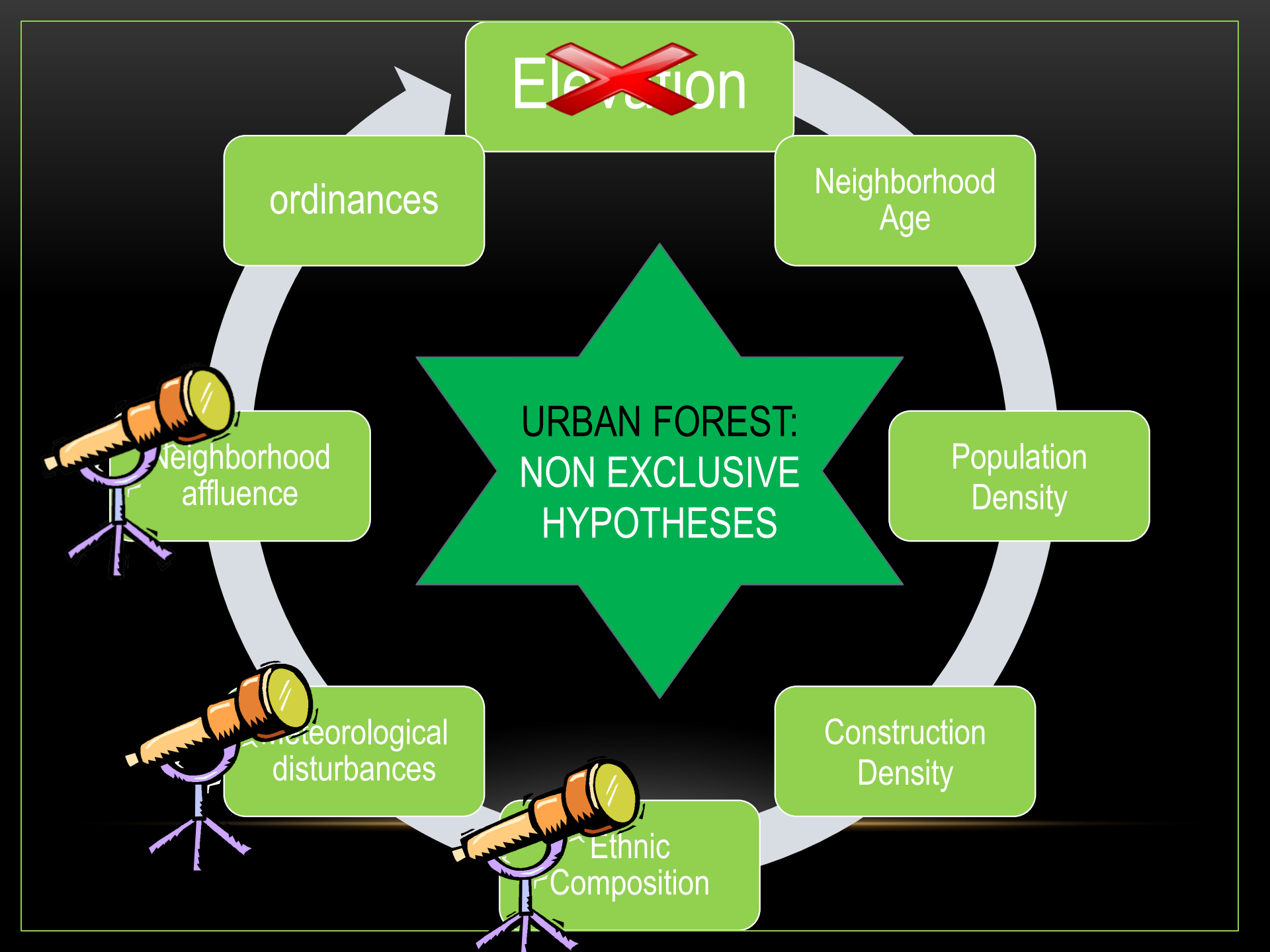
- Integrates multiple factors
  - smaller scales

Research Site & Problem Statement



RESEARCH QUESTION

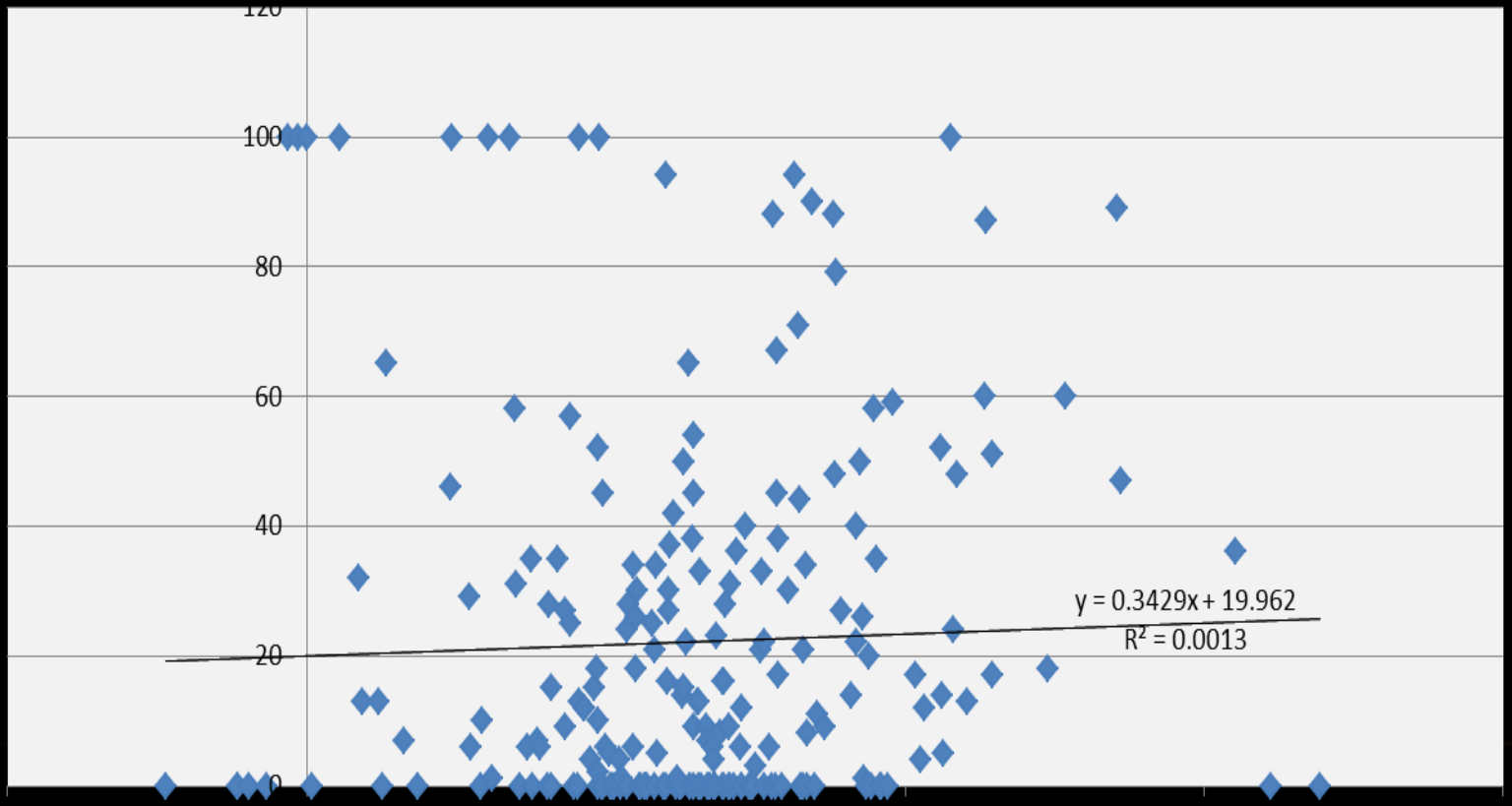
- What explains contemporary tree canopy distribution in urban Miami / why are trees where they are?
  - What are the particular historical-sociodemographic processes that shaped today's urban forest?


Elevation
Neighborhood Age
Population Density
Construction Density
Ethnic Composition
Meteorological disturbances
Neighborhood affluence
ordinances
URBAN FOREST: NON EXCLUSIVE HYPOTHESES

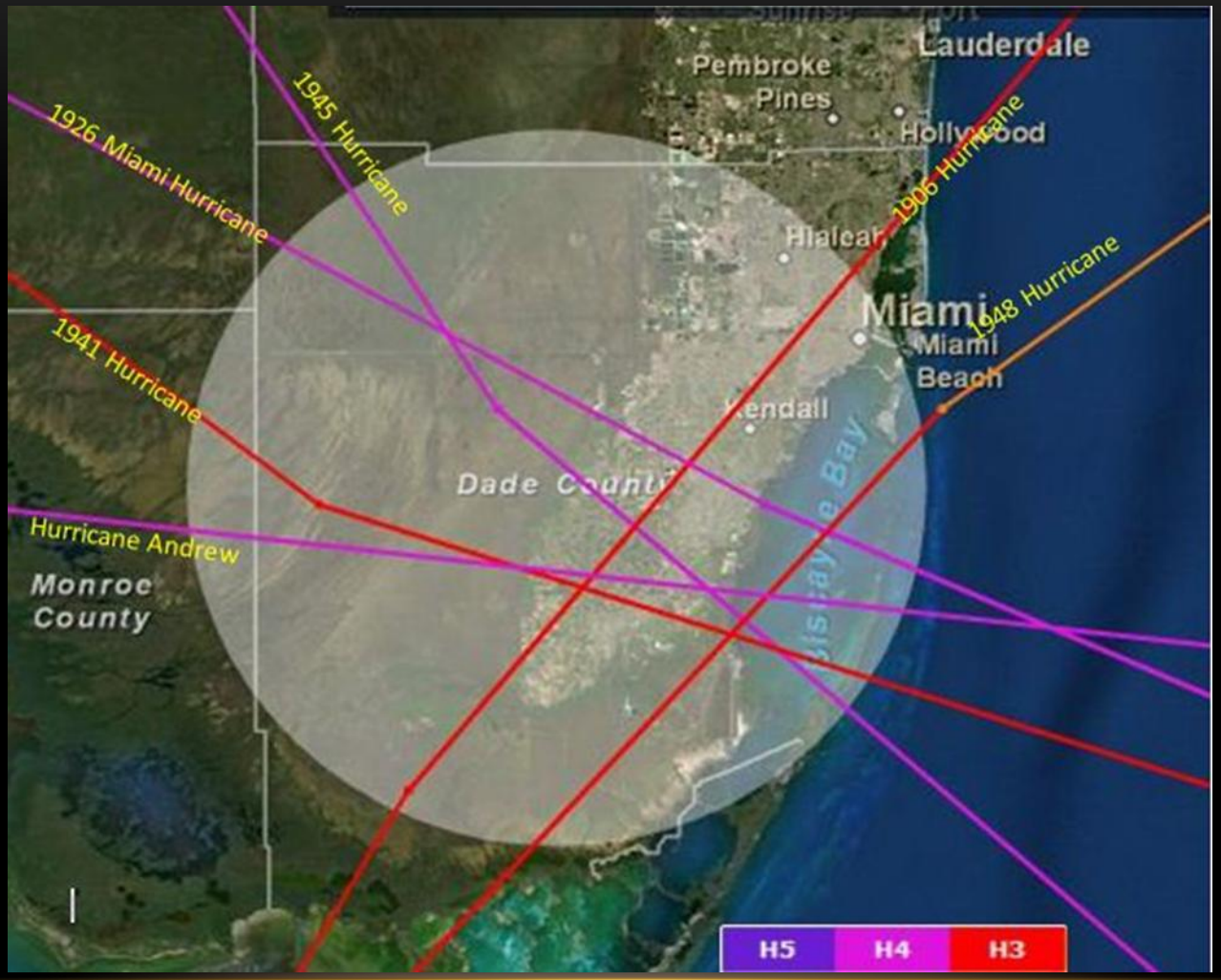
TREE COVER AND ELEVATION

- DATA SOURCE: FRANCISCO ESCOBEDO

University of Florida-IFAS, School of Forest Resources and Conservation, PO Box 110410, Newins-Ziegler Hall, Gainesville, FL 32611, USA



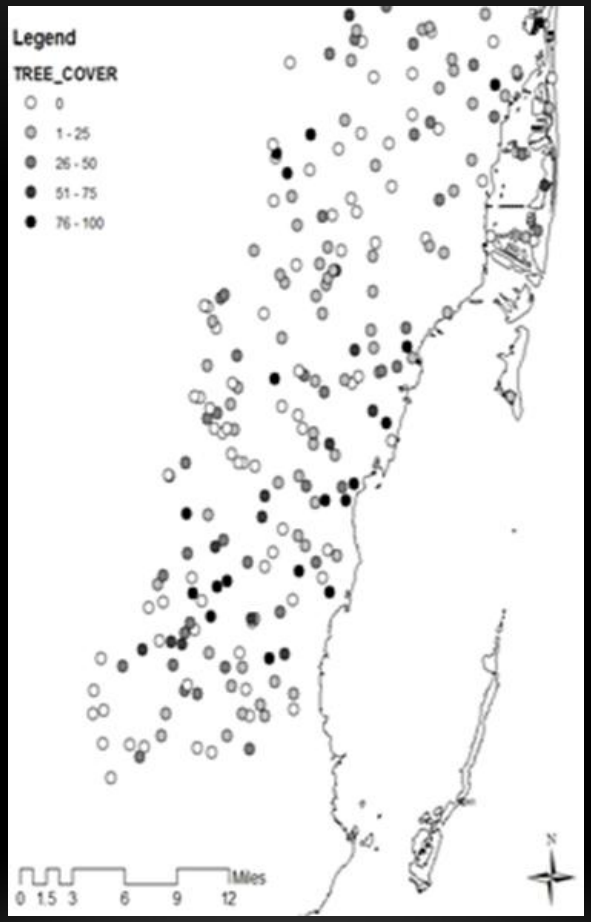
HURRICANE HISTORY IN MIAMI DADE

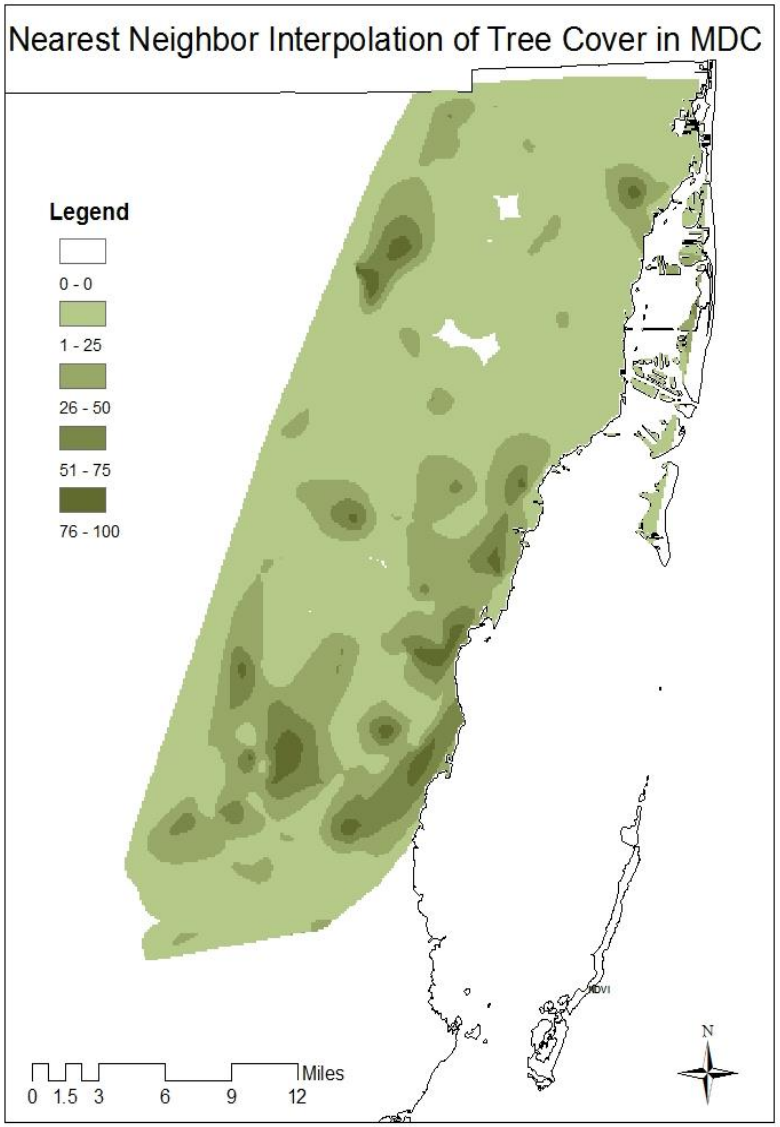


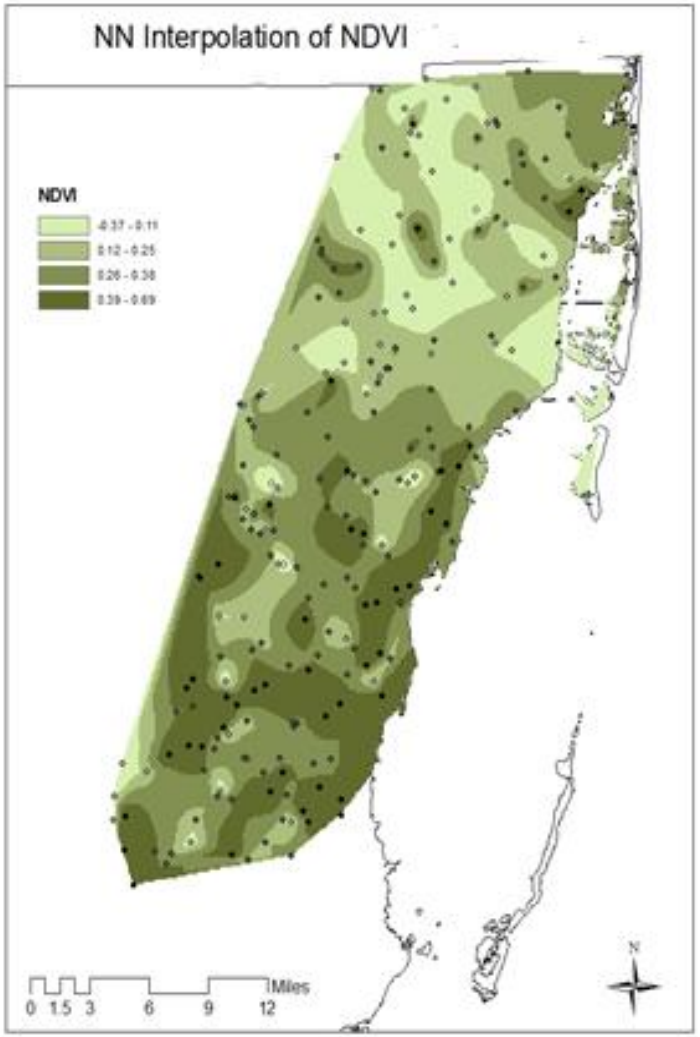
WHAT EXPLAINS CONTEMPORARY TREE CANOPY DISTRIBUTION ?

Hypothesis	Data Source	Method
1) As population increases, also construction density increases and this leads to decreases in tree canopy.	•Tree plot data – F. Escobedo •Property appraisal parcels •Census data •1913 John W. Harshberger Vegetation Map •1967 H. Davis Vegetation Map •Interview with Roger Hammer (expert informant) •Historical records	•Quantitative and qualitative •Mapping increasing densities over time (GIS) •Other GIS methods •Informant interview used to guide historical research •Used historical documents to understand link between quantitative data
2)Current canopy patterns are affected by particular municipal ordinances.	•DERM website •Coral Gables Public Service documents	•Qualitative research

TREE DENSITY - PLOTS IN MIAMI-DADE



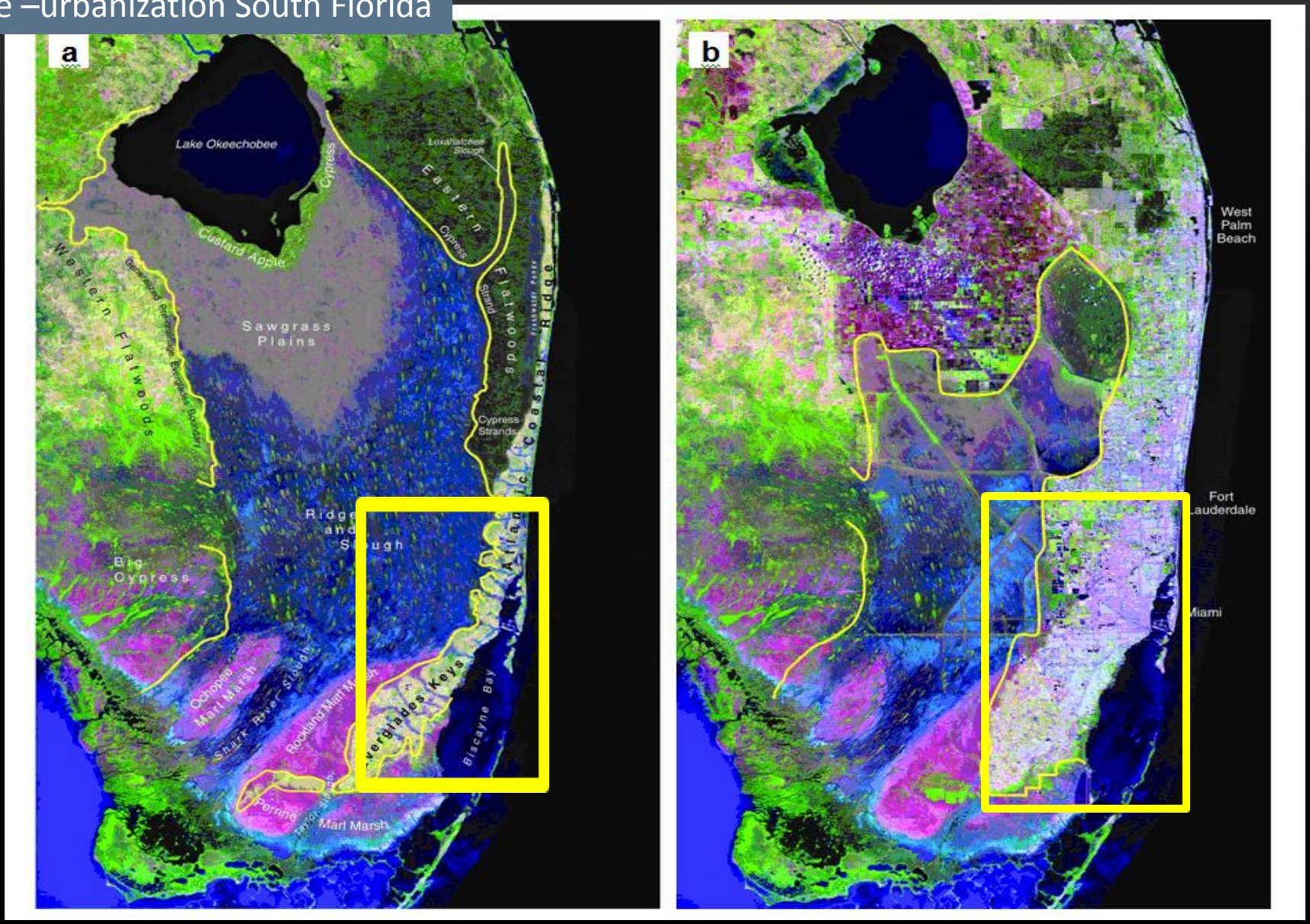

Nearest Neighbor Interpolation of Tree Cover in MDC
Legend
0 - 0
1 - 25
26 - 50
51 - 75
76 - 100
Miles
0 1.5 3 6 9 12
N


NN Interpolation of NDVI
NDVI
Miles
0 1.5 3 6 9 12
N

“What happened early on, don’t know who to blame it on - Julia Tutle or Broward. When agriculture and the rock plow came, that changed the whole ballgame… When we first started at Natural Areas Management we were charged with burning a lot of the country’s pine land. We had a map of Dade County that showed the original pine rock land canopy that covered the Miami rock ridge and next to it was what it looks like today. It went from 186k acres to fewer than 4k acres in whatever time span that was (100years). The biggest chunks would be Navye wales and Larian Penny. There used to be a sea of pine land, but now it’s limited…

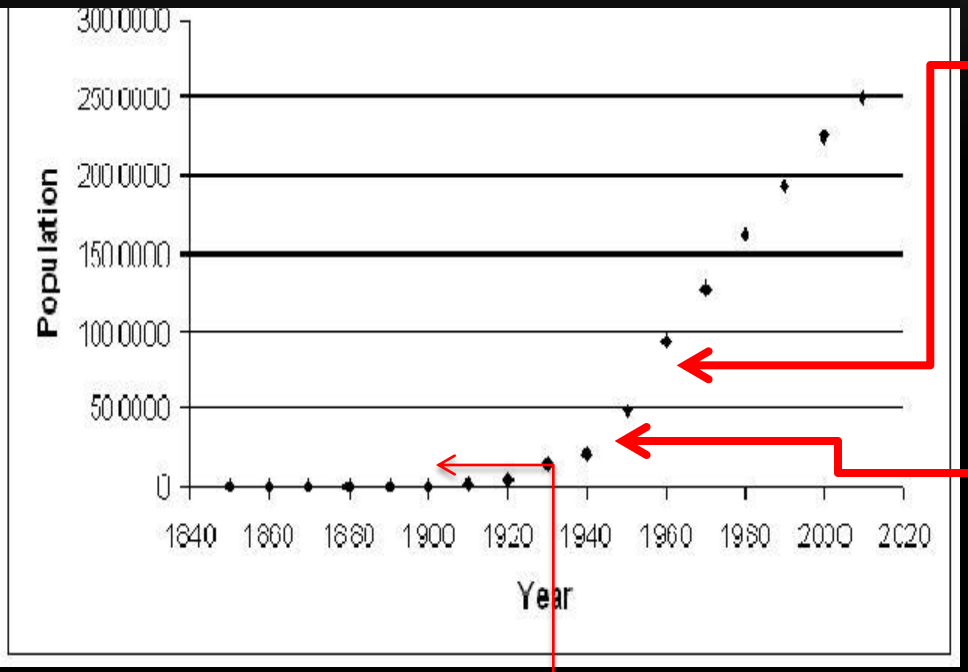
Interview with Roger L. Hammer
(Senior interpretive naturalist, Miami-Dade Parks Department,
and Manager of Castellow Hammock Nature Center since 1977)

Pre –urbanization South Florida



H1: POPULATION DENSITY INCREASE

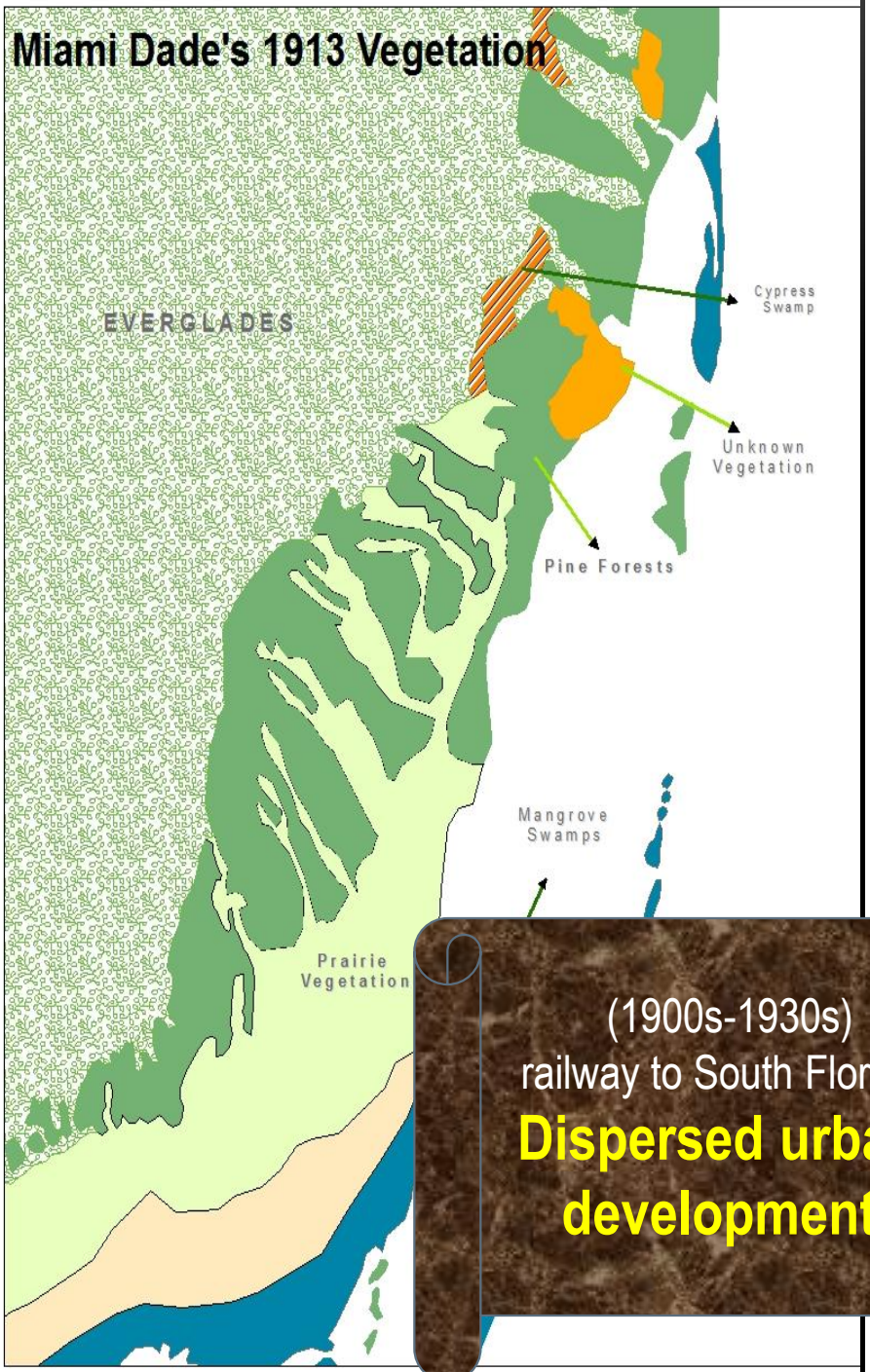
Three major points in history that determined changes in natural forest:

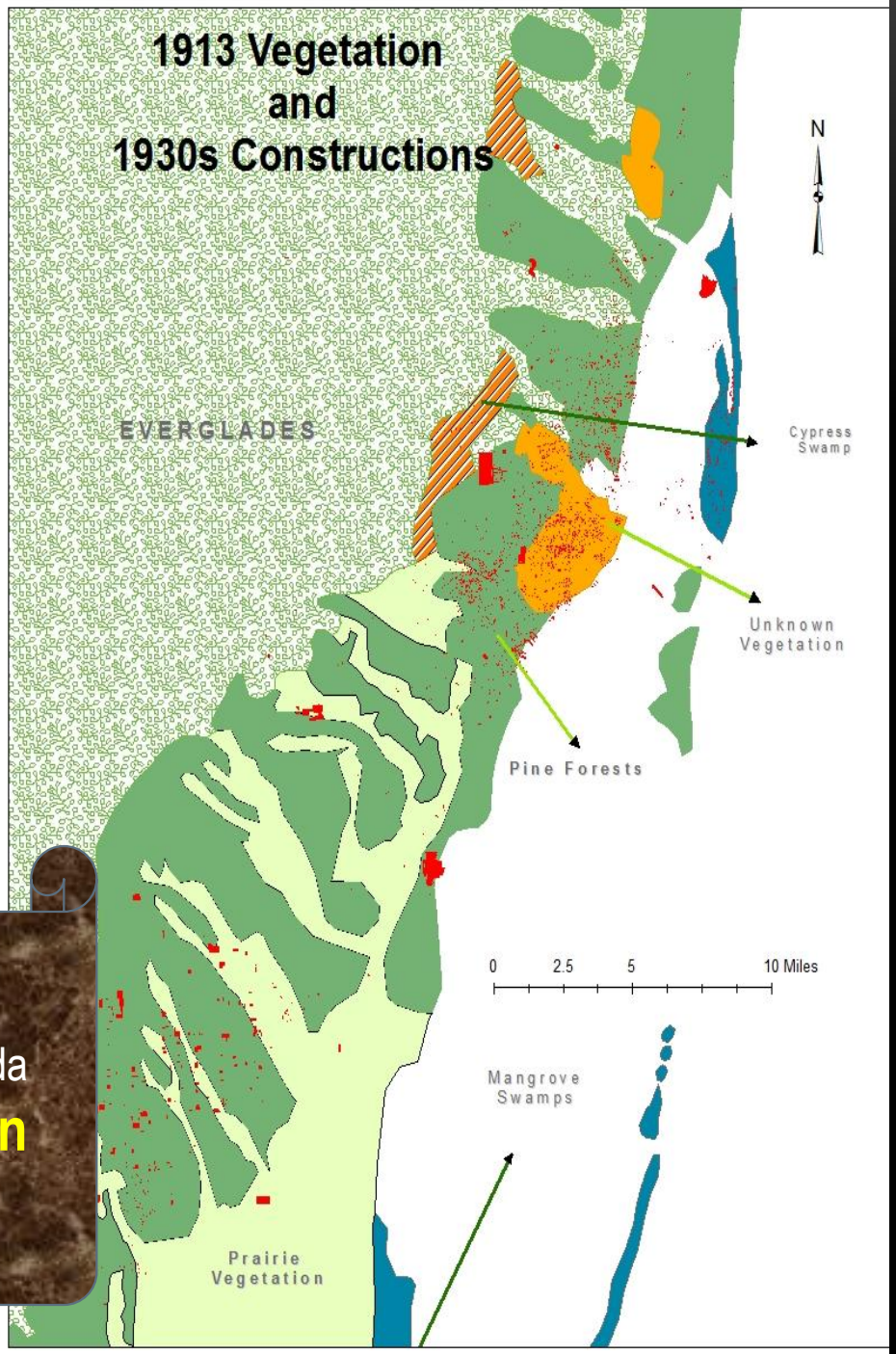


(1960s-1970s)
Cuban migration
other Latin American migrations

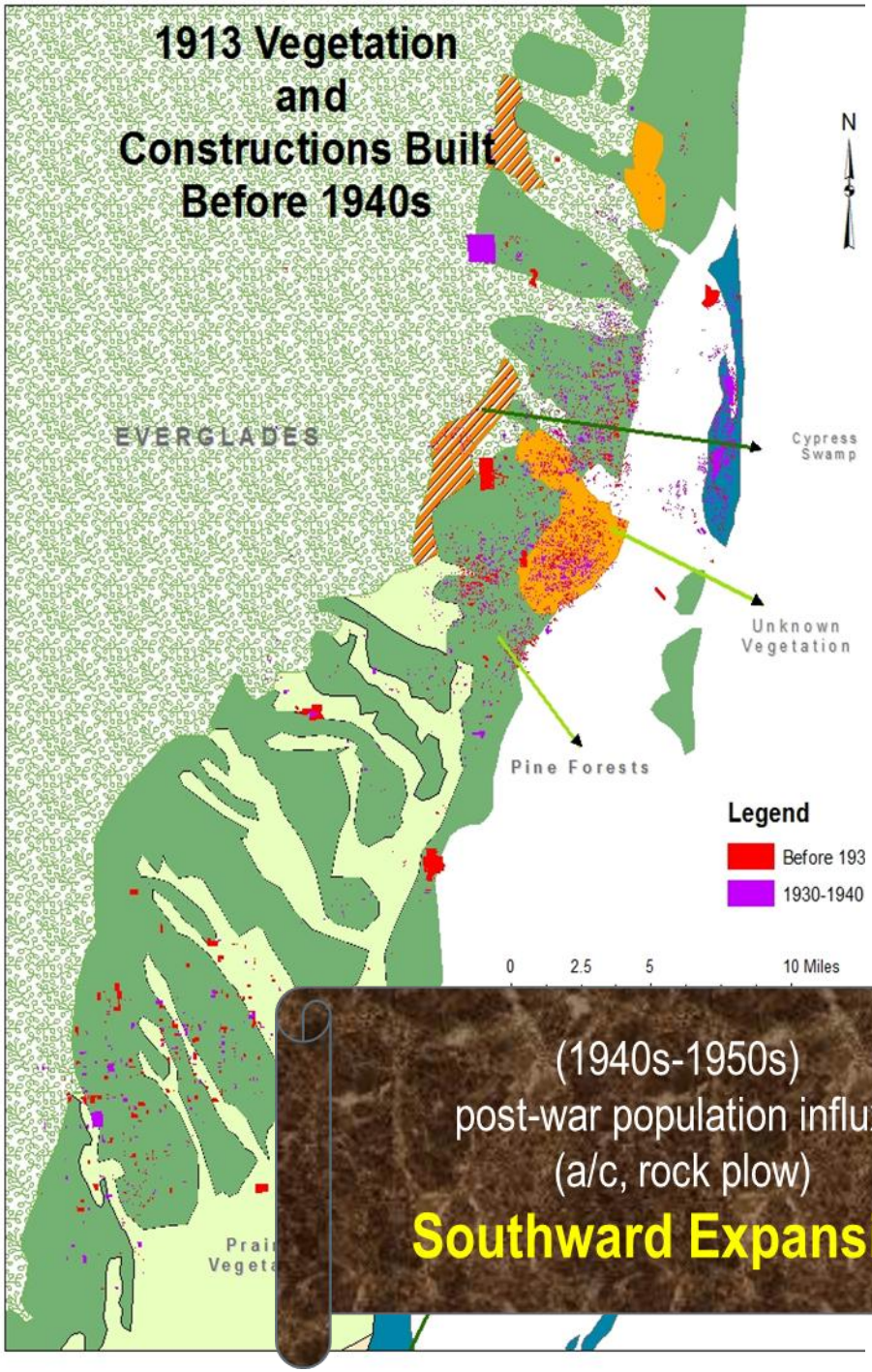
(1940s-1950s)
post-war population influx
technological advancements
(a/c, rock plow)

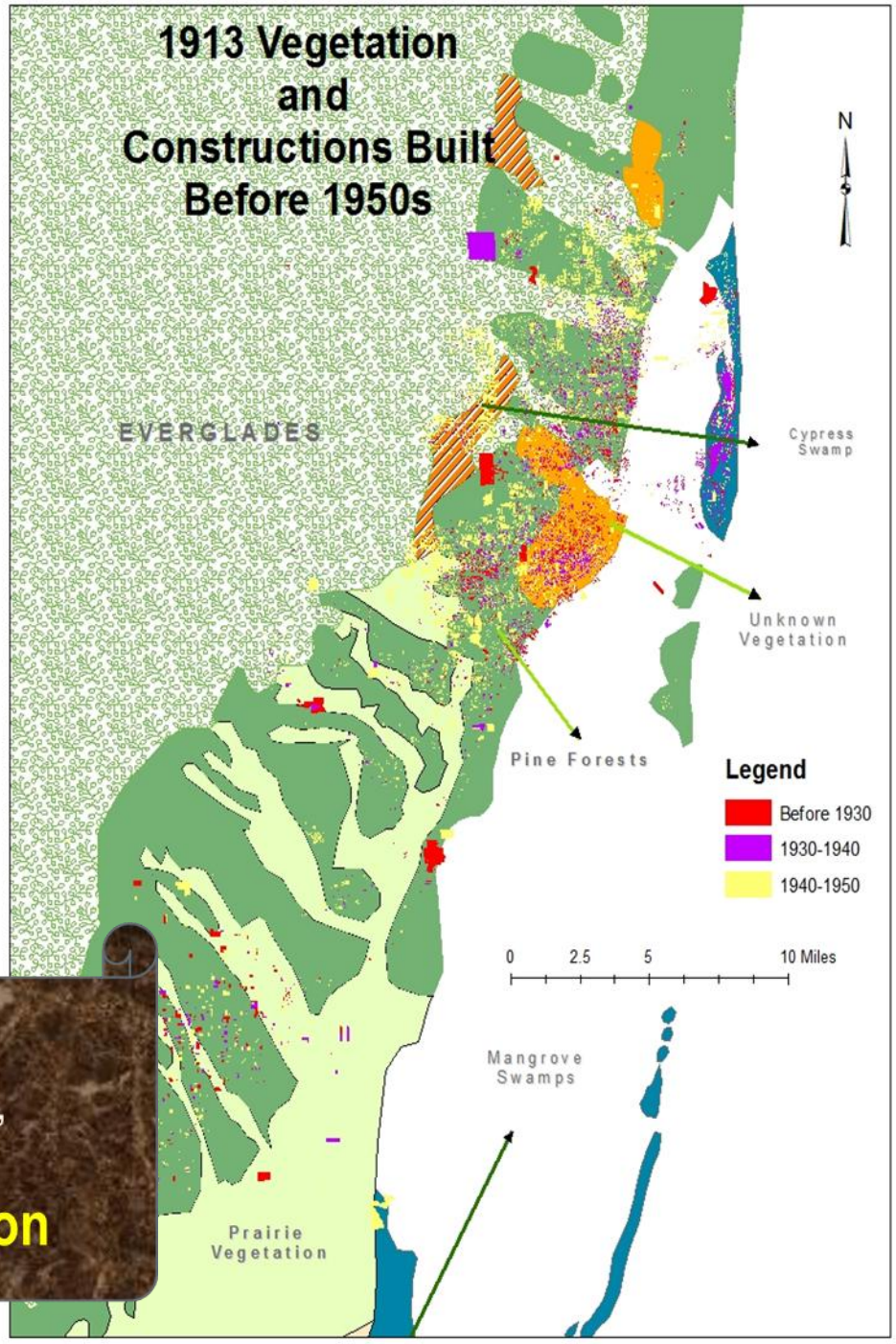
(1900s-1930s)
Flagler's railway extension to South Florida





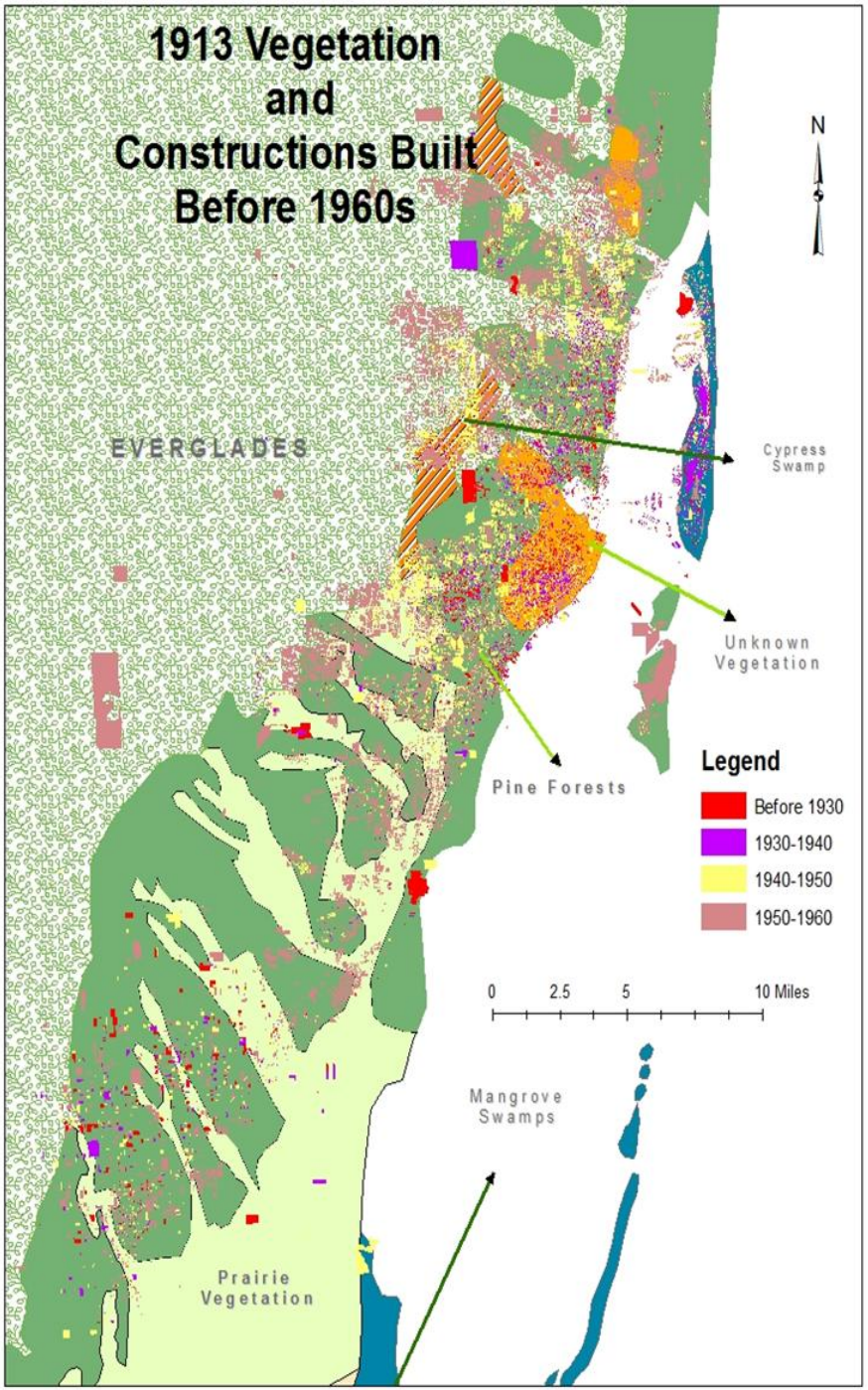
(1900s-1930s)
railway to South Florida
Dispersed urban development

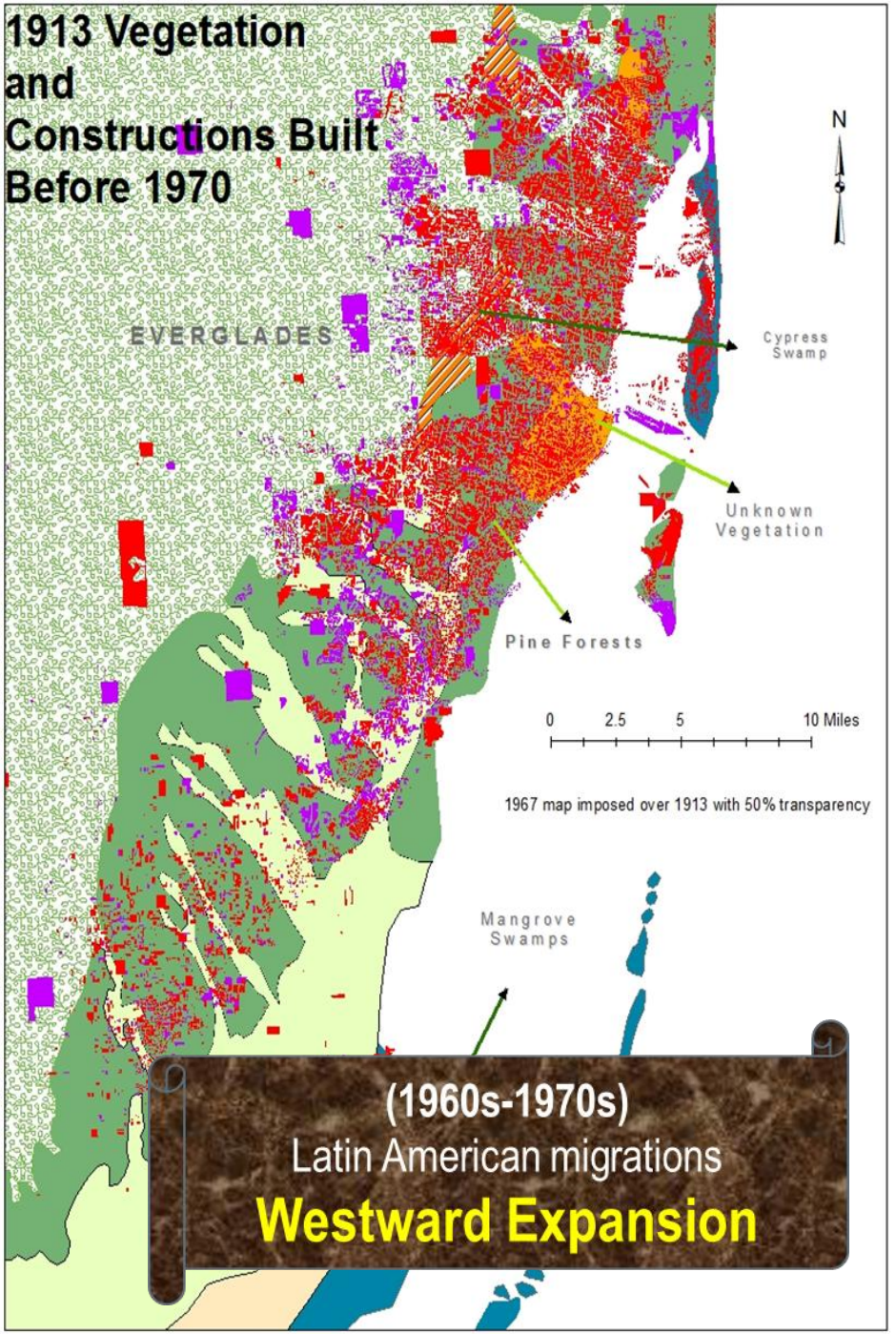


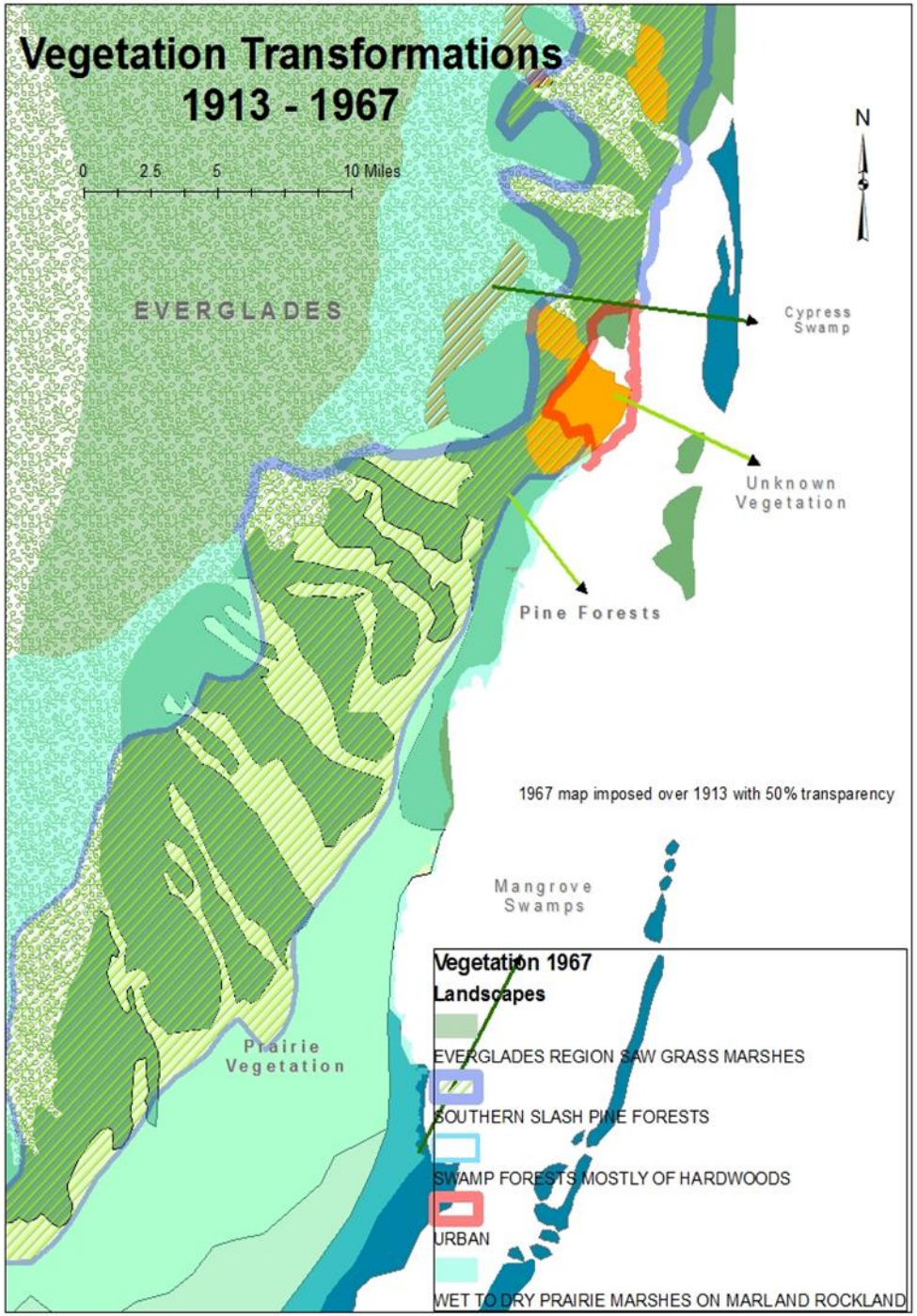


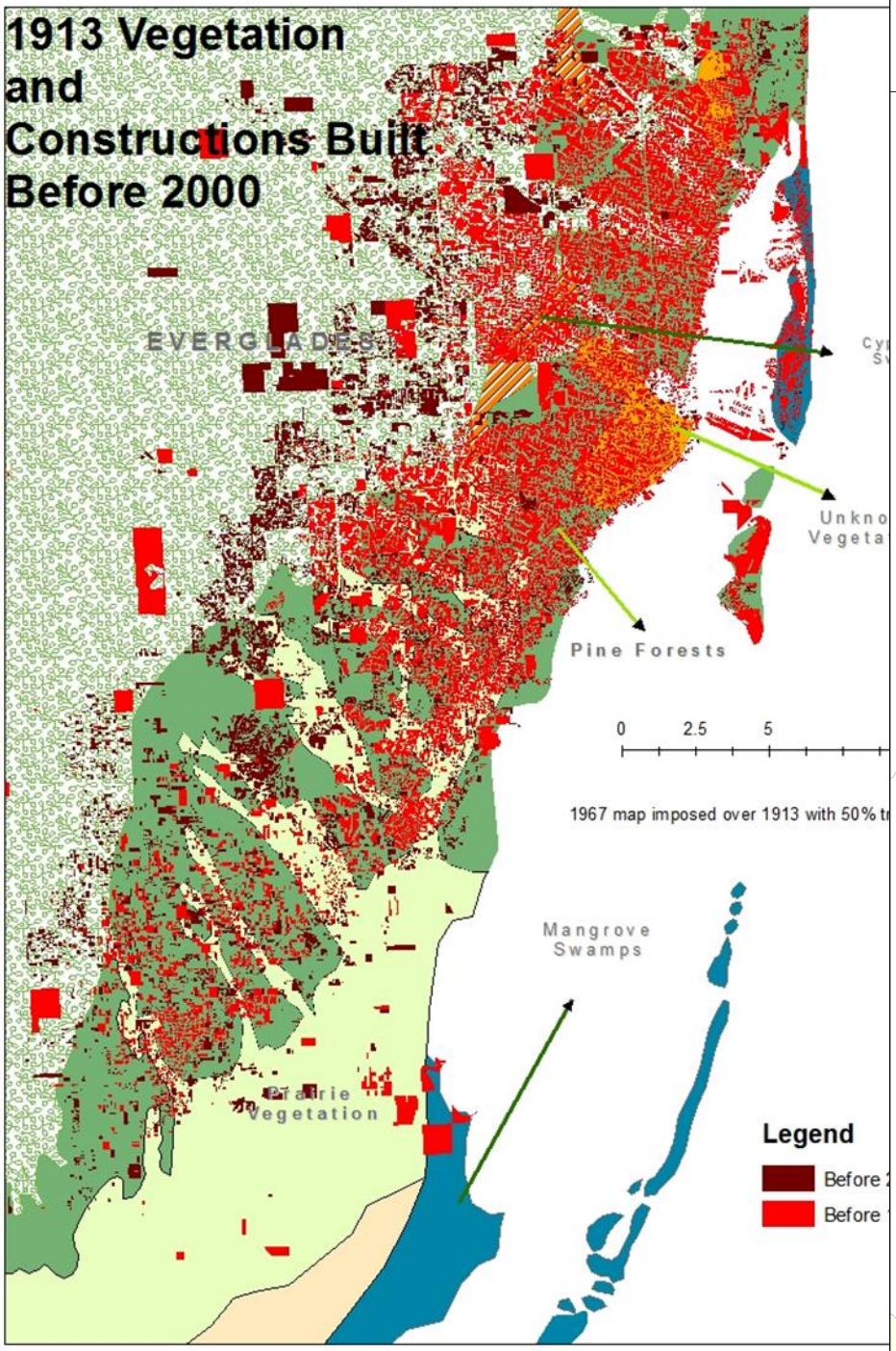
(1940s-1950s)
post-war population influx,
(a/c, rock plow)

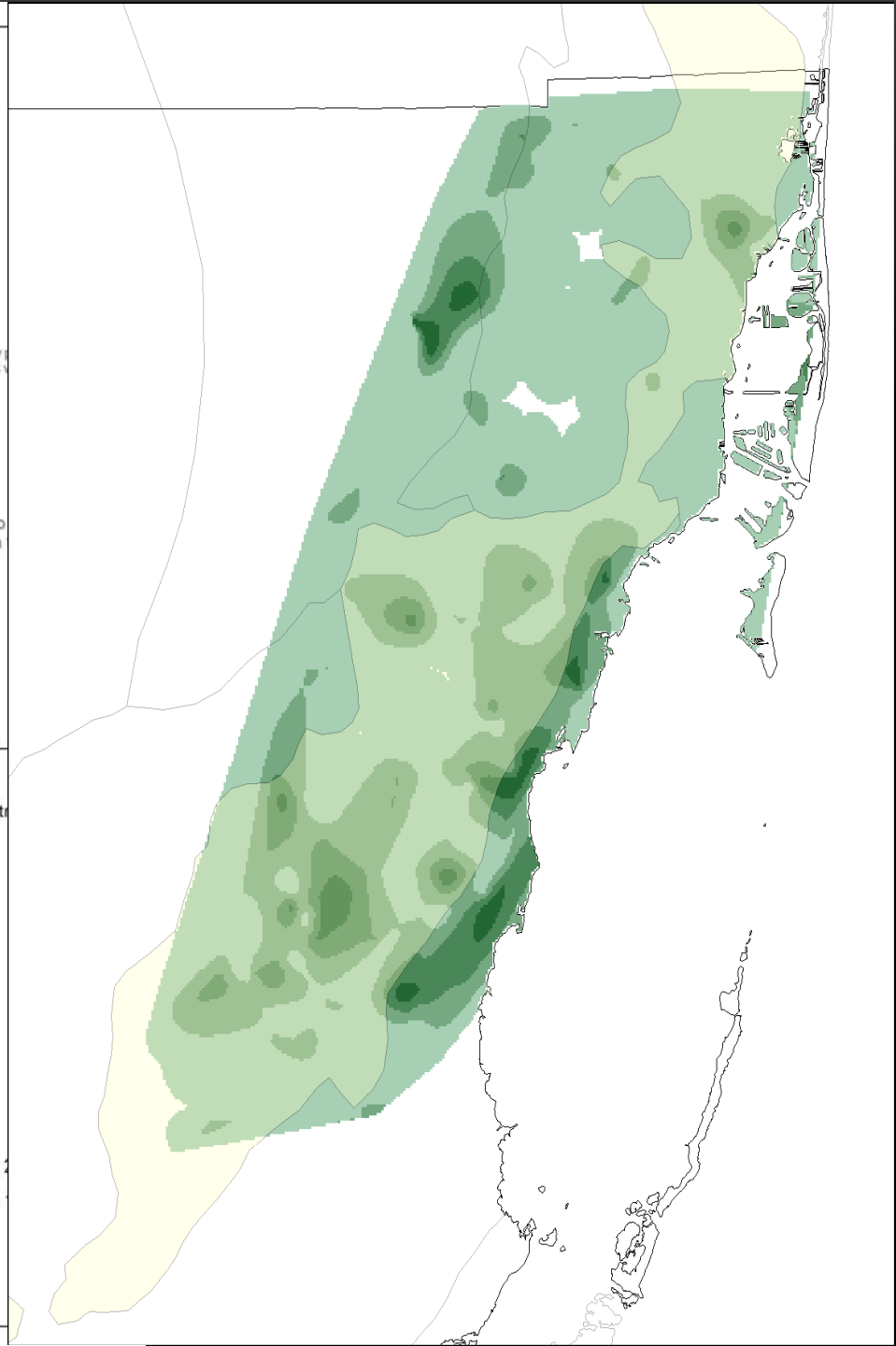
Southward Expansion

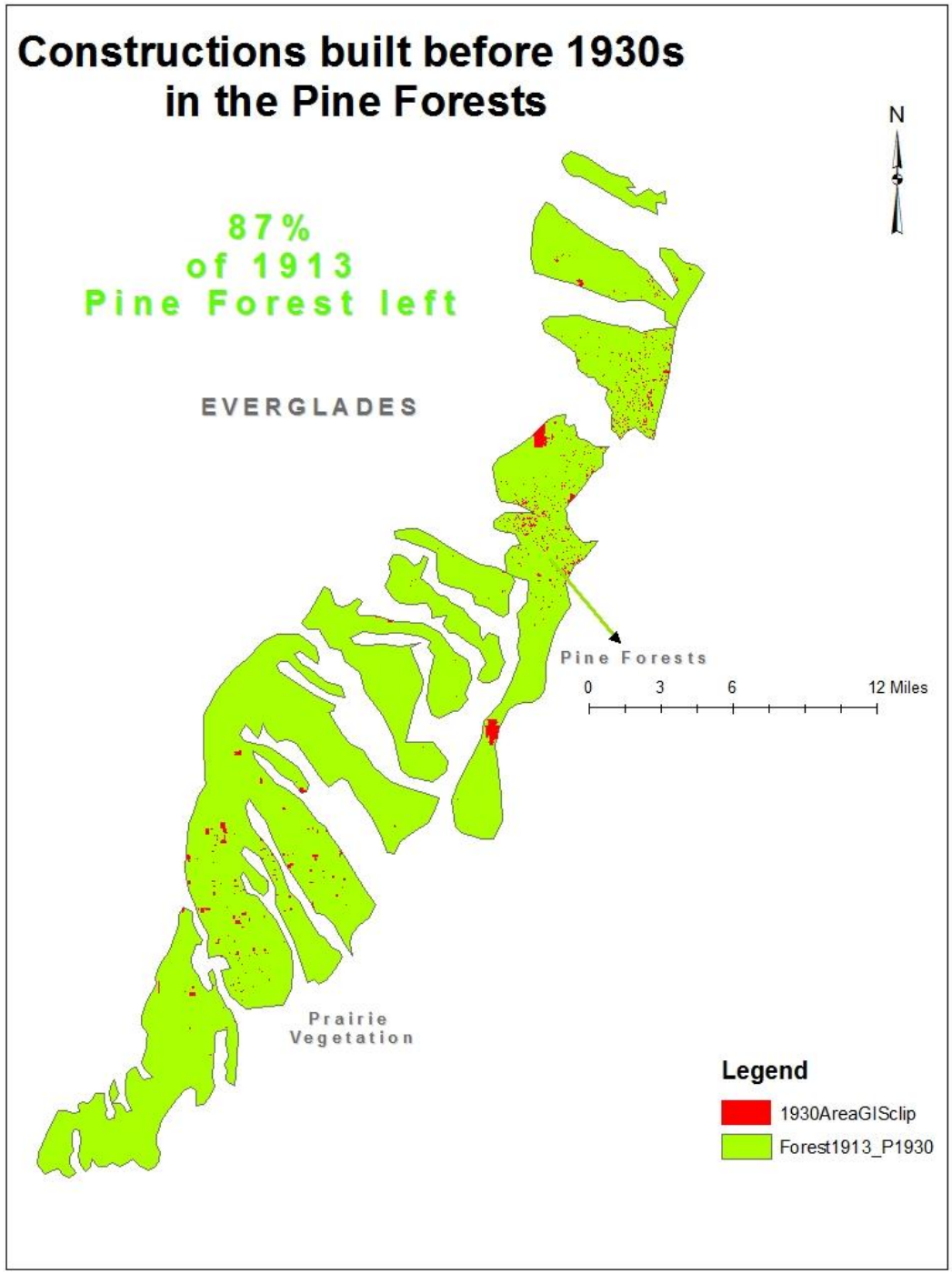

1913 Vegetation
and
Constructions Built
Before 1960s
N
EVERGLADES
Cypress
Swamp
Unknown
Vegetation
Pine Forests
Legend
Before 1930
1930-1940
1940-1950
1950-1960
0
2.5
5
10 Miles
Mangrove
Swamps
Prairie
Vegetation

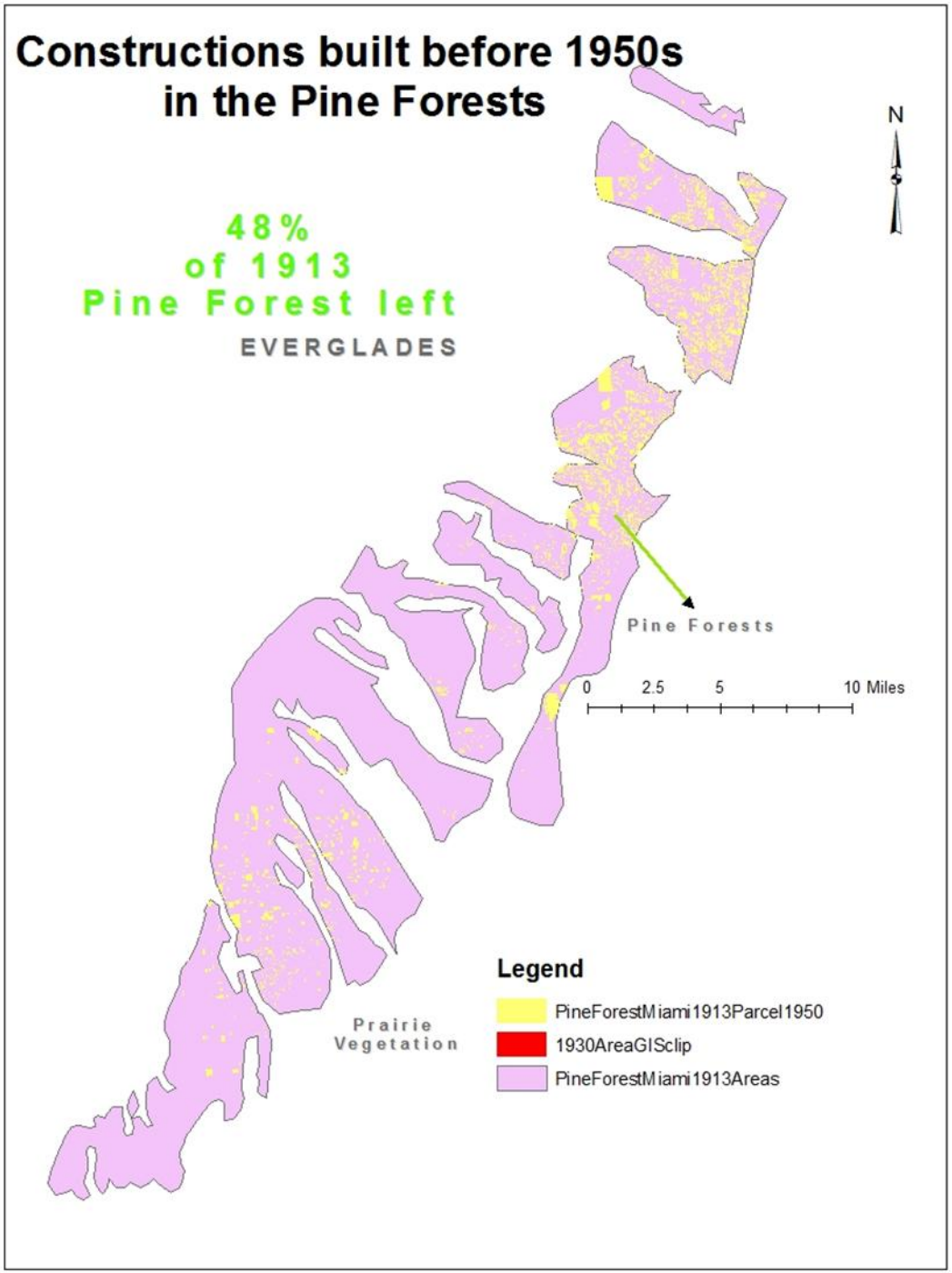

1913 Vegetation
and
Constructions Built
Before 1970
N
EVERGLADES
Cypress
Swamp
Unknown
Vegetation
Pine Forests
0
2.5
5
10 Miles
1967 map imposed over 1913 with 50% transparency
Mangrove
Swamps
(1960s-1970s)
Latin American migrations
Westward Expansion

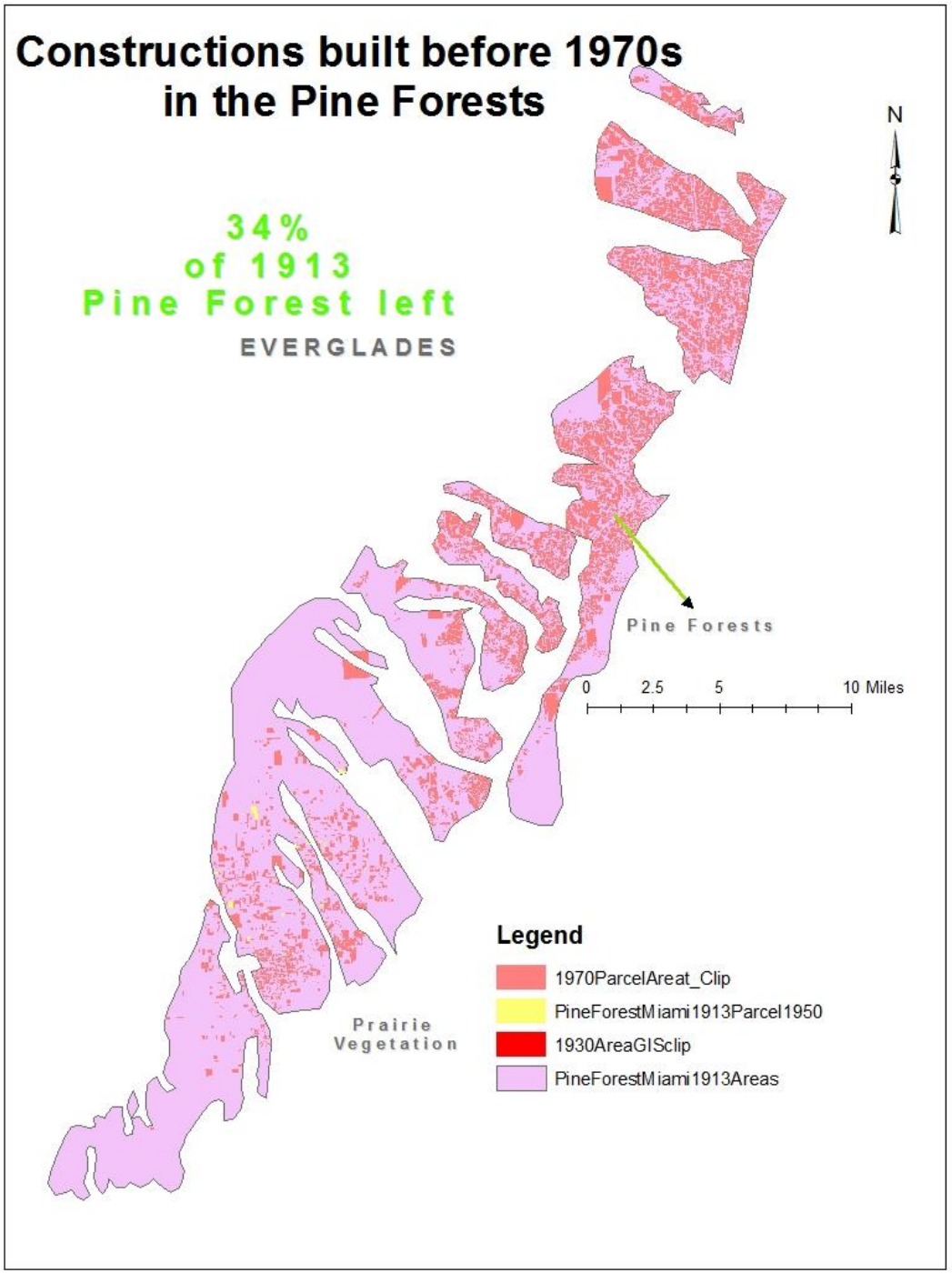

Vegetation Transformations
1913 - 1967
0 2.5 5 10 Miles
N
EVERGLADES
Cypress Swamp
Unknown Vegetation
Pine Forests
1967 map imposed over 1913 with 50% transparency
Mangrove Swamps
Prairie Vegetation
Vegetation 1967
Landscapes
EVERGLADES REGION SAW GRASS MARSHES
SOUTHERN SLASH PINE FORESTS
SWAMP FORESTS MOSTLY OF HARDWOODS
URBAN
WET TO DRY PRAIRIE MARSHES ON MARLAND ROCKLAND

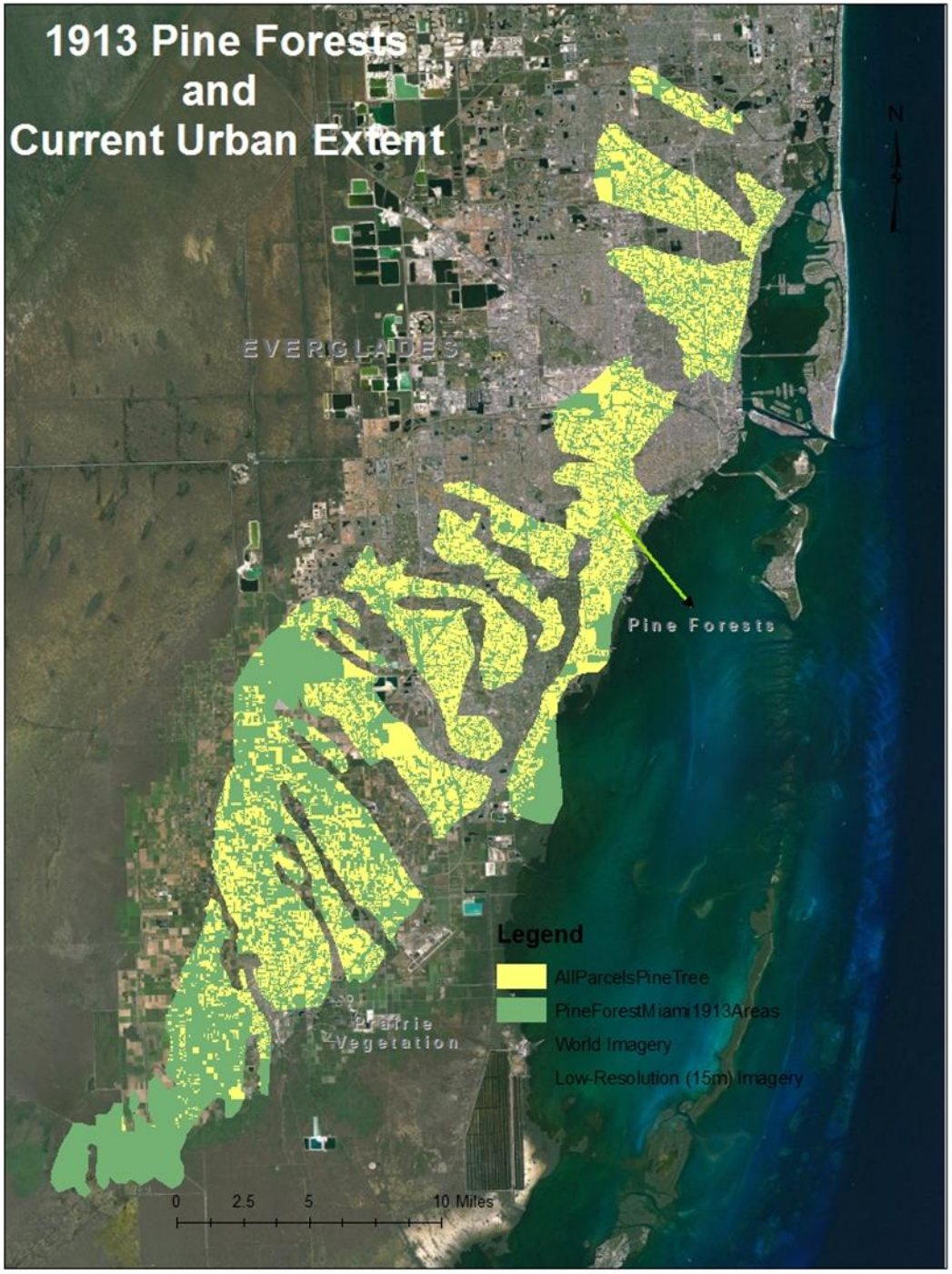

1913 Vegetation and Constructions Built Before 2000
EVERGLADES
Pine Forests
0 2.5 5
1967 map imposed over 1913 with 50% tr
Mangrove Swamps
Prairie Vegetation
Legend



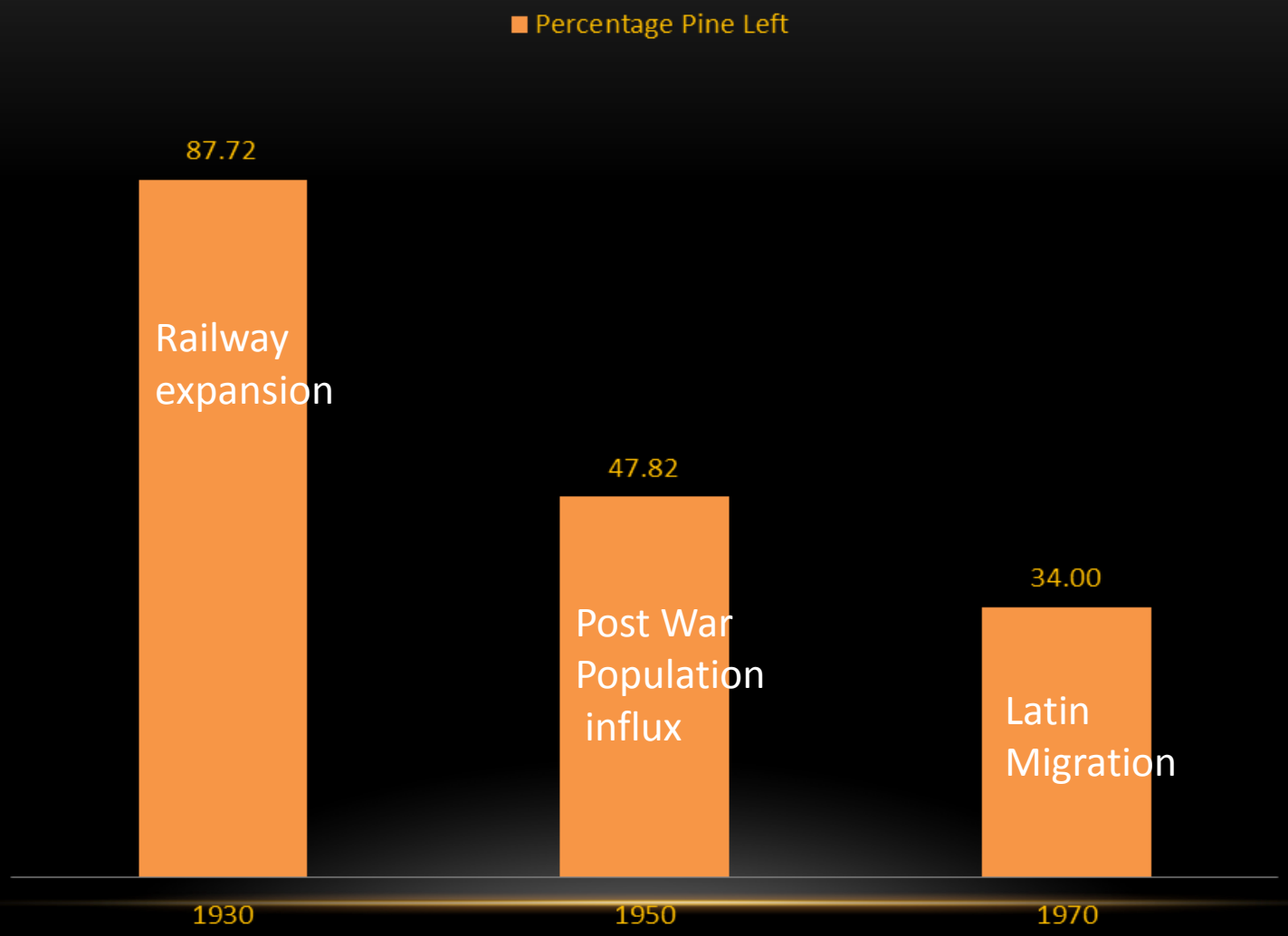

Constructions built before 1930s
in the Pine Forests
N
87%
of 1913
Pine Forest left
EVERGLADES
Pine Forests
0 3 6 12 Miles
Prairie
Vegetation
Legend
1930AreaGISclip
Forest1913_P1930


Constructions built before 1950s
in the Pine Forests
48%
of 1913
Pine Forest left
EVERGLADES
N
Pine Forests
0 2.5 5 10 Miles
Prairie
Vegetation
Legend
PineForestMiami1913Parcel1950
1930AreaGISclip
PineForestMiami1913Areas


Constructions built before 1970s
in the Pine Forests
34%
of 1913
Pine Forest left
EVERGLADES
N
Pine Forests
0 2.5 5 10 Miles
Prairie
Vegetation
Legend
1970ParcelAreat_Clip
PineForestMiami1913Parcel1950
1930AreaGISclip
PineForestMiami1913Areas


1913 Pine Forests
and
Current Urban Extent
EVERGLADES
Pine Forests
Legend
AllParcelsPineTree
PineForestMiami1913Areas
World Imagery
Low-Resolution (15m) Imagery
Prairie
Vegetation
0
2.5
5
10 Miles
N

Percentage Pine Forest Left



H2: MUNICIPAL ORDINANCES

- Section 24.49. MDC Code mandates protection of County's tree and forest resources
- Permits required for all tree removal or relocation (certain exemptions)
- DERM reserves the right to modify or deny plans
- Specific rules and standards for tree trimming/pruning
- All "regular-sized" trees removed-- except for the exempt or prohibited species -- must be replaced with equal amount of tree canopy. "Specimen-sized" trees require double canopy replacement.
- Penalties for non-compliance
- Many municipalities have their own tree ordinances

- Tree Trust Fund (2004)
  - Used for tree replacement
- City of Miami Tree Master Plan (2007)
  - Initiated by Urban Forestry Working Group of Miami Green Comission
  - Main goal: minimum of 30% tree canopy coverage, City-wide, by 2020

CONCLUSIONS

- Tree canopy
  - overall decrease
  - certain patterns of increase (previous prairies) – due to social factors
  - Current distribution – higher densities in SE
  - Further research needed