

B COMBINING LANDSAT MSS, AERIAL PHOTOGRAPHS & GROUND MEASUREMENTS
TO ESTIMATE RANGELAND PRODUCTIVITY

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Problem

- 1 Produce a vegetation map over 2.2 million acres with detail down to the plant community level.
- 2 Produce estimates of rangeland productivity (pounds of usable forage per acre for cattle), for a 500,000 acre subset of area with a design goal for accuracy and precision of $\pm 20\%$ at the 80% confidence level.

Approach

- 1 Specification of Data Inputs and their contributions
 - Maps of area (ownerships/allotments/pastures)
 - Control extent of processing
 - Basis for summarization of estimation results
 - Landsat data
 - Spectral classification as a stratification for subsequent sampling
 - Basis for map output
 - Digital terrain data
 - Topographic description of spectral classes
 - Large scale aerial photography
 - Sample of spectral classes, photointerpreted for vegetation composition
 - Stratification for selection of ground plots to measure productivity
 - Ground Plots
 - Estimates and measurements of productivity, related through the aerial photography back to the Landsat data.

Data Collection

- Map entry via digitizing and initial Landsat classification carried on in parallel
- All data registered to a 50 meter UTM grid (Zone 12)
- Survey planning model applied to determine the number of samples required to produce the productivity estimates to the specified accuracy and precision (\pm 20% at .80 probability)
- Samples allocated and selected from Landsat spectral classification, located on USGS 7-1/2 min, quads of the area
- Samples flown with large scale aerial photography (1:750 nominal scale)
- Large scale photography "bin-sort" interpreted to select plots for ground visit
- Large scale photography interpreted in detail to produce species composition estimates
- Ground plots visited and measured for pounds per unit area of usable, available and palatable species using BLM-SVIM methodology

Data Reductions

- Ground plots provided estimates of pounds per acre of forage for cattle, adjusted for utilization and availability
- Ground plot estimates combined with Landsat classes to produce estimates of pounds per acre of forage by class
- Aerial photography interpretations combined with Landsat classes to produce quantitative descriptions of vegetation by class
- Digital terrain data combined with Landsat classes to produce topographical descriptions by class.

Results

1 Vegetation Map

- Quantitative descriptions of the vegetation by Landsat class used to produce vegetation map to the plant community level based on the BLM Arizona Vegetation Framework

2 Productivity Estimates

- Pounds per acre by class combined with digitized pasture and allotment maps to produce pounds per acre by pasture and allotment

3 Application Example

- Productivity estimates by class combined with new data input, identified water sources, to produce a map of all areas at or above a specified level forage per acre within a specified distance of water

4 Comment

- It is currently felt that the major benefit of the program was the development of a geographically-referenced data base that could be exploited further, even though this data base is a residual of the project, i.e., not the original objective.