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PRELIMINARY STUDY OF LAKE PONTCHARTRAIN AND VICINITY

USING REMOTELY SENSED DATA FROM THE ERTS-A SATELLITE

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Type I Progress Report

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SUBMISSION OF PAPER

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TITLE OF PAPER: Remote Sensing of Duckweeds

ABSTRACT (Not more than 200 informative words).

During the summer of 1972, huge mats of duckweeds (Lemnaceae)
appeared on Lake Pontchartrain, a shallow estuary in southeastern
Louisiana, in water with salinities up to 10 o/oo. In color infra-
red photography, duckweeds show a characteristic light lavender
color, unlike algal mats or water hyacinth, as observed in low
level aerial photography. Although at least five species are
present in the area, most water coverage is by Lemna minor and
Spirodela oligorrhiza. ERTS imagery shows many areas of bayous,
swamps and marginal waters of Lake Pontchartrain covered with
duckweeds. Subsequent passes show a seasonal decrease in duckweeds.

Projection Requirements:

_____3-1/4" x 4"
_____X_____2" x 2"
_____Overhead Viewer

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At this time, work is progressing well on all four of the projects being undertaken. There is no problem currently impeding the progress of the investigation.

I. Monitoring Spirodela oligorrhiza and Lemna minor

Work on this project has centered on analysis of the digital tapes. A signature for the duckweeds has been defined, and a classification map of one of the test areas has been generated. The classifications shown on the map are 1) water, 2) definitely duckweed, 3) probably duckweed, and 4) other vegetation or no vegetation.

The classification scheme was confirmed by comparison with low altitude and high altitude photography. A high degree of accuracy seems to have been achieved.

During the next reporting period, the 12 September and 16 January passes will be analyzed with the classification computer program. In addition, the areas which appear visually as duckweed in the color composites will be measured from the color transparencies. These two sets of numbers will be compared.

The work being done on this project will be the subject of a paper to be presented by Dr. Smalley and Mr. Faller at the National Meeting of the American Society of Limnology and Oceanography in June. An abstract is attached to this report.

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II. Observation of Cypress Trees

Selection of test sites has been accomplished. A large, dense stand of healthy cypress has been located and visited by one of our biologists. An area of almost dead cypress and another area noticeably declining in health have been located.

These areas will be visited by a biologist during the next reporting period, after which signatures will be examined for the three areas. If time permits, additional test areas will be defined.

III. Delineations of Water Masses in the Three-Lake System

Analysis of underflight data has been extensive, but the results have been somewhat disappointing. The quality of the photography is not as good as had been anticipated, and correlation with ground observations has been little better than chance. There are still several numeric techniques which will be applied in an attempt to improve the correlation.

Data from the Sewerage and Water Department of New Orleans have been provided which give the volume of storm water pumped into Lake Pontchartrain. An approximate residence time of this storm run-off will be determined from this data in conjunction with ERTS imagery.

Currently being determined are the locations of data acquisition locations in the lakes within the ERTS imagery. When this is complete, the ground truth will be compared to the MSS data for possible correlation.

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IV. Urban Neighborhood Analysis

Work is progressing well on this project also. Four additional neighborhoods have been delineated to serve as test areas. When these have been extracted from the CCT, we will have a total of seventeen areas to serve as training sets.

We have observed that certain ratios among the MSS bands show a very tight distribution about the mean for the three test areas for which we have performed the calculations. The three represented different quartiles of physical blight and the differences between the averaged ratios were on the order of six standard deviations calculated for the individual neighborhoods. This approach seems very promising and will be pursued during the next reporting period.

The Regional Planning Commission for the metropolitan New Orleans area requested that we perform a special preliminary analysis on the urban data for them. This analysis would consist of density slicing of the four MSS bands using the digitized information from the CCT's. This product was supplied to them in the form of six maps for each band, where each map contains a printed symbol in the location of each pixel falling within the given density range and marginal registration marks. The RPC is preparing these slices for color photographic combination which they feel will assist them in their planning efforts.

During the next reporting period, a signature definition for neighborhood blight classification will be completed. Using this signature

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information, the entire metropolitan area will be subjected to this classi-
fication procedure, and each pixel classified regarding quartile of physi-
cal blight.