This presentation premiered at WaterSmart Innovations

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Using Aerial Imagery Analysis to Benefit Turf Reduction Programs in Las Vegas Valley

Assisting the Southern Nevada Water Authority's
Water Conservation Efforts

Water Smart Innovations Conference - October, 2009

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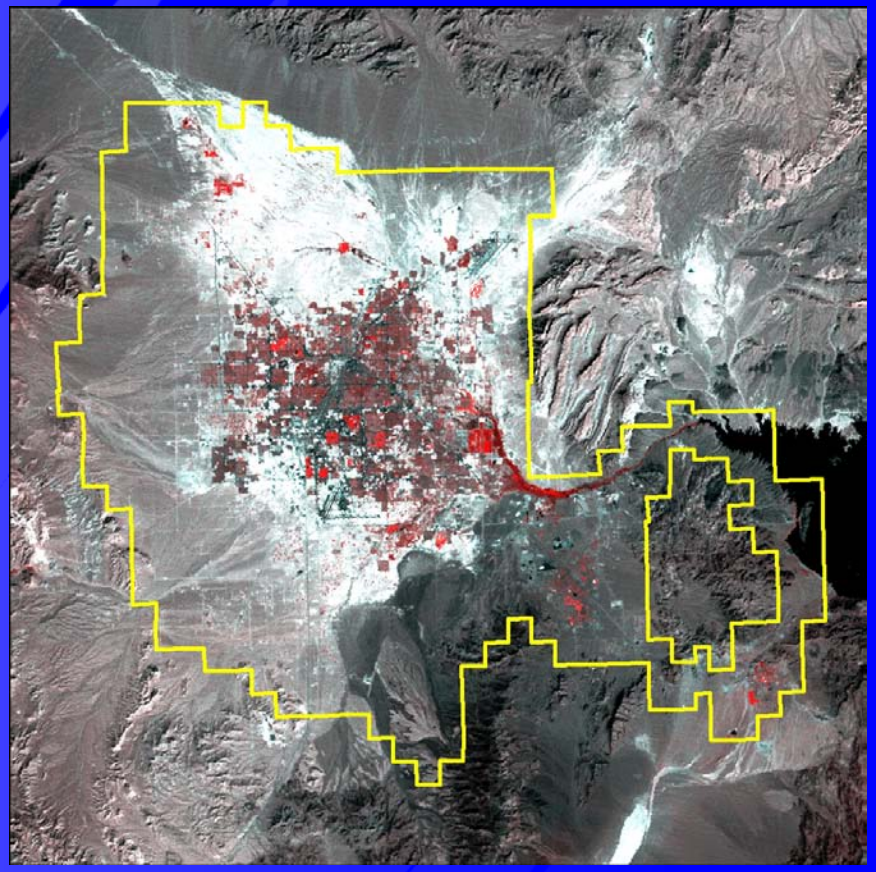
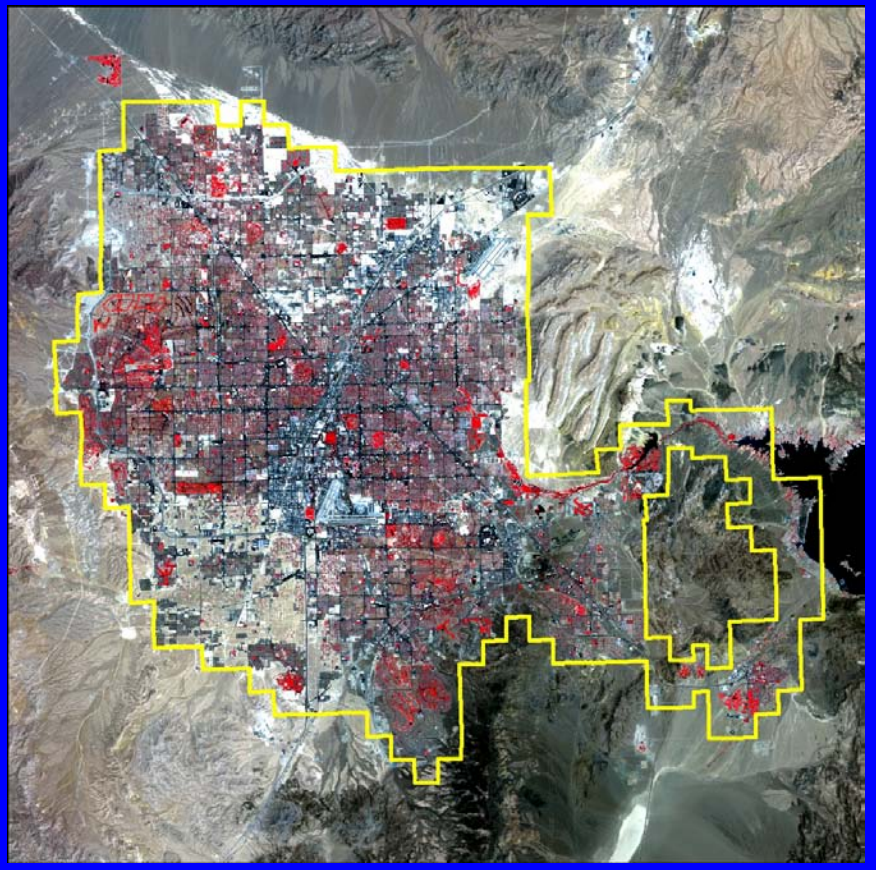
SOUTHERN NEVADA WATER AUTHORITY®

Satellite Imagery of the Las Vegas Valley



False Color Landsat 3 MSS Image
1981



False Color Landsat 5 TM Image
2009

Why does SNWA care about turf in Las Vegas?

- 90+% of water used within the LV Valley is drawn from the Colorado River – a finite source
- The Colorado River is in a severe drought
- Nearly 60% of water consumed is “lost” due to outdoor use-primarily irrigation
- Reducing turf is the most effective way to conserve water
- Water conservation efforts and results are an important component of negotiations for more water

Las Vegas Valley Turf Analysis Project Goals

- Determine the amount and distribution of turf and vegetation as a baseline
- Create datasets that will help develop new and improve current Water-Smart Landscape turf reduction programs
- Compare changes in vegetation cover over time

Landscape Conversion

Water Smart Landscape Program

- Rebate Program
- Residential
- Commercial
- Golf Courses

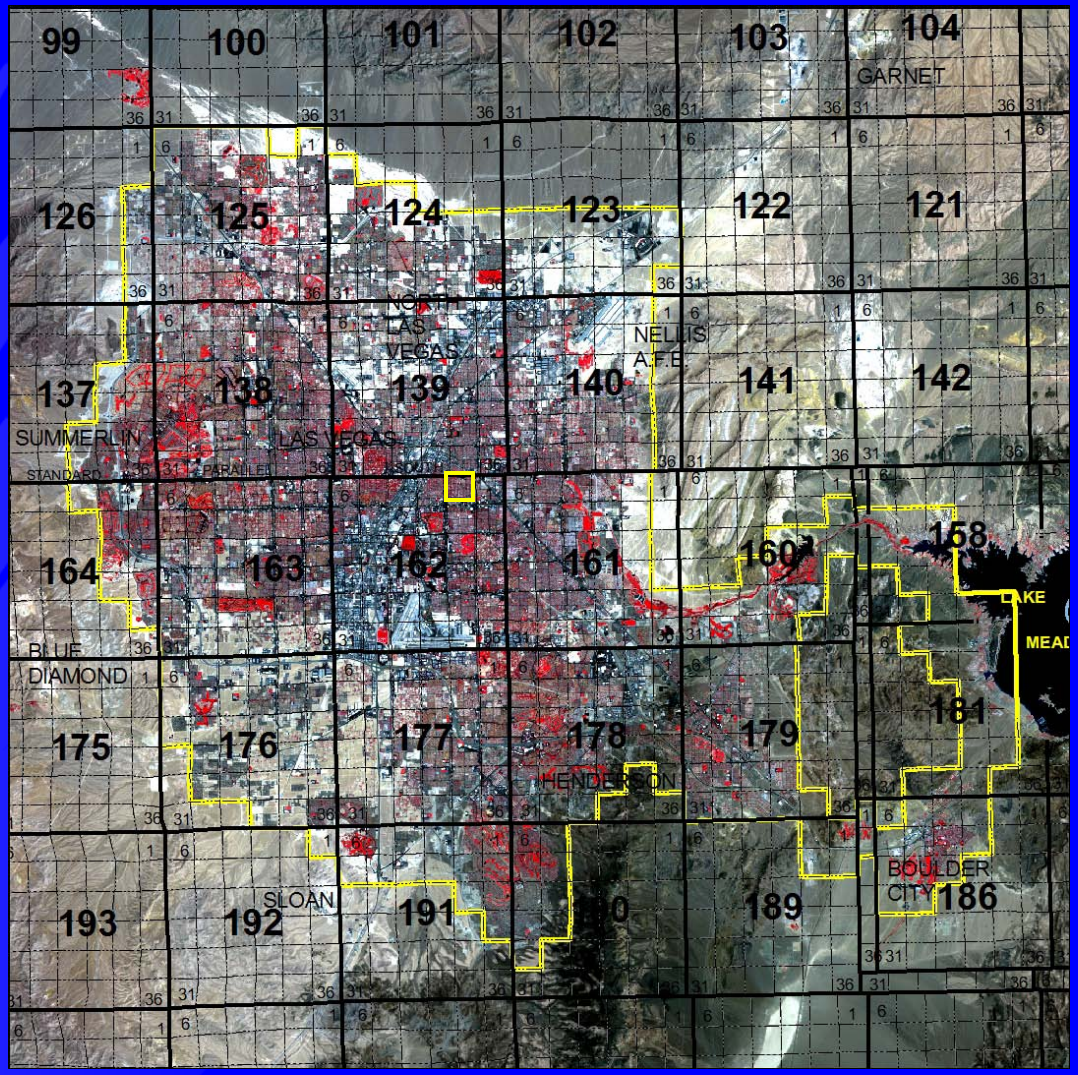
Outline

- Image products used for analysis
- GIS analysis product
- Integrate turf and tree data with other municipal datasets
- Compare 2006 results to 2008
- New Products available to aid in analysis

Aerial Imagery Product

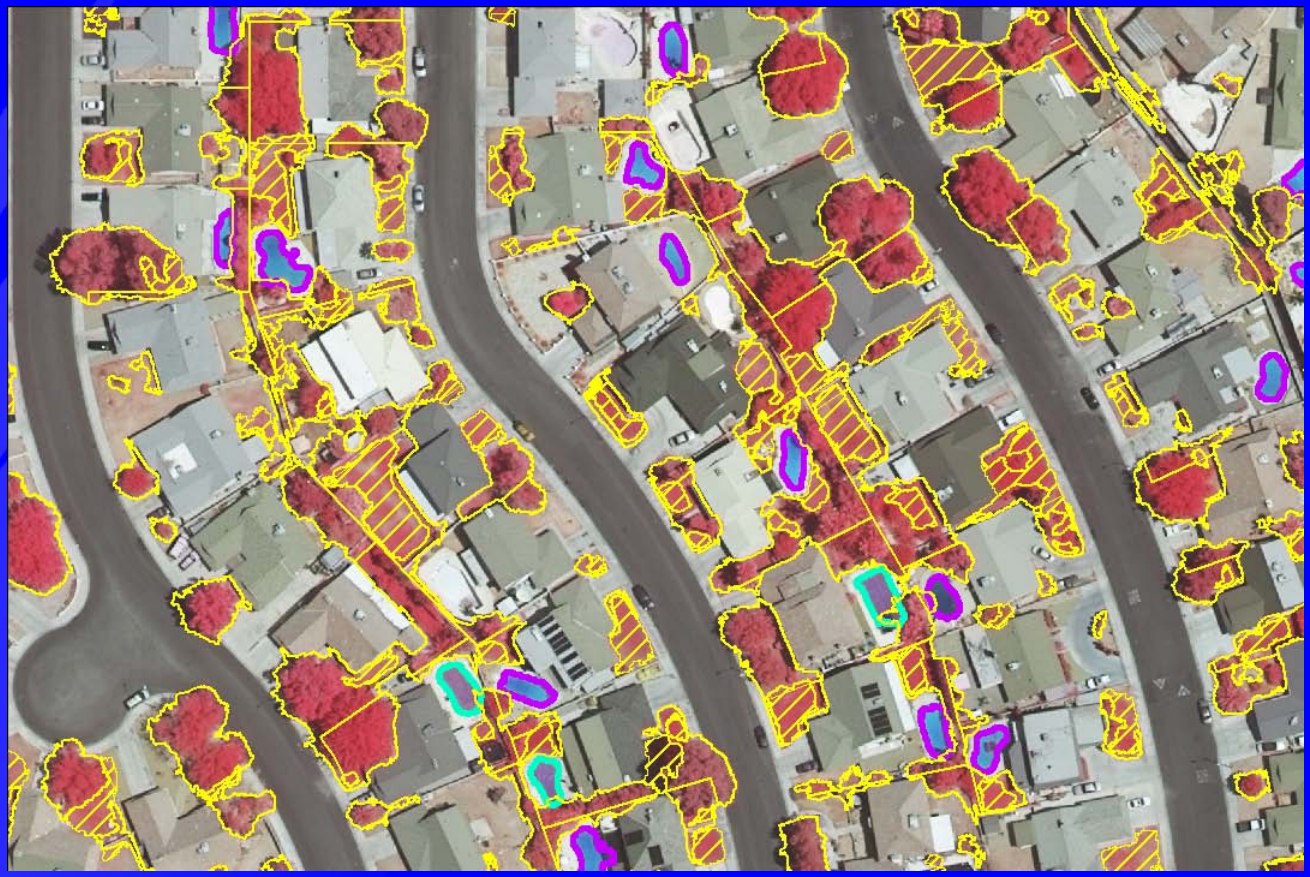
- Digital Color Infra-red Image
- 6 inch spatial resolution
- Flown June 2006, May 2007 and May 2008

Images tiled to Clark County, Nevada Public Land Survey



Classification Results

Single Family Residential Neighborhood



Turf, Trees, Roads, Covers

Turf Area Per Parcel

Ratio Turf area/Parcel area > 20%

Marketing Water Smart Landscaping Program

- Mass mailing before turf study
- Turf data enabled TARGET marketing
- Improved response over 300%
- 130 million square feet of turf converted since 2003

Back v. Front Yard Turf

Turf Concealed by Canopy

Turf Data Results/Application

- Market Analysis – improved results
- Enforce turf reduction ordinances
- Relate vegetation data to consumption
- Spatial distribution of vegetation in road right-of-ways, medians
- Track vegetation changes over time

Vegetation Analysis Totals

- Turf
  - 2006 11,425 acres
  - 2008 10,028 acres
  - Difference = -1,397 acres (-12.23%)
- Tree
  - 2006 18,463 acres
  - 2008 23,920 acres
  - Difference = +5,457 acres (29%)
  - 44% of difference is in 12.4% of tiles

Turf Decrease

2008 image with 2006 Turf Area

Changes in Tree Canopy Size

Conclusions from Results and Observations

- Why Less Turf?
  - WSL took out 755 acres of turf
  - 2006 analysis slightly overestimated turf
  - Foreclosures lead to loss of irrigation
  - Increased tree canopy covers more turf?
- Why More Trees?
  - 2006 analysis underestimated trees. Improved color balance and analysis methods 2008 captured more trees
  - Natural tree canopy growth
  - People replace turf with trees (?)

Can We Improve Analysis?

- Greater spatial resolution aerial imagery
  - Not an option, cannot fly lower
- LiDAR product
  - Light Detection and Ranging
  - Offers accurate elevation data, treetops vs. ground level - Can help classify vegetation if combined with imagery data
  - Can help determine tree age, size, distinguish trees from shrubs
  - More expensive than aerial imagery !!$$
  - Very Large datasets

Las Vegas LiDAR Test

Las Vegas LIDAR Test

Continued Work

Image Data Collection and processing

- June 2009 Image Data was collected. Will begin processing as budget priorities allow
- Will continue to research new, better products for performing analysis

Questions??

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