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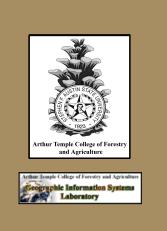
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Accuracy of Land Cover Maps Derived From Remotely Sensed Data

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Landsat ETM+, Hayter Estate



INTRODUCTION

Accurate knowledge of land cover and land cover change is essential for a wide range of objectives. Since the 1970's, remotely sensed data have been used increasingly as a means to classify and characterize the earth's land use and land cover. This project compares the accuracy of results of classifying data from mid-level to very high spatial resolutions (Landsat ETM+, SPOT 4, ASTER, SPOT 5, QuickBird). Data from all of these sensors were classified for both urban and rural settings. The project examines accuracy levels between spatial and spectral resolution.

OBJECTIVES

ASTER VNIR, 8 bit, February, 2003

Compare the accuracy of classified maps between satellites of varying spatial and spectral resolutions. Data include 30 meter (Landsat ETM +), 20 meter (SPOT 4), 15 meter (ASTER VNIR), 10 meter (SPOT 5), and 2.44 meters (QuickBird). Two tested hypotheses are:

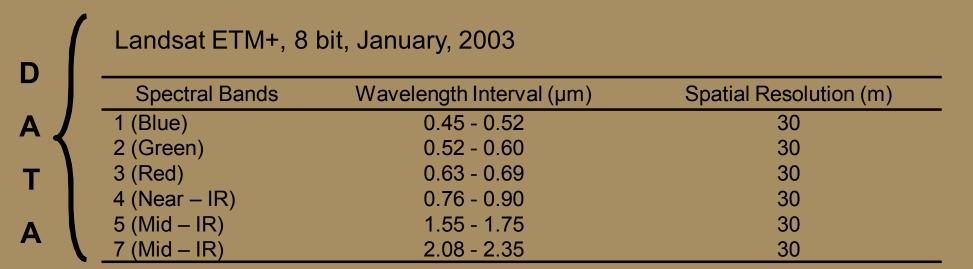
- 1 H₀ Spatial resolution of remotely sensed data does not affect the accuracy of classified maps.
- 2 H₀ Spectral resolution of remotely sensed images does not affect the accuracy of classified maps.

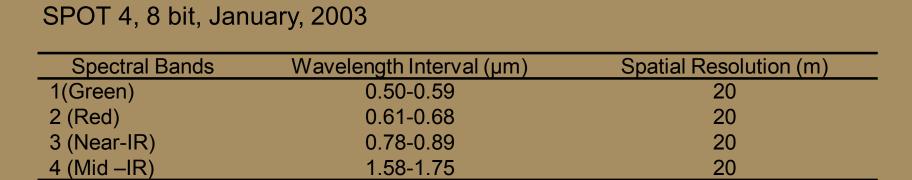
METHODOLOGY

	·			
Image	Image)	Image	(Image) (Image
Acquisition	Acquisition	Acquisition	Acquisition	Acquisition
Landsat 7 ETM+	SPOT 5	SPOT 4	ASTER J	QuickBird
Radiometric	Radiometric	Radiometric	Radiometric	Radiometric
Correction	Correction	Correction	Correction	Correction
₩	₩	₩	\	\
Geometric	Geometric	Geometric	Geometric	Geometric
Correction	Correction	Correction	Correction	Correction
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[Image]	[mage]	[Image]	[Image]	Image
Classification	Classification	Classification	Classification	Classification
↓			1	
Subset	Subset	Subset	Subset	Subset
Image	Image	Image	Image	Image
 	\	•	<u> </u>	.
Accuracy	Accuracy	Accuracy	Accuracy	Accuracy
Assessment	Assessment	Assessment	Assessment	Assessment
7.5355331116111	71330331110111	71330331110111	71330331110111	71930331110111
1	—			
Z –Test	Z –Test	Z –Test	Z –Test	Z –Test
Comparison	Comparison +	Comparison	Comparison •	Comparison
Sempanson)	Companison	Companison	Companison	Companson

RESULTS

Spatial resolution results indicate that QuickBird, with the highest spatial resolution performed significantly poorer, in terms of providing accurate classification, than any other sensor with respect to the rural environment. It also was significantly worse than Landsat ETM+ in providing accurate classification in the urban environment. In terms of spectral resolution, the results when testing for accuracy in classification using only the three bands common to all sensors (green, red, near-infrared) there was essentially no difference between any of the sensors. This outcome supports the hypothesis that spectral resolution plays an important role in land cover accuracy more than spatial resolution.





Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)
1 (green)	0.52-0.60	15
2 (red)	0.63-0.69	15
3 (near-IR)	0.76-0.86	15

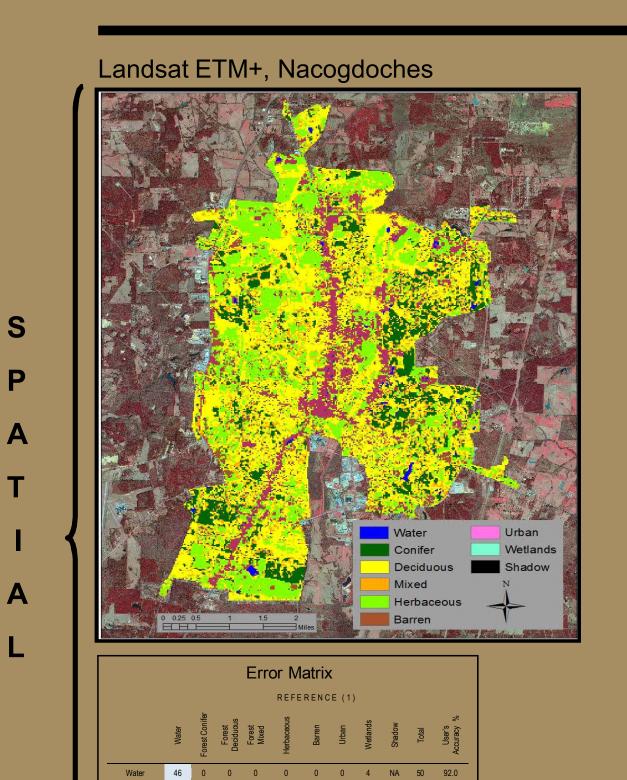
Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)
1(Green)	0.50-0.59	10
2 (Red)	0.61-0.68	10
3 (Near-IR)	0.78-0.89	10
4 (Mid –IR)	1.58-1.75	10

Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)	
1 (Blue)	0.45-0.52	2.44	
2 (Green)	0.52-0.60	2.44	
3 (Red)	0 63-0 69	2 44	

0.76-0.90

QuickBird, 11 bit, January, 2003

4 (Near – IR)



Herba- 0 0 1 1 64 10 0 0 NA 76 84.2

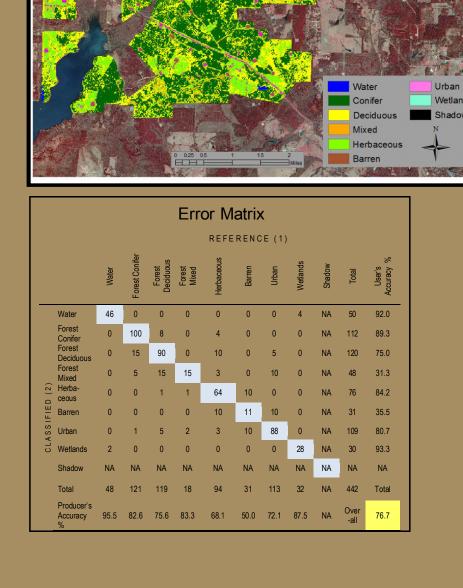
ិ Wetlands 2 0 0 0 0 0 0 28 NA 30 93.3

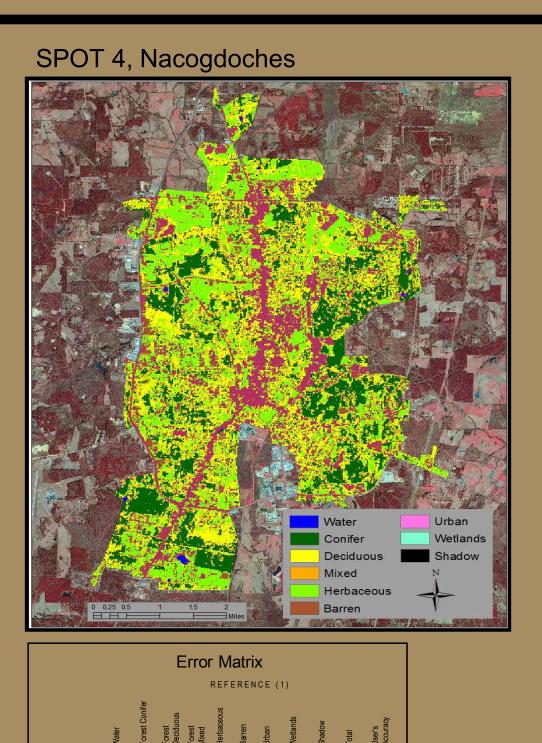
Total 48 121 119 18 94 31 113 32 NA 442 Total

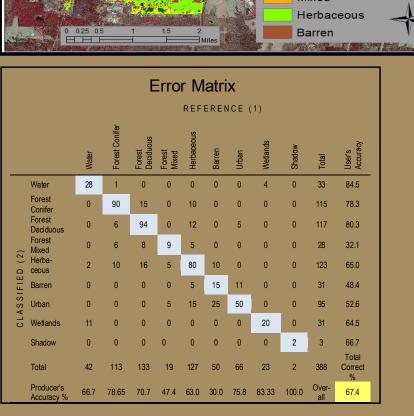
Shadow NA NA NA NA NA NA NA NA NA NA

Producer's

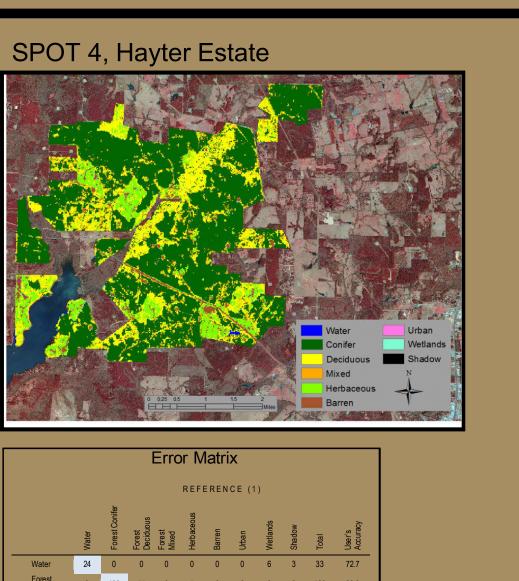
Accuracy 95.5 82.6 75.6 83.3 68.1 50.0 72.1 87.5 NA Over



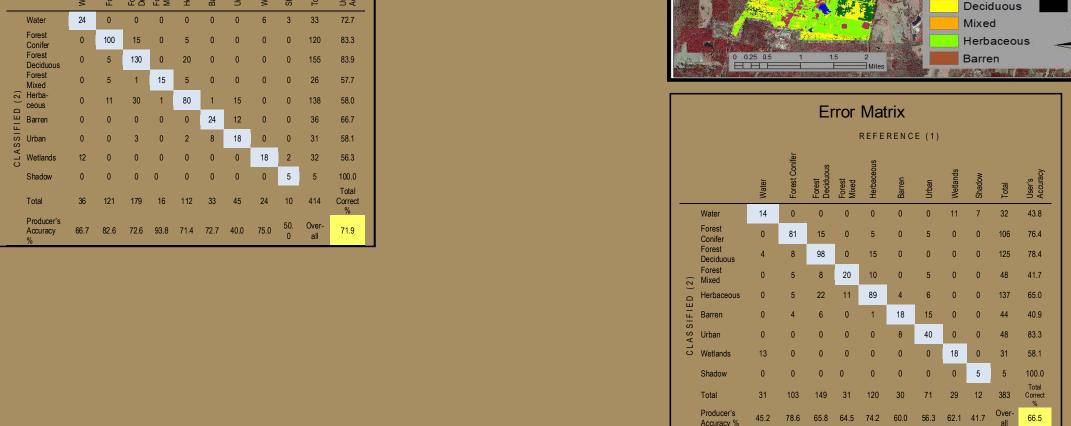




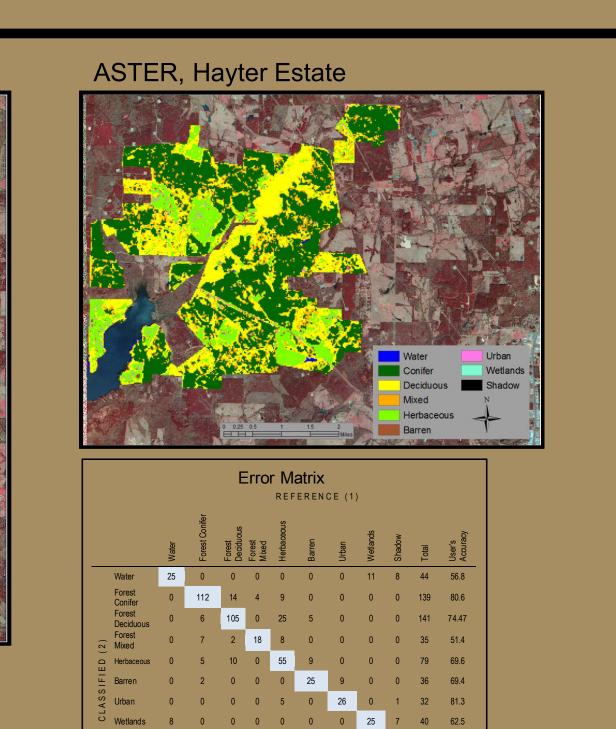
Producer's Accuracy 61.7 75.8 71.0 42.9 73.9 62.5 80.4 88.5 NA Overall 6



SPOT 4, Hayter Estate



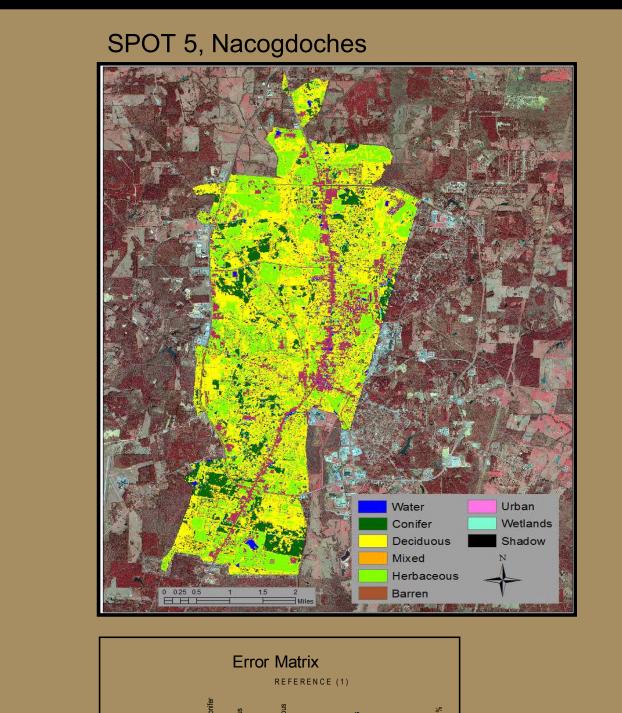
ASTER, Nacogdoches



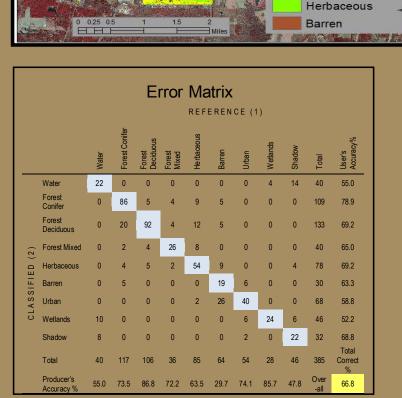
Shadow 3 0 0 0 0 0 0 4 23 30 76.7

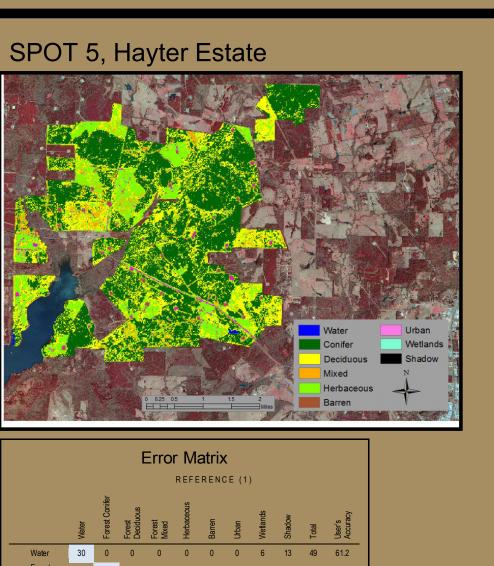
Total 36 132 131 22 102 39 35 39 39 414 Correct

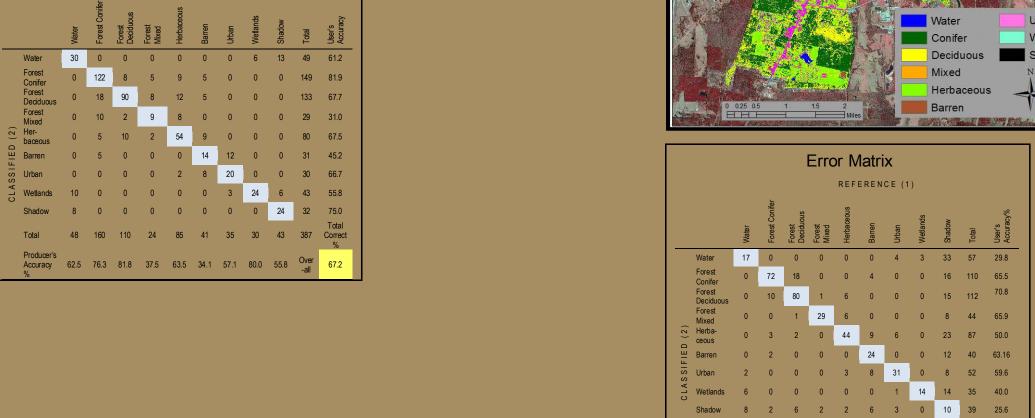
Producer's 67.6 84.85 80.2 81.8 53.9 64.1 74.3 64.1 59.0 Over-

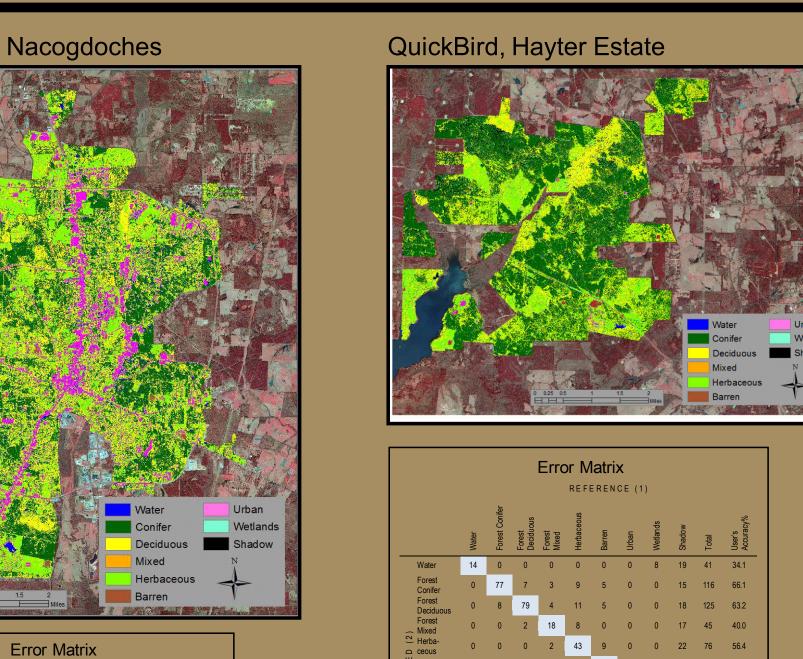


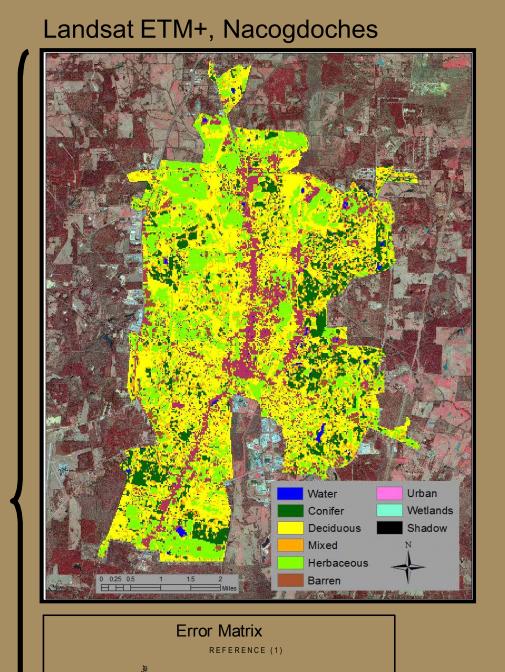
SPOT 5, 8 bit, February, 2003







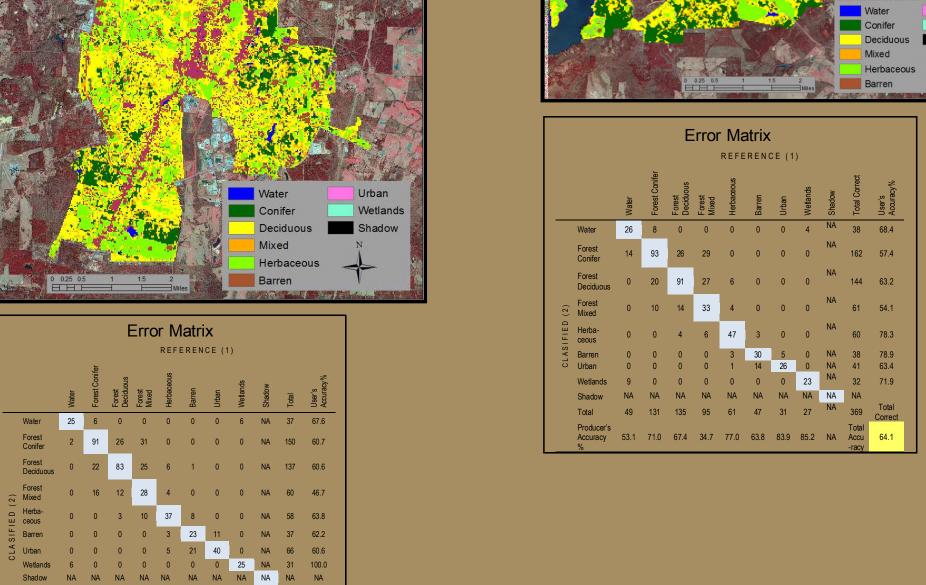


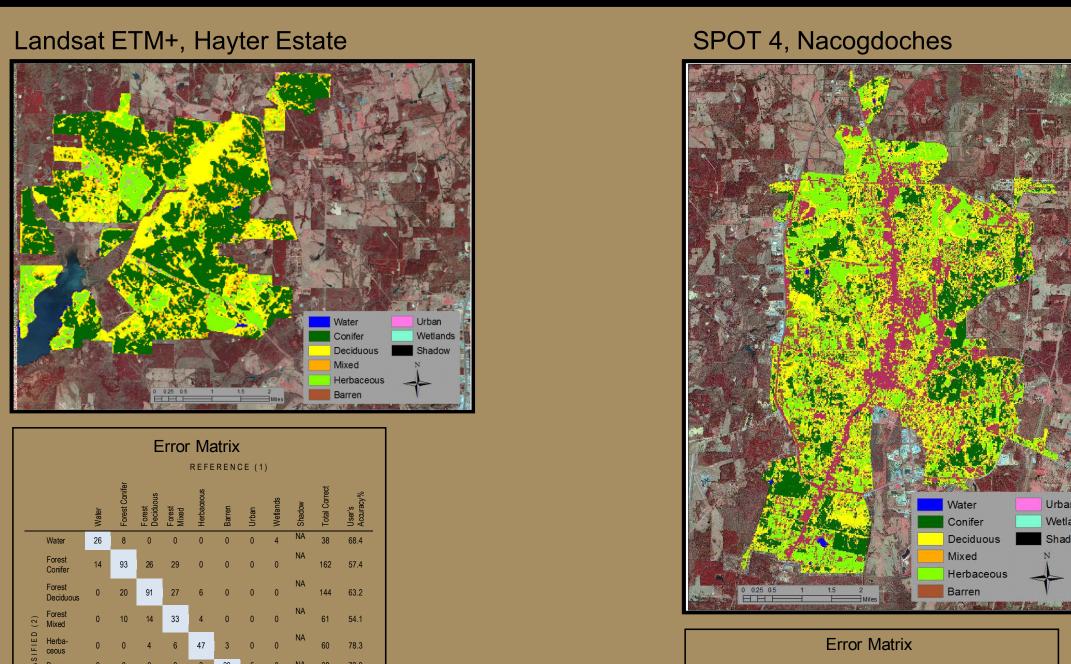


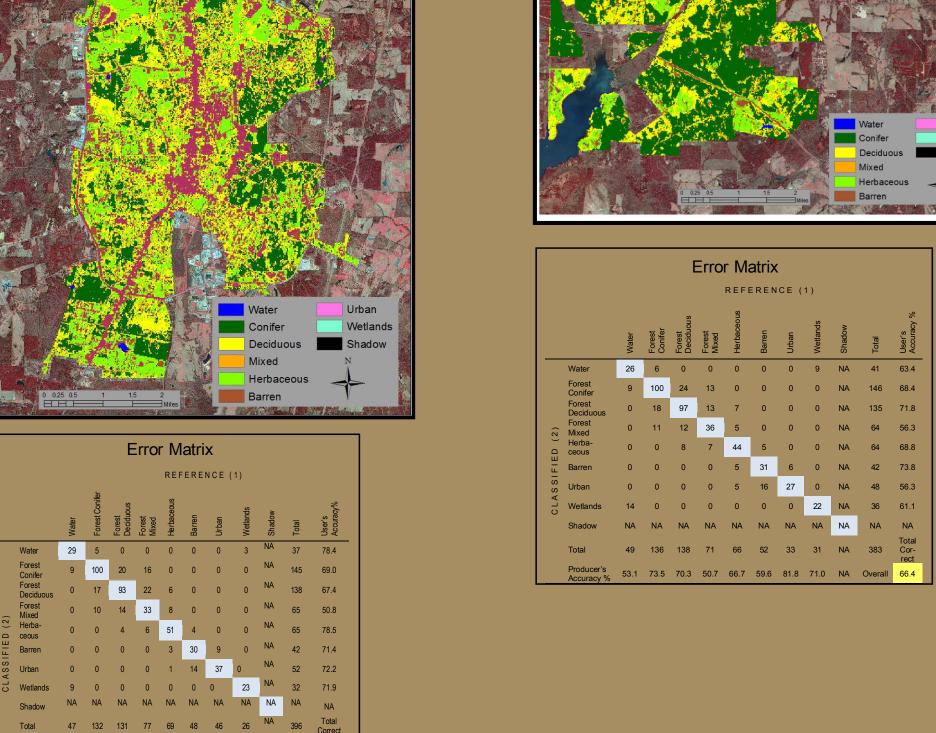
Total 33 135 124 94 55 53 51 31 NA 352 Correct

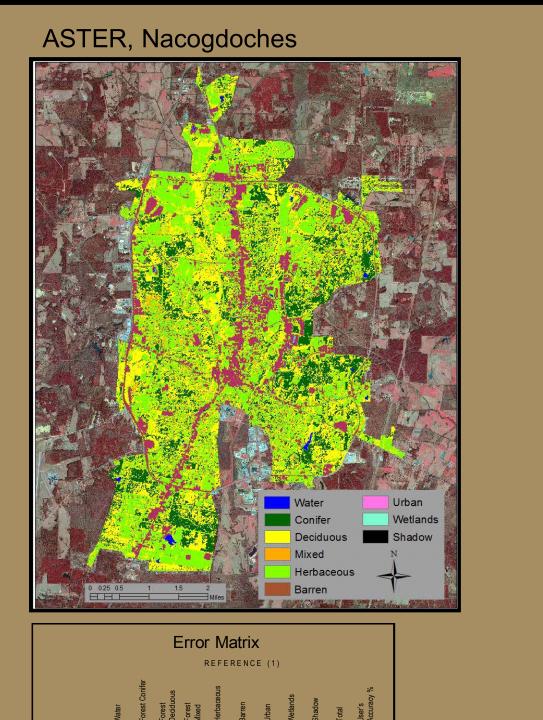
Producer's

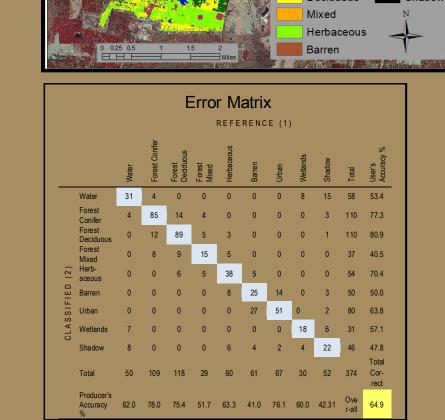
Accuracy 75.8 67.4 66.9 19.8 67.3 43.4 78.4 80.6 NA Over



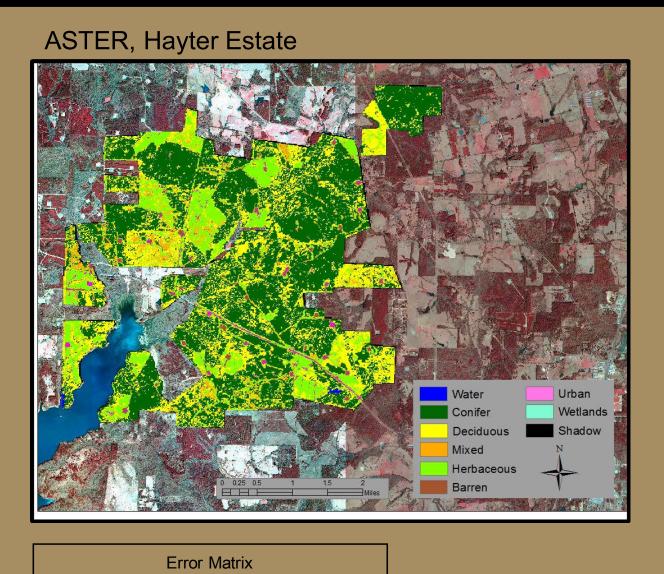


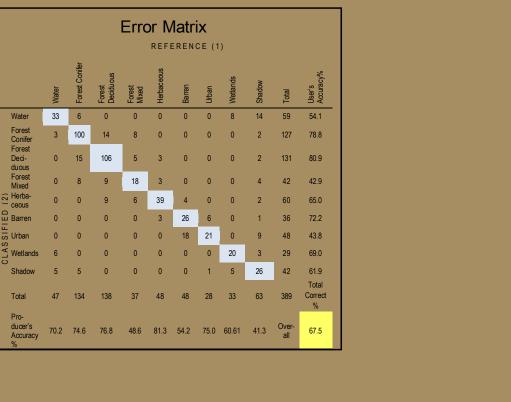


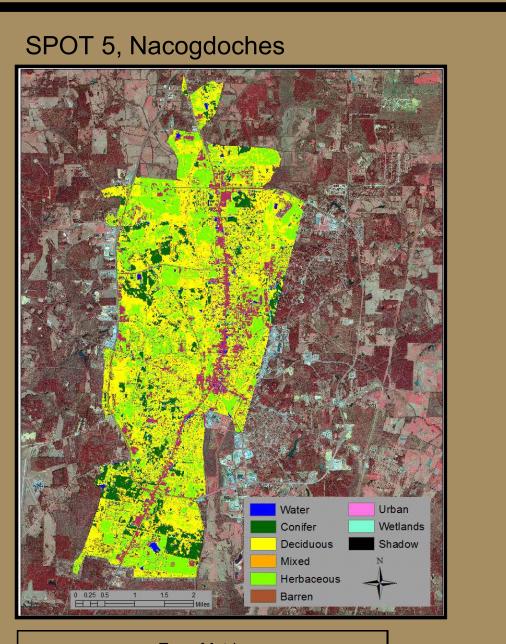


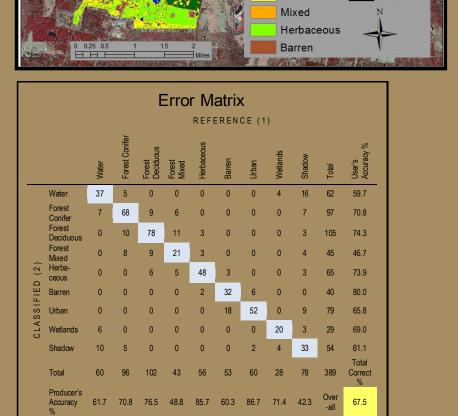


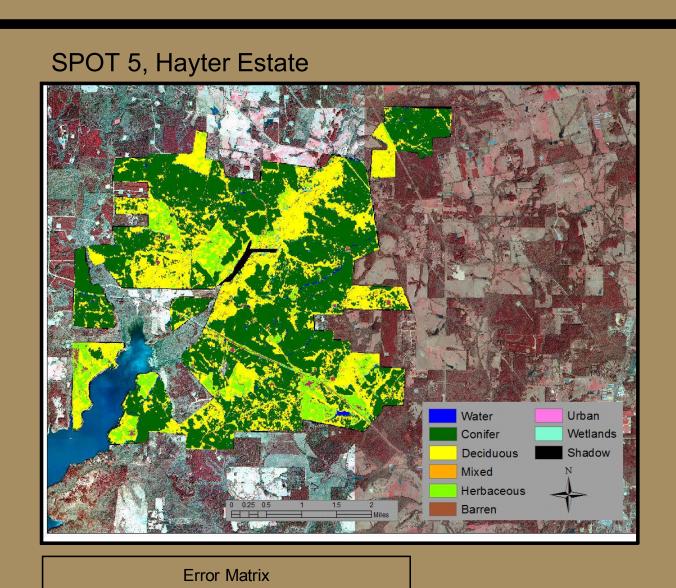
Data source: Landsat ETM+ imagery, USGS; SPOT 4 imagery, Stephen F. Austin, Center for Space Research, SPOT 5 imagery, University, Forest Resources Institute; QuickBird imagery, University of Texas at Austin, Center for Space Research.

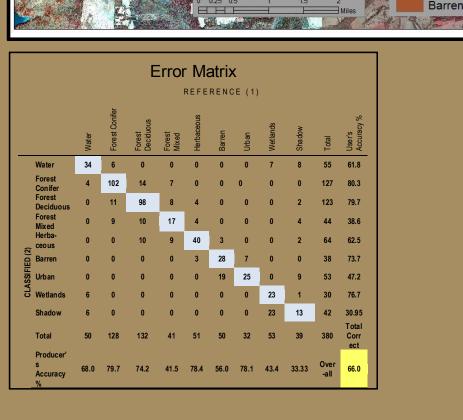


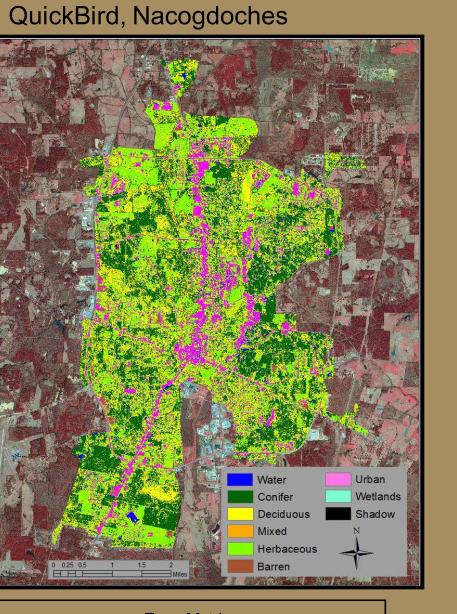






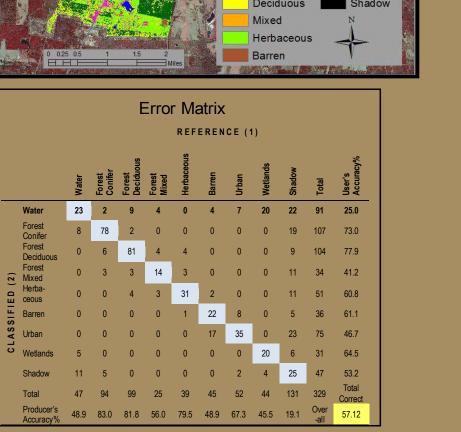


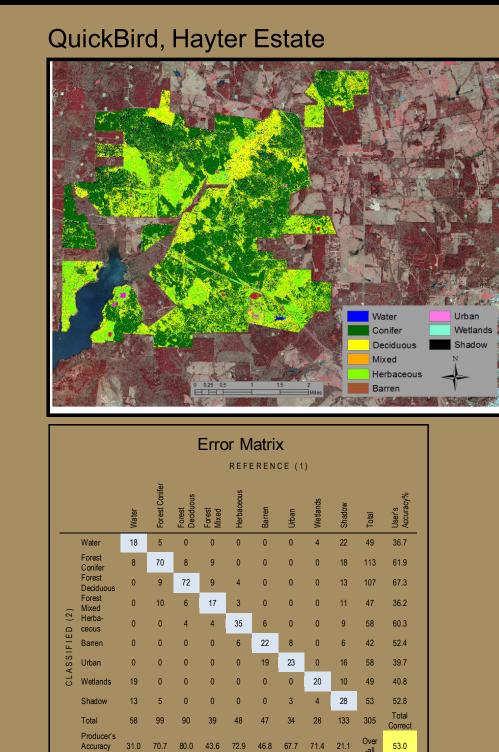




Total 33 89 107 32 61 51 47 17 139 321 Correct

Producer's
Accuracy 51.5 80.9 74.8 90.6 72.1 47.1 66.0 82.4 7.2 Over





Wetlands 13 0 0 0 0 0 18 12 43 41.8

Shadow 8 8 4 0 0 6 8 0 14 48 29.7

Total 36 95 94 27 74 55 31 26 150 301 Correct

Producer's Accuracy% 40.0 82.8 85.8 66.7 59.7 26.4 65.5 69.2 9.4 Over Accuracy% 40.0 82.8 85.8 66.7 59.7 26.4 65.5 69.2 9.4 Over 52.3