In the end, history bypassed Goryōrin, its planners, and plans. By then, however, the professional foresters and work crews operating under Property Office authority had made a lasting impact on woodland of the realm. The several aspects of their effort were deeply interconnected, of course, and disaggregating them is awkward, but doing so may help clarify what they did and did not achieve, why, and with what consequences. To that end, their exertions can be examined in terms of forest mensuration and research, afforestation and aftercare, technological adaptation, logging practice, and, by way of summation, a look at the outcome.

MENSURATION AND RESEARCH

Forest mensuration, one of the world’s more arcane arts, commands attention because it was central to the Property Office’s entire managerial effort. The relatively simple task of measuring acreage gradually gained accuracy as surveyors were trained and deployed and as surveyor’s levels and the techniques of triangulation were introduced and adopted. The much more difficult tasks of estimating stumpage volume and predicting timber yield advanced more slowly. But “eyeballing” did give way to increasingly refined techniques of estimation. And programs of research gradually produced yield tables appropriate to particular locations and tree species throughout Japan.¹

To elaborate, initially Goryōrin foresters employed the simple measuring system adopted by the Forest Agency in its 1879 mensuration manual, Shakujime shidashi benran. It applied a single eyeballing technique to all species of tree, instructing foresters to measure a tree’s diameter at eye level and to figure a one sun (3.03 cm) reduction in diameter for every ken (1.82 m) of trunk height. The method was useful for measuring conifers growing in dense plantation stands, but it seriously overstated trunk volume in most natural stands. So the guideline was
modified a few years later by the simple expedient of applying it to only fifty percent of the stumpage on such sites.

In its management plan of 1899, the Property Office spelled out new methods of mensuration. These called, in some circumstances, for the measure of every tree; in others, for the establishment of sample plots from which general estimates could be made. In the latter case stumpage on a sample plot was to be measured in this five-step manner:

1. Measure the diameter of each tree [in the sample plot] at eye level (4 shaku 3 sun above the ground) using an outside caliper (rinjaku). But round up any fraction over a half-sun. [1 shaku = 30.3 cm = 11.93 inches; 1 sun = one-tenth shaku]
2. Classify all the trees [by size] into five or fewer classes and calculate the total basal area [at eye level] for each class.
3. Using the basal area of each class, estimate the average eye-level diameter and use this figure as the sample-tree diameter [for this class].
4. Selecting a sample tree in each class, have it felled and measure its volume of wood [using the mid-diameter measure of each 2-ken log].
5. By comparing the basal area of the sample tree to that of the entire class, calculate wood volume for the class and thence for the whole sample plot.

In later years the Property Office tightened its mensuration guidelines, but it continued to advocate both full stem counts and estimates based on sample plots.

Thus regulations of 1913 specified that in preparing stumpage estimates for parcels up to 10 chôbu in size, one should select at least two sample plots, each one one-twentieth to one-fiftieth the parcel’s size; for parcels over 10 chôbu, use three sample plots one-fiftieth to one-hundredth the parcel’s size. For estimating sample plot stumpage, they replaced the Tokugawa-era “eye-level” method with “diameter at breast height” (dbh), a formulation that in fact changed the height of the measurement very little while seeming better suited to workers using calipers. And whereas the procedure of 1899 called for creation of five or fewer tree-size classes when determining sample trees, that of 1913 stipulated a separate class for each sun of increase in diameter. Lastly, it required a new, reputedly more accurate method for determining volume of the sample tree in each class.

Household foresters also started developing their own yield tables to provide estimates of the volume of wood in plantation stands of select species in designated areas and to permit projections of growth so that they could calculate sustainable rates of harvest. In practice, however, errors of mensuration and flaws in yield tables contributed to actual harvests that were well over or under estimates, to the dismay of either the Property Office or the logging contractor. By the 1920s, this situation, along with general development of the profession, was prompting active