

DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE.

FRANCIS A. WALKER, Superintendent,
Appointed April 1, 1879; resigned November 2, 1881.

CHAS. W. SEATON, Superintendent,
Appointed November 4, 1881.

REPORT

ON THE

FORESTS OF NORTH AMERICA
(EXCLUSIVE OF MEXICO),

BY

CHARLES S. SARGENT,
ARNOLD PROFESSOR OF ARBORICULTURE IN HARVARD COLLEGE,
SPECIAL AGENT TENTH CENSUS.

**BUREAU OF THE CENSUS
LIBRARY**



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,

CENSUS OFFICE,

Washington, D. C., September 1, 1884.

Hon. H. M. TELLER,

Secretary of the Interior.

SIR: I have the honor to transmit herewith the Report on the Forests of North America (exclusive of Mexico), by Charles S. Sargent, Arnold Professor of Arboriculture in Harvard College.

This report constitutes the ninth volume of the series forming the final report on the Tenth Census.

I have the honor to be, most respectfully, your obedient servant,

CHAS. W. SEATON,

Superintendent of Census.

TABLE OF CONTENTS.

LETTER OF TRANSMITTAL	Page. ix
-----------------------------	-------------

PART I.

THE FOREST TREES OF NORTH AMERICA, EXCLUSIVE OF MEXICO.

THE FORESTS OF NORTH AMERICA—GENERAL REMARKS.....	3-16
THE ATLANTIC REGION	3-6
THE PACIFIC REGION.....	6-10
DISTRIBUTION OF GENERA	10-12
DISTRIBUTION OF SPECIES	12-16
A CATALOGUE OF THE FOREST TREES OF NORTH AMERICA, EXCLUSIVE OF MEXICO, WITH REMARKS UPON THEIR SYNONYMY, BIBLIOGRAPHICAL HISTORY, DISTRIBUTION, ECONOMIC VALUES, AND USES	17-219
INDEX TO CATALOGUE	220-243

PART II.

THE WOODS OF THE UNITED STATES.

PRELIMINARY REMARKS.....	247
SPECIFIC GRAVITY AND ASH	249-251
FUEL VALUE.....	251, 252
THE STRENGTH OF WOOD	252
COMPARATIVE VALUES	252
TABLE OF RELATIVE VALUES	253-255
TABLE OF AVERAGES	256-259
TABLE ILLUSTRATING THE RELATION BETWEEN TRANSVERSE STRENGTH AND SPECIFIC GRAVITY IN THE WOOD OF CERTAIN SPECIES	259-264
GENERAL REMARKS	264, 265
TANNIN VALUES	265
TABLE I.—SPECIFIC GRAVITY, ASH, AND WEIGHT PER CUBIC FOOT OF DRY SPECIMENS OF THE WOODS OF THE UNITED STATES.....	266-349
TABLE II.—ACTUAL FUEL VALUE OF SOME OF THE MORE IMPORTANT WOODS OF THE UNITED STATES.....	350-353
TABLE III.—BEHAVIOR OF THE PRINCIPAL WOODS OF THE UNITED STATES UNDER TRANSVERSE STRAIN.....	354-415
TABLE IV.—BEHAVIOR OF SOME OF THE WOODS OF THE UNITED STATES UNDER TRANSVERSE STRAIN: SPECIMENS EIGHT CENTIMETERS SQUARE.....	414-417
TABLE V.—BEHAVIOR OF THE PRINCIPAL WOODS OF THE UNITED STATES UNDER COMPRESSION.....	418-481

PART III.

THE FORESTS OF THE UNITED STATES IN THEIR ECONOMIC ASPECTS.

GENERAL REMARKS	485
THE LUMBER INDUSTRY	485-489
FUEL.....	489
WOOD USED AS FUEL FOR VARIOUS PURPOSES.....	489
ESTIMATED CONSUMPTION OF WOOD FOR DOMESTIC PURPOSES.....	489
CONSUMPTION OF CHARCOAL.....	489
FOREST FIRES	491-493
TABLE OF FOREST FIRES OCCURRING DURING THE CENSUS YEAR	491, 492
NORTH ATLANTIC DIVISION	494-510
MAINE	494-496
NEW HAMPSHIRE	496-498
VERMONT.....	498-500
MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.....	500, 501
NEW YORK	501-506
NEW JERSEY.....	506
PENNSYLVANIA	506-510

	Page.
SOUTH ATLANTIC DIVISION	511-523
DELAWARE	511
MARYLAND	511
DISTRICT OF COLUMBIA	511
VIRGINIA	511, 512
WEST VIRGINIA	512-515
NORTH CAROLINA	515-518
Naval stores	516, 517
SOUTH CAROLINA	518, 519
Burning off dead herbage	518
GEORGIA	519, 520
FLORIDA	520-523
Pencil cedar	522
Cypress	522
SOUTHERN CENTRAL DIVISION	524-546
ALABAMA	524-530
The Maritime pine region	525-527
Cypress swamps of the Tensas river	525-527
The forests of the Chattahoochee in eastern Alabama, mixed forest growth, etc	527, 528
Forests of the Tennessee valley	528, 529
General remarks	529
The pine belt of central Alabama	529
The pine region of the Coosa	529
Naval stores	529, 530
MISSISSIPPI	530-536
The pine forests of southern Mississippi	531, 532
The northeastern counties	532-534
Central pine hills	534
Western Mississippi	534, 535
The Yazoo delta	535, 536
LOUISIANA	536-540
Moss ginning	536-540
TEXAS	540-543
INDIAN TERRITORY	543
ARKANSAS	543, 544
TENNESSEE	544, 545
Effect of fires upon the forest	545
KENTUCKY	545, 546
Pasturage of woodlands	546
NORTHERN CENTRAL DIVISION	547-563
OHIO	547
INDIANA	547
ILLINOIS	547-550
Forest fires	550-551
Statistics of growing timber	551
WISCONSIN	551-558
MINNESOTA	558-560
Forests on Indian reservations	559, 560
IOWA	560
MISSOURI	560, 561
DAKOTA	561, 562
NEBRASKA	562
KANSAS	562, 563
WESTERN DIVISION	564-580
MONTANA	564-566
WYOMING	566, 567
COLORADO	567, 568
NEW MEXICO	568
ARIZONA	568, 569
UTAH	569-571
Lake range, west of Utah lake	570
Sanpete Valley range	570
Sevier River mountains	571
NEVADA	571-573
IDAHO	573-576
WASHINGTON	576-578
OREGON	578-580
CALIFORNIA	579, 580
Pasturage of mountain forests	580
ALASKA	

LIST OF ILLUSTRATIONS.

	Page.
MAP OF THE UNITED STATES, SHOWING THE CHARACTER OF THE FUEL USED IN THE DIFFERENT SECTIONS OF THE SETTLED PORTION OF THE COUNTRY.....	489
MAP OF THE UNITED STATES, SHOWING THE PROPORTION OF WOODLAND WITHIN THE SETTLED AREA BURNED OVER DURING THE CENSUS YEAR.....	491
MAP SHOWING DENSITY OF FORESTS IN MAINE, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS, RHODE ISLAND, CONNECTICUT, NEW YORK, NEW JERSEY, AND PENNSYLVANIA.....	495
MAP OF MAINE, SHOWING THE DISTRIBUTION OF PINE AND SPRUCE FORESTS.....	496
MAP OF NEW HAMPSHIRE AND VERMONT, SHOWING THE DISTRIBUTION OF THE PINE AND SPRUCE FORESTS.....	497
MAP OF PENNSYLVANIA, SHOWING THE DISTRIBUTION OF THE PINE AND HEMLOCK FORESTS.....	506
MAP SHOWING DENSITY OF FORESTS IN DELAWARE, MARYLAND, WEST VIRGINIA, VIRGINIA, NORTH CAROLINA, OHIO, KENTUCKY, TENNESSEE, INDIANA, AND ILLINOIS.....	511
MAP OF WEST VIRGINIA, SHOWING THE DISTRIBUTION OF THE HARDWOOD, SPRUCE, AND PINE FORESTS.....	512
MAP OF NORTH CAROLINA, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	515
MAP SHOWING DENSITY OF FORESTS IN SOUTH CAROLINA, GEORGIA, FLORIDA, ALABAMA, MISSISSIPPI, AND LOUISIANA.....	518
MAP OF SOUTH CAROLINA, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	519
MAP OF GEORGIA, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	520
MAP OF FLORIDA, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	522
MAP OF ALABAMA, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	524
MAP OF MISSISSIPPI, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	530
MAP OF LOUISIANA, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	536
MAP SHOWING DENSITY OF FORESTS IN TEXAS.....	540
MAP OF TEXAS, SHOWING THE DISTRIBUTION OF THE PINE FORESTS.....	541
MAP SHOWING DENSITY OF FORESTS IN MISSOURI, ARKANSAS, KANSAS, AND INDIAN TERRITORY.....	543
MAP OF ARKANSAS, SHOWING THE DISTRIBUTION OF THE PINE AND HARDWOOD FORESTS.....	544
MAP SHOWING DENSITY OF FORESTS IN MICHIGAN, WISCONSIN, MINNESOTA, AND IOWA.....	550
MAP OF THE LOWER PENINSULA OF MICHIGAN, SHOWING THE DISTRIBUTION OF THE HARDWOOD AND PINE FORESTS.....	551
MAP OF THE UPPER PENINSULA OF MICHIGAN, SHOWING THE DISTRIBUTION OF THE HARDWOOD AND PINE FORESTS.....	551
MAP OF WISCONSIN, SHOWING THE DISTRIBUTION OF THE HARDWOOD AND PINE FORESTS.....	554
MAP OF MINNESOTA, SHOWING THE DISTRIBUTION OF THE HARDWOOD AND PINE FORESTS.....	558
MAP SHOWING DENSITY OF FORESTS IN DAKOTA.....	561
MAP SHOWING DENSITY OF FORESTS IN NEBRASKA.....	562
MAP SHOWING DENSITY OF FORESTS IN MONTANA.....	564
MAP SHOWING DENSITY OF FORESTS IN WYOMING.....	566
MAP SHOWING DENSITY OF FORESTS IN COLORADO.....	567
MAP SHOWING DENSITY OF FORESTS IN NEW MEXICO.....	568
MAP SHOWING DENSITY OF FORESTS IN ARIZONA.....	569
MAP SHOWING DENSITY OF FORESTS IN UTAH.....	570
MAP SHOWING DENSITY OF FORESTS IN NEVADA.....	571
MAP SHOWING DENSITY OF FORESTS IN IDAHO.....	572
MAP SHOWING DENSITY OF FORESTS IN WASHINGTON.....	574
MAP SHOWING DENSITY OF FORESTS IN OREGON.....	576
MAP SHOWING DENSITY OF FORESTS IN CALIFORNIA.....	578
MAP OF A PORTION OF CALIFORNIA, SHOWING THE DISTRIBUTION OF THE REDWOOD FORESTS.....	580

MAPS CONTAINED IN PORTFOLIO ACCOMPANYING THIS VOLUME.

- No. 1.—MAP SHOWING THE POSITION OF THE FOREST, PRAIRIE, AND TREELESS REGIONS OF NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 2.—MAP SHOWING THE NATURAL DIVISIONS OF THE NORTH AMERICAN FORESTS, EXCLUSIVE OF MEXICO.
- No. 3.—MAP SHOWING THE DISTRIBUTION OF THE GENUS FRAXINUS (THE ASHES) IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 4.—MAP OF THE UNITED STATES, SHOWING THE DISTRIBUTION OF THE GENERA CARYA AND UMBELLULARIA (THE HICKORIES AND CALIFORNIA LAUREL).
- No. 5.—MAP OF THE UNITED STATES, SHOWING THE DISTRIBUTION OF THE GENUS JUGLANS (THE WALNUTS).
- No. 6.—MAP SHOWING THE DISTRIBUTION OF THE GENUS QUERCUS (THE OAKS) IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 7.—MAP OF THE UNITED STATES, SHOWING THE DISTRIBUTION OF THE GENERA CASTANEA AND CASTANOPSIS (THE CHESTNUTS AND CHINQUAPINS).
- No. 8.—MAP SHOWING THE DISTRIBUTION OF THE GENUS PINUS (THE PINES) IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 9.—MAP SHOWING THE DISTRIBUTION OF THE GENERA ABIES AND PICEA (THE FIRS AND SPRUCES) IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 10.—MAP OF THE UNITED STATES, SHOWING THE DISTRIBUTION OF LIRIODENDRON TULIPIFERA AND PINUS LAMBERTIANA.
- No. 11.—MAP OF THE UNITED STATES, SHOWING THE DISTRIBUTION OF PROSOPIS JULIFLORA, QUERCUS ALBA, AND QUERCUS DENSIFLORA.
- No. 12.—MAP SHOWING THE DISTRIBUTION OF FRAXINUS AMERICANA AND PINUS PONDEROSA IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 13.—MAP SHOWING THE DISTRIBUTION OF THE GENERA CHAMÆCYPARIS AND CUPRESSUS IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 14.—MAP SHOWING THE DISTRIBUTION OF THE GENERA THUJA, TAXODIUM, AND SEQUOIA IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 15.—MAP SHOWING THE DISTRIBUTION OF PINUS STROBUS, PINUS PALUSTRIS, AND PSEUDOTSUGA DOUGLASSII IN NORTH AMERICA, EXCLUSIVE OF MEXICO.
- No. 16.—MAP OF THE UNITED STATES, SHOWING THE RELATIVE AVERAGE DENSITY OF EXISTING FORESTS.

LETTER OF TRANSMITTAL

BROOKLINE, MASSACHUSETTS, *July 1, 1883.*

TO THE SUPERINTENDENT OF CENSUS.

SIR: I have the honor to submit the following report upon the nature and condition of the forests of the United States, to which are added statistics of the lumber and other industries directly dependent upon the forest for their support.

Mr. Andrew Robeson, of Brookline, Massachusetts, has prepared the maps which accompany this report; he has supervised the entire statistical work of this division and has conducted its correspondence.

Mr. Stephen P. Sharples, of Cambridge, Massachusetts, has conducted the various experiments undertaken with the view of determining the value of the different woods produced in the forests of the United States.

Mr. C. G. Pringle, of East Charlotte, Vermont, has examined the forests of northern New England and New York, Pennsylvania, and West Virginia; and subsequently, as an agent for the American Museum of Natural History, has greatly increased our knowledge of the trees of Arizona and southern California.

Mr. A. H. Curtiss, of Jacksonville, Florida, has studied the forests of Georgia and Florida, and subsequently, as an agent of the American Museum of Natural History, has added to our knowledge of the semi-tropical forests of southern Florida.

Dr. Charles Mohr, of Mobile, Alabama, has explored the forests of the Gulf states.

Mr. H. C. Putnam, of Eau Claire, Wisconsin, has gathered the forest statistics of Pennsylvania, Michigan, Wisconsin, and Minnesota.

Mr. George W. Letterman, of Allenton, Missouri, has examined the forests extending west of the Lower Mississippi River, and Professor F. L. Harvey, of Fayetteville, Arkansas, has gathered the forest statistics of that state.

Mr. Sereno Watson, of Cambridge, Massachusetts, has studied, during a long and arduous journey, the forests of the northern Rocky Mountain region, and Mr. Robert Douglas, of Waukegan, Illinois, those of the Black hills of Dakota.

I take this opportunity to call your attention to the faithful and admirable manner in which my associates have performed the difficult duties to which they were assigned; their zeal and intelligence have made possible the preparation of this report.

It is my pleasant duty also to call your attention to the fact that this investigation has been greatly aided from the first by the experience and knowledge of Messrs. G. M. Dawson, John Macoun, and Robert Bell, members of the Geological Survey of Canada; the information in regard to the distribution northward of the trees of the eastern United States is entirely derived from the latter's paper upon the Canadian forests, published in the Report of the Geological Survey of Canada for the years 1879-'80.

I am under special obligation to Dr. George Engelmann, of Saint Louis, Missouri, my companion in a long journey through the forests of the Pacific region, for valuable assistance and advice; his unrivaled knowledge of our oaks, pines, firs, and other trees has been lavishly placed at my disposal.

Mr. M. S. Bebb, of Rockford, Illinois, the highest American authority upon the willow, has given me the benefit of his critical advice in the study of this difficult genus. I desire to express to him and to Dr. Laurence Johnson, of New York, who has furnished me with a full series of notes upon the medical properties of the trees of the United States, the deep sense of my obligation. My thanks are also due to Mr. Henry Gannett, Geographer of the Tenth Census, for cordial co-operation in the work of this division; to Colonel T. T. S. Laidley, of the United States army, in command of the arsenal at Watertown, Massachusetts, and to Mr. James E. Howard, in charge of the testing machine there, for advice and assistance afforded Mr. Sharples while conducting the experiments upon the strength of woods, as well as to a large number of correspondents in all parts of the United States who have favored me with their cordial co-operation.

I am, sir, your obedient servant,

CHARLES S. SARGENT,
Special Agent.