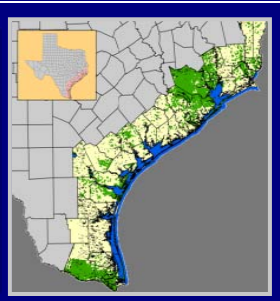
Altering Landscapes on the Texas Coast



Causes, Consequences, and Policy Implications

Samuel D. Brody

Environmental Planning & Sustainability Research Unit
Hazard Reduction & Recovery Center
Department of Landscape Architecture & Urban Planning
Texas A&M University, USA

Flooding in Texas

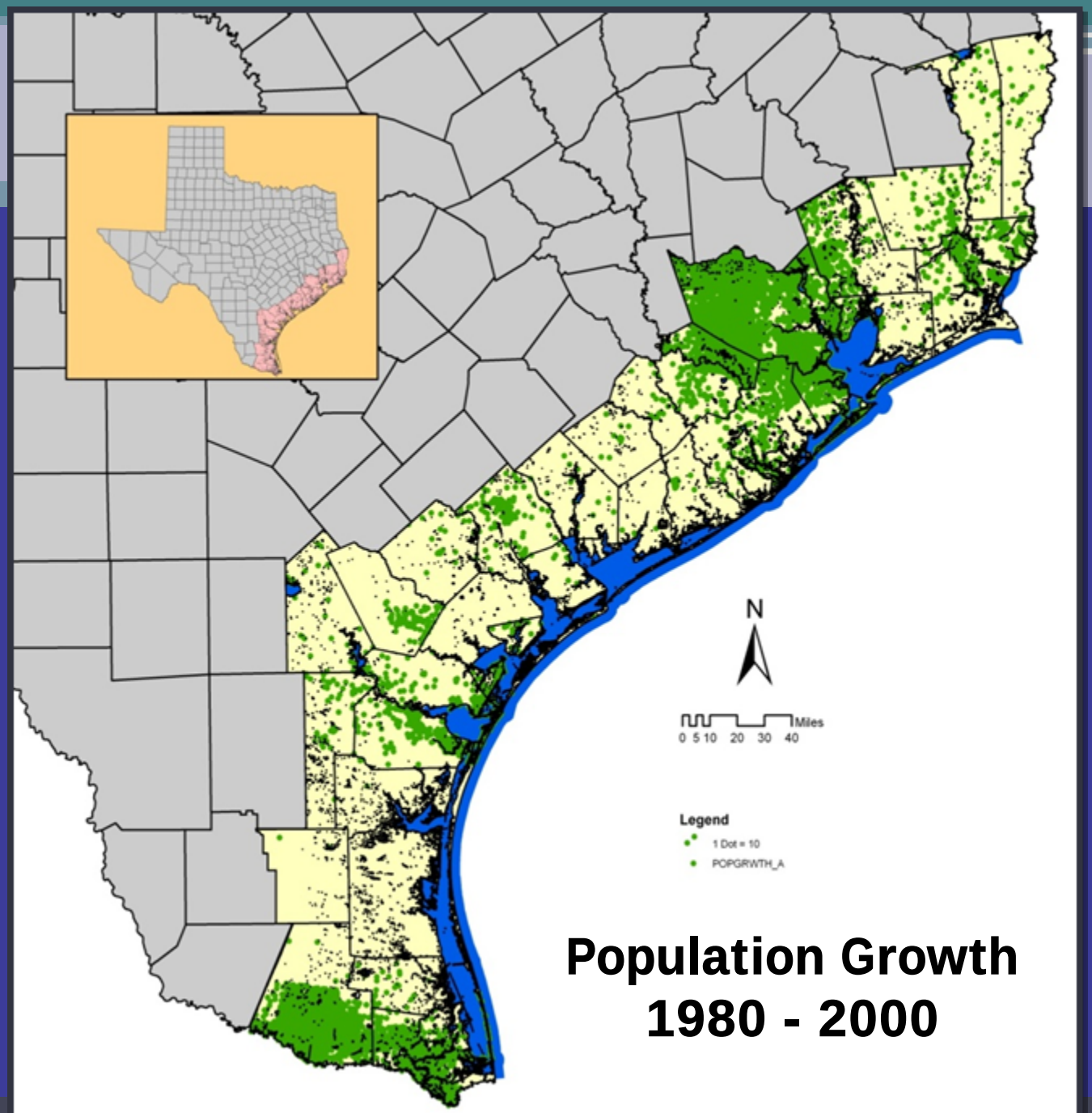
- Consistently has the most deaths and damages from severe storms than any state.
- Of the 42 flood events listed as causing more than $1 billion in damage between 1980 and 1998, 4 were in Texas.
- From 1978 to 2001, Texas suffered $2.25 billion dollars in flood damage - more than California, New York and Florida combined.

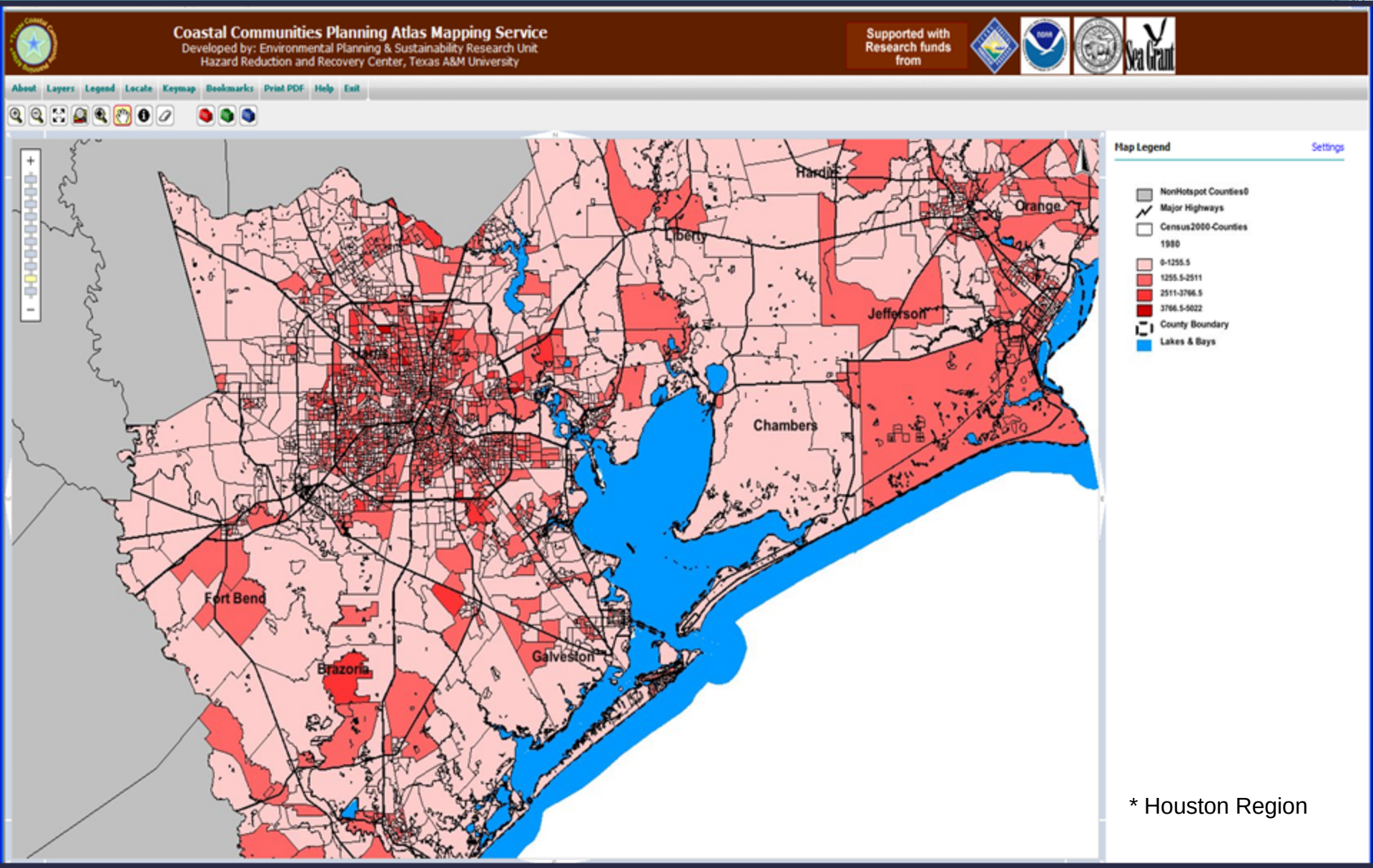
Exposure to Natural Hazards

- Not solely a technical or engineering problem
- Pattern of land use change and development exacerbating losses

Changes in Coastal Landscapes

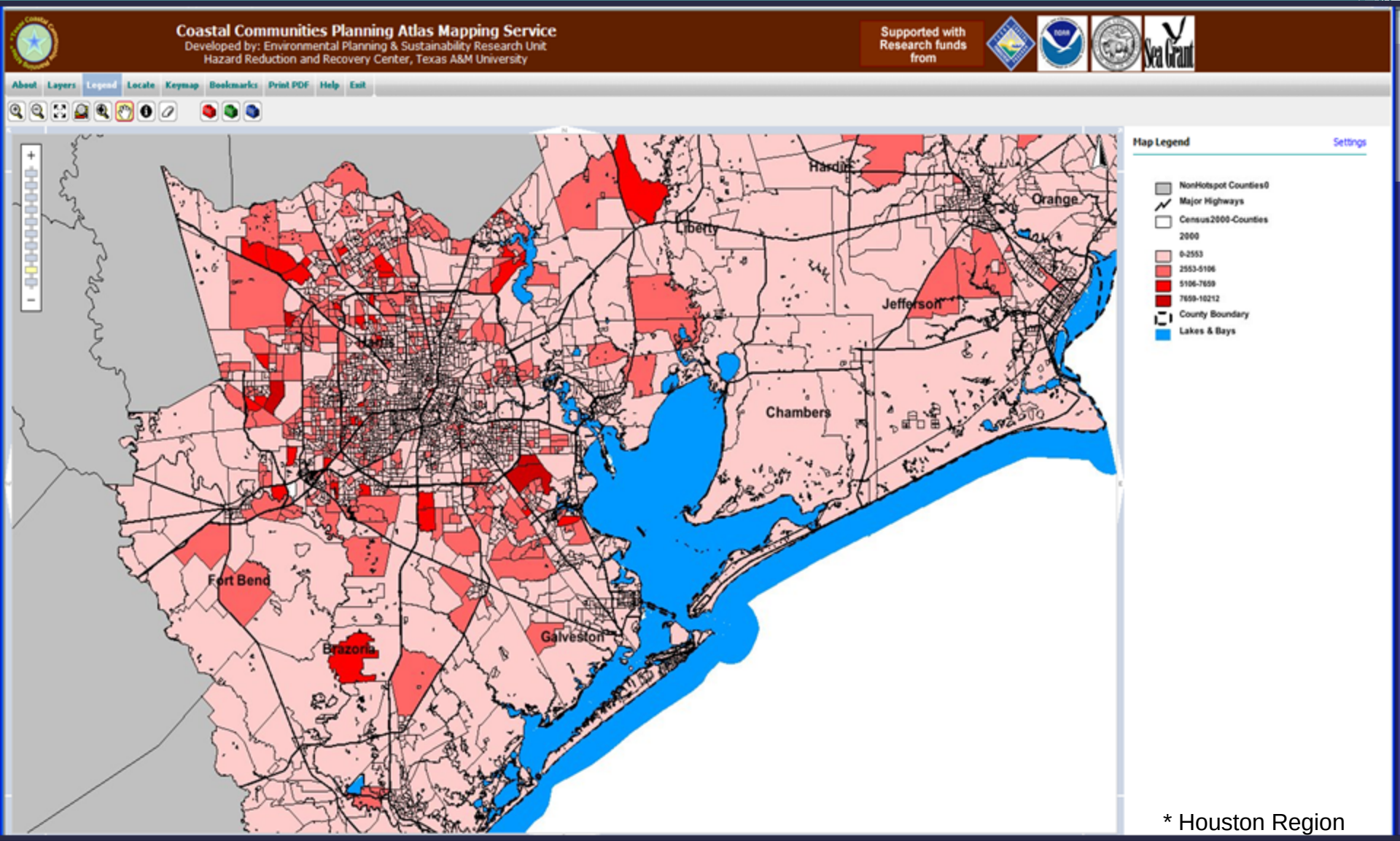
- Population Growth
- More Impervious Surfaces
- Enhanced Wetland Loss
- Sprawling Development Patterns


N
Miles
0 5 10 20 30 40
Legend
1 Dot = 10
POPGRWTH_A
Population Growth
1980 - 2000



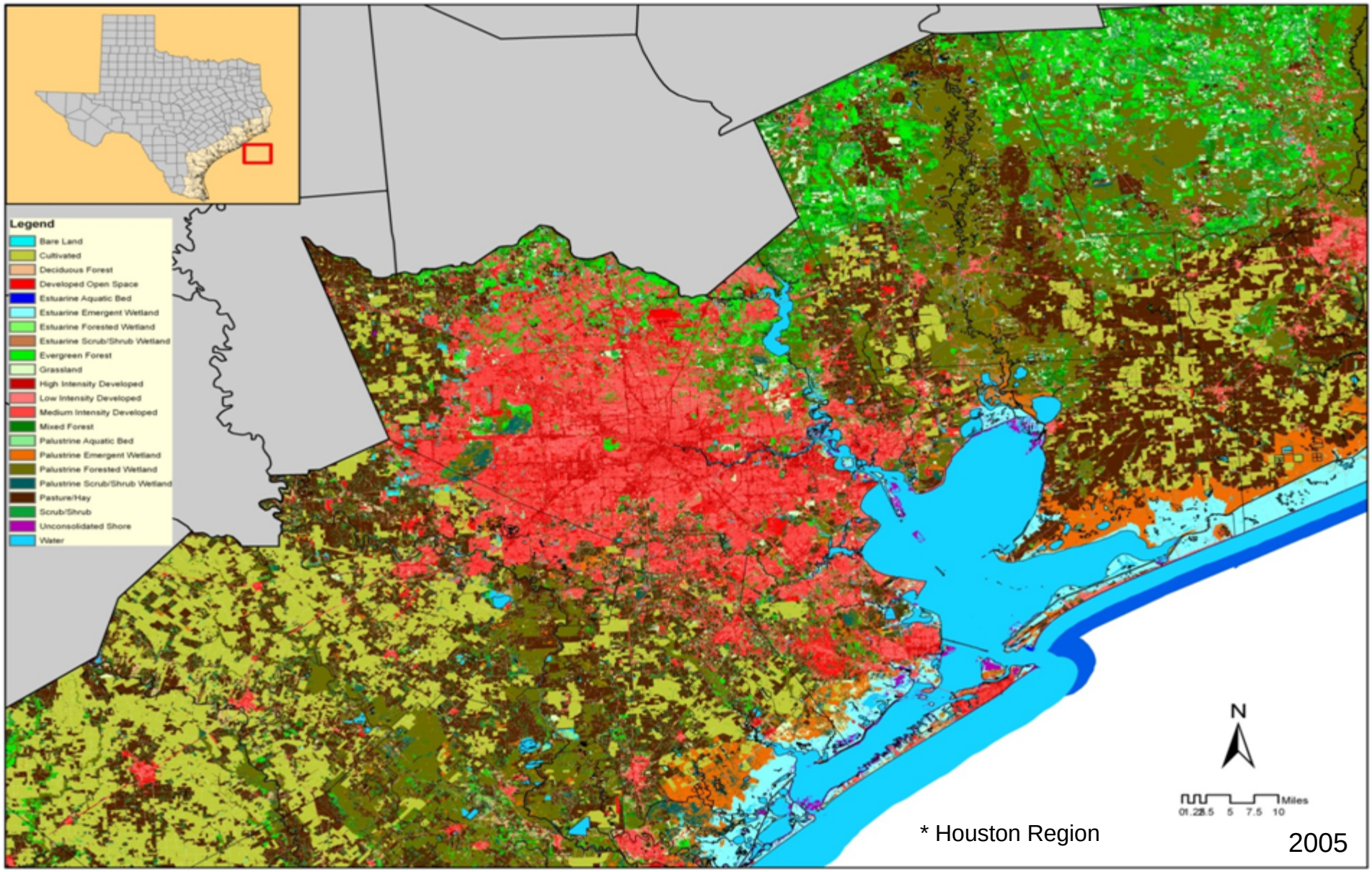
* Houston Region

Population by Block Group: 1980

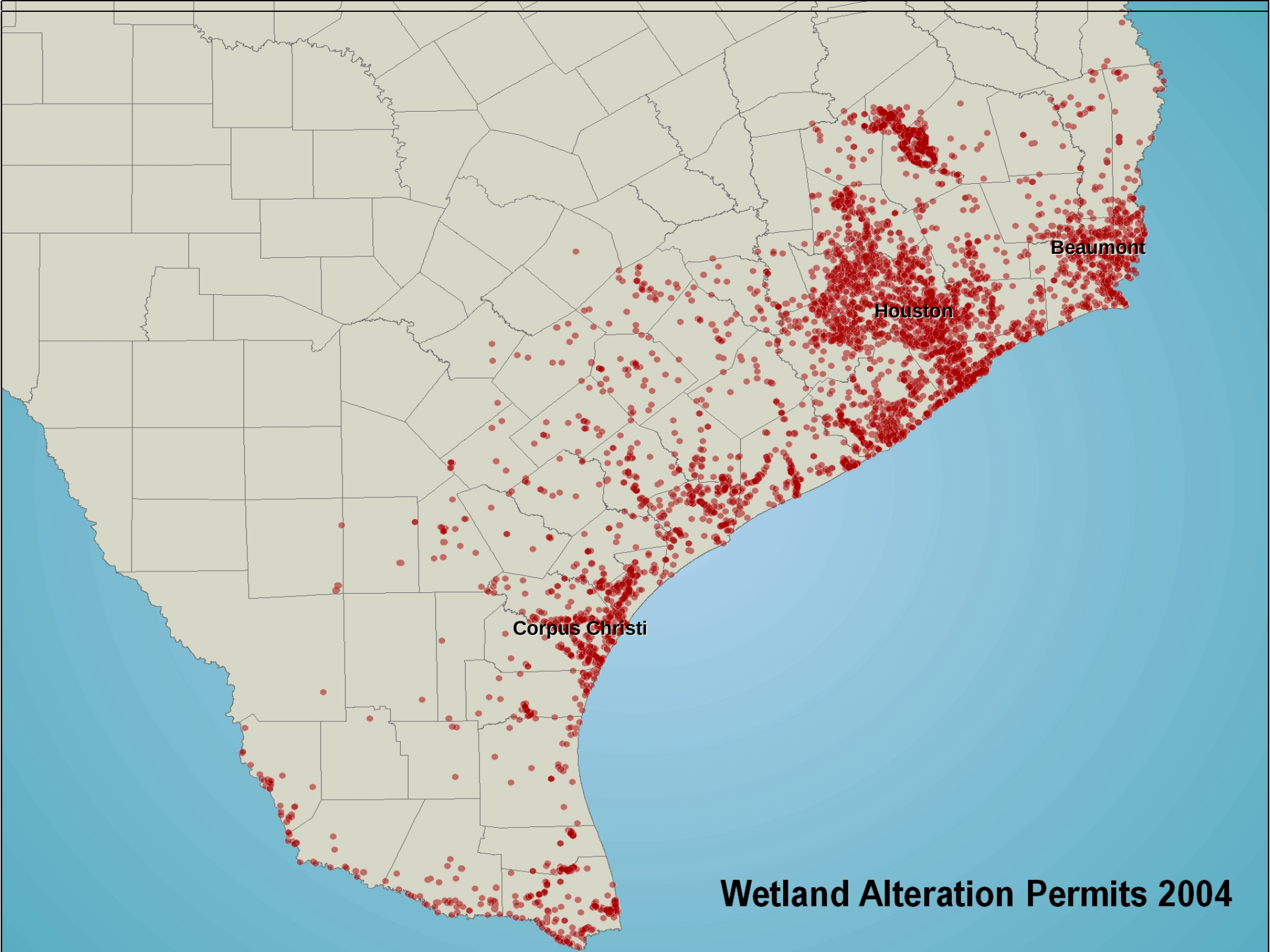


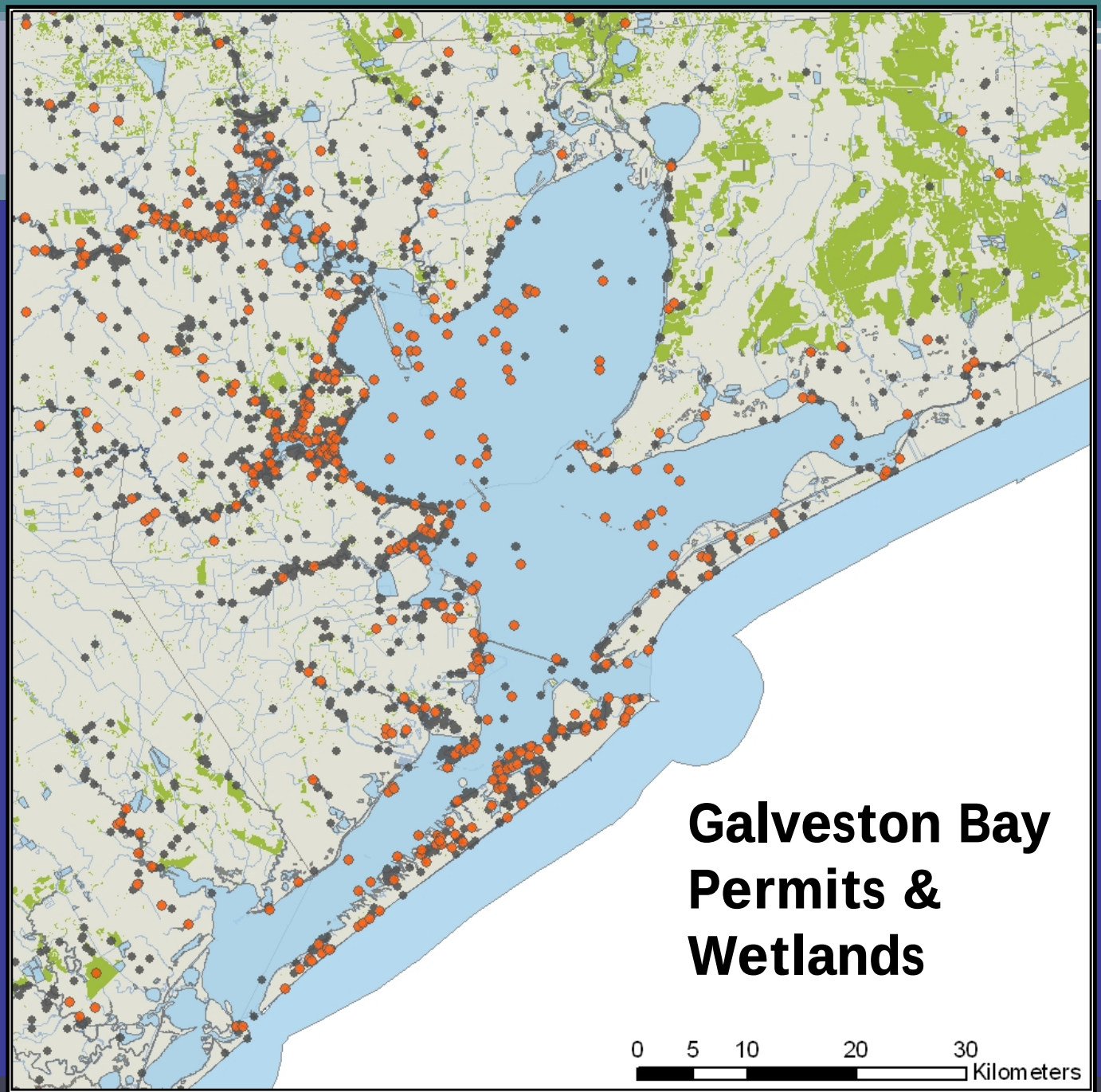
* Houston Region

Population by Block Group: 2000



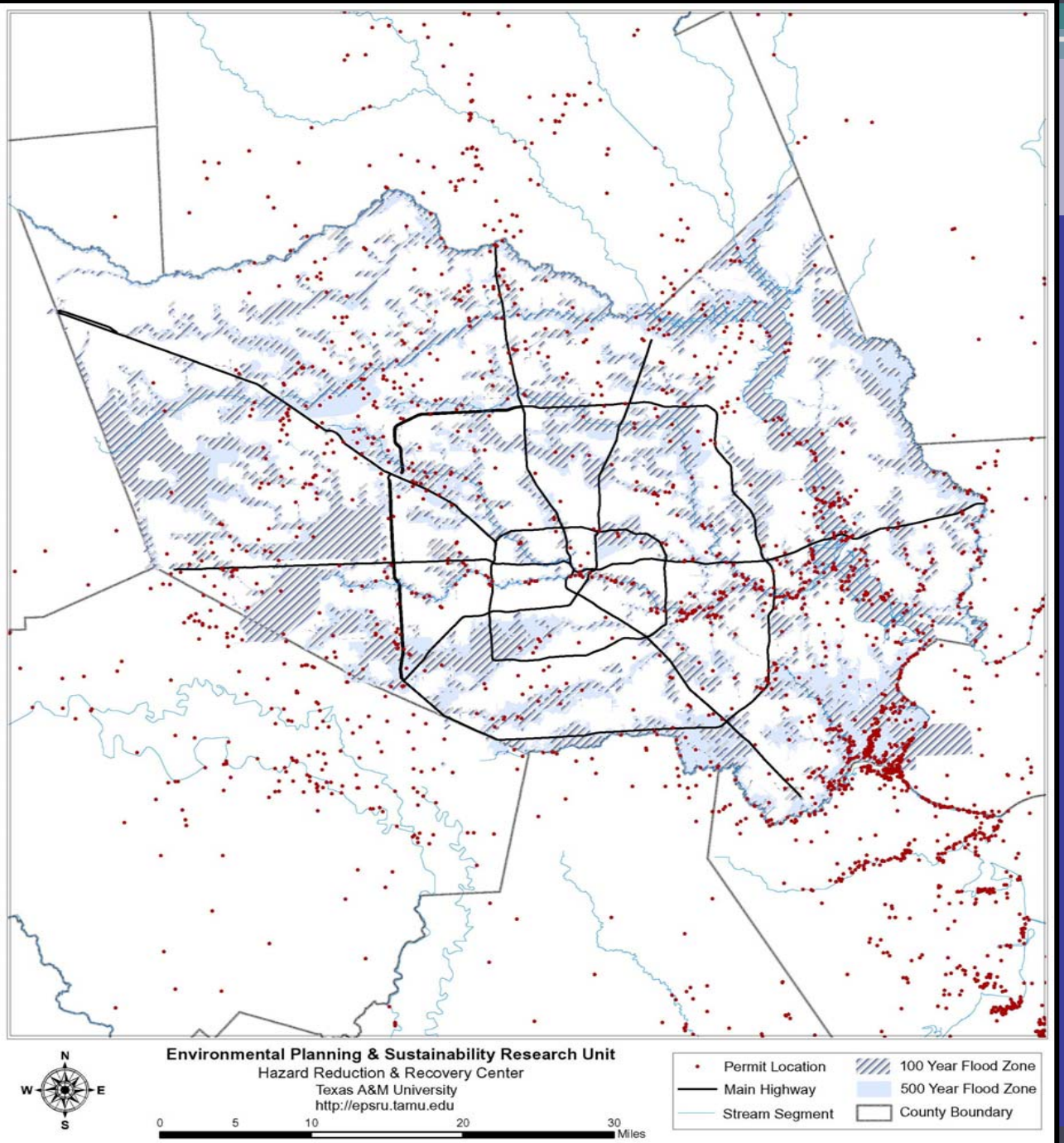
Land Use & Impervious Surfaces


Beaumont
Houston
Corpus Christi
Wetland Alteration Permits 2004


Galveston Bay
Permits &
Wetlands
0 5 10 20 30
Kilometers

Consequences of Wetland Alteration

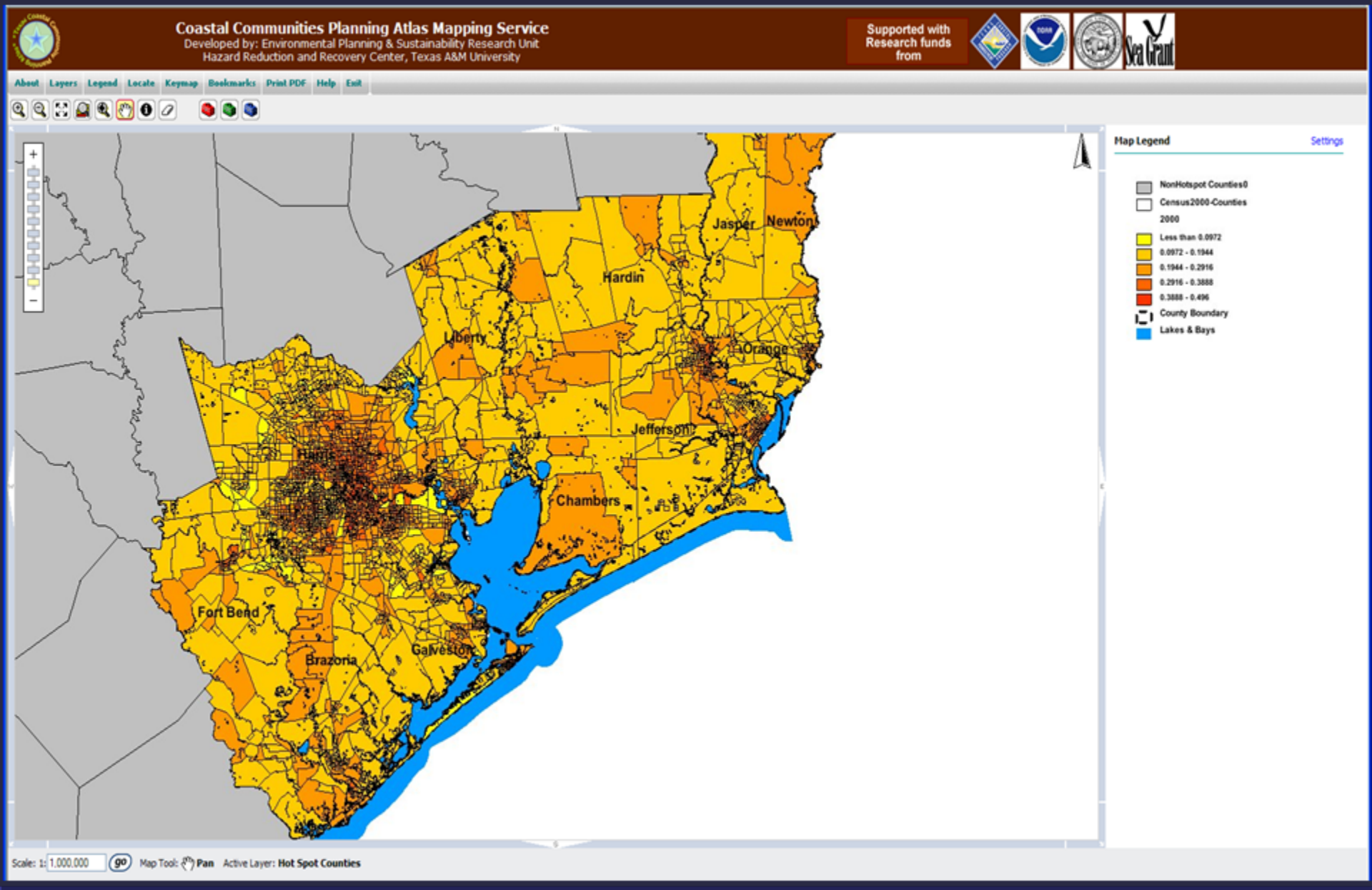
- Alteration of naturally occurring wetlands is the most important built environment indicator of flooding and flood damage:
  - Inside 100-year floodplain
  - Large development projects (>.5 acres)
  - Cumulative impacts from small scale wetland alteration
- Wetlands reduce property loss for high damage floods more so than Dams and nonstructural mitigation activities.



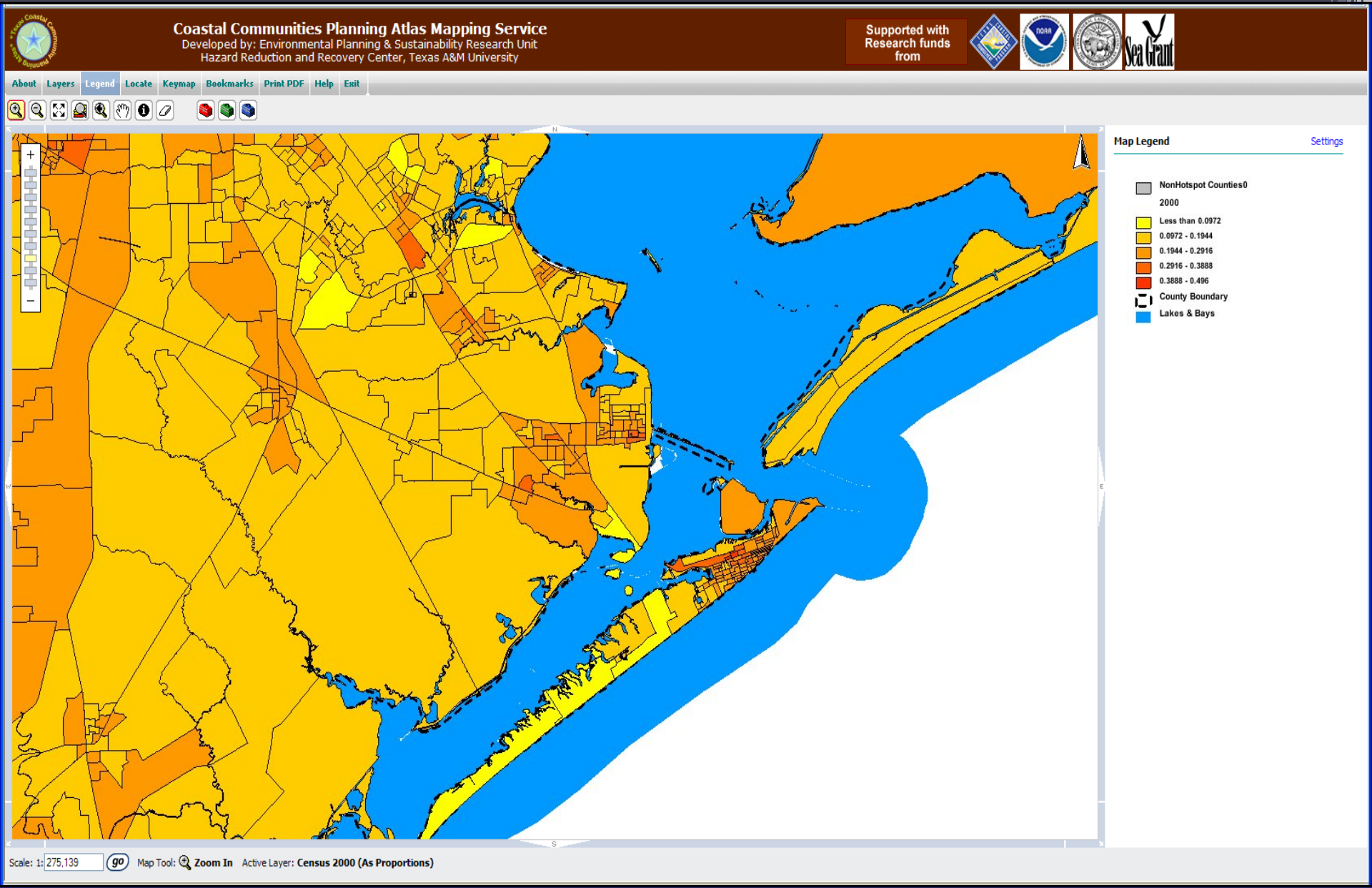
Houston Area Wetland Alteration

The Price of Permits in Texas

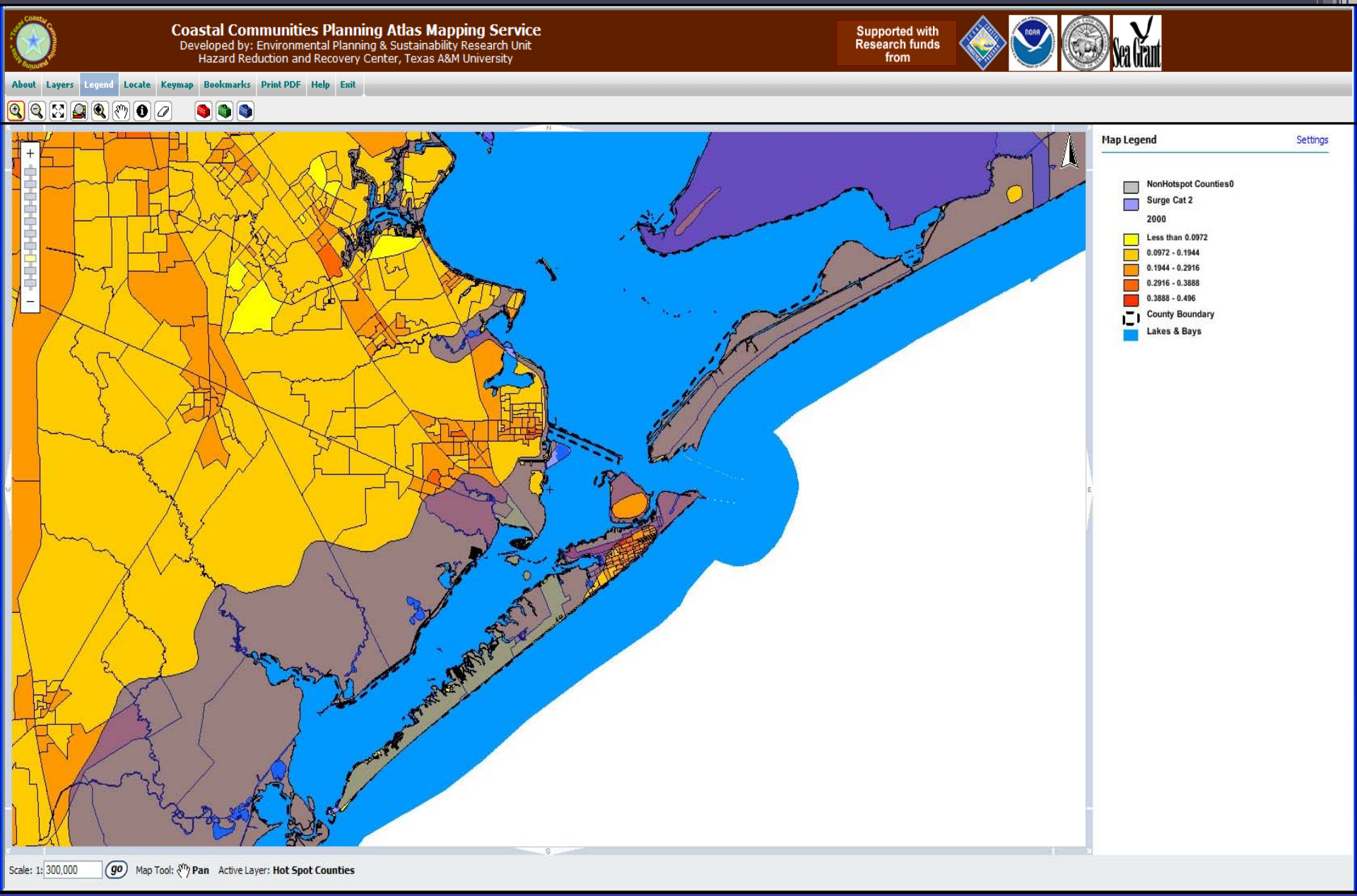
- 1 wetland permit = an average of $211.88 in added property damage per flood.
- On average, $38,138 added damage per flood.
- 129 permits = flood reducing effect of dams.



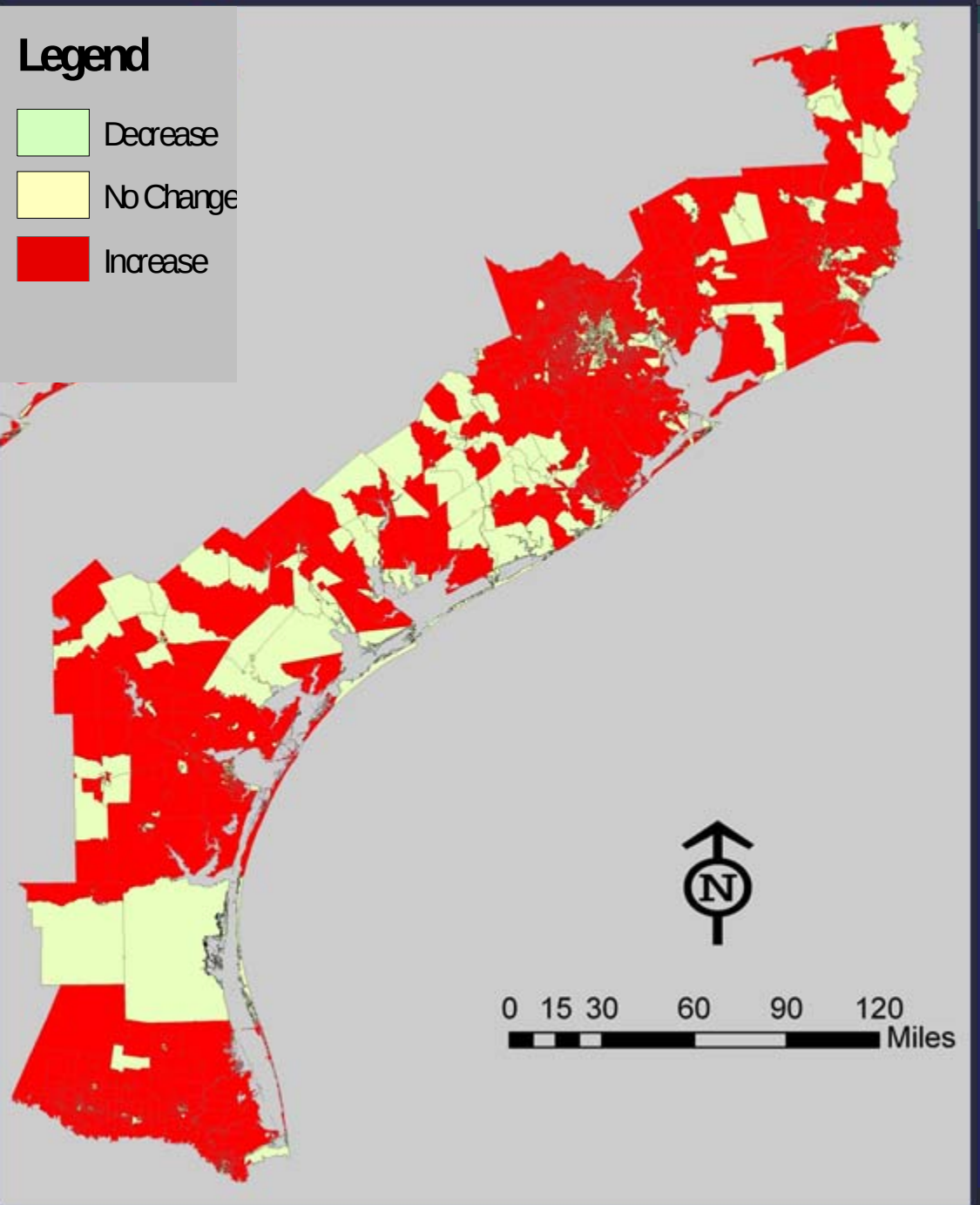
Social Vulnerability: 2000



Social Vulnerability: 2000, SE Houston/Galveston

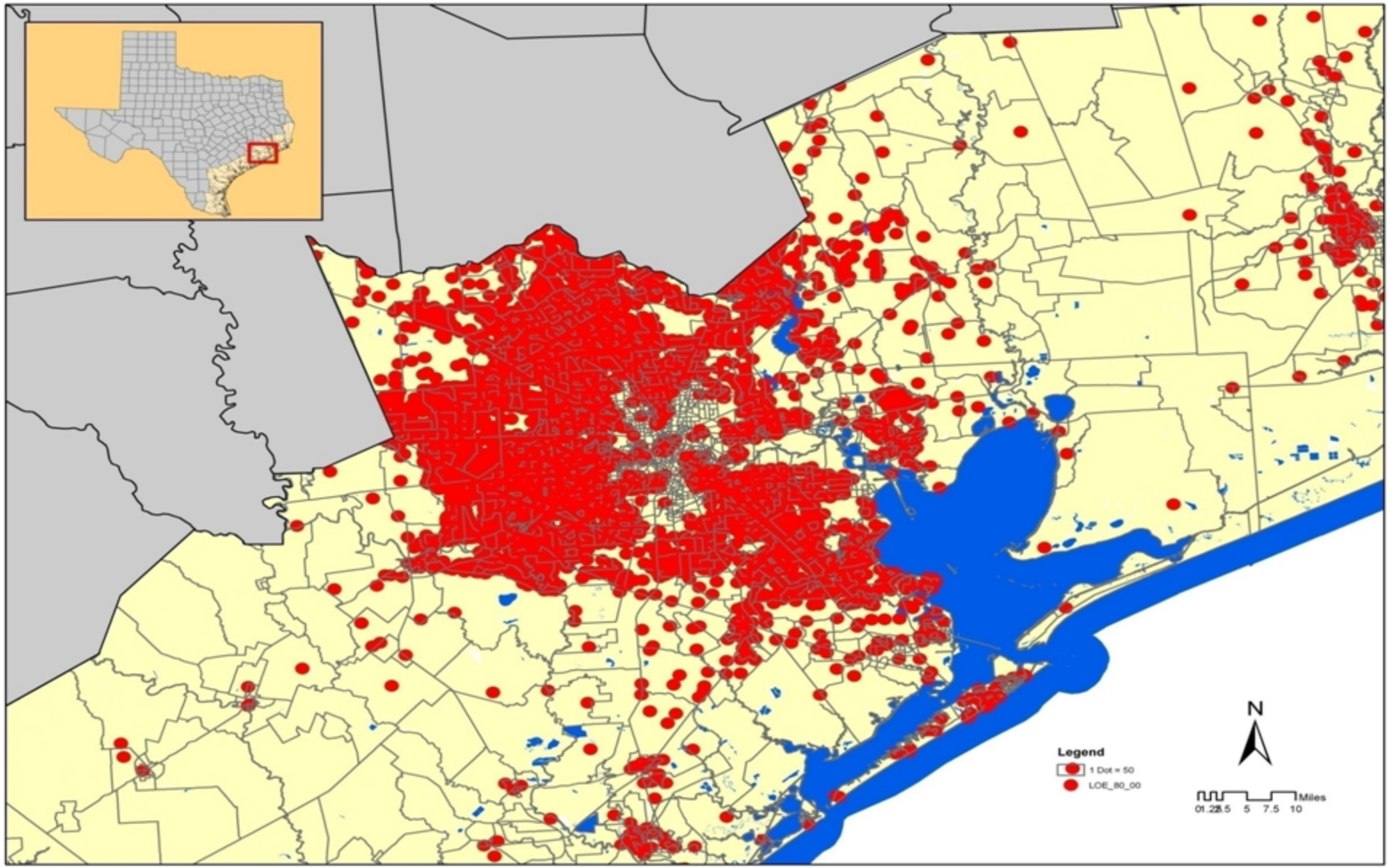


Social Vulnerability & Cat. 2 Surge (2000)



Level of Risk Exposure Change: 1980-2000

Exposure	Population -	Population +	Total
-	20.91	3.00	23.90
+	13.05	63.05	76.10
Total	33.95	66.05	100



Change in Level of Risk Exposure: Houston Region

Policy Implications

- Avoid the floodplain
- Consider wetlands as a flood control device
- Internalize costs of development
- Increase non-structural mitigation

Non-Structural Mitigation & Flood Damage

In Coastal Texas

- Real unit increase in Community Rating System (CRS) equals $38,989 reduction in average property damage per flood.
- If every jurisdiction maximized their CRS rating cost of floods less than a quarter of $320 million observed.
- Real unit increase in CRS decreases the odds of death and injury from a flood event by 36.05 %.

Policy Implications (cont.)

- Build local organizational capacity
- Targeted growth areas
- Local plans that anticipate growth

Environmental Planning and Sustainability Research Unit

The Hazard Reduction & Recovery Center at Texas A&M University

http://epsru.tamu.edu

http://Coastalatlas.tamug.edu