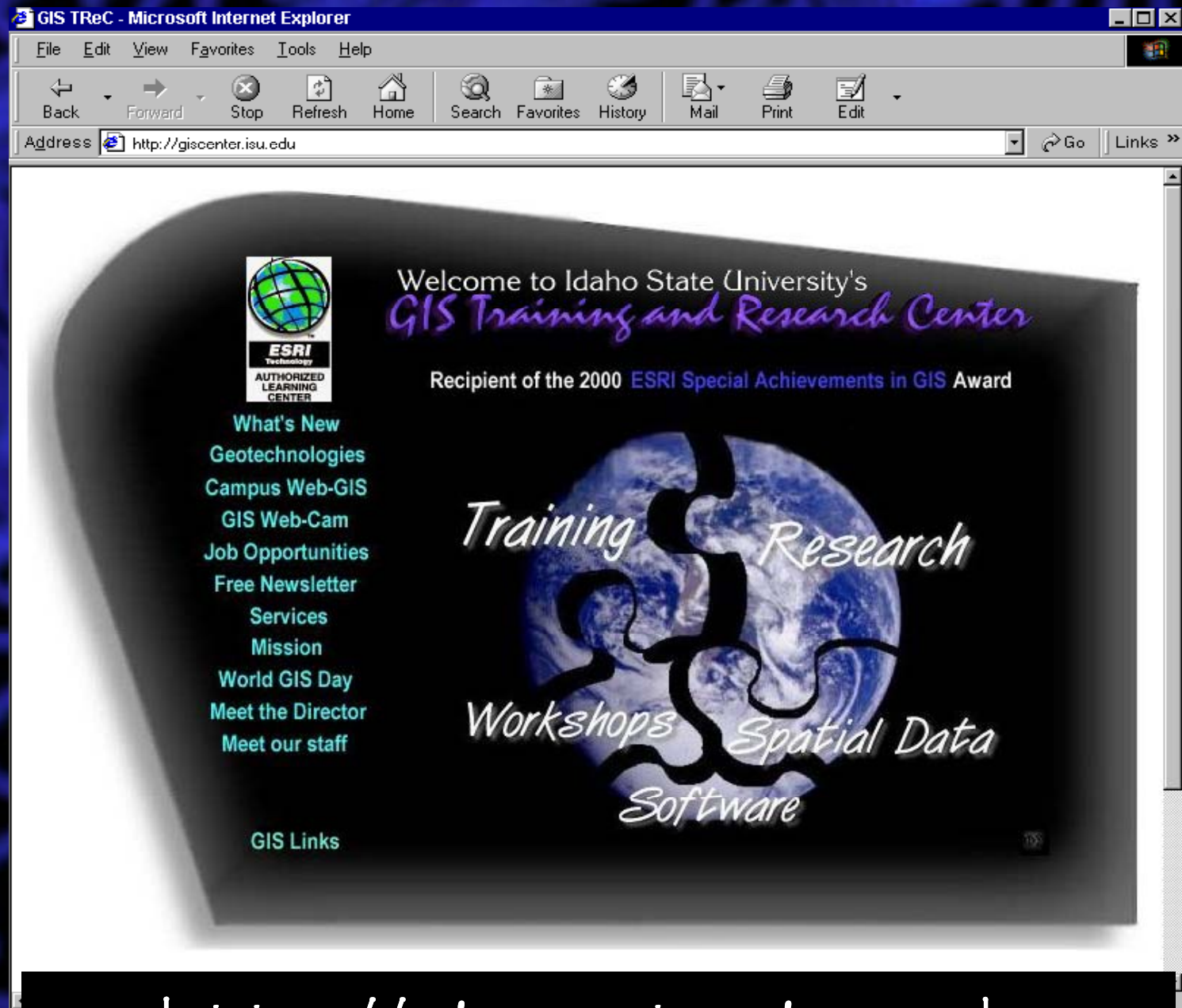


A Method to Incorporate Remotely Sensed Data into Urban Sprawl and Green Space Analysis

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Project Goal: Using Remotely Sensed Data to Assess

- Urban Sprawl
- Green Space
- Contiguity of Green Space

Urban Sprawl...What is it?

- Low-density development beyond the urban center
- Increasing separation between homes, schools, and places of employment = more driving
- Outward rather than internal growth
- Conversion of open spaces, productive agricultural land, and parks to developments

Implications of Urban Sprawl

- Traffic congestion & longer commutes
- Conversion of natural open spaces to urban areas
- Degradation of “quality” green space
- Increased cost of providing utilities, services, and infrastructure to a sprawling population



Green Space



Places within the extent of an urban area that provide opportunities for outdoor recreation and enjoyment, or simply pockets of vegetation in the city environment

Areas such as parks, green ways, residential landscaping, and un-utilized fields may serve as 'green space'

These areas provide opportunities for:

- Outdoor Recreation
- Wildlife Habitat
- Groundwater Recharge
- Urban Beautification
- Increased Environmental Health & Well Being

Implications of Lost or Degraded Green Space

Increase in:

- Non Point Source Pollution
- Air Pollution
- Risk Of Flooding

Decrease in:

- Suitable areas for outdoor recreation
- Local wildlife population numbers

Data Used in This Analysis

Phenologically Synchronized Landsat
Thematic Mapper 5 (87, 97, 00)

- Land Cover Change (LCC) data from 87-97 & 97-00
- Normalized Difference Vegetation Index (NDVI) images for 87, 97, 00



Methods:

Urban Sprawl Assessment

- LCC Data 87-97 & 97-00

Green Space Assessment

- NDVI Vegetation Indices (87, 97, 00)

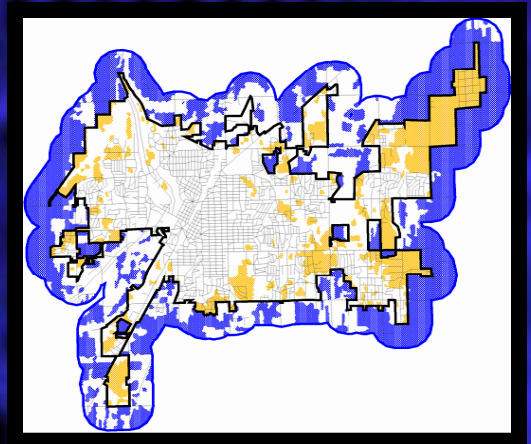
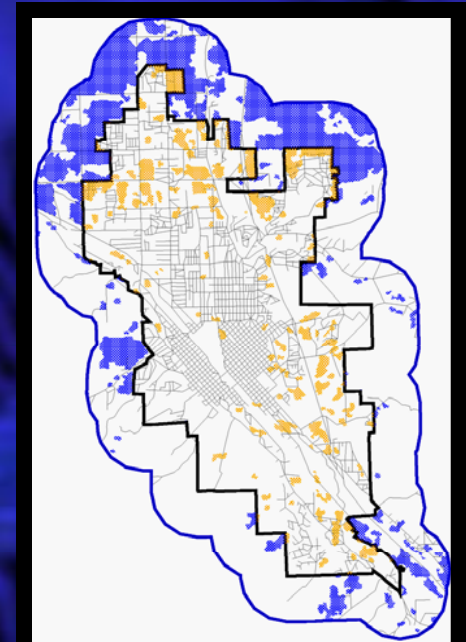
Green Space Contiguity Assessment

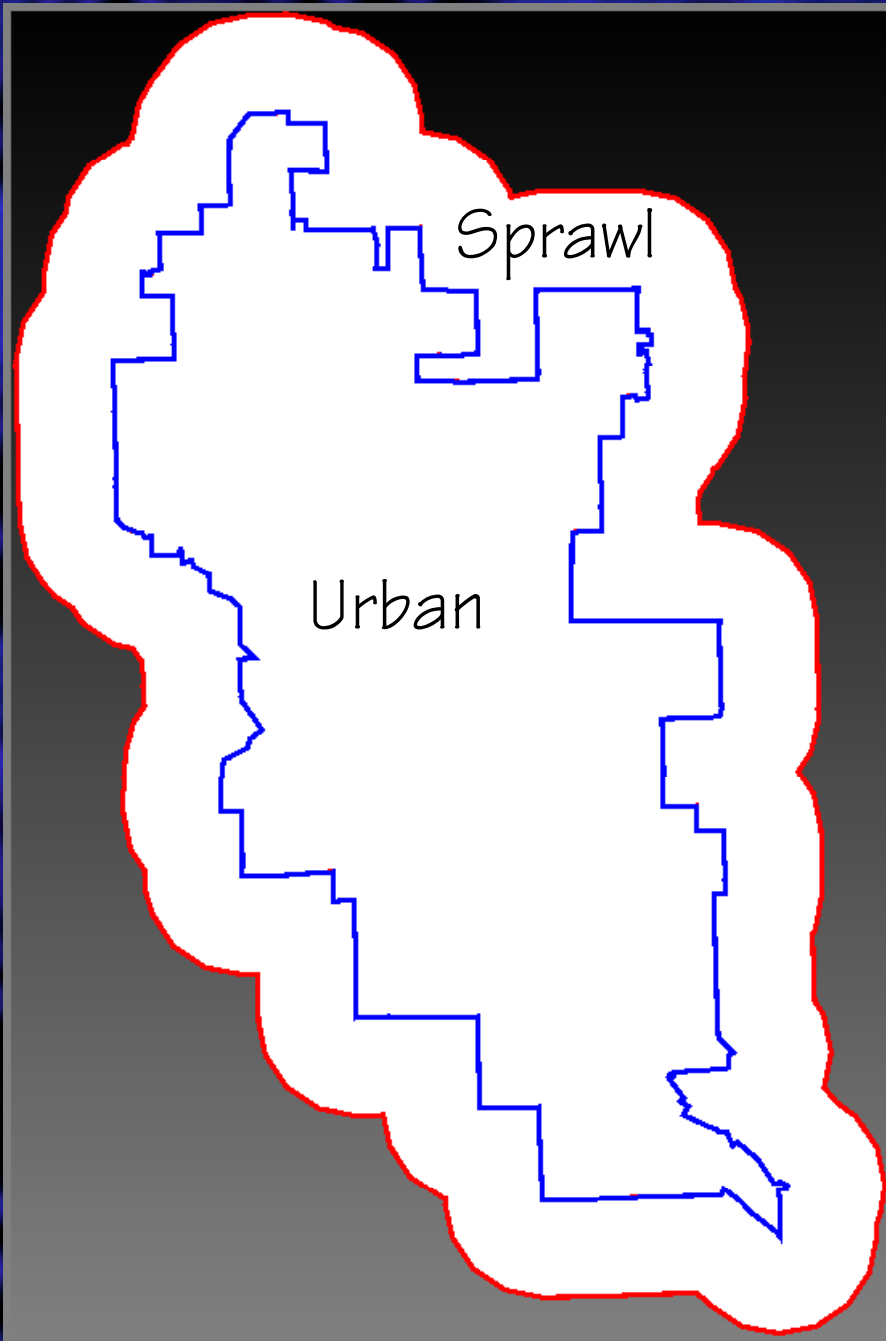
- Standardized City Block Analysis
- FRAGSTATS Landscape Metrics

Urban Sprawl Assessment

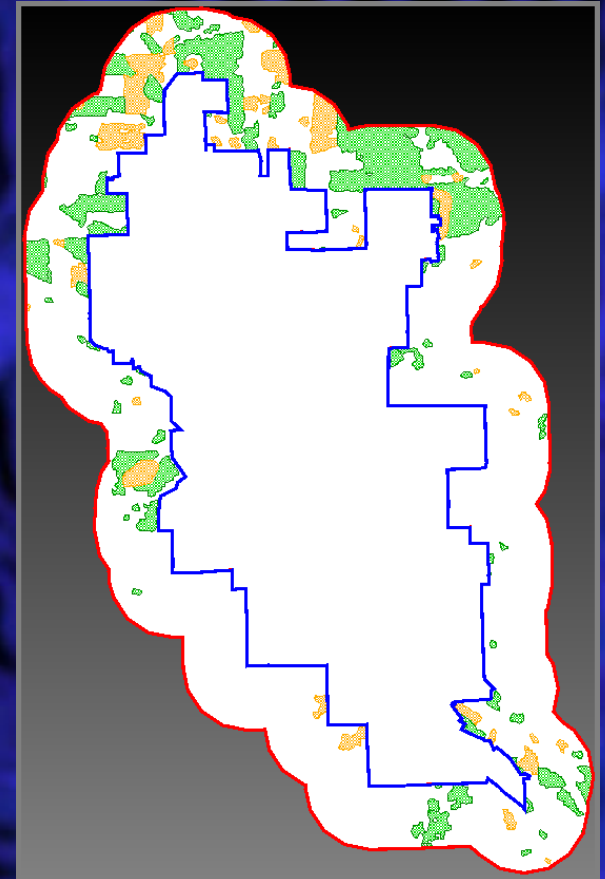
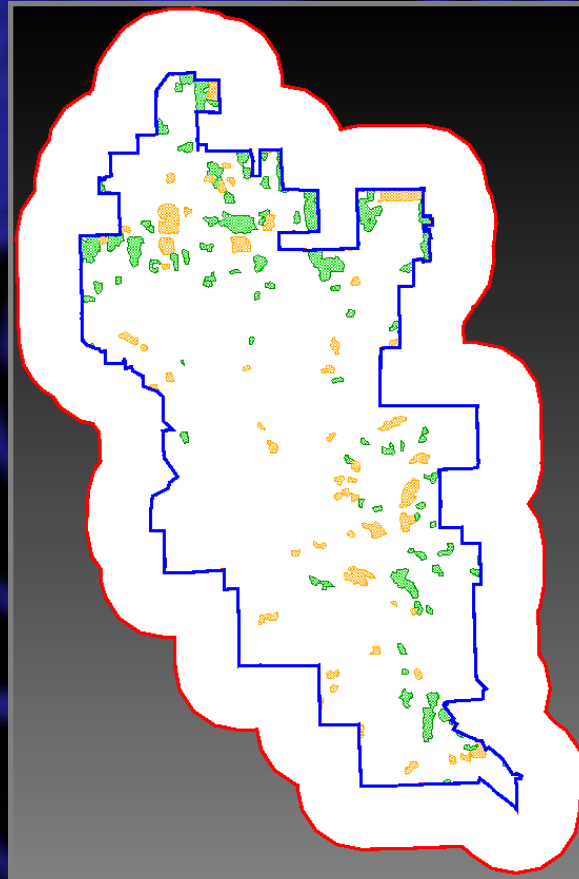
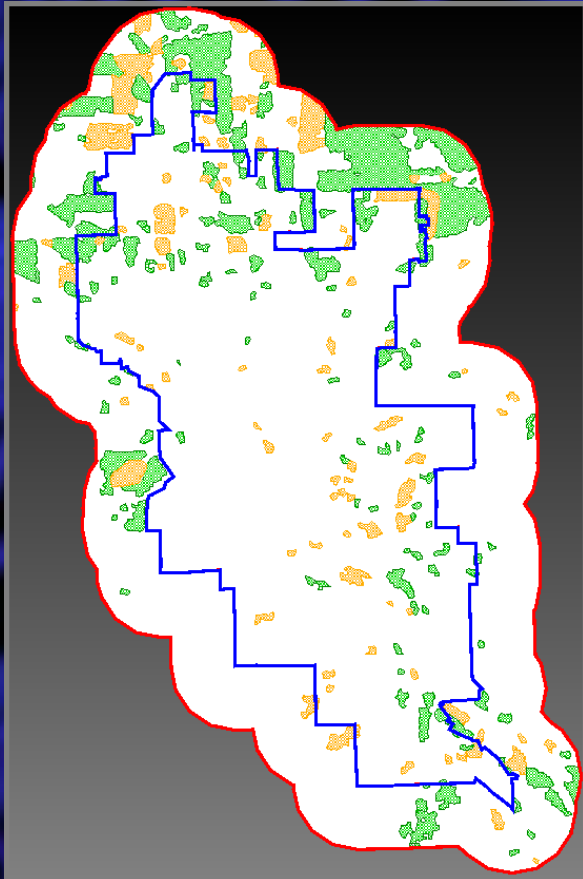
Using land cover change data

- Establish boundaries of urban areas
- Define what is considered land cover change as a result of development
- Quantify land cover change based on the established boundaries and defined type of change



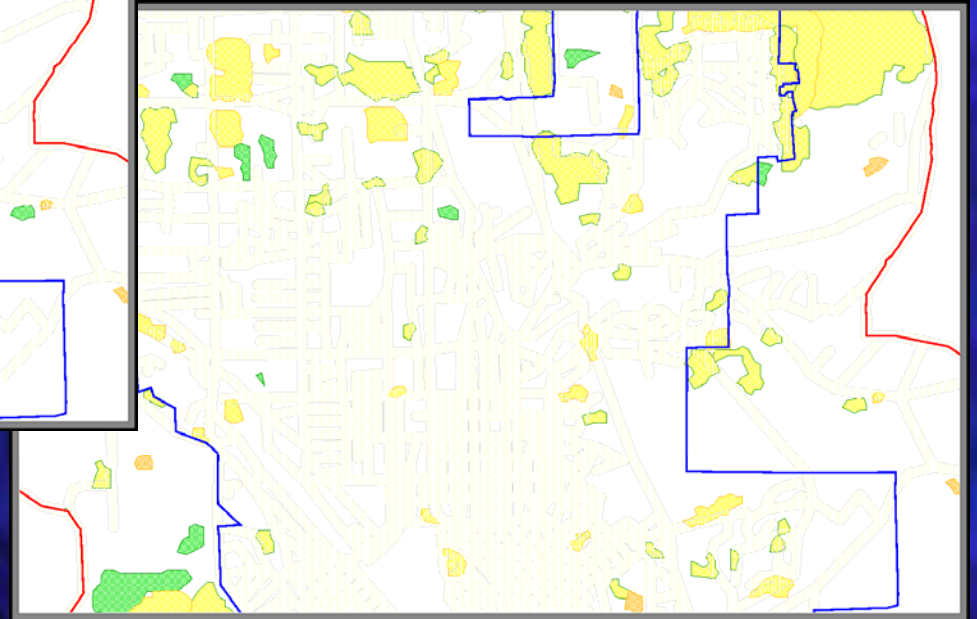
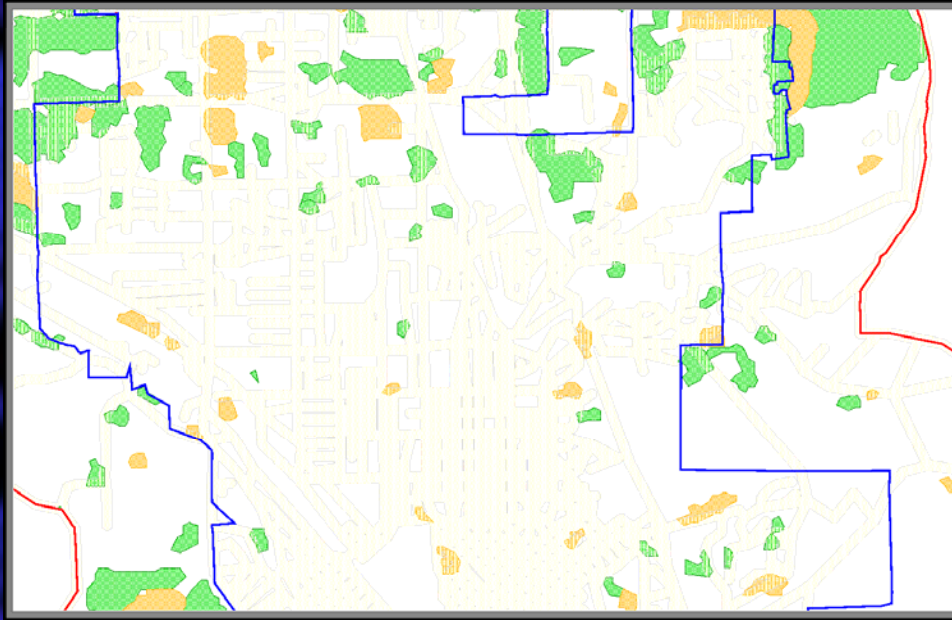


- Equal area Urban and Sprawl Zones (UZ, SZ) were created using Tiger census data
- This allowed for comparison between:
 - Zones-urban vs. sprawl zone growth
 - Cities-one cities growth vs. another



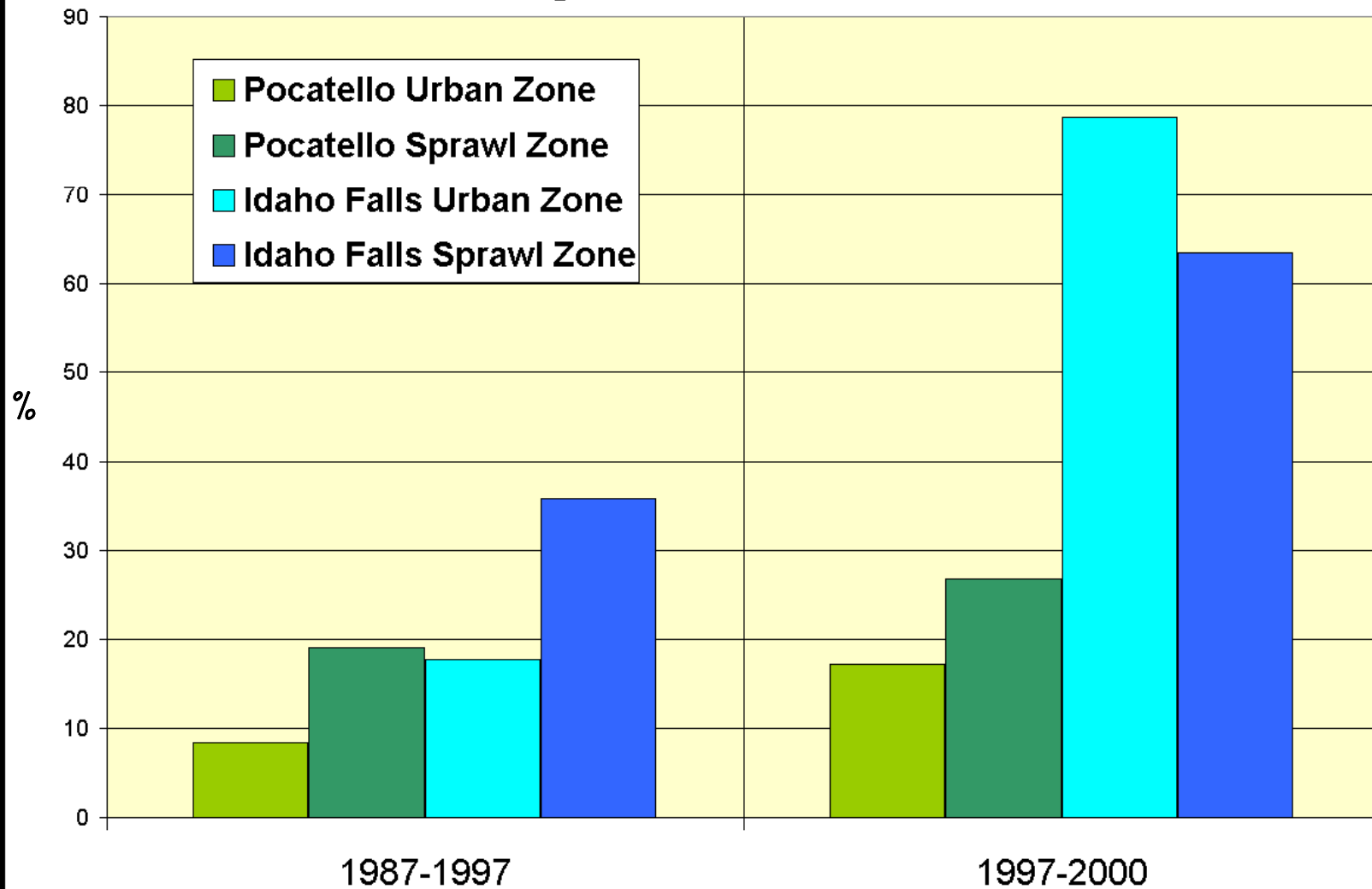
The land cover change was quantified by:

- Total Area (Urban Zone + Sprawl Zone)
- Urban Zone
- Sprawl Zone



Only land cover change occurring within 50m of a road was included in the urban sprawl analysis

Urban Change in Pocatello and Idaho Falls



Methods:

Urban Sprawl Assessment

- LCC Data 87-97 & 97-00

Green Space Assessment

- NDVI Vegetation Indices (87, 97, 00)

Green Space Contiguity Assessment

- Standardized City Block Analysis
- FRAGSTATS Landscape Metrics

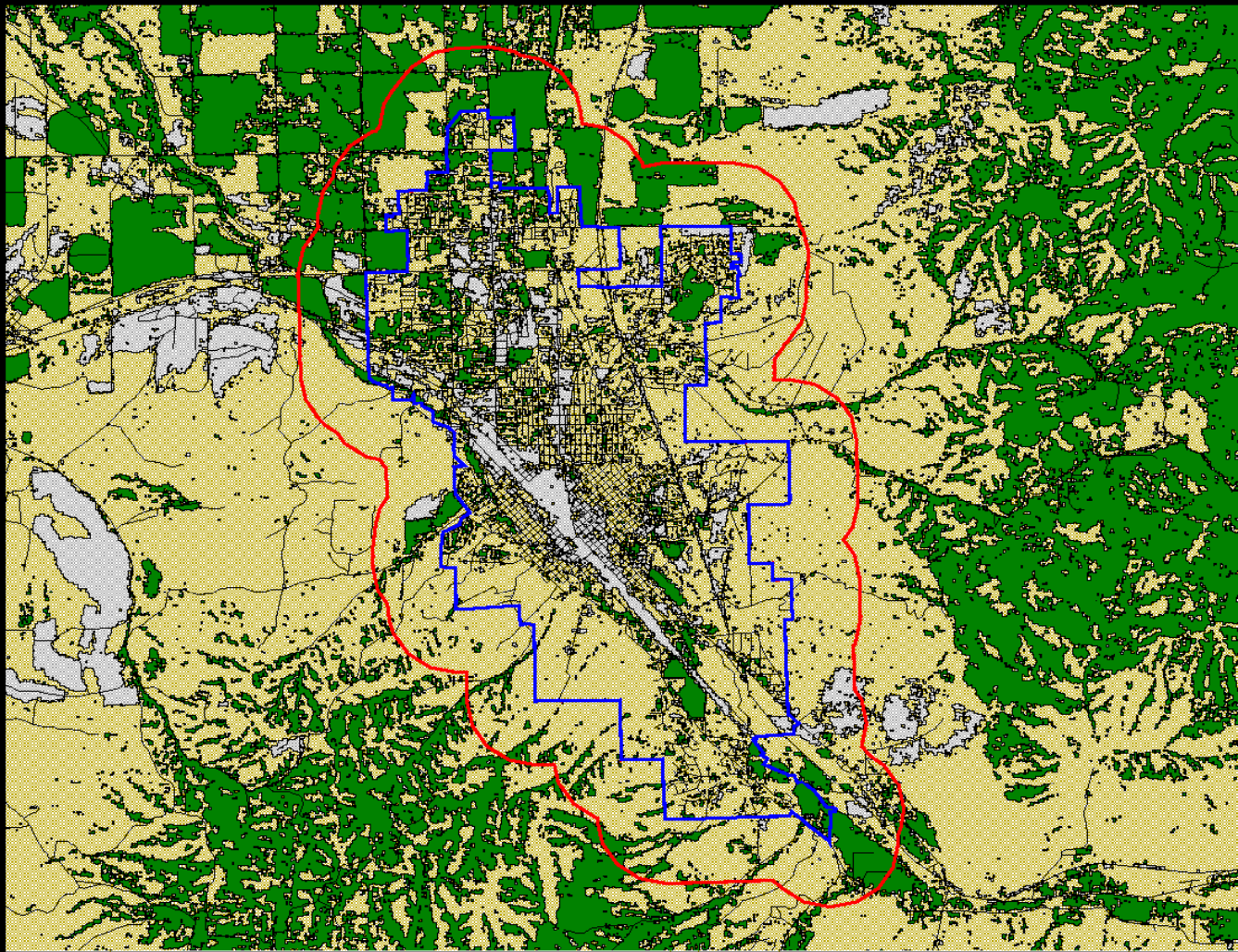
Green Space Assessment

Using an NDVI Vegetation Index

- Create an NDVI image to identify highly vegetative areas
- Establish a threshold (in the NDVI) of what is “green space”
- Compare the amount of green space between zones and cities
- Identify areas of high concentration



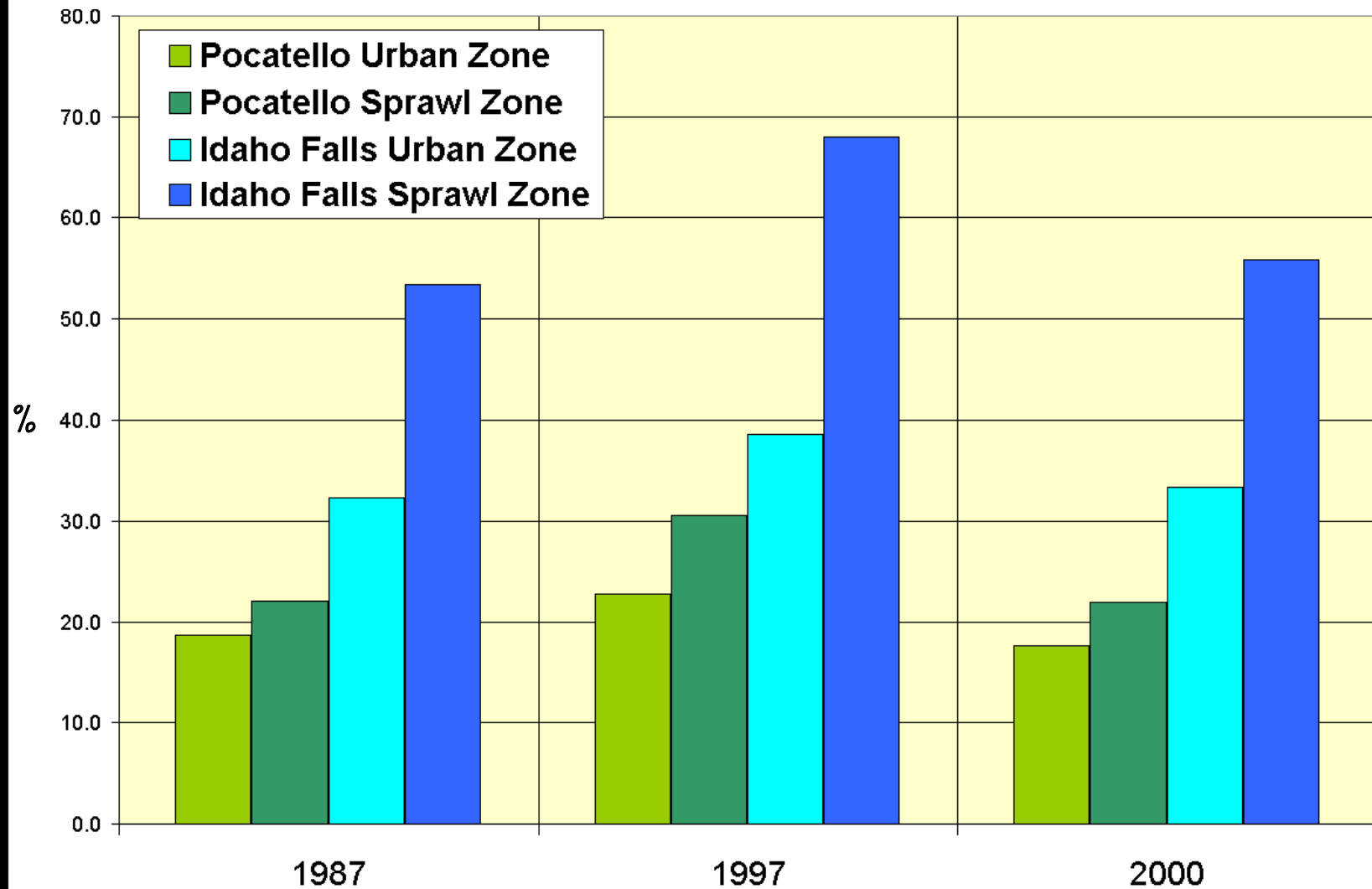
Reclassified NDVI Image



Highly vegetative (green) Moderately vegetative (brown) Non-vegetative (gray)



Percent Area Classified As Highly Vegetative



Methods:

Urban Sprawl Assessment

- LCC Data 87-97 & 97-00

Green Space Assessment

- NDVI Vegetation Indices (87, 97, 00)

Green Space Contiguity Assessment

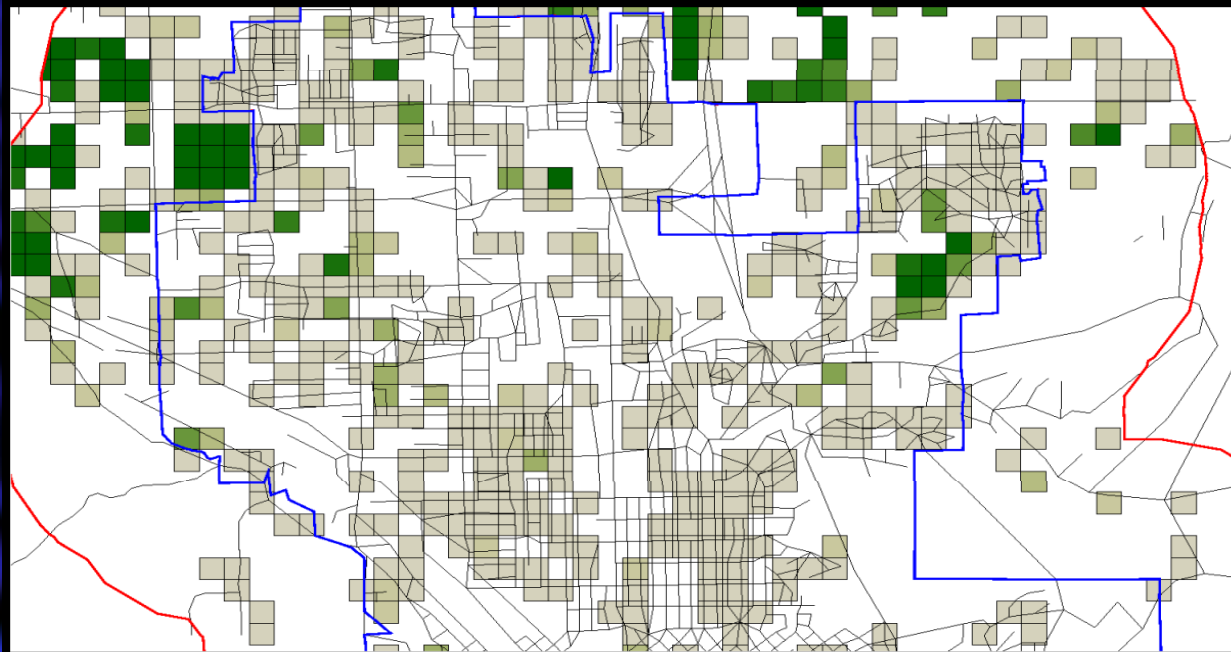
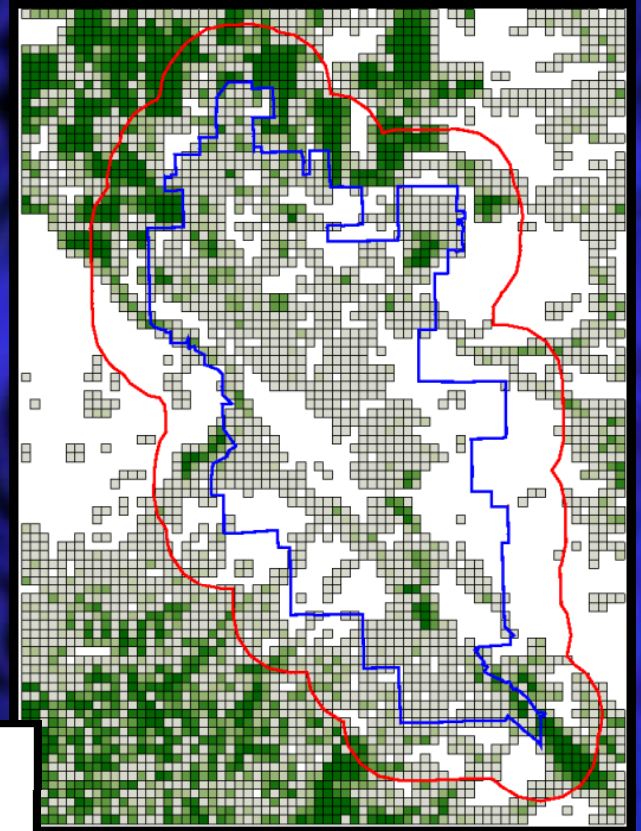
- Standardized City Block Analysis
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Green Space Contiguity

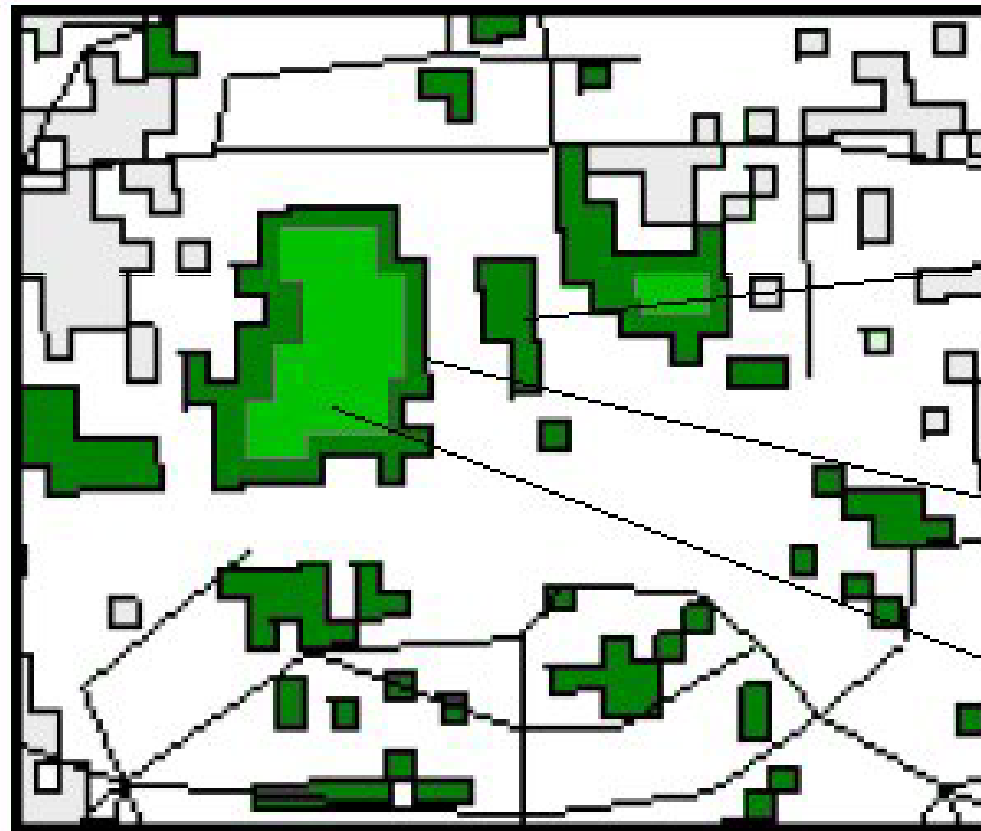
- City Grid Analysis
 - Determined contiguity of green space
 - Identified regional concentration
- Fragstats Analysis
 - Quantified the fragmentation of green space using landscape metrics

City Grid Analysis

- 200m x 200m standardized city block coverage
- Percentage of highly vegetative green space (per city block) was calculated



FRAGSTATS Analysis

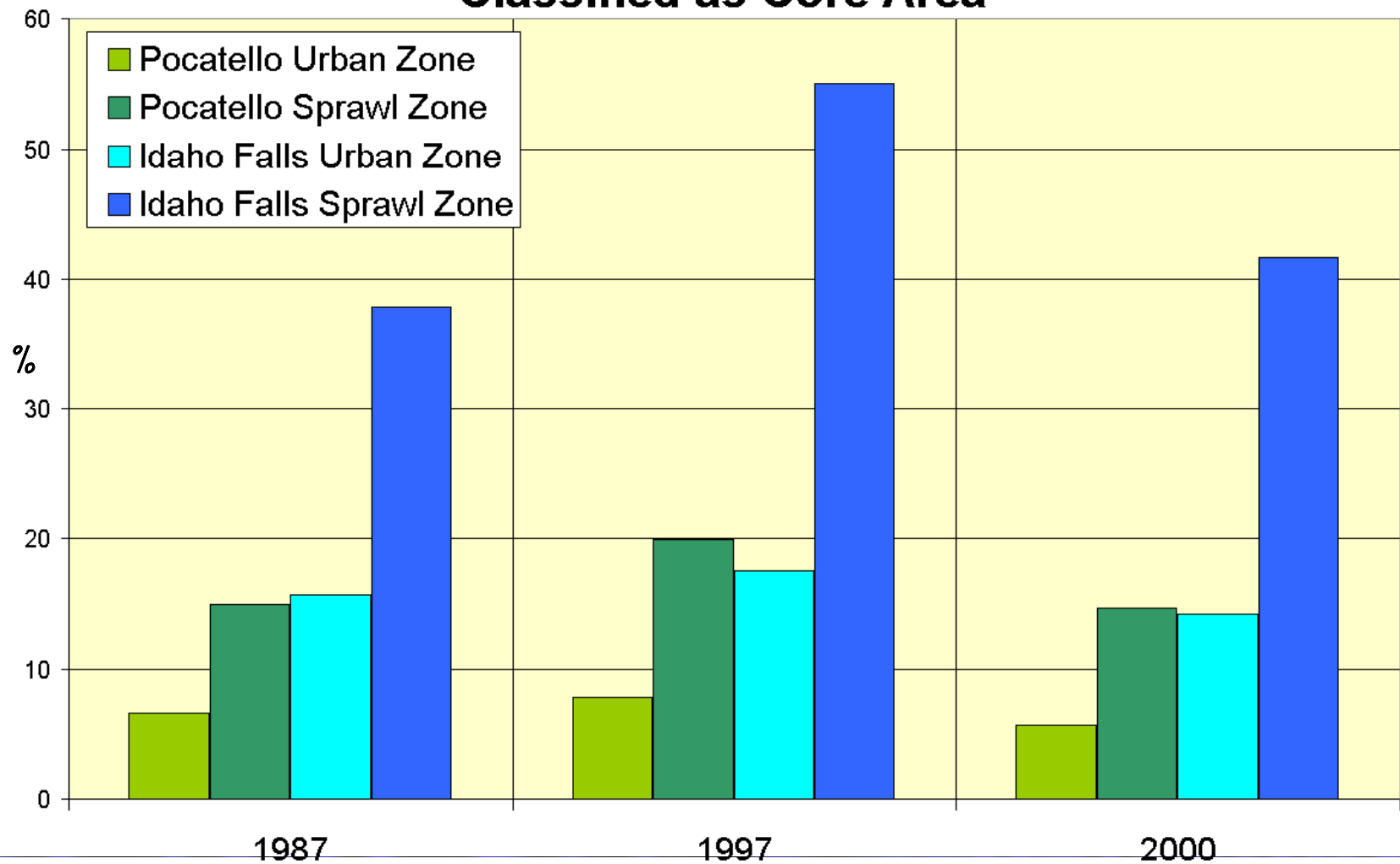


Area with No core area (all edge)
=fragmented green space

Edge area not included in the
total core amount

Core area within a larger patch
of a highly vegetative area
(contiguous green space)

Percent of Highly Vegetative Green Space Classified as Core Area



Limitations & Assumptions

- 30m x 30m pixel size
 - Regional trends vs local trends
 - Analyzes “big picture” rather than specifics
- Some land cover change may not be the result of development.
 - Sprawl Zones--development or crop rotation?
- Changes in green space may be caused by unknown factors.
 - Residential landscaping
 - Watering practices vary from year to year

Potential Applications for This Information

- Urban Planning
- Growth and Zoning Issues
- Conservation of Green Space
- Creation of New Green Space

Urban Planning



- Track urban growth/sprawl
- Protect green space areas
- Monitor increased demand on public services, utilities, and the infrastructure



Growth & Zoning Issues



- Monitor growth & development in areas of increased fire risk
- Fire control agencies response time, route, & accessibility

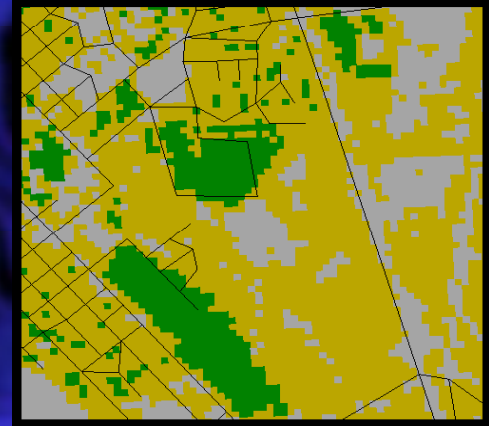
- Increased traffic congestion
- Decreased options for non-automobile based transportation solutions



Conservation and Creation of Green Space

Address changes in green space

- Conservation of existing green space
- Creation of new green space
 - City parks
 - Open spaces
 - Green Ways



Questions, Comments, Data Requests?

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