EIGHTH BI-MONTHLY PROGRESS REPORT
UNIVERSITY OF ALASKA
ERTS PROJECT 110-7
NOVEMBER 30, 1973

A. TITLE OF INVESTIGATION: Application of ERTS-1 imagery to the study of caribou movements and winter dispersal in relation to prevailing snowcover.

B. PRINCIPAL INVESTIGATOR/GSFC ID: Peter C. Lent/U682

C. PROBLEMS IMPEDING INVESTIGATION: None.

D. PROGRESS REPORT:

1. Accomplishments during the reporting period: A VP-8 analysis of snow melt conditions in northwest Alaska was carried out on an early June ERTS scene (#1313-21582). This scene encompasses the main migratory routes of the Arctic herd. An analytic display of snowmelt conditions was achieved and indications are this type of analysis will be useful in long term studies of year to year variations in timing and routing of spring or pre-calving migrations. The snow-free corridors identifiable on this scene correspond with historically known major pre-calving migration routes.

   A similar analysis of snowmelt on wintering areas in northeast Alaska was performed. The ground truth basis for the analysis is our May 21st aerial reconnaissance and photography of the area. Initially, we hoped to detect and identify winter feeding areas by premature melt-off because these areas of disturbed shallower snow melt off two weeks or so earlier than unutilized areas of deeper undisturbed snowcover. Unfortunately, the timing of this particular satellite overpass (May 20th) was about ten days too late because the valley bottom areas had almost entirely melted off. Nevertheless, A VP-8 analysis of a band 7 transparency of scene 1301-20494 resulted in a satisfactory display of snow melt conditions on that date.

   In direct analyses for winter feeding areas, a March 27th, 1973 ERTS scene (#1247-20500) was utilized. During this particular cycle of satellite overpass, we performed extensive aerial reconnaissance and landed at six different locations in the Porcupine Lake Basin, the Junjik Valley, the Chandalar Valley, and nearby uplands. At the ground sites, we collected detailed data on cratering areas including distance and direction to geographical reference points such as lakeshore features which would be identifiable on ERTS imagery. Unfortunately, all of these ground sites were cloud

covered during satellite overpass. Therefore, we selected the above scene and analysed it for cratered areas near the eastern base of Deadman Mountain. Preliminary CDU analysis yielded no useful result and a computer printout of digital densities was produced. The printout was analysed with the objective of performing a discriminate analysis on cratered and undisturbed snow. This could not be accomplished, however, because the cratered areas could not be accurately located on the printout. The approximate location of cratered areas was identified and higher band 6 densities were noted in this area. These higher densities may or may not represent the cratered snow and we are unable to precisely locate the cratered areas on the scene for verification. Although we have March 28th aerial photography of these cratered areas, they occurred on a snow covered inaccessible mountainside and we have no reliable means of determining their geographical position on the digital display.

In analyses for habitat types, several August and September scenes were analyzed. Based upon ground truth data collected during the preceding reporting period, 9.5" positive transparencies of an early August scene (1375-21002) were analysed on the VP-8. Band 7 for this scene has not been received and, therefore, only bands 4 through 6 were analyzed. Features in this analysis included pure stands of valley bottom white spruce (*Picea glauca*), dry lowland shrub willow-birch communities, upland Eriophorum tussock communities, and low density treeline spruce ecotone between valley bottom spruce and upland Eriophorum tussocks. The band 6 analysis produced satisfactory displays which were photographed but analysis of bands 4 and 5 did not produce satisfactory displays. A digital tape of this scene is on order and analysis of this scene is still in progress.

A September 1972 ERTS scene (1051-21002) covers much of the same area in the environs of Arctic Village. An attempt to analyze a 9.5" color composite transparency for habitat on the VP-8 produced no useful product. However, linear discriminate analysis of a portion of the scene indicated band 5 was the most useful for separation of valley bottom bog and white spruce stands. We believe the reason for this is that the bog areas have a relatively higher percentage composition of shrub birch (*Betula glandulosa*). The leaves of this shrub turn a brilliant red in September and this would account for the increased usefulness of band 5 for separation of these features in September. Following the discriminate analysis, a CDU display

based on band 5 was produced and photographed. Preliminary evaluation of the display is promising and more detailed evaluation is currently underway.

ERTS scene 1050-20541 is cloud free over most all the expanse of the Arctic National Wildlife Range. Ground truth data on habitat types were obtained by Dr. Robert LeResche of the Alaska Department of Fish and Game and curselves during the spring and summer of 1972. Using this as a basis for scene anlaysis, a 9.5" color composite transparency was analyzed on the VP-8 but no reasonable results were achieved. Single band VP-8 analyses of bands 6 and 7 produced reasonably satisfactory displays of alluvial gravel but displays of habitat features such as Eriophorum tussock communities, wet sedge meadows, riparian willow, and Dryas communities were poor or completely unsatisfactory. Vp-8 analysis of band 5, however, did yield a reasonable display of riparian willow. This display was photographed and is currently undergoing more detailed evaluation by Dr. LeResche and ourselves. Additionally, a digital tape of this scene is on order and the analysis will be carried further when it arrives.

Preliminary CDU analysis of an early September 73 ERTS scene (1407-20371) was used to direct production of a digital data printout of a portion of this scene. The objective of this analysis is the identification of the following features:

1) Recent forest fire burns whose vegetative cover consists primarily of fireweed (*Epilobium angustifolium*) and Marchantia

2) Older burn areas whose primary vegetative cover consists of mature willow shrubs and grasses

3) Wetter unburned areas whose primary vegetative cover consists of mature willow shrubs and sedges

4) Late burn successional stages consisting of stands of quaking aspen (*Populus tremuloides*) and/or climax forest consisting mostly of spruce and balsam popular (*Populus balsamifera*)

5) Shallow potholes and lakes

6) Silt laden rivers

7) clear streams and

8) Alluvial gravel.

Ground truth areas were accurately located on the digital data printout and feature densities are being extracted for discriminate analysis.

From analyses of scenes 1375-21002, 1051-21002, and 1050-20541, we have concluded that bands 6 and 7 are the most useful for single band vegetation analyses of summer (July to mid-August) scenes but that these bands decrease markedly in utility for similar analyses of fall (September) scenes in the Brooks Range. Conversely, band 5 seems to contribute little in single band vegetation analyses of summer scenes but increases markedly in value for similar analyses of fall scenes. We attribute this to fall foliage colors.

The file of existing imagery was reviewed for scenes which could be analysed for caribou aggregations. Criteria for scene selection were that it occur during periods of caribou migration or summer aggregation (April through October) and that the scene by reasonably cloud free (less than 20% cloud cover). A listing of 54 scenes occurring on 43 different dates was compiled. On November 28th, Dr. LeResche went to Canada with this listing to confer with Mr. Elmer DeBock of the Canadian Wildlife Service. Mr. DeBock has monitored the movements of the Porcupine herd in Canada during the past year and, based upon his data, scenes will be identified for possible analysis for caribou aggregations. In Alaska, Mr. David Roseneau of Renewable Resources, Inc. has monitored the movements of the Porcupine herd. We will consult his data to identify Alaskan scenes suitable for analysis of caribou aggregations.

2. Plans for next reporting period: Color composite transparencies of scenes 1051-21002, 1050-20541, and 1375-21002 will be mounted in a Zoom Transfer Scope. Vegetation maps on 1:250,000 scale maps will be produced by direct visual interpretation. Photographic products of VP-8 and CDU-200 habitat analysis displays of these scenes will also be transferred to 1:250,000 scale maps. These map products produced using different methods will be compared and evaluated.

The discriminate analysis of scene 1407-20371 will be completed and results will be used in subsequent VP-8, CDU-200, and digital data printout analyses of this scene.

If a suitable scene is identified for analysis of caribou

aggregations, a digital tape order for the scene will be made and VP-8 analyses of transparencies on hand will be undertaken.

E. SIGNIFICANT RESULTS:

Successful single band VP-8 analyses of spring snowmelt indicate this application will be useful in long term studies of pre-calving caribou migrations.

Single band habitat analyses have been successful and will have cost effective application to habitat analyses in northeast Alaska. In these analyses, bands 6 and 7 were found most useful for mid-summer analyses whereas band 5 was found most useful for analyses of September scenes.

F. PUBLICATIONS: None

G. RECOMMENDATIONS: None

H. CHANGES IN STANDING ORDER FORM: None