

Alaska, Its Timber Resources
and Probable Future Development

by

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A Thesis
Presented to the Faculty
of the
School of Forestry
Oregon State College

In Partial Fulfillment
of the Requirements for the Degree
Bachelor of Science

May 1938

Approved



Professor of Forestry

ACKNOWLEDGMENTS

To Mr. R. R. Robinson of the Regional Forester's Office in Juneau, and to the Portland office of the Alaska Steamship Company, I wish to express my appreciation for their help in securing data for this thesis.

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Eight stars of gold on a field of blue-
Alaska's flag. May it mean to you
The blue of the sea, the evening sky,
The mountain lakes, and the flow'rs nearby;
The gold of the early sourdough's dreams,
The Precious gold of the hills and streams;
The brilliant stars in the northern sky,
The "Bear" - the "Dipper" - and, shining high,
The great North Star with its steady light,
Over land and sea a beacon bright.
Alaska's flag - to Alaskans dear,
The simple flag of a last frontier.

Marie Drake

INTRODUCTION

I have heard much about the timber resources of Alaska for several years, and naturally, I have been curious as to whether they really were much of an asset to the States, as to how much development had been made in them, and as to what the possible future development of them might be.

Alaska is recognized as one of the few remaining frontiers. Present conditions in Alaska with regard to land resources are much the same as those which prevailed in Western United States about the 1880's.

In this thesis I will attempt to answer some of the pertinent questions concerning Alaska's timber resources. If this does contribute to the reader's knowledge of Alaska's problem and practices, then its purpose will be served.

GENERAL

What is now the territory of Alaska was, until 1867, a part of the Russian Empire and was known as Russian America. Russia obtained the area by right of discovery over three-fourths of a century earlier. Despite their long occupancy, they left the country in much the same condition as they had found it - an unbroken wilderness. They did not foster general colonization and the white population was restricted almost exclusively to the officials of the fur companies, who confined their operations chiefly to the exploitation of the fur bearers of the coastal waters.

Prior to the purchase of Alaska by the United States, little interest was taken in the territory, and American sovereignty did not usher in an era of development. On the contrary, there was almost absolute governmental neglect, and a period of stagnation ensued which lasted until the turn of the century when gold was discovered. This greatly increased the white population and made it imperative that our government take some steps in developing the territory.

At present, Alaska is the largest outlying possession of the United States. It forms the northwest extremity of the North American continent. Its western extremity lies within sixty miles of the Asiatic coast, and its position with

regard to latitude is about the same as the Scandinavian peninsula. The panhandle of Alaska is only five hundred miles north of Seattle. The northern one-fourth of the territory must be regarded as Arctic, but the southern seaboard, exposed to the warm winds and waters of the Pacific, gives to the entire southern portion a comparatively warm climate. Permanent ice fields and glaciers, though prominent features of Alaska, cover only a small percentage of the land area and are largely limited to the mountainous system along the southern coast and to the slopes of the high Alaska range.

The area contained is 586,400 square miles, or about one-fifth the size of continental United States. Although it does form the northwest extremity of the North American continent, only one-fourth of its area is north of the Arctic Circle. (2)

The population totals over 60,000 people. Of this number about fifty percent are whites and the remainder are Indians and Eskimos. (1)

The title to lands of Alaska is controlled almost entirely by the Federal Government. Private ownership does not exceed one percent of the area. The greater part of the territory remains on the status of public domain, but small portions of the Federal lands have been withdrawn from private entry under the public-land laws and are administered for specialized purposes. Principal withdrawn areas are: (1)

Chugach National Forest - 4,800,000 acres -
for continuous timber production.

Tongass National Forest - 16,546,000 acres -
for continuous timber production.

McKinley National Park - 1,692,300 acres -
for birds and wildlife.

Katmai National Monument - 2,000,000 acres -
for its unique physical features.

Glacier Bay National Monument - 500,000 acres -
for its superlative beauty.

Aleutian Islands - bird and wildlife refuge.

Land laws concerning these withdrawn areas are much better enforced than are those laws applying to public domain lands. (7)

The only means of transportation with the outside world is by water, and two steamship companies operating from Seattle and Vancouver run all year. Within Alaska there are over ten thousand miles of roads and trails with twelve hundred miles of gravelled roads suitable for light auto traffic. (1) Much of the inland travel is accomplished by aeroplanes. At present there are about thirty-five commercial aviation companies operating approximately eighty planes in the territory.

GEOGRAPHIC REGIONS

The Territory has a wide range of climates. Arctic conditions prevail in the extreme north. The interior compares with the prairie Provinces of Canada, and the whole Pacific coastal strip, with its moderate winter temperatures and heavy precipitation, bears a striking climatic resemblance to the coast of British Columbia, Oregon, and Washington. The high range of mountains lying parallel and adjacent to the southern coast blocks progress inland of the warm moisture-laden winds from the Pacific, and consequently, interior Alaska has a light precipitation and the low winter temperature typical of lands of its high latitude. (2) Because of this variety of climate and certain natural barriers, the Territory can easily be classified into four geographic divisions. They are as follows:

Southeastern Region

This region consists of a long, narrow strip of mainland and an adjoining archipelago of hundreds of islands extending southeasterly about 400 miles from the main land and adjoining the west side of northern British Columbia. It is of extremely rough and rugged topography, but a large portion of it is readily accessible by water due to the very irregular coast

line, which is interspersed by an intricate system of bays, straits, canals, and inlets. The area consists of about 35,560 square miles and of this, about 25,900 square miles are forested.

Contrary to general belief, the winter climate of this region is mild. This is principally due to the low elevation and its proximity to tide water. The mean summer temperature is 50 to 55 degrees F., and the mean winter temperature is 30 to 35 degrees F. Snow never accumulates in this low land area, but various other factors combine to give it a high mean precipitation. The mean precipitation for Sitka is 83 inches; Juneau, 81 inches; and Ketchikan, 159 inches. May, June, and July are the driest months and the greatest rainfall is during September, October, and November, when the precipitation may be two or three times that of the summer. (2)

Southern Region

This area includes the Alaska and Kenai Peninsulas and the Aleutian and Kadiak Island groups. Generally it is characterized by great irregularity. Mountains extend from very irregular shore lines to high elevations, and deep water is characteristic of most of the inlets. The mean summer temperature is 50 to 55 degrees F., while the mean winter temperature is 20 to 35 degrees F. The population consists mostly

of Eskimos. The land area is 62,915 square miles.

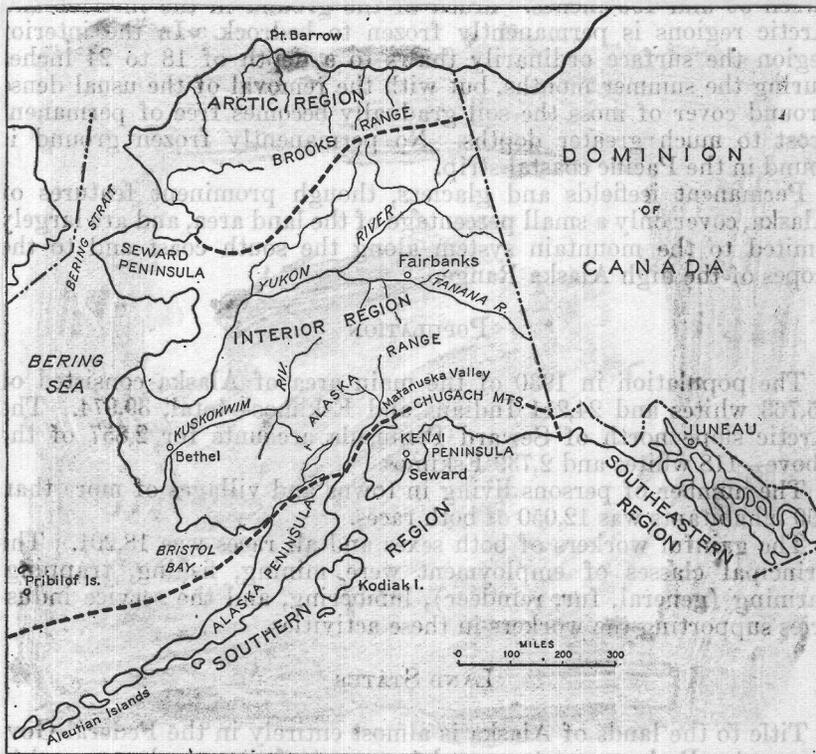
Interior or Central Region

This is an area of 373,465 square miles. It extends from the Arctic Divide on the north to the crest of the Chugach Mountains on the southern coast, and includes the large drainage areas of the Yukon and Kuskokwin Rivers. It includes also the region between the Alaska Range and the Chugach Mountains. This is principally a region of high plateaus, ridges of moderate slope and height, and of broad valley floors. In the Yukon and Kuskokwin drainages the plateau section gives way in the western or lower river stations to the Yukon-Kuskokwin Delta, a wide strip of marshland across which the two rivers flow to reach the Bering Sea.

Arctic Region

This is an area of 114,460 square miles. It includes all lands draining into the Arctic Ocean north of the Seward Peninsula. Its southern limit is the high Brooks Range and some lower mountains to the southwest which form the divide between the Yukon and Arctic drainages. The topography consists of a low lying area along the shores of the Arctic Ocean, which gradually goes into rolling hills and steep slopes as the crest of the Brooks Range is approached. The mean temperature of this

region is 38 to 45 degrees F. in summer and -16 to -10 degrees F. in winter. The annual precipitation is between 7 and 15 inches.



COVER TYPES

Alaska has two fairly distinct classes of forests corresponding with climatic regions formed by major physiographic features. These are essentially the "Coast Forests" and "Interior Forests". In addition to the forest types there is also the non-forest regions which are made up of the grasslands, tundra, and agricultural lands.

Commercial Types

Practically all of the merchantable timber of the Territory is within the exterior or coast forests of southeastern Alaska. The timber here is inferior when compared with that of the Puget Sound area, but compared with second growth stands of eastern United States, or with European forests, its value can be readily recognized.

As found in this region, the forest is predominantly a mixed stand of western hemlock and Sitka spruce. In many places western red cedar and Alaska cedar are associated with the predominant species in small proportions. The total volume of the region is about 85,000,000,000 board feet. This consists of about seventy-five percent western hemlock, twenty percent Sitka spruce, and five percent cedars. The average stand per acre is 26,000 board feet, and the majority of the

merchantable trees are from two to four feet in diameter and from ninety to one hundred and forty feet high. The forests have an almost tropical density of small trees and bushes in the understory. This is composed essentially of hemlock, blueberry, and devils-club. Down timber, which decays very slowly because of almost continuous saturation from abundant rainfall, occurs in profusion, and a carpet of moss, often six inches in thickness, covers the entire forest floor.

A description of the major forest types is as follows: (13)

Western Hemlock (*Tsuga heterophylla*)

It is the most common tree and constitutes the great bulk of commercial timber. In association with other species, it forms dense forests from tidewater to elevations of 2000 feet.

In the typical even aged stands the mature tree reaches an average size of three feet in diameter and from 100 to 140 feet in height. It has a long slender bole, and the main trunk is free of large knots.

Ordinarily the trees are sound when young, but as they reach maturity are affected by heart rot. Many of the old, over-mature trees are so defective as to be classed as unmerchantable.

Hemlock is used extensively as piling for the construction of fish traps, which are used in the coastal waters of

Alaska by the salmon canning industry. It is also used to some extent for paper and pulp but it is handicapped for this use, because it cannot be profitably shipped to the general markets in competition with Puget Sound hemlock.

Sitka Spruce (*Picea sitchensis*)

While this tree constitutes only about twenty percent of the volume of the forests, it is the most desirable species. The average mature tree is about five feet in diameter and 160 feet high, with a clean trunk. It is the principal saw-timber tree of the region and is manufactured into the usual forms of lumber. When and if pulp mills can be attracted to Alaska, spruce will be used in the manufacture of pulp and paper.

Western Red Cedar (*Thuja plicata*)

This tree constitutes only about three percent of the stand. The average diameter is five feet with a height of 100 feet. Most individuals are limby, heavily tapered, and subject to severe heart rot so they are of little value commercially.

Alaska Cedar (*Chamaecyparis nootkatensis*)

This tree constitutes only about three percent of the

stand. The average size is about twenty-four inches in diameter and eighty feet in height. It is used locally for boat construction and for telephone poles, but it is of little commercial value.

Non-commercial Types

The non-commercial or woodland timber types are confined principally to the interior forest region. The forest zone of the main area of the Territory extends north to the south slope of the Brooks Range and west to Norton Sound, and from Bethel on the Kuskokwin River to the base of the Alaska Peninsula. No satisfactory estimate of the actual acreage within this zone covered with forests is available, but a conservative guess places the extent of the dense and open woodland stands at between 100,000 and 125,000 square miles, or sixty-four to eighty million acres. The average stand per acre is probably about seven cords, giving an estimated total volume of about 500 million cords. (8)

The timber of this region is small and of very slow growth. Tree growth is handicapped by the cold climate and by the frozen character of the soil, which seldom thaws below a depth of eighteen inches. They cannot send their top roots into this frozen gravel, and consequently, the tendency is for them to form a mat of branched roots which are covered and bound

together with moss. Principal uses are for fuel wood and log cabins.

A description of the forest types is as follows:

White spruce (*Picea alba*)

This is the most prevalent type of the interior forest. It is found in mixture with Alaska white birch and with northern black cottonwood as a frequent associate. It occupies the better-drained soils of valley floors, benches, rolling ground, and the lower slopes of the high ridges. It reaches the largest size of any interior species but rarely exceeds eighteen inches in diameter and sixty feet in height. It occurs most frequently as open woodland, being seldom continuous over extensive areas. Trees are valuable for spars when floated to tidewater.

Northern Black Cottonwood (*Populus trichocarpa hastata*)

Cottonwood occurs in quantity only on lands bordering the large mainland streams. The mature trees have an average diameter of three feet and are eighty to ninety feet in height. Black heart, black knots, and heart rot are common on mature trees, but extensive areas of immature trees of excellent quality are found along some of the larger streams.

Mountain hemlock (*Tsuga mertensiana*)

This species is largely confined to the high altitudes but occasionally is found near sea level on rocky sites. It is largely inaccessible and of little value commercially.

Firs

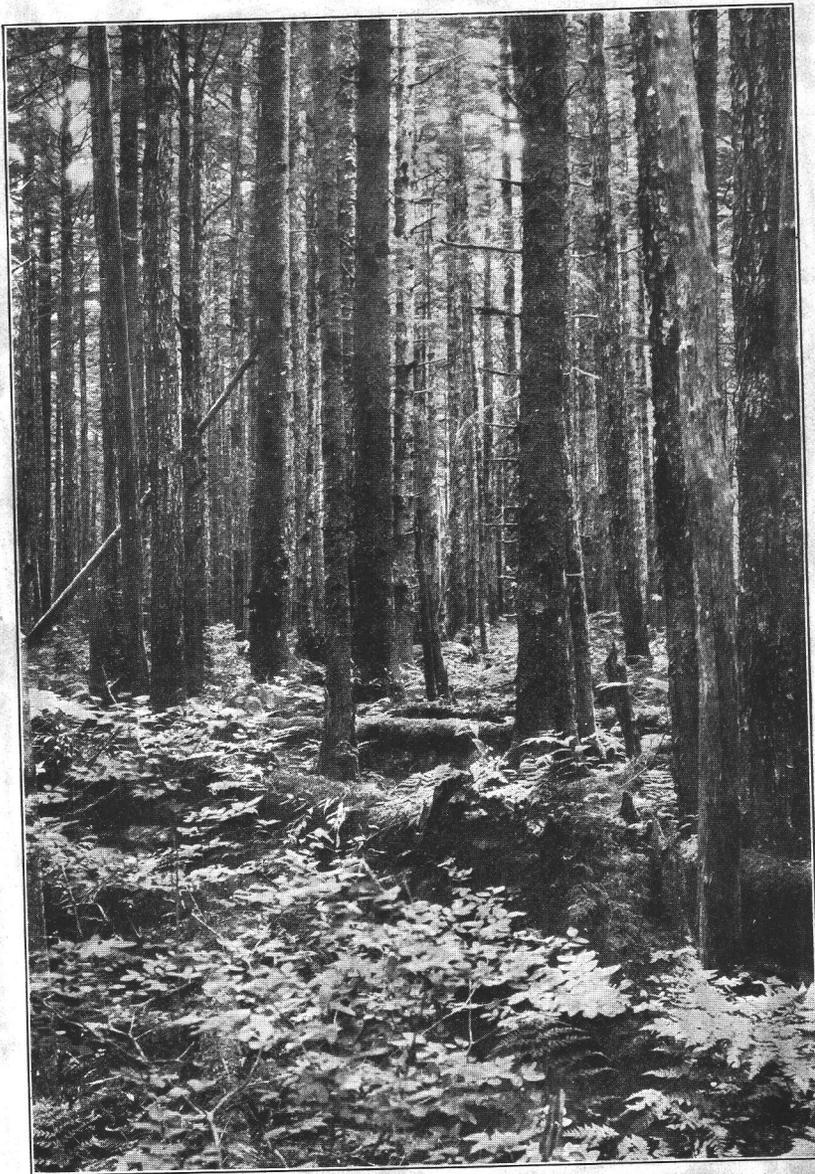
A fir similar to *Abies grandis* is common, but it is a decidedly scrubby and inferior tree.

Pines

Pinus contorta is the only species of pine present. It forms extensive forests along ridges near lakes and bogs but is very small and scrubby.

Scrub

This term is used to describe the open stands of dwarfed, defective trees. This may include any of the above species mentioned and also such species as birch, alder, crab-apple, larch, aspen, poplar, balsam, and black spruce. It is estimated that there is an average stand of about eight cords per acre in this scrub type, but actually it is of inferior quality and low value.



TYPICAL STAND OF SECOND-GROWTH TIMBER ON THE TONGASS NATIONAL FOREST, ALASKA.

Site index, 108 feet at 100 years. Age, 97 years. Total volume of stand, approximately 12,000 cubic feet per acre. Merchantable volume, approximately 11,000 cubic feet per acre.

Non-forest Types

The non-forest lands consist of grassland, tundra, and agricultural land.

The grassland areas occur over the Alaska Peninsula, the Aleutian Islands, and the south slopes of the Alaska Range. This portion of the southern Alaska coast is beyond the western limits of the western hemlock-Sitka spruce forests; however, thickets of stunted alders are found in some of the more protected spots. Lower slopes of the prevailing mountainous lands are covered with a dense, waist-high growth of grass and herbs. This occurs from tidewater to high elevations, becoming more sparse toward the higher levels.

The tundra occurs over the vast treeless section north of the Brooks Range and bordering the Bering Sea and Arctic Ocean. The average composition of the tundra cover throughout is about thirty percent lichens, twenty-five percent sedges, twenty-five percent shrubs, and twenty percent grasses, weeds, and mosses. Three main vegetative types are recognized; namely, wet tundra, dry tundra, and rocky or ridge areas. The wet and dry tundra areas are of heavier plant cover than the ridge areas, usually running one hundred percent in cover and density, whereas the rocky or ridge type of the mountainous regions includes a larger proportion of lichens, grasses, and weeds. The wet tundra type is the most extensive and comprises chiefly cotton sedges,

low or bog shrubs and lichens, while the dry tundra type is less extensive and runs more to the larger shrubs, grasses, weeds, and black sedges.

The grasslands and tundra cover types are important for use in grazing both wild and domestic animals. The maintenance of grass and tundra lands is essential to the present and future welfare of Alaska.

The existing and potential agricultural areas are estimated to be about 65,000 square miles. They occur in the larger valleys of the forested regions and are more or less in patches. There is at present about 10,000 acres of improved farm land; principal crops being wheat, oats, barley, peas, vetch, potatoes, and carrots. Dairying is an important feature because of the high local demand for dairy products.

MANAGEMENT AND ADMINISTRATION OF NATIONAL FORESTS

Forest Service

Alaska has two national forests comprising what is known as Region 10 of the Forest Service. The Tongass Forest of 16,546,000 acres includes the greater part of southeastern Alaska, and the Chugach National Forest of 4,800,000 acres covers the shores of Prince William Sound. The two national forests comprise a total land area of 21,346,000 acres and include about 80,000,000,000 board feet of timber.

The management of the national forests is to provide for a continuous and adequate supply of timber for wood-using plants that may be installed in the region. The establishment of such plants will in turn foster the permanent development of the territory and allow a sustained contribution to the nation's supply of timber products. Objectives the Forest Service has initiated are the development and maintenance of a permanent pulp and paper manufacturing industry, commensurate with the available water power and timber resources; and the furnishing of a permanent and convenient supply of timber for local consumption, with such an additional supply to the local sawmills for the general lumber markets as may be needed to justify efficient milling facilities and provide yearlong operations.

In their timber-use policy the Forest Service has set up the following considerations:

1. The productive forest land, after examination and careful study, will be divided into pulp-timber allotments, local-use allotments, and general-use areas.
2. Pulp-timber allotments will be laid out as complementary to definite available water-power sites suitable for use in the manufacture of pulp. Each allotment will include sufficient timberland to supply a sustained annual yield of timber equal to the mill capacity obtainable through a full economic development of the accompanying water-power site or sites.
3. Local-use allotments will be laid out on the basis of the suitability of the timber for the common local uses and its accessibility to points of consumption. In determining the size of local-use allotments consideration will be given to the probable opportunities for the local users to get material from present or future sales on pulpwood allotments, so that the allotments will not need in all cases to be so large as to supply the entire estimated future local demands. They will, however, be sufficiently large to permit of their being managed on the principle of sustained yield, using one or several allotments as the unit of management. On these allotments timber unsuitable for local use will be disposed of on the stump for pulpwood or other purposes under small, short-term sales.
4. General-use areas will include all bodies of timber not specifically placed in the two foregoing classifications. They will be available for sale for any product for the general or local market. Sustained-yield management will be practiced so far as possible.
5. So far as the Forest Service is able to control the location of pulp mills, they will be so distributed that an adequate timber supply under the management plan will always be available within a reasonable log-towing distance of each plant.

6. Initial sales within an allotment will ordinarily include those timber units most accessible to tide-water, the more inaccessible units being left for later exploitation.
7. Other things being equal, preference will be given to such industries and applicants as contemplate the most complete manufacture in Alaska.
8. Aggressive action will be taken to interest prospective investors in the pulp-timber and water-power resources. Data on location and amount of timber supplies, power resources, plant sites, transportation, labor, markets, construction costs, operating costs, and other governing factors will be gathered and made available to possible timber buyers and other interested parties.
9. Sawmills established primarily to supply an important local demand which may be insufficient to provide yearlong operations, permit efficient milling methods, and justify first-class equipment, will be encouraged in any efforts they may make toward the placing of the excess lumber cut on the general markets of the United States and foreign countries. The establishment of minor wood-using industries, especially those using western red cedar and Alaska cedar, will also be encouraged.
10. Sales of timber will not be made when it is anticipated that the wood will be exported from the Territory of Alaska in the form of logs, cordwood, or other raw product necessitating primary manufacture elsewhere. Export of raw material will, however, be allowed in individual cases where this will permit of a more complete utilization of material on areas being logged primarily for local manufacture; prevent serious deterioration of logs unsalable locally because of an unforeseen loss of markets; permit the salvage of timber damaged by wind, fire, insects, or disease; or bring into use a minor species of little importance to local industrial development. No sales, except for purely local use, will be made to aliens or alien corporations.
11. Small sales will be encouraged so far as is consistent with the investment required and the demands of the industries. Every encouragement will be given to the establishment of a competitive log market.

Timber is ordinarily offered for sale on applications from interested parties; stumpage alone being offered for sale, the land being retained by the government for the production of succeeding forest crops. The timber of the unit applied for is appraised by a forest officer on the basis of its value after manufacture into the usual timber products of the region, minus the cost of logging and manufacturing and a reasonable margin for profit and risk under the prevailing local conditions. The timber is then advertised for sale by sealed bids for a period of not less than thirty days, as required by law, the advertisement naming the appraised stumpage rates as the minimum that will be considered, and sold to the highest bidder who can make a satisfactory showing of ability, financial and otherwise. It is sold for use and cannot be held for speculation or other purposes. Hence long-term contracts specify a definite date by which logging must begin, and provide that certain minimum amounts be cut in given periods. Because of this reason the maximum amount of timber that will be placed under contract to one firm and the period of time allowed for its removal from the sale area are governed by the purchaser's logging and manufacturing investment, practical operating methods, and markets.

The Forest Service Timber Sale Standards are as follows:

1. Sales by "value and amount" shall be made only when the total stumpage value involved is less than \$100. A field examination and marking of sale boundaries is required except within those areas which have been approved as handlogging areas.

2. All sales exceeding \$100 in stumpage value, except sales by tree measurement, shall be made by "area." A field examination must be made prior to sale. Boundaries must be marked before cutting begins.
3. Scattered patches of timber in one locality which are to be logged successively by one concern shall be combined in one contract and not disposed of through a number of unadvertised sales. A boundary line will be placed around each separate unit.
4. Sales shall be made by "Tree Measurement" in cases where this method will be of advantage to the Forest Service and not cause a hardship to the purchaser. Forest officers may make sales by tree measurement up to the limits of their individual sale authorizations but prospective tree measurement sales exceeding \$500 in stumpage value shall be submitted to the Regional Forester for review and sanction before being advertised or approved. Until more accurate volume tables are available tree measurement sales of over \$100 in stumpage value will necessarily have to be carefully considered.

In cruising areas to be sold by tree measurement every tree to be removed shall be actually measured for diameter, its gross volume determined from approved volume tables, and its defect estimated. The trunk above the line of saw-cut, as well as the stump, shall be blazed and marked "U.S."

Tree measurement sales must be inspected as cutting proceeds and before closing in the same manner as sales on which the material is scaled.

5. A 100 percent timber estimate will be standard for all merchantable timber areas of 10 acres or less, a 20 percent estimate for larger areas.
6. A variation of 10 percent from the actual cut will be the standard of accuracy in timber cruising.
7. Topography will be placed on all sale maps regardless of the size of the area. For sale areas on gentle slopes a 25' contour interval should be used where necessary to emphasize certain topographic features. Otherwise, a 50' contour will be standard.

8. Chaining of distances rather than pacing will be standard practice in mapping sale areas.
9. The standard map scale will be 8" or 16" to the mile. Every map shall contain a "Locality Map" traced from a navigating chart. Map sheets shall be cut to letter size or double letter size.
10. It will be standard practice to have sale contracts terminated on December 21 of the year in which cutting is to be completed. This may be disregarded in very small sales to be completed at once.
11. A carbon copy of each contract approved by a Regional Forest Inspector or a Ranger shall be sent to the Regional Forester. An extra copy of the contract and map shall be supplied the purchaser with instructions to give it to the logging foreman on the sale area. An extra copy of contract and map shall be carried by the Forest Officer in the field.
12. Forest officers shall keep in their field notebooks an up-to-date list of sales under their supervision. Each sale will be listed on a separate page. Such essential data as sale designations, locations, amount, rates, unit of deposit, periodic cuts, special requirements and sale period will be shown. Notations will be made on this page showing dates of sale inspections, etc.
13. The Forest officer in charge of the sale shall supply the logging foreman with copies of the Standard Cutting Rules with instructions to place them in the hands of subforemen in charge of various classes of logging activities.
14. Logging foremen must always be taken over the sale boundaries before cutting begins.
15. Logging operators will be instructed by the officer in charge to mark all rafts of sawlogs from a given sale by a series of consecutive numbers and a distinctive sale mark. These marks will be placed on the rear swifter or tail stick of the raft.
16. Scaling at the logging camp rather than at the mill or elsewhere will be standard practice. Where scaling through special arrangement is done elsewhere by some other office than the man in charge of the sale, the scale report will be sent to the latter.

17. Every raft scaled shall bear the distinctive scaling mark allotted to the scaling officer. It will be placed on the rear swifter or tail stick in Roman numerals.
18. Sale areas will be inspected by the officer in charge at every visit to the camp for scaling, etc. No sale exceeding \$100 in stumpage value will be closed until a final inspection has been made after logging is completed. Regional Forester's sales will be inspected at least once a year by a member of his office detailed to this work.
19. The original copy of each cutting report will be sent to the Regional Forester by the Forest officer in charge of the Division. The purchaser will be furnished copies of the cutting reports by the same officer as soon as possible. The information on the back of the Form will be omitted from purchaser's copy.
20. No contract, regardless of size, will be approved before deposit is made. Cutting must not start before contract is approved. Deposits must absolutely be kept ahead of falling operations.
21. DEPOSITS ON SALES. The following schedule of stumpage deposits will be used except in the case of tie sales on the Kenai and Prince William Sound Divisions.
 - (a) Estimated timber value on sale area \$250 or less - Initial deposit for the full amount.
 - (b) Estimated timber value on sale area \$250 to \$500 - Initial deposit \$250; balance in round numbers and in one payment as cutting proceeds.
 - (c) Estimated timber value on sale area \$500 to \$1000 - Initial deposit with bid \$500; balance in round numbers and one payment as cutting proceeds.
 - (d) Estimated timber value on sale area, over \$1000 - Initial deposit with bid and each subsequent payment, \$500, \$1000, \$1500, \$2000, depending on size of the proposed logging operation.
 - (e) Emergency Agreements for Advance Cutting - Deposit of not less than \$250 and in round numbers. Deposit for emergency agreement does not obviate necessity

for deposit with bid. If estimated entire balance due on sale, after deposit with emergency agreement, is less than \$500, the entire balance due, in round numbers, shall be deposited with bid in place of the scheduled deposit with bid provided above.

22. A refund of the balance on deposit will be made to the purchaser at the close of a sale rather than a transfer of the balance to another existing or prospective sale.

The stumpage prices now being received for national forest timber in Alaska vary with the species, quality, and accessibility. However, the average price per M. is \$1.50 for Sitka spruce, western red cedar, and Alaska cedar, and \$1.00 for hemlock.

The fire season on the National Forests of Alaska is regarded as opening June 1 and closing September 1. Although most of the area has a light fire risk due to the heavy precipitation, there are certain periods of moderately high fire danger. Greatest danger zones are on timber sale areas, so, consequently, all operators must abide by the following requirements for fire protection:

1. The logging operator shall do everything in his power to prevent and suppress forest fires on and near the sale area. His employees may be used by the Forest Service for fighting fire and payment therefor will not be made if the fire is on or adjacent to the sale area or if the operator or his men caused or could have prevented the origin or spread of the fire.
2. During periods of extreme fire danger, the Forest officer in charge may prohibit smoking in the woods and the building of lunch and camp fires except at designated places.

3. Each wood or coal burning engine working on or near the sale area shall be provided with an efficient spark arrester. This will be placed in use when deemed necessary by the Forest officer or placed in use without instructions from such officer at the end of any period of ten days in which no rain has fallen on the sale area and will be kept in use for the remainder of the dry period.
4. Each steam donkey engine shall be equipped with an injector having a threaded "T" for a connection with a fire hose, 100 feet of serviceable fire hose, six 12-quart pails, 3 shovels, 4 mattocks and a constant supply of not less than 12 barrels of water. Gas donkeys shall be equipped with six 12-quart pails, 3 shovels, and 4 mattocks. This equipment must be maintained in good condition and when not in use in fighting fire shall be kept in a special place on the engine sled.
5. A watchman shall be placed at each steam donkey engine during the noon hour and for two hours following the close of operations for the day at such times as the Forest officer in charge may think this advisable because of an unusual fire risk. A watchman shall be so placed without instructions from the Forest officer at the end of any period of ten days during which no rain has fallen on the sale area and this precautionary measure will be continued until the end of the dry period.
6. The Forest officer may require that the ground at each setting of a donkey engine be cleared of all or any part of the inflammable material for a distance of 100 feet in all directions.
7. No brush, slash or debris shall be burned during the fire season without the written consent of the Forest officer in charge.
8. During periods of exceptional fire danger the Forest Supervisor may require the operator to use additional precautionary measures, but if such precautions appear inadequate or if the operator shall not comply with the emergency measures required, the Supervisor has authority to close down such machines or such portions of the logging operations as he thinks should be temporarily discontinued.

Machine logging with donkey engines is the only practical means of moving logs from the woods, because of the rough topography, the large quantity of debris on the ground, and the large size of many of the trees. Ground-skidding and high-lead systems are now used somewhat, but overhead systems will probably prove most economical for more extensive operations. Much of the timber can be logged directly into tidewater and then towed in the form of flat rafts to the mills, making a very economical logging operation.



Dense forests of Western Hemlock and Sitka Spruce pulptimber clothe the lands adjacent to the network of navigable protected waterways in Southeastern Alaska. This photograph shows North Arm of Hood Bay, Admiralty Island.

FOREST INDUSTRIES

Practically all of the timber used in southeastern Alaska is purchased from the Forest Service. The greater part of the output goes into lumber, but about twenty percent is used in the round for fish-trap and wharf piling. There are two modern electric-driven mills of 100,000 board feet daily capacity, one each at Ketchikan and Juneau. There are three mills of 25,000 board feet daily capacity, one each at Ketchikan, Hyder, and Hidden Falls. In addition there are numerous small mills cutting less than 10,000 board feet daily. Most of the lumber manufactured by these mills is used locally by the mining and fishing industries, but the two larger mills are shipping a considerable and increasing amount of spruce uppers to the United States and foreign countries.

PROBABLE FUTURE DEVELOPMENT OF TIMBER RESOURCES

The pure stands of high-grade spruce saw timber is too limited to support a large industry, and it is unlikely that the mill run of lumber from the predominating hemlock-spruce forests can compete with the material of the same species produced in the Pacific Northwest. The average of lumber cut from the mixed hemlock-spruce forest gives a large amount of low grade material which must be used locally, since it will not pay for shipping it to foreign markets, and there is little local market for by-products. Hence an extensive sawmill development primarily for entering the general markets is inadvisable. Rather, the sawmill capacity in Alaska should be gauged to the local demand, and if this is done, the supply of high-grade saw timber is sufficient to maintain a thriving lumber industry. The common lumber can be sold locally, and the clears produced will stand the shipping charge to the general markets outside the Territory.

There is considerable local demand for hemlock piling, but there is little chance of expansion because piling cannot be shipped to the general world markets at a profit.

The manufacture of cedar has possibilities of developing an important industry. The manufacture of articles, such as moth-repellent chests and battery separators from Alaska cedar,

is entirely feasible, and since there is a large amount of western red cedar of shingle grade, the shingle industry will probably develop.

The industry having the greatest possibilities is the manufacturing of newsprint paper. Conditions appear to be less favorable for other branches of the pulp and paper industry, but conditions appear to be very favorable to the large scale operations which now characterize this industry.

In 1927 there were two large pulp-timber contracts awarded but were cancelled soon after on account of the economic depression. At the present time there are no operating pulp or paper mills in Alaska; the nearest mill being the newsprint plant of Pacific Mills (Ltd.), having a capacity of over 300 tons daily, and located at Ocean Falls, British Columbia, 296 miles south of Ketchikan.

The outstanding advantages of southeastern Alaska as a location for manufacturing newsprint are water transportation to the markets of the world and abundant water power and timber resources, which are available for bona fide development and use under reasonable agreements with the United States. (8)

Approximate distances from Ketchikan, the most southerly Alaska port, to some of the possible world markets are as follows:

	MILES
Minneapolis, via Prince Rupert, B. C. and Canadian National Railway	2,390
Chicago, via Prince Rupert, B. C. and Canadian National Railway	2,700
Seattle	660
San Francisco	1,300
Colon	4,638
New Orleans, via Panama Canal	6,084
Savannah, via Panama Canal.	6,407
New York, via Panama Canal.	6,663
Honolulu.	2,450
Yokohama.	3,911
New Zealand	6,550
Sydney, Australia	6,850

As can be readily seen the pulp and paper markets of the Orient and Australia are as readily accessible to Alaska as the Pacific Coast States and British Columbia.

As for timber resources, studies by the Forest Service indicate that the forests of this region, under proper management, can produce 1,500,000 cords of pulpwood annually in perpetuity. Converted into newsprint this represents a production of 1,000,000 tons or more than one-fourth of the present yearly consumption in the United States. Since much of the pulp used in the United States is now imported from other countries, it

seems that the development of this industry in Alaska would be feasible for supplying part of our needs.

The run-off per square mile of drainage basin is very high because of heavy precipitation in this region, which makes for excellent water power resources for industrial use. A potential 600,000 horsepower has been covered by reconnaissance, the outstanding characteristics being high-head developments, short conduits, small drainage basins, good water storage facilities, accessibility of the projects to navigable waters, and the opportunity to locate industrial plants either at the powerhouse sites or within very short power transmission distances.

INTERIOR FORESTS

Growth in the interior forests is so slow that even under good protection and management, it may fall short of supplying the timber needs of the future local population; and even if there were an over-supply, it is of such poor quality that it could not economically be manufactured and sold in the general timber-products markets.

Most of the interior forest land is classified as public domain and comes under the jurisdiction of the General Land Office, a branch of the Department of Interior. Since the forests are not considered of commercial importance, no management work has been done in the past. About all that is being done at present is a little bit of fire protective work. A few temporary employees are hired by the General Land Office to do protective work in the vicinity of the larger towns, and the Government-owned Alaska Railroad takes steps to prevent and suppress fires along their right-of-way. Fire protection is about the only type of management needed, but a more intensive fire protection program is immediately essential. (6)

Naturally a country of such light rainfall as interior Alaska, with very little organized fire protection, is subject to devastating forest and tundra fires. These fires are an outstanding menace to wildlife, reindeer grazing, stock

raising, and agricultural development, and their effects transcend in importance the combined results of all other agencies which work toward the depletion of the valuable land resources. The most accessible localities, such as those around settlements and along roads, trails and navigable rivers, have suffered the greatest fire damage and exhibit extensive areas of continuous burn and large tracts that have been almost denuded, as the result of repeated fires and the consequent slow recovery of the vegetation.

Fires in Alaska are almost all man-caused and are due in large measure to a lack of appreciation of their damaging effects on the vegetative cover, and hence on the enterprises which this cover helps to support. In fact, a majority of persons who travel, work, or live in this region handle fire in a casual way that indicates a failure to realize that unrestrained burning is drawing away a large share of the resources on which the Territory is dependent for its continued well-being. However, there is a changing sentiment as regards fire, and it is believed that, with aggressive leadership, a predominant sentiment against fire could soon be obtained.

The first step, in order to obtain satisfactory results, is the formulation and establishment of a fire protection organization. The executive head of the project should be sympathetic with its objectives and experienced in the broad

aspects of administrative work in fire protection. The organization should be represented in each of the larger community centers of high fire risk, the majority of the men should be yearlong employees, and the key men should be of proven ability in establishing fire protection systems, and effect cooperative agreements with public and private agencies for the prevention and suppression of fires. One of the major functions of the organization would be educational efforts directed toward fire prevention; and since the population in the fire susceptible regions is only about 32,000 people, much of the educational work could be done through personal contact.

CONCLUSION

An integrated program of Federal activity for the administration of cover resources is desirable. At present each Department does its work without regard to conflict with other agencies, and consequently, there is little harmony. Different viewpoints by the Department of Interior and the Department of Agriculture, with respect to the program necessary or desirable, tends to result frequently in no action being taken. Since the Department of Agriculture has a greater official interest in the protection and proper management of forest and grass resources, perhaps the best solution would be the transfer of the administration of these public domain lands to the Department of Agriculture.

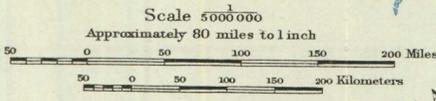
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DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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



Edition of 1927

HEMLOCK SPRUCE COASTAL FORESTS.
SPRICE-BIRCH INTERIOR FOREST-SPARSE.
SPRICE-BIRCH INTERIOR FOREST.

