Lessons from the Forest Service Experience Applied to Wisconsin.

Given a vast unknown inaccessible mountainous region of several million acres to manage so as to produce the greatest possible sustained income from the land was the problem that confronted us in the Forest Service over twenty years ago in the West.

Today, in Wisconsin, the same problem confronts us and is especially acute in the northern half of the state, although the land is not so rough or inaccessible. One of the first essentials of the management of anything is a plan, and so the first thing done by the Forest Service was to have some plan of management, crude though it might be, which could be improved and modified with better knowledge of conditions.

**Essentials of a Forest Working Plan.**

In order to have any kind of a rough plan for the forest I found it was necessary to know the following things:

1. How much timber there was and where it was located.

2. The age classes of timber, its rate of growth, and whether it was going backward or not. This decrement or loss due to over-maturity of the timber is of great importance, for in the case of over-maturity, where the market would warrant, we would cut there first, before windfall and disease got the upper hand. I just recently received a letter from a friend of mine in the Canadian Service who states that Canada is putting on a big National Forest Inventory and will have twenty growth study parties in the field, and will not only study the annual increment that its forests are putting on each year, but also make studies of the annual decrement or loss going on due to over-maturity of its forests. That is the way Canada is meeting the need of a land inventory and appreciates the use of growth studies and the necessity of selling and cutting timber before it goes backward.

3. The burned areas and the areas of no timber where planting might be resorted to.

4. The areas of better soils which might be blocked out as agricultural.

5. A study of the silvicultural requirements of the trees and the reproduction in order to determine cutting methods to perpetuate the valuable species.

In order to ascertain the above it involved a land inventory. My bear paw snowshoes were in demand all winter taking me in many inaccessible regions mapping timber, old burns, etc., that we might better know our forest, and its most marketable timber.

How does this apply to us here? The Wisconsin Land Economic Inventory is making just such a study to determine the above facts
which were considered necessary by the forest service before any crude plan of forest management could be adopted. Our present inventory will give us maps showing the location of the timber of the state, its kind, size, age, etc. It will give the total estimate of timber on the ground by species, its rate of growth and predictions for the future yield. It will give all the open and burned over areas where planting might be desirable, the areas of swamps, lakes, land now in agriculture, etc., besides many things on game and fish not pertaining to this article.

And so then we are just starting something (we have only been in two counties) to give us such facts which are essential before any kind of a working plan or system of management for the northern part of the state can be attempted.

In any plan of timber management one of the first essentials is to know the kind of timber producing the greatest income and its silvical requirements so that a proper method of cutting may be used to perpetuate this desired species. I think here in this state we are inclined to consider all areas of green as satisfactory timber land, where as a matter of fact, we have many thousands of acres that are producing no income whatever, I refer to our vast forests of pin-cherry, scrub-oak, and scattered popple. Mr. Goodman rightly pointed out that rather than talk of selective cutting as applied to all timber, it is better to say a plan of management, as selection cutting does not, in my judgment, apply to pine timber, and if practiced too restrictively in this state is liable to lead to the predominance of maple, and the exclusion of yellow birch and basswood. Restrictive cutting may lead, therefore, to the predominance of the weed tree and the exclusion of the desirable.

I quote the following from a technical report I wrote for the Coeur d'Alene National Forest over twenty years ago, which shows a similar problem to that here. "The problem of maintaining the white pine stand on this forest will not be an easy one. Actual counts of seedlings and young trees made on plots where white pine runs over fifty per cent of the mature stand, show that for every young white pine tree found in the reproduction, there are from one to three hundred white fir or hemlock. Numerous examples of this inferior reproduction can be found on all parts of the forest.

The loss incurred by allowing fine stands of white pine to deteriorate into stands of white fir and hemlock is great, as the following stand of merchantable timber is not only poorer, but the forest has no longer the ability to seed up with the proper species. It is noticeable, however, on this forest that wherever there are old burns or open places the reproduction is in most all cases of the more desirable kinds of timber. Such examples as these have helped in the solution of a proper cutting system. The problem has been to find some method of cutting that would meet the silvical demands of the species to be favored, and keep the poorer species from becoming the predominant stand." This lead to clear cutting in strips and the group seed tree method.

In my last paper I endeavored to show how much more favorable clear cutting methods were for the reproduction of yellow birch than a restrictive or selective system, as shown by a recent study made in the Adirondacks. Clear cutting does not mean desolation or destruction of our forests as so many seem to think, but it is a
scientific method of forestry management adapted for the reproduction and better growth of intolerant species such as our yellow birch, basswood and pine.

Knowledge of Rate of Growth Fundamental.

In any plan for forest management it is necessary to know how fast the various species grow so that we may determine the most valuable species to raise, predict its growth in fully stocked stands at any age, and the financial return. The growth study recently made in Vilas County, Wisconsin, reveals a wide range in the rate of growth of the various species in board foot production and I think is quite conclusive as the most desirable species for financial return.

<table>
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<tr>
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<th>Volume in 50 years</th>
<th>Volume in 100 years</th>
<th>Volume in 150 years</th>
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<tbody>
<tr>
<td>White pine</td>
<td>30</td>
<td>330</td>
<td>1200</td>
</tr>
<tr>
<td>Norway &quot;</td>
<td>100</td>
<td>470</td>
<td>1000</td>
</tr>
<tr>
<td>White spruce</td>
<td>10</td>
<td>200</td>
<td>620</td>
</tr>
<tr>
<td>Yellow birch</td>
<td>none</td>
<td>90</td>
<td>240</td>
</tr>
<tr>
<td>Maple</td>
<td>none</td>
<td>Av. Dia.</td>
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<td></td>
<td></td>
<td>6 in.</td>
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<td></td>
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<td>None</td>
<td>75</td>
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In one hundred and fifty years the white pine has produced a board foot volume of sixteen times that of the hard maple, and in one hundred years Norway pine has produced twenty-seven times the cubic foot volume of the hard maple. Can there be any doubt, therefore, as to the species to encourage in the northern part of the state, especially as most of our land is adapted to the growing of pine and spruce as well as having a favorable climate for these species?

In fifty years Norway pine has a big lead over the others and probably would be most valuable for short rotations for the production of pulp. Spruce will probably do much better in planted stands as in natural stands it is growing the greater part of its life under suppression. Therefore the figure of 820 board feet, the maximum growth found for white spruce for one hundred and fifty years, would probably be nearer correct for this species.

Planting

One of the first things we endeavored to do on our National Forest twenty years ago was to locate old burns and open areas not restocking with timber, and endeavor to restock them either by seeding or planting. I had charge of seeding twenty-four hundred acres with corn planter and planted possibly two hundred acres to white pine and Douglas fir another time and we endeavored to seed and plant on the most open and most favorable planting areas first. Planting was soon found to be the most successful method.

Here, in Wisconsin, therefore I believe it would be very desirable to plant up with pine or spruce our most favorable open areas first, as mapped by the inventory, then underplant with the same species our scattered popple, pin-cherry and scrub-oak lands, gradually converting them back to their original pine type and to a species that
will yield good financial returns. The growth study has shown that white pine will grow well under popple stands up to a density of about 50%. After that it is shaded out.

I do not believe it would be possible to convert our hardwood stands, even if we so desired, over to pine and spruce and therefore, I believe they should be left under a good form of management to produce the most rapid growth of the most desirable species. Growing as they do on the more valuable soils they will doubtless be used more and more as a woodlot proposition.

The popple, pin-cherry and scrub-oak stands, however, could be converted by planting into pine and spruce. This, of course, would call for a far greater nursery output which would be the first thing necessary in any planting plan.

Financial Rotation or When to Cut

There was one other important point we endeavored to ascertain on our national forest. This was as to the best rotation or when to cut or what is known as the best financial rotation. I believe we found this to be only about seventy-five years even for saw log timber.

Here we find that for pulp material in a planted stand the best financial rotation for white pine would be about sixty or seventy years and for Norway pine about forty years, figuring 3% compound interest on the investment.

For saw log material the best financial rotation for white pine would be probably from 110 to 130 years and for Norway pine about ninety years, at 3% compound interest on the investment. This would mean a diameter at breast height for pulpwood on an average of eleven inches for both white and Norway pine and twenty three or twenty-four inches for white pine and twenty inches for Norway when cut for saw timber.

Summary

The experience from National Forest work shows the following needs:

1. An inventory of our stock. (To show our timber, its kind, location, age, rate of growth, decrement, and its silvical requirements to perpetuate itself.)

2. To know our large areas of open non-agricultural lands that are not restocking to a species of value.

3. To plant first, those very favorable areas, to pine and spruce, and second, underplant our vast areas of popple, pin-cherry and scrub-oak gradually converting them into revenue producing species, so they will be assets and not losses to the community.

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