

# MONITORING ELK IMPACTS IN THE SUBALPINE OF MOUNT RAINIER NATIONAL PARK

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## INTRODUCTION

There is concern that the apparent population growth of Mount Rainier's north elk herd may be subjecting several Park ecosystems to overuse, damage, and substantial alteration. The purpose of this project is to develop a system to inventory and monitor trails and wallows caused by elk in the northeastern part of Mount Rainier National Park. One objective of this project is to determine if trail and wallow impacts to vegetation and soils can be documented as elk impacts, using remote sensing and other analytical techniques. The task of establishing an inventory and monitoring system was started in August 1985. Two approaches have been initiated: 1) complete enumeration of elk trails conducted in the field for forested areas with the aid of topographic maps and resource aerial photographs, and 2) mapping of trails and wallows in non-forested areas from large scale aerial photographs conducted in the laboratory and field checked for accuracy.

### Field Enumeration and Mapping

Methods were developed to map and quantify elk trail impacts in areas covered partially by forest canopies. This elk trail enumeration and mapping are sensitive to both the number and location of trails. This procedure identifies elk trails and provides statistics showing the areal extent of vegetation loss to elk trails.

The methods involved enlarging Park resource aerial photography from a scale of 1:24,000 to a scale of 1:6,000. Topographic contour lines and stream locations were transferred from 7.5 feet topographic quadrangles to clear overlays on the enlarged photography. Elk trails were mapped in the field, using topographic overlays on photographic enlargements. The areas selected for trail enumeration were completely canvassed by hiking each enumeration area. All elk trails that were discovered in enumeration areas were delineated on photo enlargements. Oblique, 35mm photographs were acquired from the end of each trail. Trail width measurements were taken at points five meters from the ends of each trail and at approximately the midway point between the two ends of each trail. The line intercept method was used to record the extent of any green vegetation that intercepted the tape measure as it was laid across the trails for the width measurements.

The enumeration areas were in areas with significant elk impacts and in areas with little or no present impacts. Five elk trail enumeration areas were established at various locations (Table 1).

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Table 1. Location of Five Elk Trail Enumeration Areas in Mount Rainier National Park

<u>Location</u>	<u>Number of trails enumerated</u>
1) South of Clover Lake	45
2) West of Sunrise Lake	6
3) West of Bear Park Lake	16
4) Lower Huckleberry Basin	42
5) Upper Huckleberry Basin	0

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#### Aerial Photographic Interpretation

185 natural color aerial photographs were obtained from flights on August 6 and August 12, 1985. The flight lines were located over a selected area in a region extending from Elysian Fields to Bear Park. The scale of the 9 x 9 inch color negatives is approximately 1:6,000

Standard aerial photographic interpretation methods were used to delineate elk trails for four non-forested areas selected for preliminary analysis. The photographic interpretation and mapping were performed in the laboratory on enlarged prints at a scale of 1:2,400. Elk trails were delineated in four areas with four different elope aspects.

Field checking for elk trail mapping accuracy was accomplished in September 1985. The preliminary interpretation overlays of delineated trails were removed from the enlargements before the field trip. The field checking consisted of a complete canvassing of each of the four areas. All trails were delineated on photographs in the field for each area using methods described in the elk trail enumeration and mapping section of this paper.

An accuracy assessment was conducted by comparing the results of the laboratory mapping to the results of the field mapping. Table 2 contains the results of the accuracy assessment. Overall, the results ranged from 61.0% of the trails interpreted correctly on Green Park Ridge to a high of 95.8% at the Bear Park East site. The ridge sites resulted in the lowest accuracies because of a lack of contrast between non-vegetated trails and slopes with drying vegetation cover. Since the 1985 season was very dry, the color of the herbaceous vegetation was brown instead of green on the aerial photography. This resulted in little contrast between the vegetation and the elk trails, causing mostly omission errors on the ridges and other dry areas. The average trail width ranged from 40 cm at the Bear Park East site to 59 cm on Bear Park Ridge.

Table 2. Remote Sensing Mapping Accuracy of Elk Trail Mapping at Four Sites in Mount Rainier National Park

<u>Location</u>	<u>Aspect</u>	<u>Percent Correct</u>	<u>Average Trail Width</u>
Bear Park North	North	92.4%	43cm
Bear Park East	East	95.8%	40cm
Bear Park Ridge	West	64.8%	59cm
Green Park Ridge	South	61.0%	52cm

### Critical Area Inventory

An inventory was conducted to identify critical areas for elk trampling and wallowing. A critical area was defined as a site in a wet meadow having bowl-shaped depressions or showing evidence of trampling. Trampling activity was characterized by a loss of vegetation, while the bowl-shaped depressions were identified as features used by elk for wallowing.

All 185 aerial photographs were examined for critical areas. Twenty-three critical areas were identified on the aerial photographs. These locations were transferred to 7.5 foot quadrangle maps which illustrate the location and the index number of each critical area.

### CONCLUSION

Two methods were selected for identification of elk impacts to allow for data collection in both forested and non-forested areas. The field enumeration and mapping were conducted in areas covered partially by forest canopies; the aerial photographic interpretation method was used in non-forested areas.

Overall, the preliminary results look encouraging in that it should be possible to monitor elk trail and wallow impacts using remote sensing techniques. It seems that a large aerial photographic scale of at least 1:2,400 is required for the monitoring of elk trails and wallows. This work will continue during 1986 with further development and testing of monitoring procedures.