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Utilization Problems on the Ozark National Forest

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The problems which have confronted the administrative officers of the Ozark National Forest have been numerous and varied. In the handling of most of them definite policies have been followed and results have been very satisfactory. The fire situation is well in hand. The erection of numerous observation towers, well located, and the conviction of some of the chief offenders have had a very decided effect in decreasing the acreage burned over each year. The settlement of claims cases; the administration of the Forest Homestead act; free use; special use; and other problems, which on Western Forests are simply routine, because of the peculiar nature of the people living within the boundaries of the Ozarks National Forest, require a high degree of tact and skill.

In the sale of timber from the Forest however, definite policies have only recently been laid down; and these policies will change from time to time with the increase of knowledge gained from the experience of those in charge of the sales. In the past timber was sold only in small quantities for local manufacture and consumption, most of which was converted into boards and construction material. The timber in greatest demand was shortleaf pine, because of its accessibility, growing as it does on broad ridges upon areas of Government land scattered among the settlers, and also because of the many uses in which it may be put. Hardwoods were not wanted and only occasionally would applications be made for these species.

Within the past few years however, a complete change has taken place, and applications for the purchase of hardwood timber are the rule, and for pine, the exception. This reversal of conditions may be accounted for in several ways. First, the hardwood supplies of the country are rapidly diminishing, and operators are compelled to go back farther and farther each year, as the more accessible forests are depleted, to get the prime
timber so desirable for certain purposes. And again, companies or individuals cutting over areas of private timber land within the boundaries of the Forest, desire to lengthen their operations by purchasing government timber which lies handy to their plants, and which may be handled at a profit. Large compact bodies of Government timber of good quality have attracted operators whose stumpage in other regions has been or soon will be exhausted.

Problems in the utilization of National Forest timber arose when the sales were small and of little consequence. The same problems presented themselves when larger sales were contemplated, and in a correspondingly larger way. In order to more clearly understand the numerous difficulties which have arisen in connection with these sales, it will be well to know something of the condition of the country, of the forest growth, and of the people within the reserved area.

The Ozark National Forest occupies more or less of the area lying within thirteen counties in northern Arkansas. The Government land comprises the roughest, rockiest and the most sterile areas in the Boston Mountains. North of the Forest is the White River, which for some distance forms the northern boundary. A short distance south is the Arkansas River, within the drainage area of which much of the Forest lies. Between these streams, extending in an easterly and westerly direction across the state is a fairly well defined flat topped ridge, from which flow numerous small tributaries north and south which, especially in their lower portions, cut up the country very badly and often lie in deep canyon-like valleys with steep rocky sides. The geological formation is mostly a soft sandstone or limestone, and the constant wearing away of these easily decomposed rocks has produced numerous outercrops and low cliffs which sometimes extend along the slopes for long distances.

The main streams in the vicinity of the Forest are from 400 feet to 600 feet above sea level. The highest hills in the eastern portion have elevations ranging from 1,600 to 2,000 feet, while in the western end of the Forest the hills have all the appearances of real mountains as they are from 2,800 to 3,000 feet in height. The tops of the main ridges are broad, fairly level and smooth, and together with the less extensive spurs constitute the principal areas occupied by settlers within the Forest. The bot-
Tom land along the streams is also devoted to agriculture, but the valleys are generally so narrow that the amount of land of this character is relatively small.

The alienated land within the boundaries of the Forest includes all of the land occupied by settlers—the more level ridge tops and fertile valleys—and tracts of good timber acquired under the Timber and Stone act, the mining laws and other acts of Congress.

The National Forest land comprises the remainder and consists of the most inaccessible, the roughest and the least valuable land lying within the Forest boundaries; slopes too steep or too rocky to be farmed; deep canyons, with numerous outcrops and cliffs along their sides; narrow valleys; broad rock strewn ridge tops; and occasionally large or small tracts of fairly good timber, difficult of access.

The original Forest, created in 1907, embraced about one and one-half million acres in one contiguous body. The great opposition to the continuance of the Forest by the settlers forced the elimination of approximately 600,000 acres in 1910 in the more thickly settled portions. The eliminations were so made, however, that practically all of the vacant land was retained as isolated areas ranging from 80 to 640 acres or more in extent.

The Forest now consists of three principal divisions: the eastern, the central or main division, and the western division, each separated from the other by the eliminated land lying between. The present area included within the boundaries of the Ozark National Forest in 963,500 acres. The actual amount of vacant land is 481,575 acres, or approximately 50 per cent of the total area.

The people living within the Forest are mostly descendants of the early inhabitants of the mountainous regions lying east of the lower Mississippi. The great emigration to this region began about the time of the Civil war and continued for some time afterward. As a rule, the people are happy, contented, good natured, easy going, and entirely satisfied with their lot. Schools and churches are few among them; roads are poor; there are no bridges across the streams, and travel is local and restricted to periods of good weather. Farming is of the crudest kind and land is cleared only as needed to supply the immediate wants of the family. There seems to be no desire on the part of the average
mountaineer to get out of the narrow channel in which environment has placed him.

The outlying forest has always been considered "community" property for the pasturing of hogs and the supplying of wood for building purposes and for fuel. Each year for generations the forest has been burned over to improve the range and kill the ticks and other vermin which infest the woods. In the early days practically all the more valuable timber lying close to drivable streams was cut in trespass from government lands and floated to market, without restraint. Almost all of the black walnut and red cedar has been cut from the Forest in this way.

The entire area included within the Ozark National Forest was originally forest clad. There are no natural prairies, and the only tracts not now covered with tree growth are those cleared and under cultivation, or areas only recently abandoned. Land once cultivated if left idle is very quickly converted into forests of pine or hardwoods. Along the steep slopes on south exposures small open areas are occasionally found which are the nearest approach to natural treeless land. This open condition is due to the frequent ground fires which burn over the dry slopes making reproduction impossible. Red cedar and blue ash seedlings are coming in from the sides and in a few years if fires are kept out these dry sites will be reclothed with valuable tree species.

The forest is a natural selection area of hardwoods in mixture, and in parts a mixed uneven aged stand of hardwood species and shortleaf pine. More than 50 species of merchantable timber trees have been noted, the most common of which are several species of the white oak and black oak classes, shortleaf pine, four of five species of hickories, several species of gums, ashes, elms, maples, sycamore, black walnut, cucumber tree, beech, cherry, black locust, honey locust and red cedar.

The total stand of all species on the Forest is estimated to be approximately 1,000,000,000 feet B. M. White oaks, principally Quercus alba, constitute the bulk of the stand. These species comprise 56 per cent of the total volume or about 600 million feet B. M. The black oak class, including black oak, red oak, Texan oak, Spanish oak, black jack oak and others, but principally the first three species mentioned, constitute about 24 per cent of the total or about 250 million feet B. M. Shortleaf pine is sometimes found in pure stands of small extent, but gen-
erally in mixture with hardwoods on the ridges. It makes up about 10 per cent of the total stand, or somewhat more than 100 million feet B. M. Hickories contribute 3½ per cent to the volume or about 40 million feet B. M. The remaining 6½ per cent is made up largely of black gum, sycamore, elms, ashes, maples, cherry and others in lesser amounts.

The forest may be divided roughly into four main types: the stream type, the lower slope type, the upper slope type, and the ridge type.

The lowest or stream type lies along the watercourses, where moisture is abundant for at least a large part of the growing season. These sites are very restricted in area but furnish a great variety of species, the commonest ones being sycamore, red gum, birch, red maple, ashes, elms, and black walnut.

The lower slope type extends from these areas of almost constant moisture some distance up the slopes. The surface is often heavily rock strewn and steep, but the soil is generally moist and of good quality and contains more or less humus in mixture. The predominating species on these sites is white oak, which here reaches its best development on the Forest. Associated with the white oak are black walnut, hickory, hard maple, red oak, cucumber tree, basswood and black locust.

The upper slope type occupies the remaining slope area extending to the more or less level ridge tops. The timber on these locations is principally white oak of an inferior quality, black gum and hickories. The soil is dry and sterile and produces a forest growth of small size and of poor quality.

The ridge type occupies the ridges, and occasionally extends somewhat down the sides. The most abundant species on these sites is black oak, a small, scrubby, defective tree of little commercial value in this region. White oak, hickories, black gum and chinquapin, which latter is a characteristic species on dry sterile ridges, often form a large percentage of the stand on the type. On exceptionally dry and sterile areas black oak frequently forms pure stands, and when closely grown produces tall, straight, thrifty trees.

Shortleaf pine is found only on ridge tops, or at least only for a short distance down the slopes, in mixture with hardwoods, or occasionally almost pure. It occupies exceptionally dry limestone or sandstone sites, and is quite local in its range. It can-
not be said to be a distinct type except when it is the predom-
ininating species, which seldom occurs.

The Ozark National Forest is primarily a hardwood forest
and in management the more valuable hardwood species are fa-
vored in reproduction. The greatest problem, then, is to get rid
of the great quantities of mature and overmature, more or less
defective timber, and to secure favorable silvicultural conditions
for the large quantities of young growth of the more desirable
species, which is already on the ground.

The difficulty encountered in improving the silvicultural con-
ditions by removing the ripe timber does not lie in the inability
to dispose of the stumpage, for timber sale applications have
been received which, if granted, would cover all of the more val-
uable merchantable material growing on the Forest.

The great trouble, however, is that each applicant wants only
one species of timber and that of a certain minimum size. The
timber operators in the hardwoods of Arkansas are "specialty" men. The tight cooperage producer wants only the choicest
white oak above 18" D. B. H. Red oak timber makes good staves
but they are not as profitable to handle as those made from the
white species. The wagon stock manufacturer requires clear
straight grained oak or hickory of large size. The hub manufac-
turer wants round white oak timber of suitable size for turning
out 7 or 8 inch hubs. The manufacturer of lumber requires logs
of the best quality; the distance to market is so great that poor
grades of lumber cannot be handled to advantage.

These specialized industries are largely the result of poor and
inadequate transportation facilities. Railroads follow along the
Arkansas and White Rivers on either side of the Forest, and one
formerly traversed it north and south but now lies entirely
within an eliminated area. The haul to shipping points on these
railroads is over extremely rough and rocky roads, built at lit-
tle or no expense, and which are consequently very poor. During
rainy seasons the ridge roads are often so soft as to be impass-
able; the switchbacks down the slopes frequently wash out; the
roads in the valleys are largely in the creek beds, and during
high water traffic is entirely suspended. The length of haul is
often as great as 25 or 30 miles. From necessity then, under
present conditions, it is not profitable to market inferior prod-
White oak stumps cut low by cooperage operators that no clear material may be wasted. 
Ozark National Forest.

A great waste of white oak timber. Upper portion of tree after removal of clear heading bolts. No use is made of this material. Ozark National Forest.
ucts, and much cheaper to haul out the finished or partly man-
ufactured article than the raw materials.

This latter consideration gives rise to numerous small "specialty" mills scattered throughout the mountainous region. One
company may operate several of these mills in different locali-
ties and, as there are numerous concerns operating in the coun-
try besides several private individuals, the large number of
small manufacturing plants located in the hills may be easily
accounted for. Buyers go back into the remotest parts of the
Forest and secure by contract or by purchase of the stumpage
sufficient timber of the settlers to provide for a "setting" for a
stave, heading, or other "specialty" plant. To make a "setting"
profitable in the stave industry at least 200 cords of bolts must
be in sight. From a cord of bolts of average size and quality
about 500 staves of the upper grades are obtained. A standard
stave is 34 or 35 inches long, 4½ inches wide, not less than 7/8
inch thick, must be free from all defects and sap, and must be
almost perfectly quarter sawn. Heading material grades similar
to staves as to quality and defects, but it is cut only 22 inches
long. In ordinary timber the average width of heading is about
7½ inches.

As National Forest land generally constitutes a considerable
portion of the area in the vicinities of these small mills in iso-
lated regions the operators, in order to increase the sawing pe-
riods, try to purchase additional timber from the government
by direct application or through the application of others, which
is located near by and which may be handled at a profit. Only
the choicest white oak is desired and this must be of large size.
Under these conditions the operators are willing to pay the ap-
praised price for mature white oak, but are unwilling to buy the
other species for which they have no use in their industry.

The question then that immediately arises is this: Is it more
profitable to sell the mature oak at the present time and get im-
mediate revenue at the sacrifice of favorable silvicultural condi-
tions for restocking with desirable species, or to hold the timber
until such time as the mature and defective trees of all species
may be removed at one operation, thus insuring ideal conditions
for the growth of the future stand? Everywhere on the Ozark
the reproduction on the ground is sufficient to restock the
forest if fires are prevented from burning over the surface. The
composition of the young growth varies greatly however with the locality and type. White oak, red oak and hickory predominate, and these are the species that should be favored in the new stand. Along the lower slopes on moist sites rich in humus white oak reproduction is very plentiful and in good thrifty condition. Young growth of hickory, maple, black walnut, ash, black locust and other desirable species is found in greater or less numbers in mixture, and a future stand of the better species of trees on these sites is assured. On such areas the question becomes one of revenue only; whether it is more profitable to dispose of only the select white oak now, or hold the entire merchantable yield until such time as all species may be disposed of, in this way employing the more valuable trees in selling the less valuable ones.

On poorer sites, where white oak is not so plentiful and is of smaller size and of poorer quality, the problem is somewhat simplified. Inferior species as black oak and black gum often constitute a large percentage of the stand, especially of the younger growth. If white oak shows promise on these areas it would be very detrimental to the future stand to remove the larger seed bearing trees and leave the inferior species in undisputed possession of the ground; further, with the choicest white oak removed it would be almost impossible to find purchasers for the inferior black oaks and gums which by themselves are entirely unsalable at the present time in this region.

In either case the prime white oak should be used to sell the inferior species and the whole sale area cleaned up at one time. It is extremely desirable that mature and defective timber of all species be removed from the Forest for silvicultural reasons, in a manner which will stimulate the young growth of the better species now on the ground. This end cannot be attained by removing the merchantable timber one species at a time, since for financial reasons the more valuable species will be taken out first, leaving the less desirable species to seed the areas now without reproduction or not fully stocked. The remaining poorer species would probably be left until the second cutting of the better timber, on account of the lack of markets for the former at the present time and because of the low prices which would be received.

To determine the advisability of disposing of the mature white
oak timber only, experimental sales have been made in different portions of the Forest. These sales were made largely upon the assumption that the mature and overmature white oak timber was deteriorating in quality each year; that the dead tops and decayed butts of the large trees indicated a poor condition; and that to realize anything from it the timber must be cut at once. The first allotment of timber to be sold to "specialty" operators amounted to three million feet. This was presently increased to six million feet in order that a wider range of conditions and a larger number of purchasers could be secured. Careful supervision was maintained and detailed reports submitted from time to time as the cutting progressed on each sale. Silvicultural conditions were especially studied to determine as nearly as possible what the composition and character of the stand would eventually be with the mature white oak timber removed. The results of these investigations will determine largely the future policy to be followed in making timber sales.

With the cutting of the timber a second problem was encountered as important or of greater concern than the first—that of the utilization of the felled tree. On private areas the operators were long used to taking only the choicest cuts from the trees purchased from settlers leaving the remainder of the contents, merchantable for other purposes, to rot upon the ground. Thousands of acres of hill timber in northern Arkansas have been cut over for white oak stave material, and often not more than two or three sections were taken from the trunks of the trees. Timber found to be slightly defective after felling often was not utilized at all, which, for purposes other than cooperage stock, was entirely merchantable. Certain areas of private white oak timber land in the vicinity of the Ozark National Forest cut over for staves showed a waste of 50 to 75 per cent of sound material from which rough lumber and ties could have been obtained very cheaply and profitably. The whole trouble, so far as the utilization of the timber is concerned, is that stave or other "specialty" operators desire only the stock which they use in their business. Timber which will produce a high percentage of first class material is eagerly sought after, and high prices are sometimes paid to owners where competition is great. The portion of the tree not made into this special stock is wasted, so the less
waste there is likely to be the greater are the prices paid for the stumpage. Operators have offered as high as $10.00 per thousand feet B. M. stumpage for selected white oak trees on National Forest land in a region where the prevailing price for all the timber of this species is only $3.00 per thousand. The profits of these "specialty" operators then depend more on the quality of the products than on the quantity of material produced, and it is the desire of every one engaged in the business to turn out as nearly 100 per cent of the highest grades of stock as is possible for him to do.

The applications received for the purchase of timber to be sold in experimental sales in a short time covered the entire quantity. Competition was keen, and in several instances the original applicants were outbid by rival concerns. Only the mature and overmature white oak above 18 inches D. B. H. was advertised for sale. A minimum price of $3.50 per thousand was placed on the stumpage, and much of it sold as high as $4.35 per thousand feet, B. M.

The first experimental "specialty" sale was one of oak heading stock and included only the mature white oak and red oak timber on a forty acre tract. The purchaser of the stumpage operated a small heading mill less than a quarter of a mile from the sale area and cut the timber into rough heading in the woods. As heading bolts are cut 22 inches long it was expected that, in addition to the clear sections from the body of the tree, the operator would utilize the smaller clear cuts from the upper portions of the trunk between the larger branches. Almost without exception however, no use was made of this material as no bolts were taken from the bole above the first large limb. With the larger trees defective sections, which in private operations would have been entirely discarded, were partly utilized by taking out one or two small clear bolts. Stumps were cut low and brush disposal was fairly satisfactory, but wherever possible the trees were felled in such manner that the crowns would fall outside the sale area on private land, in which cases no lopping of limbs was deemed necessary by the purchaser.

At the completion of the cutting the area was closely inspected by the Forest Supervisor, a Lumberman, and two Forest Assistants, and all were agreed that from every standpoint—silvicultural, utilization, and financial—the experiment had not proven
Typical stand of hardwood timber, Ozark National Forest. Note abundant reproduction.

A small sawmill, Ozark National Forest. These mills cut only choice logs, and are very wasteful of timber.
A success. The timber actually scaled and paid for amounted to 13,000 feet, for which $39.00 were received. From the appearance of the area by a rough inspection, one would estimate the amount of timber removed to be four or five times the amount actually scaled; in fact, Forest officers, knowing nothing of the scale, estimated the amount removed to have been 60,000 feet.

The purchaser tried to utilize all of the material suitable for his purpose and at the same time turn out a high percentage of first class heading. On private areas 90 per cent of all the heading cut was of the upper grades. The timber was simply exploited and only the cream of the material taken. Red oak heading was not made at all, and of the white oak the materials suitable for lower grades of heading and "cut offs" were left in the woods to rot. Small operators desire only the choicest timber, and it is only with great difficulty that they can be made to see any profit in handling the inferior grades. The purchaser offered to pay $10.00 per thousand for selected white oak trees suitable for his purpose, but thought $3.00 per thousand feet a high price to pay for the woods run of timber of this species above 18 inches in diameter, breast high. The percentage of the upper grades of oak heading cut from the 13,000 feet of timber purchased on the sale area was about 86, the remaining 14 per cent being mostly high class red oak stock, so that very few of the lower grades were produced. Red oak timber was not utilized as closely as was the white oak, since nothing but the choicest heading of this species was made, and consequently large amounts of apparently sound material remained upon the ground at the completion of the sale.

This timber sale is typical of all the other "specialty" sales on the Ozark National Forest. The operators must be driven to utilize short pieces and inferior materials. Generally speaking they gladly pay for merchantable material not utilized, but say that they cannot handle it at a profit for other purposes. The Forest officers in charge of the sales realize that one of the greatest objects to be attained in the sale of Government timber is the complete utilization of merchantable materials as a general conservation policy, and whenever circumstances justify it he requires such utilization rather than allow the timber, even though paid for, to remain in the woods.
In general, "specialty" sales of National Forest timber have not been a success on the Ozark from the standpoint of the forester, and further sales have been discontinued. From the operators point of view however they have been entirely successful and profitable as evidenced from the great desire of the larger companies to make further purchases. When the local Forest officers refused to consider further applications for white oak stave materials, after the experimental sales were completed, the companies interested appealed through political agents at Washington to the higher officials of the Service for an opportunity to buy more of the mature and overmature white oak, claiming that these trees were rapidly deteriorating in quality and in a few years at the most would be dead and beyond redemption. To the casual observer this appeared to be entirely true. The white oak trees of suitable size for stave making almost invariably are dead topped, show signs of decay at the bases, and appear to be in very poor condition generally.

As a result of these appeals men were put into the field to determine the correctness of the assertions of the operators who wished to purchase the timber. After a very careful and exhaustive study on the ground they found that, while in many of the large trees rot had set in at their bases in openings made by fires, it rarely extended above the ordinary height at which the tree would be cut in lumbering operations and therefore would not greatly effect the quality of the standing tree. The defects occasioned by dead tops was also found to be very local and did not reach into the body of the tree, but terminated mostly before the lowest large green side branches were reached. The body of the average mature tree, which contains the choicest material for any purpose, was found then to be generally sound and would remain alive and in fair condition for many years.

This report, together with the adverse reports of all other Forest officers detailed to investigate the question, will probably result in the complete abandonment of sales to specialty operators.

Another problem encountered in connection with specialized sales is the excessive cost in administering them. In order to handle these sales properly it is necessary in most instances to detail a Forest officer to take charge of each individual sale area. Two or more sale areas close together may be handled by one
man, but usually the tracts are widely separated and more officers are required. Rangers on the Ozark National Forest administer large districts, have a multitude of duties and can attend to only the smallest of local sales, easily reached from headquarters.

The larger timber sales then are under the direct supervision of specially detailed men, as Lumbermen, Forest Assistants and Rangers, each with one or more assistants. These officers are paid, in addition to their salaries, a per diem allowance for subsistence and this expense, together with the salaries and expenses of inspecting officers and other necessary charges consumes a large portion of the revenue derived from the sales.

The expense per thousand feet B. M. of administering these sales is abnormally large. If all the merchantable timber on an area were removed in the course of the lumbering operations the cost of handling the sale would not be increased materially, and the expense per thousand feet B. M. would compare favorably with that on other National Forests. Under existing conditions the cost of administration in some of the smaller sales has equalled, or has actually exceeded, the receipts from the sales of the stumpage.

Favorable conditions for cutting hardwood timber and utilizing the entire merchantable contents of the trees will come only with improved transportation facilities, and the installation of mills designed to manufacture articles in the making of which complete or nearly complete conversion of the merchantable material may be had. Such commodities may be cross arms, insulator pins, dowels, novelties, furniture stock, vehicle stock, and other articles which may be made from the sound timber remaining after the principal products, such as heading, staves, lumber, quarter sawed material or other stock has been cut out.

This larger utilization of the felled tree will come with the increasing scarcity of hardwood timber and the rising of stumpage values. The latter consideration will make it possible to operate these small diversified manufacturing plants at a profit. To better silvicultural conditions in the forest the entire mature and overmature stand of all species should be removed, with special attention paid to the young growth on the ground. If these trees could be removed and the entire merchantable material
utilized, the Forest would not only be vastly improved silviculturally, but would soon be placed on a self sustaining basis and would possibly yield a revenue above operating expenses, which is the ultimate object to be attained.