B AN INVENTORY OF CALIFORNIA'S IRRIGATED LAND

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The California Department of Water Resources (DWR) has carried out a program for monitoring irrigated crop acreage for more than 30 years. Currently, about 9.5 million acres are irrigated. The Department requires crop data for a large variety of its studies and activities. Land use surveys are conducted approximately one seventh of the state each year, with the result that the entire state is resurveyed about every seven years.

Up-to-date 35 mm aerial photography is acquired of the survey area, each slide netting about one square mile. Photointerpreters identify field boundaries, and, to the extent possible, crop type. These are delineated on 7-1/2 minute quadrangle base maps. Completed maps are then checked in the field. Acreages are determined for each crop type by various geographic subdivisions.

Early on, DWR anticipated the prospects for supplementing their data by use of satellite-related techniques. At the minimum, it was expected that techniques could be developed to provide relatively rapid, inexpensive updating of total irrigated acreage for points in time between regular, detailed crop surveys, and to provide data on off-season crops which the regular summer survey does not entirely account for. In addition, the potential existed that satellite-related techniques could be developed to provide crop data at reduced cost.

After several years of preliminary investigation, NASA and DWR initiated the current five year, Applications Pilot Test project entitled "Irrigated Lands Assessment for Water Management." NASA provides the major part of the funding, DWR cooperates in program direction and provides ground truth. Most of the research has been by the University of California at Berkeley and at Santa Barbara. We are currently in the fourth year of the project and some notable accomplishments have resulted from work to date.

The project is divided into four tasks as follows —

Task I Estimation of irrigated land using manual analysis techniques

Task II	Estimation/Mapping of irrigated land using digital analyses techniques
Task III	Estimation/Mapping of crop type using manual analyses techniques
Task IV	Estimation/Mapping of crop type using digital analysis techniques

In 1979, a statewide test of the Task I techniques was made. The performance goal of $\pm$ 5% at the 95% confidence level by each of the state's 10 major hydrologic basins was bettered in all but a few cases. The process used was photointerpretation of enlarged Landsat scenes (1:150,000 scale), adjusting the determined acreage using a regression estimator and ground truth data from 637 sample cells (total population of 6001 cells). Sample cells were allocated to areas stratified on the basis of field size and selected crop types. Interpretation of three dates of imagery was required to span the complete time during which irrigated crops are grown in California. Currently an operations handbook is being prepared which will incorporate modifications in procedures found desirable as a result of this test.

Task I was given the major attention during the projects first period. Now a larger share of time is being spent on the other tasks. For Task II, two major subject areas being addressed involve registration of multitemporal data and classification procedures. In addition, work has been conducted on rotation of image to north as required for the map product. The Band 7 to Band 5 ratio classification procedure has received the most attention, with a preliminary analysis of a 16-7½ minute test area in Sacramento Valley showing good results.

Task III focus principally on small grains identification, with the object of providing DWR with implementable techniques in the very near future. Irrigation of small grains has increased in California. This is an off-season crop which is only partially accounted for in our regular crop surveys.

The principal effort on crop identification is in Task IV. The major focus is on the crop types and/or groups comprising the bulk of the irrigated acreage in the Sacramento Valley, because there are fewer crop categories found here than in the other major agricultural regions of the state.

In summary, Task I has provided techniques for irrigated area estimation that DWR can now implement. Task II requires some refinement and testing. However, the Task II promises to provide DWR with operational techniques in the near future.