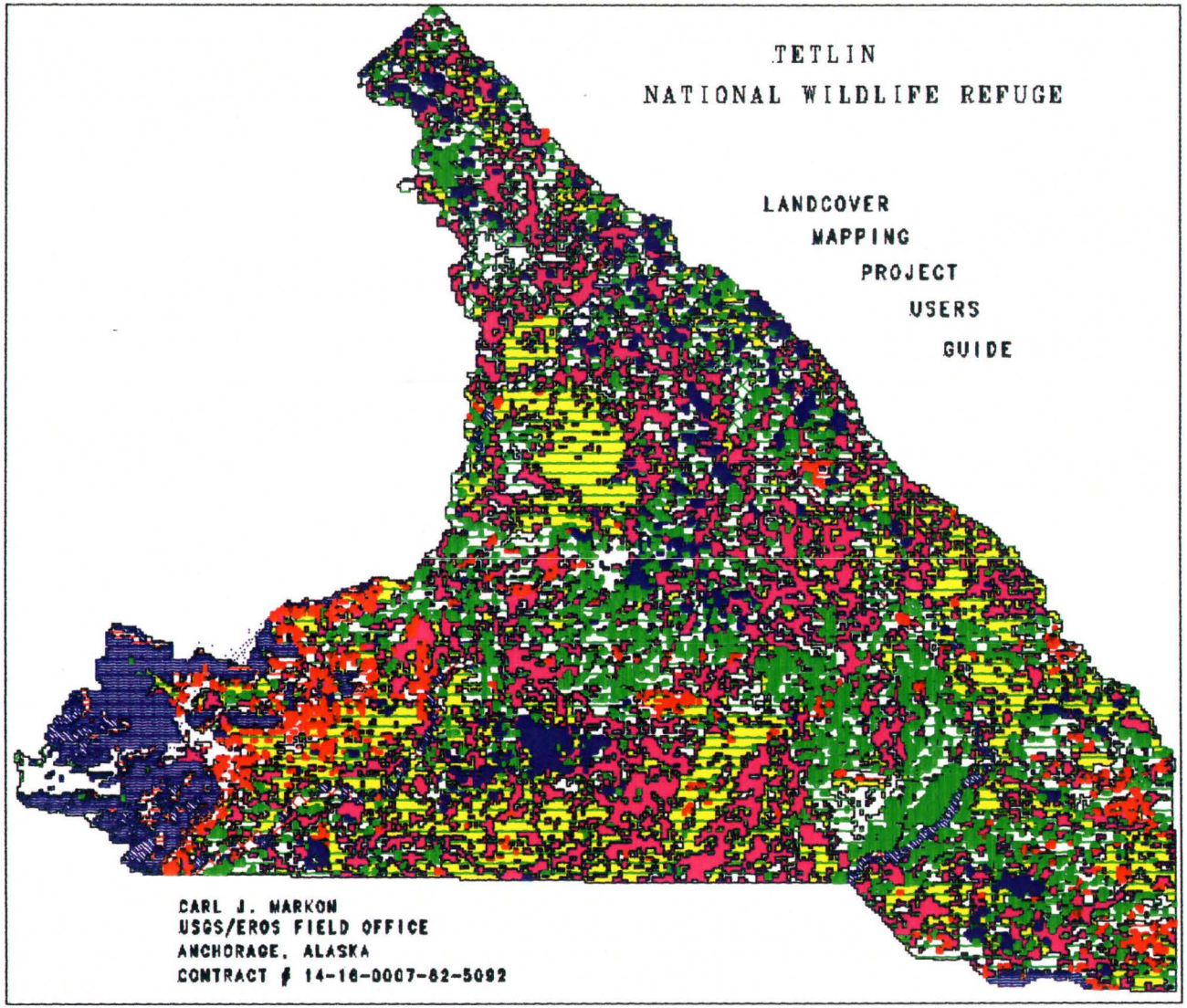
TETLIN
NATIONAL WILDLIFE REFUGE
LANDCOVER
MAPPING
PROJECT
USERS
GUIDE
CARL J. MARKON
USGS/EROS FIELD OFFICE
ANCHORAGE, ALASKA
CONTRACT # 14-16-0007-82-5092

TETLIN NATIONAL WILDLIFE REFUGE
LAND COVER MAPPING PROJECT
USERS GUIDE

INTRODUCTION

Title III of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA, 1980) established the Tetlin National Wildlife Refuge (TNWR). Section 304 of the Act requires the Secretary of Interior to "prepare, and from time to time revise, a comprehensive conservation plan" for the refuge. Before developing a plan for the refuge, the Secretary shall identify and describe--a) the populations and habitats of the fish and wildlife resources of the refuge; b) the special values of the refuge as well as any other archeological, cultural, ecological, geological, historical, palentological, scenic, or wilderness value of the refuge; c) areas within the refuge that are suitable for use as administrative sites or visitor facilities...; d) present the potential requirements for access with respect to the refuge...; and e) significant problems which may adversely affect the populations and habitats of fish and wildlife identified and described..." (ANILCA, 1980). Vegetation, water, and terrain (elevation, slope, and aspect) are the components of habitat and can be used in the determination of the above requirements.

The U. S. Fish & Wildlife Service (USFWS) has the responsibility for collecting the resource information to address the research, management, development and planning requirements identified in Section 304. Because of the brief period provided by the Act for data collection, habitat mapping, and habitat assessment, the USFWS in cooperation with the U.S. Geological Survey's EROS Field Office, used digital Landsat multispectral scanner data (MSS) and digital terrain data to produce land cover and terrain maps. A computer assisted digital analysis of Landsat MSS data was used because coverage by aerial photographs was incomplete for much of the refuge and because the level of detail, obtained from the analysis of Landsat data, is adequate to meet most USFWS research, management and planning needs. Relative cost and time requirements were also factors in the decision to use the digital analysis approach.

OBJECTIVES

The primary objectives of the mapping project were to:

1) produce digital land cover/terrain classifications for the TNWR, using digital Landsat and terrain data.

2) provide registered Landsat data for the entire study area defined as the TNWR.

3) provide other derivative products and output products as required.

The primary objectives of this user guide are to give a brief discussion of the methodology used and describe the different types of data products produced.

AREAS OF COVERAGE

The TNWR consists of approximately 900 thousand acres of land and water in the east central portion of Alaska. The northwest and southeast latitude/longitude coordinates of the mapped area are 63 20'/143 15' and 62 20'/140 45' respectively. The entire study area covers roughly 1 degree of latitude and 4 degrees of longitude. Portions of one Landsat scene (Number 2958-19453, 6 September 1977) provided complete coverage of TNWR and the surrounding area.

METHODOLOGY

A computer compatible tape (CCT) was obtained for the Landsat scene covering the refuge lands. The Landsat scene was radiometrically and geometrically corrected (registered to a 50-meter Universal Transverse Mercator [UTM] grid) and the boundaries of the refuge and the corresponding 1:63,360-scale USGS quadrangles digitized. This made it possible to summarize land cover information for each quadrangle and the refuge as a whole. Training blocks (sample areas containing representative land cover types) were selected for field study, and training statistics were derived from them. Figure 1 shows the location of the training blocks used in this study. A modified clustering technique was used to generate initial spectral classifications (Fleming, 1975), using the EROS Field Office computer system (HP-3000) and IDIMS software (ESL Incorporated, 1981).

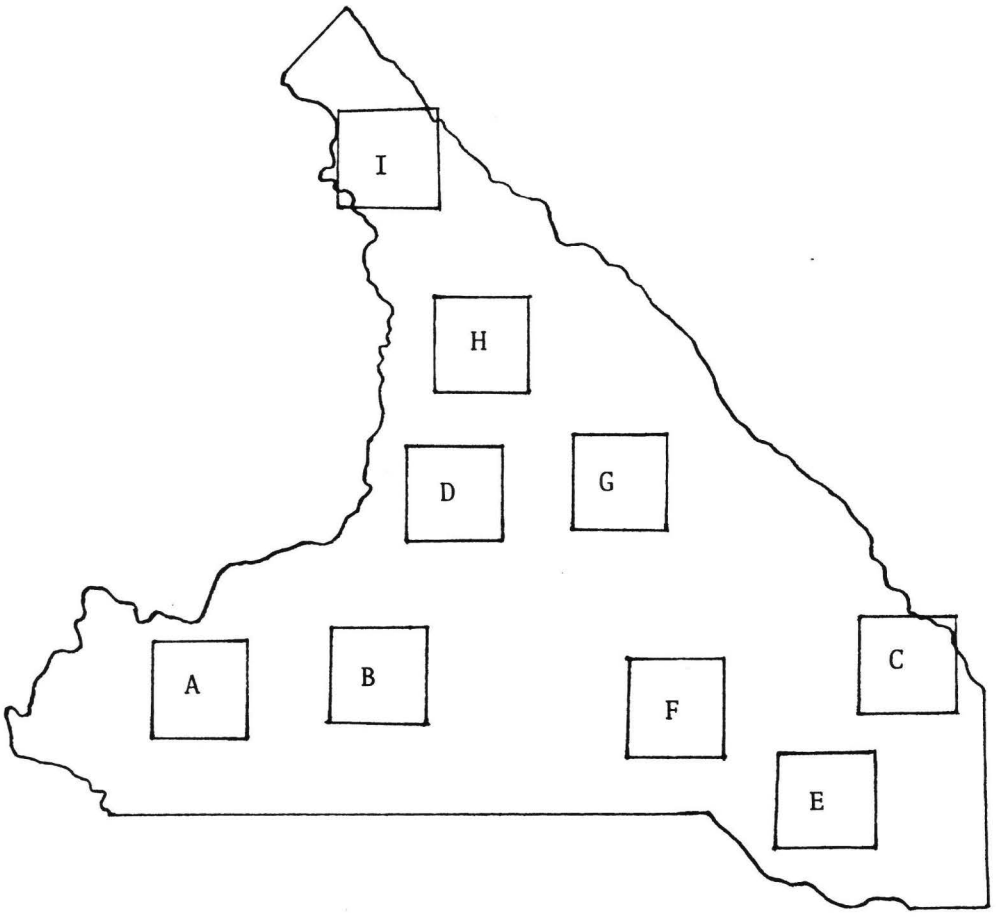

Figure 1.--Location of training blocks used to collect field data and develop training statistics for Landsat scene classification of the Tetlin National Wildlife Refuge.

Field data on vegetation cover, structure, and composition were collected in each training block to identify land cover types corresponding to computer-derived spectral classes. Final land cover classifications, designated by USFWS personnel, were produced after applying stratification techniques to improve classification accuracy. Land cover classifications were merged with digital terrain data derived from 1:250,000-scale USGS quadrangles to improve classification accuracy and to make possible the production of additional resource data products displaying topographic variables such as elevation, slope, and aspect, either singularly or in combination. The specific procedures used in producing land cover/terrain classifications and output products are detailed in Appendix A. A schematic diagram of the mapping process is shown in Figure 2.

USFWS personnel worked with EROS personnel to conduct the digital analysis required to produce land cover classifications for the refuge and coordinated with USFWS Information Resource Management personnel to ensure that the digital data were compatible with the USFWS geobased information system.

PRODUCTS

The following products were produced for the mapping project:

1) Land cover classifications of the refuge and surrounding areas. This included hard copy 1:250,000 photographic prints of the land cover.

2) Acreage estimates for each land cover type in the refuge for each 1:63,000-scale USGS quadrangle and for the refuge as a whole.

3) Computer tapes of all raw and registered Landsat scenes.

4) Computer tapes containing land cover and terrain data classifications.

5) Computer tapes of resampled land cover and terrain data.

6) Elevation, slope, and aspect maps in the form of photographic prints at a 1:250,000 scale.

7) This users guide.

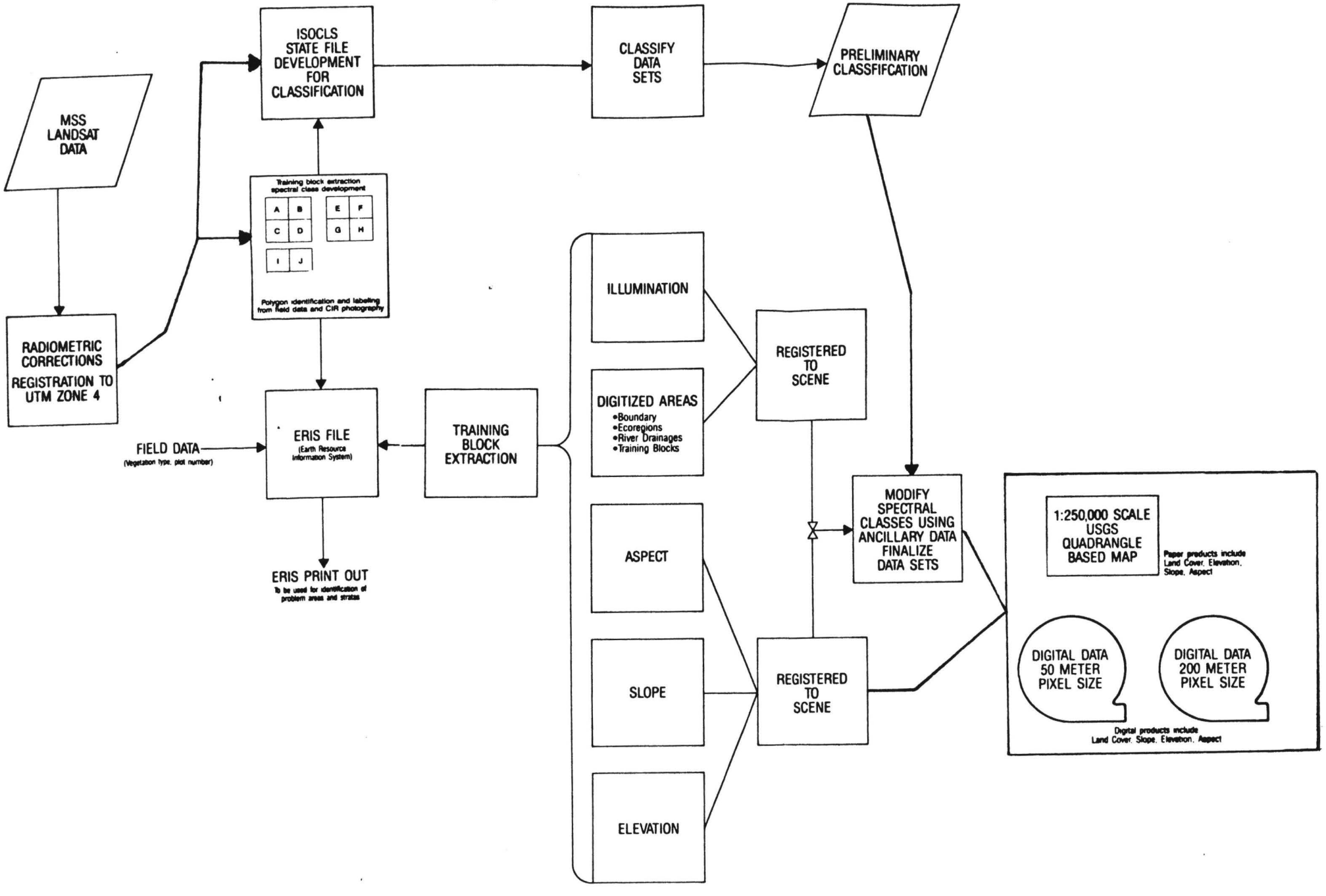

Figure 2.--Schematic diagram of the mapping process used to produce the land cover classification of the Tetlin National Wildlife Refuge.

PRODUCT DESCRIPTIONS-HARD COPY

LAND COVER CLASS DESCRIPTIONS

Based on information acquired in the field, discussions with USFWS personnel, and Landsat spectral discrimination, seven major land cover classes were recognized: Forest, Deciduous, Scrub, Dwarf Scrub, Herbaceous, Scarcely Vegetated, Water, and Snow. Included in these major classes are 19 subclasses (Table 1). A complete description of each of the major classes and subclasses can be found in Talbot et al. (1984).

Acreage estimates for each land cover class within the refuge were summarized and are listed in Table 2. Acreage estimates for each class summarized by 1:63,360 USGS quadrangle covering the TNWR are listed in Appendix B.

Final hard copy land cover maps were produced at a 1:250,000 scale in the form of a photographic print. Each map contained collar information which included: map title, a list of vegetation classes, locational diagram of the refuge with respect to the State, scale bar and latitude/longitude tick marks. Each land cover class was depicted on the map as a color. The color scheme used was based on input from USFWS and USGS/EROS personnel.

TERRAIN CLASS DESCRIPTIONS

Terrain class maps were produced from the elevation, slope, and aspect digital data and produced for the refuge. Elevation classes were broken into the following catagories (in meters): 489-548, 549-610, 611-731, 732-853, 854-975, 976-1066, 1067-1219, 1220-1371, 1372-1524, 1525-1676, 1677-1981, 1982-2255, 2256 and higher. Slope classes were broken into 0-2%, 3-5%, 6-10%, 11-15%, 16-25%, 26-40%, 41-70%, and 71% and higher. The aspect classes were broken into eight directions: north, northeast, east, southeast, south, southwest, west, northwest. All of the maps contained the water classes and the aspect map contained the 0-2% slope class. Collar information included: map title, scale, locational diagram, map legend, latitude/longitude, and tick marks.

OTHER PRODUCTS

Photographic products of the land cover and terrain maps may be purchased from USGS/EROS.

Table 1.--Land cover classes used for the Tetlin National Wildlife Refuge land cover map.

CLASS VALUE	CLASS DESCRIPTION
0, 1	Background
2	Closed Needleleaf Forest
3	Open Needleleaf Forest
4	Needleleaf Woodland
5	Mixed Forest
6	Deciduous Forest
7	Lowland Deciduous Scrub
8	Alpine and Subalpine Deciduous Scrub
9, 12	Graminoid Marsh/Alluvial Scrub
10	Prostrate Shrub Tundra
11, 21	Dwarf Shrub Graminoid Tussock Peatland
13	Clear Water
14	Shallow-Low Sedimented Water Aquatic Vegetation
15	Medium-High Sedimented Water
16	Barren Screes
17	Scarcely Vegetated Screes
18	Barren Floodplain
19	Scarcely Vegetated Floodplain
20	Snow
22	Northway Airport

Table 2.--Acreage estimates for each land cover class for the Tetlin National Wildlife Refuge.

	ACRES	PERCENT
Closed Needleleaf Forest	89799.7	9.70%
Open Needleleaf Forest	197923.5	21.39%
Needleleaf Woodland	264049.9	28.54%
Mixed Forest	31974.8	3.46%
Deciduous Forest	16186.3	1.75%
Lowland Deciduous Scrub	6199.9	0.67%
Alpine and Subalpine Deciduous Scrub	37029.4	4.00%
Graminoid Marsh/Alluvial Scrub	2934.6	0.32%
Prostrate Shrub Tundra	4380.2	0.47%
Dwarf Shrub Graminoid Tussock Peatland	190285.6	20.56%
Graminoid Marsh/Alluvial Scrub	12955.6	1.40%
Clear Water	28940.4	3.13%
Shallow Low Sedimented Water/Aquatic Veg.	8737.1	0.94%
Medium-High Sedimented Water	6403.0	0.69%
Barren Screes	11053.2	1.19%
Scarcely Vegetated Screes	3273.4	0.35%
Barren Floodplain	4606.8	0.50%
Scarcely Vegetated Floodplain	7831.3	0.85%
Snow	691.2	0.07%
Northway Airport	68.5	0.01%
TOTALS	925324.4	100.00%

PRODUCT DESCRIPTIONS-DIGITAL

GENERAL

Digital data are stored at USGS/EROS on CCT's in either an IDTRANS or TRANSFER format. Digital data stored in the IDTRANS format are used at USGS/EROS for internal processing. The TRANSFER format is usually used when data are shipped to other U.S. government agencies or the private sector. Images are generally written on a TRANSFER tape with one image line per record and one image per file. Images may be band-by-band or line-by-line. If the data format is floating point, either a Hewlett-Packard 3000 or IBM format may be specified. Data may be read onto the tape at either 1600 or 6250 bits/inch (bpi). All data relating to this project have been delivered to USFWS at 1600 bpi using the Hewlett-Packard 3000 floating point format.

An attempt was made to standardize the pixel size and UTM origins of the data. For this project the final data sets were produced at three different pixel sizes: 50X50 meter, 100X100 meter, and 200X200 meter. Pixel sizes were predetermined by the USFWS prior to the finalization of the land cover classification. All of the data which has been transfered to the USFWS covered under the Interagency Service Agreement is summarized in Appendix C. This summarization contains image name, data type, number of lines and samples, UTM origins, pixel size, and storage location at the EROS Field Office.

LAND COVER

The land cover images contain up to 19 different classes (Table 1). The data is byte data. The lowest class, 0, is a background or fill class. The class descriptions corresponding to each class number may be found in Talbot et al. 1984.

ELEVATION DATA

The digital elevation data were derived from digital terrain data created by the Defense Mapping Agency (DMA). The DMA generated the data by digitizing contour lines, spot elevations, and stream and ridge line data from the 1:250,000-scale USGS quadrangles. The contour intervals range from 50 to 200 feet. These data were then converted to a rectangular grid of values, producing elevation estimates spaced every 0.01 inches on each 1:250,000-scale map (approximately 200 feet on the ground). The data are integer data and can range in values from 0 to about 3000 meters. The data is recorded in one meter increments.

SLOPE DATA

The slope data were computed using the digital elevation data. Slope is computed as percent slope, i.e. units of rise per 100 units of run. The data is byte data and is recorded in one percent increments. Values can range from 0 to 255.

ASPECT DATA

The aspect data were computed using the digital elevation data. Aspect is computed clockwise from north in degrees. The data are byte data with values from 0 to 180: 0 and 180 = north, east = 45, south = 90, and west = 135. Values increase in two degree increments.

ACKNOWLEDGEMENTS

This project was funded by an interagency service agreement between the U.S. Fish and Wildlife Service and the U.S. Geological Survey/EROS Anchorage Field Office, contract number 14-16-0007-82-5092. Field and botanical assistance was provided by Steve Talbot and Mark Shasby. Appreciated are David Carneggie and Mark Shasby for their support and review of this report.

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ESL Incorporated, 1981. IDIMS Functional Guide, Technical Manual ESL-TM705. ESL Incorporated, Sunnyvale, California. Vol. I, 716 p., Vol. II, 319 p.

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Talbot, S. S., Markon, C. J., and Shasby, M. B., 1984, Landsat facilitated vegetation classification of Tetlin National Wildlife Refuge, Alaska, in Inventorying Forest and Other Vegetation of the High Latitude and High Altitude Regions, Fairbanks, Alaska, 1984, Proceedings: Washington, D.C., Society of American Foresters, p. 143-151.

APPENDIX A

PROCEDURES FOR LAND COVER CLASSIFICATION USING LANDSAT CCT'S

Preprocessing

1. Enter Landsat Data (CCT format) into IDIMS
2. Display and select Landsat subscenes
3. Perform radiometric corrections
    a. Destrip to correct for detector miscalibration
    b. Fix bad data lines
4. Perform geometric corrections
    a. Select control points from Landsat data and maps for image registration
    b. Digitize control points and map boundaries
    c. Generate transformations and rotate Landsat scenes
    d. Register Landsat image to 50 meter UTM grid
5. Produce strata mask for study areas
6. Digitize refuge boundaries
7. Mosaic and register DEM data

Image Training and Classification

1. Select training blocks for study area in each Landsat scene
2. Apply IDIMS clustering algorithm (ISOCLAS)
3. Produce statistics of the spectral classes within the training blocks
4. Produce photographic image of each Landsat training block and color coded cluster map
5. Prepare for field investigations
    a. Acquire aerial photographs of cluster blocks for annotation in field
    b. Develop strategy for aerial reconnaissance and on-the-ground investigations

APPENDIX A

6. Field verification

   a. Describe land cover type associated with each cluster class
   b. Collect auxiliary information when appropriate, e.g. wildlife habitat value, soils, quantitative plant description, etc.

7. Return to IDIMS and edit cluster statistics and pool and/or delete cluster classes

8. Produce preliminary classification based on edited cluster statistics

9. Evaluate preliminary classification based on edited cluster statistics

10. Post-classification refinement where necessary to improve classification accuracy. This step may be facilitated by several approaches, two of which are presented:

    a. Stratification based upon physiognomic, soil or other resource data

       (1) Digitize boundaries of strata
       (2) Produce and apply strata mask
       (3) Identify cluster classes for each strata
       (4) Combine classifications for all strata
       (5) Reclassify entire study area

    b. Merge DEM digital terrain data with Landsat data

       (1) Define control points for DEM
       (2) Generate transformation between latitude/longitude (DEM) and UTM grid
       (3) Register DEM to UTM grid
       (4) Generate slope and aspect data
       (5) Define strata based on combinations of elevation, slope, and aspect
       (6) Identify cluster classes within each strata

APPENDIX A

Generate Output Products

1. Generate digital tape file for classification of refuge (1:250,000 USGS quadrangles)

2. Generate digital tape files for classification of the refuge matching the 1:63,360-scale USGS quadrangles

3. Produce acreage estimate for refuge or units (quadrangles) within refuge area

4. Produce photographic prints for the final classification of the refuge area at a 1:250,000 scale

APPENDIX B

	NABESNA C-4		NABESNA C-3		NABESNA C-2		NABESNA C-1		NABESNA D-3	
	ACRES	PERCENT	ACRES	PERCENT	ACRES	PERCENT	ACRES	PERCENT	ACRES	PERCENT
CLOSED NEEDLELEAF FOREST	1687.0	2.3	10499.8	6.4	20013.8	11.9	26653.3	17.1	5181.6	8.7
OPEN NEEDLELEAF FOREST	2681.6	3.6	25786.6	15.8	43108.9	25.5	39081.8	25.1	14694.3	24.6
NEEDLELEAF WOODLAND	4169.1	5.6	45206.2	27.6	61365.2	36.4	40086.9	25.8	18462.6	30.9
MIXED FOREST	3551.4	4.8	12431.5	7.6	3562.5	2.1	6436.3	4.1	1373.2	2.3
DECIDUOUS FOREST	2747.1	3.7	5998.3	3.7	1178.0	0.7	3006.5	1.9	155.0	0.3
LOWLAND DECIDUOUS SCRUB	940.8	1.3	1595.6	1.0	428.7	0.3	315.6	0.2	101.9	0.2
ALPINE AND SUBALPINE DECIDUOUS SCRUB	31169.7	42.3	4136.4	2.5	84.6	0.1	89.5	0.1	42.6	0.1
GRAMINOID MARSH/ALLUVIAL SCRUB	35.8	0.0	620.2	0.4	98.8	0.1	116.1	0.1	680.1	1.1
PROSTRATE SHRUB TUNDRA	4356.9	5.9	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DWARF SHRUB GRAMINOID TUSSOCK PEATLAND	6078.0	8.3	44560.6	27.2	34134.3	20.2	32085.2	20.6	15401.0	25.8
GRAMINOID MARSH/ALLUVIAL SCRUB	156.9	0.2	690.6	0.4	447.2	0.3	843.8	0.5	543.6	0.9
CLEAR WATER	32.7	0.0	5379.9	3.3	3089.3	1.7	2243.0	1.4	415.7	0.7
SHALLOW LOW SEDIMENTED WATER/AQUATIC VEG.	11.7	0.0	581.3	0.4	693.1	0.4	576.3	0.4	753.0	1.3
MEDIUM-HIGH SEDIMENTED WATER	532.4	0.7	2387.5	1.4	74.7	0.0	1111.9	0.8	429.9	0.7
BARREN SCREES	10974.9	14.8	56.8	0.0	4.3	0.0	8.0	0.0	1.8	0.0
SCARCELY VEGETATED SCREES	3251.8	4.4	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BARREN FLOODPLAIN	252.0	0.4	1575.8	1.0	59.9	0.0	909.3	0.6	364.4	0.6
SCARCELY VEGETATED FLOODPLAIN	594.2	0.8	2117.6	1.3	431.1	0.3	1858.1	1.2	1053.2	1.8
SNOW	690.6	0.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTHWAY AIRPORT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	73914.6	100.0	163648.1	100.0	168774.4	100.0	155421.6	99.9	59653.9	100.0

APPENDIX B

	NABESNA D-2		NABESNA D-1		NABESNA B-2		NABESNA B-1		TANACROSS A-3		TANACROSS A-2	
	ACRES	PERCENT	ACRES	PERCENT	ACRES	PERCENT	ACRES	PERCENT	ACRES	PERCENT	ACRES	PERCENT
CLOSED NEEDLELEAF FOREST	15288.6	9.6	1007.5	3.8	0.6	14.3	3531.6	8.4	4507.7	7.8	1428.2	8.2
OPEN NEEDLELEAF FOREST	40120.2	25.1	3844.2	14.6	2.4	57.1	10967.5	25.8	13699.8	23.6	3936.2	22.6
NEEDLELEAF WOODLAND	49723.1	31.1	10181.1	38.8	1.2	28.6	13456.4	31.8	16598.9	28.7	4799.2	27.4
MIXED FOREST	693.1	0.4	194.5	0.7	0.0	0.0	3327.8	7.8	373.7	0.6	30.8	0.2
DECIDUOUS FOREST	1596.8	1.0	89.5	0.3	0.0	0.0	1291.7	3.0	67.9	0.1	55.5	0.3
LOWLAND DECIDUOUS SCRUB	1845.2	1.2	53.7	0.2	0.0	0.0	264.3	0.6	491.1	0.8	163.0	0.9
ALPINE AND SUBALPINE DECIDUOUS SCRUB	0.0	0.0	0.0	0.0	0.0	0.0	1506.6	3.5	0.0	0.0	0.0	0.0
GRAMINOID MARSH/ALLUVIAL SCRUB	1212.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	169.8	1.0
PROSTRATE SHRUB TUNDRA	1.8	0.0	0.0	0.0	0.0	0.0	12.9	0.0	0.0	0.0	0.0	0.0
DWARF SHRUB GRAMINOID TUSSOCK PEATLAND	27790.6	17.4	9651.0	36.8	0.0	0.0	6894.6	16.2	11124.3	19.2	2566.0	14.6
GRAMINOID MARSH/ALLUVIAL SCRUB	4290.8	2.6	173.5	0.7	0.0	0.0	24.7	0.1	4203.7	7.3	1580.8	9.0
CLEAR WATER	10989.1	6.9	331.7	1.3	0.0	0.0	1010.0	2.4	4099.3	7.1	1349.7	7.7
SHALLOW LOW SEDIMENTED WATER/AQUATIC VEG.	3610.1	2.3	155.0	0.6	0.0	0.0	174.8	0.4	1517.8	2.6	664.0	3.7
MEDIUM-HIGH SEDIMENTED WATER	1380.6	0.9	367.5	1.4	0.0	0.0	0.0	0.0	72.2	0.1	46.3	0.3
BARREN SCREES	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0
SCARCELY VEGETATED SCREES	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0
BARREN FLOODPLAIN	488.0	0.3	129.7	0.5	0.0	0.0	0.0	0.0	435.5	0.8	392.2	2.2
SCARCELY VEGETATED FLOODPLAIN	627.6	0.4	72.8	0.3	0.0	0.0	0.0	0.0	738.8	1.3	337.9	1.9
SNOW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTHWAY AIRPORT	68.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	159726.1	100.0	26251.7	100.0	4.2	100.0	42477.7	100.0	57932.5	100.0	17519.6	100.0

APPENDIX C

The following source data is relevant to all images listed below.

Coverage: Registered MSS data for TNWR

UTM Northing	= 7040000	Number of Lines	= 2800
UTM Easting	= 380000	Number of Samples	= 2600
UTM Zone	= 7	Pixel Size (in meters)	= 50
		Tape Format	= IDTRANS

TYPE OF IMAGE	DATA TYPE	EROS FIELD OFFICE TAPE LOCATION	FILE
Landcover	Byte	1008	11
Elevation	Integer		
Slope	Byte		
Aspect	Byte		

The following source data is relevant to all images listed below.

Coverage: Preliminary classification of TNWR

UTM Northing	= 7040000	Number of Lines	= 2800
UTM Easting	= 380000	Number of Samples	= 2600
UTM Zone	= 7	Pixel Size (in meters)	= 50
		Tape Format	= IDTRANS

TYPE OF IMAGE	DATA TYPE	EROS FIELD OFFICE TAPE LOCATION	FILE
Landcover	Byte	1010	6
Elevation	Integer		
Slope	Byte		
Aspect	Integer		

APPENDIX C

The following source data is relevant to all images listed below.

Coverage: Tetlin NWR

UTM Northing	= 7010250	Number of Lines	= 1800
UTM Easting	= 402850	Number of Samples	= 1946
UTM Zone	= 7	Pixel Size (in meters)	= 50
		Tape Format	= IDTRANS

TYPE OF IMAGE	DATA TYPE	EROS FIELD OFFICE TAPE LOCATION	FILE
Landcover	Byte	1003	1
Elevation	Integer	1003	3
Slope	Byte	1003	4
Aspect	Byte	1003	5
Refuge Mask	Byte	1003	2

The following source data is relevant to all images listed below.

Coverage: Tetlin NWR

UTM Northing	= 7010250	Number of Lines	= 354
UTM Easting	= 402850	Number of Samples	= 384
UTM Zone	= 7	Pixel Size (in meters)	= 254
		Tape Format	= IDTRANS

TYPE OF IMAGE	DATA TYPE	EROS FIELD OFFICE TAPE LOCATION	FILE
Landcover	Byte	1003	6
Elevation	Integer	1003	8
Slope	Byte	1003	10
Aspect	Byte	1003	9
Refuge Mask	Byte	1003	7

APPENDIX C

The following data files contain land cover classification and correspond to the USGS 15 minute (1:63,360 scale) topographic maps covering the TNWR. All of the data can be found on EROS Anchorage Field Office storage tape IDT 1006:

QUADRANGLE	FILE NO.
Tanacross A3	2
Tanacross A2	3
Nabesna D3	4
Nabesna D2	5
Nabesna D1	6
Nabesna C4	7
Nabesna C3	8
Nabesna C2	9
Nabesna C1	10
Nabesna B2	11
Nabesna B1	12