

B PRESENT/FUTURE CALIFORNIA DEPT OF FORESTRY REMOTE SENSING
ACTIVITIES

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Following completion of the statewide California mosaic two years ago, the California Department of Forestry (CDF), has been involved in several other projects utilizing Landsat data. These include the following —

- 1 Completion of supervised Landsat classifications —
 - Santa Cruz County, involving NASA Ames, CDF and John Brockhaus and Dr. Norman Pillsbury at California State University at San Luis Obispo
 - Humboldt County, involving NASA Ames, CDF and Ken Mayer and Dr. Lawrence Fox of Humboldt State University
 - Nevada, Placer, El Dorado Counties, involving NASA Ames CDF and the US Forest Service
- 2 Utilization of Landsat data as one layer in a Geographic Information System (GIS), in Santa Cruz County, to assess the usefulness of GIS for policy analysis purposes, determination of areas of reforestation potential, and identification of fire hazard areas, involving NASA Ames and CDF.
- 3 Determination of "Prime" timberland in Humboldt County, involving Humboldt State University and CDF.
- 4 Creation of line printer maps from the original unsupervised California mosaic Landsat classification at 1/24,000 (7½') quad scale.
- 5 Installation of VICAR/IBIS software package at the centralized state computing facility in Sacramento, Teale Data Center. (At the present time VICAR, Version 3, will not run on the IBM 370 at Teale, perhaps due to some incompatibilities with an IBM subroutine called SU 9).

As CDF's Landsat work has progressed, many questions have arisen, several of which we have yet to answer. One of these questions deals with classifications. It is one thing to decide before analysis, what the classification system should be. It is a totally different matter to fit the Landsat data to the classification. It is much easier to

fit a classification to Landsat than the other way around. Few classification systems in use are oriented to a remote sensing perspective, that is, the view from above. The question is, what types of classifications can be used to yield the most information from Landsat analysis of large areas, that have ecological meaning about the vegetation on the ground?

A second question deals with data aggregation. In the GIS demonstration, NASA utilized 100 meter square grid cells, representing 1 hectare on the ground. This level of information may be more specific than necessary, to provide data for policy analysis, and a data base built on this cell size for the forest lands of the state would require 16,000,000 cells. However, the question arises as to what results when the data is "smoothed" or aggregated into larger cell sizes, as large as perhaps, a square mile? What limits are put on variance? Are cells labeled based on proportions of types within? Or on the presence of "important" features? Is all specificity lost?

Another question deals with the topic of classification techniques, whether to use a supervised or unsupervised approach. Often a combination is used, but the question is whether to use supervised at all. The literature seems to support the theory that wildland environments, because they are so complex, are best classified using unsupervised techniques, resulting in lower costs and more accurate results. However, the supervised classifications currently underway in Santa Cruz and Humboldt Counties are yielding results of 85-90% accuracy. It appears that extreme care in the selection of training sites and editing of statistics, in addition to a detailed knowledge of the resource types in an area can yield highly accurate classification results. Certain classification routines may be more amenable to the development of supervised statistics than others. However, it also appears possible that a prestratification of the data into ecologically similar types and then performance of an unsupervised classification may yield accurate results. An analysis has not been done to determine cost trade-offs.

None of these questions have stopped CDF from utilizing and realizing the benefits of Landsat data, but before successful implementation of an operational Landsat analysis system, answers are necessary.