EDUCATIONAL.

Forest Ranger School.

The Regents of the University have established a department of Forestry in the College of Agriculture for the purpose of organizing courses of study for the training of Forest Rangers, and also to give instruction to both long and short course students in agriculture, in the care of woodlands, especially the management of farm woodlots.

The practice of forestry by the owners of timber land, the organization and rapid development of definite forest policies by the states, and the organization of forest fire protective associations, are bringing about a demand for young men who have had practical training in Forestry. It will be the aim of the Ranger School to meet this demand by preparing men for such secondary positions as rangers, guards, tree planting experts, nursery foremen, and other positions with lumber companies, commercial nurserymen, and the owners of timber estates. Young men who have already gained some experience in woodcraft and in practical lumbering operations will find this course of especial value, as they will receive training which will fit them for the more expert quality of service which is demanded by modern methods of handling timber holdings.

This two year course is not offered as a complete education in Forestry. On satisfactorily completing the course, the student will be a trained ranger or guard, or an expert in tree planting and forest nursery practice, but he will not be a professional forest engineer.

The life of a ranger is a life in the woods, and no one should enter the school with any misunderstanding in this respect. Students who are not physically able to do hard woods work and who do not care for the rough outdoor life, are advised not to enter the course.

Facilities for the Course.

The Ranger Course will be offered in coöperation with the State Board of Forestry, field instruction being given on the state forest reserves. It is not expected, however, that the men trained in this work will be used exclusively in the State Forest Service.

By this coöperation with the State Board of Forestry, special facilities are offered for the student to gain practical training in forestry. A term of instruction will also be given each year at the College of Agriculture, thus providing facilities for instruction not only in Forestry, but also in the other closely allied subjects.

The state forest reserves now comprise about 400,000 acres, principally located at the headwaters of the Menominee, Wisconsin, and Chippewa rivers, in the counties of Forest, Oneida, Vilas, Iron, and Price. The reserves are divided into districts with a forest ranger or patrolman in direct charge of the field work in each district.

A large forestry headquarters building with boathouse, barn, storehouse, wood and ice house, etc., has been erected at Trout lake, in Vilas county. Here is located the main forest nursery which contains some 2,500,000 young trees that will be planted on lands denuded through lumbering, followed by forest fires. Another forest nursery will be started at the Carr lake ranger station in the spring of 1913, and it is planned to have eventually at least, a small forest nursery at each ranger station.

Comfortable houses for the rangers, with barns, wood and ice houses, etc., have already been built at the following ranger stations: Little Carr lake, Plum lake, Oxley and Rest lake; and during the winter of 1912–13, houses will be built at Star lake and Carroll lake. All ranger stations are connected by telephone with the nearest towns and with the forestry headquarters building.

General Plan of Course.

The Forest Rangers' Course includes work during two years, arranged each year according to the following plan:

(1) Work at the University from January 7, 1913, to April 15.

(2) Work on the state forests under the direction of the Professor of Forestry and in coöperation with the State Board of Forestry, from April 16 to July 31.

During the field instruction period, the student will receive board and lodging, but will be expected to devote practically one-half of such period to practical work in connection with the instruction work.

(3) From August 1 to November 30 the student may continue his work on the forest wholly under the direction of the State Board of Forestry. For this period he will receive, in addition to maintenance, $40.00 per month.

During the season of 1913, from August 1 to November 30, the State Board of Forestry cannot take over ten or twelve students; and this number will be selected at the end of the field instruction period, depending upon progress made and standing during the course.

Location of Field Work.

The field instruction will be conducted for the most part at the field Headquarters Camp of the State Board of Forestry, which will be placed at the disposal of the school. This camp is in the center of the state forest reserve region, and is located on Trout lake, which is some twelve miles north of Woodruff, Wisconsin, a station on the Chicago and North Western Railroad. The region offers an exceptional opportunity for the student to study all phases of forestry, especially from the standpoint of fire protection, which is the greatest problem confronting lumbermen and foresters. Side trips will be taken to all points of the reserve and much of the time will be spent in tents during the summer months.

After the close of the field instruction period selected students will be assigned work under the direction of the State Forest Rangers during August, September, October, and November. Exceptional opportunities will be given the student to gain practical field experience in the various lines of forestry management, such as making roads, trails and fire lines, building bridges, telephone lines, and lookout towers; establishing section lines and corners, fighting fires and patrolling, burning slash, and studying the tree growth and logging methods.

The nursery work will be carried on at Trout lake and Toma-

hawk lake throughout the season, and practical work in cone collecting, seeding, care and protection of seedlings, planting, transplanting, and field planting will be an important feature of the work of the student.

Tuition and Fees.

Tuition for residents of Wisconsin	Free
Tuition for nonresidents	
First term (at University)	$7.50
Second term (in field)	7.50
Incidental fee (for all students)	
First term (at University) (including medical and gymnasium fees)	4.00
Second term (in field)	2.50
Laboratory fees (for all students)	
First term (at University)	5.00
Second term (in field)	7.50
Key and breakage deposit (balance refundable)	2.00
Other expenses	
Books, approximately	15.00
Board and room (at Madison) approximately, per month	25.00
Board and room (in field) furnished free at headquarters camp by State Board of Forestry as compensation for practical work done.	

A list of rooms and boarding places, to aid students in securing desirable accommodations at the University, will be furnished upon application. All students live in private homes, as the University has no dormitories.

Mail should be addressed to the College of Agriculture, Madison, Wisconsin, and marked "Ranger Course."

Courses of Study.

First Year.

Dendrology and Silviculture	Woodcraft.
Soils	Meteorology.
Land Surveying and Mapping	Fish and Game.
Introduction to Forestry	First Aid to Injured.
Physics	Mechanical Drawing.

Second Year.

Forest Measurements (Cruising)	Silviculture.
Utilization (Lumbering)	Forest protection.
Tree diseases	Forest Law.
Forest Entomology	Forest Administration Policy.

Every student will be given a thorough physical examination by the medical examiner, and will be required during the Uni-

versity term to take two half-hour periods per week of development exercises and athletic drill. These activities are carried on in the stock pavilion which has been equipped with facilities for this purpose, including gymnastic and athletic apparatus, lockers, and shower baths. Lectures on hygiene and the laws of efficient living will be given by members of the department of Physical Education.

The Ranger Course will be in charge of Assistant Professor F. B. Moody, formerly Assistant State Forester of Wisconsin. The courses in Soils, Land Surveying and Mapping, Mechanical Drawing, Entomology, Tree Diseases, and Physics will be given in various departments of the College of Agriculture, and all other courses in the department of Forestry.

Description of Courses.

First Year.

Dendrology (In department of Forestry). Characteristics of the important timber trees of the lake states. Forest regions of the U. S., their commercial importance and distribution in Wisconsin. Detailed study of the species of trees native to Wisconsin. Field practice.

Silviculture (In department of Forestry). Relation of forests to factors of soil and climate. Factors influencing growth and distribution of trees. Seed production, time of seeding, cost of gathering seed, raising of seedlings, transplanting, field planting. Methods of handling species especially adapted for Wisconsin conditions. Field practice.

Soils (In department of Soils). Origin, classification, physical and chemical composition. Relation between forest growth and soil condition. Effects of tillage and fertilizers. Differentiation of agricultural and forest lands. Field practice.

Land Surveying and Mapping (In department of Agricultural Engineering). Land survey; Scheme of U. S. public land and other surveys in the U. S. Problems involved in relocation of old land surveys. Methods of relocating adapted to forest work. Demarcation of forest boundaries. Use of surveying instruments, such as hand level, compass, transit, aneroid barometer; theory and practice of compass, and chain surveying.

Field work will include running lines, pacing, locating and establishing section corners, topographic mapping.

Mathematics (In department of Forestry). Mathematical operations of simple surveying.

Introduction to Forestry (In department of Forestry). Brief history of forestry and its development in Wisconsin.

Second Year.

Forest Measurements, Cruising (In department of Forestry). Use of various log rules. Method of measuring logs, lumber, bark, piling, etc. Determination of rate of growth in height and diameter of trees and volume of single trees and stands. Field practice.

Utilization (In department of Forestry). Logging and milling (cutting and skidding). Methods of manufacture of pulp, lumber, veneer, charcoal, woodenware, etc. Uses of the various wood produced within the state and points of production. Wood preservation. Logging tools and implements (costs).

Tree Diseases (In department of Plant Pathology). Local diseases of the more important timber trees. Life history and methods of control.

Forest Entomology (In department of Economic Entomology). Description and life history of insects injurious to forest trees of the lake states region. Methods of control.

Forest protection (In department of Forestry). From fires, wind, insects, etc. General scheme for state forest reserve. Fire lines, purpose of; how constructed, where located, costs. Source of danger from fire, campers, fishermen, hunters, settlers, locomotives, lightning.

Telephone lines. Construction. System used—ground line, pole line, tree line. Equipment used per mile and per station, costs. Maintenance. Fire tools, cost.

Roads. Laying out, grading, building, purpose of, cost per mile. General plan of roads for reserve.

Lookout towers. Location. Construction, steel and wood; specifications of; cost. Methods of locating fires, use of maps, etc. Reports.

Ranger cabins and barns. Requirements for ranger. Methods of construction and costs.

Physics (In department of Forestry). Lectures on the elementary principles of solids, related to the subject of forestry. Pulleys, lever, resultant of forces, friction, jack screws, humidity. (For students who have not had high school physics.)

Meteorology (Special lectures). Weather forecasting and observation. Storms, winds, humidity.

Fish and Game (In department of economic Entomology). Care and propagation. Habits, usefulness and protection.

Forest Law (Special lectures). Leases, titles, conveyances, abstracts. Federal laws and laws of states regarding fires, trespass and taxation.

Forest Administration and Policy (In department of Forestry). Organization of state service. Qualifications. General plan of development of the Forestry Board.

First Aid to the Injured (Special lectures).

Woodcraft (In department of Forestry). Camp practice and cookery, packing, care of horses. Supplies for field trips and costs of supplies and camp outfits. (Given in the field.)

Lectures on Forestry.

During 1911 and 1912 a number of lectures on forestry were given throughout the state to various clubs and associations, and in nearly every case lantern slides were used to illustrate the difference between ordinary lumbering operations and forestry methods. The public as a whole know very much more about the general principles of forestry than they did a few years ago, as so much has been written about the conservation of natural resources, but there is still a rather general impression among many people that forestry is horticulture or landscape gardening. Of course this is an absolutely wrong impression, as forestry is the management of timberlands so as to insure successive crops of timber, and a continual campaign of education is necessary in order that the people of the state may appreciate the great economical questions that are involved in the conservation and systematic management of the forest resources of Wisconsin.

The staff of the Forest Products laboratory, which is located at Madison, during the winters of 1910–1911 and 1911–1912, gave some sixty lectures on the general principles of forestry, the course being open to all students of the University, and they

also gave a technical course, of about the same number of lectures, on the utilization of forest products and wood preservation, to the junior and senior students, in the College of Engineering.

Study of Farm Woodlots.

During the summer of 1912 Professor O. L. Sponsler, of the Department of Forestry, University of Michigan, made a preliminary study of the condition and present management of farm woodlots in three typical counties of Wisconsin, namely, Sauk, Lincoln and Manitowoc. A large amount of data was secured which shows quite clearly what must be done to improve the condition of the farm woodlots in each of these counties. It is intended to publish this information in the form of bulletins, one for each county, and to send them to the farmers. Following is Professor Sponsler's general report with his conclusions and recommendations:

Typical Woodlots of Wisconsin.

During the summer of 1912 a study was made of the farmers' woodlots and of the economic or other factors relating to their development or lack of development. The work was done under the supervision of the State Forester.

Three counties were covered,—Sauk, Lincoln and Manitowoc, chosen because they represent more or less typical regions of the state. Sauk county is representative of a considerable area of hilly country, part of which is more suitable for growing timber than agricultural crops; Lincoln county, of a region on the frontier of farming, where timber interests and farm interests meet; Manitowoc county is representative of a hardwood pine country after it has been under cultivation for a generation or more.

The work was of a general nature leading to a more detailed study of the individual woodlot and of the influences acting upon its development. Data was collected in each county to show the present condition of the wooded areas, and their treatment; the attitude of the farmer toward his woodlot; locations were noted for later detailed work, which will determine the value of the different methods of treatment of woodlots and the kind of woodlot best suited to the locality.

This report is in the nature of a summary of the data collected and the conclusions drawn from them. It should be understood that before recommendations other than of a most general and approximate nature can be made, sufficient data from specific detailed field studies must be collected.

Improvement of the woodlots throughout the state might then be obtained by a persistent diffusion of the recommendations and conclusions. Model or demonstration woodlots would be of great value to show the woodlot owner in his own locality what could be done with a little proper care.

Sauk County.

Sauk county, situated in the south central part of the state, contains about 24 full townships. The Wisconsin river forms its southern boundary. The rainfall averages 30 inches, of which half comes during the 21 weeks of growing season between May 10 and October 1. Corn yields well and quite a little tobacco is grown in this county.

About half of the county is rather steep slope land, one-fourth quite level table lands, and the remaining fourth is level river bottoms and prairie. The table lands are from 200 to 400 feet above the valleys and prairies.

Practically all of the land that is fit for the plow is now under cultivation. The land can be roughly classified as follows:

Total area of county	532,000 acres	100%
Cities and villages	6,000 acres	1%
Cultivated	180,000 acres	35%
Woodland	88,000 acres	17%
Brush and pasture lands	220,000 acres	40%
Swamp, sand barrens, rock	38,000 acres	7%

In the western part of the county the farms average about 120 acres, the table-lands and valleys are cultivated and the slopes left are covered or partially covered with woods. This part is essentially a dairy country and all land available is used for pasture.

In the eastern part the farms are generally smaller. The method of farming is rapidly changing over to dairy farming although very large areas here are without water.

This brings up the problem of the value of combined woodlot and pasture. It is generally held among foresters and by a large percentage of the farmers that the greatest income from the land is not derived when woodlots are pastured. This should be determined by experimental areas.

The woods are mainly hardwoods with a little jack pine on the north side and south side of the county. The amount of woods distributed over the county varies with the distance from the railroads. The amount of land cleared seems to be governed by the distance from a shipping point for wood products. In this county the townships within a five mile haul of railroads contain less than 15 per cent of wooded land, while those farther away run from 20 to 30 per cent wooded. From the agriculturists' viewpoint, the country as a whole has almost the ideal proportion of woodland, i. e., nearly 20 per cent.

By far the greater area of timberland is under oak. The ridges and hills, generally nonagricultural lands, are covered with young stands of oak, 30 to 50 years old, much of it will yield 25 to 30 cords per acre or more. The ridges in the vicinity of Baraboo are covered for many square miles with this kind of growth in almost unbroken stands. The land is divided into small plots of 10 to 90 acres and owned by farmers who live often several miles away.

This type of woods has reached a stage at 30 to 50 years old, where the advice of the well trained forester is needed in its treatment. At present it is in excellent condition, but unless proper care is taken the stand will rapidly deteriorate, and the result will be a large area of "oak openings" such as are now common in the older settlements of Ohio and southern Michigan, non-productive and undesirable.

The four or five townships on the north side of the Baraboo river are rather sandy and have scattered woodlots of scrubby oaks and in places considerable jack pine. About one-tenth of this poor area is covered with woods.

There is another long, narrow, sandy area of less extent in the southern part of the county along the bluffs of the Wisconsin river. A great deal of this sandy country is not fit for agriculture, although attempts are made and failures noted. It does, however, grow pine at a fair rate. At present the woods are in an open and altogether unprofitable condition and no attempt is made to improve them.

In a few valleys and on richer slopes there are still left small areas of maple-basswood or elm-ash woods, which have not been cleared for the plow. Some of them are in excellent condition, but most of them are culled or too open. In some places white pine has formed an important part of the woods.

Although several thousand cords of fuel wood are shipped out of the county each winter, the cities and villages report a scarcity of firewood. A few portable saw mills and several stationary mills take care of the local work. Generally throughout the county the wood is used up to the best advantage. Very little dead stuff is left in the woods and cordwood is cut down to two inch sticks. Often the tree is cut to produce the best in logs, then ties, then fuel wood. The latter, however, is the chief product.

There will be very little land cleared in the future. The farmers want to keep the woodlots they now own to raise wood; and many realize that they must have young trees, middle-aged and old ones, if they expect to cut year after year. Many realize, too, that in order to have small trees start, they must keep the cattle out of the woodlot. Only a few stop to consider the effect of grass in the woodlot, or the benefit of a dense fringe of limby trees or brush on the border of the woods. A number of farmers cut only the large trees and allow the small ones to grow. A few cut clean and allow the sprouts to form the next generation of woods.

The woodlots in Sauk county are not in a deplorable condition, by any means. It is true however that most of them could easily be made to yield more than they do at present. Very few farmers have any definite idea of the amount of wood they take from the woodlot year after year, and still less of the amount of wood their woodlot is growing every year.

Work on typical areas of woods on the Baraboo ridge in the eastern part of the county, in the sandy regions, and on the slopes of the western ridges, should be carried on to show in dollars and cents how much the woodlots are now earning and how much they could earn under proper treatment.

Further, a careful study of the coppicing power of the oak in various parts of the county should be made. This is extremely important to the future of the oak woods now existing. When this information is once gathered it should be persistently distributed to woodlot owners. A few demonstration areas, state owned, on which typical methods of care of the woodlot are shown, would pay the state well. A rather radical suggestion for this county, but not at all impractical, is that the county own a good share of the sandy lands especially, and perhaps some of the oak ridges, and take care of them on good forestry princi-

ples, either through a county forester or through the State Board of Forestry.

The care of woodlots in Sauk county could not be improved to any appreciable extent by legislation, that is, through partial or complete exemption of taxes. A man on the ground with figures showing what woodlots are earning and what they can earn will accomplish much and cost little.

Lincoln County.

Lincoln county, situated in the north central part of the state, contains 30 full townships. The rainfall averages 32½ inches, annually, of which 15½ inches fall during the 15 weeks growing season between June 1 and September 20.

The surface of the county is rolling with generally low hills. The northern half of the county is fully 20 per cent swamp, the southern half a trifle more than 5 per cent; some of these may be drained. A rough classification of the land follows:

Area of county	564,000 acres	100%
Swamp, rough, rocky	113,000 acres	20%
Cultivated	20,000 acres	4%
Timber and brush land	423,000 acres	76%

About 80 per cent of the county is agricultural land and only 20 per cent is owned as farms, and only four per cent is broken by the plow. Lumber companies, land companies, speculators and large interests hold over 425,000 acres, while farmers hold 125,000 acres as farms. The farms are naturally more or less segregated.

From the viewpoint of development there are three classes of land, distributed in fairly well defined regions.

1. Unimproved, mostly timberland, some brush land.
2. Partially improved, now undergoing development.
3. Old, well developed farms.

The partially improved farms are scattered throughout the region, and occupy only about one-third of it.

The farms are generally large, 120 to 160 acres, although there are some less than 80 acres. Dairy farming seems to be the future method.

The forests in the county are four-fifths hardwood, or hardwood and hemlock, the remaining one-fifth is a strip on the north side of the county of jack pine and Norway pine stands. The swamps of spruce and tamarack would reduce both the hardwood and pine areas by about proportional amounts.

Very little of the sandy pine lands are improved, although a considerable amount is cut-over.

The hardwood and hemlock lands in the western half of the county are covered with a stand of timber that will take the lumbermen owners about twenty years to cut; in the eastern half the lands are mostly cut-over and settled, with scattered farms. A few townships in the south and southeast have been quite densely settled for a generation, and here although there are not as many woodlots as is desirable, they are generally in good condition.

In the area partially developed the land is in several stages of improvement from forest and brush land to stump pasture and tilled land. The forest is a necessity here to provide an income while part of the land is being cleared. A great deal of the woods left for the farmer has been exploited, leaving culled or young stands.

The woodlots in the southern area of improved lands are generally older with good stands of hard maple, yellow birch, basswood and hemlock. There are large areas of aspen scattered through the farm areas, and in many places the aspen is the only wood growing on the farm.

The woodlots in the hardwood area are found to be in the following conditions:

1. Burned-over lands now grow up to aspen of various ages.
2. Cut-over clean and now grown up to young yellow birch, basswood, hard maple, and some hemlock, often spots of aspen.
3. Cut-over for logs only, leaving culls which will make bolt wood and fuel.
4. Cut-over for white pine only, leaving a hardwood-hemlock stand of log timber and small stuff.

Ash, elm and soft maple enter into the composition, especially of the third class mentioned, that in which only logs have been removed.

Little thought is given to the woodlots, except as to how they can be exploited. Very few are suffering from grazing, because there is a large area of woods and few cattle. On the new farms the tendency is to clear the land as rapidly as it can be afforded, and generally the land that is not cleared is covered with brush and young stuff that would not pay immediately for its own clearing.

The wood that is cut is used up fairly well, for there is a market for everything, even to shaky, punky stuff, which can be sold for lime-kiln fuel wood. A local market is created for bolt wood by the manufacture of boxes, handles, hubs, excelsior, woodenware, etc., while the tannery takes the hemlock bark.

There is too much wood all around the people here in Lincoln county, and too great a desire to get the land cleared, to get them to consider with much seriousness the necessity of looking forward to a future supply. On almost every farm there will be an area left for woodlot, much of it will be young, because that is the only timber it would not pay to cut now. There is little that can be done now in this type of partially developed country for the betterment of woodlot conditions, unless it is a material aid in fire protection and a persistent system of warnings against killing out the young growth by grazing. If this is carried out, the forest growth will take care of itself, for it has several species prominent throughout (hard maple, yellow birch, basswood and hemlock) that, by their development of crown, keep the woods in prime condition with almost no help from man.

Exemption from taxes of a limited area for each farm might be a stimulus to the preservation of woodlands. Definite knowledge should be obtained in this county concerning the growth of the four or five important species, so that when the demand comes for the application of this knowledge the state will be in a position to aid immediately.

Manitowoc County.

Manitowoc is situated on Lake Michigan, about midway between the north and the south ends of the state. It contains about 16 full townships, with over 30 miles of lake front, and extends inland on an average about 20 miles. The rainfall averages 30 inches, of which 15 inches comes during the 22 weeks of growing season between May 9 and October 10. Small grains, oats, barley and rye are the chief crops.

The surface of the county is level, or rolling with low hills, the slopes of which are rarely too steep for agriculture. The waste lands, mostly swamps, some rough, broad river valleys, and some sandy areas make up about 10 per cent of the county.

A rough classification follows:

Total area of county	370,000 acres	100%
Waste land, swamps, etc.	37,000 acres	10%
Cities and villages	5,000 acres	2%
Woodlots	43,000 acres	12%
Cultivated (1911 crop report)	162,000 acres	44%
Pasture land mostly, with little brush land	123,000 acres	32%

The farms average from 80 to 100 acres in size. Dairying is the main method of farming, and all are old farms.

The county was originally covered with a good forest of hardwoods, hemlock and white pine. In the development of the country, the composition of the remaining woods was changed by various conditions, so that now on the sandy lands of the northeast townships, white pine is very common in mixture, and there are a few woodlots of pure white pine. The north third of the county has a considerable amount of hemlock and white pine mixed with the hardwoods. In the remaining two-thirds the hardwoods make up the woodlots.

Taking the county as a whole not more than 12 per cent of the area is covered with woodlots, just a trifle more than one-half as much as there should be for the best agricultural conditions. The center tier of townships is almost bare of woodlots, scarcely five per cent is covered. The part of the county north of this strip is better supplied (about 16 per cent covered) than that south (about 10 per cent in woods).

The composition of the woodlots varies considerably, due to the culling out of the different species. There are, for example, small woodlots of pure white cedar, pure hemlock, pure black ash, pure tamarack and stands of almost any combination of these four species; then there are pure maple, pure beech, and pure white pine, and also mixtures of these three; very often hemlock is in mixture with the three last mentioned. There are also a few woodlots of oak, especially in the west and south part. Occasionally small areas of birch and aspen are kept for woodlots.

Most of the woodlots are made up of old culled stuff which has been pastured until entirely free of young growth. There are, however, a few that are in excellent condition in that they have a good distribution of good species of all ages and form dense woods.

Comparatively little thought is put on the woodlot. A few farmers keep the cattle out in order to allow young trees to grow. A few use a little selection in cutting in so far as choosing large trees instead of small. Occasional patches of cedar are trimmed up to post height in order to get cleaner post material.

Almost one-half of the farmers in the county use coal for heating purposes. Very few places in the county are more than five or six miles from the railroad. The cities and villages fur-

nish good local markets, with their various wood-using industries, for bolt wood, fuel wood and logs.

Before very much improvement will be made on the woodlots of this county, it will be necessary to obtain definite figures on what woodlots of certain types are now earning and on what they can be made to earn. It will be necessary to show how much in dollars and cents is lost by the present method of management, or rather mismanagement, and how this method can be changed to one that will turn the loss to a profit. At the present time the farmers in a large part of the county are at the mercy of the coal market and this condition is on the increase. The acreage of woodlands is insufficient, even if growing at their best, to supply the population outside of the cities and villages with fuel alone, to say nothing of the wood for other uses on the farm.

The matter of cedar for fence posts should be investigated for it seems to be a promising source of profit.

A total exemption of taxes on woodlots with limitation would probably help as a stimulus to bring about better management of existing woodlots, and help to increase the acreage of woodlands.

At least five or six of the common types of woods mentioned above, that is, pure maple, pure hemlock, pure pine, pure cedar, and representative mixtures, should be thoroughly studied for the amount of wood produced annually per acre in their present condition, and in typical excellent conditions.

Summary.

1. The woodlots are for the greater part in poor condition. They are growing half a cord of wood or less per acre each year, when they should grow about a whole cord or more.

2. Many counties represent a distinct region in which the kind of woods and the condition of woodlots differ greatly.

3. Each kind or condition of woodlot needs a different method of treatment in order to make it serve its best use.

4. There is a general lack of knowledge among the owners of woodlots concerning the amount of wood in cords, or other unit of measure, that will grow each year on an acre.

5. There is also a lack of knowledge concerning the simple means of keeping a woodlot in its best growing condition.

6. There is a marked neglect of keeping account of the amount of material taken from the woods.

7. Some method of exemption from taxes of woodlots may help to improve the conditions, but there does not seem to be demand for it among the owners of woodlots.

Recommendations.

I. (a) Collect data on the amount of wood grown annually per acre in woodlots representing the most common condition in each region. Express this amount both in cords and in dollars and cents.

(b) Collect similar data in woodlots that are now in the best growing condition.

(c) Determine the species which will produce the greatest profits in each region.

(d) Determine the best method of improving the poorer woodlots.

II. (a) Persistently distribute this information among woodlot owners in small but frequent doses.

(b) Start model or demonstration woodlots in every county if possible, at least in every region of different forest types, and show by actual management of the woodlot the practical value of the information that has been distributed.

(c) To owners who ask for it, give advice and instruction, preferably directly to the owner while on the woodlot.

Experimental State Woodlots.

The best utilization of the thousands of farm woodlots in Wisconsin is not only extremely important to the owners themselves, but to the whole state as well, for if these woodlots are well managed they are going to furnish a very considerable part of the future timber supply of the state. In many of the northern counties the state owns a few scattered forties, some of which are timbered, and it is proposed that from forty to eighty acres of such land should be used by the state as demonstration woodlots to be operated in coöperation with the state or County Agricultural Experiment stations. It is rather difficult to explain to any farmer, by means of a report or bulletin just how he should manage his woodlot, but it becomes a simple matter when you can take him upon timberland that is being properly man-

aged, and let him see good and bad methods, and in addition give him all the costs of operation, net profits, and so forth.

The State and County Agricultural Experiment stations should give a short field course on woodlot management, using the state demonstration areas for nearly all of their work.

The farmer's woodlot, especially in the northern part of the state, should not only supply him with all the saw logs, timbers, fence posts, cordwood, etc., that he will ordinarily use, but he should also have considerable material to sell and will find that his woodlot is his bank upon which he can draw in time of necessity.