

*Subalpine Fir on Harris Ridge near Hollis,
Prince of Wales Island, Alaska*

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IN SOUTHEAST Alaska subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.) has been reported at several locations on the mainland. These include: Very Inlet and Boca De Quadra (Taylor, 1929), at the head of Lynn Canal near Skagway (Sudworth, 1908; Anderson, 1919; Hultèn, 1941), at the head of Portland Canal near Hyder (Taylor; Hultèn), and at Taku Glacier (Heusser, 1954). However, to my knowledge, only one occurrence has been observed on any island in southeast Alaska.

Heusser (1960) reported learning through personal communication from Robert A. Gregory, U.S. Forest Service, that subalpine fir had been observed at timberline in the vicinity of Hollis, Prince of Wales Island. This is approximately 80 miles northwest of the nearest previously reported occurrences at Very Inlet and Boca De Quadra (Figure 1). During the summer of 1964 I visited the stand of subalpine fir reported by Gregory to locate the occurrence exactly, to collect specimens for positive identification,¹ and to observe the stand in some detail.

Stand Location and Description

The stand is located at 3,000-foot elevation one mile east of Harris Peak on a ridge (Harris Ridge) between Harris River and Maybeso Creek, approximately three miles southwest of Hollis, Alaska. Subalpine fir occupies a roughly triangular area with apex at the summit of a small peak and extending downslope approximately 300 feet to a maximum base width of 500 feet. Within this area trees occur in scattered clumps on a steep, south-facing alpine meadow above the line of continuous timber (Figure 2). Many clumps consist entirely of fir, while others include mountain hemlock (*Tsuga mertensiana* (Bong.) Carr.) and Sitka spruce (*Picea sitchensis* (Bong.) Carr.). On the summit several small fir trees were found within a clump of mountain hemlock and Sitka spruce. Among the more prominent shrubs

¹ Identification was confirmed by Dr. Elbert L. Little, Jr., U.S. Forest Service dendrologist. Cone and foliage specimens are on file at the U.S. Forest Service Herbarium, Washington, D.C.

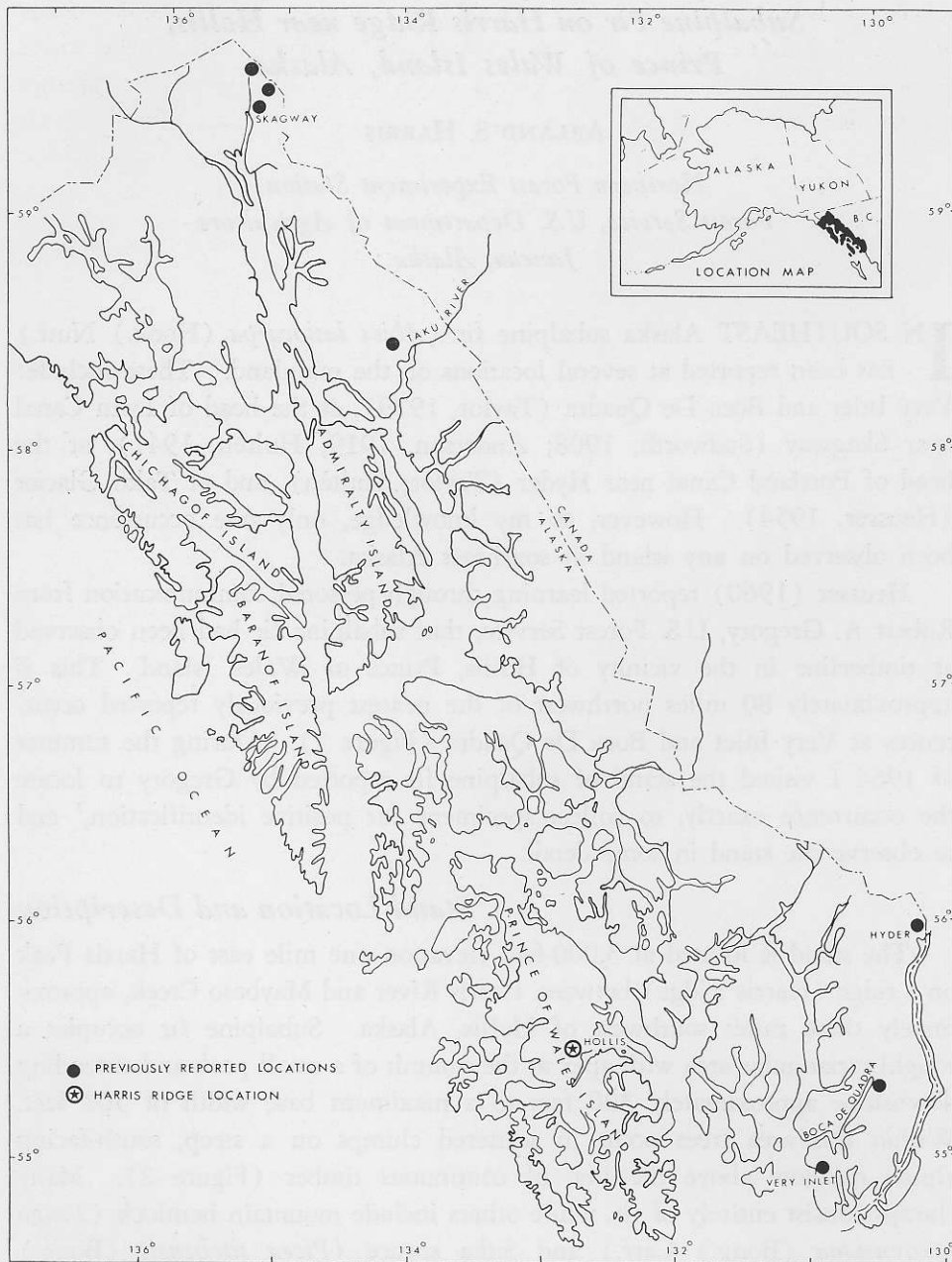


Figure 1. Map of southeast Alaska showing location of subalpine fir on Harris Ridge near Hollis and at other reported locations in southeast Alaska.



Figure 2. Subalpine fir and mountain hemlock on Harris Ridge near Hollis. Trees occur in scattered clumps on a steep alpine meadow.

and herbs present were deer cabbage (*Fauria crista-galli* (Menz.) Makino), bunchberry (*Cornus canadensis* L.), and yellow heather (*Phyllodoce glanduliflora* (Hook.) Cov.).

Best-formed and largest trees were found a short distance downslope, midway within the stand. Tree form ranged from decumbent to erect with much evidence of snow and wind damage. The largest tree measured was 11.0 inches in diameter one foot above ground, 8.6 inches in diameter 4.5 feet above ground, and approximately 17 feet tall. One tree, 3.2 inches in diameter, had 94 growth rings 1.5 feet above ground. A needle rust, tentatively identified as *Melampsorella cerastii* (Pers.) Schroet., was seen on several trees.

Reproduction

Many trees bore cones; those measured averaging 1.5 inches in length. At the time of my visit on September 11, cones were ripe, with some already beginning to disintegrate. All cones examined contained seed, but all seed examined was hollow. Many cones had been damaged by insects, but no insects were seen.

I found no small seedlings. What at first appeared to be seedlings proved to be protruding tips of vine-like decumbent stems overgrown by low alpine vegetation. Reproduction by layering was evidenced by clumped erect stems, several stems sometimes arising from the rooted branches of a prostrate and decaying veteran. Layering of alpine fir has been reported as common by Oosting and Reed (1952), and this appeared to be the principal means of reproduction here.

Plant Geography

The origin of this isolated stand, separated from its closest known neighbor by some 80 miles of low-lying forest and broad fjord, is open to speculation.

Hultèn described subalpine fir as an inland tree whose range reaches Alaska at a few points from the east. Heusser (1954), in reporting the occurrence of subalpine fir on a ridge bordering Taku Glacier, expressed the view that the species presumably spread to Alaska from an unglaciated area or areas in the western Yukon by way of British Columbia during middle postglacial time when major valleys between the Coast and Interior were ice free. However, the presence of this isolated stand on Prince of Wales Island is less readily explained in terms of postglacial migration from the east.

As an alternative, one might speculate that the stand descended from a remnant of the species that survived the last major glaciation. Subalpine fir occurring on Vancouver Island supports this argument. Schmidt (1957) suggested that its distribution on Vancouver Island could be explained to some degree on the basis of survival in mountain-top refugia during one or more glacial periods. However, he could offer no geological evidence that mountains protruded above the ice or that favorable environmental conditions prevailed to allow the species to survive. As circumstantial evidence he cited Dahl's (1946) thesis that, in high mountains bordering a deep ocean, nunataks are bound to exist during major glaciation. This is because a continental ice sheet moving oceanward cannot extend far into deep water for, once afloat, ice is quickly broken up and carried off by the sea. Since the ice surface will maintain a gradual slope back from a relatively low face, high peaks near the sea must protrude above the ice.

Schmidt further pointed to Heusser's report of subalpine fir on a ridge bordering Taku Glacier as evidence that the species can survive under "ice age" conditions.

A similar case could be made to explain the occurrence of subalpine fir on Harris Ridge. Again, there is no direct evidence to support such a conclusion, but, in discussing the glacial history of a part of the Craig C-2 quadrangle, which lies a few miles northeast of the Hollis area, Sainsbury (1961)

suggests that during glaciation some of the mountains to the west which exceed 3,300 feet in height may have stood as nunataks. More convincing proof must await further botanical and geological investigation.

Climate

The Harris Ridge occurrence is noteworthy also in that here subalpine fir, usually considered an inland species, exists under maritime conditions. Six years of precipitation records from sea level near Hollis, at a point approximately three miles from the Harris Ridge location, show an average of 12.6 inches of rain for the three-month period of June, July, and August, and an average annual precipitation of 103 inches. Heusser noted that the distribution of subalpine fir in Alaska at Portland Canal, Taku Valley, and Skagway is coincident with relatively dry areas having a climate more continental than maritime. Schmidt reported that, on Vancouver Island, the climatic stations nearest to known localities of subalpine fir receive less than eight inches of rain during the period of June, July, and August as compared with 10 to 18 inches from stations in the typical oceanic climate. Thus, the occurrence on Harris Ridge suggests that the species is also tolerant to greater precipitation and that precipitation alone is not a major factor in determining its distribution along the coast.

Future Botanical Exploration

Although much botanical exploration has been done in southeast Alaska at lower elevations near tidewater, areas only a few miles inland and at higher elevations remain virtually unexplored. The 1:250,000 U.S. Geological Survey map series compiled in 1952 shows some 30 peaks and ridges at least 3,000 feet in elevation on Prince of Wales Island, some or all of which could presumably offer a suitable habitat for subalpine fir. Thus, it seems unlikely that the island occurrence reported here is unique. Similar habitats can be found on Baranof, Chichagof, Admiralty, and several smaller islands; also, at innumerable locations on the mainland. Until these areas have been systematically searched and the presence or absence of subalpine fir noted, present knowledge of its range in southeast Alaska must be considered incomplete and its postglacial plant geography uncertain.

Summary

Subalpine fir occurs at 3,000-foot elevation on Harris Ridge near Hollis, Prince of Wales Island, southeast Alaska. This is the only occurrence of the species to be reported on any island in southeast Alaska, the nearest reported location being on the mainland approximately 80 miles distant. The origin

of this isolated stand appears more easily explained in terms of descent from a local remnant population that escaped glaciation than from postglacial westward migration.

The occurrence demonstrates that subalpine fir, usually considered an inland tree, is able to grow under maritime climatic conditions and suggests that precipitation alone is not a major factor in its distribution along the coast. More investigation is needed to complete present knowledge of the range and postglacial plant geography of the species in southeast Alaska.

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