Socio-economic drivers of land-use change at several sites in the Plum Island Estuary LTER region

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CLARK LABS idrisi32

HERO network

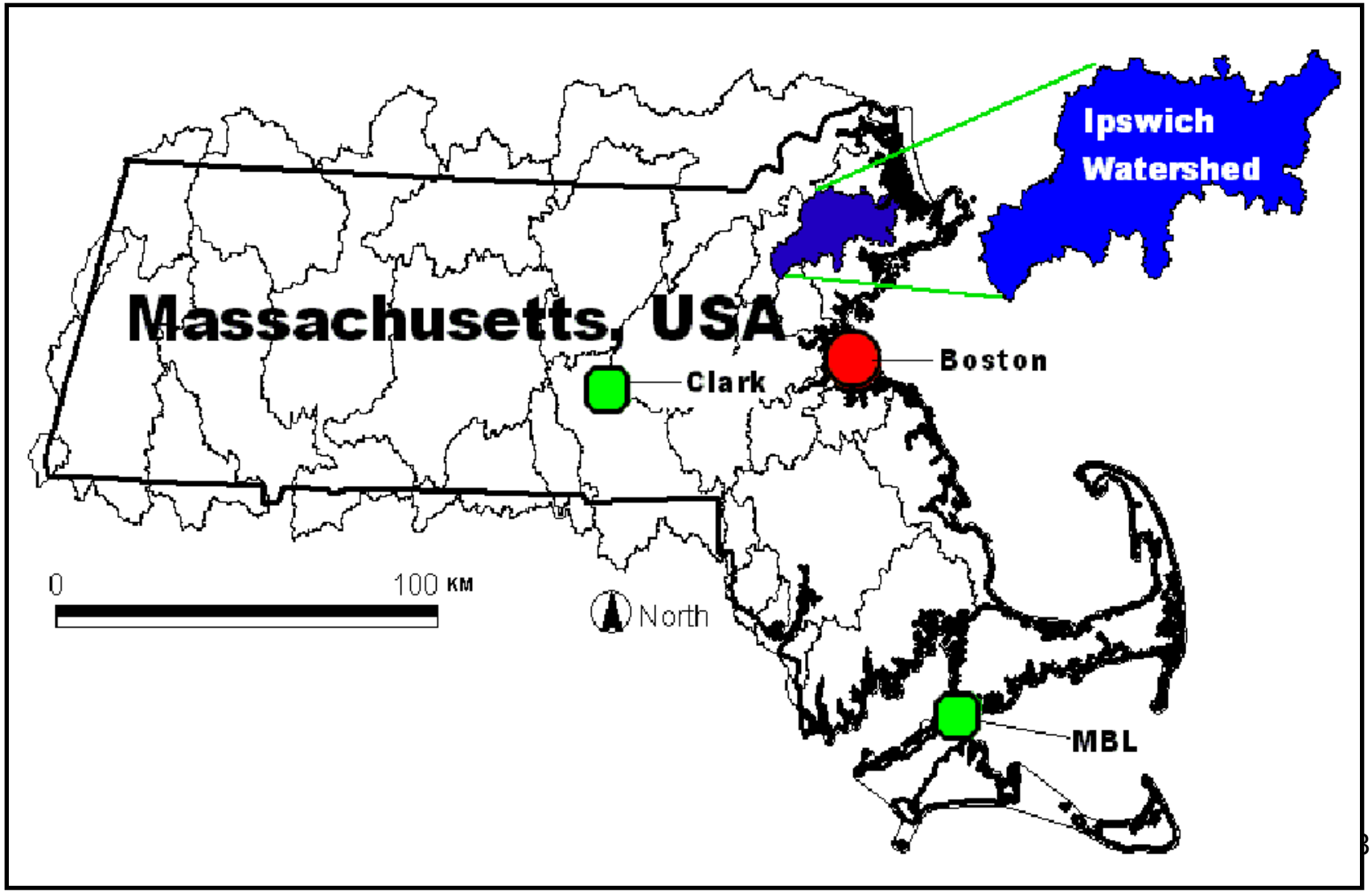
Center for Integrated Study of the Human Dimensions of Global Change

NSF

Main Points

- PIE-LTER serves as the inspiration to create general statistical and modeling methods that can be applied elsewhere to study land change.
- These methods are incorporated into accessible GIS software.
- NSF-funded HERO program is designed for cross-site comparison of land change.
- Quality control on data and metadata is key.
- Some of our best work is done with REUs.
- We are fully integrated with policy makers.

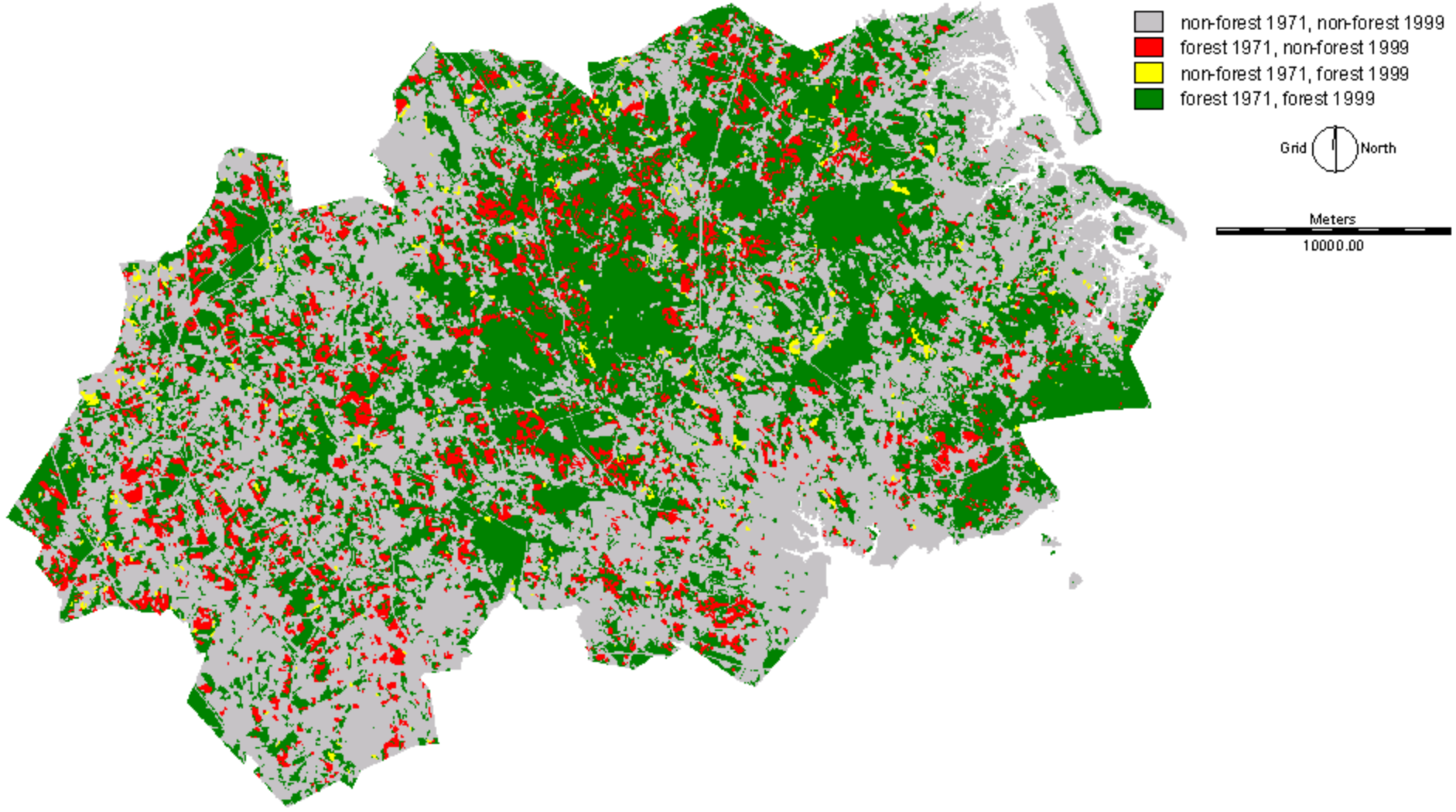
Plum Island Estuary LTER



Research Experience for Undergraduates (REU)

Towns of Ipswich Watershed

Forest Change 1971 - 1999



Wall of Equations

Information of Location

Simulated Stratum

Simulated Grid Cell

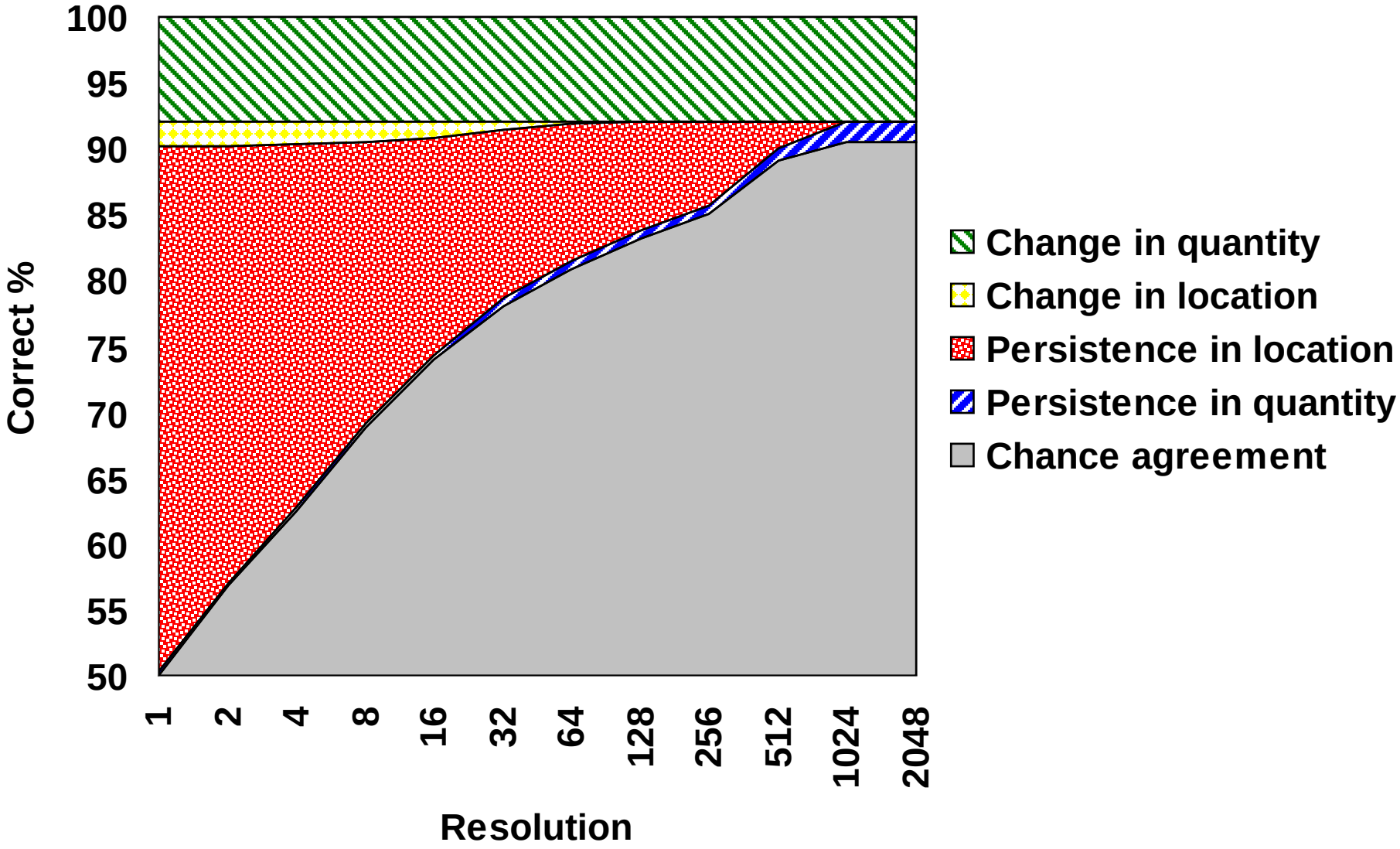
Simulated Stratum

No

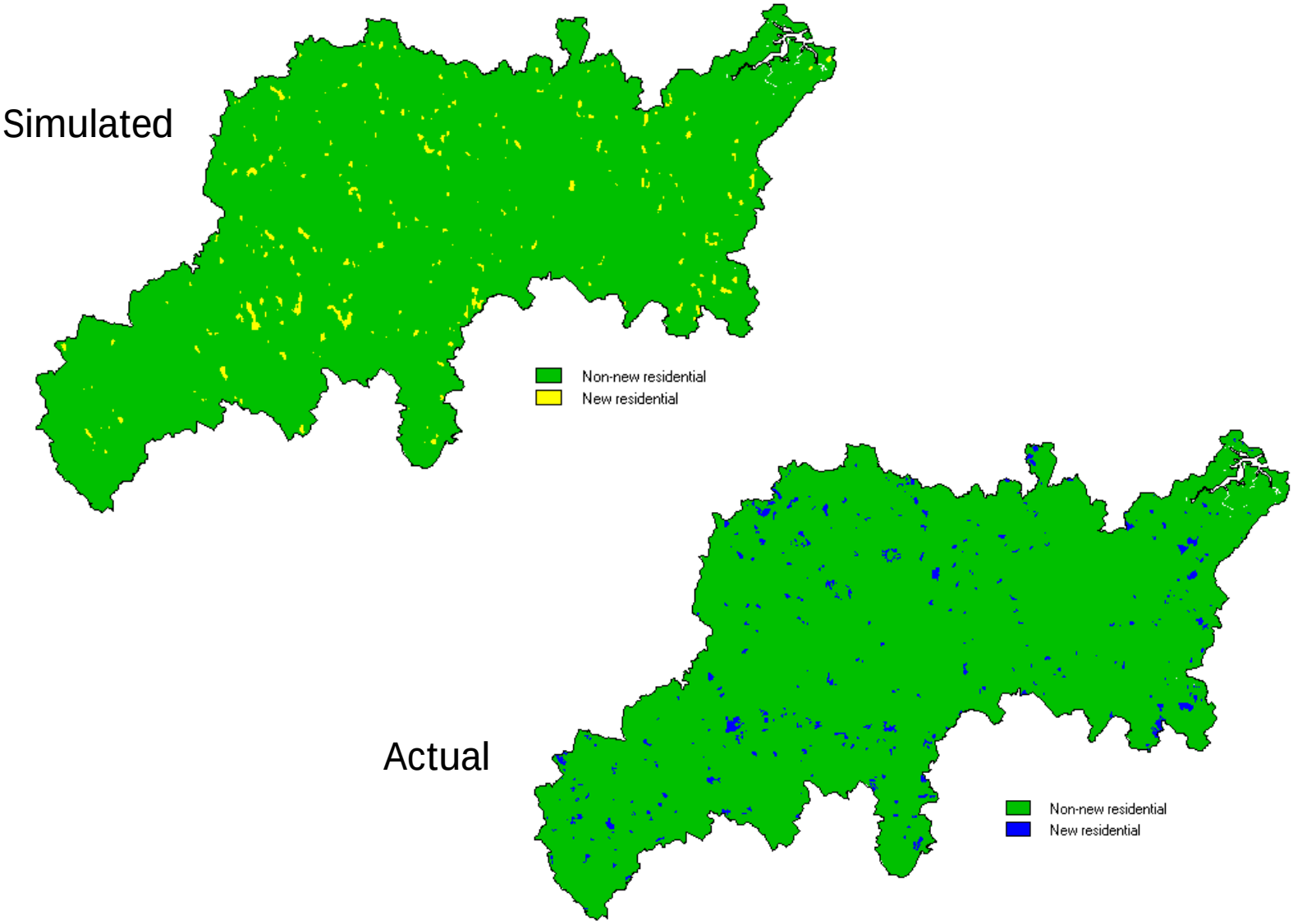
Information of Location \ Information of Quantity	No	Simulated	Perfect
Perfect	$\sum_{j=1}^{J} MIN(R_{..j}, \frac{1}{J})$	$\sum_{j=1}^{J} MIN(R_{..j}, S_{..j})$	$\sum_{j=1}^{J} MIN(R_{..j}, R_{..j})$
Simulated Stratum	$\frac{\sum_{d=1}^{D} W_{d\cdot}\left[\sum_{j=1}^{J} MIN(R_{d.j}, E_{d.j})\right]}{\sum_{d=1}^{D} W_{d\cdot}}$	$\frac{\sum_{d=1}^{D} W_{d\cdot}\left[\sum_{j=1}^{J} MIN(R_{d.j}, S_{d.j})\right]}{\sum_{d=1}^{D} W_{d\cdot}}$	$\frac{\sum_{d=1}^{D} W_{d\cdot}\left[\sum_{j=1}^{J} MIN(R_{d.j}, F_{d.j})\right]}{\sum_{d=1}^{D} W_{d\cdot}}$
Simulated Grid Cell	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, A_{dnj})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, S_{dnj})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, B_{dnj})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$
Simulated Stratum	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, E_{d\cdot j})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, S_{d\cdot j})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, F_{d\cdot j})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$
No	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, \frac{1}{J})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, S_{..j})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$	$\frac{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}\left[\sum_{j=1}^{J} MIN(R_{dnj}, R_{..j})\right]}{\sum_{d=1}^{D}\sum_{n=1}^{N} W_{dn}}$

Information of Quantity

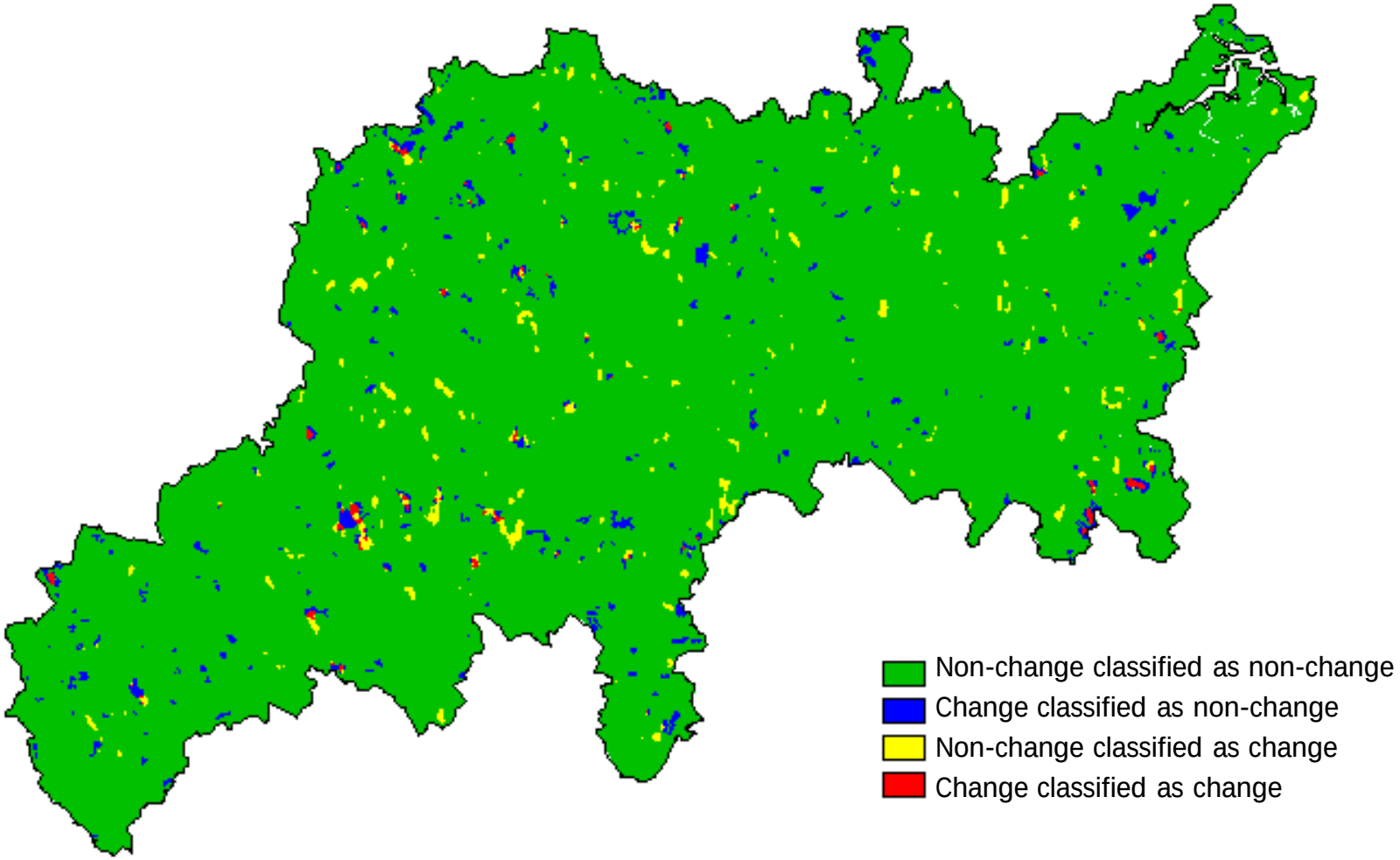
Land Cover Change 1971 - 1999



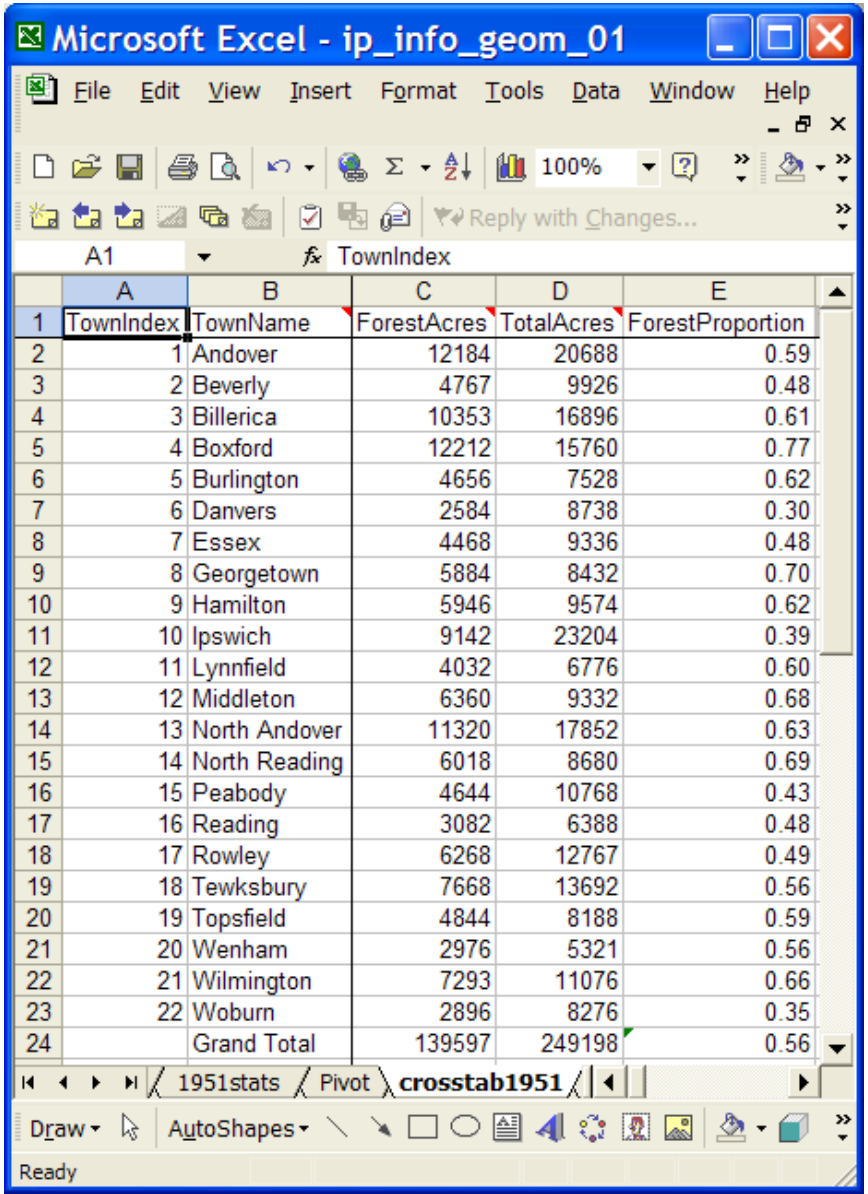
Simulated and actual deforestation 1985-1991



Simulated versus actual deforestation 1985-1991



1951 Forest by town



Microsoft Excel - ip_info_geom_01

File Edit View Insert Format Tools Data Window Help

100%

Reply with Changes...

A1 TownIndex

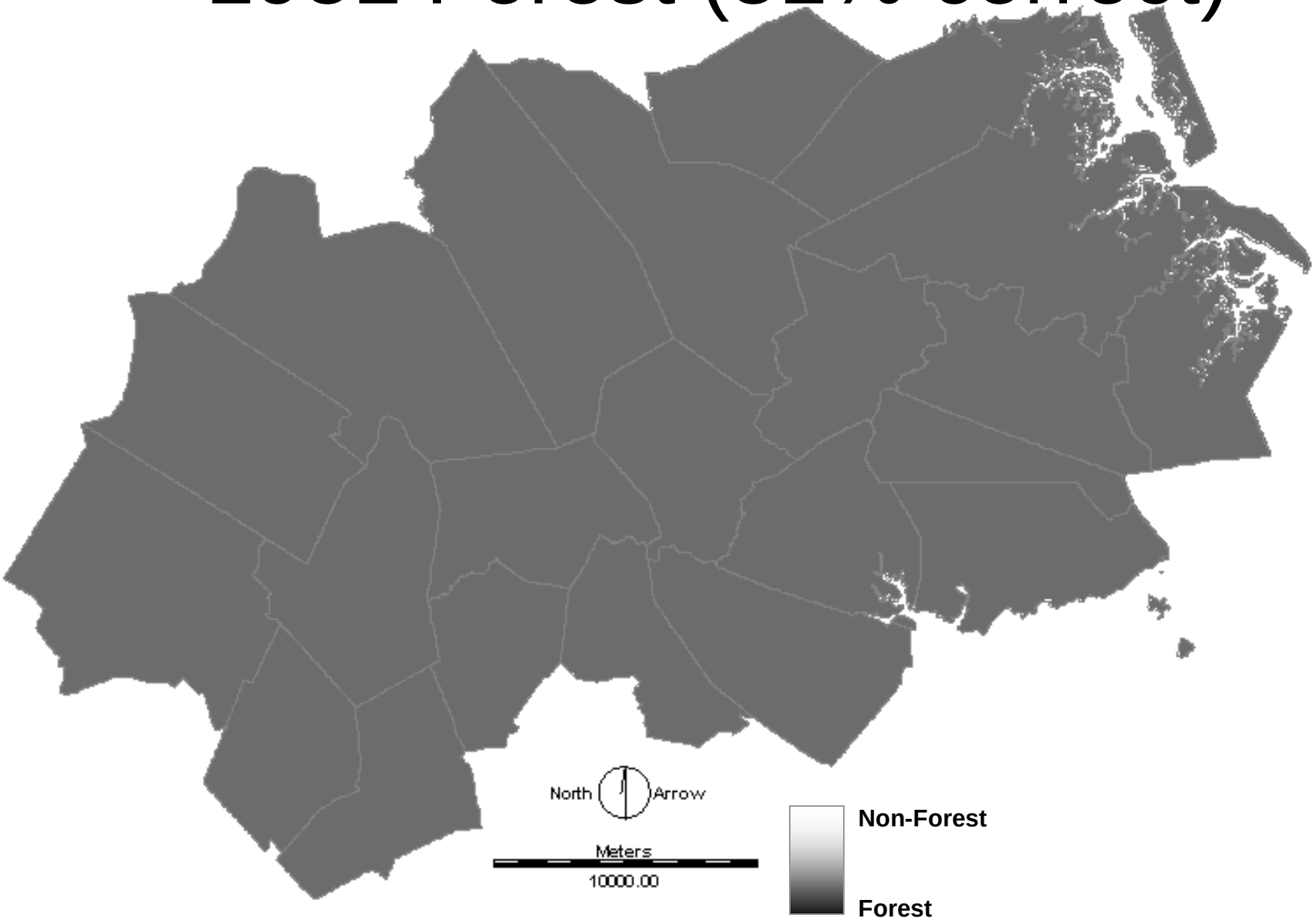
	A	B	C	D	E
1	TownIndex	TownName	ForestAcres	TotalAcres	ForestProportion
2	1	Andover	12184	20688	0.59
3	2	Beverly	4767	9926	0.48
4	3	Billerica	10353	16896	0.61
5	4	Boxford	12212	15760	0.77
6	5	Burlington	4656	7528	0.62
7	6	Danvers	2584	8738	0.30
8	7	Essex	4468	9336	0.48
9	8	Georgetown	5884	8432	0.70
10	9	Hamilton	5946	9574	0.62
11	10	Ipswich	9142	23204	0.39
12	11	Lynnfield	4032	6776	0.60
13	12	Middleton	6360	9332	0.68
14	13	North Andover	11320	17852	0.63
15	14	North Reading	6018	8680	0.69
16	15	Peabody	4644	10768	0.43
17	16	Reading	3082	6388	0.48
18	17	Rowley	6268	12767	0.49
19	18	Tewksbury	7668	13692	0.56
20	19	Topsfield	4844	8188	0.59
21	20	Wenham	2976	5321	0.56
22	21	Wilmington	7293	11076	0.66
23	22	Woburn	2896	8276	0.35
24		Grand Total	139597	249198	0.56

1951stats Pivot crosstab1951

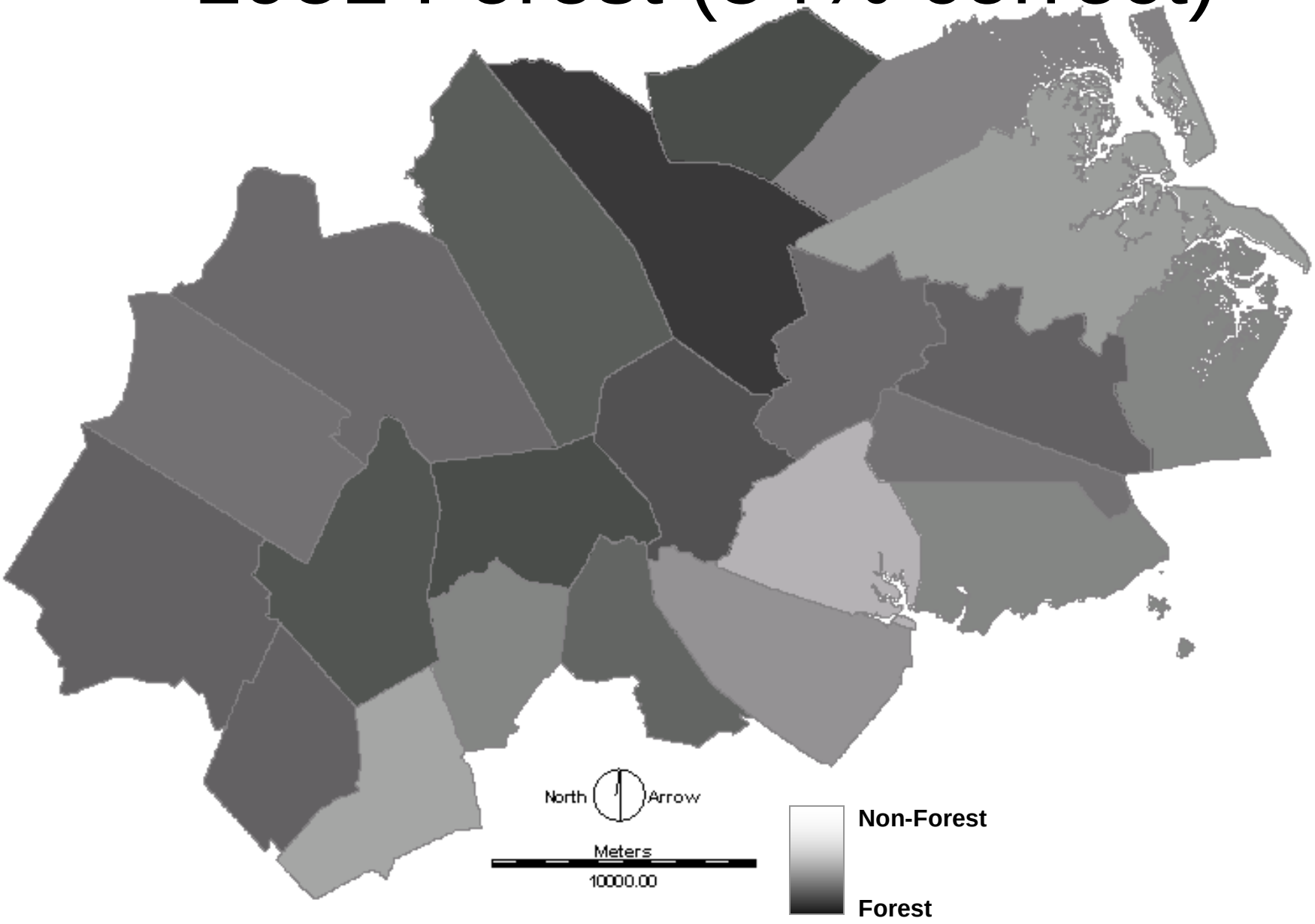
Draw AutoShapes

Ready

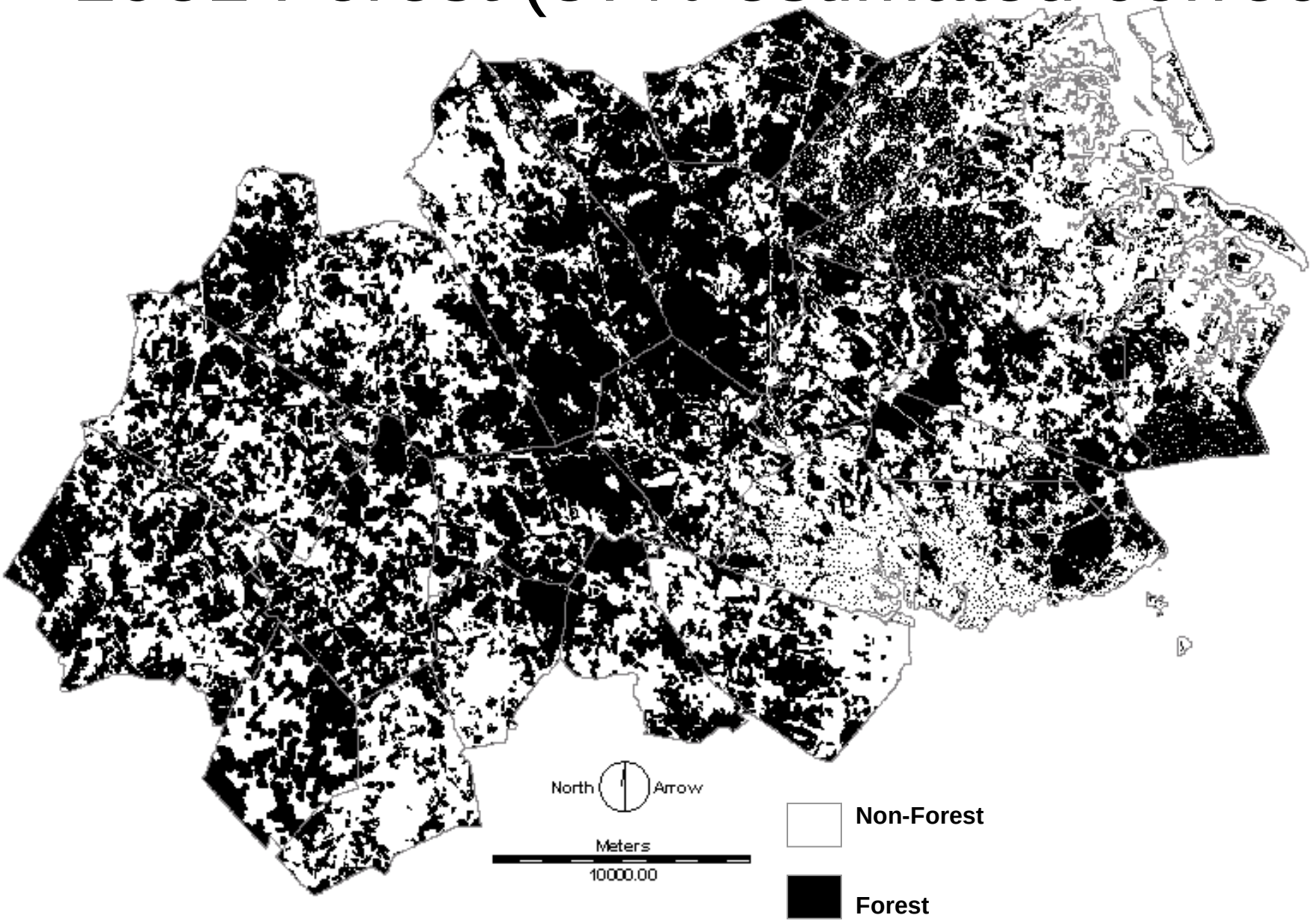
1951 Forest (51% correct)



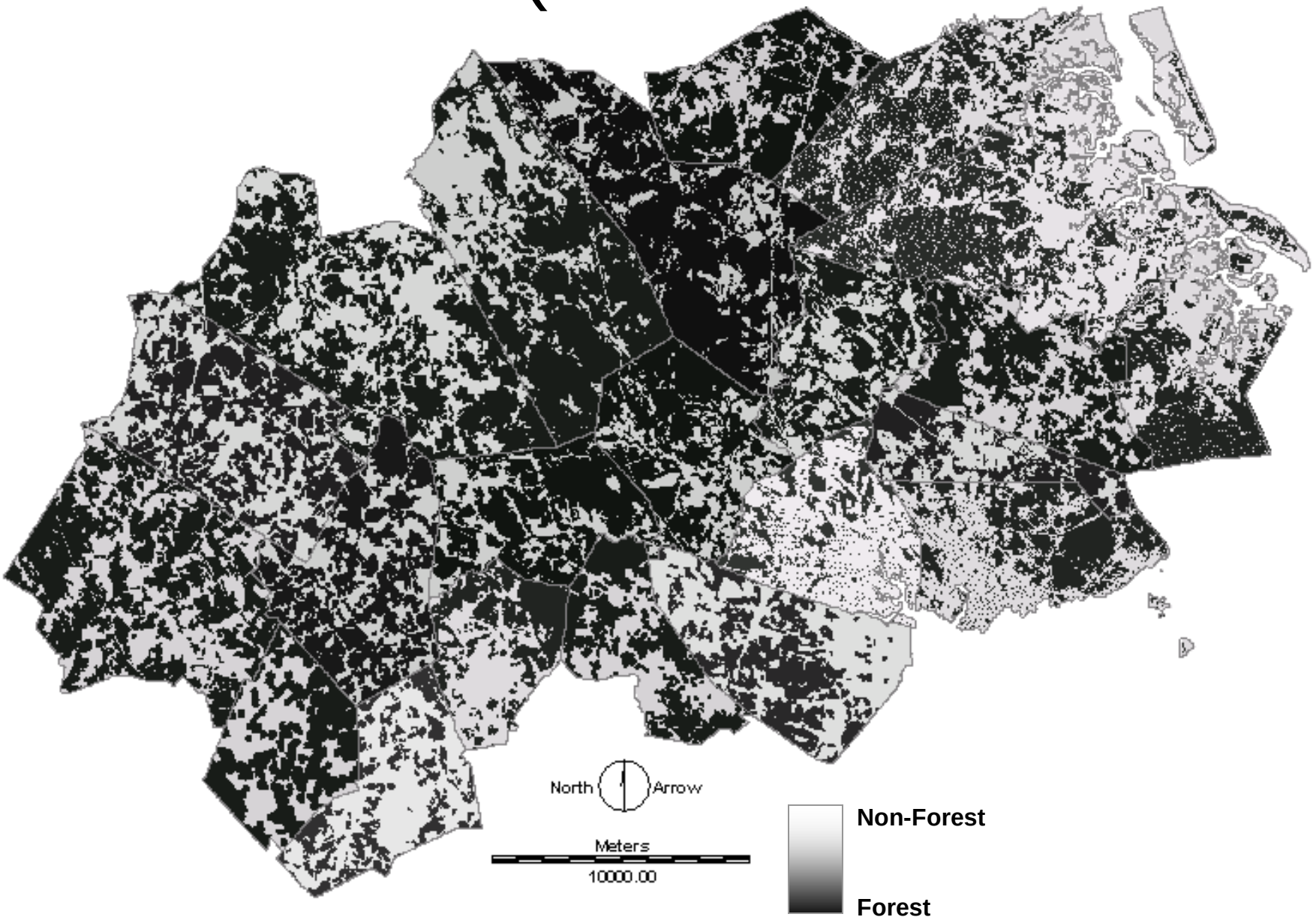
1951 Forest (54% correct)



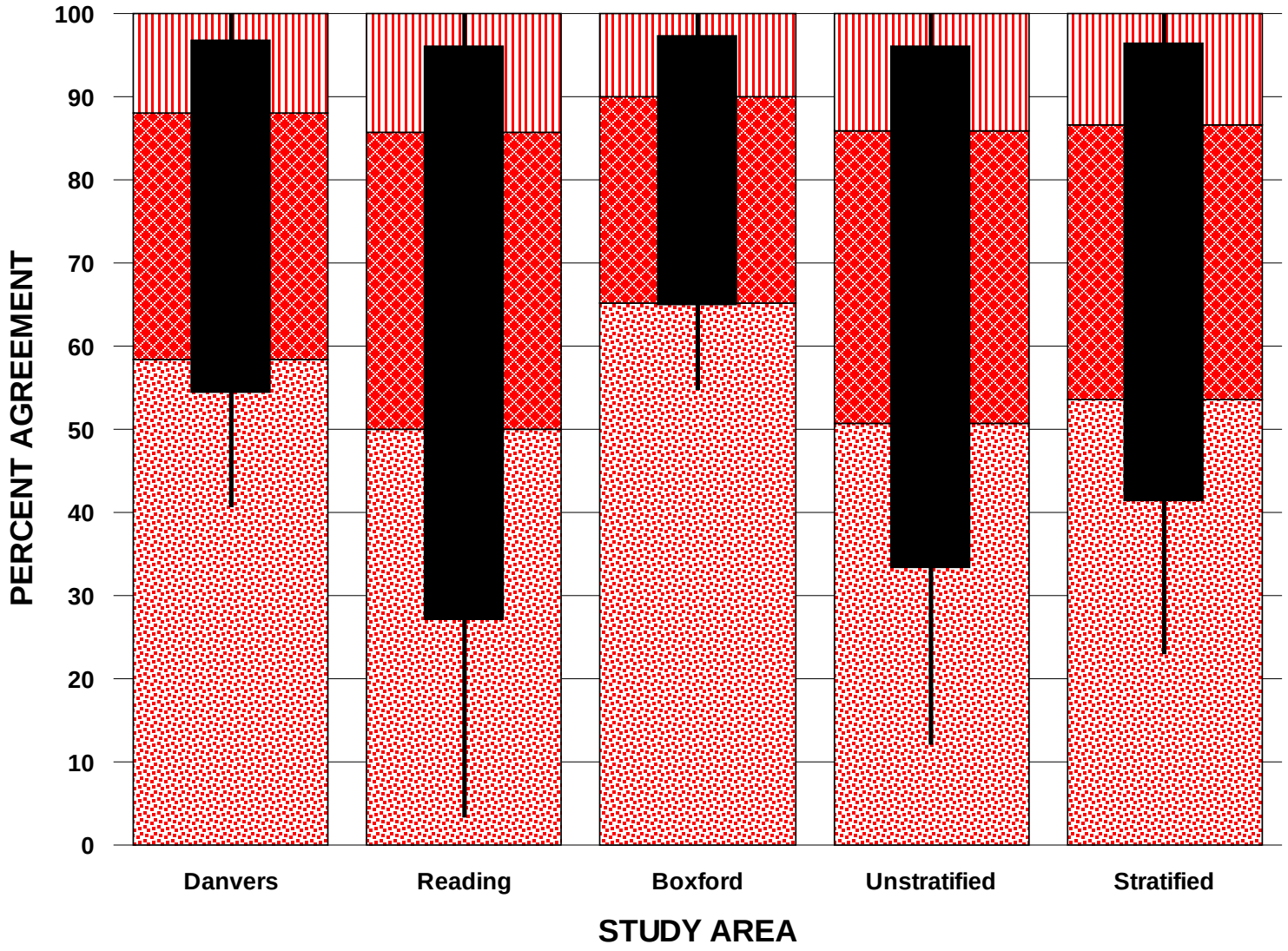
1951 Forest (87% estimated correct)



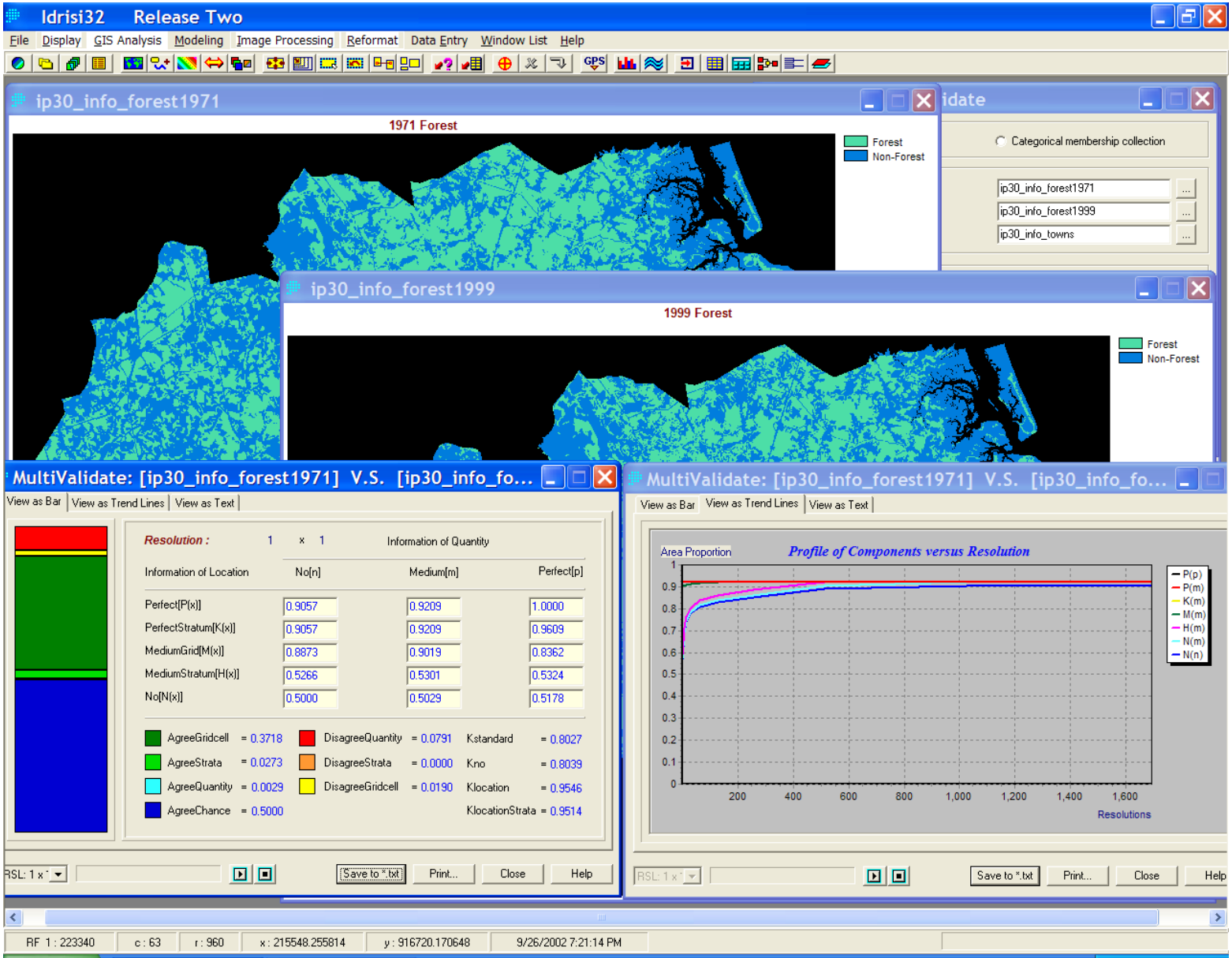
1951 Forest (87% estimated correct)



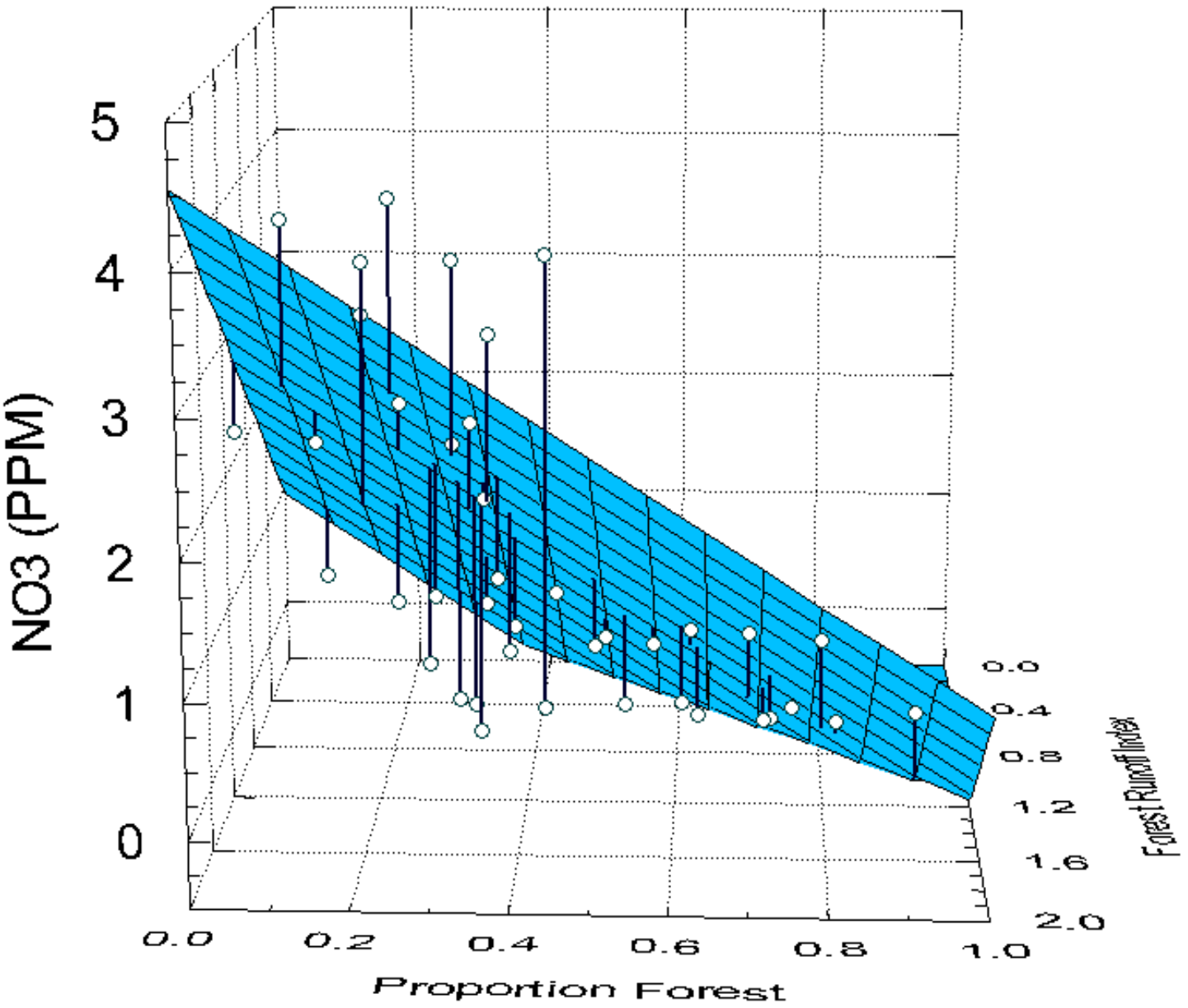
1951 Forest (87% estimated correct)



GEOMOD & MULTIVALIDATE in *IDRISI32*

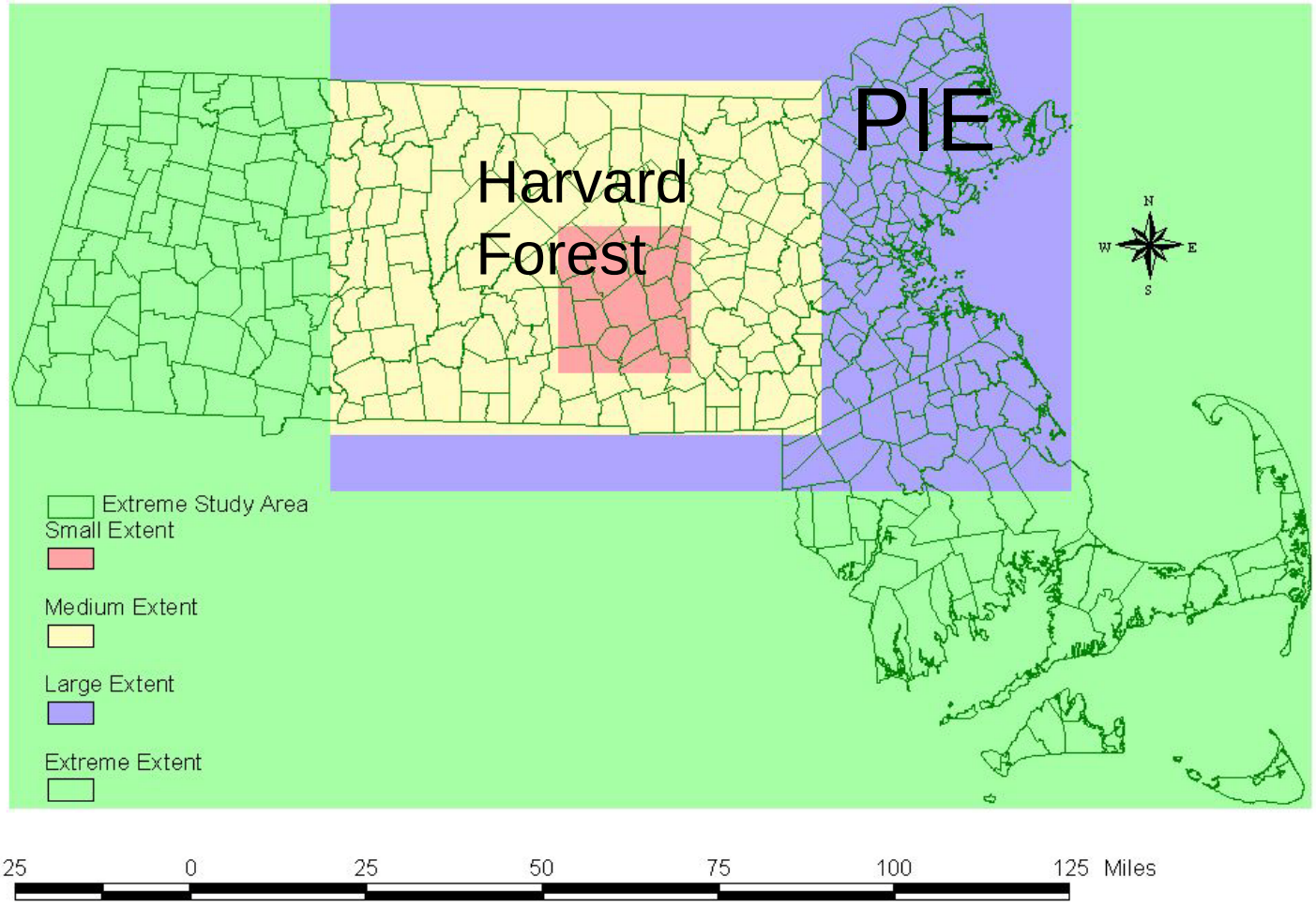


Water quality versus land indices



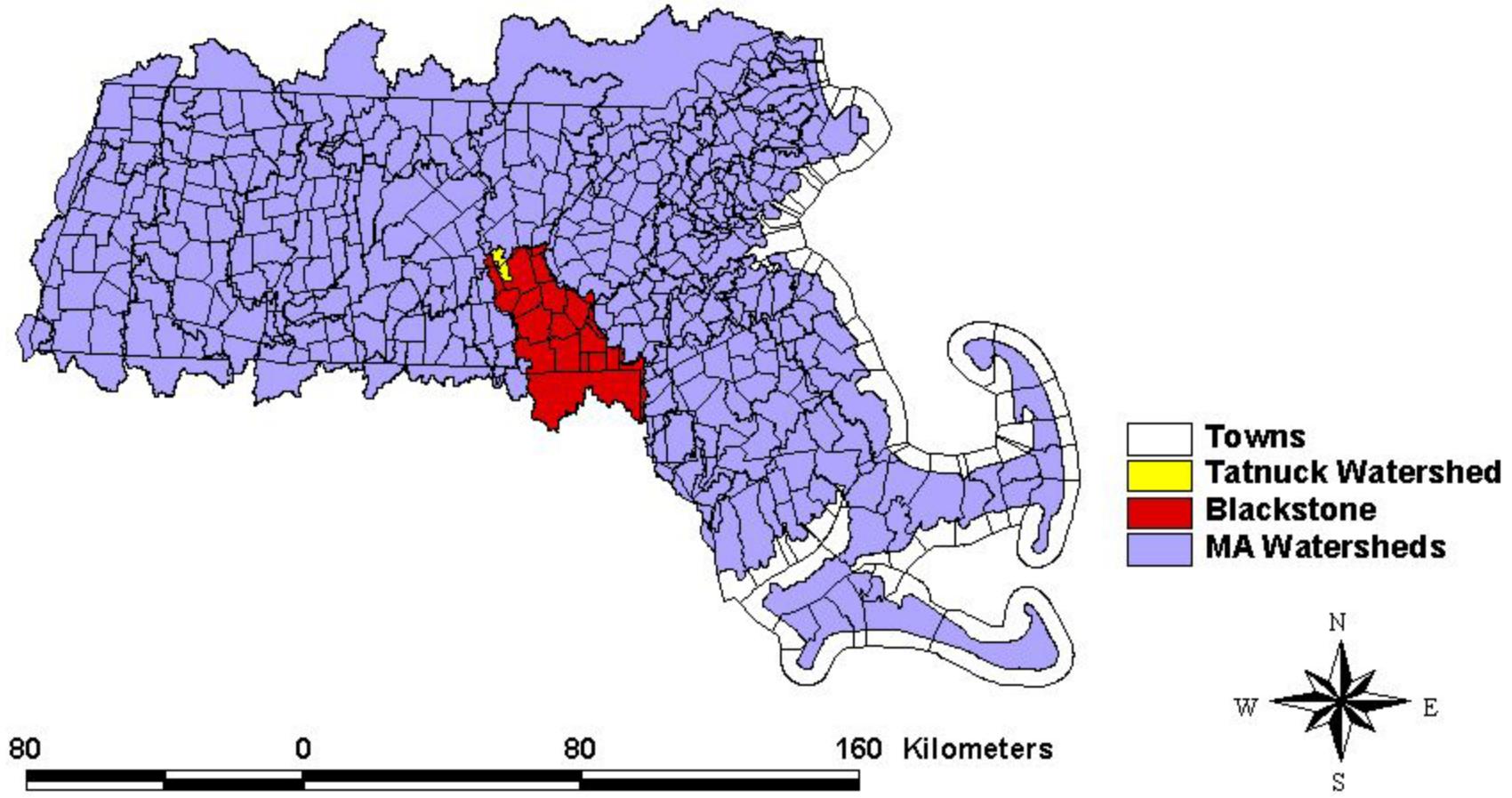
Human Environment Regional Observatory

HERO Study Areas and LTER sites

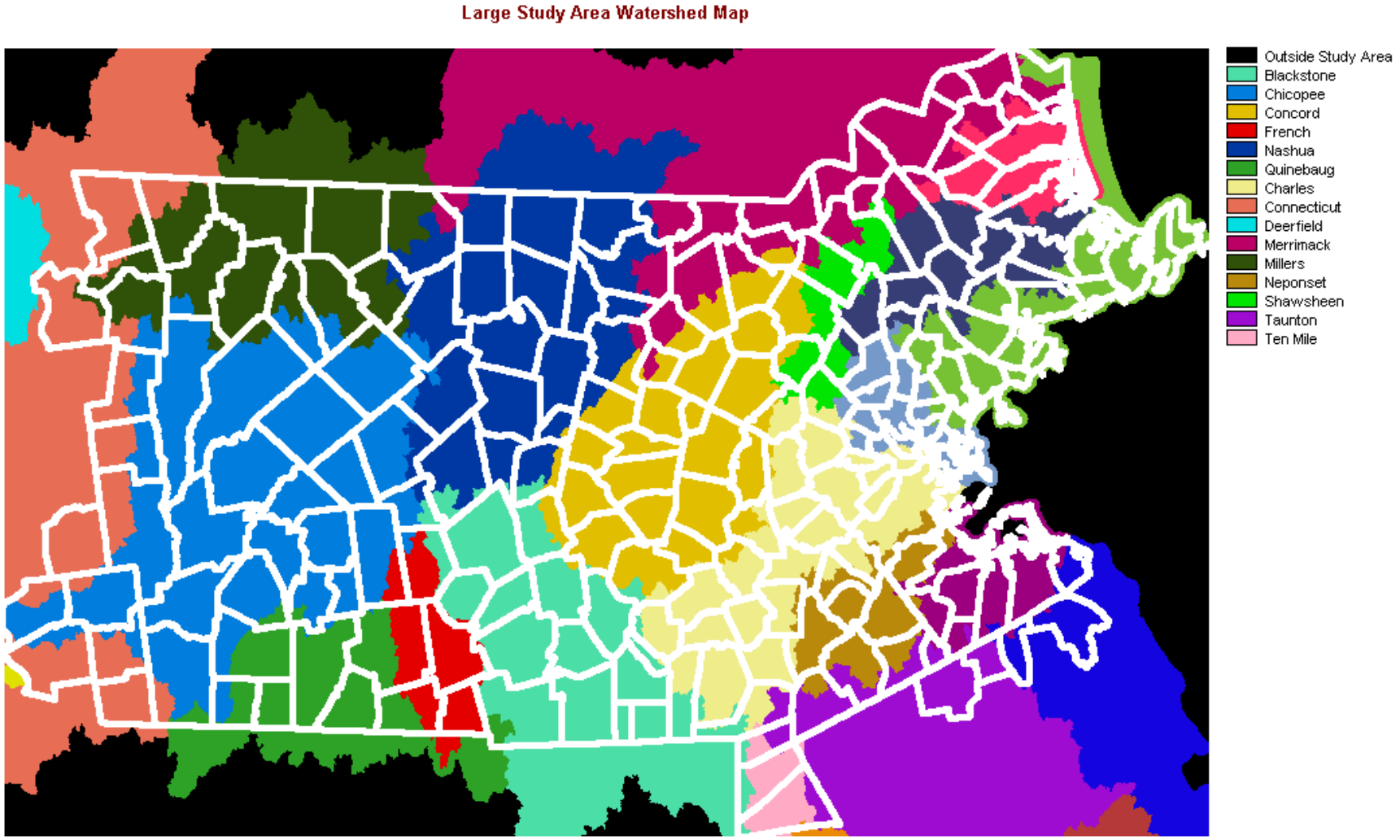


REUs publish in professional peer-reviewed scientific journals

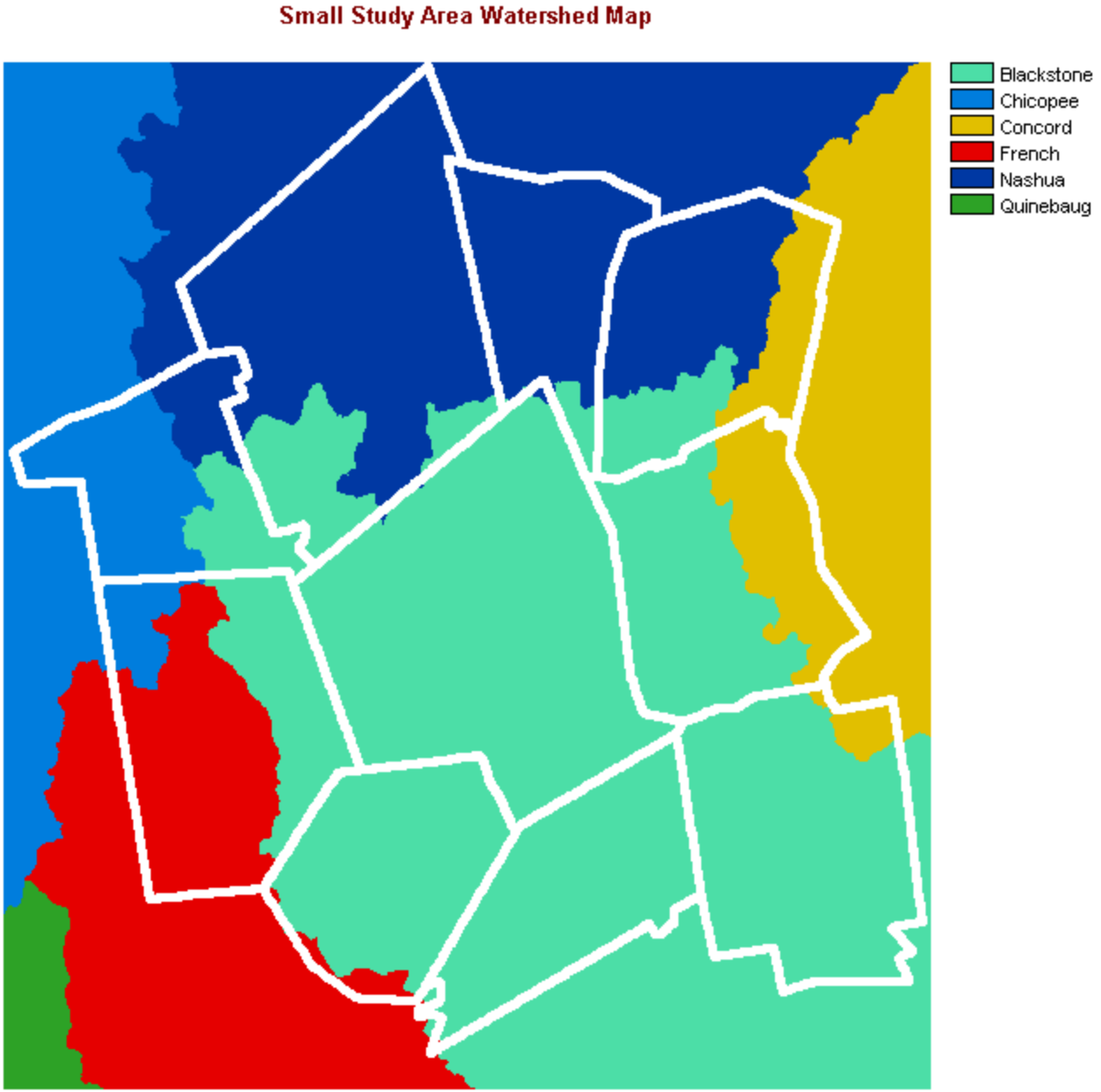
Massachusetts Watersheds



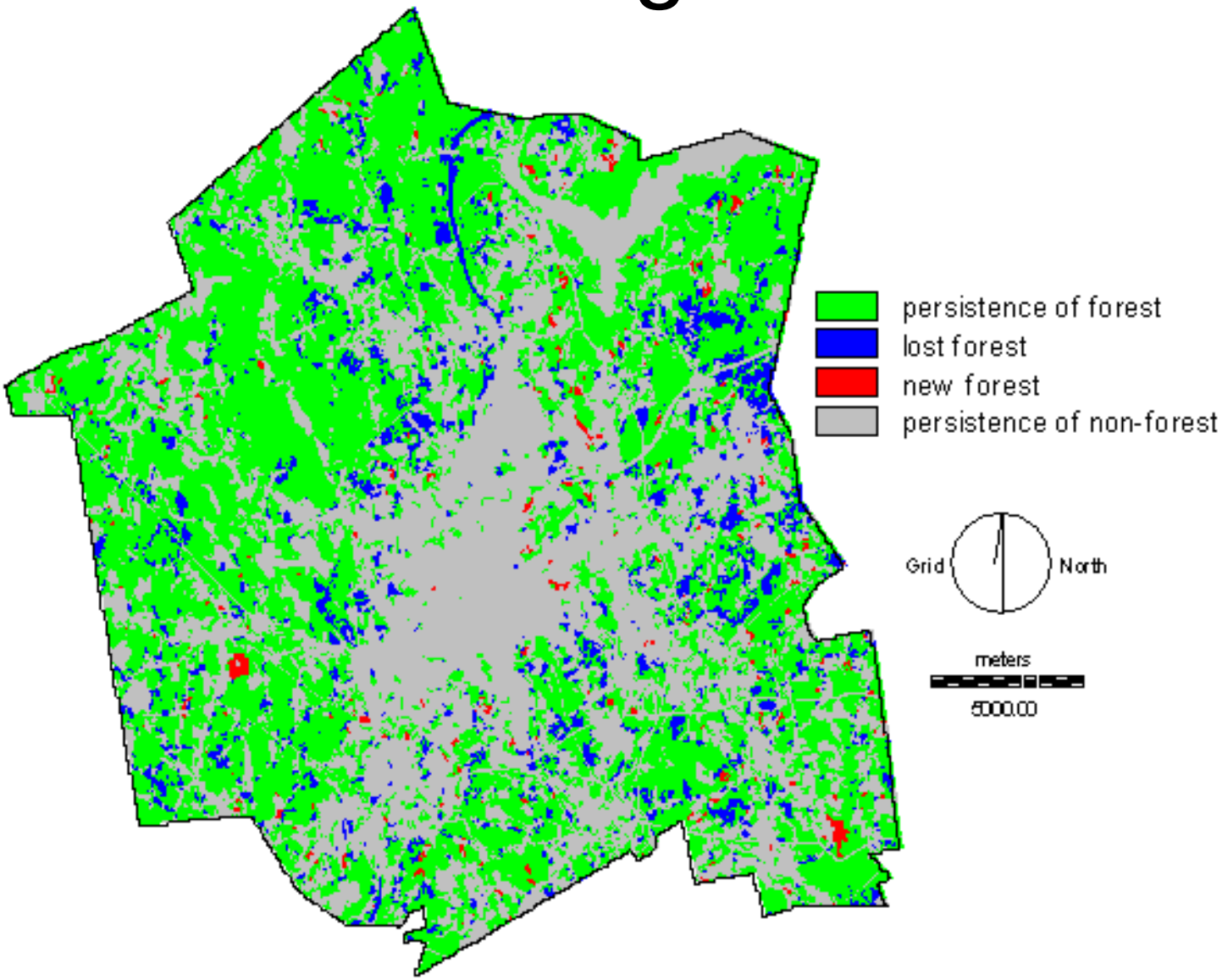
HERO-CM Large Window



HERO Small Window



Forest Change 1971-1999



Deforestation 2001

Former Forest 2002

Imminent Land Change?

Conservation Commission Meeting

Wetland?

Ken Chin's Parking Lot 1

Ken Chin's Parking Lot 2

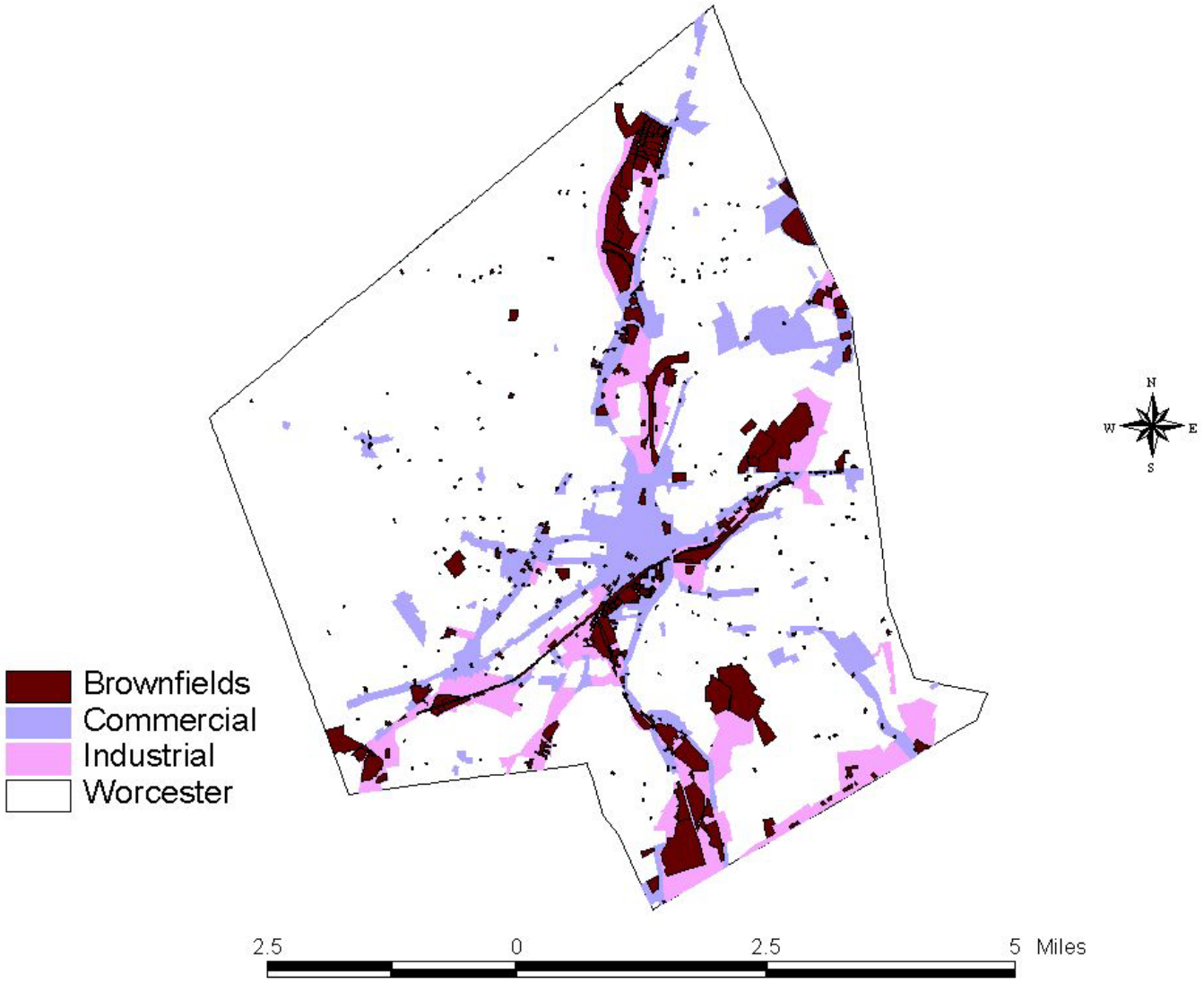
Ken Chin's Parking Lot 3

After

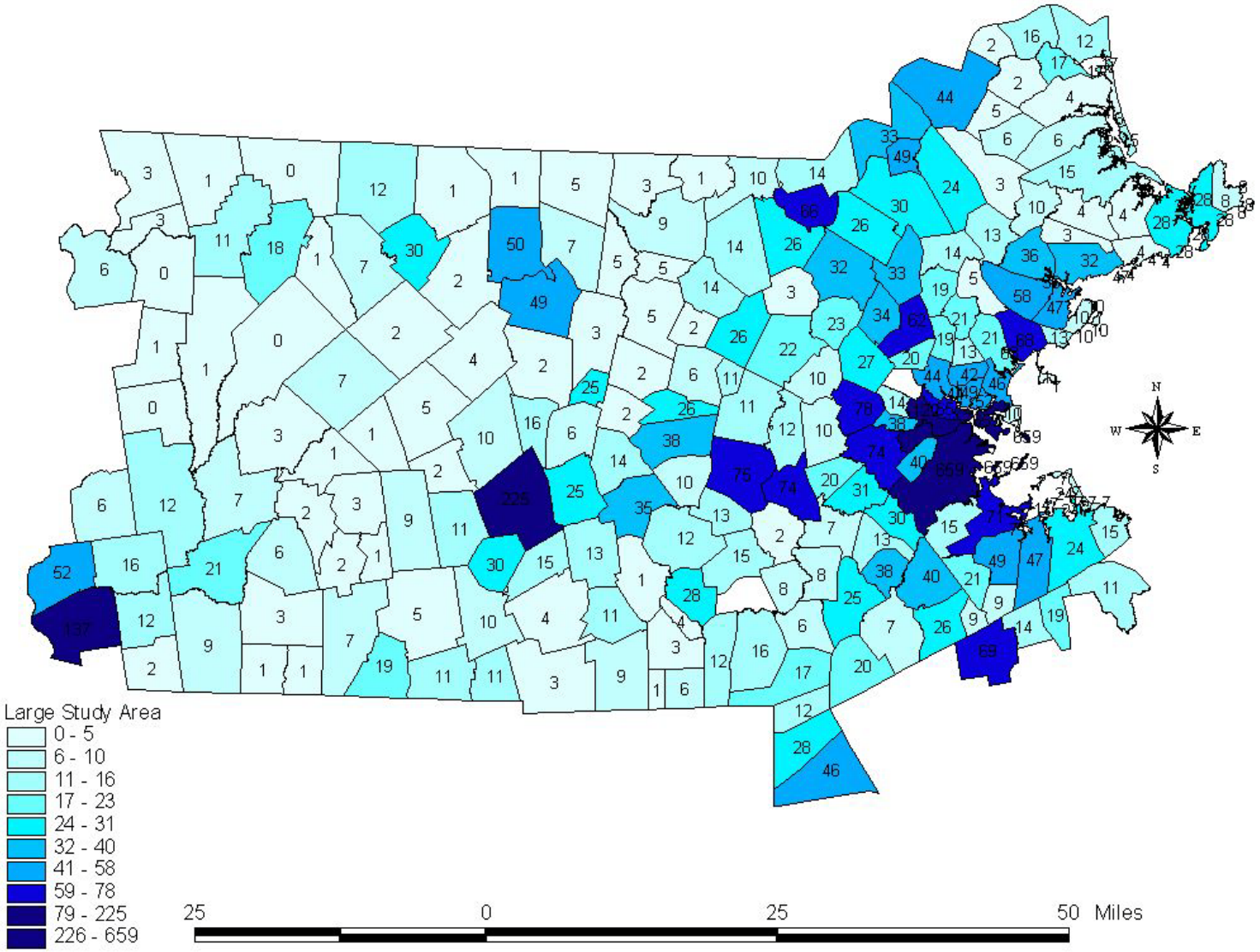
Before


FOR SALE
1 3/4 ACRE BUS. ZONED
GLICKMAN
REAL ESTATE
852-3720
Abraham

Brownfields in Commercial/Industrial Areas

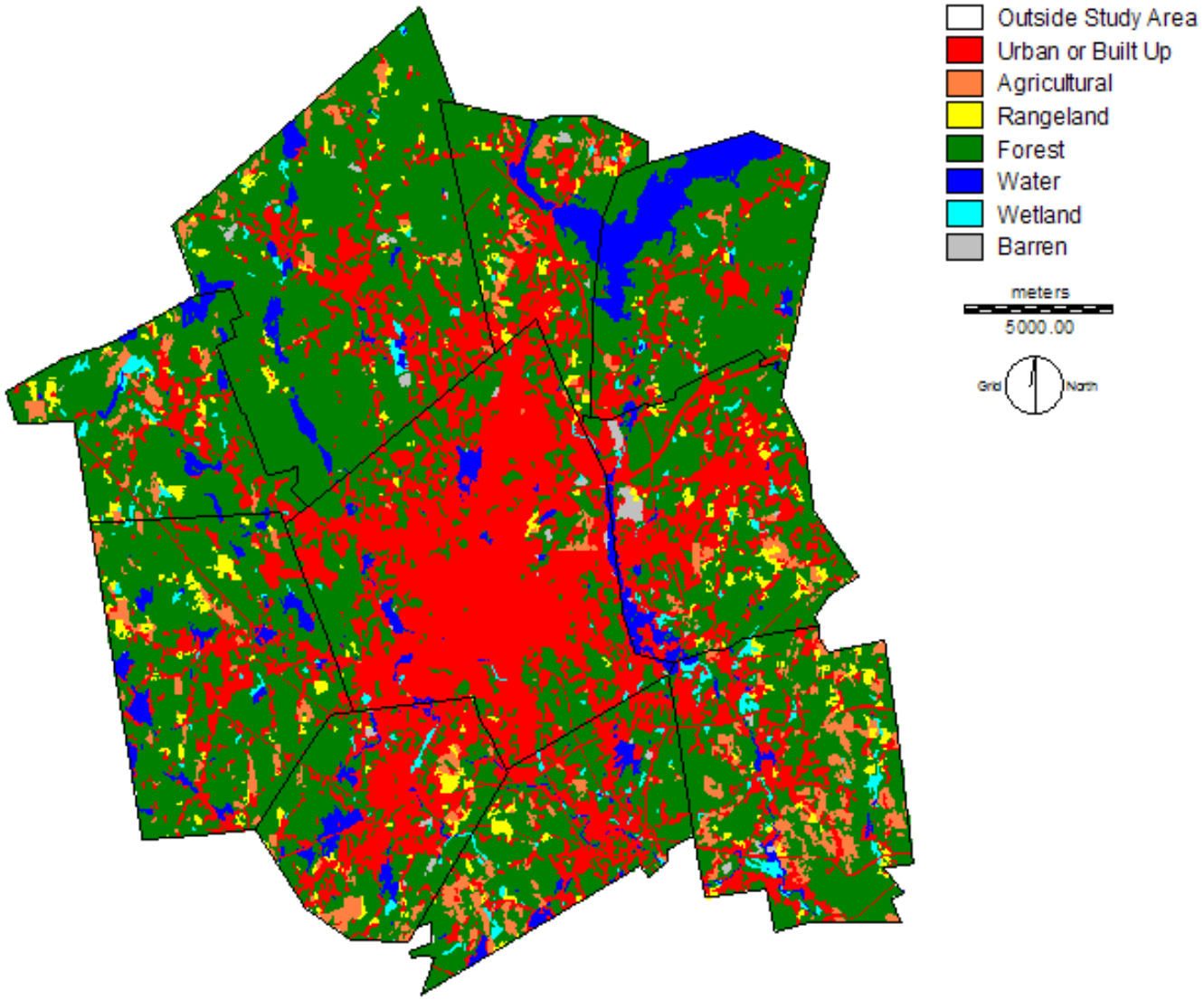


Known Brownfields (Large Study Area)

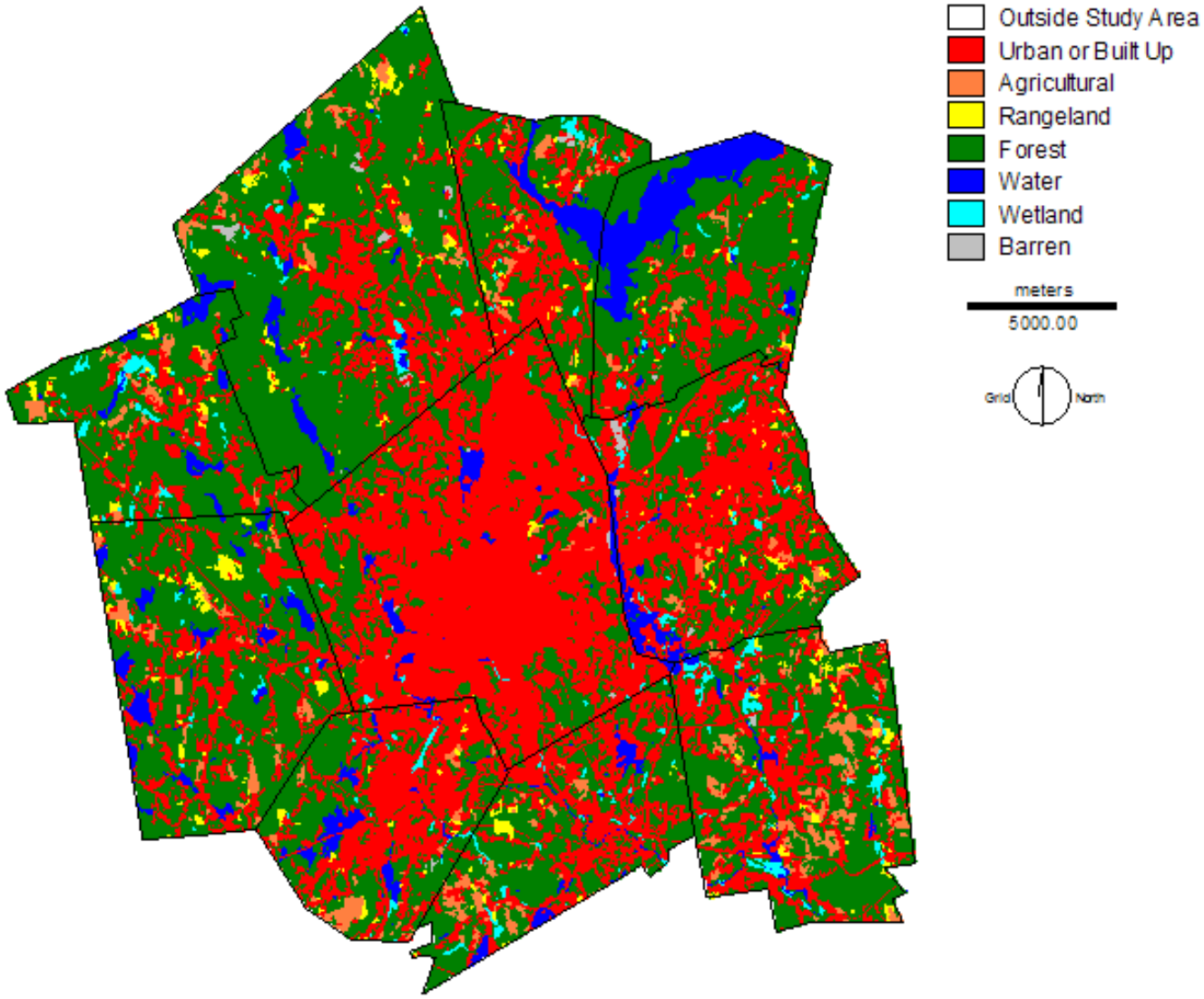


HEROs Working with the Mayor

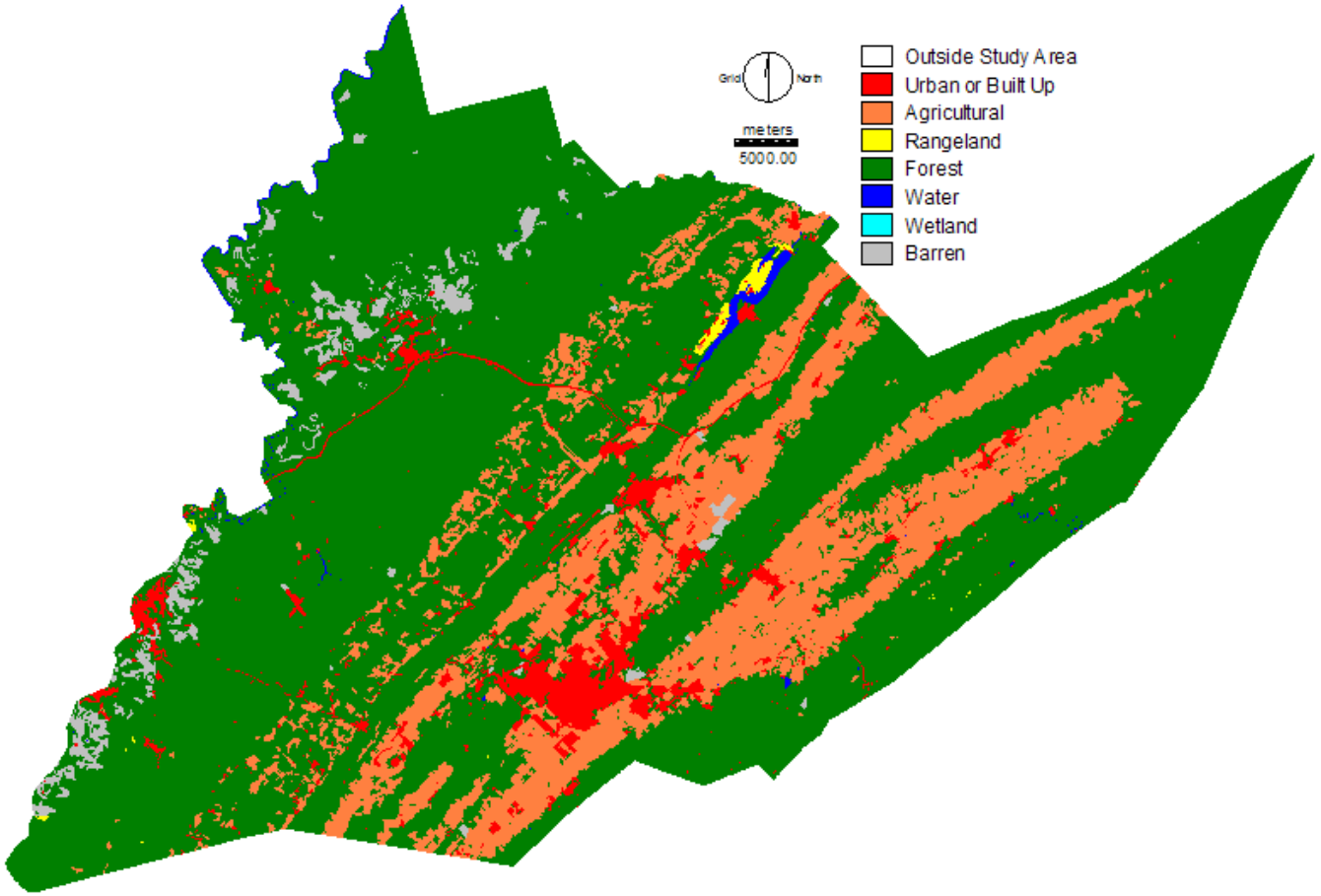
Central Mass 1971



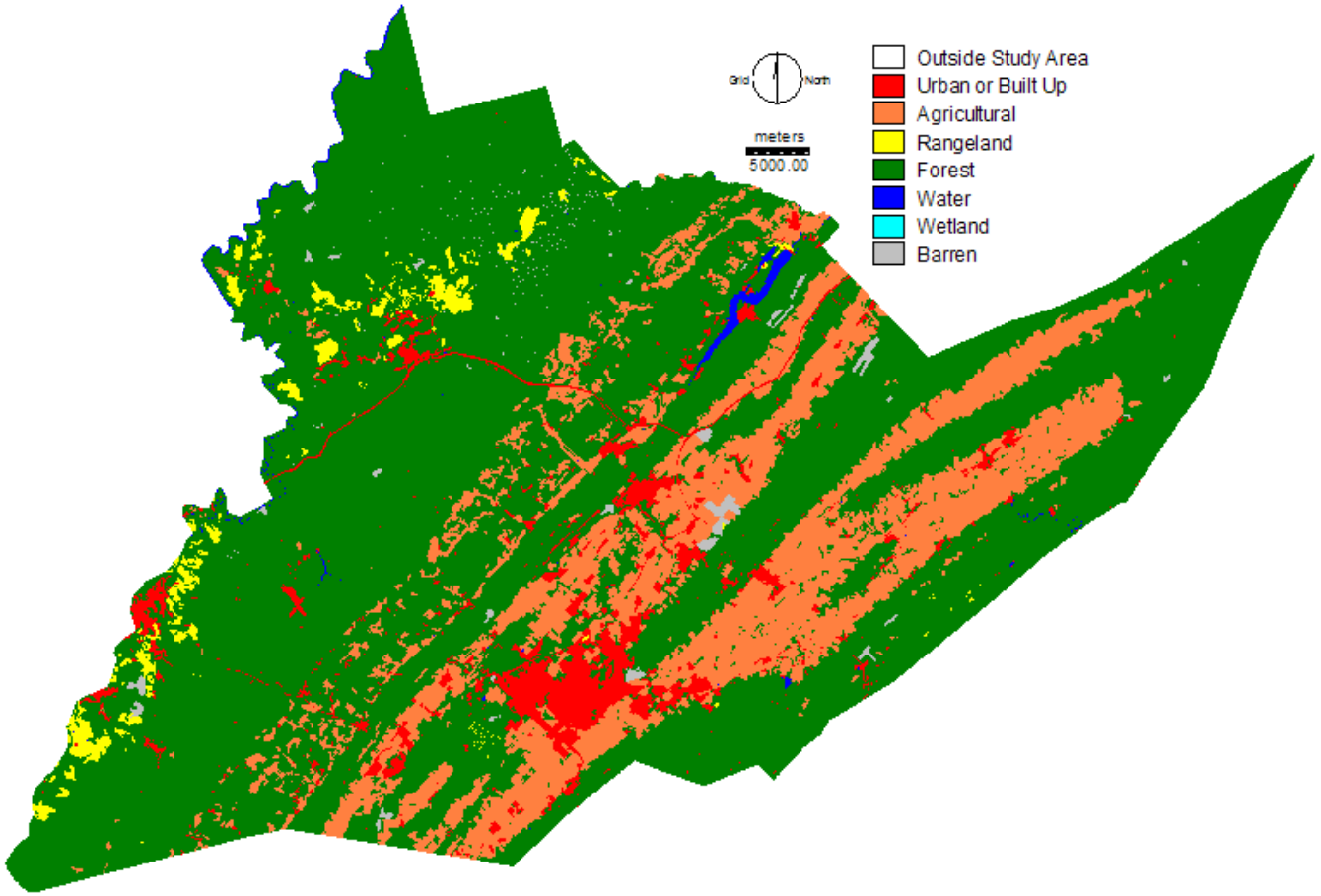
Central Mass 1999



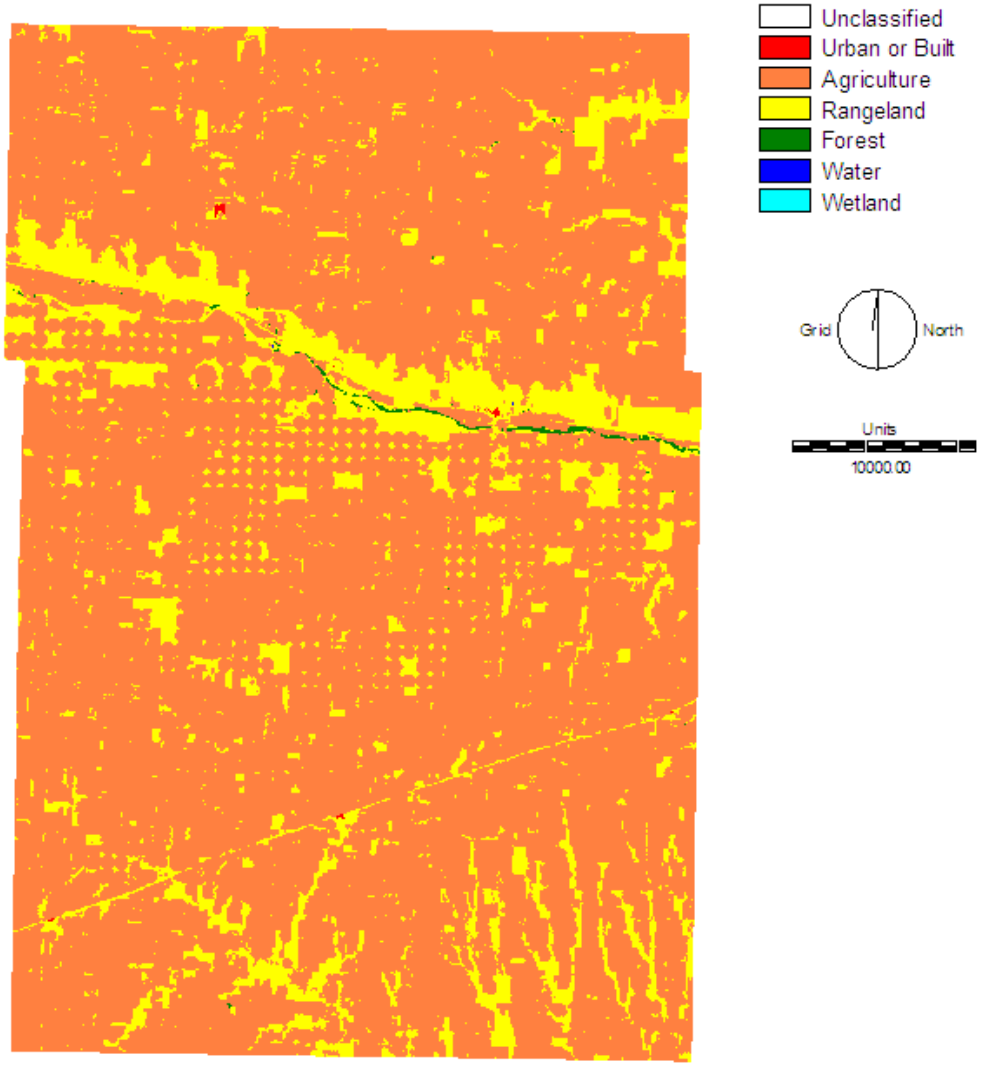
Centre County PA 1972



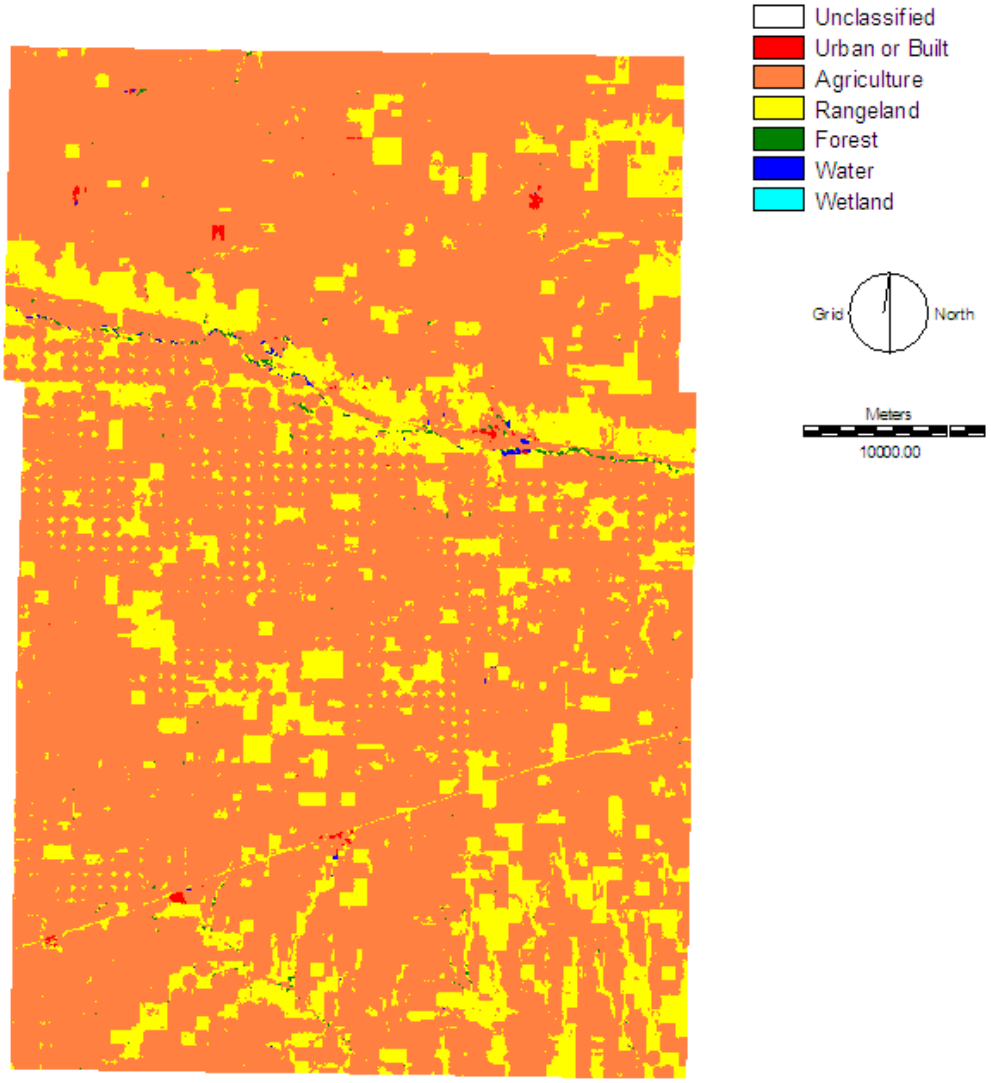
Centre County PA 2002



Kansas 1985


Unclassified
Urban or Built
Agriculture
Rangeland
Forest
Water
Wetland
Grid
North
Units
10000.00

Kansas 2001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Meters
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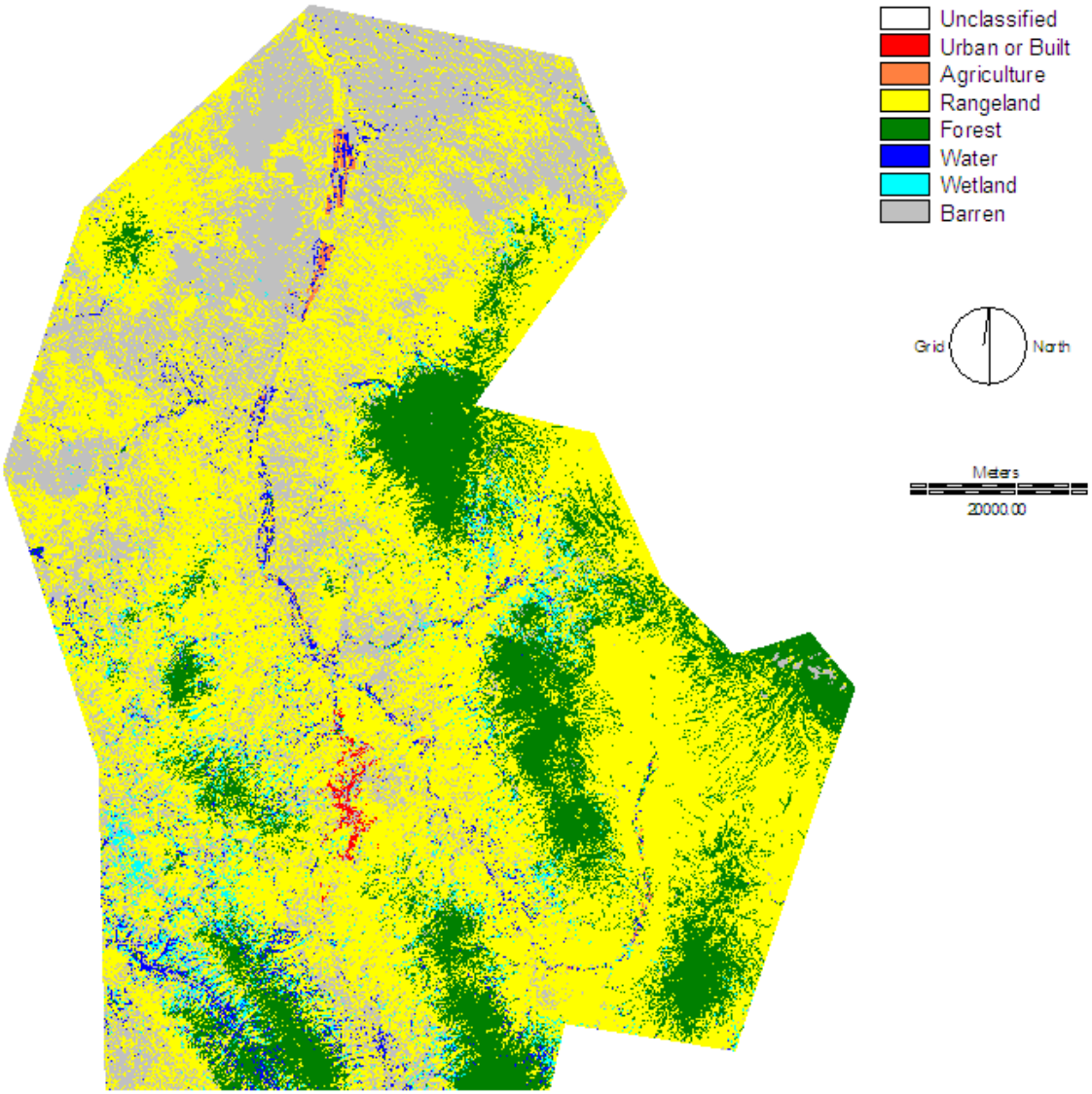
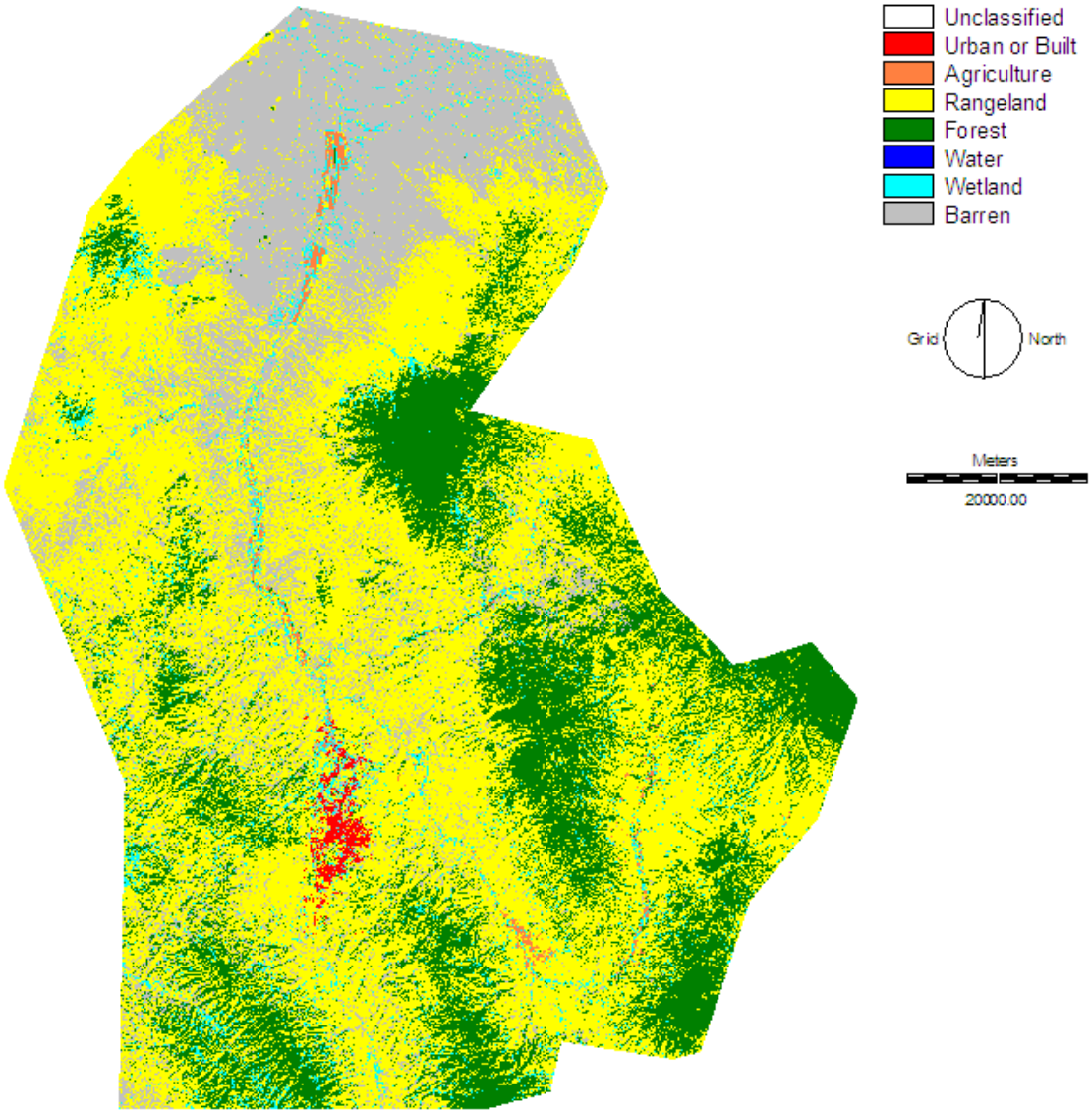
Arizona 1986



Arizona 1999



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