

Rangelands

USE OF VERY LARGE SCALE AERIAL DIGITAL PHOTOGRAPHY TO MONITOR VEGETATION AT CORONA RANCH.

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THE STORY IN BRIEF: We used a 2-camera system to obtain 1- and 10-mm/pixel (GSD), geocoded, nested and simultaneously-acquired, aerial images of Corona Ranch. These images coupled with a digital point frame (“SamplePoint” software) could allow low-cost high-detail pinyon juniper woodland monitoring across extensive areas in NM and the southwest. This technique has been successfully used in Nevada and Idaho to monitor the occurrence of invasive weeds such as cheatgrass and spotted knapweed, but has yet not been tested on woodland-dominated rangelands.

THE PROBLEM: The investigation of landscape-scale processes involving semiarid woodland dynamics has been hindered by lack of effective methods for making fine-scale measurements across extensive areas in a cost-effective and timely manner. Very large scale aerial (VLSA) imagery has been used to conduct fairly detailed vegetation monitoring over extensive areas of Wyoming, Nevada and South Dakota. We are currently testing its usefulness in piñon juniper woodlands of Corona Ranch.

OBJECTIVE: This project’s objectives are to: a) evaluate woodland responses to past thinning treatments; b) explore juniper sapling-herbaceous understory relations; c) study focal research areas (cattle grazing exclosures, targeted grazing plots); and d) collect preliminary data to conduct tree biomass estimates for future bio-fuel applications.

EXPECTED OUTCOMES: We plan to use VLSA images to establish baseline vegetation cover benchmarks for long-term monitoring of plant community dynamics at Corona Ranch. Other short and longer term expected outcomes involve studying juniper sapling-herbaceous understory relations, comparing vegetation of grazing exclosures with adjacent grazed pastures, and developing equations to predict juniper biomass from VLSA stereo photographs.

DURATION: 2007 – (These data are preliminary)

APPROACH: Two digital cameras mounted on a small airplane were used to take photographs at approximately 2,500 stations located at 150-m intervals along EW flight lines spaced 600 m apart over the entire 11,330 hectares of CRLRC (Figure 1). Digital cameras captured geocoded pictures with field-of-view of 36x24m and 3x4m and resolutions of 7.2 mm and 1.1 mm ground sample distance, respectively (Figure 2). Acquired images are being analyzed using “Sample Point” and “ImageMeasurement” software developed by USDA-ARS.

RESULTS: Image analysis is currently being conducted at two locations. At NMSU in Las Cruces (NM), basic cover measurements are being recorded on a subset of images containing live and dead (snags) one seed juniper saplings. At the USDA_ARS High Plains Grasslands Research Station in Cheyenne (WY) analysis of a subset of stereo

images is being conducted which will allow the calibration of algorithms to determine woody biomass from 3-D images. Such algorithms are being developed jointly between USDA-ARS HPGRS and a division of USDI-BLM Denver office.

POTENTIAL APPLICATION: Once calibrated, this monitoring technique could have important practical applications in woodland management decisions. Prescription of fire or alternative thinning programs (chemical, mechanical, biological), evaluation of harvestable biomass for small energy plants, assessments of habitat quality for deer and livestock, are only a few of the potential applications.

EDUCATIONAL PLAN: A detailed account of the results of this study will be submitted for publication in a peer-reviewed rangeland management journal. Our final article will be posted on the Corona Range and Livestock Research Center’s web site (<http://corona.nmsu.edu>).

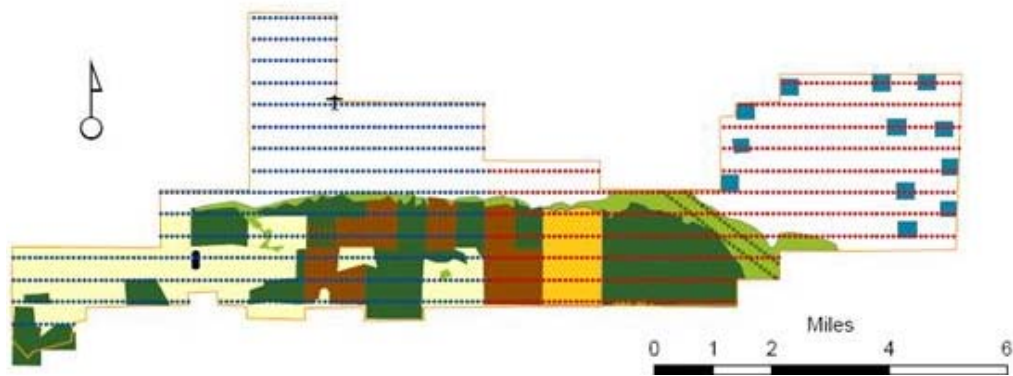


Figure 1:

Location of flight transects and image location points across Corona Range and Livestock Research Center.



Figure 2: Lightweight aircraft used (upper left and right) and example of paired 7.2 mm (lower right) and 1.1 mm (lower left) digital images taken at one sampling point with fields of view of 36 x 24m and 3 x 4m, respectively.