FORESTS OF ALASKA

Thesis for Graduation

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Accepted
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INTRODUCTION

So little has been said about the forest resources of Alaska That I dare say that even many a college graduate still pictures untouched forests, only used by the prospector and trapper for fuel and shelter.

We all know there are forests in Alaska, but what kind; what species; are they merchantable; are they accessible; and how extensive are they?

This Thesis will include such information that should be of some value and interest, not only to the Forester, but, if you please, to people in all walks of life. It will have information that we would all like to know so that when we think of green timber, perpetuation in other words, we will think of Alaska first.

With all the knowledge gained in practicing and experimenting of Forestry in the United States, Alaska should be brought up as a good child with policies which would rank or even be superior to those of Norway, Sweden or Finland.

To my estimation more encouragement should be given to the establishment of real Forestry in Alaska. This can be done by advertising Alaska's possibilities to real Foresters--thus, the main purpose of this Thesis. Since the possibilities are there, why not use them right?

HISTORY

The earliest references to Alaska are as yet shrouded in uncertainty. The term "Alaska" comes from the lips of the native inhabitants and means "Great Country". At one time it ws thought to be one of the large islands in the Bering Sea. Explorers as early as 1711 mention Alaska in their notes. These explorers then traveled along the eastern points of Siberia. Since many men had seen the coast, credit only could be given to the one who could scientifically prove his case. The name of Vitus Bering, and the date 1741 are now accepted as authentic data for the discovery of Alaska.

Russia's claims to this great territory were based chiefly on the work of Bering and his lieutenant, because other nations were to outstrip her in exploration of Alaska. The Russian traders were quick to respond to the story of Bering's discovery and they soon descended upon the Aleutian Islands to exploit them of their furs. Official Russia, however, was practically inactive for twenty-five years; no Russian reached the mainland again until 1761. The real Russian exploration of Alaska was not undertaken until practically the opening of the nineteenth century.

In 1867, William H. Seward, then Secretary of State, arranged a treaty by which this country bought Alaska from Russia for $7,200,000. Although regarded at the time as a waste of money, the purchase has proved to be a good investment. Products, many hundreds of millions of dollars in value, have been taken from Alaska, and its exports to the United States have amounted to as much as $70,000,000 in a single year.

GEOGRAPHY

Alaska has an area of 586,000 sq. miles, or 375,000,000 acres, or more than ten times that of the State of Illinois. Its northernmost and southernmost points are as widely separated as Canada and Mexico.

The United States Geological Survey recognizes four main divisions of the surface of Alaska:

(1) The Pacific Mountain system, which, in southeastern Alaska, is a continuation of the Mountains of B. C., extends northwest to the Mt. McKinely range, and then swings sharply to the southwest, with a prolongation far into the Pacific Ocean, represented by the Aleutian Islands.

(2) The Central Plateau Region, which includes most of the Yukon and Kuskokwin basins.

(3) The Rocky Mountain System, which bounds the Central Plateau Region of the north and northeastern.

(4) The Arctic Slope to the northward of the Rocky Mountain System.

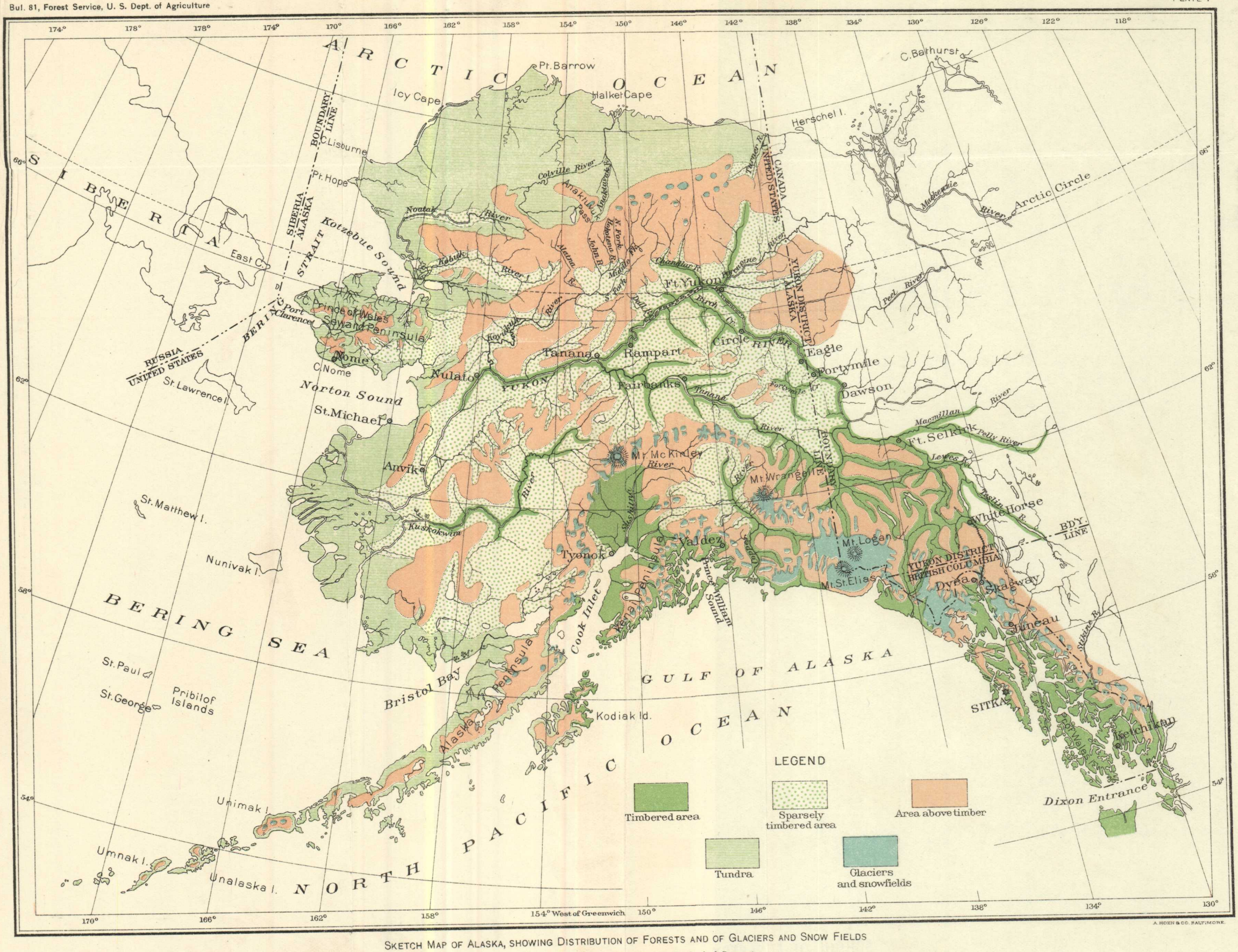
The Pacific Mountain Region is characterized on the coast by innumerable fiords and inlets, by deep inland passages and mountains that rise thousands of feet almost straight up from tidewater. There is very little level land in this region, especially in the southeastern part. The mountains are great masses of rock and the upper parts of them are covered with great masses of snow and ice. On the coast many glaciers reach tidewater, but in the interior they are confined to higher

altitudes.

The Central Plateau is not so much a plateau as it is a rolling-hill and low mountain country with wide streams. Its area is nearly as great as that of the other three combines.

The Rocky Mountain Region is a comparatively narrow elongation of the Rocky Mountain System of North America, and stretches across northern Alaska nearly from east to west.

The Arctic Slope Region, lying north of the Rocky Mountain Region, is composed of rolling tundras, in which truly Arctic conditions prevail. It has been less explored than any other region of Alaska.



SKETCH MAP OF ALASKA, SHOWING DISTRIBUTION OF FORESTS AND OF GLACIERS AND SNOW FIELDS

(From Professional Paper No. 45, U. S. Geological Survey)

Scale

0 100 200 300 400 500 miles

CLIMATE

The climate of southern and southeastern coast region of Alaska is mild and wet. The annual precipitation of Juneau and Sitka is 80 to 90 inches. At these points the precipitation is usually in the form of rain. In the mountains immediately above tidewater the snowfall is very great. The lowest temperature record at Sitka is 4° F below 0°, and the highest 87°. At Juneau the lowest is 10° below 0° and highest 88°. The Sitka temperature is but little cooler than that of the northern part of Puget Sound or of Scotland.

In the Central Plateau region of the interior, the summers are short and comparatively hot; the winters long and intensely cold.

Despite the low temperatures and long winters of the Yukon Valley, there is ordinarily a good growing season of at least three months. During much of this time daylight is almost continuak, and growth is rapid. The frozen subsoil is practically impervious to water, which accumulates in poorly drained areas and causes many swamps.

RESOURCES OF ALASKA

The principal industries of southeastern Alaska are salmon fishing and mining, both of which use considerable power. The mining industry is very uncertain, varying greatly from year to year, according to the quantity and quality of the material found. The fishing industry seems to have passed its peak, and unless adequate steps are taken to regulate the annual catch and increase the propagation of salmon through the hatcheries, the industry will soon be of much less importance than at present.

There are other industries, such as fur farming, but none is sufficiently extensive to furnish the foundation and support for a growing population.

The potential value of the timber resource is tremendous. The pulp industry will undoubtedly soon develop on a large scale. Not only the timber resources will encourage their onslaught, but also the unlimited water power. Alaska's future in pulp and paper seems to be its greatest asset.

FORESTS OF ALASKA

Most visitors perhaps are interested chiefly by the unmatched scenery, the rugged mountains of the mainland and of the larger islands, the narrow, sinuous passages between the islands, the deep inlets, the snowfields, glaciers, waterfalls, and the Indian villages. Such a visit reveals that one of the most important of the resources of southeastern Alaska is the timber. The high range of the mainland and the back bone of the larger islands rise above timberline, but many of the islands and peninsulas of the mainland have a relatively low elevation and are wooded on the top. But the forests, as viewed from the water, give little idea of their real character.

If, however, one goes back into the woods, landing for example, at the head of one of the innumerable bays, he finds himself in a great timber forest, with the characteristics and many of the same species found in the forests of the coast of Washington. It is in reality in the same forest region as Western Washington and British Columbia, for southeastern Alaska, under the influence of favorable ocean currents, is characterized by a very equable climate, a relatively long growing season, and a large amount of moisture. These are the same climatic conditions that create the great forests of the northwest coast of the States. There is on the coast of Alaska, as far south, the same response of vegetation to climate and a forest composed of trees of large size and heavy yield, and having the same general form, character of reproduction and

of life development.

The northern coast forests of the States represent the center of best development of the prevailing forest type, and the Alaskan coast forest as its northern extension. As one moves from the center or optimum region of development of a forest type, the number of species drops off and the trees do not reach as great size and yield. This is true of Alaska. One conspicuous species of the Washington and Oregon coast is absent, the Douglas fir, as well as a number of the less important species. The forest is made up chiefly of Sitka spruce, western hemlock, and red and yellow cedar, with a number of other species so scattered or so inferior as to be of no economic importance. The trees are also smaller, for in Alaska the spruce reaches a maximum diameter of about 8 feet and a height of over 200 feet, while in the States one finds spruce more than 12 feet in diameter. But this comparison indicates an extraordinary development of the Washington forests rather than small yield in Alaska.

On the coast of southeastern Alaska the trees grow to a large size; in the interior the timber is much smaller. The higher mountains are completely above timberline. Climatic conditions in the region adjacent to the Bering Sea and on the Arctic slope make forest growth altogether impossible, so there are great stretches of tundra whose vegetation consists chiefly of moss, sedges and few small shrubs. Layers of moss 12 to 18 inches thick are not at all uncommon on the coast or in the interior.

The total forest and woodland area of Alaska is approximately 100 million acres, or about 27% of the land surfact of the territory. Of these, about 20 million acres may possibly bear timber of sufficient size and density to be considered forest in the sense that much of it can be used for raw timber, while the balance, or 80 million acres is woodland.


DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
MAP OF
ALASKA
Compiled by Alaska Branch from all available authentic sources, chiefly from maps of the U. S. Geological Survey and the U. S. Coast and Geodetic Survey
U.S. Government Radio Stations
Scale 1/5000000
Approximately 80 miles to 1 inch
Edition of 1927
HEMLOCK-SPRUCE COASTAL FORESTS.
SPRUCE-BIRCH INTERIOR FOREST-SPARSE.
SPRUCE-BIRCH INTERIOR FOREST.
ARCTIC OCEAN
BERING SEA
BERING STRAIT
SIBERIA
ALASKA
RUSSIA
UNITED STATES
NORTON SOUND
BRISTOL BAY
GULF OF ALASKA
PACIFIC OCEAN
ALEUTIAN ISLANDS
PRIBILOF IS.
ISLANDS OF THE FOUR MOUNTAINS
BROOKS RANGE
DE LONG MTS.
BAIRD MOUNTAINS
ENDICOTT MTS.
ALAKSEN RANGE
YUKON MOUNTAINS
KUSKOKWIM MOUNTAINS
ALEUTIAN RANGE
KENAI MOUNTAINS
CHUGACH MOUNTAINS
TALKEETNA MTS.
WRANGELL MOUNTAINS
NUTZOTIN MTS.
MACKENZIE RIVER
YUKON RIVER
KOYUKUK RIVER
PORCUPINE RIVER
TANANA RIVER
KUSKOKWIM RIVER
KOBUK RIVER
NOATAK RIVER
SEWARD PENINSULA
KODIAK I.
KATMAI NAT. MON.
MILITARY CABLE
BRITISH COLUMBIA
YUKON
DIXON ENTRANCE
QUEEN CHARLOTTE IS.
BERING SEA
ALEUTIAN ISLANDS
NEAR ISLANDS
RAT ISLANDS
ANDREANOF ISLANDS
PACIFIC OCEAN
West of Greenwich
East of Greenwich

ALASKA MAP A

NATIONAL FORESTS

The National Forests of Alaska had their real beginning in 1902. Little study or thought had been given at that time to the timberlands of the territory as almost all of those who came north had eyes but for mineral, fur, and fish. Timber to the early pioneers was either merely a hindrance to travel and work, or at least a feature of no consequence.

An exception, however, was Lieutenant George T. Emons, a naval officer, who acquired an intimate knowledge of conditions on the southern Alaska coast during assignments there when law and order in Alaska were largely represented by the Navy as law-giver, policemen and floating court. Lieutenant Emmons, with a trained, scientific mind, became a student of the things that came under his observation in this pioneer region. Apparently he was the first to see the forests as a resource and to recognize their possibility for the practice of forestry by the Federal Government to help supply the future timber needs of the territory and nation as a whole. The first withdrawal of Public Domain in Alaska for Forest Reserve purposes was made in 1902 upon his recommendation. It involved four islands with an area of 4,500,000 acres in southeastern Alaska and was designated the Alexander Archyselago Forest Reserve.

With this first withdrawal the small group of aggressive pioneer government foresters, who under President Roosevelt's patronage, were then building the block which is now the National Forest system of the United States, turned their attention to Alaska. In 1903 a forest inspector from the then Bureau of

Forestry in Alaska made examinations of the timberlands to determine their desirability for addition to this first reserve or as new reserve units.

These investigations were continued in succeeding years, being especially pressed after the reserves were placed under the supervision of the Forest Service in 1905, and as a result of the findings more withdrawals were made from time to time. By 1909 the withdrawals considered advisable had largely been made and the areas consolidated into two immense units, the Chugach National Forest in the region adgacent to Prince William Sound, and the Tongass National Forest, comprising the greater part of southeastern Alaska.

The accomplishments of this formative period from 1903 to 1909 can be credited to W. A. Langille, at first a forest inspector in the Bureau of Forestry, and later the Forest Supervisor of the Alaskan National Forests under the Forest Service. He can truthfully be termed the Father of Alaskan Forestry.

The Tongass Forest.

The Tongass National Forest, comprising an area of about fifteen million acres, contains one of the most extensive bodies of timber remaining in the United States. Its great extent, its enormous volume of useful products, and its accessibility give to this forest far more than local importance. It will be a great factor in industrial upbuilding of Alaska. As a reservoir of forest supplies it has an importance that makes its problems of national interest.

The favorable climatic conditions have produced a forest of large yield of valuable timber. Not uncommonly individual spruce trees contain over 15,000 feet of lumber, A single log was brought into a mill in Ketchikan that scaled 18,000 feet. It was 154' long and 41" in diameter at the top end. Many stands yield 50,000 board feet per acre, and restricted areas run as high as 100,000 feet per acre. There are now on the Tongass Forest fully eight to ten million acres carrying merchantable timber which will average, over the entire area, not less than 7,000 to 9,000 feet at a conservative estimate. This does not include several million acres throughout the Forest, whose timber cannot at the present time be considered of merchantable character. A total of from 60 to 70 billion feet of timber of useful sizes and quality is a conservative estimate.

The coast forest timber constitutes one of the greatest natural resources of southeastern Alaska. There is not only an abundant supply for local use, but there are exceptional opportunities for the development of wood using industries for export from Alaska. The timber is of good quality and heavy yield, and it is very accessible, easily logged, and close to water transportation. On the Tongass National Forest there are 12,000 miles of shore line. The timber is close to the water and can be easily logged, with a small amount of investment required for improvements. There are many undeveloped water powers close at hand, available for use in running a sawmill or pulpmill. Under right handling, that provides for perpetuation of the forest, not less than five or six hundred million feet reducing the total stock, as the new growth would equal

the amount cut.

The heavy rainfall which occurs on the greater protion of the Tongass National Forest prevents, during normal seasons, serious danger from fire. This heavy rainfall however, occurs chiefly on the islands; it falls off on the deep indentations and inlets and up the rivers of the mainland. Conspicuous examples of this are the Stikine River and Lynn Canal. In these sections forest fires have already done a large amount of damage, and seasons of great hazard are frequent. Dry seasons however, also occur on the other portions of the Tongass National Forest, and there are many places which show damage from former forest fires.

Chugach Forest.

The coast forests to the westward of Cape St. Elias are comprised in the Chugach National Forest. The Chugach Forest comprises a total land area of 8,368,044 acres.

The region falls within the same general climatic zone as southeast Alaska. A heavy and well distributed rain-fall and a fairly long growing season cause a forest of excellent yield wherever the soil is suitable. Approximately 80 percent of the whole area is of the coast type, the remaining 20 percent of the interior type.

The conditions for forest growth are somewhat less favorable than in southeast Alaska. The chief cause of the difference is the more rugged topography than the average on the Tongass. Again the forest is at a higher latitude which combined with the local effect of the numerous ice fields and glaciers gives somewhat, less favorable conditions of growth. The coast type

of forest on Chugach is composed almost wholly of Sitka spruce and hemlock. A little yellow cedar has been found but it is very localized and not sufficient quantities to be of any economic importance. Cottonwood also occurs with the coast type, but is of little commercial importance. The average run of merchantable spruce is from two to three feet in diameter and 80 to 110 feet in height. The hemlock averages less in size than spruce.

At the west end of the Chugach Forest there is a marked change in the climatic conditions. Whereas the rainfall on Prince William Sound is 75 to over 100 inches, it is less than 30 inches at northwestern edge of the forest. The high mountain ranges separate the Forest into two climatic regions. The Forest on the west end of the Chugach is of the interior type. This portion of the Forest is subjected to a great hazard from fire.

The total volume of timber on the Chugach National Forest is estimated as approximately 6 to 8 billion feet. This includes the timber of merchantable size and character, which is suitable forlumber, piling, ties, and pulp material.

The shipping to Alaska of lumber products from the outside does not prove in the slightest degree that Alaskan timber is unfit to meet the requirements of local use either in quality or amount. It indicates that the present economic conditions have not yet justified the development of a manufacturing industry that can compete with outside material. At the present time also there is a great depression in fir on the coast, due to overstocking the market, and lumber is sold at very low

prices. Labor costs are much higher in Alaska than in the States, an item that in many cases enables coast mills , under conditions at present, to compete in the north. But very important also is the fact that the lumber industry has not yet developed in the west Alaskan Forest on a scale to enable competition with the great mills to the south.

Forests of the Interior.

The interior of Alaska has climatic conditions very different from the southern coast and a correspondingly very different character of forest growth. A short growing season of great intensity, light rainfall, and a cold soil are factors that restrict species to a few of the hardiest kinds, and produce a forest of slow frowth and light yield. The dominant species are white spruce, white birch, and cottonwood. The spruce grows heaviest on the flat lands, where it is often in pure stands over considerable areas or is mixed with cottonwood or birch. On the hill slopes the birch predominates and frequently forms pure stands. In the swamps the white spruce is often replaced by black spruce, growing alone or with willows, and in places having a mixture of tamarack. Aspens and willows constitute a minor growth, coming upon newly formed river bars or on burned areas.

The largest and most valuable tree is white spruce. Its average size is from 6 to 10 inches; its maximum seldom over 18 inches in diameter. Cottonwood reaches similar dimensions, but birch is smaller by some 20 to 30 percent. As is evident from the size of the oldest trees, the growth is exceedinly slow,

due to the cold soil and short growing season. The timber is often knotty and the lumber, as compared to that produced in the States is of inferior quality.

The forests are one of the most vital factors in the development of the interior of Alaska. They are absolutely necessary in the establishment and building up of the chief industries, Mining, and Agriculture, essential in the construction and maintenance of pioneer roads and trails, and their presence is an indispensable element in making the country habitable. Therefore the value should not be gauged by the size and quality of the trees for lumber, or their place for possible use in the lumber markets of the Pacific soast, but rather for their economic value as a local necessity.

The interior forests of Alaska are being destroyed at an appalling rate by forest fires. Conditions existing in the Western United States 25-30 years ago are repeating themselves in Alaska. The entrance of the white man brought the forest fire, and he has succeeded in a short period of less than 20 years in destroying the forests to an average extent of fully a million acres a year.

The summer season though short, is hot and dry, and, except where a great deal of moisture is in the soil and moss, the forest will burn. Especially on slopes and benches the ground cover dries out sufficiently to carry fire. The fire usually does not burn rapidly, but eats its way over the ground, burning up the vegetable stuff and moss and any slash and snags that may lie in its path.

ADMINISTRATION

The National Forests of Alaska pay their way. During the past five years the receipts from the sales of timber and other sources have paid for the administration and handling of the forests.

The Administration of Alaskan Forests is decentralized to a high degree. Very large authority is delegated to the local officers in order to avoid delays in transacting business which are incidental to a centralized handling of work in Washington. Aside from matters pertaining to alienation of Government land, more than 98 percent of the Forest business is handled by the local force, only the largest timber sales, water power permits, and questions of policy being referred to the Washington Office.

UTILIZATION

Logging.

The four-hundred-million feet of timber sold and cut to date from the National Forests in Alaska has been made into products such as piling, sawlogs, and shingle bolts. The logging methods have been developed from "hand logging", in which the trees were felled so that they would fall directly into the water, or could be rolled in by hand, to steam donkey logging, the donkey being mounted on a raft and "beached" at high tide, yarding directly into the water. Later two donkeys have been used, a yarder and a roader. In the water the logs are boomed and towed to the sawmills.

The principal sawmills are located at Ketchikan, Wrangel, Petersburg, Hadley, Chekan, and Douglas Island. The lumber cut annually is probably about 30 million feet. This consists almost entirely of spruce since hemlock is but little used. The material cut is used for fish boxes, mining timbers, and general construction purpose. Lumber demands a fair price, but the demand is limited.

Pulpwood Resources.

The use of timber for commercial pulpwood in Alaska is just beginning. The National Forests of Alaska probably contain one-hundred-million cords of timber suitable for the manufacture of newsprint and other grades of paper. Under careful management these forests can produce two-hundred-million cords of pulpwood annually for all time, or enough to manufacture one-third of the

pulp products now consumed in the United States.

The Alaskan forests also contain the second chief essential of paper-manufacturing industry--water power. While no accurate survey of water power has been made, known projects have a possible development of over one-hundred-thousand horse power; and the Forest Service estimates that a complete exploration of the National Forests in southern Alaska will disclose their potential horse power to be not less than a quarter of a million.

Scarcely any other part of the country offers a field for the upbuilding of a permanent pulp and paper industry equal to that afforded by Alaska. It is a virgin field, but, in spite of its natural advantages and vast supplies of raw material, existing economic conditions shall have to become favorable in order to attract capital.

Public ownership of the National Forests and their administration in accordance with the general policy pursued by the Forest Service affords capital certain important advantages. The amount of the investment necessary is greatly reduced by the fact that the Service is in position to guarantee permanent supplies, on reasonable terms as to price, and made available as needed. In other words, the operator does not need to invest heavily in raw material or assume the speculative rish involved when timber must be carried for a number of years with accumulating charges before manufacture. Again, prospective operators do not have to negotiate with a number of different owners, or spend money in building up an operating unit. It is the desire of the Government to facilitate the establishment of mills, and

the Forest Service is therefore glad to make available all the information that it can secure and to offer terms and conditions of sale that will interpose no unnecessary or unreasonable obstacles to development.

The value to Alaska of a pulp and paper industry on the National Forests can scarcely be overstated. By creating a demand for labor it will build up the population; by creating a market for farmers' crops it will stimulate Agricultural development; and it will improve transportation fascilities, and benefit all kinds of business.

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