

THE BEGINNING OF THE FOREST SURVEY

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"I thought that job on the Forest Survey...was the best possible job in the world. It was exploring an unknown resource, in beautiful places, with some wonderful timber—and getting paid for it."

THE WONDERS WHICH Phil Briegleb remembered from that stint of work—the dark green spill of forest from ridgeline to valley floor, the colonnade of giant boles crowding acre upon acre, the Depression-staving paycheck earned by sizing up this big timber—may have been grand, all right, but no more so than the language which spelled out the project. The Forest Survey was prescribed in Section 9 of the McSweeney-McNary Act. In that 1928 manifesto which blue-printed the Forest Service's system of regional experiment stations and set the directions of federal forestry research, one sentence sweepingly called for "a comprehensive survey of the present and prospective requirements for timber and other forest products in the United States, and of timber supplies, including a determination of the present and potential productivity of forest land therein, and of such other facts as may be necessary in the determination of ways and means to balance the timber budget of the United States."

Here was the directive for a long-needed inventory of American forest resources, both privately held and public—an accounting of whatever stands of timber remained after several generations of colossal logging. Estimates had been done before. As far back as 1876, Franklin B. Hough began the study which became the four-volume *Report Upon Forestry*



Philip A. Briegleb

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Robert W. Cowlin

U.S. Forest Service



Thornton T. Munger, 1924.

Photo from "Thornton T. Munger: Forest Research in the Northwest," An Interview Conducted by Amelia R. Fry for the Forest History Society and the Regional Oral History Office, University of California, Berkeley, 1967.

for the Department of Agriculture. But the Hough report and subsequent government forestry studies were indeed estimates rather than inventories, and the chronic argument of impending-timber-famine versus there'll-always-be-plenty-of-sawlogs raged largely without firm figures. The lack of sound information sometimes was dizzying. "In 1909," one historian has pointed out, "the Forest Service estimated that there were 400 billion board feet of timber left in the United States; in 1910, the estimate was 530 billion board feet, an increase of 32 percent"—a volume jump which was due, of course, not to instantaneous tree growth, but to variations in estimating methods and to the improved marketability of some species. When at last federal forestry research began coming into its own during the 1920s, a national forest survey stood out as an obvious and attractive project. And less than coincidentally, this nationwide inventorying would begin with the Douglas-fir region west of the Cascade Range in Oregon and Washington.

Somewhere on the scales of inducement must have been the fact that this was the home region of Senator Charles L. McNary, the Oregon Republican who had been the stalwart sponsor of such major Forest Service legislation as the Clarke-McNary Act of 1924 and the McSweeney-McNary Act of 1928. Political niceties aside, the trees themselves argued for the Pacific Northwest. Although comprising only about 30 million acres of forest land—

a fraction of the national total—the Douglas-fir region was known to have a major share of the nation's remaining volume of sawtimber. Much of it stood in tremendous old-growth stands, remnants of the Northwest timber bonanza which loggers had been cutting away at since the early 1850s, and many of those surviving stands conveniently were within the boundaries of national forests. Finally, the Douglas-fir region was the research heartland of the Pacific Northwest Forest Experiment Station, the Portland-based Forest Service facility which could be tooled up for the task of inventorying.

Planning began in earnest in early 1929. Thornton T. Munger, who had come to Oregon fresh out of the Yale graduate program in forestry in 1908 and subsequently helped to pioneer in Douglas-fir regeneration studies, had been tapped as director when the Pacific Northwest Forest Experiment Station was set up in Portland in mid-1924. Since then, Munger had earned a reputation as both taskmaster and budget-hawk, and the Douglas-fir survey would reflect his passion for detail and close management. Munger conferred at the national office during a January trip to the East Coast. In July, Earle H. Clapp, head of the Branch of Research, visited the PNW Station for two weeks to discuss the Survey. That same month funds began to flow—an initial appropriation of \$30,000—and from mid-summer on, personnel who would be instrumental in the Survey were showing up on the Station roster;

Philip A. Briegleb, Robert W. Cowlin, Floyd L. Moravets.



Horace J. Andrews

U.S. Forest Service

ALTHOUGH THE SURVEY was mandated to have four main areas—the timber inventory, an assessment of forest growth phases, a study of forest depletion, and the estimated requirements for forest products—the vital decision facing the staff was the inventory method, which would yield the basic data for the entire project.

Sweden and Finland had done their forest surveys by a line-plot method, measuring the timber volume on plots at regular intervals along traverse lines. But since much information about the Pacific Northwest timber stands already existed in the cruise records of private owners and county tax officials, and since line-plotting the jumbled terrain of the Douglas-fir region would be a daunting task, Munger and his Survey leaders decided on a compilation method. Those already-existing records would be used, supplemented where necessary, and tested for accuracy by sample cruises. On the national forest holdings, some of the country already had been covered in preparation for timber sales or land classification. For the territory which had never been cruised, one or two men from each national forest staff would carry out a timber volume estimate and construct a type map—a system, Cowlin recalls, which was grandly dubbed an “intensive application of an extensive reconnaissance.”

Even as plans for the Forest Survey were being shaped, the Pacific Northwest lumber industry was suffering economic heaves and staggers—a periodic epidemic all through the history of the industry. Slackening of the postwar boom of the 1920s had meant a decline in lumber sales and a sag in lumber prices. Now, with the onset of the Depression, lumber production was plummeting. In the Douglas-fir region, focal area of the Forest Survey, lumber production plunged from about 10 billion board feet in 1929 to 7.5 billion board feet the next year. Such economic woes threatened the cooperation which the PNW Station would need to gain private timber volume data for Survey compilations.

The issue came up prominently at the 1930 meeting of the Forest Research Council, the advisory body for the PNW Station. After Thornton Munger outlined the Survey plans, it began to dawn on the lumbermen present that their county assessors might be an avid audience for the published results—might, indeed, be inspired to boost assessed valuations if the woodland totals looked larger than had been imagined.

Promptly enough, Sol Reed of the Simpson Logging Company “brought up the question of the possible reaction upon the owners of having the County Assessors put small second growth on the tax rolls if the type maps, as published, should show these



Christopher M. Granger

U.S. Forest Service

areas." C. S. Chapman of the Weyerhaeuser Timber Company wondered whether the Forest Service totals "would not cause various counties to recruise their timber," obviously to the detriment of the timbermen's tax valuations.

Even in the dry language of the official minutes—Munger, as secretary, was uncharacteristically restraining his literary style—the meeting starts to fizz:

The problem of whether volume cruise statistics should be released on a county basis was then reopened. Dean Peavy [George W. Peavy of the Oregon State College School of Forestry] said that he thought the public and the counties needed this data and should have it. Mr. Reed said that it was not the purpose of the act to give such data to the counties. Mr. Allen [E. T. Allen of the Western Forestry and Conservation Association] spoke against releasing the data in county units and said that the assessors might increase the assessments against owners of timber, but also said that Chambers of Commerce and similar agencies would very much appreciate the release of this data on a county basis. Mr. Chapman suggested that for the time being the Station merely collect the data and decide later how it was to be used.

The timbermen stuck to their guns and won. The Survey leadership agreed that all private timber cruise data would be kept confidential and that compilations would not be released in any form that would disclose the timber holdings of any single private owner.

With that rift papered over, the plans and staffing for the Survey went ahead quickly. Washington County, on the western outskirts of Portland, was selected as the starting point, and Briegleb was assigned to gather its timber data. Early in January 1930, Horace J. "Hoss" Andrews, a forester who had directed a forest land and economic survey for the state of Michigan, was brought in as senior forest economist and regional director of the Survey.

The same week, District Forester Christopher M. Granger was appointed national director of the Forest Survey and moved his office the several blocks to the PNW Station. Donald N. Matthews from the Umpqua National Forest came north to head the teams which would gather field information on national forest lands. Robert W. Cowlin, a young California forest economist hired a few months earlier, was put in charge of assembling data on timberlands outside the national forests. Foresters were added for the measuring and compiling out in the woods.

At the end of July, they were joined by a lanky legend out of the Tennessee hills—Jim Girard, a veteran Forest Service woodsman who had the skill of glancing at a stand of trees and estimating its timber volume with uncanny accuracy. Girard had a reputation as a self-taught genius of timber cruising. At one point the aura of legend around him included the story that Chief Ferdinand A. Silcox had forbidden him to travel by plane because he was the

one irreplaceable man in the Forest Service. His presence added inspiration as well as expertise to the Survey staff.

The Survey got well under way in 1930. Munger at mid-year reported that private timber cruise records "continue to be gathered in at the rate of about one-half million acres a month." The estimable Girard was coaching survey teams in his skills of "ocular estimation." Phil Briegleb and Edward D. Buell ran a sample strip survey of 122 miles through the Willamette Valley and found that even in that most intensive farmland "from 10 to 20 percent of the area remains in some form of forest cover and less than 75 percent of the area is actually tilled." In August field work was begun in three northwestern Oregon counties, permission to use the cruise records of the gigantic Weyerhaeuser Timber Company had been obtained, and arrangements were made to experiment with aerial photography over rugged portions of the Siuslaw National Forest.

Not all the business of the Survey was straightforward data gathering. Munger reported in December 1930 that he had spent "considerable time enlisting support for [Oregon and Washington] State financial cooperation on the Forest Survey and bills to that end have been prepared." For the men in the field, Munger himself sometimes had to be a point of negotiation. The PNW Station director long had been fond of cutting budget corners by having staff members sleep in the woods or in a Forest Service vehicle while out on assignment. At least one car had been remodeled so the front seat could be folded down into a "bed," an innovation which burlier members of the staff, such as future Chief Richard E. McArdle, later remembered with regret. But on the Survey Munger's predilections quickly were headed off by Hoss Andrews, and the men found normal living quarters whenever possible.

Late in 1930 G. H. Lentz of the Southern Forest Experiment Station arrived to study Survey methods and problems, in preparation for the same project in his own region. Out of Lentz's stay in Portland came the decision that the line-plot survey would be the better method in the more uniform topography and even stands of the southern pine country. The upshot was that the Washington Office of the Forest Service and national Survey director Granger now had second thoughts about the compilation method being used in the Douglas-fir region. It was decided that a comparison should be run. Lewis County in southwestern Washington, which offered an array of forest conditions and topography, was chosen as the test area. East to west across forty townships—roughly one million acres—linear swaths of timber would be singled out at three-mile intervals. Crews would then measure timber volume on quarter-acre circular plots at ten-



Mt. St. Helens and the Lewis River Valley, Gifford Pinchot National Forest, Washington.

Photo by Leland J. Prater, U.S. Forest Service

chain (660 feet) intervals within the forested strips.

Cowlin, who had charge of the line-plot survey experiment, calculated that 960 man-days were spent in the woods of Lewis County. "The 8-hour day was unheard of," he recalled, "for in some instances it would take several hours or more to reach the line in the morning and a like amount of time or more to reach the camp, night lodging place, or automobile at the end of the day." Munger's monthly report for June 1931 almost purred a summary of the crews' habitual hours: "The Arkansas day of 'can see to cain't see' was in effect much of the time."

Rugged though the work was, Cowlin at least remembered some rewarding moments out in the big trees. Francis X. Schumacher, a visiting mensurationist from Forest Service headquarters in Washington, D.C., had profited nicely from the survey crew in a weekend poker game in Chehalis. But on Monday Cowlin and a cohort evened the score with bets on tree diameters before they were measured. "Schu had a tendency to underestimate the large old-growth Douglas-fir," Cowlin reported with relief.

The Lewis County measurements were compiled by the end of June 1931. About 486 miles of survey line had been run, marking off "about 3,888 sample plots"; the field work, Munger calculated, had cost a total of \$10,448. Now computations were made to compare the two methods of survey. They were found to be fairly close in results. The line-plot method proved a bit more precise in revealing small stands of hardwood within the big coniferous forests; the compilation method was more flexible for use in difficult terrain and varied expanses. The decision was made to continue the compilation method, not only for the Douglas-fir region but also for the ponderosa pine region survey to be carried out east of the Cascades.

After the Lewis County experiment the Survey resumed what Munger termed "the regular routine

of check cruising, mapping in place and other work connected with the Inventory phase." In August 1931 he reported: "On the private lands in the region five men were mapping in place and four men were adjustment cruising, while on the national forests seventeen were in the field." In October, Edward Buell and Warren H. Bolles were brought in from the field to begin compiling data on the first geographical unit covered by the Survey, a six-county region of northwestern Oregon. Their tabulating would consist of "compiling volumes in both board and cubic feet, compiling type acreages, the preparation of type maps, the working out of growth figures and the working out of cutting depletion for this unit." Munger saw this initial run-through as a chance to smooth out problems before the remaining ten geographical units were ready for compiling.

Through 1931 and 1932 the county-by-county inventory made its way through the timber country west of the Cascades. Munger's first monthly report for 1933 told of the next phase: "January marked the beginning of the big job of office computation and recapitulation. The eleven members of the staff, augmented by two men detailed from the regional forests and by three temporary helpers, have been at this work in both the Lewis Building and at the overflow office in the laboratory on the east side of town. . . ."

The tabulated results being readied for publication could be as challenging in their own way as the line-plot survey in rugged terrain. From the start, at Munger's suggestion and with the agreement of the Station's advisory committee, it had been planned that one form which the Survey results should take would be type maps. By different colors, these would show the age classes and species of timber throughout the region. The idea, if it could be achieved, would be something of a graphic triumph: a mapped profile of the timber stands to accompany the statistical compilations. Besides the computations, then, this cartography for the thirty-eight counties of the

Survey had to be accomplished. And the computations themselves were intricate, involving twenty separate steps of data handling.

One earlier complication had faded, however. Timber owners no longer were so chary of Survey results being published on a county basis—in fact, a mood for merger had made the lumber industry much more interested in comprehensible Survey data to suit its own purposes. The earlier stipulation that watersheds rather than counties be the statistical basis quietly vanished. But at the 1932 meeting of the PNW Station's advisory council, it was reaffirmed that "the survey should give no information as to timber valuation, only types and volumes."

The office work and what Munger called the "tag ends" of field work went on all through 1933. Then in April 1934 the Douglas-fir survey results came into print with the production of 150 mimeographed copies of the processed data and some explanatory text. For each county of western Oregon and western Washington, a set of five tables showed these basic inventory statistics:

- Volume of timber by species for each ownership class (national forest; other federal holdings; Indian lands; state, county and municipal holdings; and private ownership);
- Area of all forest cover types, by ownership;
- Area of generalized forest types, by ownership;
- Area of immature coniferous forest types, subdivided by age and how well stocked the stands were;
- Area of forest land according to quality of productive capacity.

Such were the initial Survey results to be made public. The official published version of the Douglas-fir regional survey did not make it into print for several more years. Recomputations had to be done because of rapid changes in the Northwest timber picture even as the PNW Station staff had been readying the initial mimeographed report. The Tillamook fire of 1933, which consumed some 311,000 acres, for instance, drastically changed the statistical portrait of formerly timber-rich Tillamook County. Elsewhere, continued heavy logging was just as fatal to the original Survey figures. Recomputations run in two of the prime cutting counties in 1937 showed that in Grays Harbor County, Washington, total sawtimber volume had been depleted by more than half a billion board feet a year since the 1933 inventory—much of that depletion the remnants of the area's old-growth Douglas-fir. In Clatsop County, Oregon, the depletion had averaged more than 400 million board feet per year.

Juggling such recomputations and the strictures of review by the national office of the Forest Service, Andrews and Cowlin worked at the final Survey report for the Douglas-fir region through 1936 and on into 1937. More revising and recomputing delayed publication until December 1940, when *Forest Resources of the Douglas-fir Region* at last appeared. Just as the timber inventory had been the first in the nation done under the Survey, now the



Federal Emergency Relief Administration computers and map colorists at work on the Forest Survey, Pacific Northwest Forest and Range Experiment Station, Portland, 1935. See back cover for sample of type map.

PNW Station



Coastal variety of lodgepole pine, Tillamook County, Oregon.

PNW Station

computed—and recomputed—results were the first of the comprehensive regional reports to be issued.

In more ways than had been planned, the Douglas-fir inventory proved to be a rehearsal for the grandly conceived nationwide Forest Survey. The magnitude of the inventorying and the time it consumed were to be experiences repeated in other regions. By the end of 1938, a decade after the McSweeney-McNary Act authorized the Forest Survey, some 289 million acres of forest land—about 45 percent of the total forest area in the continental United States—had been covered, and only about half of the gathered data analyzed. World War II broke off Survey work. In 1944 and again in 1949, congressional amendments to the original enabling legislation provided for resurveys to bring data up to date.

In effect the Forest Survey became perpetual. It continues even yet as an area of research at half a dozen regional experiment stations, including the PNW Station where it all began. Now the Forest and Rangeland Renewable Resources Planning Act of 1974 (the Humphrey-Rarick Act) has broadened the scope for these project teams by authorizing them to inventory all renewable resources—not only timber, but range, water, fish and wildlife, and recreation areas—by 1979. It is a vaster concept than ever before, but the first steps toward such inventorying were taken those several decades ago, when the Douglas-fir first were counted. □

Some of the material in this article is from my history of the Pacific Northwest Forest and Range Experiment Station, **Horizons of Timber and Grass**. Both that work and this article draw heavily on Robert W. Cowlin's unpublished manuscript in the PNW Station files, "Federal Forest Research in the Pacific Northwest." My interviews with Bob Cowlin and Philip A. Briegleb, both veterans of the Douglas-fir regional survey, were valuable for detail and insight. I've also made use of the PNW Station's monthly reports, 1924-1940: Thornton T. Munger, director for most of that period, wrote a remarkably lucid and detailed record of the Station's activities in those reports. The information on timbermen's qualms about the Survey is also from PNW Station archival material—The Forest Research Council Minutes of Meetings, specifically the council's fifth annual meeting, February 21, 1930.

The quote about the disparity in 1909 and 1910 estimates of sawtimber is from Harold K. Steen, "Forestry in Washington to 1925" (Ph.D. dissertation, University of Washington, 1969). That same source is the best on forest estimates compiled before the Forest Survey—for instance, the **Report on the Forests of North America**, which botanist Charles S. Sargent produced for the census of 1880; **The Forest Reserves**, directed by Henry Gannett of the U. S. Geological Survey at the turn of the century; and the volume on **Standing Timber** published by the U. S. Bureau of Corporations during its 1913-1914 examination of the lumber industry.