

A map of the United States showing the Wildland Urban Interface (WUI). The map is color-coded: green for forested areas, yellow for intermix and wildland, and red for urban areas. The Great Lakes and the Gulf of Mexico are shown in light blue. The title "Demographic Growth and Change in the Wildland Urban Interface" is overlaid in large white text with a black outline.

# Demographic Growth and Change in the Wildland Urban Interface

Susan I. Stewart

WUI

Threats, Challenges, and Opportunities

Taking the Long-Term Perspective for Wildland Fire Management

Wildland Fire Leadership Council, June 20, 2007

water



# The Wildland Urban Interface

Where **structures** and other human development meet or intermingle with undeveloped **wildland vegetation...**

*Federal Register*

*...and where demographic changes and trends impact wildland fire management*

## SPORTS SCORES



## 'The Rock' and hard places

■ Tough receiver shines in first half for 4-2 Bengals; others struggle near midseason, 1, 10-11C

By John Saunders &amp; Andrew...

T.J. Houshmandzadeh: Noted for physical play.

## USA TODAY

NO. 1 IN THE USA



## Much eager for 'Borat'

■ The crazed comic's Kazakh character brings 'learnings' to big screen, 1E

By Gao Miao-Hsuan, USA TODAY

Sacha Baron Cohen: Punctures culture wars.

Fri/Sat/Sun, October 27-29, 2006

## Newsline

News Money Sports Life

## Weekend gas gauge

	Regular	Mid	Premium
Current average	\$2.202	\$2.317	\$2.422
Week ago	\$2.220	\$2.356	\$2.442
Year ago	\$2.593	\$2.754	\$2.854

Source: AAA.com, an online directory of prices from previous weeks.

- Exxon Mobil's \$10.5B profit nears record, 1, 3B
- Find prices in 50 states at money.usatoday.com



By Helen Kohler, Los Angeles Times, USA AP

## California wildfire kills four; arson cited

■ \$100,000 reward is offered after wind-fueled blaze near Palm Springs takes lives of firefighters; colleagues mourn loss, 3A

## Get ready to fall back

Daylight-saving time ends at 2 a.m. Sunday. Turn clocks back one hour.



USA TODAY

## Bush signs bill for 700-mile border fence

Mexico's president calls idea "shameful"; no money has been allocated for U.S. barrier, 7A

## South Korea to enforce U.N. resolution

Seoul defies warning from North Korea, says it will honor sanctions imposed after nuclear test, 12A

## Ferris Bueller reduced to pure fiction?

The days of skipping school and getting away with it appear to be gone forever, but not without debate, 5A

## Gators on top again

## Coaches' POLL

■ No. 1 Florida is only the second national champ in 40 years to return five starters, 1C

## Standings

No. 2 North Carolina

No. 3 Kansas

No. 4 Ohio State

No. 5 (tie) UCLA

and Pittsburgh



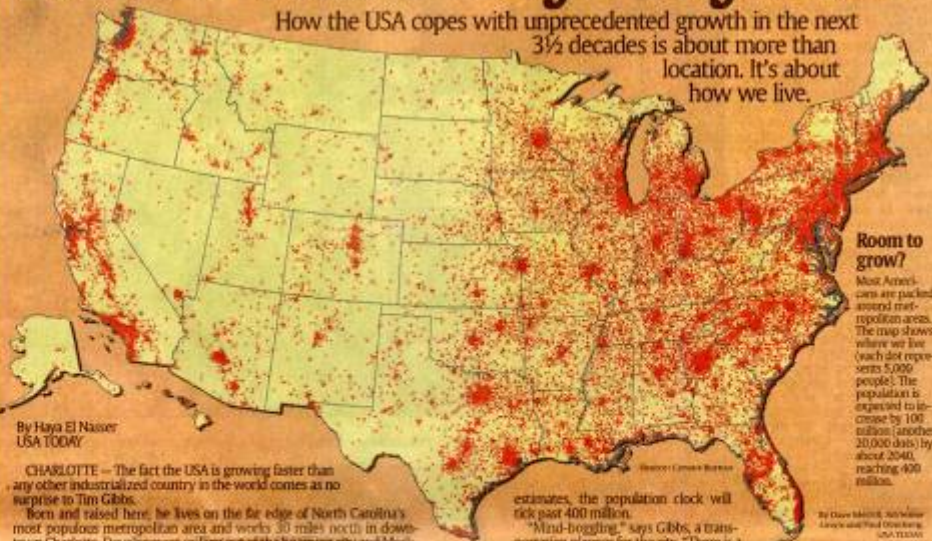
Joakim Noah: "We're playing for history."

By Andrew Gumpert, USA TODAY

## 100 million more Americans

## Where will everybody live?

How the USA copes with unprecedented growth in the next 3½ decades is about more than location. It's about how we live.



By Haya El Nasser, USA TODAY

CHARLOTTE — The fact the USA is growing faster than any other industrialized country in the world comes as no surprise to Tim Gibbs.

Born and raised here, he lives on the far edge of North Carolina's most populous metropolitan area and works 30 miles north in downtown Charlotte. Development spilling out of the booming city and Mecklenburg County is creeping closer and clogging his commute. It takes after 6:15 a.m. or before 8 a.m., he's on the road for up to 90 minutes.

"It's just overwhelming," says Gibbs, 46. "Folks who were born here try to figure out where is everybody coming from. . . . Growth is out of control."

He hasn't seen anything yet. The USA added 100 million people in the past 30 years and last week topped 300 million. We'll add the next 100 million even faster. Sometime around 2040, according to government

estimates, the population clock will tick past 400 million.

"Mind-boggling," says Gibbs, a transportation planner for the city. "There is a finite amount of land available."

Can the USA, which trails only China and India in population, absorb another 100 million people in such a short time? Where will everybody live? Space itself isn't the issue. More than half of Americans live within 50 miles of the Atlantic, Pacific, Gulf and Great Lakes coasts on just a fifth of the country's land area, according to the Center for Environment and

## Room to grow?

Most Americans are packed around major metropolitan areas. The map shows where we live (each dot represents 5,000 people). The population is expected to increase by 100 million (another 20,000 dots) by about 2040, reaching 400 million.

By David H. Freed, 2006 Reader Service and Field Marketing, USA TODAY

## Cover story

Please see COVER STORY next page ▶



**Missouri Ozarks**



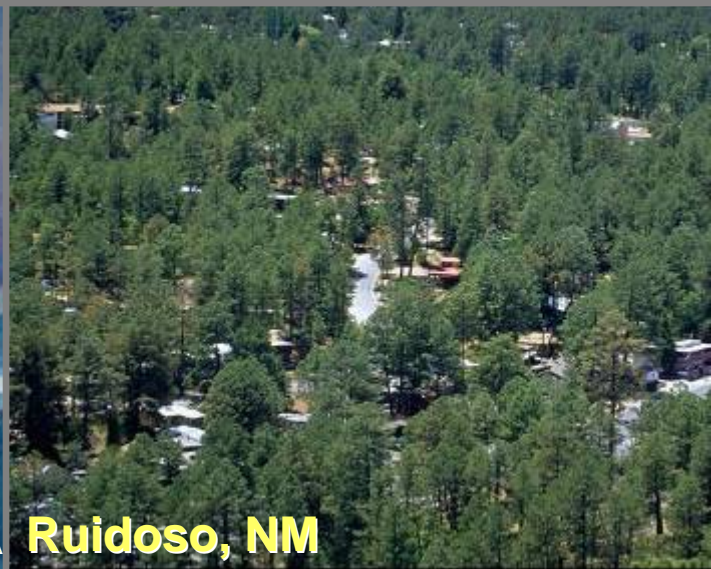
**Port Charlotte, FL**



**Bend, OR**



**Oakland Hills, CA**



**Ruidoso, NM**



**Northern Minnesota**



# Wildland Urban Interface 2000





## WUI


 intermix and interface

## Non-WUI Vegetated

 very low density housing  
 no housing

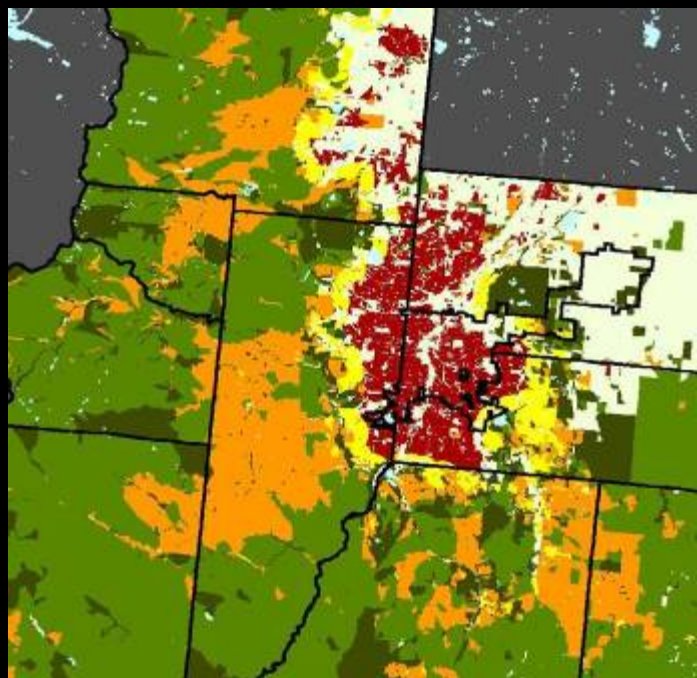
## Non-vegetated or agriculture

 medium and high density housing  
 low and very low density housing

 water

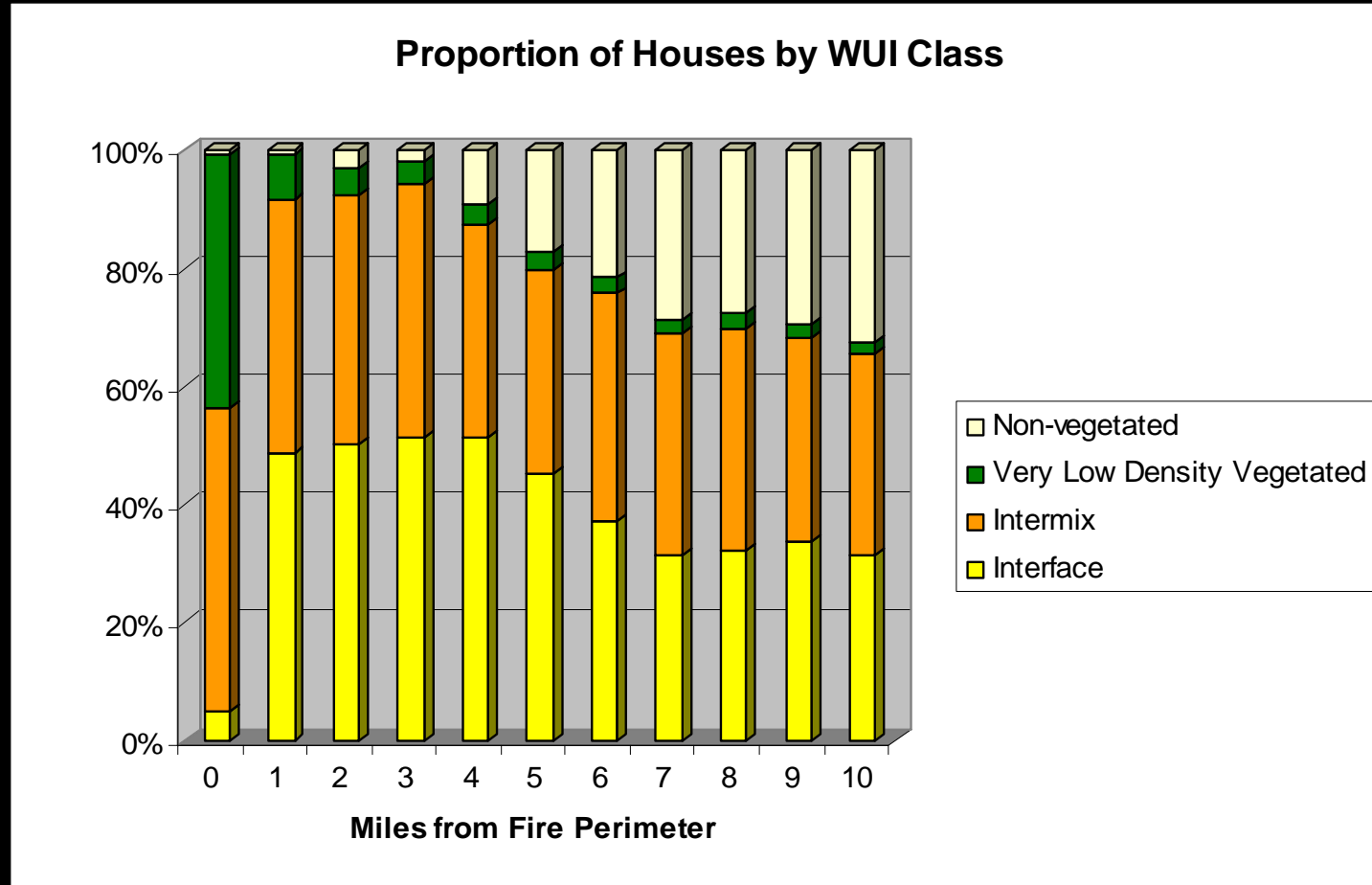
# The 2000 WUI

## Intermix and Interface



- Of the total WUI *area*
  - 82% is **intermix**
  - 18% is **interface**
- Of the *houses* in the WUI
  - 49% are in the **intermix**
  - 51% are in the **interface**

# WUI homes near fire perimeters



Within 4 miles of 2006 Western fire perimeters, over 90% of housing units classified as WUI, or very low density vegetated (Potential WUI)

# Population in WUI, 2000

**104 million people**  
**37% of the population**

Percent Population in WUI





# WUI Growth in the 1990s:

*Where are the 13.6 million new homes?*

- 1990 and 2000 Census block boundaries reconciled.
- 1992/3 NLCD land cover data used for both periods.



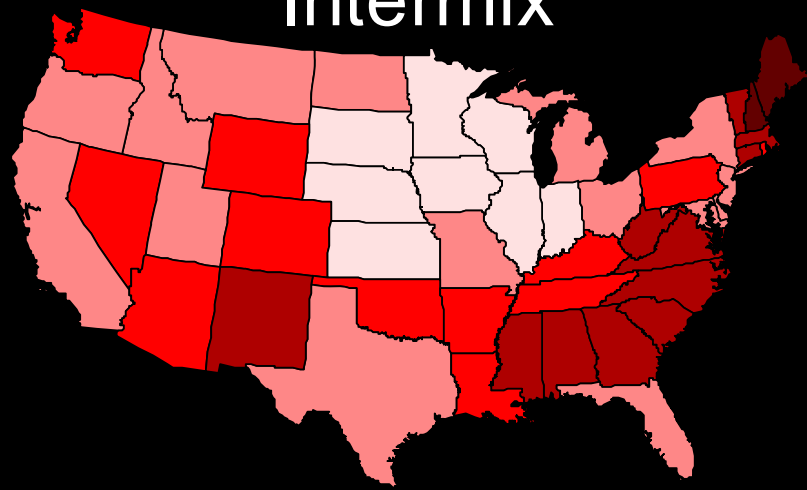
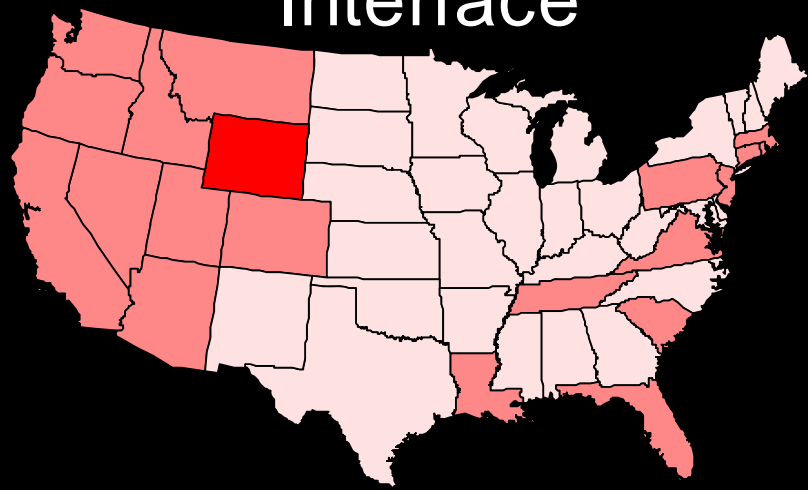
# WUI Growth, 1990-2000

- 60% of new homes are in the WUI
- Intermix WUI is growing the fastest
  - ⇒ Growth rate 4.6 times higher than in the non-WUI

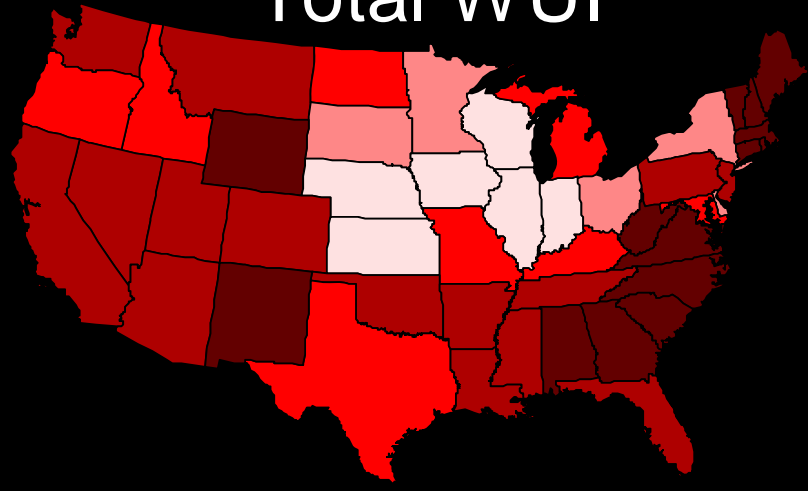
# Percent New Houses in the WUI

## Interface

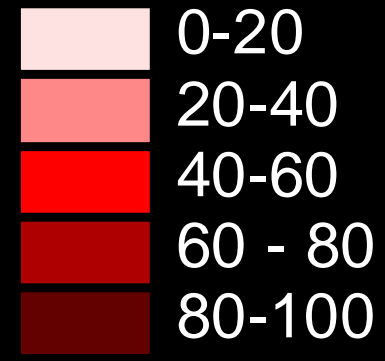
## Intermix



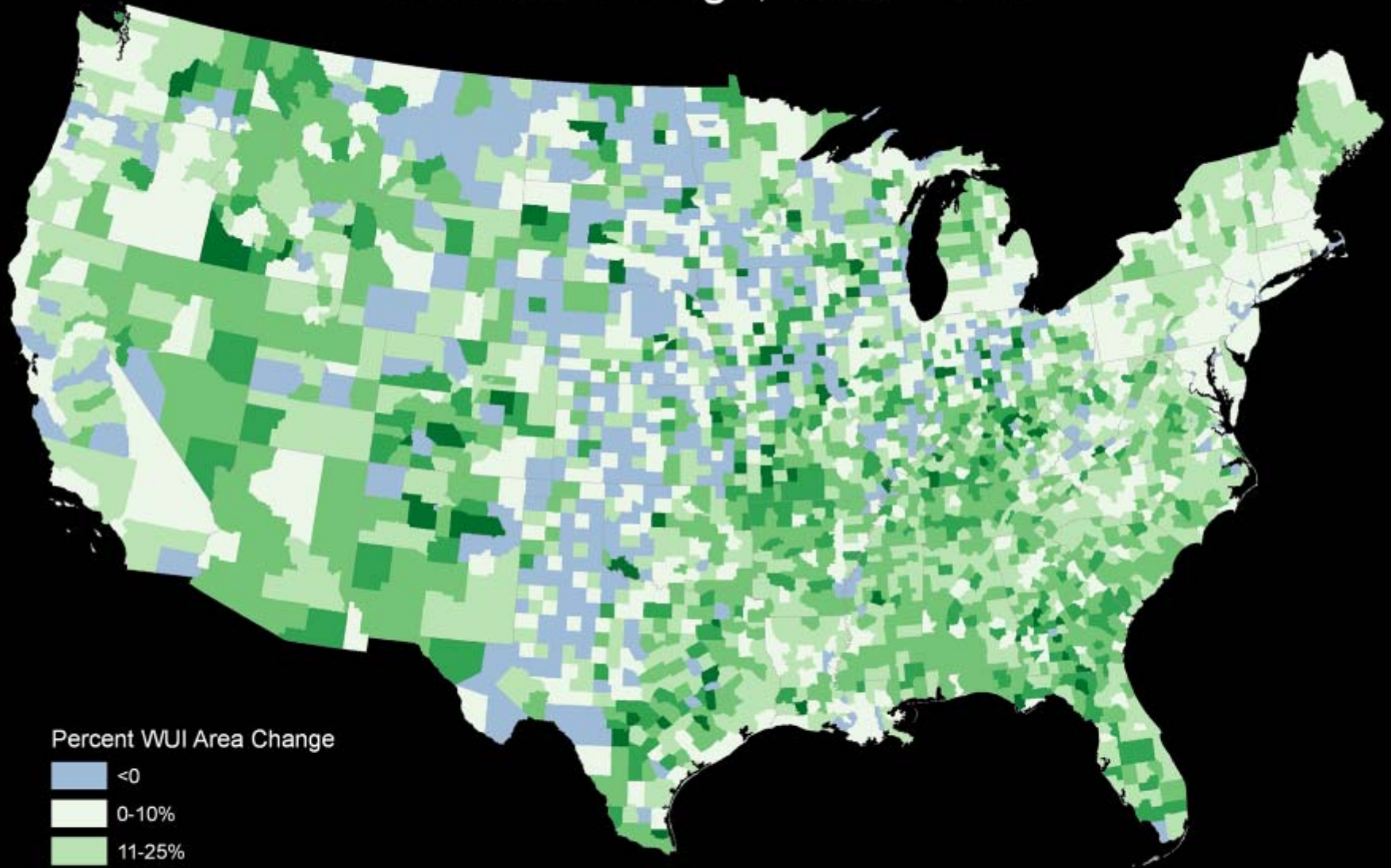
## Total WUI



Percent of all new house



# WUI Area Change, 1990 - 2000



Percent WUI Area Change

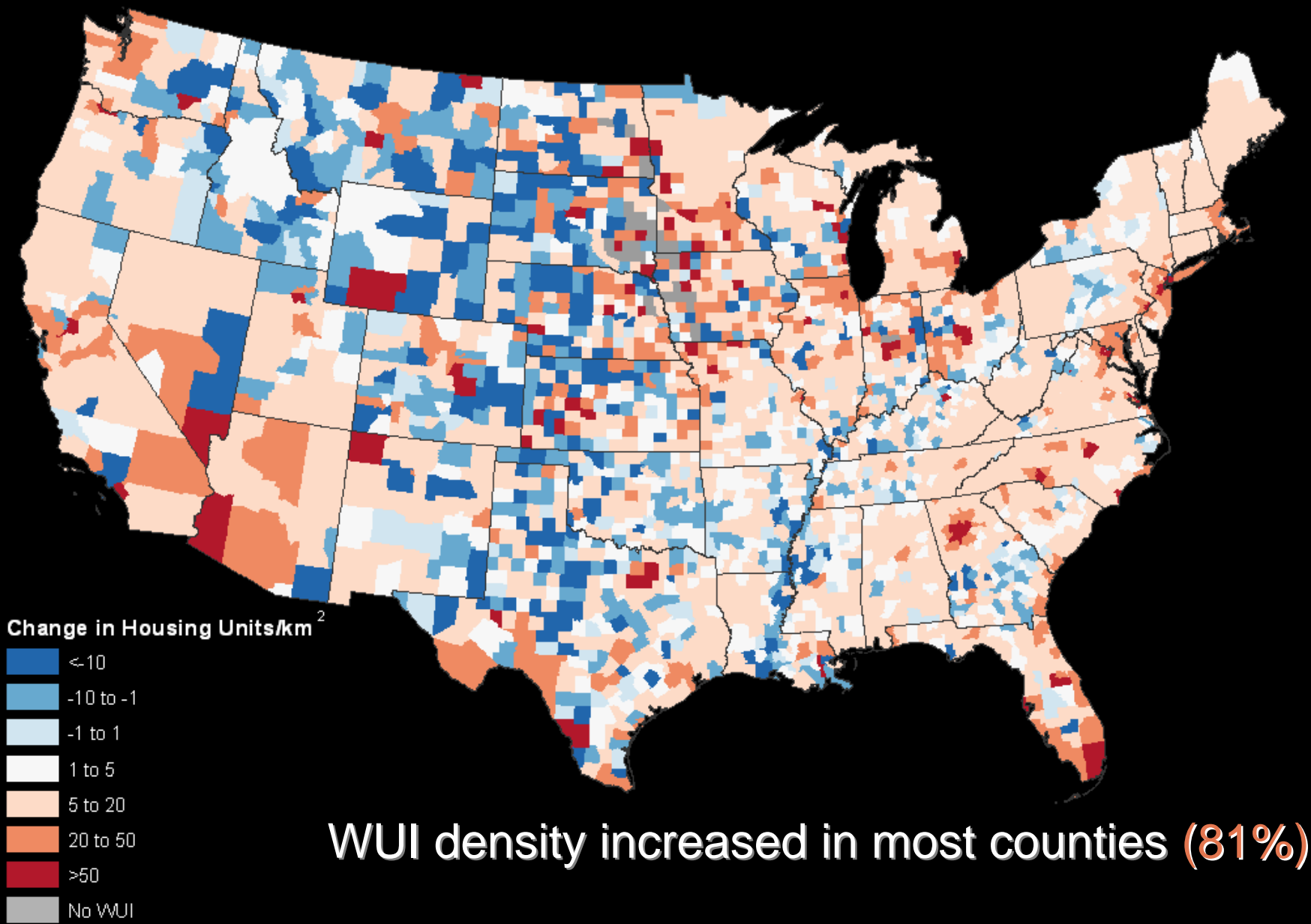
- <0
- 0-10%
- 11-25%
- 26-50%
- 51-100%
- >100%

Extent of WUI area increased in a majority (83%) of counties

# **Social Implications: WUI Area Increase**

- New neighborhoods can be designed so residents can better coexist with fire
- New subdivisions attract buyers from other areas
  - residents who are “new” to the WUI and fire
  - social networks not yet developed
  - familiarity with landscape may be low

# WUI Housing Density Change, 1990 - 2000



# **Social Implications: WUI Density Increase**

- New homeowners added to neighborhoods with existing programs, social capital
- New homes in existing neighborhoods are efficient to protect
- Infrastructure loads increase and capacity may be reached or surpassed (water, roads)
- Rising property values encourage re-investment in homes and property
  - possibility of underinsurance increases

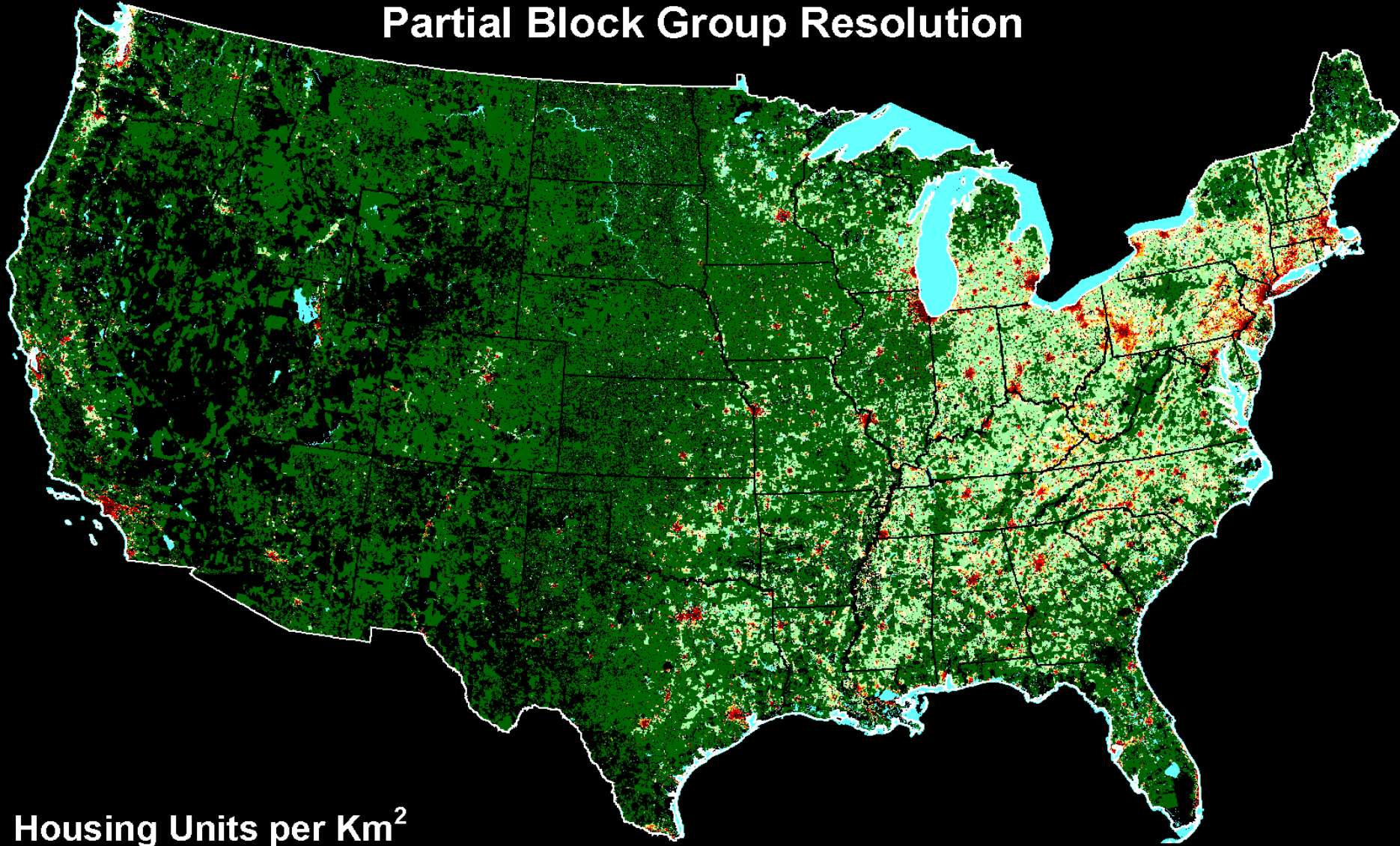
# Future Social Trends

- Continued housing growth



# Housing Density 1940

Partial Block Group Resolution

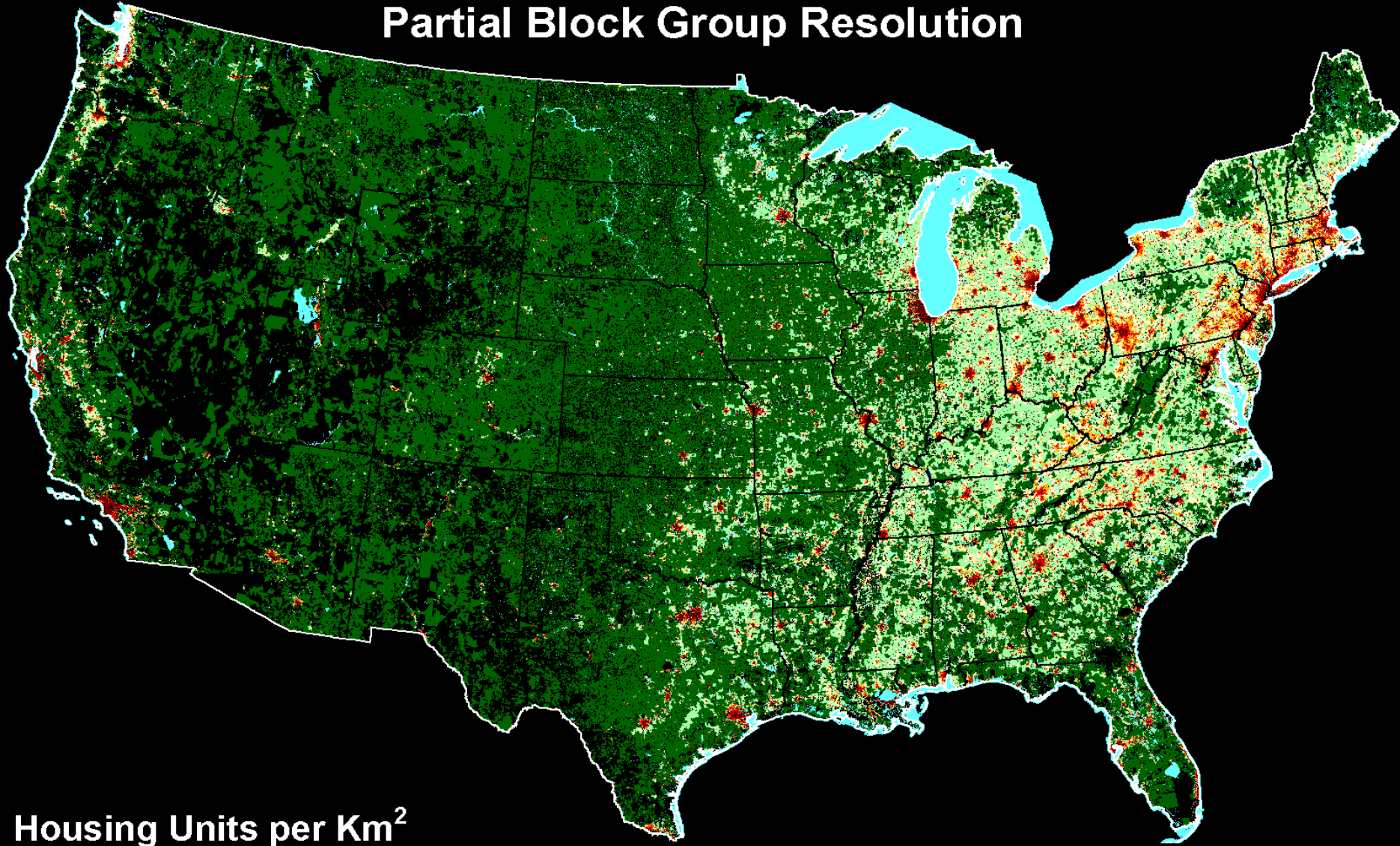


Housing Units per Km<sup>2</sup>



# Housing Density 1950

Partial Block Group Resolution

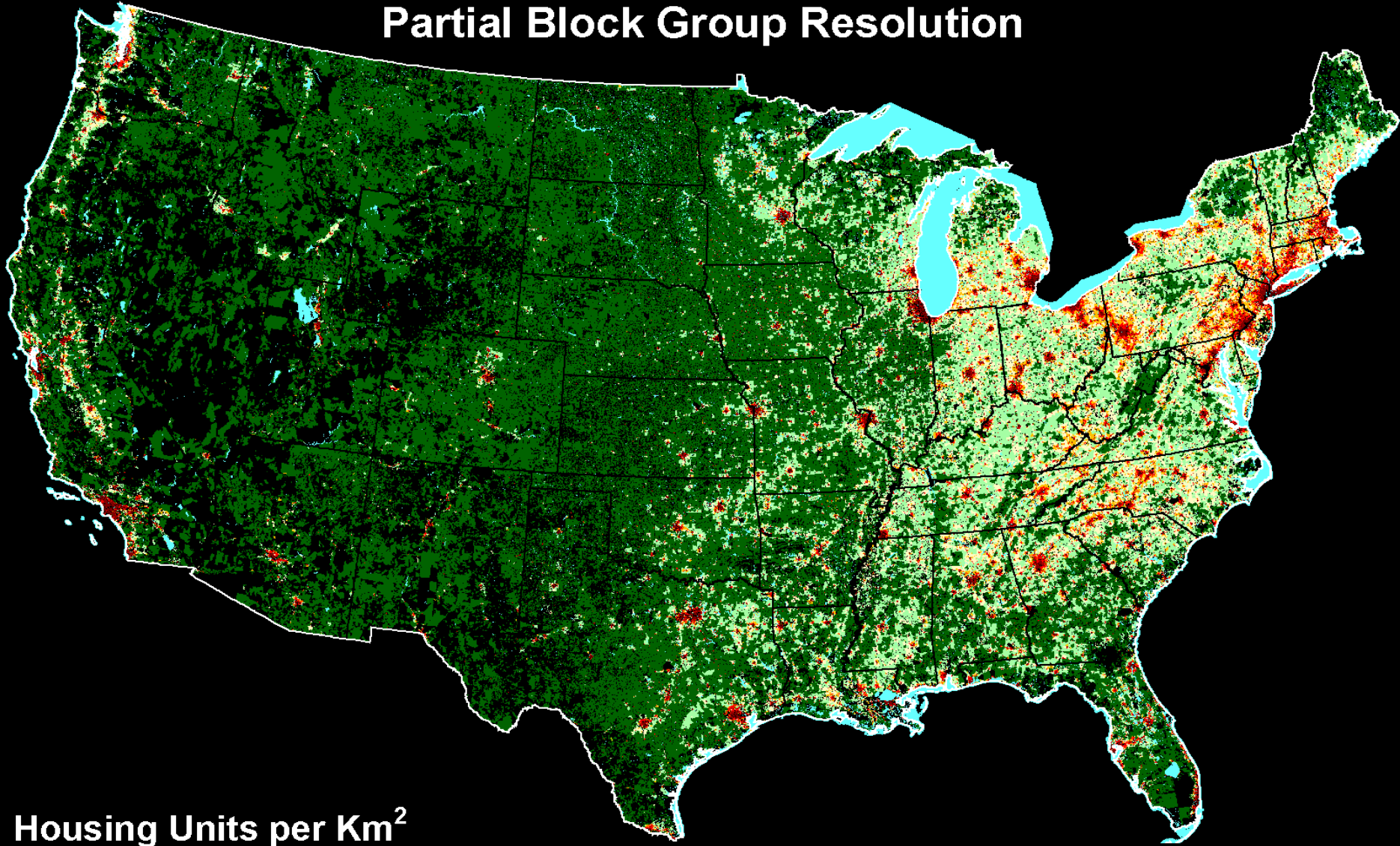


Housing Units per Km<sup>2</sup>



# Housing Density 1960

Partial Block Group Resolution

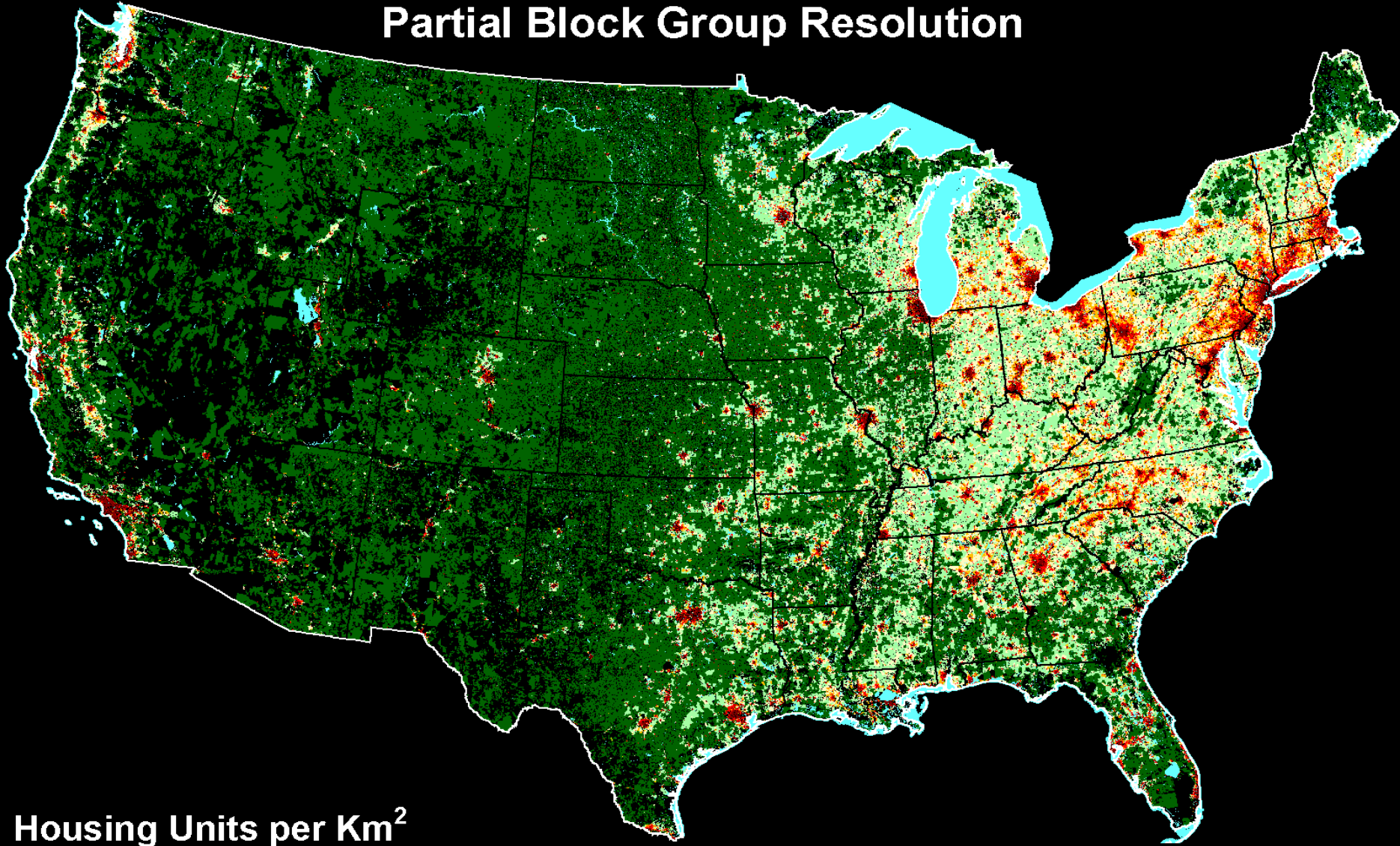


Housing Units per Km<sup>2</sup>



# Housing Density 1970

Partial Block Group Resolution

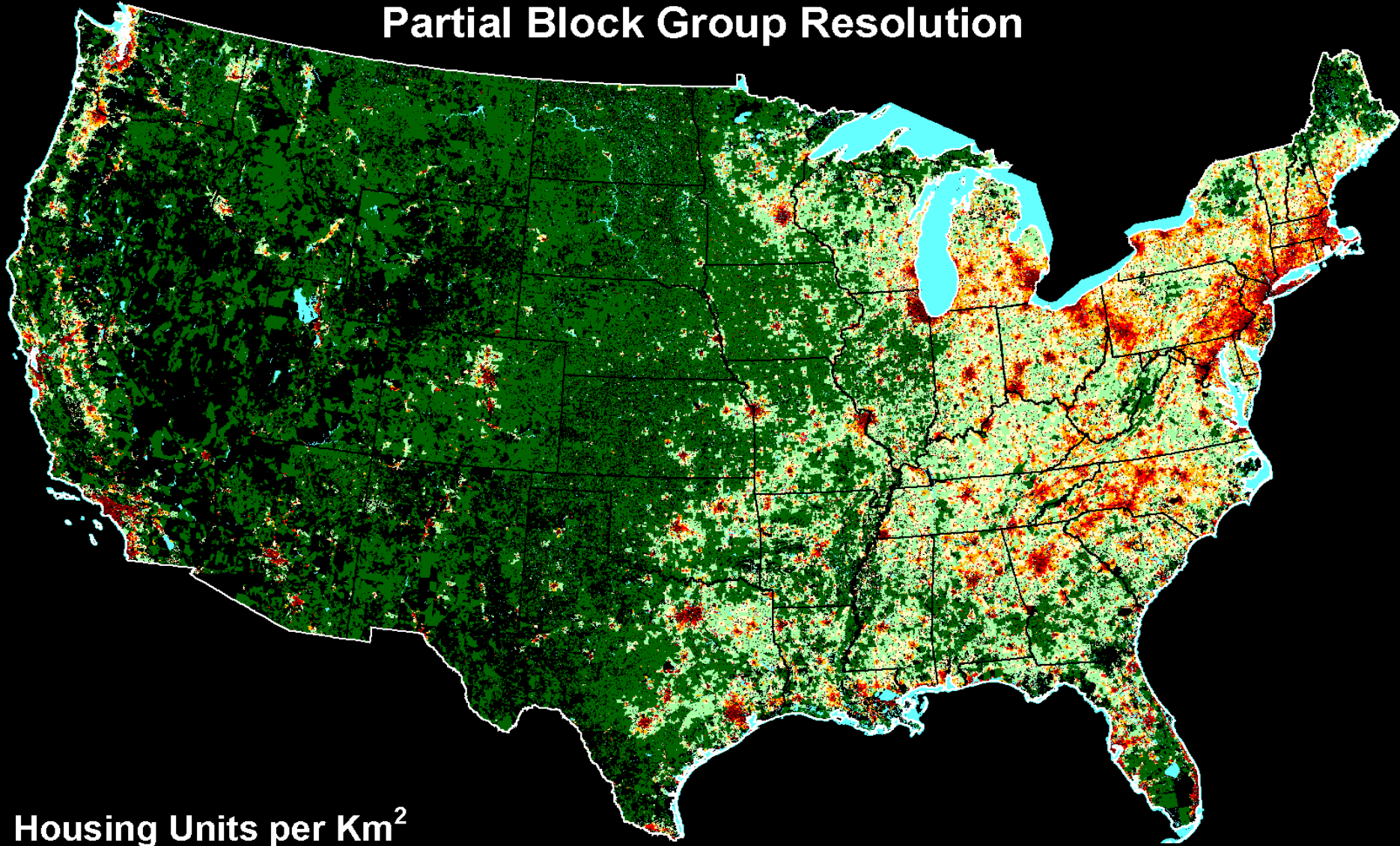


Housing Units per Km<sup>2</sup>



# Housing Density 1980

Partial Block Group Resolution

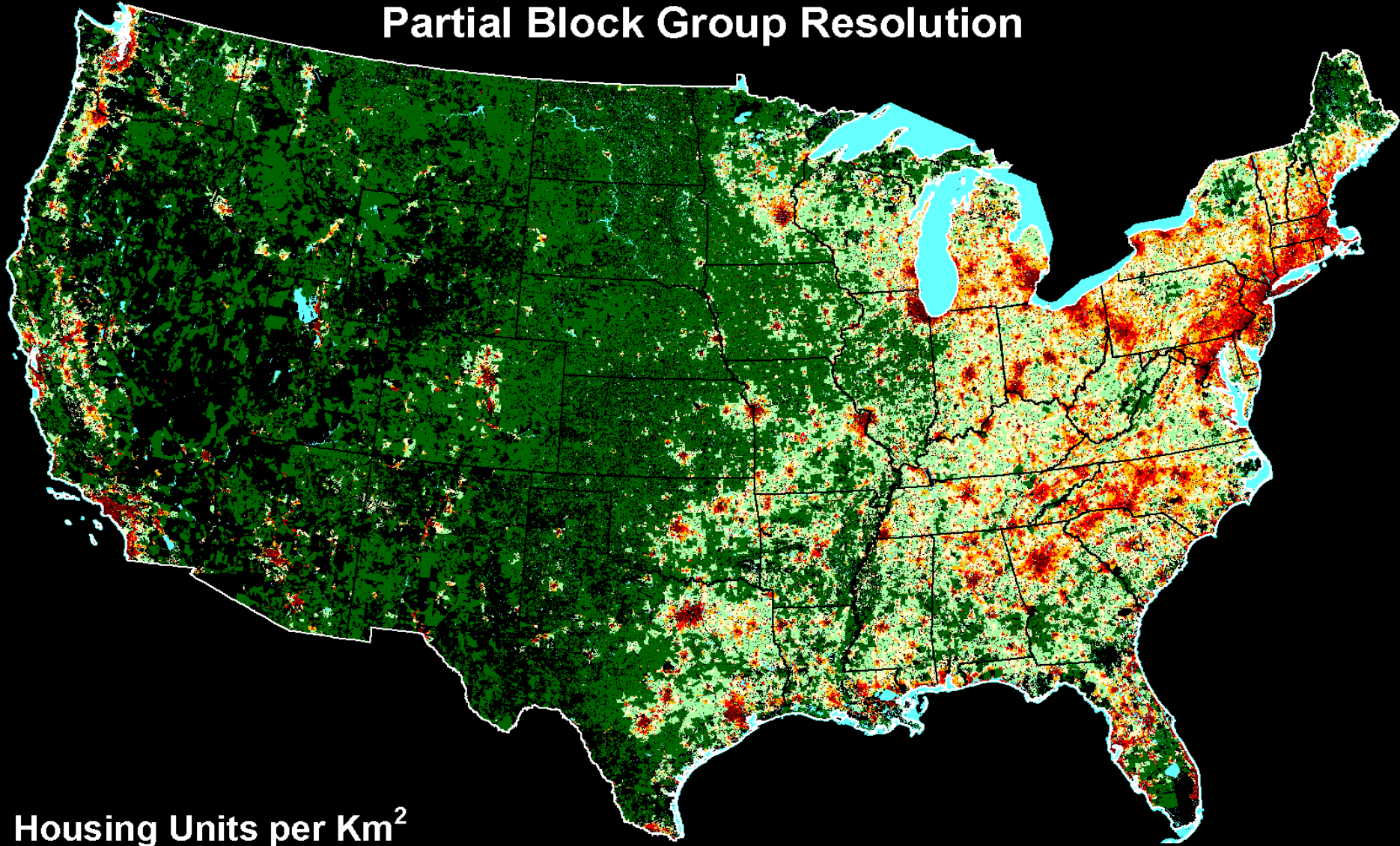


Housing Units per Km<sup>2</sup>



# Housing Density 1990

Partial Block Group Resolution

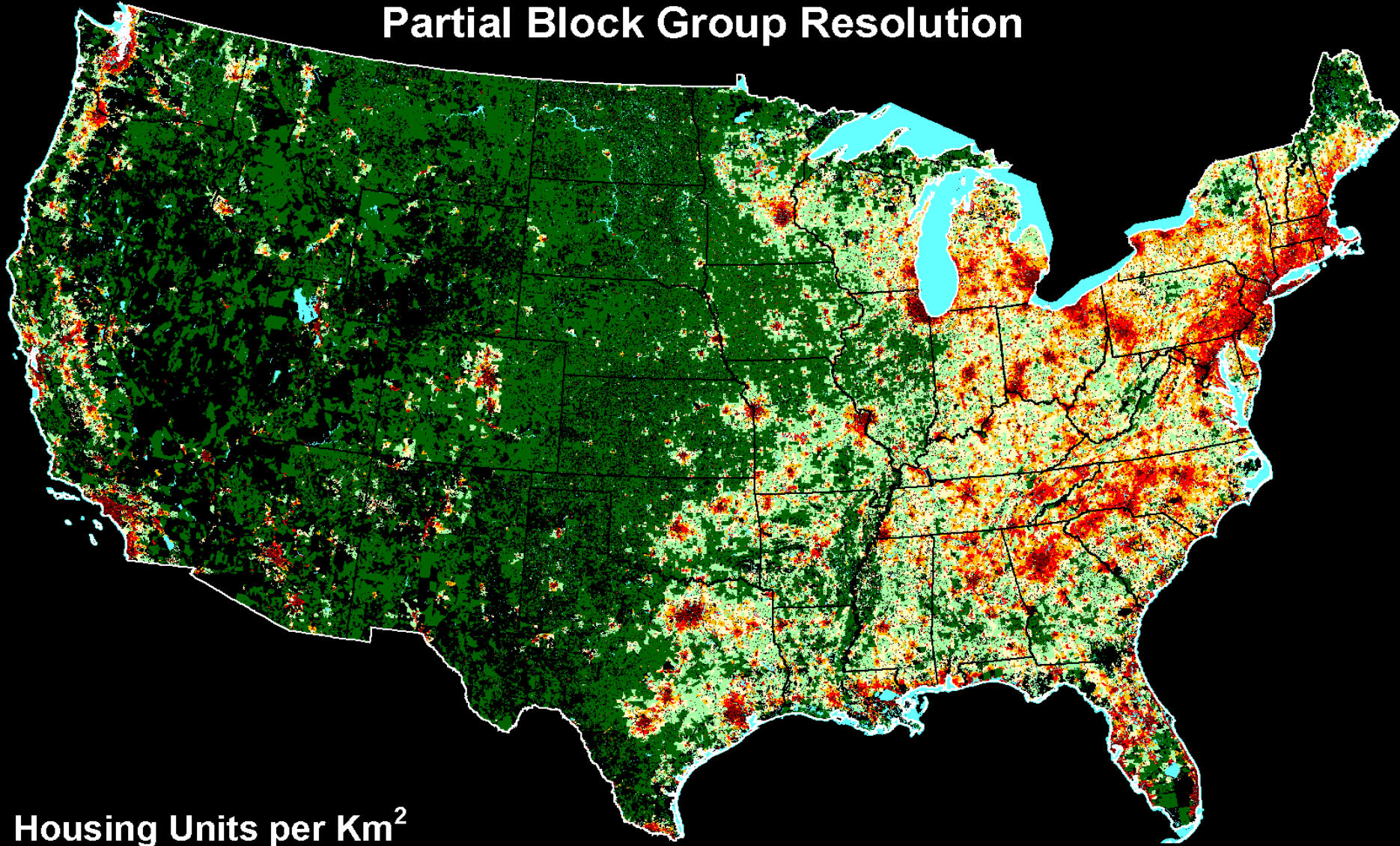


Housing Units per Km<sup>2</sup>



# Housing Density 2000

Partial Block Group Resolution

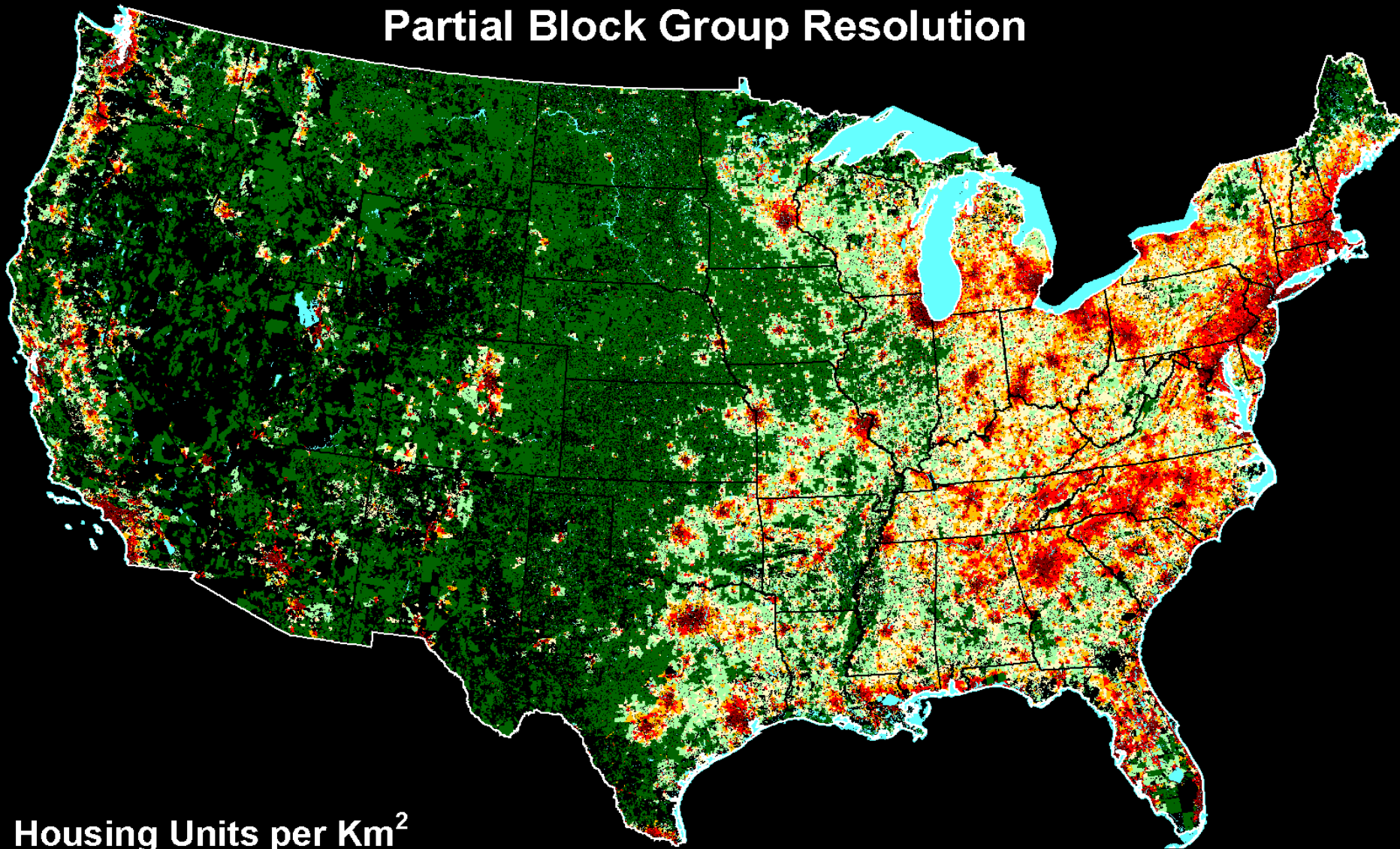


Housing Units per Km<sup>2</sup>



# Projected Housing Density 2010

Partial Block Group Resolution



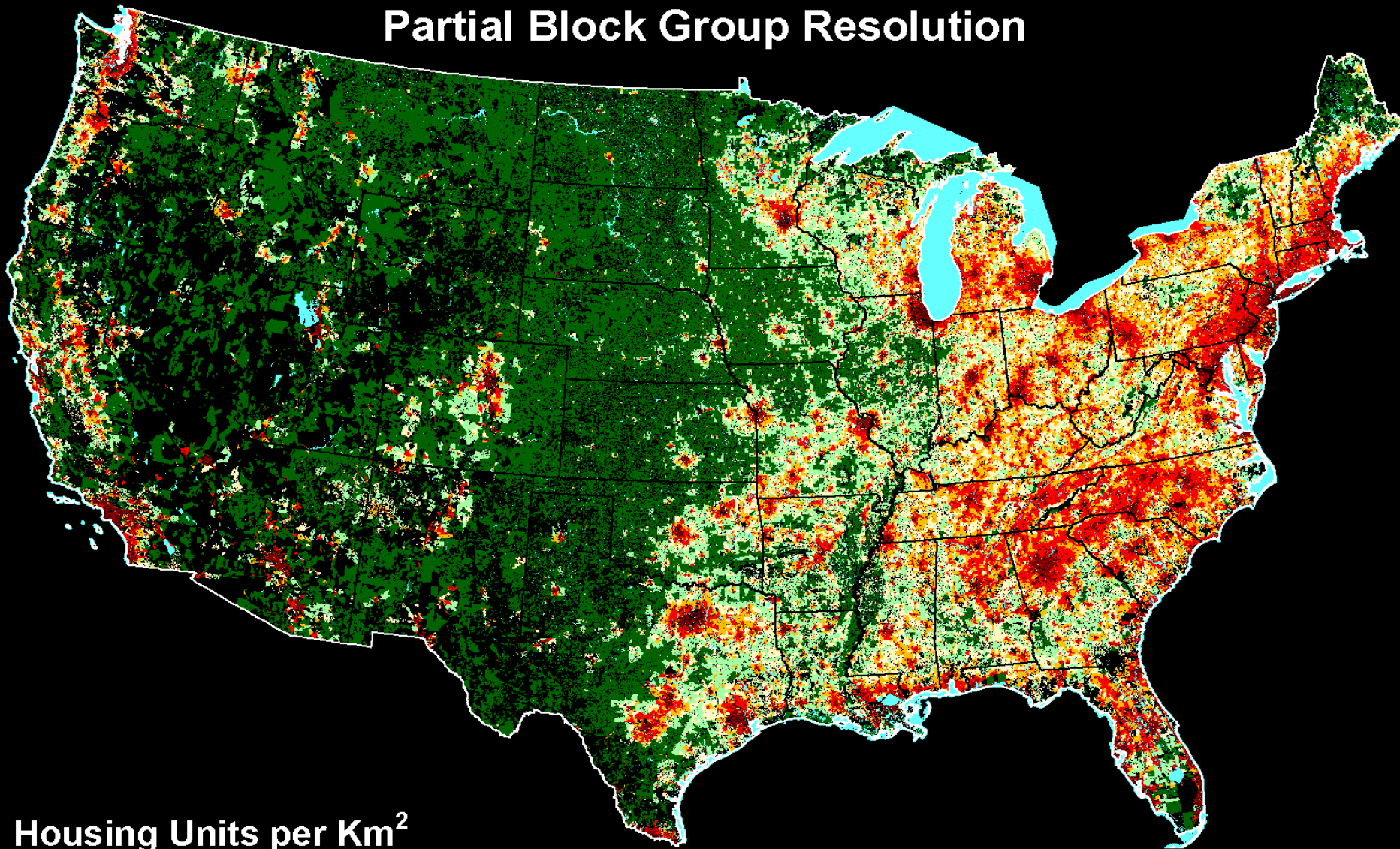
Housing Units per Km<sup>2</sup>





# Projected Housing Density 2020

Partial Block Group Resolution

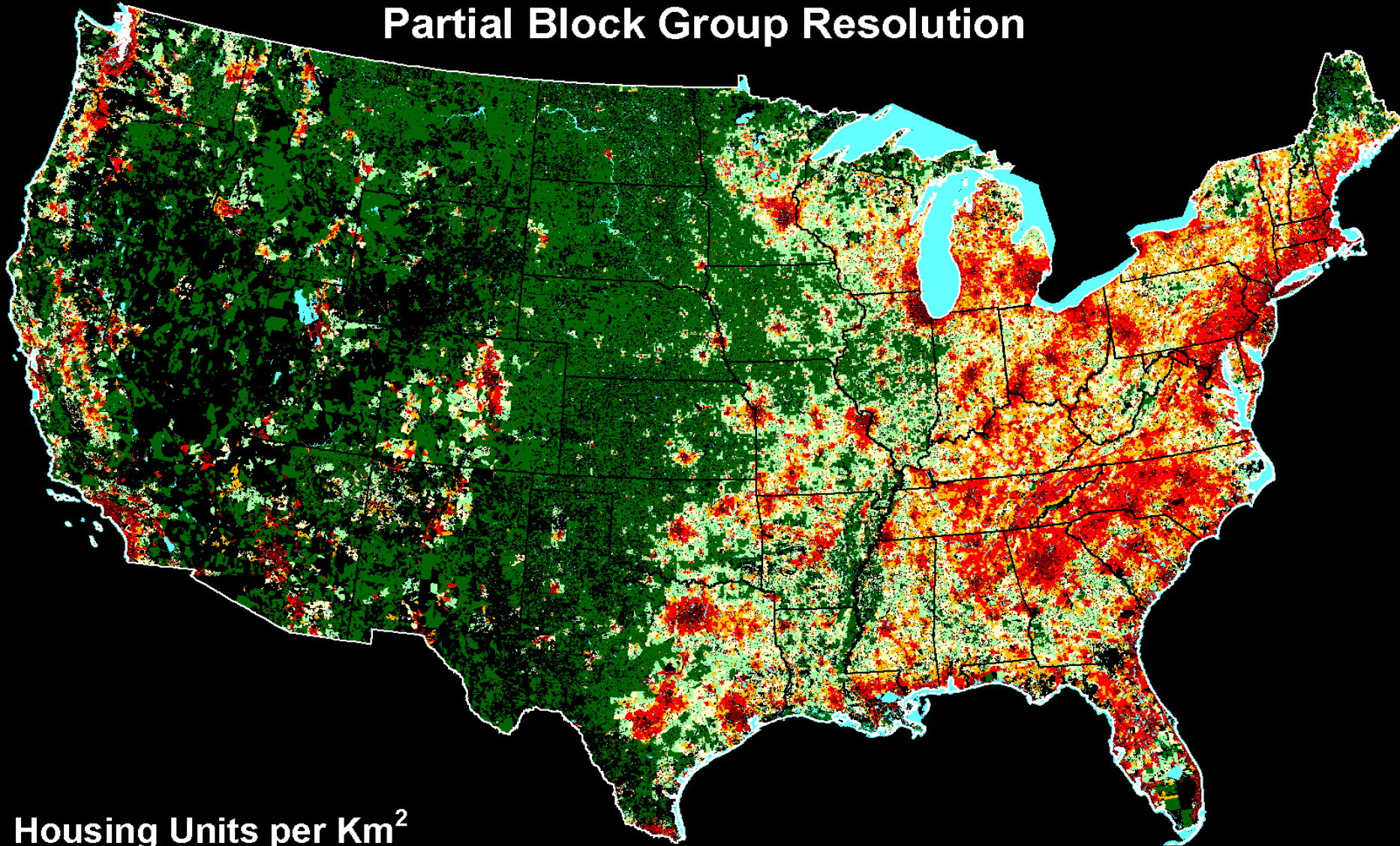


Housing Units per Km<sup>2</sup>

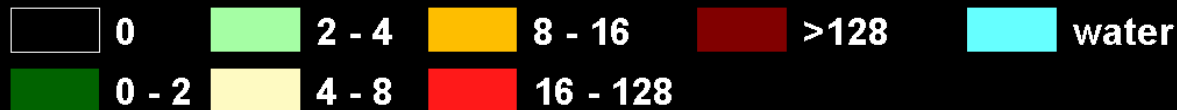


# Projected Housing Density 2030

Partial Block Group Resolution



Housing Units per Km<sup>2</sup>



# What Drives Housing Growth?

- Population growth
- Affluence
- Land use planning and policy



**Figure 4: Interim Projections: Percent Distribution of Population by Region of the United States, 2000 to 2030**



Source: U.S. Census Bureau, Population Division, Interim State Population Projections, 2005

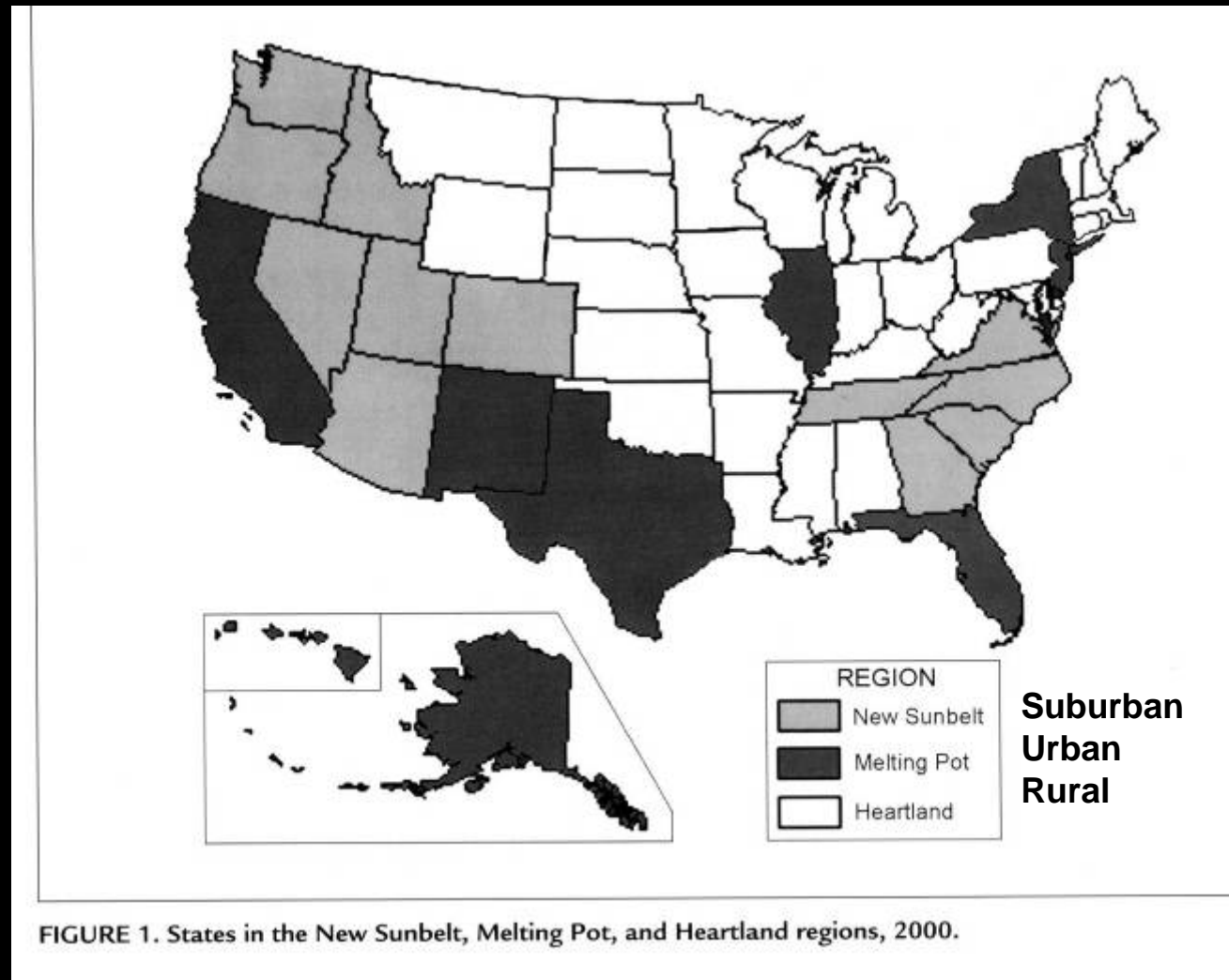
# Expected Trends

- Decentralization, including wider range of racial, ethnic groups
  - Stable 1990s trend
  - Job location decentralization will continue
- Metro areas and their peripheries will grow, with variations by region

# Three Americas

- State-by-state analysis highlighting groups of states with similarities:
  - New Sunbelt: suburban-type growth, both Black and White families, domestic migration
  - Melting pot states: urban-like growth, immigrants, high birth rates
  - Heartland: other states, high growth not expected.

## William H. Frey's "Three Americas"



William H. Frey, 2002. Three Americas: The rising significance of regions. *Am. Plann. Assoc. Journal* 68(4):349-357.



# Non-metro Growth

- Growth expected in areas with...
  - Proximity to growing metro
  - Resource amenities
- Baby boomer retirement migration will be significant
  - From 2010, 3% growth/yr among 65+
  - Amenity “bust” when Baby Bust comes of age and Boomers require more health care, family support

# WUI growth potential

Percent Wildland Vegetation that...

	North	Rocky Mountain	West Coast	South	Lower 48 states
is WUI	31%	2%	8%	22%	13%
has housing < WUI threshold	56%	52%	40%	54%	52%
has no housing	13%	46%	52%	24%	35%

# Growth and Protected Areas

- Near urban: heavy day use, high pressure on edges, complex and diverse mix of neighbors
- A day's drive away: Recreation and retirement homes near and within; rural amenity-led growth with strong tourism and service sectors
- Remote: unclear, varied patterns.

# Wildland Urban Interface 2000



## WUI

intermix and interface

## Non-WUI Vegetated

very low density housing

no housing

## Non-vegetated or agriculture

medium and high density housing

low and very low density housing

water

WUI and LANDFIRE data sets are complementary and should be integrated to create a comprehensive national strategic map

# Wildland Urban Interface Project Team

**Roger B. Hammer**  
Oregon State University

**Todd J. Hawbaker, Volker C. Radeloff,  
Alexandra D. Syphard, and Shelley Schmidt**  
SILVIS Lab, University of Wisconsin-Madison



**Susan I. Stewart**  
NRS, Forest Service Research



**We appreciate the support of:**

USDA Forest Service Northern Research Station, Pacific Northwest Research Station, Northern Global Change Research Program, National Fire Plan, and the University of Wisconsin-Madison

## Nonmetropolitan Recreational and Retirement Counties

