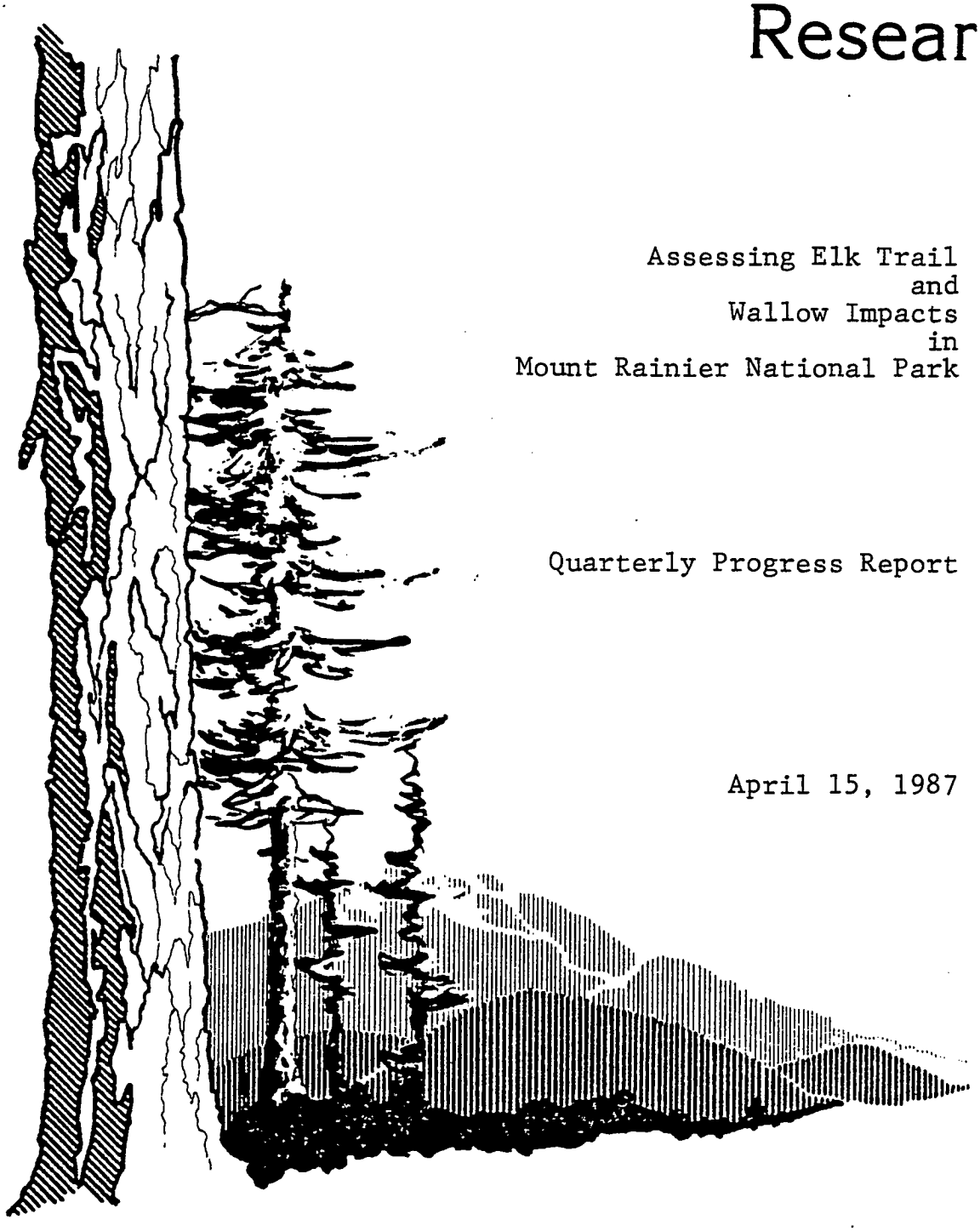
Sub. 16

Remote Sensing Research



Assessing Elk Trail
and
Wallow Impacts
in
Mount Rainier National Park

Quarterly Progress Report

April 15, 1987

Environmental Remote Sensing
Applications Laboratory – ERSAL
OREGON STATE UNIVERSITY

ASSESSING ELK TRAIL AND WALLOW IMPACTS IN MOUNT RAINIER NATIONAL PARK

Quarterly Progress Report
for the periods
October 1 through December 31, 1986
and
January 1 through March 31, 1987

Submitted to

National Park Service
Pacific Northwest Region

By
Environmental Remote Sensing
Applications Laboratory (ERSAL)
Oregon State University

April 15, 1987

ASSESSING ELK TRAIL AND WALLOW IMPACTS IN MOUNT RAINIER NATIONAL PARK

INVESTIGATORS

William Ripple, Principal Investigator
Barry Schrumpf, Co-Principal Investigator
Edward Starkey, Co-Principal Investigator

SUMMARY OF OVERALL PROGRESS

Work continued on a remote sensing system to monitor trails caused by elk in Mount Rainier National Park. The following is a summary of progress from October 1, 1986 through March 31, 1987. The activity in these quarterly periods involved: 1) the establishment of baseline data on elk trails in permanent photo-plots on 1985 and 1986 aerial photography, and 2) accuracy assessment for the Fremont Lookout North photo-plot site.

Permanent Photo Plots

Additional baseline data on elk trails were established for ten photo-plots on the 1986 aerial photography and six corresponding photo-plots on the 1985 aerial photography. These square photo-plots were selected by Mount Rainier National Park staff to serve as permanent sites for the elk trail monitoring system. Table 1 shows the 1986 and 1985 photography frame numbers

associated with these selected sites. Six of the sites have photographic coverage from both years. Only sites that appeared to have favorable elk habitat and relatively free from large areas of closed forest canopy were chosen. Sites near the edges of photographs were avoided because of radial displacement problems associated with photographic edges.

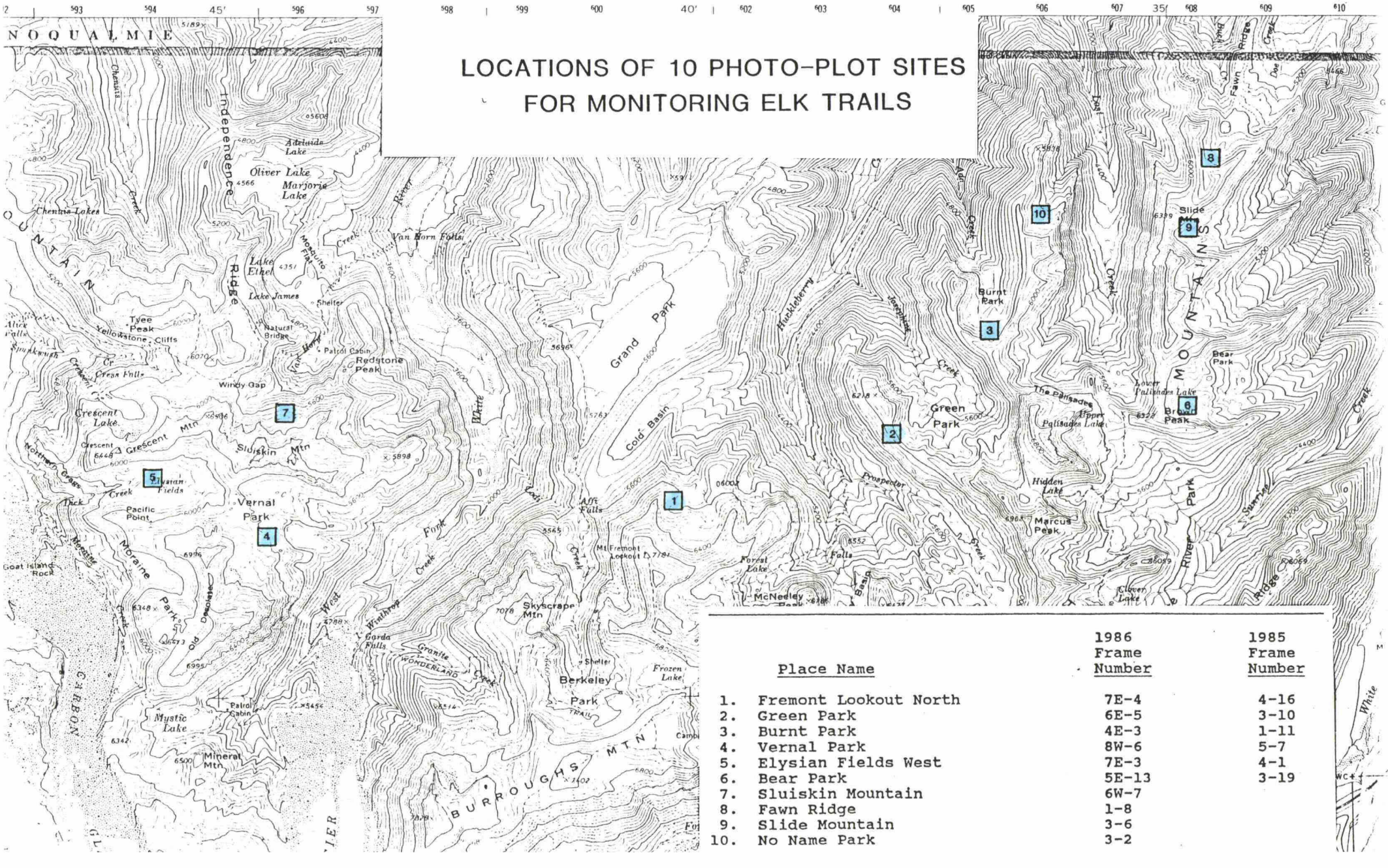
	Place Name	1986 Frame Number	1985 Frame Number
1.	Fremont Lookout North	7E-4	4-16
2.	Green Park	6E-5	3-10
3.	Burnt Park	4E-3	1-11
4.	Vernal Park	8W-6	5-7
5.	Elysian Fields West	7E-3	4-1
6.	Bear Park	5E-13	3-19
7.	Sluiskin Mountain	6W-7	
8.	Fawn Ridge	1-8	
9.	Slide Mountain	3-6	
10.	No Name Park	3-2	

Table 1. Locations and frame numbers associated with the photo-plot sampling sites selected by Mount Rainier National Park Staff.

Figure 1 shows the locations of the ten permanent photo-plots, and Appendix 1 contains figures showing the trails delineated for each photo-plot. From August 1985 to August 1986 there appeared to be no detectable increase in elk trails in the Bear Park plot. The Elysian Fields West plot also had no detectable increase and appeared to be free from trails during both years. The interpretation results for Green, Burnt, and Vernal Park plots show slight increases in the extent of elk trails from

MT. RAINIER NATIONAL PARK

Figure 1.



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6.	Bear Park	5E-13	3-19
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8.	Fawn Ridge	1-8	
9.	Slide Mountain	3-6	
10.	No Name Park	3-2	

1985 to 1986. There appeared to be a significant one year increase in elk trails for the Fremont Lookout North plot. It should be noted that a portion of the trail differences on these sets of aerial photographs could be the result of differences in photo quality, distance from the photo centers, and plant phenological stages.

Fremont Lookout North Ground Truth and Accuracy Assessment

Field work for ground data collection was conducted in September, 1986 at the Fremont Lookout North photo-plot. An overlay of delineated elk trails was produced and removed from the photograph before the field trip. The field method involved a complete canvassing of the entire Fremont Lookout North photo-plot. Each trail that was discovered was delineated on the photo enlargement. Oblique 35mm photographs were acquired for each trail. Trail width measurements were taken at points five meters from the ends of each trail and at the approximate midway point between the ends of each trail. The line intercept method was used to record the extent of any vegetation that intercepted the tape measure as it lay across each trail.

The results of the trail measurements are shown in Appendix II for each trail arc in the Fremont Lookout North photo-plot. The average trail width was found to be 55.8cm with an average vegetation intercept width of 10.4cm. The overall average vegetation width (intercept) determined from a previous study of

five elk trail enumeration areas was 4.0cm (Ripple, et al., 1986). The greater amount of vegetation on the Fremont Lookout North trails indicates that these trails may be recent features. This also supports the evidence provided by the differences in apparent trails on the 1985 and the 1986 aerial photography.

An accuracy assessment was conducted by comparing results of laboratory mapping to the results of field mapping at the Fremont Lookout North plot. Seventy-six percent (76%) of the trails were interpreted correctly, with a 12% commission error and a 12% omission error. It was discovered that the commission was caused by interpreting decayed logs as trails, and the omissions were a result of little contrast between vegetation and elk trails on xeric sites.

Transfer of Results to Rainier Park

Completed results from the 1985 elk trail enumerations including original aerial photographs were sent to Mount Rainier National Park on March 31, 1987. See Appendix III for a copy of the correspondence.

Photo Index Maps

Photo index maps were constructed for the 1985 and 1986 flights over Mount Rainier National Park. Copies of these maps are shown in Appendix IV.

WORK FOR SUCCEEDING QUARTERLY PERIOD

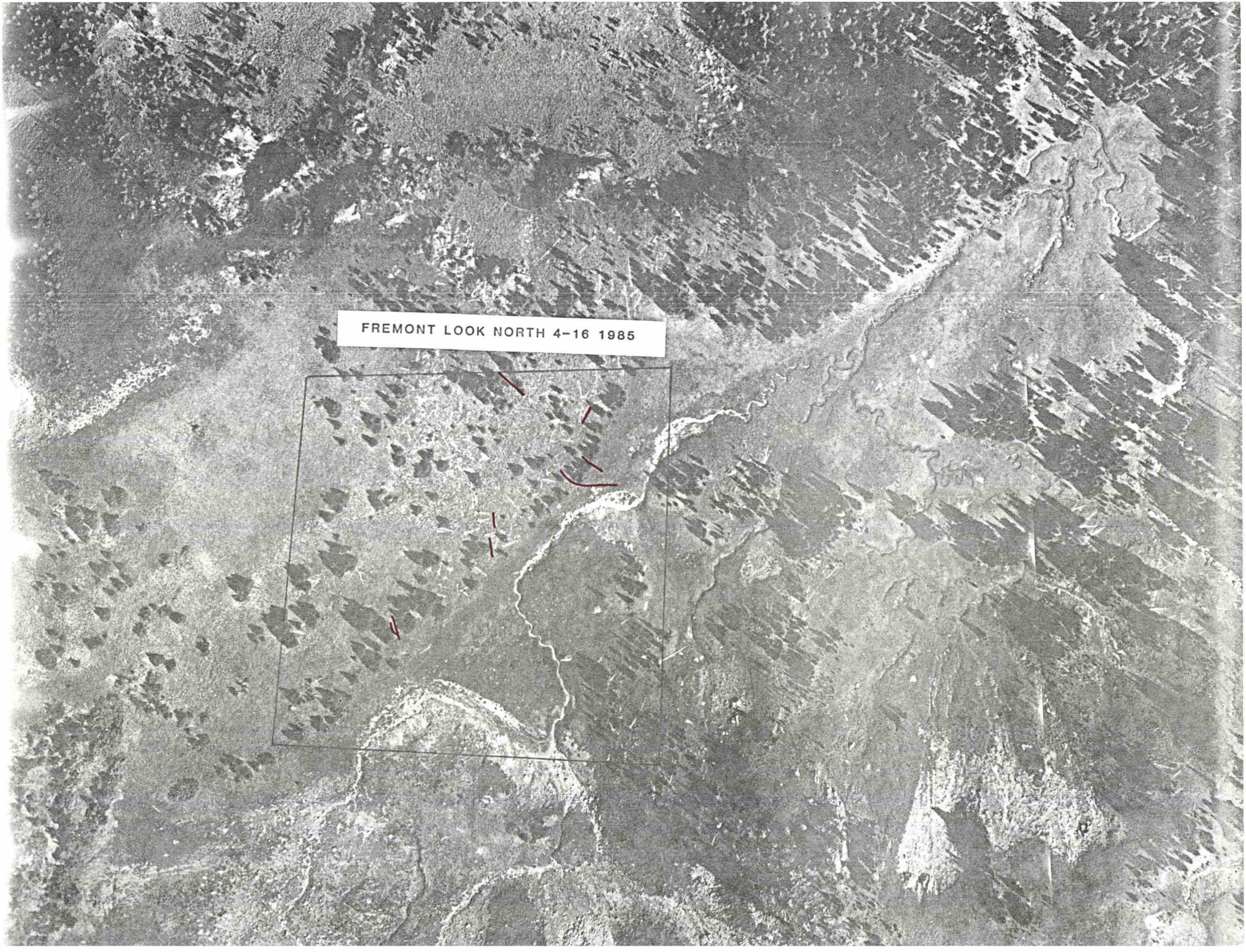
1) Compile data listing the visible presence and absence of elk trails for each of the 174 photo frames.
2) Establish specifications and plans for the acquisition of aerial photography over Mount Rainier National Park during the summer of 1987.
3) Produce a document which describes the first two years of activities for assessing elk trail and wallow impacts in Mount Rainier National Park.

REFERENCES

Ripple, W.J., B.J. Schrumpf, and E.E. Starkey. 1986. Assessing Elk Trails and Wallow Impacts in Mount Rainier National Park: First Year Activities Final Report. Environmental Remote Sensing Applications Laboratory, Oregon State University.

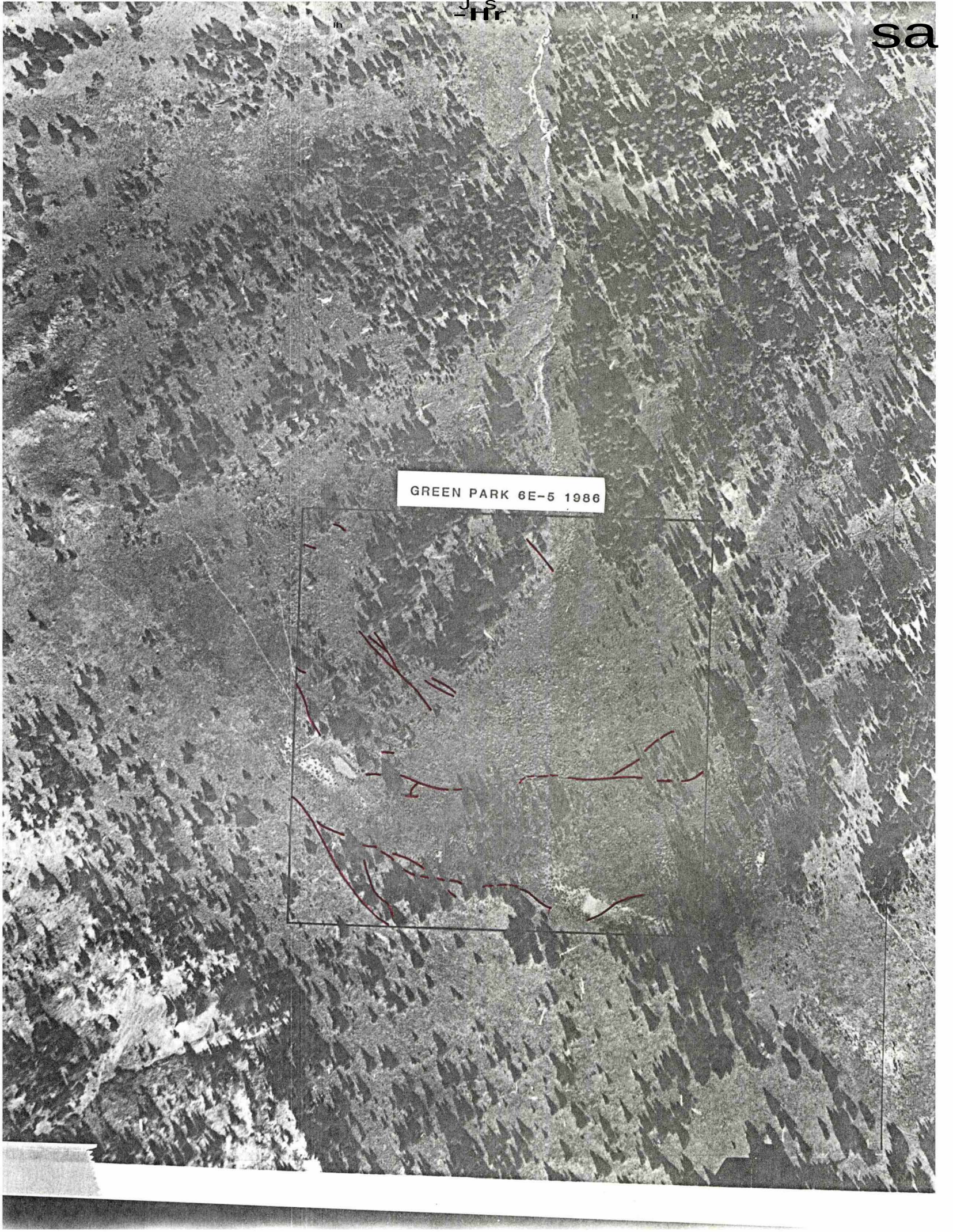
APPENDIX I

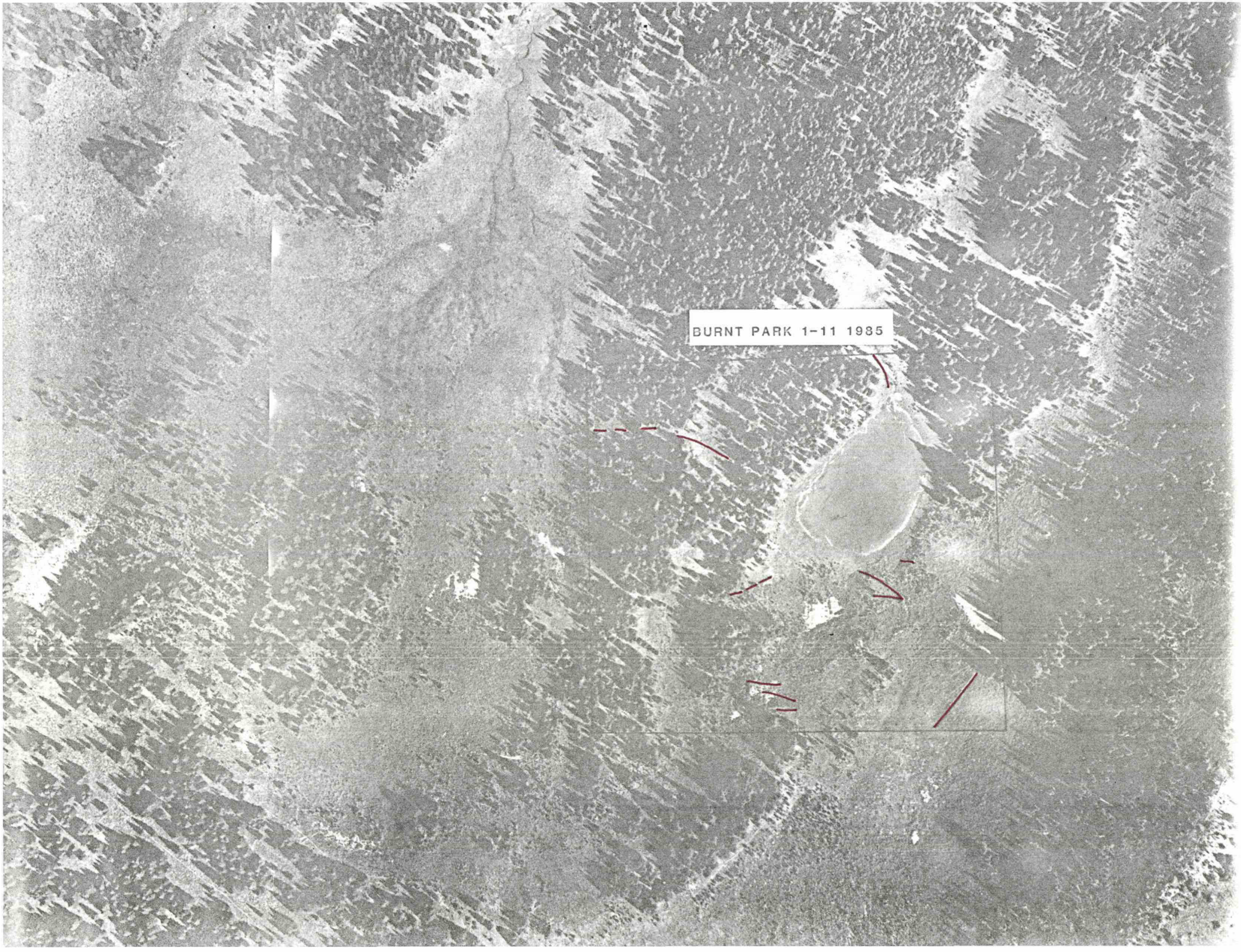
Photo-Plots Associated With
Ten Sites
for Monitoring Elk Trails

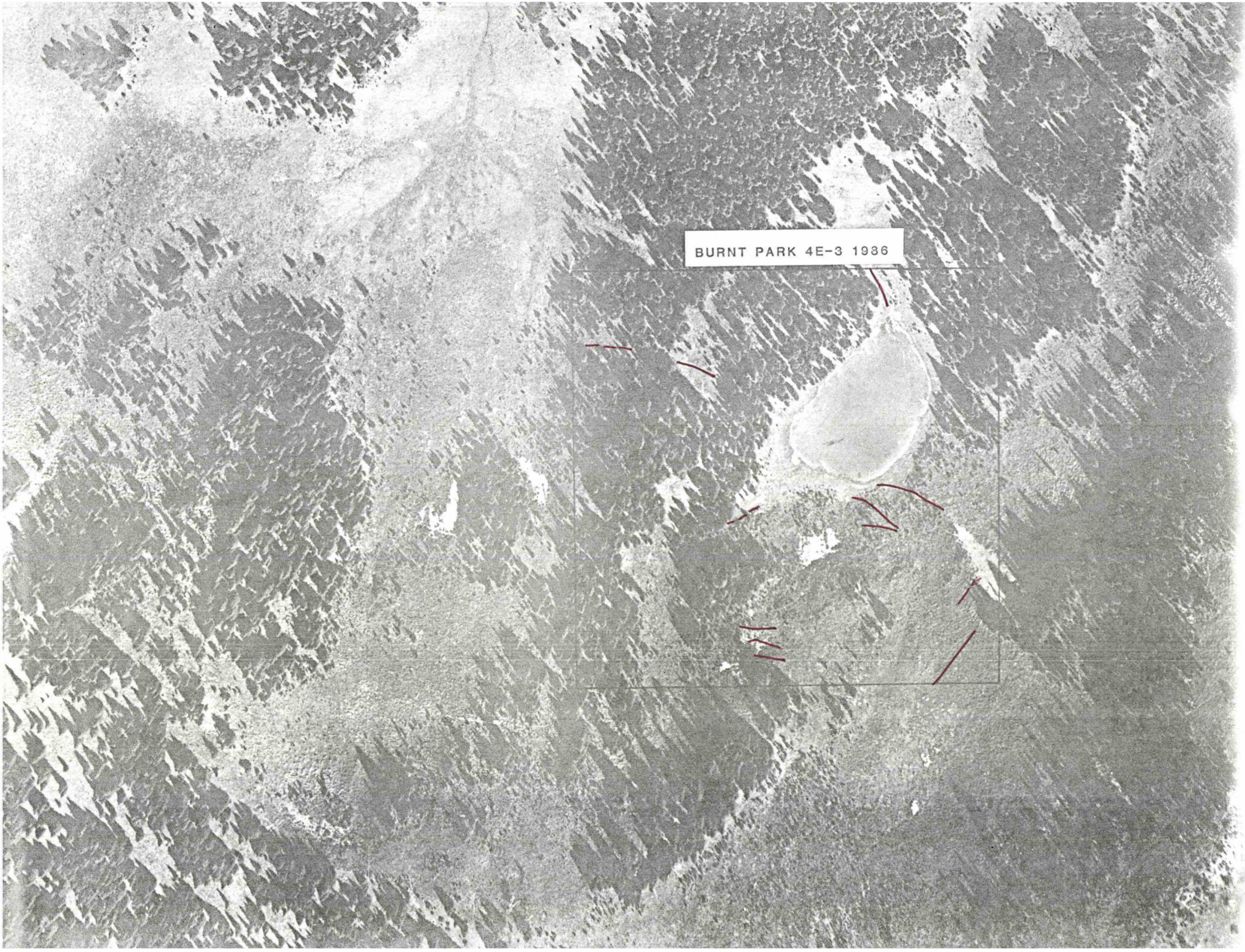

FREMONT LOOK NORTH 4-16 1985

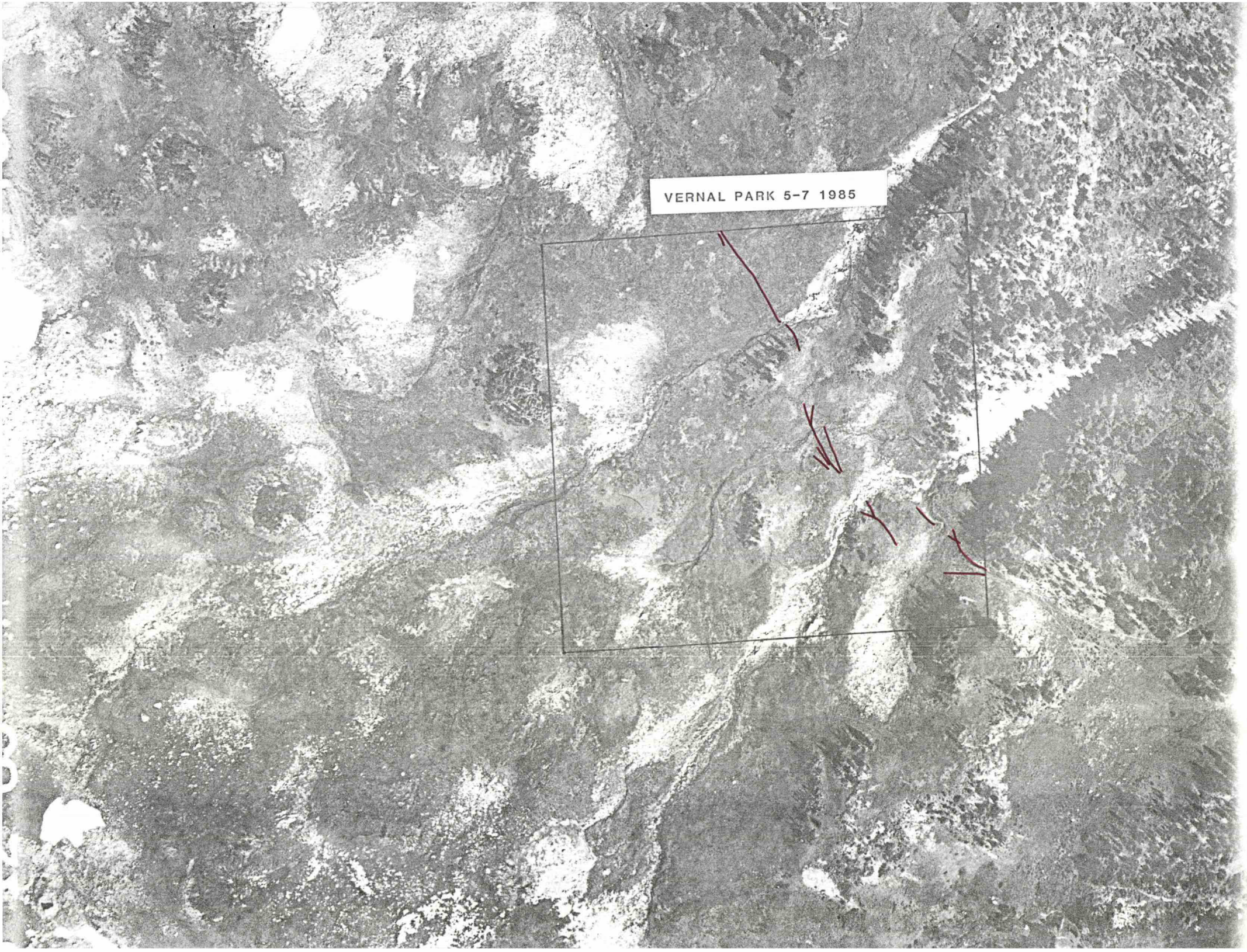

FREMONT LOOKOUT NORTH 7E-4 1986
1
2
3
4
5
6
7
8
9
10
11
12
13
14

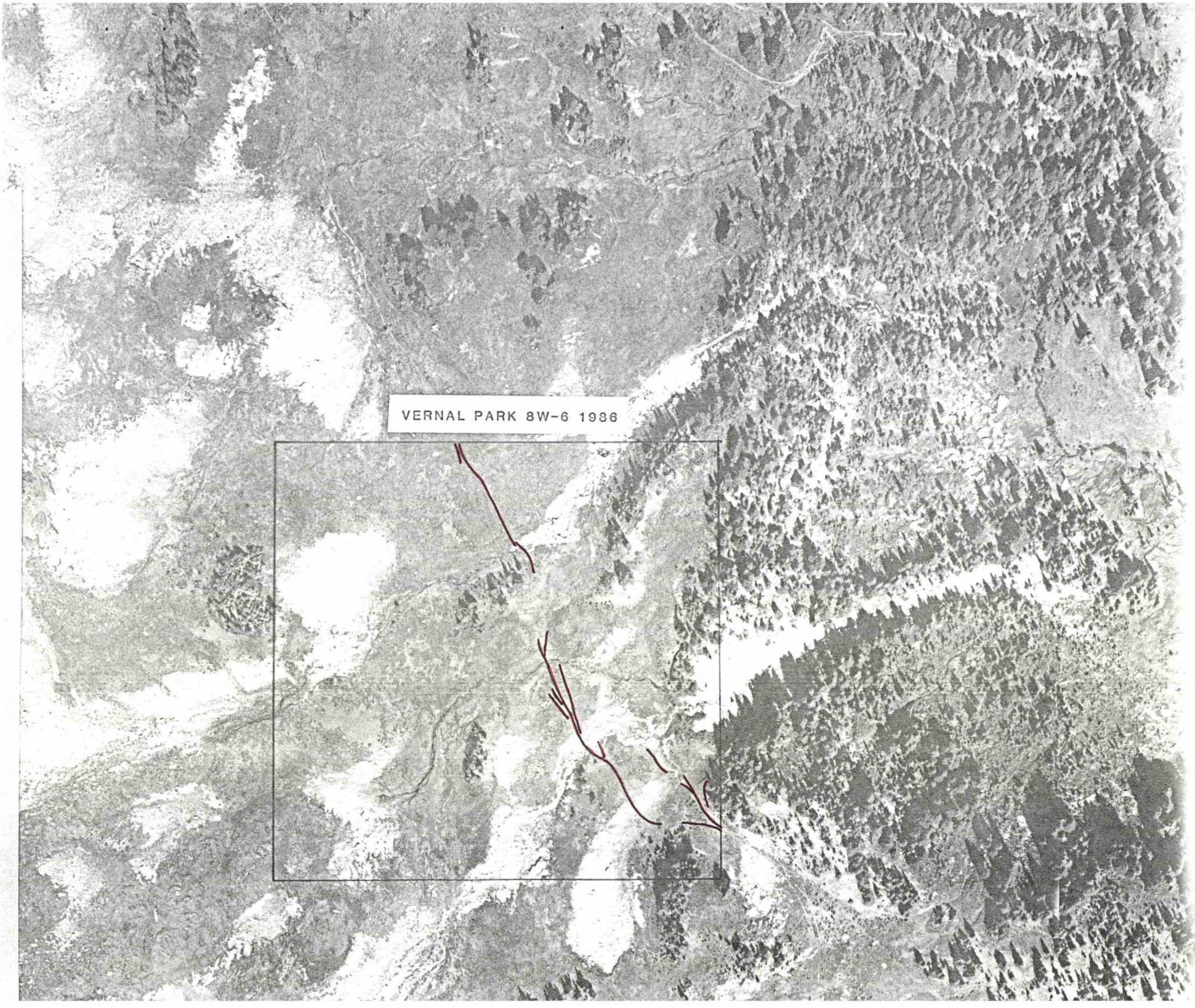

GREEN PARK 3-10 1985

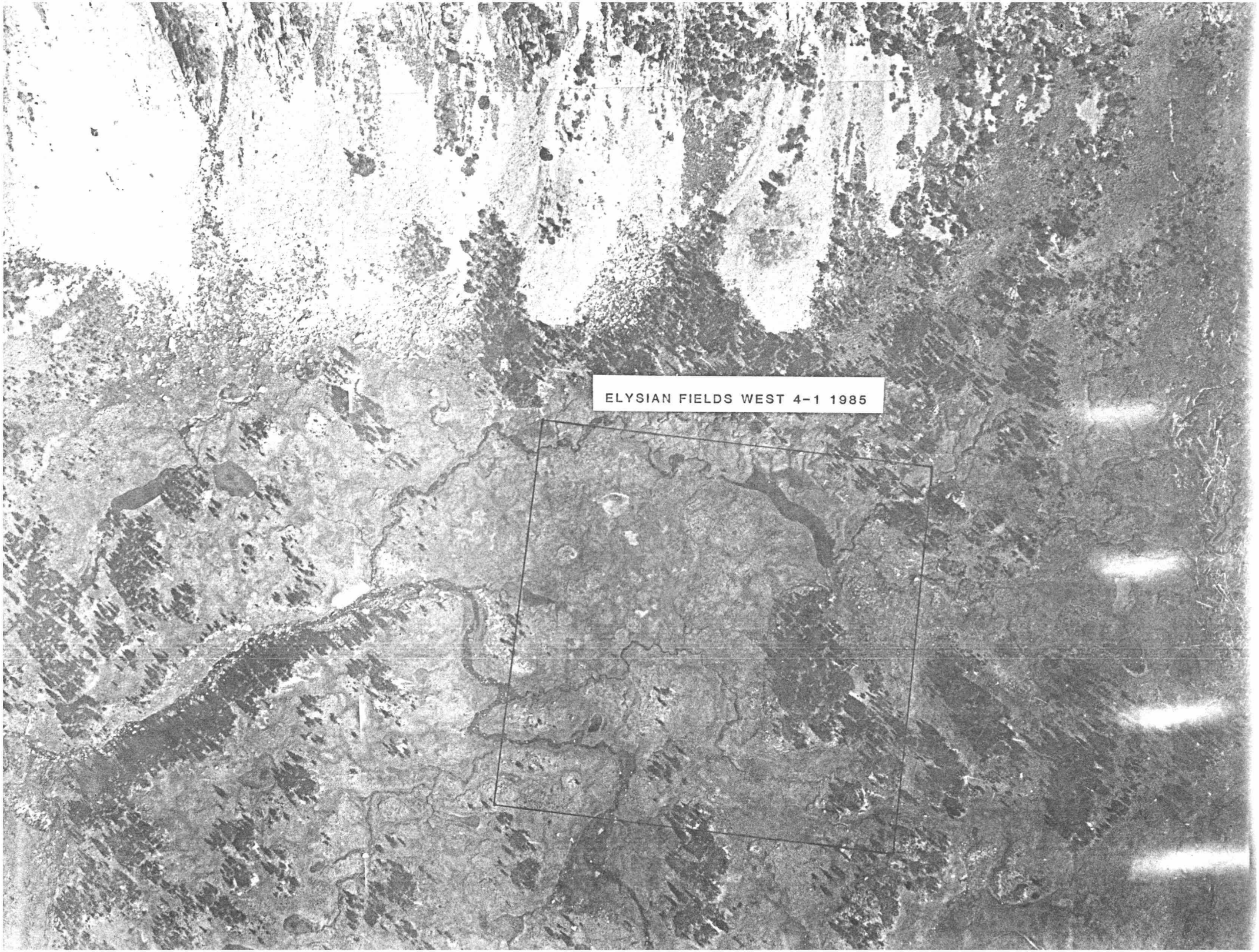

GREEN PARK 6E-5 1986

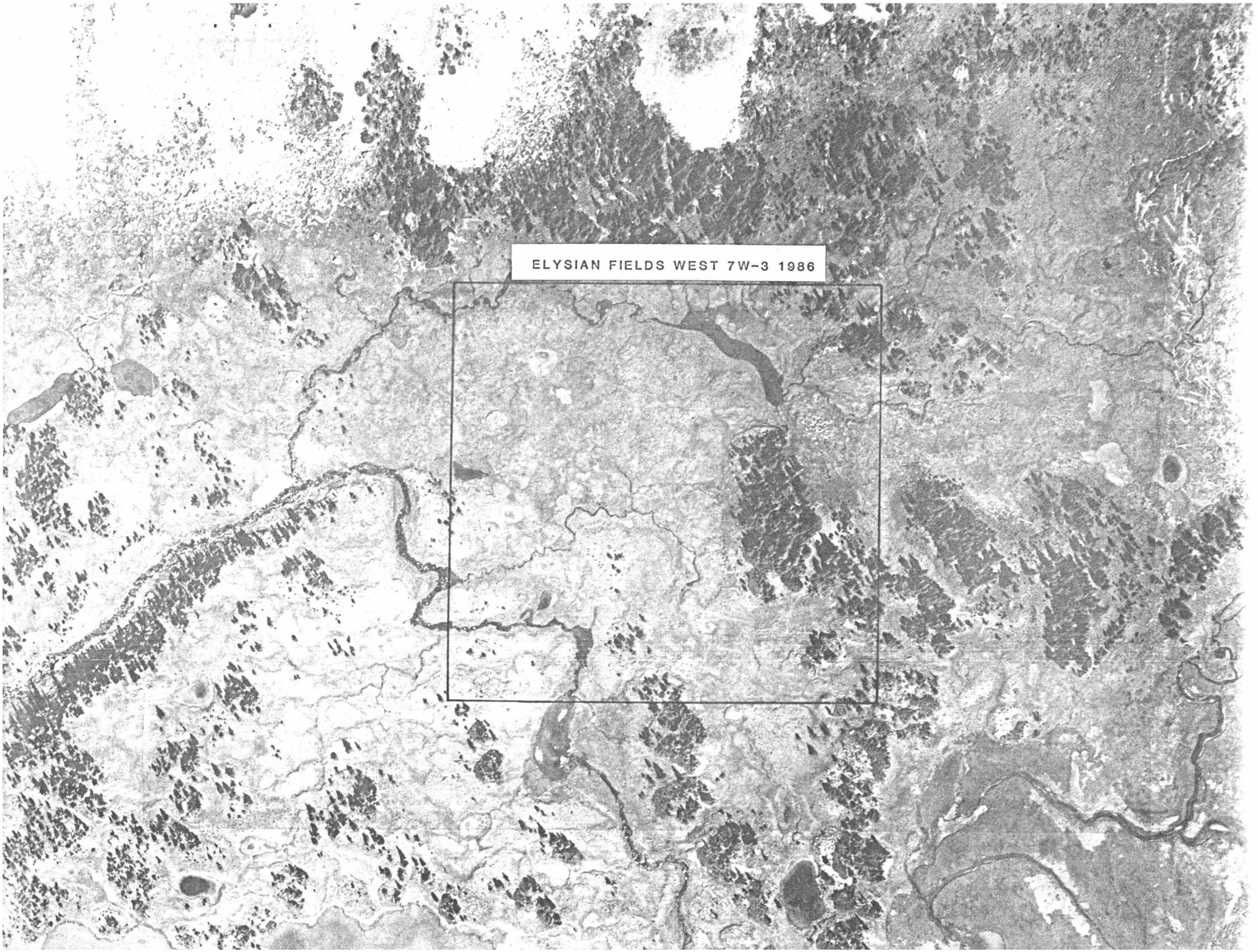

BURNT PARK 1-11 1985

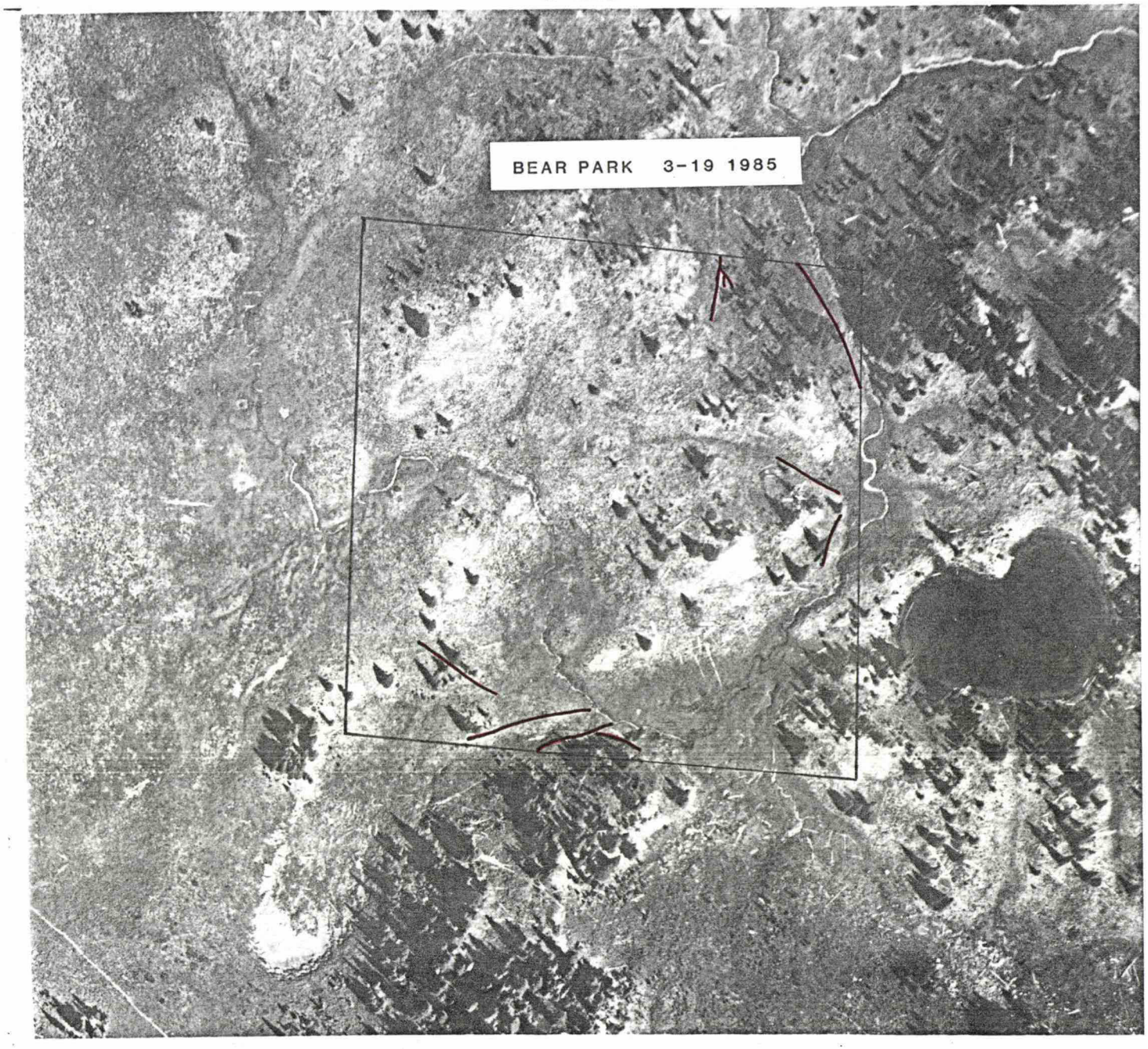

BURNT PARK 4E-3 1936


VERNAL PARK 5-7 1985

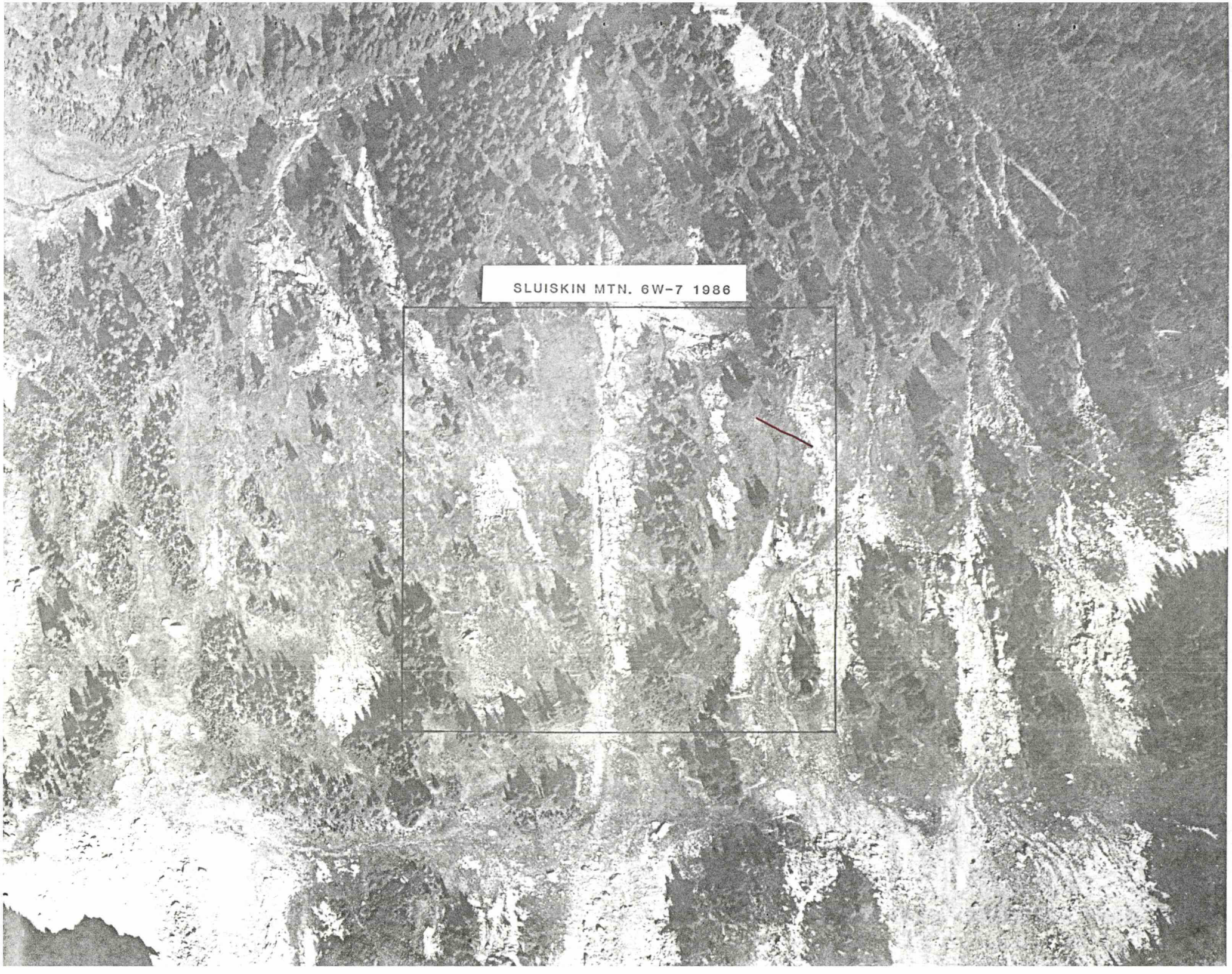

VERNAL PARK 8W-6 1986


ELYSIAN FIELDS WEST 4-1 1985

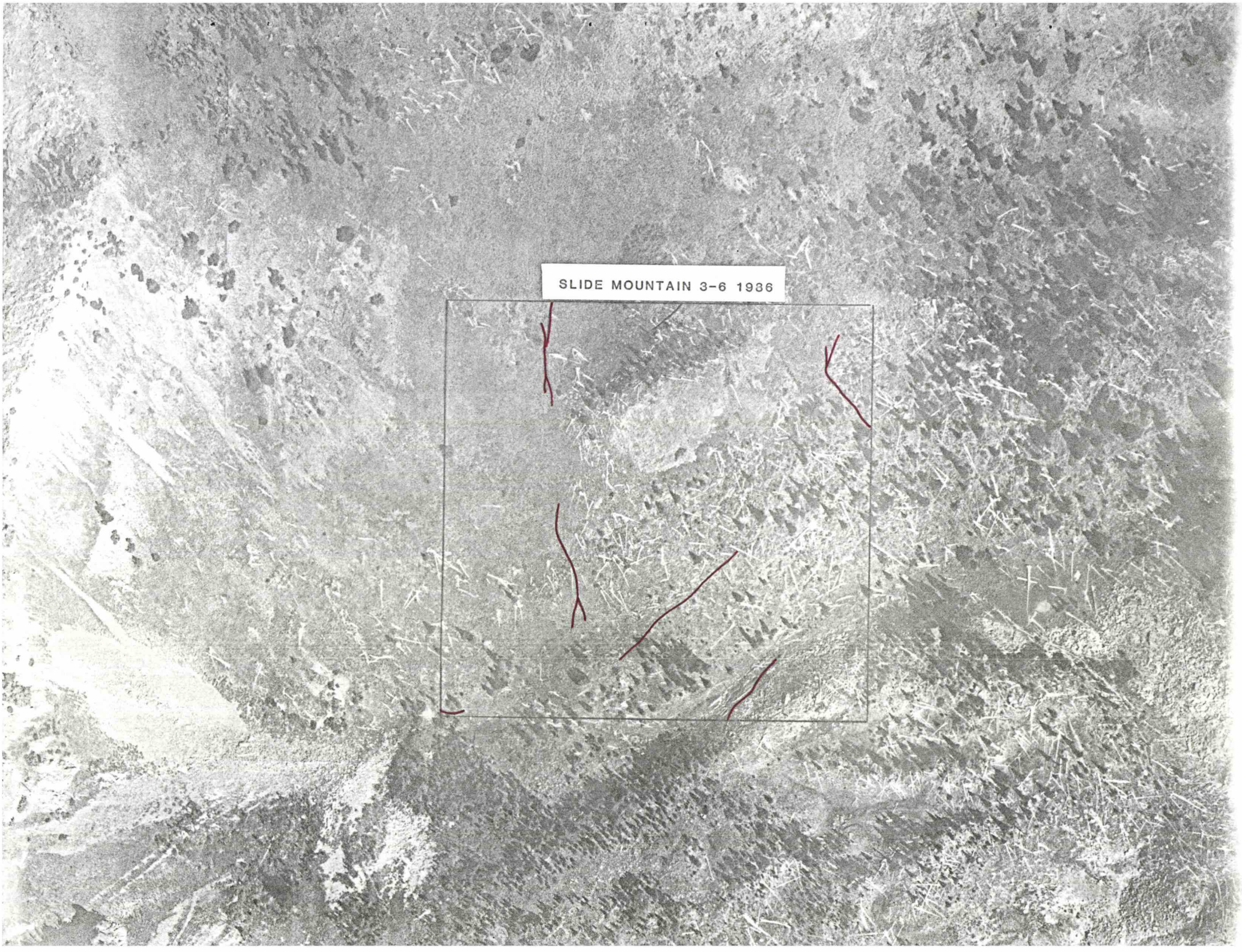

ELYSIAN FIELDS WEST 7W-3 1986


BEAR PARK 3-19 1985


BEAR PARK SE-13 1986


SLUISKIN MTN. 6W-7 1986


FAWN RIDGE 1-8 1986


SLIDE MOUNTAIN 3-6 1936

APPENDIX II

Trail and Vegetation Widths

for

Fremont Lookout North Plot

1986

FREMONT LOOKOUT NORTH 1986

Arc	Observation	Trail Width (cm)	Vegetation Width (cm)	Photo
1	a	85	3	#23
	b	75	5	Looking northwest
	c	60	4	
	$\bar{x}$	73.3	4.0	
2	a	63	2	#24
	b	63	0	Looking northwest
	c	59	6	
	$\bar{x}$	61.7	2.7	
3	a	49	6	#1
	b	60	4	Looking north-northwest
	c	70	0	
	$\bar{x}$	59.7	3.3	
4	a	34	20	#3
	b	38	18	Looking north
	c	49	23	
	$\bar{x}$	40.3	20.3	
5	a	70	2	#4 looking north-northwest
	b	71	14	#5 looking north-northwest
	c	35	25	#6 looking west
	$\bar{x}$	58.7	13.7	
6	a	50	7	#8 looking south
	b	48	10	
	c	38	18	#9 looking south
	$\bar{x}$	45.3	11.7	
7	a	55	18	#10
	b	73	3	Looking north
	c	69	4	
	$\bar{x}$	65.7	8.3	
8	a	65	8	#12
	b	80	2	Looking south
	c	78	0	
	$\bar{x}$	74.3	3.3	
9	a	42	3	#13
	b	53	12	Looking north
	c	50	9	
	$\bar{x}$	48.3	8.0	
10	a	44	21	#14
	b	60	12	Looking north
	c	39	21	
	$\bar{x}$	47.7	18.0	
11	a	50	25	#15
	b	40	30	Looking southwest
	c	55	28	
	$\bar{x}$	48.3	27.7	
12	a	60	2	#16
	b	50	15	Looking north
	c	53	5	
	$\bar{x}$	54.3	7.3	
13	a	43	3	#17
	b	54	10	Looking north
	c	48	8	
	$\bar{x}$	48.3	7.0	
14	No measurements due to snow storm			

Average trail width 55.8cm

Average vegetation width 10.4cm

APPENDIX III

Project Correspondence

Environmental Remote Sensing Applications Laboratory (ERSAL)

Oregon State University

Corvallis, Oregon 97331-6703 (503) 754-3056

31 March 1987

Mr. Bob Dunnagan
Mr. Stan Schlegal
Mt. Rainier National Park
Tahoma Woods, Star Route
Ashford, WA 98304

Dear Bob and Stan;

Under separate cover I am sending some of the completed results from the 1985-1986 remote sensing of elk impact activities. You will find original color photographs with the five elk trail enumeration areas outlined on acetate overlays. These areas, with their spatial extent of soil exposed by elk trails, include Upper Huckleberry Basin (0m/km^2), Sunrise Lake (1,568m/km^2), Bear Park (6,575m/km^2), Clover Lake (13,007m/km^2), and Lower Huckleberry Basin (14,502m/km^2). These quantitative estimates apply only to the areas outlined on the photographs. These enumeration areas should provide you with permanent baseline elk impact data. Please store these photographs in your archives, along with the enclosed report, which describes trail characteristics for each elk trail enumerated.

Also enclosed, please find the following enlarged prints from the 1985 aerial survey: Fremont Lookoet (5-17), Cold Basin (3-2), Fremont Lookout East (5-19), and Elysian Fields East (4-3).

Stan, I suggest that you try delineating elk trails on these enlargements. I think the Elysian Fields East and Fremont Lookout East photographs would be the most appropriate for delineating elk trails.

Please feel free to contact me if I can provide you with any additional information at this time.

Sincerely,

Bill

William Ripple
Research Associate

WJR/vd
Encs.

cc: Ed Starkey
Barry Schrumpf

APPENDIX IV

Photo Index Maps

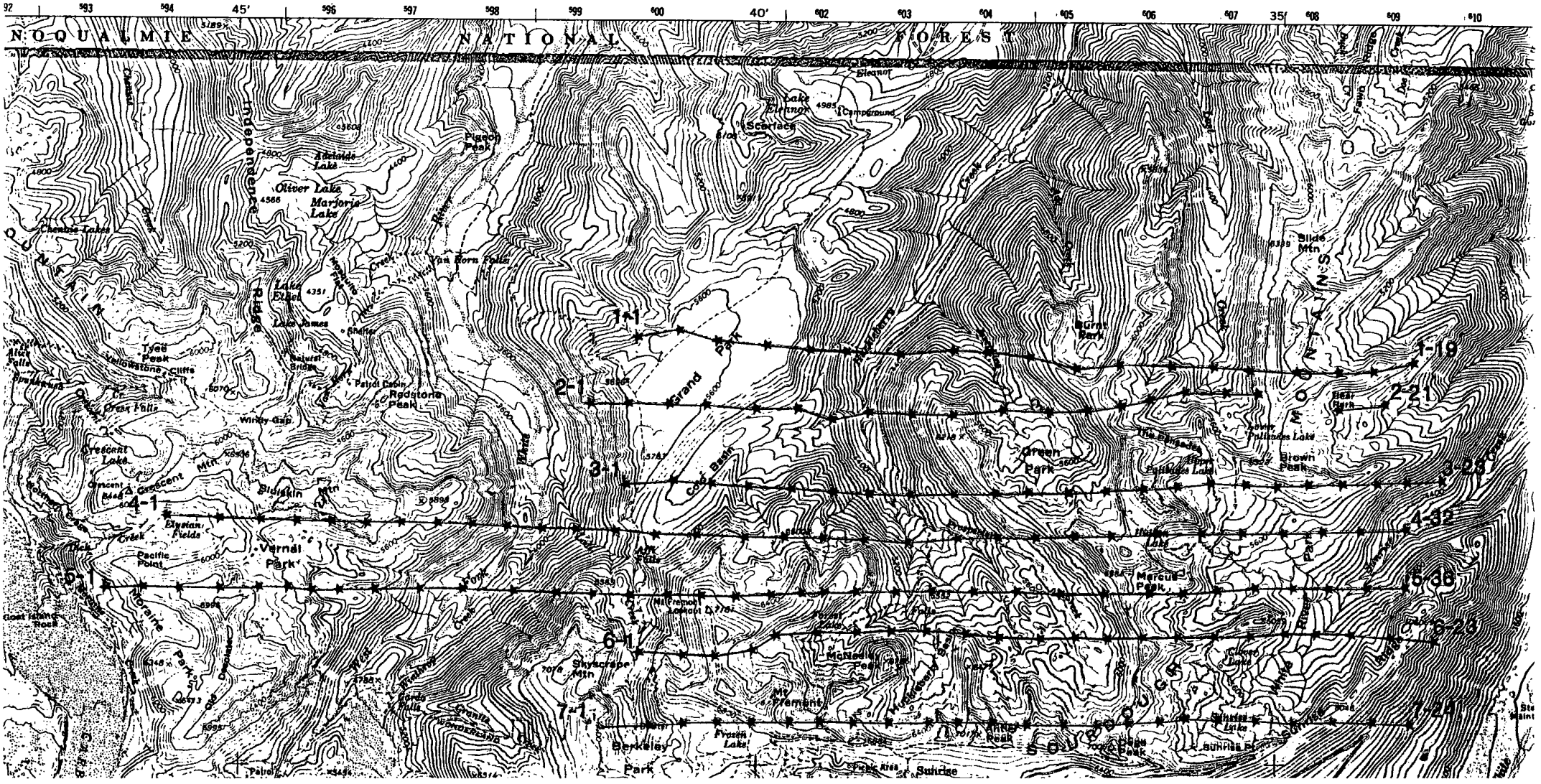
for

1985 and 1986 Flights

ELK IMPACTS STUDY

AUGUST 6 & 12, 1985 AERIAL PHOTOGRAPHY

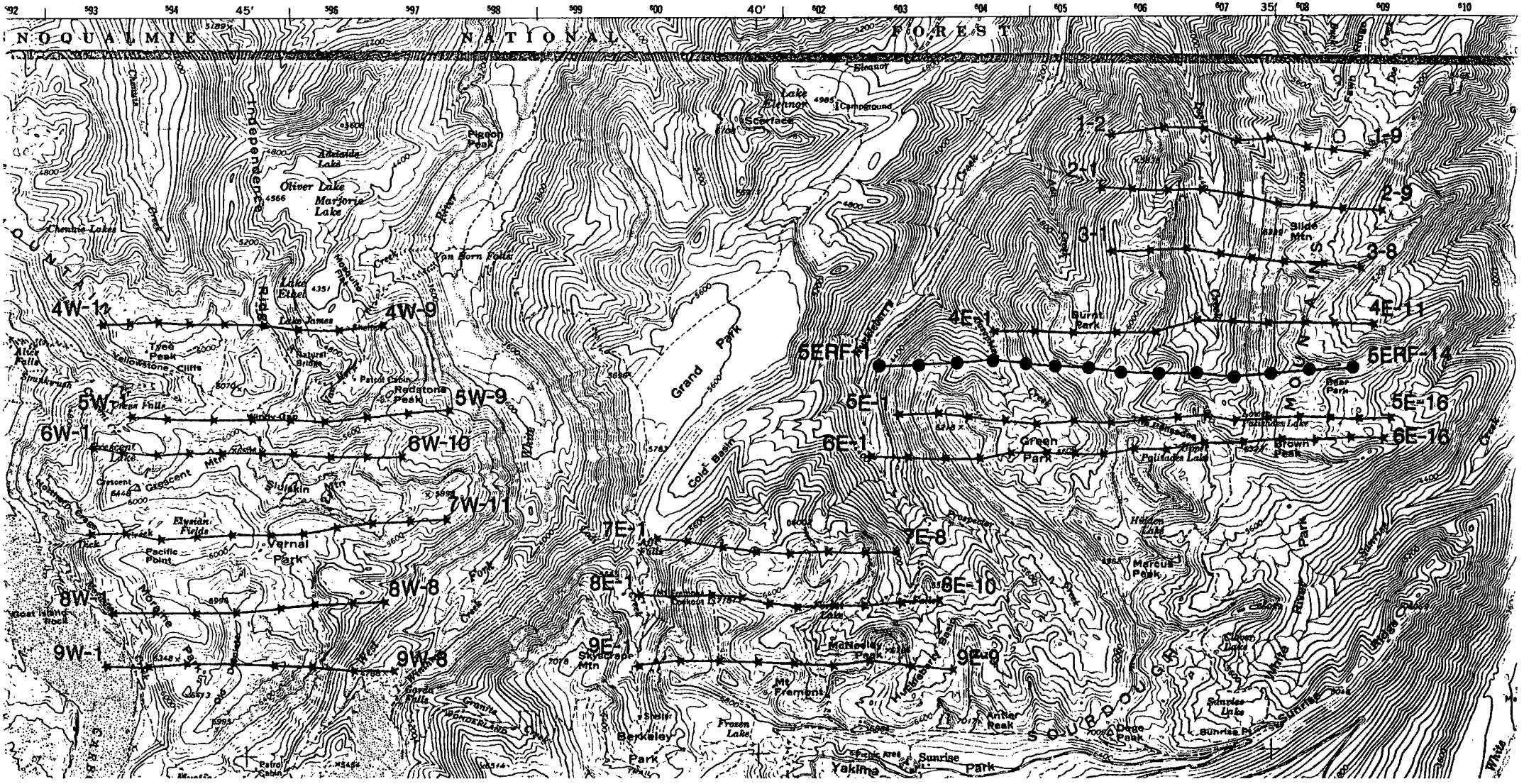
MT. RAINIER NATIONAL PARK

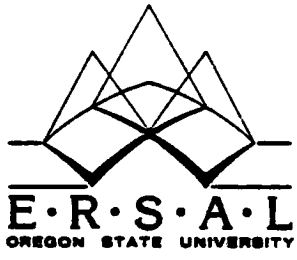


ELK IMPACTS STUDY

AUGUST 14 & SEPTEMBER 9, 1986 AERIAL PHOTOGRAPHY

MT. RAINIER NATIONAL PARK





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Oregon State University
Corvallis, OR 97331-6703

NPS 4/87