Local Wildlife Habitat Classification using High-Res Aerial Photos and Multi-Source Data for Change Detection

by

Luis Murillo

Summary

- Objectives
- Background
- Methods
- Results
- Conclusions

Objectives

- Classify local wildlife habitats using high resolution CIR aerial photos.
- Detect land cover change overtime using classified images and ancillary data.

Objectives

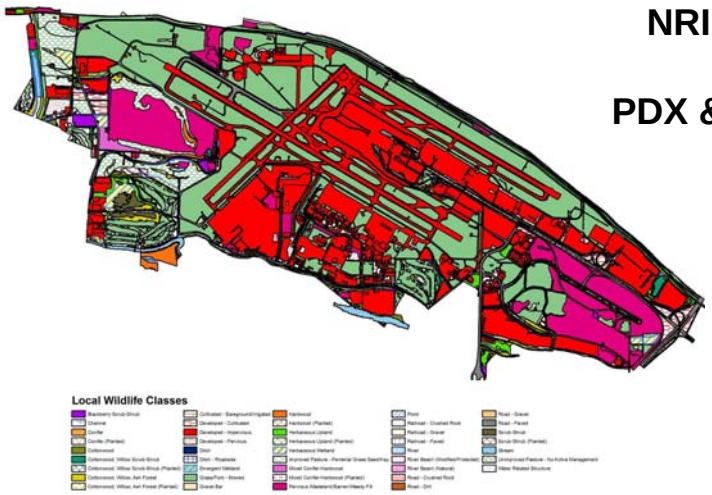
Questions:

- Can this level of classification be done?
- What are the limitations associated?
- Cost?

Background

- Need a local classification scheme.
- Mitigation, propriety value, liabilities.
- First NRI year 2000 at a cost of $3M.
- Updates every 2 years at cost of $150K.

Background



NRI year 2000 PDX & PIC

Methodology

Mosaic and Color Correction

↓

Unsupervised Classification

↓

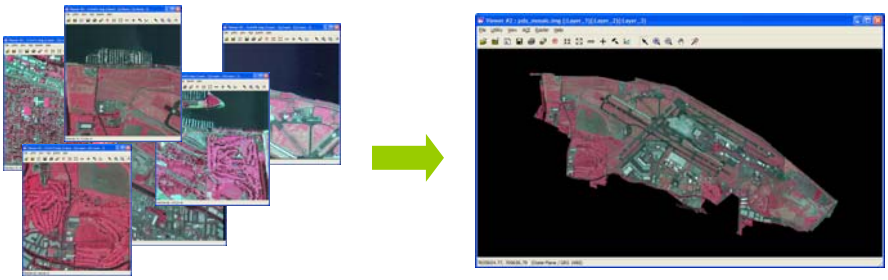
Supervised Classification

↓

Post-classification Change Detection

Methodology

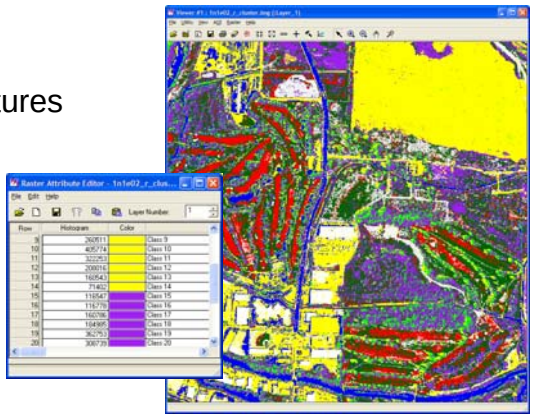
Mosaic and Color Correction



Methodology

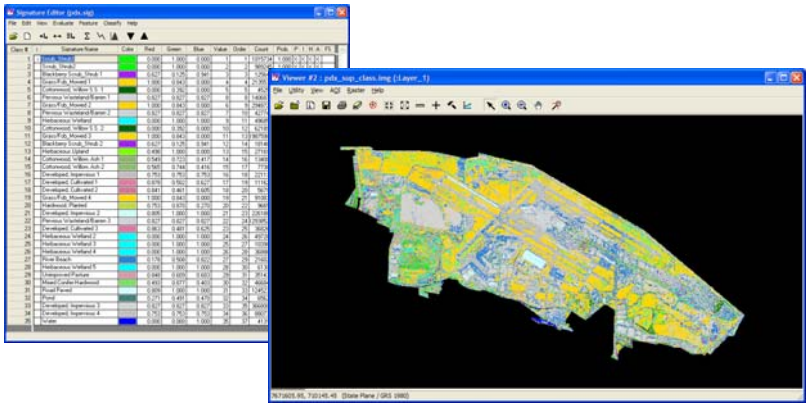
Unsupervised Classification

- Thresholding
- AOI to select signatures for supervised classification



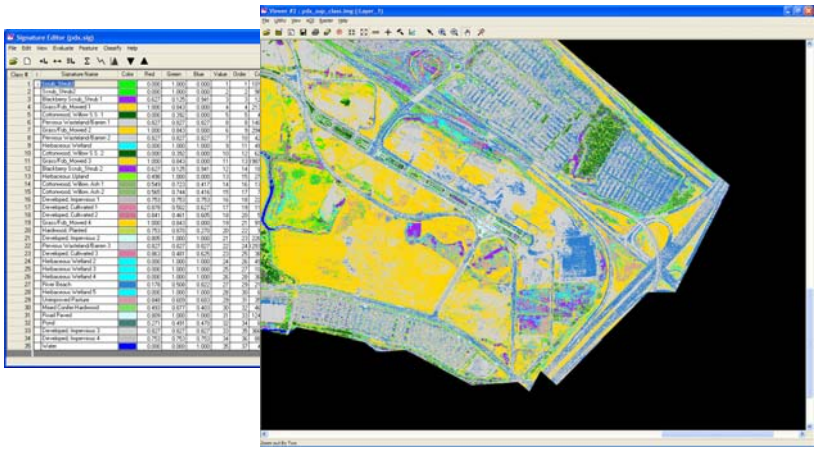
Methodology

Supervised Classification



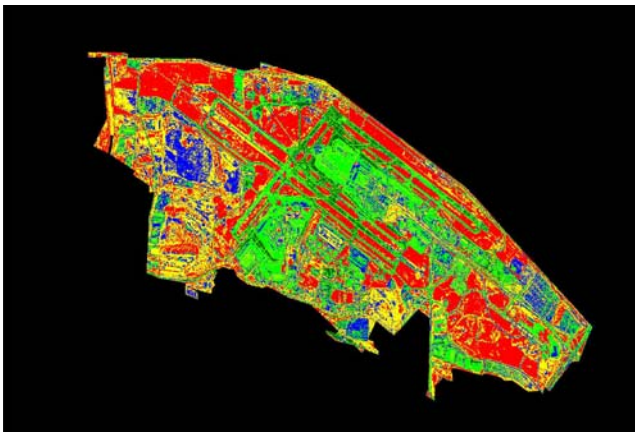
Methodology

Supervised Classification



Methodology

Change Detection



Results

Accuracy Assessment

ACCURACY TOTALS

Class Name	Reference Totals	Classified Totals	Number Correct	Producers Accuracy	Users Accuracy
Unclassified	31	31	31	---	---
Scrub_Shrub1	0	0	0	---	---
Scrub_Shrub2	1	1	1	100.00%	100.00%
Blackberry Scru	1	1	1	100.00%	100.00%
Grass/Fob_Mowed	0	0	0	---	---
Cottonwood, Wil	0	0	0	---	---
Grass/Fob_Mowed	2	2	2	100.00%	100.00%
Pervious Wastel	1	2	1	100.00%	50.00%
Pervious Wastel	1	0	0	---	---
Herbaceous Wetl	0	0	0	---	---
Cottonwood, Wil	0	0	0	---	---
Grass/Fob_Mowed	2	1	1	50.00%	100.00%
Blackberry Scru	0	0	0	---	---
Herbaceous Upla	0	0	0	---	---
Cottonwood, Wil	0	0	0	---	---
Cottonwood, Wil	0	0	0	---	---
Developed, Impe	0	0	0	---	---
Developed, Cult	0	2	0	---	---
Developed, Cult	0	0	0	---	---
Grass/Fob_Mowed	2	0	0	---	---
Hardwood, Plant	0	0	0	---	---
Developed, Impe	0	0	0	---	---
Pervious Wastel	0	2	0	---	---
Developed, Cult	0	0	0	---	---
Herbaceous Wetl	0	0	0	---	---
Herbaceous Wetl	0	0	0	---	---
Herbaceous Wetl	0	0	0	---	---
River Beach	0	2	0	---	---
Herbaceous Wetl	0	0	0	---	---
Unimproved Past	1	0	0	---	---
Mixed Conifer-H	0	0	0	---	---
Road Paved	0	0	0	---	---
Pond	0	0	0	---	---
Developed, Impe	2	0	0	---	---
Developed, Impe	6	6	6	100.00%	100.00%
Water	0	0	0	---	---
Totals	50	50	43		

Overall Classification Accuracy = 86.00%

Results

Accuracy Assessment

KAPPA (K^) STATISTICS

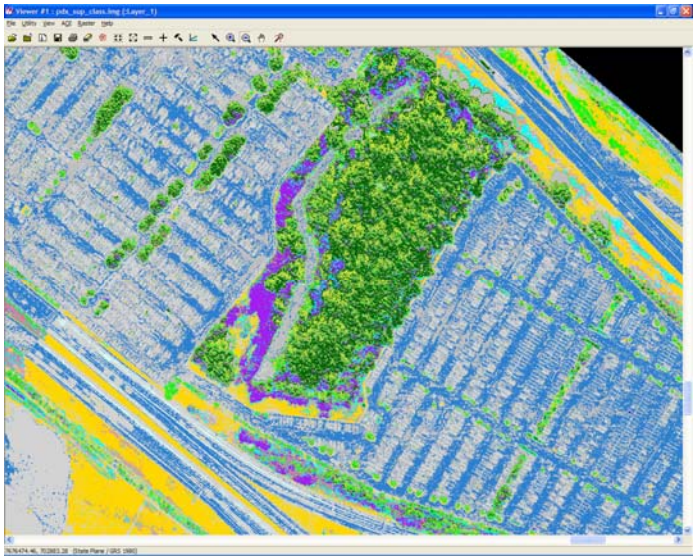
Overall Kappa Statistics = 0.7656

Conditional Kappa for each Category.

Class Name	Kappa
Unclassified	1.0000
Scrub_Shrub1	0.0000
Scrub_Shrub2	1.0000
Blackberry Scrub_Shrub 1	1.0000
Grass/Fob_Mowed 1	0.0000
Cottonwood, Willow S.S. 1	0.0000
Grass/Fob_Mowed 2	1.0000
Pervious Wasteland/Barren 2	0.4898
Pervious Wasteland/Barren 1	0.0000
Herbaceous Wetland	0.0000
Cottonwood, Willow S.S. 2	0.0000
Grass/Fob_Mowed 3	1.0000
Blackberry Scrub_Shrub 2	0.0000
Herbaceous Upland	0.0000
Cottonwood, Willow, Ash 1	0.0000
Cottonwood, Willow, Ash 2	0.0000
Developed, Impervious 1	0.0000
Developed, Cultivated 1	0.0000
Developed, Cultivated 2	0.0000
Grass/Fob_Mowed 4	0.0000
Hardwood, Planted	0.0000
Developed, Impervious 2	0.0000
Pervious Wasteland/Barren 3	0.0000
Developed, Cultivated 3	0.0000
Herbaceous Wetland 2	0.0000
Herbaceous Wetland 3	0.0000
Herbaceous Wetland 4	0.0000
River Beach	0.0000
Herbaceous Wetland 5	0.0000
Unimproved Pasture	0.0000
Mixed Conifer-Hardwood	0.0000
Road Paved	0.0000
Pond	0.0000
Developed, Impervious 3	0.0000
Developed, Impervious 4	1.0000
Water	0.0000

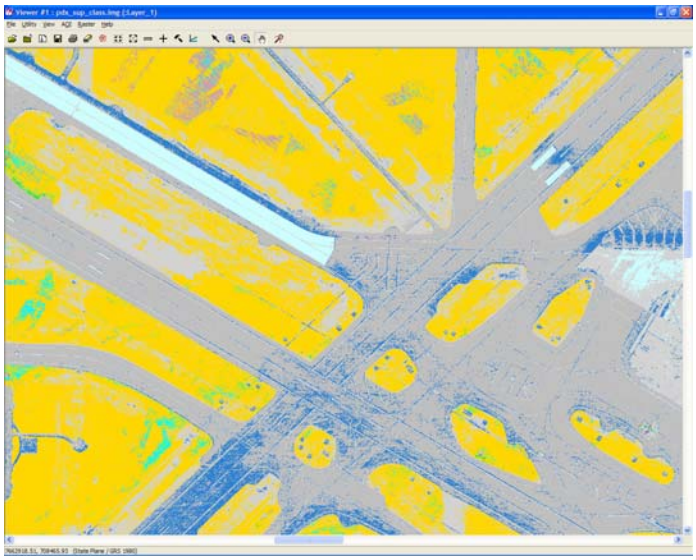
Results

Blackberry, Cottonwood, and Wetland-Herbaceous



Results

Grass/Fob-Mowed, Developed-Imper. (concrete)



Conclusions

- Some success classifying local classes
  - High-Res photos create problems in classification.
- Change detection was not too successful
  - Success might increase when more data become available
- Limitations range from skill level to data availability
- Cost effective?