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Summary Estimates of Forest Resources on Unreserved Lands of the Stikine Inventory Unit, Tongass National Forest, Southeast Alaska, 1998

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Abstract

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Summary estimates are presented of forest resource area, timber volume, and growth and mortality of timber on unreserved national forest land in the Stikine inventory unit of the Tongass National Forest. Pacific Northwest Research Station, Forest Inventory and Analysis, crews collected inventory data from 1995 to 1998. Productive forest land area (timberland) was estimated at 1,158 thousand acres, cubic-foot volume on timberland at 6,222 million cubic feet, and net annual growth and mortality at 11,003 and 50,426 thousand cubic feet, respectively.

Keywords: Forest surveys, timber resources, statistics (forest), Alaska (southeast), Stikine.

Summary

The total land and water area of the Stikine inventory unit of the Tongass National Forest is 3,579,000 acres. Unreserved lands within the area encompass 2,871,228 acres, 80 percent of the total. Sixty-three percent (1,795,545 acres) of this unreserved area is forested and almost 60 percent of the forest land is timberland (1,071,622 acres). Cubic-foot volume on timberland is estimated at about 5.8 billion cubic feet. Nearly 75 percent of this volume is in western hemlock and Sitka spruce trees. Net annual growth of growing stock on timberland is estimated at 3.8 million cubic feet and average annual mortality is about 38.7 million cubic feet.

Preface

Forest Inventory and Analysis (FIA) is a nationwide project of the USDA Forest Service authorized by the Forest and Rangeland Renewable Resources Research Act of 1978. Work units, located at Forest Service research and experiment stations, conduct forest resource inventories throughout the 50 states. The FIA program of the Pacific Northwest Research Station is responsible for forest inventories in Alaska, Washington, Oregon, California, Hawaii, and the Pacific Trust Islands.

Inventory Area

The forest resources on unreserved, national forest lands within the Stikine inventory unit (fig. 1) were sampled with a single phase, unstratified, systematic grid sample (grid spacing is 2.98 miles). No ground sampling occurred in wilderness areas. Ground plots (2.47 acres) were established at each grid intersection and were subsampled by a cluster of four, 24-foot, fixed-radius subplots. Three other subplots were sited, one each at 120 feet north, southeast, and southwest from the first, centrally located subplot. Each subplot was mapped for land cover.

Some plots were either entirely or partially physically inaccessible owing to dangerous terrain. For these locations, land cover was estimated; detailed measurements of trees and other vegetation were not made. These locations contribute to estimates of other forest land and nonforest area.

Sampling Error

Estimates presented in this report are based on sampling and are subject to two types of error. The first is sampling error. This type of error can be estimated mathematically. The second type of error comes from measurement mistakes or equipment limitations; it cannot be estimated mathematically but is minimized through proper training, supervision, and emphasis on careful work.

Bootstrap estimation was used to estimate sampling error. The bootstrap process is an iterative resampling, with replacement, of the sample list. For each sample, a new estimate of the total is constructed. The means and variances of the estimated totals provide the estimate of standard error. The estimated errors presented in table 1 resulted from 300 iterations. Sixty-eight percent confidence bands (one standard error) can be calculated from these figures.

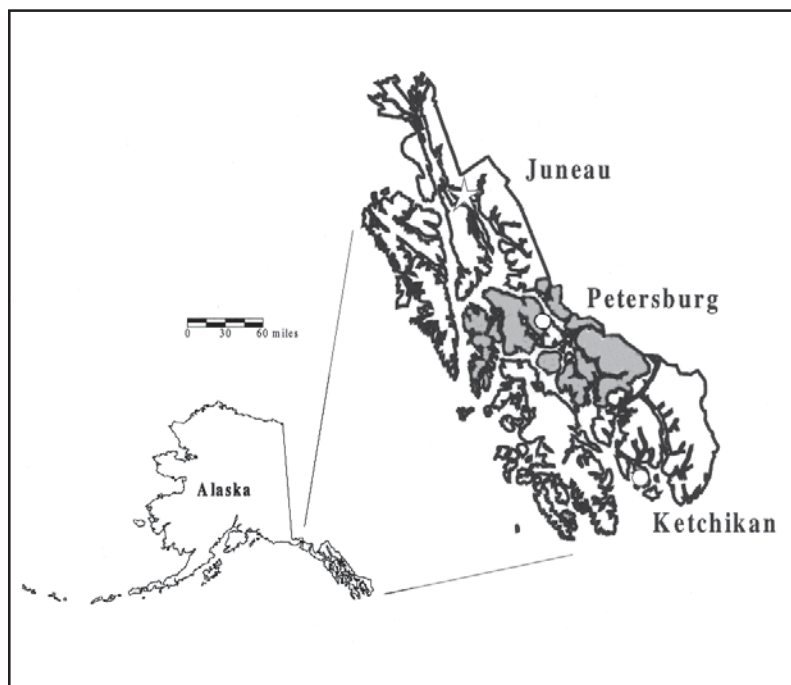


Figure 1—Stikine inventory unit, southeast Alaska, 1998.

Table 1—Bootstrap estimates of the mean and standard error for selected forest resource estimates, Stikine inventory unit, south-east Alaska, 1998

Resource estimate	Mean	Standard error
Productive acres	1,066,581	62,446
Nonproductive acres	729,892	51,359
Nonforest acres	1,074,755	58,410
Net volume (ft ³)	5,765,755,693	465,182,118
Gross growth (ft ³)	42,574,363	2,850,123

Key Findings

- Slightly less than two-thirds of the Stikine inventory unit's unreserved land base of 2,871 thousand acres was classified as forest land (1,796 thousand acres). Fifty-nine percent of this forest land was timberland (1,072 thousand acres).
- Sitka spruce was encountered as a pure forest type on 3 percent of the timberland acres.² This species, however, accounted for almost 23 percent of total net cubic volume on timberland. The highest net cubic volumes per acre were found in stands of Sitka spruce where average volume per acre was estimated at 9,200 cubic feet. Also, gross annual growth in the Sitka spruce forest type (65 cubic feet per acre) exceeded that in all other forest types. Slightly higher mortality (76 cubic feet per acre) though, resulted in a negative net annual growth.
- Average annual mortality also exceeded gross annual growth for the Alaska-cedar/hemlock, mixed conifer, and western redcedar/hemlock forest types. Total net annual growth for all forest types was estimated at 3,763 thousand cubic feet.

Acknowledgments

Completion of this inventory, from design through data collection and compilation, resulted from the efforts of many people. Thanks go to Ray Koleser, data collection team leader, and the data collection staff: DeAnna Barbaria, Kent Barkhau, Don Bertolette, J. Buck, Whitney Burgess, Brian Charlton, Ian Doleman, Jason Downing, Jason Edney, Jahn Haddeland, Albert Helgenberg, Corey Henderson, Keith Kanoti, Dan Kenney, Tristan Kelley, Mary Miller, L. Pejchar, David Pierce, Brandy Reed, Julie Roller, Sadie Rosenthal, John Saddler, Chris Teutsch, David Thompson, Fred Thorsteinson, and August Wright. Thanks also to Kevin Dobelbower, information management team leader, for database development and field data recorder and compilation programming, and to Edward Ezzell for database and systems maintenance.

Literature Cited

Viereck, L. A.; Little, E. E., Jr. 1972. Alaska trees and shrubs. Agric. Handb. 410. Washington, DC: U.S. Department of Agriculture. 265 p.

Appendix

Names of trees¹

Common name	Scientific name
Softwoods:	
Alaska-cedar	<i>Chamaecyparis nootkatensis</i> (D. Don) Spach
Lodgepole pine	<i>Pinus contorta</i> (Dougl.)
Mountain hemlock	<i>Tsuga mertensiana</i> (Bong.) Carr.
Sitka spruce	<i>Picea sitchensis</i> (Bong.) Carr.
Western hemlock	<i>Tsuga heterophylla</i> (Raf.) Sarg.
Western redcedar	<i>Thuja plicata</i> (Donn)
Hardwoods:	
Red alder	<i>Alnus rubra</i> Bong.

¹Scientific names according to Viereck and Little (1972).

Table 2—Area by land class, unreserved national forest land, Stikine inventory unit, southeast Alaska, 1998^a

Land class				
Timberland	Other forest land	Total forest land	Nonforest land	All land
Thousand acres				
1,072 (37.3%)	724 (25.2%)	1,796 (62.5%)	1,076 (37.5%)	2,871 (100%)

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 3—Area of timberland by forest type, unreserved national forest land, Stikine inventory unit, southeast Alaska, 1998^a

Forest type	----- Area -----	
	Thousand acres	Percent
Softwoods:		
Alaska-cedar/hemlock	49	4.6
Lodgepole pine	17	1.5
Mixed conifer	240	22.4
Mountain hemlock	46	4.3
Sitka spruce	32	2.9
Western hemlock/Sitka spruce	189	17.6
Western redcedar/hemlock	81	7.6
Western hemlock	411	38.3
Total, softwoods	1,066	99.5
Hardwoods:		
Red alder	6	.3
Total, hardwoods	6	.3
All types	1,066	100.0

^a Totals may be off due to rounding. Estimates are subject to sampling error.

¹Scientific names for all trees are given in the appendix.

Table 4—Net volume of growing stock on timberland by species, unreserved national forest land, Stikine inventory unit, southeast Alaska, 1998^a

Species	----- Volume -----	
	<i>Thousand ft³</i>	<i>Percent</i>
Softwoods:		
Alaska-cedar	780,046	13.6
Lodgepole pine	30,525	.5
Mountain hemlock	339,950	5.9
Sitka spruce	1,306,178	22.7
Western redcedar	312,249	5.4
Western hemlock	2,978,647	51.8
Total, softwoods	5,747,595	99.9
Hardwoods:		
Red alder	8,052	.1
Total, hardwoods	8,052	.1
All types	5,755,647	100.0

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 5—Net volume of growing stock on timberland by forest type, unreserved national forest land, Stikine inventory unit, southeast Alaska, 1998^a

Forest type	----- Volume -----		
	<i>Thousand ft³</i>	<i>Percent</i>	<i>Ft³/ acre</i>
Softwoods:			
Alaska-cedar/hemlock	166,214	2.9	3,401
Lodgepole pine	16,982	.3	1,025
Mixed conifer	979,966	17.0	4,077
Mountain hemlock	154,775	2.7	3,330
Sitka spruce	294,504	5.1	9,200
Western hemlock/Sitka spruce	1,282,245	22.2	6,789
Western redcedar/hemlock	447,385	7.8	5,508
Western hemlock	2,376,847	41.3	5,777
Total, softwoods	5,718,917	99.4	5,366
Hardwoods:			
Red alder	36,730	.6	6,332
Total, hardwoods	36,730	.6	6,332
All types	5,755,647	100.0	5,371

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 6—Gross annual growth of growing stock on timberland by forest type, unreserved national forest land, Stikine inventory unit, southeast Alaska, 1998^a

Forest type	-----Growth-----	
	<i>Cubic feet</i>	<i>Ft³/ acre</i>
Softwoods:		
Alaska-cedar/hemlock	1,729,635	35
Lodgepole pine	258,766	16
Mixed conifer	9,030,079	38
Mountain hemlock	1,452,310	31
Sitka spruce	2,075,520	65
Western hemlock/Sitka spruce	7,593,096	40
Western redcedar/hemlock	3,914,782	48
Western hemlock	16,153,270	39
Total, softwoods	42,207,456	40
Hardwoods:		
Red alder	252,861	44
Total, hardwoods	252,861	44
All types	42,460,317	40

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 7—Net annual growth of growing stock on timberland by forest type, unreserved national forest land, Stikine inventory unit, southeast Alaska, 1998^a

Forest type	-----Growth-----	
	<i>Cubic feet</i>	<i>Ft³/ acre</i>
Softwoods:		
Alaska-cedar/hemlock	-1,354,101	-27
Lodgepole pine	117,698	7
Mixed conifer	-5,401,105	-22
Mountain hemlock	801,426	17
Sitka spruce	-355,715	-11
Western hemlock/Sitka spruce	2,473,553	13
Western redcedar/hemlock	-230,458	-3
Western hemlock	7,459,292	18
Total, softwoods	3,510,589	3
Hardwoods:		
Red alder	252,861	44
Total, hardwoods	252,861	44
All types	3,763,450	4

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Table 8—Average annual mortality of growing stock on timberland by forest type, unreserved national forest land, Stikine inventory unit, southeast Alaska, 1998^a

Forest type	----- Mortality -----	
	<i>Cubic feet</i>	<i>Ft³/acre</i>
Softwoods:		
Alaska-cedar/hemlock	3,083,736	63
Lodgepole pine	141,068	9
Mixed conifer	14,431,184	60
Mountain hemlock	650,884	14
Sitka spruce	2,431,235	76
Western hemlock/Sitka spruce	5,119,543	27
Western redcedar/hemlock	4,145,240	51
Western hemlock	8,693,978	21
Total, softwoods	38,696,867	36
Hardwoods:		
Red alder	—	—
Total, hardwoods	—	—
All types	38,696,867	36

— = no data were collected.

^a Totals may be off due to rounding. Estimates are subject to sampling error.

Glossary

Forest land—Land at least 16.7 percent stocked by live trees of any size, or land formerly having such tree cover and not currently developed for nonforest use. The minimum area for classification as forest land or subclasses of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must be at least 120 feet wide to be classified as forest land. Unimproved roads and trails, streams, and clearings in forest areas must be less than 120 feet wide to be classified as forest land. (*See also* timberland, other forest land, reserved forest land, and nonforest land.)

Forest type—A classification of forest land based on the species forming a plurality of stocking on the area currently occupied by tree cover.

Growing stock volume—Net volume in cubic feet of live sawtimber and poletimber growing stock trees from stump to a minimum 4.0-inch top (of central stem) outside the bark. Net volume equals gross volume less deductions for rot and missing bole sections.

Land class—A classification of land by major use, such as timberland, other forest, or nonforest. The minimum size area for classification is 1 acre.

Mean annual increment (m.a.i.)—A measure of the productivity of forest land in terms of the average increase in cubic-foot volume per acre per year. The minimum standard for timberland is the ability to produce 20 cubic feet per acre per year at culmination of m.a.i.

Mortality, average annual, of growing stock—The volume of sound wood in live sawtimber and poletimber trees dying annually from natural causes during the 5 years prior to measurement.

Net annual growth—The increase in net volume of wood for growing stock trees during a specified year. Components of net annual growth are (a) the increment in net volume of trees alive at the beginning of the specified year, plus (b) the net volume of trees reaching sawtimber or poletimber size during the year, minus (c) the net volume of trees that died during the year.

Net volume—The gross volume of a tree less deductions for rot, sweep, or other defect affecting product use.

Nonforest land—Land that does not qualify as forest land. Includes land that has never supported forests and lands formerly forested where forest use is precluded by development for nonforest uses. Included are lands used for agricultural crops, improved pasture, residential areas, city parks, improved roads, operating railroads and their right-of-way clearings, and pipeline clearings. If intermingled in forest areas, unimproved roads, streams, canals, and nonforest strips must be more than 120 feet wide, and clearings or other areas must be 1 acre or larger to qualify as nonforest land.

Other forest land—Forest land not capable of producing 20 cubic feet per acre per year or more of wood at culmination of mean annual increment (m.a.i.) and not withdrawn from timber use by administrative statute.

Productive forest land—Forest land producing or capable of producing 20 cubic feet per acre per year or more of wood at culmination of mean annual increment (m.a.i.).

Poletimber trees—Growing stock trees greater than 5.0 inches in diameter at breast height and less than sawtimber sized.

Reserved forest land—Forest land withdrawn from timber utilization through statute or administrative regulation.

Sawtimber trees—Growing stock trees at least 11.0 inches in diameter at breast height for hardwoods and 9.0 inches for softwoods.

Timberland—Forest land producing or capable of producing 20 cubic feet per acre per year or more of wood at culmination of mean annual increment (m.a.i.) and not withdrawn from timber use by administrative statute.

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