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PROGRESS REPORT

CR-136784

Evaluation of Skylab Imagery as an Information Service for Investigating Land Use and Natural Resources. NASA 9-13364.

This report covers the period of January 1-31, 1974. During the month of January S190A and S190B imagery from the SL3 mission was received. This imagery has now been cataloged and work is progressing on enlarging selected test areas for detailed interpretation and comparison of the Skylab S190A data to that of the S190B and ERTS data.

Three general test sites have been selected on the basis of coverage and variation in land use features. These sites include part of the Finger Lakes region between Ithaca and Syracuse, N. Y. , part of the Lower Hudson Valley from West Point to Kingston and extending west into the Catskill Mountains, and Suffolk County on Long Island. Investigations are currently under way for each site to determine the type of land use inventory and data correlation which can be done with the SL3 data.

The following is data obtained from a survey of wildlife biologists and environmentalists from the Northeast regional area:

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## NATURAL RESOURCE INQUIRY

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A questionnaire was sent out to wildlife biologists and environmentalists on the regional level in state and federal agencies. Its aim was to assess the value of satellite data to people involved in environmental studies. Eightyone questionnaires were distributed and 31 returned. This was a 38 percent return. However, 7 of those returned did not reach the addressees, presumably because they had moved. The return of actual responses was 24 or a 32 percent response.

A few of the responders indicated that they did not actually feel qualified to answer the questionnaire because either they only reviewed studies, or remote sensing data was not applicable to their work. This may explain the poor response received.

The review of the questionnaire data includes a listing of the questions and the responses along with an analysis of the responses.

1. Do you conduct regional studies:

If so, what is the nature of the study (i.e., analysis of wildlife habitat, hunting activity, etc.)?

Response:

95.8% conducted regional studies:

The type of study could be grouped into several major categories:

Environmental analysis	12.5%
Wildlife and fisheries habitat	58.3%
Wetlands	20.8%
Timber	8.3%

Of the responders studying wildlife and fisheries habitat 38percent were working on the applied field level while the other 62 percent were in

regional supervisory capacity. Some of the responders were studying one or more species such as: pheasant, wild turkey, beaver, bear. Others studied specific regions.

2. What is the typical area covered in your regional study (approximately in square miles)?

There was a great range in responses to this question. Some responders listed several regions of different sizes.

Size in square miles	% of responders
less than 100	37.5
1,000 - 5,000	25.0
5,000 - 10,000	8.3
greater than 10,000	29.2

3. What is the minimum size of the data unit required for your study (i.e., for vegetation it may be 10 acres, or for waterbodies one acre, etc.)?

Response:

This question was included to see how the data unit requirement for wildlife habitat analysis corresponded to the interpretable unit size of satellite imagery. The minimum interpretable unit for the ERTS imagery was about 25 acres at a scale of 1:62,500.

Data type	minimum unit size(acres)	% of responders
Forest	5-20	8.6
Open land	1-10	45.7
	40-100	8.6
Wetlands	.1-10	17.1
Water	1-10	11.4
Not applicable		8.6

This indicates that 74.2 percent of the responders required data in a unit size of 1 to 10 acres. This resolution capability is not possible with the present ERTS imagery using manual interpretation. However a preliminary view of the Skylab imagery indicates that it has considerably greater resolution so it may be useful for these studies.

4. Do you currently use any of the following data sources:

	% responding yes	Scale
airphotos	100	varied
USGS topographic maps	100	1:24,000 90%
county maps	70.8	varied
tax maps	16.8	varied
other		

If you do not use any of the above or similar sources, what is your data source?

This question was included to find whether the personnel in wildlife used any map data. It is clear that they do use at least some data of this kind. Other specialty maps used were soil maps, road maps and flood plain maps, in approximate order of importance.

5. Do you use consultants or information from other disciplines in your analysis? If so, what disciplines?

Response:

none	7	landscape architects	3	National marine fisheries	1
soil	9	hydrolic tables	3	archeology	1
forestry	6	geologists	2	planners	1
engineers	5	extension agents	2	weather	1
State fish & game	5	census	2	transportation	1
EPA water quality	3	outdoor recreation	2	power transmission	1

Response to this question indicates a variety of disciplines are used in wildlife habitat evaluation. Only 29 percent did not use any consultants.

6. In what form would you like your initial data (i.e., computer tapes, acetate overlays, topography maps similar to USGS)?

Response:

Data type	% responders
Topographic maps	95.8
Acetate overlays with topographic maps	79.2
Computer printout	4.2
Vegetative diversity	4.2
Undecided	4.2

This question was asked to find what format was desired by researchers, and whether satellite imagery could be presented in a compatible format. 79.2 percent wanted acetate overlays that could be used with topographic maps. This would be a suitable format for mapping vegetational or cultural information from satellite imagery. Only one person desired computer information, several said they definitely did not want any computer analysis.

7. Do you use any of the following resource data? Please check whether the data is required, or of no use for your analysis.

	% responses		
	Required	Desirable	No Use
topography			
slope	<u>43.5</u>	<u>52.2</u>	<u>4.3</u>
aspect	<u>23.8</u>	<u>61.9</u>	<u>14.3</u>

## 7. continued

## % response

	Required	Desirable	No Use
geology			
surface	<u>26</u>	<u>60.9</u>	<u>13</u>
subsurface	<u>13.6</u>	<u>54.5</u>	<u>31.8</u>
soil type	<u>45.5</u>	<u>54.5</u>	<u>0</u>
climate			
rainfall			
monthly averages	<u>21.7</u>	<u>60.9</u>	<u>17.3</u>
seasonal averages	<u>23.8</u>	<u>52.3</u>	<u>23.8</u>
other <u>largest storm; evapotranspiration</u>			
temperature			
monthly averages	<u>22.7</u>	<u>50</u>	<u>27.3</u>
seasonal averages	<u>17</u>	<u>50</u>	<u>33</u>
other <u>first and last frost; solar radiation</u>			
vegetation type			
forest general	<u>66.6</u>	<u>19</u>	<u>14.3</u>
deciduous	<u>77.3</u>	<u>13.6</u>	<u>9.1</u>
coniferous	<u>77.3</u>	<u>13.6</u>	<u>9.1</u>
species composition	<u>56.5</u>	<u>34.8</u>	<u>88.7</u>
brushland general	<u>72.7</u>	<u>18.2</u>	<u>9.1</u>
species composition	<u>43.5</u>	<u>39.1</u>	<u>17.4</u>
agricultural general	<u>66.6</u>	<u>19</u>	<u>14.3</u>
abandoned fields	<u>54.2</u>	<u>33.3</u>	<u>8.3</u>
pastures	<u>56.5</u>	<u>34.8</u>	<u>8.7</u>

7. continued

	% response		
	Required	Desirable	No Use
active cropland general	<u>33.3</u>	<u>42.9</u>	<u>18.5</u>
crop type	<u>33.3</u>	<u>42.9</u>	<u>18.5</u>
index of diversity of vegetative types	<u>50</u>	<u>31.8</u>	<u>18.2</u>
water			
ponds and lakes	<u>90.5</u>	<u>9.5</u>	<u>0</u>
streams and rivers	<u>85.7</u>	<u>14.3</u>	<u>0</u>
wetlands	<u>82.6</u>	<u>17.4</u>	<u>0</u>
seasonal fluctuations	<u>61.9</u>	<u>33.3</u>	<u>4.8</u>
other <u>developed areas; tidal range; marsh vegetation; topography</u> of lake bottoms; beaver flowage; native hay			

This list of resource information was included to find what types of data were used. Some of this information can not be obtained from satellite imagery (i.e., weather information) however it can be monitored in other ways by satellite. The vegetation was broken down into several levels of precision in hopes of determining how specific the needs of the responders were. Unfortunately most responders indicated they wanted all levels rather than distinguishing between levels. 56 percent of the responders required species of vegetation. Information this specific is difficult if not impossible to obtain from satellite imagery. However 20.8 percent could use a break down of forest into deciduous and coniferous types which can be determined from satellite imagery. Specific agricultural information was required by only 33.3 percent of the responders.

8. What factors do you feel are necessary to define wildlife habitat? Please indicate what specific species, if any, you are considering.

Cover	% responders
generalized vegetation types	66.6
specific species	66.6
specific vegetation conformations	58.3
topographic features	58.3
Food	
generalized vegetation types	50
generalized animal types	50
specific species	45.8
abundance	54.1
Water	
type	62.5
minimum amount	54.1
seasonal fluctuation	45.8
Space	
minimum area characterized by:	
vegetation type	58.3
human density	41.6
Diversity	33.3
No response	16.6

This was asked to determine what factors were required for habitat analysis; to determine if habitat could be analysed by satellite. Vegetative cover was judged the most important factor. However species was required. Many of the other factors could be determined by satellite imagery.

9. Do you feel wildlife habitat can be accurately mapped over extensive areas using any of the above criteria?

response:

83.3 percent of the responders did feel that habitat could be mapped with the above information. 16.7 percent did not respond to this question.

10. What cultural information is necessary for your needs?

	% response
population density	62.5
present land ownership	54.2
present land use	87.5
size of land parcel	54.2
possible future use	66.6
cost of land	33.3
present property taxation	12.5
hunting/fishing pressure	62.5
hunting/fishing success	62.5
other: shoreline development; recreational habits	
no response	8.3

This question was designed to see what cultural information was used or would be used by wildlife biologists. Some factors such as cost of land, land ownership, and hunting/fishing pressure or success cannot be determined by satellite data or other remote sensing methods. However others such as present land use and parcel size could possibly be determined by satellite. Present land use was the factor of most use to the responders (87.5%).

11. Are there natural resource data not presently obtainable that you would like to see more available?

response:

Response to this question was 54 percent. The responses varied widely, some requests did not deal with data applicable to remote sensing. The responses can be roughly grouped into categories as follows:

Needs	% response
digest of information available	23
shoreline vegetation inventories	15.4
analysis of critical habitat i.e., endangered species breeding or wintering habitat	23
analysis of urban fringes	15.4
data on specific game species habitat	15.4
time pursuing game	7.8

Apparently the other 46 percent of the responders did not have any need for new information.

In general it would seem that personnel responding to this questionnaire would like to obtain information in the same general format that it has been available to them in the past. This would be in the form of acetate overlays showing cultural or natural configurations.

The vegetational information required by wildlife personnel, such as species composition of forests, is not feasible from satellites. however generalized vegetational types, agricultural areas, water and topography can be obtained using satellite data. The greatest difficulty in application of satellite data to this field is the requirement of data units less than 10 acres for most features.

This questionnaire did indicate the need for greater communication with wildlife personnel since 23 percent requested greater availability of satellite data. These people were apparently not aware of the distribution sources currently available.

Although this questionnaire is of limited extent (24 replies) it does give some idea of the needs of wildlife personnel and feasibility of using satellite data to meet these needs.

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