High Altitude Photography and Range Trend

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With the availability of U-2 and landsat aerial photography, the agencies concerned with shifting range trend on public lands have a tool that can bring efficiency to the trend process in line with the space age.

Space age technology often smacks of high technology and the orthodox quickly fade from the technology. There is no need to fade away as all the "Star Wars" style of trend documentation involves is observation of tone changes on aerial photographs.

The Concept

The concept to put in practice is that at key location of rangelands a darkening of tones on aerial photographs taken at 5-year interval of each other would mean an improving range condition. A lightening of tones would indicate a decline in range condition. Range condition is determined by the species composition, and the amount of ground cover: the greater the amount of desirable species and ground cover the better the condition. Desirable species are all the perennial grasses, forbs, and browse desirable to livestock and wildlife.

The concept is drawn from a study on the Arizona Strip, where 13 different sites were observed for tone changes on aerial photographs and field range condition were checked on the ground. Seven of the sites had trend data, some of which went back to 1950. Six of those sites with trend data are exclosures. Trend and condition were determined through plots and transects.

The aerial photos studied were black and white (1:20,000) of 1966 and 1974; color infrared (1:15,000) of 1976, and color infrared, (1:120,000) of 1978. Visual comparison was used to study tones at the sites on the air photos.

The Result

The study demonstrated that where dark tones and darkening tones occurred on two aerial photographs taken at the 10-year interval (1966 and 1976), or 2-year interval (1976-1978), the better condition was with the darker tones and the poorer conditions were with the lighter tones.

Such things—film development, chemistry, film type, wet or dry weather—did not influence the condition and trend detection. If species composition and good perennial plant cover existed, the darker tones resulted and lighter tones resulted from poor perennial plant cover.

As with most studies, an exception showed up. Our exception was when brush reinvasions are occurring on land treatment areas or where brush and trees are invading into their climax areas, darker and darkening tones showed up on the aerial photographs. The brush reinvasion demonstrated a decline in trend with darkening tones.

Practical Use

There are two potential uses of air photos in trend. Both

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This series of four photographs is all of the same area. The on-theground-photographs were taken where the arrow/circle $(0 \rightarrow)$ symbol is shown on the aerial photograph.



Picture 1

1:20,000 black and white air photo taken in April 1974. A grazing system was started in 1974. Note even tone and fence line contrast (arrows).



Picture 2

On the ground 1973 trend photo. Note good grass cover. This is what ground cover conditions were like in picture 1.





Picture 3

1:15,000 October 1976 color infrared air photo. Note the lightening of the tone. Down trend, again note fenceline contrast (arrows).).

would involve the complete selection of key areas through-

out an administered area. Trend would be read every year for

a 3 to 5-year period to get the "pulse" of the range. After this

has been done, the high altitude aerial photography could be

evaluated every succeeding 5 years by observing key areas

on the aerial film. If there has been a significant shift in the

tone, field crews could be sent to the site to read trend. The

key areas where no tone shift has occurred left them remain

the film and read 10 to 20% of the trend measurement areas.

Reading of the 10 to 20% of the plot would pick up any

contradictions that may occur in interpreting the tone and

Another method of use would be to, every 5 years, evaluate

unread as there is no significant shift in condition.

condition and would continue to refine the method.



Picture 4

On-the-ground photo 1977 showing large loss of western wheat grass. Ground cover was reduced from 6 units to 1 unit in plot and transect. High utilization and drought is the reason for loss. This is what ground cover conditions were like when picture 3 was taken from the air.

Conclusion

The use of high altitude photography could be used to detect significant shift in trend quality. One cannot quantify the species lost or gained and that would have to be obtained in the field where tone showed big shifts.

This method, however, could bring savings in manpower and gasoline in the future.

The savings would come as fewer trend plots would have to be read yet any significant shifts would be picked up on the film and could be checked in the field. With plans to greatly expand trend measurement areas over the whole of public lands, this is a tool to reduce vehicle use and manpower needs.

Conference on Ecological Modelling

The Third International Conference on State-of-the-Art in Ecological Modelling will be held from Monday, May 24, until Friday, May 28. The theme of this international conference will be "Application of Ecological Modelling to Environmental Management." Besides technical papers, there will be a strong emphasis on case studies. Abstracts of 200-500 words should be forwarded by December 15, 1981 to either Prof. Gaylord. V. Skogerboe or Prof. William K. Lauenroth, Natural Resources Ecology Laboratory, Colorado State University, Fort Collins, Colorado 80523.

Some of the technical subject areas proposed for this conference are: model identification, development, parameter estimates, stability, validation, and verification; model applications to lake and river systems, wetlands, forests, grasslands, etc; and case studies, such as the Baltic Sea, Great Lakes, Rhine River etc.