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FILE REPORT NOR-Y-41

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STAND STABILITY IN SELECTED HIGH-USE CAMPGROUNDS IN ROCKY MOUNTAIN NATIONAL PARKS.

Pl comm'd
1 Dec 72
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Northern Forest Research Centre
Environment Canada
Edmonton

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STAND STABILITY IN SELECTED HIGH-USE CAMPGROUNDS IN ROCKY MOUNTAIN NATIONAL PARKS

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INTRODUCTION

During recent years the advent of a large variety of recreational vehicular accommodation and increased leisure time has resulted in a tremendous increase in the demand for campground facilities. Existing campgrounds have been expanded and new campgrounds established, but the expansion has not kept pace with the demand. Consequently, campgrounds in popular areas are filled to capacity, especially on weekends, and this has created a number of problems.

To determine the nature of these problems and whether or not the Canadian Forestry Service could make a useful contribution towards alleviating some of them, the Forest Insect and Disease Survey, Northern Region, Edmonton, conducted a preliminary survey of some sixty-five campgrounds within the region during 1971. At the request of the National Parks and Historical Sites Branch, eight of these campgrounds were in Rocky Mountain National Parks. They were: Tunnel Mountain, Two Jack Lake (Lakeside), and Johnston's Canyon in Banff National Park; Wilcox Creek and Wabasso in Jasper National Park; Kicking Horse Pass in Yoho National Park; Redstreak in Kootenay National Park; and Illecillewaet in Glacier National Park.

This report summarizes the pertinent findings of these surveys. The results are indicative only, since the surveys were of a preliminary nature. Firm conclusions cannot be drawn from such limited data and must await more detailed studies, should these be considered to be desirable.

Most of the data collected during these surveys is not reported here. However, those on tree increment and soil compaction are presented in graphic form, as they may be useful. In addition, notes on insect and disease conditions and on some of the apparent problems in various campgrounds are presented.

METHODS

The amount of time and money available for conducting the surveys were both limited, hence no elaborate sampling methods were employed. In each campground, a "typical" area was selected. The data and observations referred primarily to this area, since time did not usually allow a thorough examination of the whole campground. Increment cores were taken at the 1-foot level for each major tree species; one in a high-use area and the other in a low-use area whenever possible. Penetrometer[1] readings were taken on the side of a spade cut, one inch below the surface of the mineral soil, for several categories of disturbance of surface vegetation (see Fig. 6). Four readings were made at each of four locations for the first three categories, but only two readings at each location were taken for the last two categories. Additional increment cores were taken at random in the Tunnel Mountain campground. Six cores were taken from each section in Village 1, five from each of four areas in the trailer area, and a total of 25 cores were taken from the tent-trailer area. Each campground was examined for evidence of insects or diseases and the general condition of the stand noted.

[1] A spring-loaded, hand-held device for measuring hardness of the soil. The reading obtained when a plunger is inserted a given depth into the soil provides an index of its hardness, hence the name penetrometer.

RESULTS

The 5-year increments for the various tree species are shown in Figs. 1 - 4, for high- and low- use areas when both were available. Some of the trees in the high-use areas show a decline in growth during recent years, and this may be attributable to the abuse (mainly hacking of trunks and trampling of roots) that they have received. The significant feature revealed by the figures, however, is how well the trees withstand abuse. Although these are single cores, the more extensive sampling in Tunnel Mountain revealed similar trends (Fig. 5).

The penetrometer readings (Fig. 6) vary between campgrounds. However, the results indicate that a considerable amount of compaction is present, and that it sometimes becomes appreciable even before the ground vegetation has been worn off.

In general, insects or diseases did not appear to be a major problem in the campgrounds. However, in Illecillewaet, many of the hemlock had very little sound wood, and had many conks of brown stringy rot, Echinodontium tinctorium Ell. & Ev.. Since hemlock comprises almost half of the stand, this could be a major problem as the weakened trunks may break during storms. Some heart rot was also noted at Wilcox Creek, Johnston's Canyon and Kicking Horse Pass campgrounds, but does not appear to be a major problem as yet. Dwarf mistletoe on lodgepole pine was noted in Johnston's Canyon and Sections C to J of Village 1 in Tunnel Mountain. It was particularly prevalent in Sections E to G.

Fill for camping sites surrounds some trees in Wilcox Creek and Village 1 in Tunnel Mountain, and some of these trees may eventually die. Elk damage was noted on trembling aspen in Johnston's Canyon.

GENERAL COMMENTS

It would be presumptuous of us to state how campgrounds should be designed and operated, as we have had no first-hand experience in this field. However, from the point of view of maintaining reasonably healthy stands of trees within the campgrounds we feel that the following points are worthy of consideration, and hope that they may be of some assistance.

1. If a choice is available, campgrounds should be placed in areas best able to withstand heavy use. It is beyond the scope of this report to state how these areas may be defined, except to point out that they are not necessarily areas in which the trees are growing most rapidly.

2. The design of the campground should be such that people are discouraged from walking through stands of trees unnecessarily. Paths should be provided to facilities, but these will not be used unless there is a logical reason to do so, hence their location must be well chosen. Underbrush should be left undisturbed. Barriers should be erected if necessary; prickly bushes such as juniper and roses might also be used in clumps to act as barriers.

3. It is questionable if quick recovery reclamation prescriptions are likely to be useful in severe cases. Young trees planted in a heavily used campground will certainly have a high mortality rate before reaching a useful size, unless they are afforded some form of protection for a number of years.

4. Vehicular traffic among the trees should be eliminated, by barriers if necessary. Posts are very effective, but large boulders can be used with equal effectiveness.

5. Campground supervisors should be made aware of the hazard that some of the trees present to occupants of the campgrounds, so that the hazards can be removed or the campground evacuated during violent storms.

6. Camping sites should be spread out as far as possible within the limitations of the budget. This increases privacy, but more importantly, it cuts down on the abuse to trees, assuming that the campground is well designed.

7. Remedial action against insect pests should be undertaken promptly, to minimize the damage to trees already growing under stress.

Fig. 1. Five-year increments during the period 1942 to 1971 for lodgepole pine. Histograms for high-use areas are solid, those for low-use areas are open.

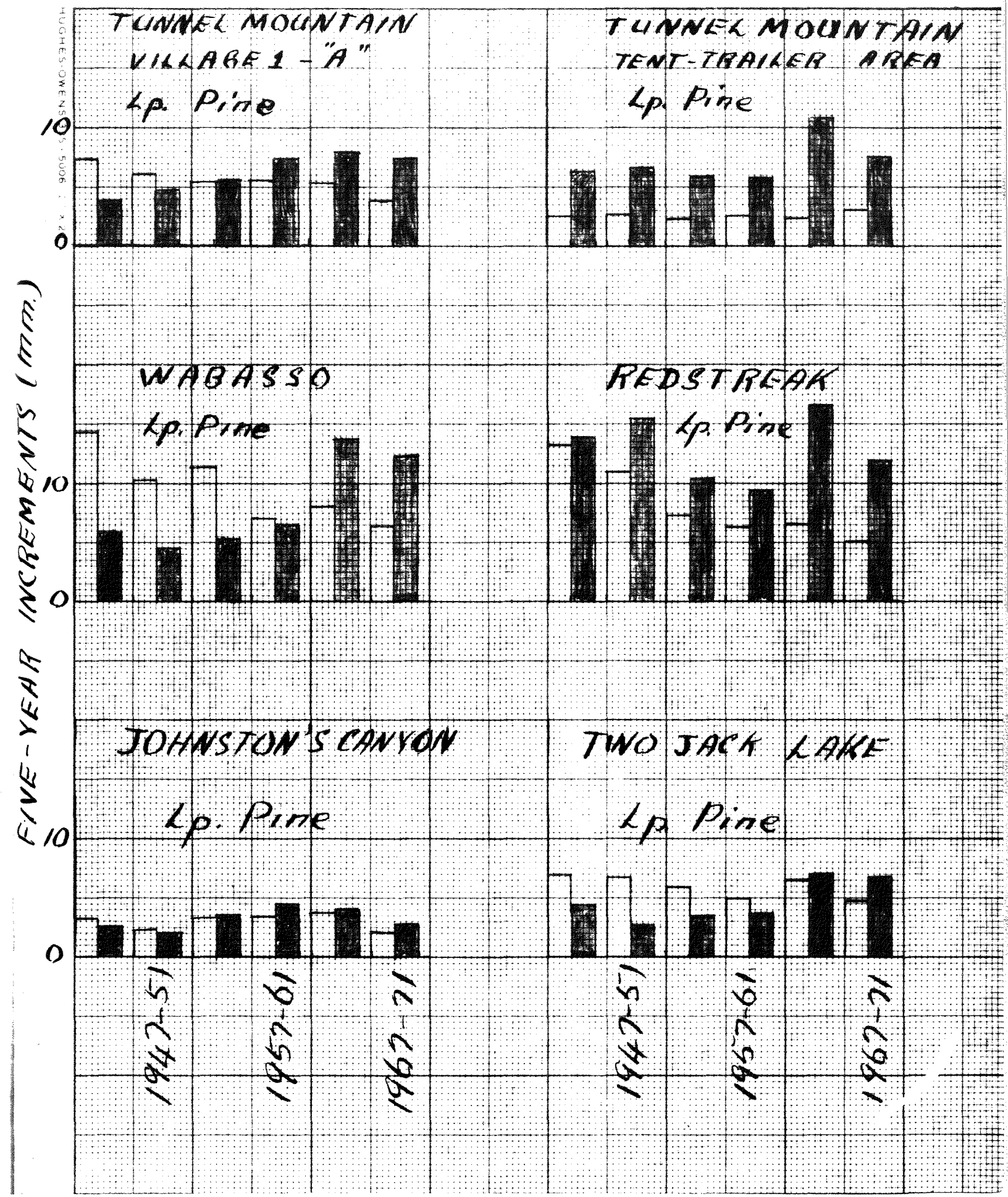

TUNNEL MOUNTAIN
VILLAGE 1 - "A"
Lp. Pine
TUNNEL MOUNTAIN
TENT-TRAILER AREA
Lp. Pine
WABASSO
Lp. Pine
REDSTREAK
Lp. Pine
JOHNSTON'S CANYON
Lp. Pine
TWO JACK LAKE
Lp. Pine
FIVE-YEAR INCREMENTS (mm.)
10
0
10
0
10
0
1947-51
1952-61
1962-71
1947-57
1952-61
1962-71

Fig. 2. Five-year increments during the period 1942 to 1971 for white spruce and Engelmann spruce. Histograms for high use areas are solid, those for low-use areas are open.

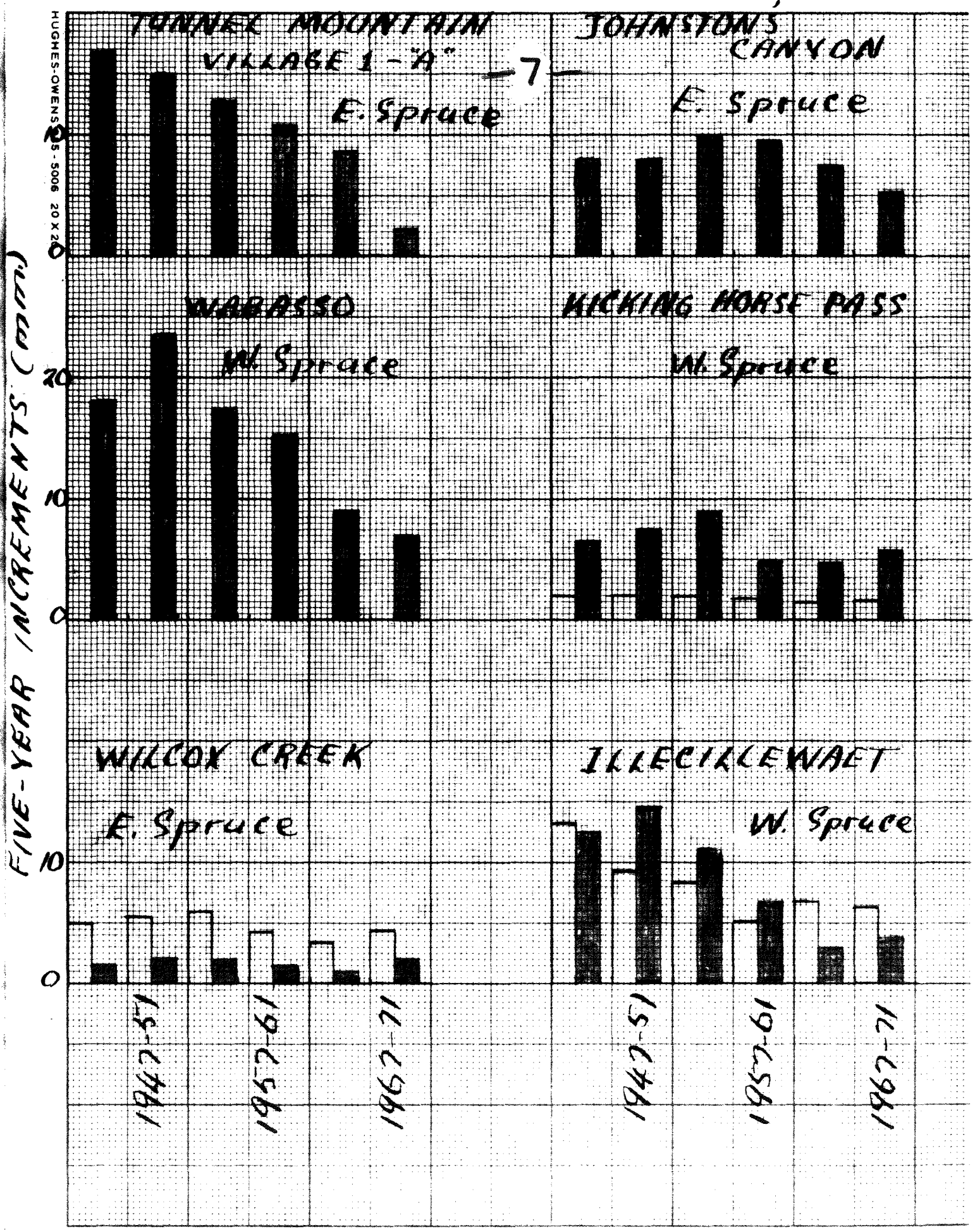

TONNEK MOUNTAIN
VILLAGE 1 - "A"
E. Spruce
JOHNSTONS CANYON
E. Spruce
WABASSO
W. Spruce
KICKING HORSE PASS
W. Spruce
WILCOX CREEK
E. Spruce
ILLECILLEWAET
W. Spruce
FIVE-YEAR INCREMENTS (mm)
20
10
0
1942-51
1952-61
1962-71
HUGHES-OWENS 5 - 5006 20 X 20

Fig. 3. Five-year increments during the period 1942 to 1971 for Douglas fir, alpine fir and hemlock. Histograms for high-use areas are solid, those for low-use areas are open.

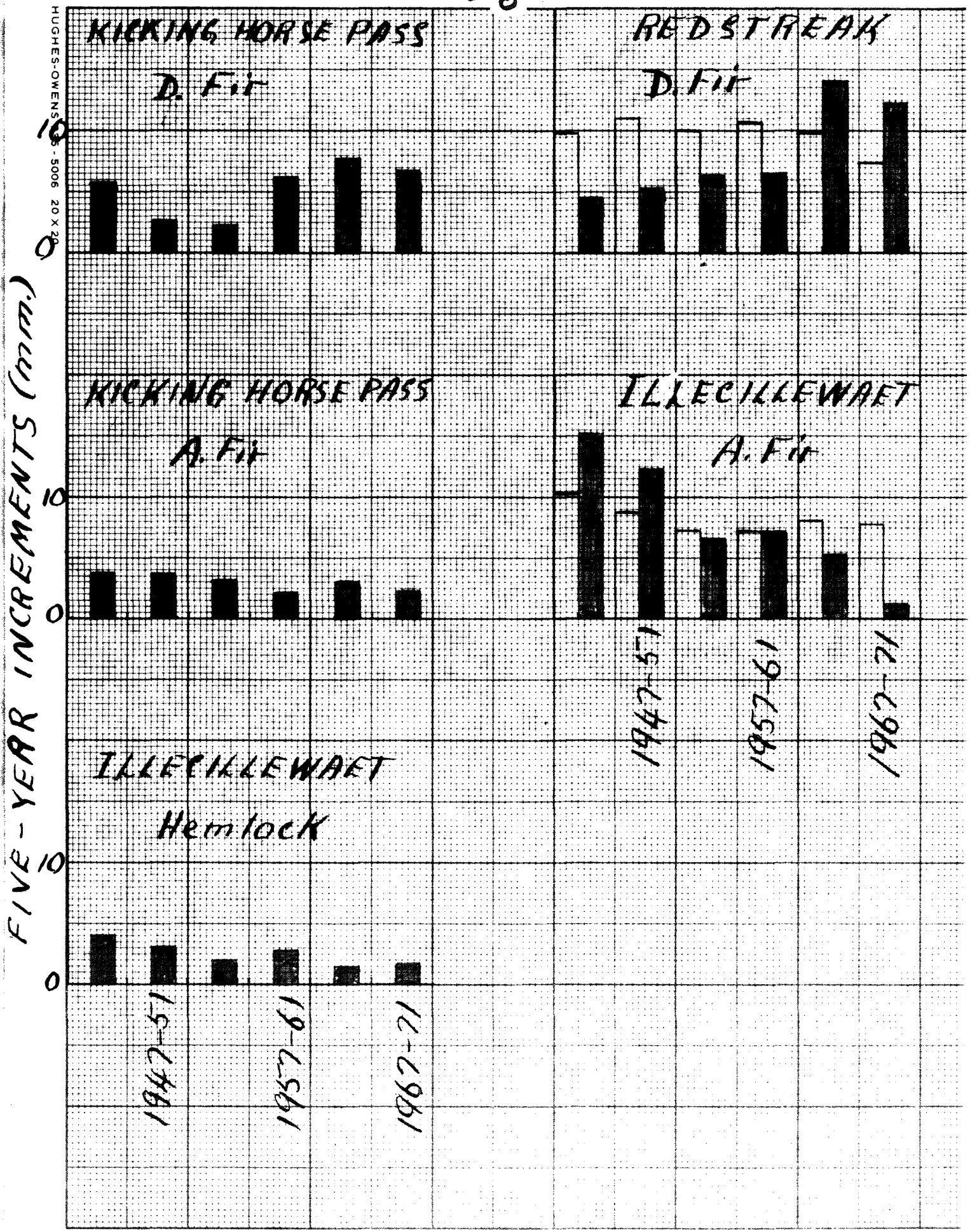

KICKING HORSE PASS
D. Fir
REDSTREAK
D. Fir
KICKING HORSE PASS
A. Fir
ILLECILLEWAET
A. Fir
ILLECILLEWAET
Hemlock
FIVE-YEAR INCREMENTS (mm.)
10
0
10
0
1942-51
1957-61
1962-71
1942-51
1957-61
1962-71

Fig. 4. Five-year increments during the period 1942 to 1971 for trembling aspen, balsam poplar and white birch. Histograms for high-use areas are solid, those for low-use areas are open.

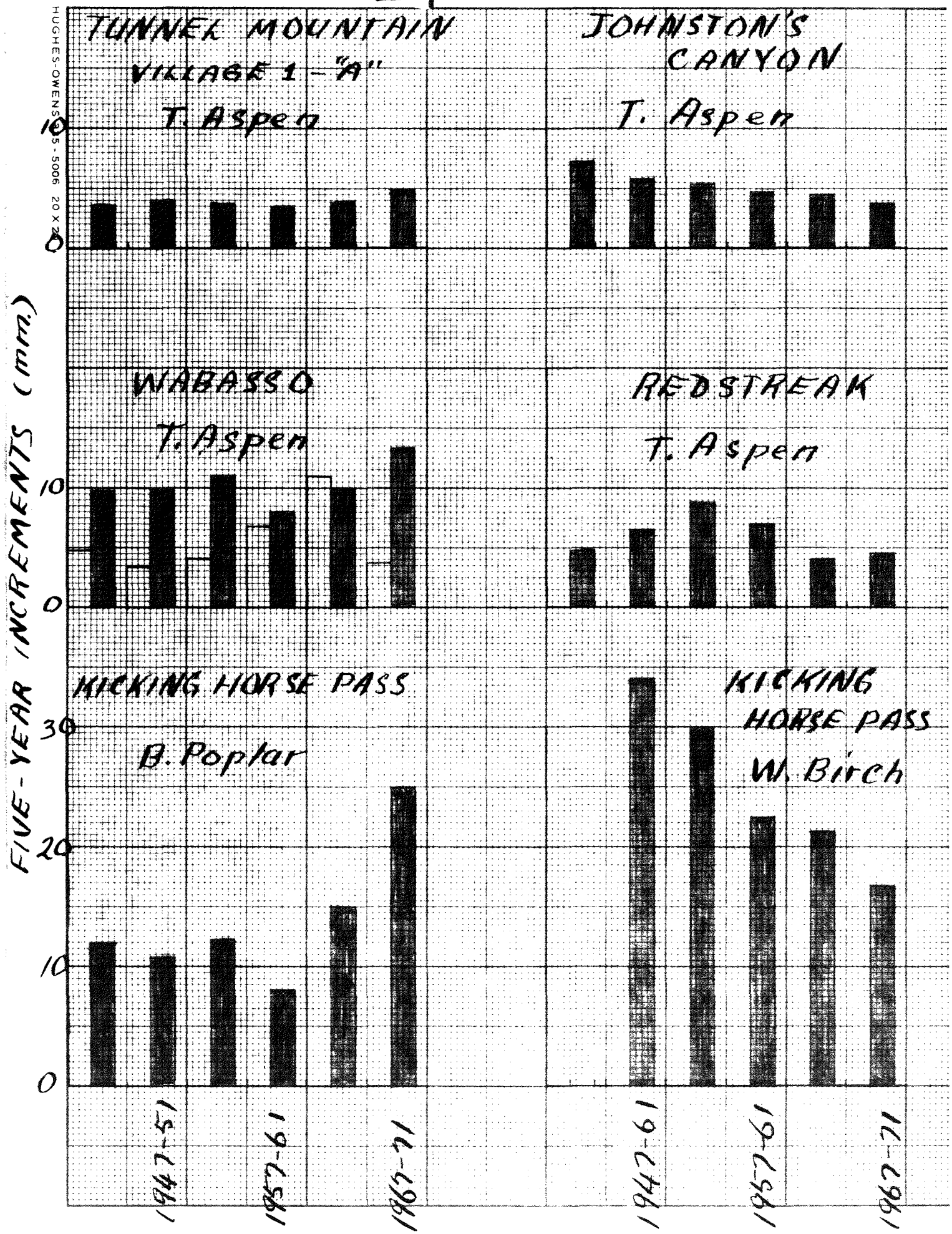

TUNNEL MOUNTAIN
VILLAGE 1 - "A"
T. Aspen
JOHNSTON'S
CANYON
T. Aspen
WABASSO
T. Aspen
REDSTREAK
T. Aspen
KICKING HORSE PASS
B. Poplar
KICKING
HORSE PASS
W. Birch
FIVE-YEAR INCREMENTS (mm.)
0
10
20
30
1947-51
1957-61
1967-71
HUGHES-OWENS 5-5006 20 X 20

Fig. 5. Mean 5-year increments during the period 1942 to 1971 for a random selection of lodgepole pine in designated sections of Tunnel Mountain campground.

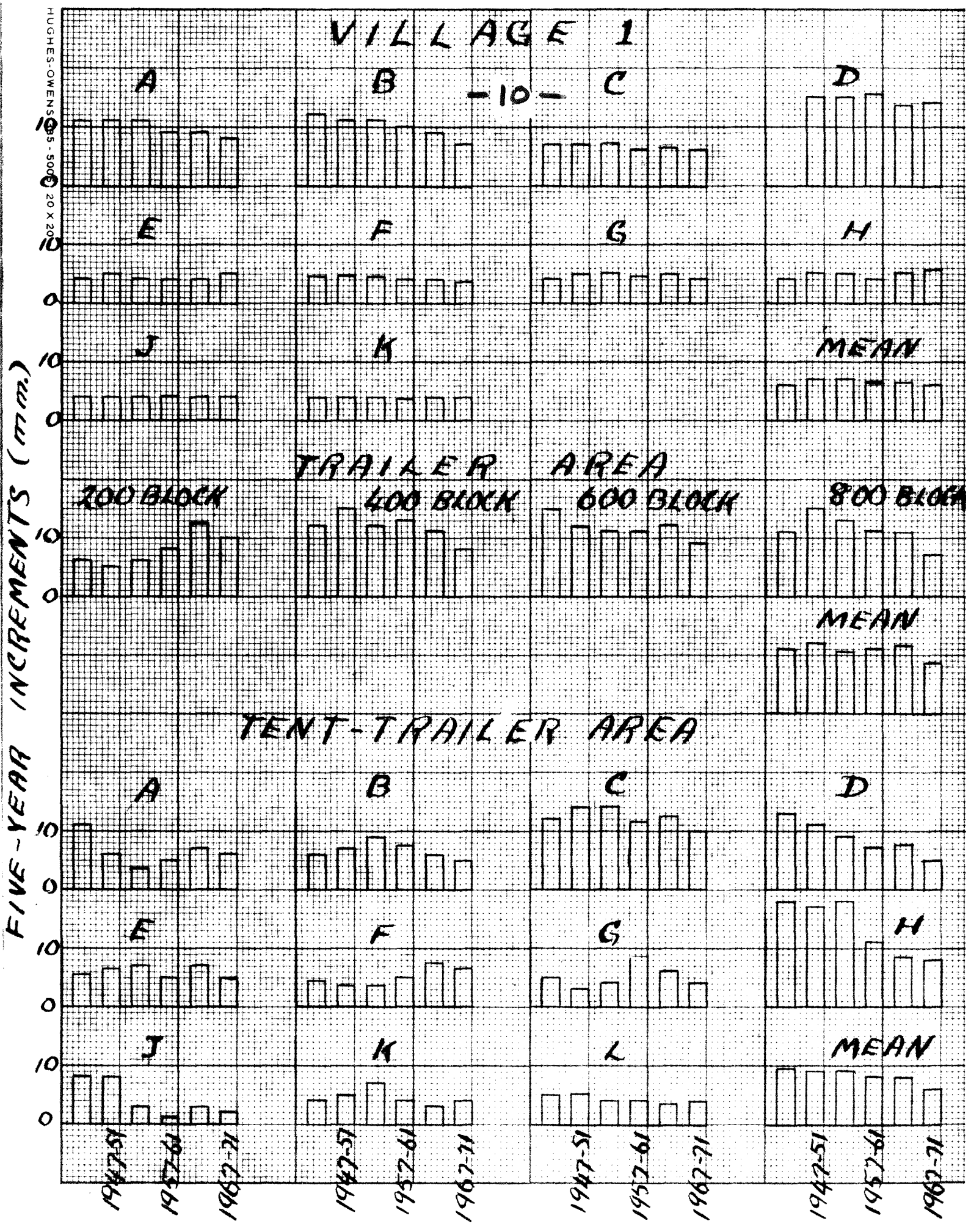
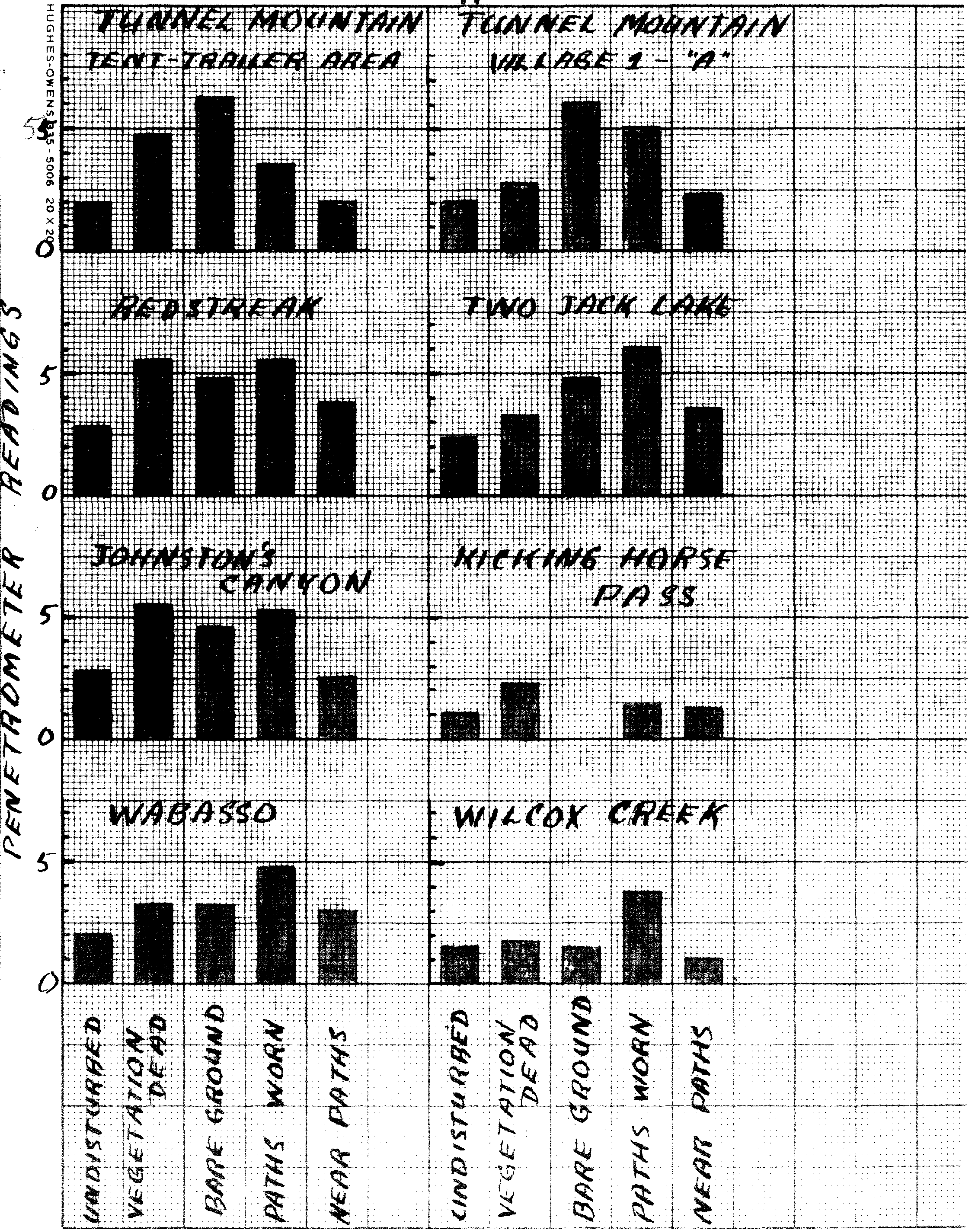

VILLAGE 1
-10-
A
B
C
D
E
F
G
H
J
K
MEAN
TRAILER AREA
200 BLOCK
400 BLOCK
600 BLOCK
800 BLOCK
MEAN
TENT-TRAILER AREA
A
B
C
D
E
F
G
H
J
K
L
MEAN
FIVE-YEAR INCREMENTS (mm)
10
0
10
0
10
0
10
0
10
0
1947-51
1952-56
1957-61
1942-46
1947-51
1952-56
1957-61
1942-46
1947-51
1952-56
1957-61
1942-46
1947-51
1952-56
1957-61

Fig. 6. Mean penetrometer readings for soil beneath surfaces falling into different categories of ground vegetation disturbance.


TUNNEL MOUNTAIN
TENT-TRAILER AREA
TUNNEL MOUNTAIN
VILLAGE 1 - "A"
REDSTREAK
TWO JACK LAKE
JOHNSTON'S CANYON
KICKING HORSE PASS
WABASSO
WILCOX CREEK
PENETROMETER READINGS
0
5
UNDISTURBED
VEGETATION DEAD
BARE GROUND
PATHS WORN
NEAR PATHS
HUGHES-OWENS 335-5006 20 X 20