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Geovisualization of Ecological Data for Park Policy Support

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Vegetation Change in the Newberry Mountains

Dr. Scott Abella

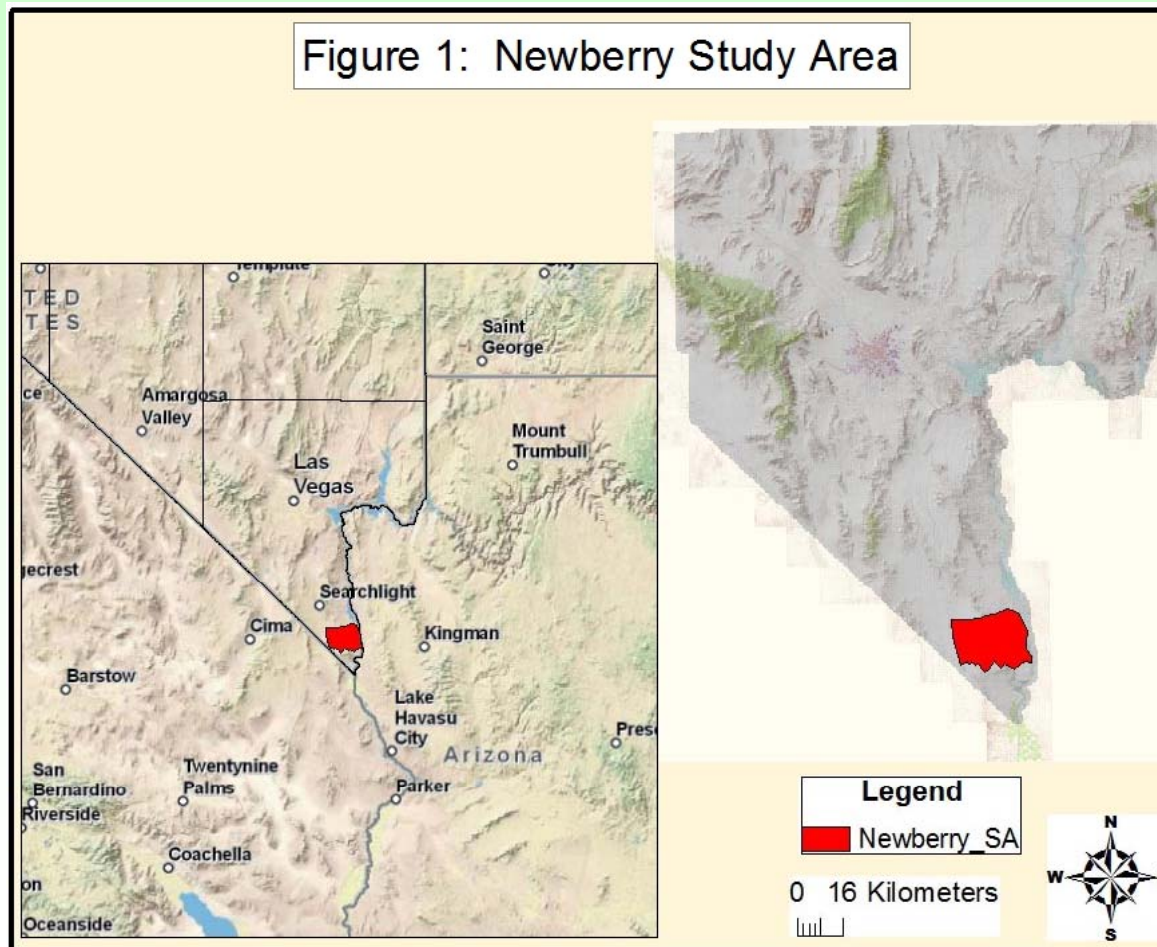
Dr. Haroon Stephen

Graduate student, Mr. Ross Guida

Policy and Outreach Component

Study Area

- Newberry Mountains, just NW of Laughlin
- Lake Mead NRA



Background

- Literature shows upward elevation shifts of biological species as a result of climate change
- Effects of climate change expected to accelerate in coming decades

Problem

- Concern both about species migrating out of parks and the potential inability of species to quickly adapt to the changing conditions within National Parks and other federal land boundaries

Research Questions

- What shifts in distributions of desert communities have occurred over the last 30 years across a 1,500 meter elevation gradient in the Newberry Mountains?
- Based on the changes in the last 30 years what potential future shifts may occur by the year 2040 under simulated climate change?

Datasets

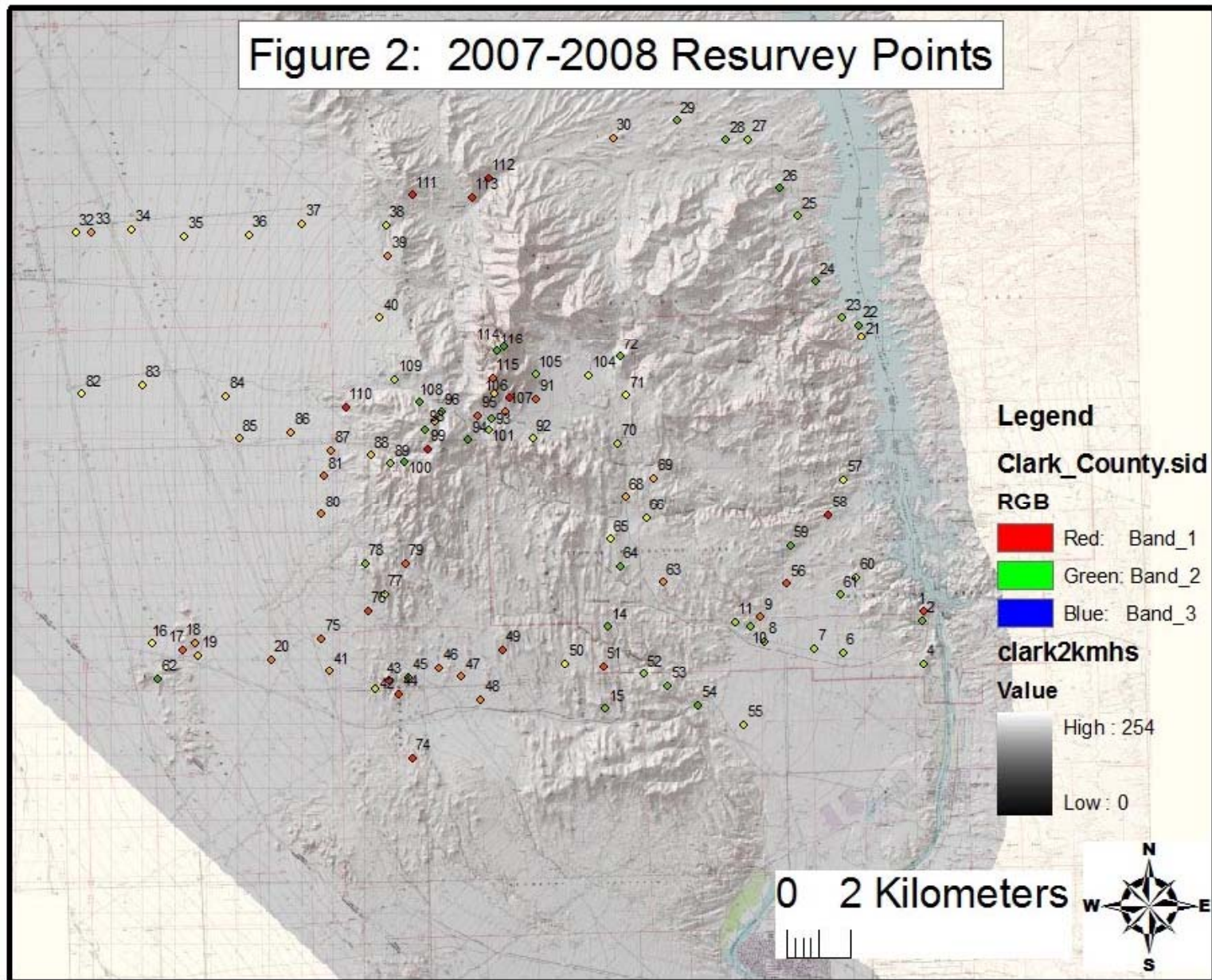
- Baseline data: 1979 UNLV MS thesis by Jim Holland, park planner, Lake Mead NRA
 - 116 data points
- Points resurveyed in 2007-2008
- Datasets contain:
 - Slope
 - Aspect
 - Soil descriptions
 - Vegetation community data

Resurvey Field Photos



- Photos courtesy of Chris Roberts, LMNRA, Natural Resources Division

Data points in ArcGIS 9.3



Methods

- Maxent and Bioclim species distribution models will be used on 1979 data
- Determine model that most accurately portrays 2007-2008 species resurvey data
- Use model to project changes under simulated climate change 30 years from now
- ArcGIS used to create full databases and show changes over time
 - Shifts across the elevation gradient over the last 30 years

Project Goals

- Use the 30-year dataset to model past and potential desert community shifts
- Transfer findings to resource managers with NPS and other land management agencies
- Foster a meaningful two-way flow of data between researchers and stakeholders
- Produce original data and information which assists two-way flow of data into the future
- Produce geovisualizations in the new lab at UNLV
- Apply techniques on other study areas

Geovisualization

- 3D Visualization of mountains DEM overlaid with soil and vegetation maps
- Classification of satellite imagery using spectral signatures of known species
- Maps showing changes in density and distribution of vegetation
- Visualization for spatial characteristics of change (e.g., linking change at A to the change at B)
- Visualization of vegetation change in connection with climatic, ecological, meteorological, & hydrological variables
- Visualization of future projections/scenarios

References (see poster)

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