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APPENDIX

a proposal

OZARK RIVERS NATIONAL MONUMENT

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UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

MARCH 11, 1960

Memorandum

To: Director, National Park Service

From: Secretary of the Interior

Subject: Report on Ozark Rivers National Monument Proposal

The report on the Ozark Rivers National Monument Proposal may be released upon request, for information purposes, if a copy of this memorandum is included in the bound report to show that the report is still being reviewed by the Department of the Interior, and that its publication at this time should not be construed either as approval or disapproval by this Department of its recommendations.

Acting Secretary of the Interior

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APPENDIX
to
A PROPOSAL
OZARK RIVERS
NATIONAL MONUMENT

United States
Department of Interior
Fred A. Seaton, Secretary

National Park Service
Conrad L. Wirth, Director

February 1960

FOREWORD

This Appendix serves as a supplement to the January 1960 report of the National Park Service entitled "A Proposal - Ozark Rivers National Monument." The report was designed to present the over-all story briefly and clearly. The Appendix has been compiled for those who have need to evaluate further certain details and technical information.

In general, the Appendix is comprised of technical statements, all of which were developed or compiled during the study and considered in reaching conclusions. In addition, the tentative boundary of the proposed Monument, as presented in the report, has been indicated on U. S. Geological Survey topography maps. These maps are also included in the Appendix.

The technical statements were prepared in two cases by outside sources and in the other by representatives of the National Park Service. Listed below are the subjects of these technical statements and the names of their authors.

Biology - H. Raymond Gregg, Superintendent Hot Springs National Park, National Park Service

Geology - Edwin C. Alberts, Regional Naturalist Region Two, National Park Service

History - Ray H. Mattison, Historian Region Two, National Park Service

Archeology - Dr. Carl H. Chapman, Director of American Archeology, University of Missouri

Economic and Social Impacts - Staff of Agricultural Economics University of Missouri

The reports on Archeology and Economic and Social Impacts were prepared under contracts between the University of Missouri and the National Park Service.

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Chapter 1

GEOLOGY

INTRODUCTION

The Current and Eleven Point Rivers flow in a generally southern direction, draining the plateau lands at the southeast edge of the Ozark Province in the State of Missouri, to join the Black River in Arkansas above its confluence with the White River. The geological structure of this region is relatively simple. The predominant sedimentary rock strata lie almost flat. Faulting and folding are extremely rare. The original stream-formed valleys developed on a higher landscape surface, and have lowered themselves through once-overlying strata into the present surface rock formations. Numerous entrenched meanders and other stream features characteristic of super-posed drainage occur throughout the region.

From the standpoint of aesthetics, ecological influence, and land form, the important rock layers of the Current and Eleven Point country are the Gasconade and Roubidoux formations, both of Lower Ordovician Age. The Roubidoux is principally a sandstone formation. It is the surface exposure over most of the Ozark plateau in the study region. The Roubidoux overlies the Gasconade, comprised primarily of dolomite, a magnesium-rich limestone. The Gasconade Formation makes up most of the picturesque bluffs rimming the Current River and Jacks Fork above Van Buren, and the valley walls of the Eleven Point River. The character and relationship of these two widespread flat-lying strata largely control the nature of geological features discusse in more detail in this report.

The porous sandstone members of the Roubidoux absorb most of the area's rainfall and melting snow. As these waters descend, they penetrate the joints and fissures of the underlying dolomite. Solution of the dolomite along these lines over very long periods of time has resulted in a remarkable abundance of caverns and underground water conduits. Ground water collecting and circulating through these natural conduits in the rock emerges in places as springs of tremendous flow.

KARST TOPOGRAPHY

The surface expression of the geological events affecting this vast honey-combed system of underground caves and caverns is a large number of potholes and sinks which dot the plateaus between the major stream valleys, giving them something of a pock-marked character. This type of terrain is called karst topography, from its classic expression in the Karst region of the Italy-Yugoslavia borderland. Nearly every characteristic of karst topography discussed in textbooks can be found within the Current River watershed between Van Buren and Montauk State Park. Karst topography of this sort also occurs in parts of Kentucky, West Virginia and southern Indiana. However, with the exception of Mammoth Cave National Park, topographic features of this type are lacking in areas now within the National Park System.

Such features as dolines, which are funnel-shaped sinks, are found in nearly every stage of development. The Devil's Well is a spectacular example of a deep funnel-shaped sinkhole resulting from the collapse of a cave roof, providing a window through which, with lighting, one may look down some 90 feet to the surface of a 65-foot deep lake which fills the

floor of an expansive bell-shaped cavern. Several large dolines are found in the region between Summersville and the Current River. Some of these sinks are small, only 75 to 100 feet in diameter, and 30 to 40 feet deep. Many, however, are much larger, varying from 400 to as much as 1,500 feet in diameter, with depths in the range of 120 feet.

"The Sunkland" is an almost classic example of a feature known as an uvala. Here a long, fully-enclosed hollow several hundred feet across, and approximately a mile long, can be seen. Such features are produced by the successive collapse of inter-connected passages and dolines of great size, producing the surface effect of an elongated trough. The beautifully developed pockmarked pattern of sink topography from small collapsed pits, and karst fens, (shallow, marshy sinks), together with the more spectacular larger sink valleys east of Hartshorn, provide an unusually complete series of field exhibits of this type of landscape features, probably unrivaled on this continent.

Interestingly, the solution-formed landscape of this region includes geologically ancient "fossil sinks" as well as those of modern times. Some are exposed along road cuts such as the large one south of Round Spring State Park on State Highway 19. Here a sink, presumably developed in Mississippian time, and now filled with cave deposits and fallen roof debris of that period, is graphically revealed. Further reconnaissance should identify other examples of this phenomenon at points suitable for public access and interpretive treatment.

Unfortunately, for maximum understanding of the relationship and origin of these karst features, the present dense second growth deciduous forest and a heavy understory of shrubbery in much of the region mask most of the detail and interfere with visibility required to present and interpret them effectively. Some vista cutting and maintenance suppression at strategic rim points would probably be required in developing these areas for public use.

SUBTERRANEAN STREAM PIRACY

Examples of both surface meander cutoffs and stream capture and shortcutting by subterranean stream piracy are to be seen at scattered points in the study area. One of the best examples of this type of feature is "The Sinks," in Section 27, Township 31N, Range 4W. Access is by a county road connecting from State Highway 19 at a point approximately five miles north of the Round Spring bridge over the Current River. Here there has been a shortening of a stream meander by subterranean diversion. Sinking Creek enters an open tunnel beneath an 80-foot bluff, to emerge 120 feet or more away at the base of the sheer wall on the other side of a long-abandoned meander bend. The tunnel was formed long before the present stream level by underground solution. This creek "discovered" this opening - an old cave gallery - and abandoned its former course where the cutting action of the stream had narrowed the ridge to a minimum width. One may see clearly through the tunnel from portal to portal, and it is possible to float through this tunnel in a boat, with ceiling height for a man to stand

on much of the course. The wide oxbow course of the long-abandoned valley of Sinking Creek is still easily traced, much of it being cleared for agriculture. During periods of extreme flooding, probably this U-shaped bend still serves as an overflow channel, with waters spreading over it and finally finding their way around the old course at the downstream end of the tunnel.

A similar cave-tunnel is developing within a meander bend of the Barren Fork of Sinking Creek, about three miles distant. This feature is labeled on the topographic map as "Smith Spring," in the northwest quarter of Section 20, Township 31N, Range 4W. It is believed to be the property of a Mrs. Ferris who lives nearby. Unlike the situation at the Sinks, the stream here remains active in its established meander channel, except that in times of high water, overflow enters the upper end of the cutoff tunnel and re-enters the stream below the meander. This is a fine example of an earlier stage of the process by which ultimately a feature much like the Sinks can be expected to develop. The Sinks and the earlier stage diversion tunnel at Smith Spring could be connected by a corridor of land, and become either a detached unit or one tied together with the Round Spring section of a national area by extension of a neck of land along Sinking Creek to these points. Smith Spring is accessible by a satisfactory road which branches from the approach road to the Sinks at a point a few hundred yards off State Highway 19.

A somewhat related, almost unique, feature involving piracy by subterranean passages is in the vicinity of Jam Up Cave on the Jacks Fork. This cave is in Section 4, Township 27N, Range 6W. At an earlier period, Jacks Fork, following a meandering course predetermined on an older land surface, cut a sharp elbow bend into the dolomite layers within which Jam Up Cave had been dissolved. As the river cut down, it exposed the northern end of a passage of this cavern. Just south of this point, Jam Up Creek, with headwaters as much as eight or ten miles beyond, was carrying a sizable flow of water on a northerly course, and was cutting the apex of a meander bend toward the north, directly opposite the southward-cutting meander of Jacks Fork. When the grade level of Jam Up Creek had been lowered some 50 or 60 feet below the general surface level of the plateau into which it is cut, and about a like distance higher than the present surface level of Jacks Fork, the roof of an underground tunnel connecting with Jam Up Cave collapsed at a point in the bed of Jam Up Creek. The creek then entered this passage and followed its course through the cave to join Jacks Fork and complete the act of stream piracy. With the stream flow cut off from the lower three or four miles of the meandering course of Jam Up Creek, (now known as Lost Hollow), erosive action was greatly reduced so that it retains approximately the same elevation and gradient as it had, perhaps thousands of years ago, when the stream was diverted into Jam Up Cave.

Another feature of considerable interest is the development of a splendid example of what is known as a karst fenster or window at a point some 200 yards down the course of the subterranean tunnel into which Jam Up Creek now flows. Surface water percolating downward produced a funnel-form doline or solution hole opening into the tunnel. The process has continued until the opening is now about 60 feet in diameter at the surface, with a 15

to 20-foot "window" through which one may see the diverted water of Jam Up Creek threading through blocks of tunnel roof fall enroute to its outlet into Jacks Fork through Jam Up Cave. Another interesting feature is the continued downward cutting of the gradient of Jam Up Creek above the diversion point by perhaps 20 feet below the general grade of the now-abandoned valley below this point.

Lost Hollow itself is an interesting feature, with examples of compounded, opposing, meander-cutting action by pre-diversion Jam Up Creek and a southern tributary which joins Lost Hollow a short distance above its junction with Jacks Fork.

Not only is Jam Up Cave of extreme interest because of its part in this spectacular subterranean stream piracy, but its spaciousness, the interior features, and its setting make it extremely impressive to visit. Approached from Jacks Fork, the north portal is seen to be a huge vaulted arch. Tremendous quantities of cave fall have enlarged the original opening upward in a receding concentric pattern resembling the form of a bandshell. The highest point of the frontal arch reaches just under the rim of the canyon wall, approximately 125 feet above the water level of Jacks Fork. Great quantities of cave fall have produced a frontal ridge of broken debris some 25 feet higher than the forward-sloping floor of the cave. There is evidence that at flood times sufficient logs, sticks, leaves and other debris are carried through the cavern from Jam Up Creek to clog the outlet of the cave, building up a pool which has been as deep as 15 to 20 feet behind the frontal ridge, which acts as a partial dam. This makes it extremely unlikely that any productive evidence of prehistoric or recent Indian occupation will be found in Jam Up Cave. The pile of debris near the entrance reduces the amount of light reaching the interior of the cave. This produces a weird half-light within the tremendous chamber under the ridge dividing Jacks Fork and Jam Up Creek. This great interior hall of the cave can be traversed some 350 to 400 feet, where further progress is stopped by a deep subterranean lake filling a pit produced when the roof of a lower cavern level collapsed. This lake is surrounded on three sides by sheer 20-foot cliffs broken only by the course of an almost inaccessible waterfall down which the flow of Jam Up Creek enters the chamber. The lake undoubtedly is deep, but no data are available. It will be of interest to determine whether aquatic animals brought in from Jam Up Creek have found existence possible in this dark pond. It is possible to walk down a broken rock slope to the very edge of the water. The atmosphere of the brink overlooking the lake is intriguing, with the feel of the bank of the River Styx. When one's eyes become adapted to the dim light, it is possible to distinguish across the lake, an oval-shaped solution cavity to the left and about on a line with the top of the falls. Some distance back of this cavity, daylight from the previously described karst window can be seen faintly.

Looking back from the lake toward the exit, one is impressed with the view of the river bluffs on the opposite side of Jacks Fork through the graceful framework of the high, vaulted arch, which is fully 80 feet high and 100 feet wide at its base.

BIG SPRINGS

The springs of this part of Missouri are world famous for their immense volume and the regularity of their flow. Several of them are among the largest in the world. The Large Springs of Missouri, a publication of the Missouri Geological Survey, provides description and statistics on spring flow for all of the major described springs of the state, including those in the study region. Therefore, only brief discussion is presented here.

These springs are part of a widespread, sizable and intricate interconnected spongework of caverns which underlies much of the Ozark plateau. Greer Spring and Big Spring obviously emerge under considerable hydrostatic head, producing surging effects analogous to artesian flow. These are quite impressive to behold.

A very unusual feature of the springs of the Current-Eleven Point country is the ebb-and-flow phenomenon. Only 24 springs of this type have been reported in the United States. Largest of these in the study area is Rymer Spring, with a reported volume of 14 million gallons daily. There is no dramatic quality in the behavior of these springs except at times of the peak flow of the larger ones, and such periods of flow are of only short duration. The ebb-and-flow action is cyclic but somewhat irregular in interval. The existence of such an unusual behavior of spring water requires explanation. Springs of this sort usually indicate the existence of underground storage chambers of substantial size and a series of siphon-like cavern tubes leading to the spring outlet. It will be virtually impossible to explain the exact mechanism of a particular ebb-and-flow spring, but the basic principle of such springs is relatively easy to interpret, and their unique character when known arouses much curiosity on the part of the general public.

CAVERNS

As indicated in the discussions of solution features, caverns are very abundant throughout the region. Any river float trip affords an opportunity to visit dozens of "wild" caverns, many of which have had little exploration. One important cave has been developed for visitor use. It is known as Round Spring Caverns, located on private land near Round Spring State Park. It is a spacious and extremely interesting cavern, exhibiting nearly every type of flowstone decoration to be found in caves anywhere on the earth. Caves of Missouri by J. Harlen Bretz gives an excellent illustrated description of this spectacular cave. This eminent speleologist devotes 16 pages to this single cave, and is high in his estimate of its quality and rank in a state which possesses a great wealth of limestone caverns.

This cave has not been a profitable venture in recent years despite the excellent manner in which it has been developed for access. Conversations with the owner indicate it could be purchased at a reasonable

figure. While this cavern would not be sought on its own merits as a unit of the National Park System, it should be included in the proposed new national area to illustrate an important manifestation of solution and deposition in limestone formations, thus adding a colorful and dramatic chapter to the area's primary and fascinating solution landscape story to be interpreted to the public.

Ashley Cave, in the southwest quarter of Section 32, Township 32N, Range 7W, on the north fork of Ashley Creek approximately three miles southwest of Montauk State Park, is extremely interesting. It combines geologic values with evidences of prehistoric occupation and historic association. It is shown as Saltpeter Cave on the Cedargrove Quadrangle map.

Production of saltpeter from nitrates was carried on at this cave during the War of 1812. General William Ashley operated it in connection with his gunpowder factory at Potosi, Missouri. The probable period of operation was from 1813 to 1816. The cave was visited and described by Schoolcraft in 1818 or 1819, at which time he reported that no activity was going on, but the old works were still present. It is unknown whether this site was worked subsequently, but ample evidence remains of old disturbance of cave earth, with what appear to be piles of leached dirt dumped from the hoppers over the anterior portion of the cave. There is evidence at various points within the cave of digging to obtain material for the leaching of nitrates. Archeological excavation may uncover evidences of the wooden structures or implements of the nitrate mining period. Dr. Carl Chapman of the Department of American Archeology of the University of Missouri, who participated in examination of this cave, discovered sufficient evidence to indicate fairly extensive prehistoric occupation of the cave.

Different peoples, some of whom may date to rather early times in this region, probably frequented this cave. The University of Missouri will be interested in further studies at this site at the first favorable opportunity. Such research might contribute materially to the interest and potentialities of this cave for interpretive treatment. Dr. Chapman's preliminary appraisal of the prehistory of the Current-Eleven Point country forms another appendix to this report.

On one of the large blocks of roof fall, near the front of Ashley Cave, is what may well be an Indian petroglyph. It is a circle some six or eight inches in diameter with a straight vertical line through it. Cursory examination of the cave revealed no other petroglyphs or pictographs.

An interesting interior feature, about 200 feet inside the cave entrance, and within a large opening where the cave bends to the right, is a large geometric mass of roof fall which, as seen in the dim light, vaguely resembles a great altar. When one proceeds around the bend into the darker portion of the cave and looks toward this feature, he becomes aware that it is so illuminated by light entering the cave front that it appears as though a faint, bluish spotlight were playing upon it. The emotional impact of this is strong, the softness of light and altar-like mass of the roof fall

creating an impressive cathedral atmosphere. It would be possible to develop a safe walk along the cave floor to a point well beyond the bend without the necessity of interior lighting. The use of light-colored chip material would take advantage of reflected light to give safe footing.

A few hundred yards upstream and across a deep, long pool of the North Fork of Ashley Creek is a cave within which there is a sizable spring. This cave is difficult to approach, being across water and high enough up in the cliff that access from below is hazardous, particularly with the rock wet from the flow of spring water. The local name is Whiskey Cave for reasons obvious from impoundment bins used during prohibition time to provide cold spring water for condensation of distilled vapors. Near Whiskey Cave would be an excellent site for a campground or day-use area, associated with visits to the Ashley Cave if that should prove desirable. This land might well be included in the Ashley Cave unit of the national area, both for the potential of the water resource for camping and day use and for a folk-culture value of the same order as the display of old whiskey stills in the Blue Ridge and Great Smoky Mountains regions.

It would be possible to include the Ashley Cave vicinity in a narrow extension from Montauk State Park, which would be contiguous to the proposed national area, and thus provide connection and access over land in public ownership.

PALEONTOLOGY

Paleontological resources of the area are not notable, but marine and vertebrate fossils of Upper Cambrian and Lower Ordovician Age can be found at numerous sites. Fossil-bearing rocks of these geological periods are widely distributed in the Middle West, but they are not well represented in the National Park System. Fossil algae deposits outcrop in places. Their characteristic appearance has given them a local appellation, "cabbage rocks." Interesting in situ fossil exhibits could be developed at dozens of places in the area under study.

"SHUT-INS"

Numerous other interesting geological features would be added attractions for those who come to see the primary landscapes and geological features described as potentially of national significance. So-called "shut-ins" are numerous in the Current River Valley east of Eminence. A "shut-in" is merely an exposure of hard, erosion-resistant pre-Cambrian rock through which a stream has cut rugged gorges, usually with wider valleys above and below where the stream has been more effective against the softer sedimentary country rock. Some "shut-ins" have attractive rapids or waterfalls. An especially noteworthy example is Rocky Creek Falls in Section 18 Township 28N, Range 2W. In some instances, such as the falls below the confluence of the branches of Rocky Creek, pioneer water-powered grist mills were operated at the site of falls and rapids in these "shut-ins."

Several interesting geological processes can be interpreted at these points. For one thing, the pre-Cambrian surface on which the sedimentary rocks of this region were deposited was extremely irregular. By contrast, in most areas of the National Park System where these extremely ancient rocks occur, the top of the pre-Cambrian basement rock complex is quite flat, and usually represents a peneplain surface. In the Current River country, however, the Paleozoic sediments of limestone, dolomites and sandstones overlap each other, and in some instances surround, but do not now completely bury protuberances of the ancient crystalline rock. These "domes" through which the "shut-ins" have been carved once stood as islands in an ancient sea. They were carved by erosive forces more than half a billion years ago, and buried beneath great thicknesses of later sediments. There they lay in darkness for hundreds of millions of years. Their geologically recent re-exposure by the erosive work of streams presents graphic evidence which can be used to bring home to the perceptive viewer the vastness of geological time and events. Another interesting aspect of the "shut-ins" story is that most of the dark-pink pre-Cambrian rock exposed locally appears to be an ancient lava flow.

BIBLIOGRAPHY - GEOLOGY

The Large Springs of Missouri, by H. C. Beckman and N. S. Hinchey, Missouri Geological Survey and Water Resources, Rolla, Missouri, Edward L. Clark, Director and State Geologist, Vol. XXIX, Second Series, 1944.

Surface Waters of Missouri, by Harry C. Bolon, Missouri Geological Survey and Water Resources, Second Series, Vol. 34, 1952.

The Geology of Missouri, by Edwin Bayer Branson. University of Missouri Studies, Vol. 19, No. 3, p. 535, 1944.

Caves of Missouri, by J Harlen Bretz. Missouri Geological Survey and Water Resources, Volume XXXIX, Second Series, 1956.

Genetic Relations of Caves to Peneplains and Big Springs in the Ozarks, by J Harlen Bretz. American Journal of Science, Vol. 251, No. 1, pp. 1-24. January 1953.

Origin of Filled Sink Structures and Circle Deposits of Missouri, by J Harlen Bretz. GSZ Bul., Vol. 61, No. 8,pp. 789-834, August 1950.

Ebb and Flow Springs in the Ozarks, by Josiah Bridge. Missouri, School of Mines and Metallurgy, Bull. 1, No. 7, 1923.

Geology of the Eminence and Cardareva Quadrangles, by Josiah Bridge. Missouri Bureau of Geology and Mines, Rolla, Missouri, Vol. XXIV, Second Series, 1930.

Geological Map of Missouri, by Edward L. Clark. State of Missouri, Bus. and Adm. Div. of Geological Survey and Water Resources, 1939. (Reprinted 1948 w/o revision.)

Geography of the Northern Ozark Border Region in Missouri, by James E. Collier. University of Missouri Studies, Vol. 26, No. 1, 1953.

Physical Profiles of the Ozark Provinces, by Arthur B. Cozzens. Amer. Midland Naturalist, Vol. 24, No. 2, pp. 477-489, September 1940.

Subterranean Stream Piracy in the Ozarks, by C. L. Dake and J. Bridge. University of Missouri, School of Mines and Met., Bull. Tech. Ser., Vol. 7, pp. 3-14, 1923.

Large Springs, Pirates of the Ozarks, by W. L. Doll. Missouri Acad. Sci. Proc., Vol. 5, No. 4, p. 133, 1940.

Physiography of the Eastern United States, by N. M. Fenneman. N. Y. McGraw-Hill Book Co., Inc., 1938.

Missouri Spelunkers Explore Devils Well, by Oscar Hawskley and Jerry Vineyard. Nat. Speleological So. News, Vol. 14, No. 6, pp. 56-59, June 1956.

Stratigraphy and Paleontology of the Roubidoux Formation of Missouri, by Robert L. Heller. Missouri Geological Survey and Water Resources, Second Series, Vol. 35, 1954.

A Missouri Ebb and Flow Spring, by Walter David Keller. Earth Science Digest Vol. 1, No. 7, pp. 7-9, February 1947.

The Soils of Missouri, by M. F. Miller and H. H. Krusekopf. Missouri Agri. Exp. Sta. Bull. 264, January 1929.

Geography of the Ozark Highland of Missouri, by Carl Ortwin Sauer. Geog. Soc. Chicago Bull. Vol. 7, p. 245, January 1920.

Some Aspects of the Cave Region of the Central Ozark Plateau in Missouri, by Ralph B. Weiss. Compass, Vol. 31, No. 2, pp. 86-87, January 1954.

Chapter 2

BIOLOGY

INTRODUCTION

The diversified and extremely interesting biological resources of this area owe their origin and character in part to the variety of habitats produced by present climate, soils, and topography. They also are the result, directly or indirectly, of the very long period of time during which the Ozark plateau stood as a land mass above the inundation of surrounding regions. Later, continental glaciation which brought climatic influences that induced southward migrations into the region further enriched the flora. Likewise, the area's central position on the continent has resulted in the converging here of floral elements traceable to origins in other directions. For example, many plants of southwesterly origin occur in dry sites. Cool cove environments often contain plants characteristic of the Appalachian uplands. In some of the karst fens or marshes around potholes, and along the river floodplains, a considerable number of species characteristic of the Gulf Coastal Plain and the lower Mississippi Valley occur.

The mobility of animals generally, except in some of the lower orders and specialized forms, tends to create wider distribution patterns, and fewer specialized ecological limitations than is the case with the plant base upon which animal life depends. Thus, in the Ozark plateau there are few really distinctive zoological resources. However, the representation of the aboriginal fauna, with the exception of such major mammals as bison and elk, and predators such as the mountain lion, is surprisingly complete. The opportunity to see a great variety of bird and mammal life, and a considerable abundance of some forms, is excellent, and the prospect for perpetuating and improving this situation is very good.

ANIMAL LIFE

Lying along the Mississippi Valley flyway of waterfowl and shore birds, the area receives seasonal influxes of numerous species in these categories, thus enriching the characteristic birdlife of the several upland habitats represented in the region. Turkeys had become extremely scarce or extinct prior to introduction of new stocks within recent times. Under protection they now are increasing, and will become an interesting feature of the region's fauna. The bobwhite survives in good numbers in favorable habitat.

White-tailed deer are abundant throughout the area. Both gray and red foxes seem to thrive against the pressures of civilization. Bobcats still persist in small numbers. The mountain lion has not been reported in recent years other than by vague, unauthenticated rumors. Black bear probably have re-entered at least the Eleven Point River country from the mountains of Arkansas, and under protection in due time may be re-established in small numbers in any sizable block of land dedicated to wilderness preservation. The red wolf, (canis niger gregory:), a native species of this part of America, still persists in small numbers. Trappers turn in a number of pelts each year for bounties paid by the State. This variety of wolf is not represented in an existing unit of the National Park System.

Small mammals such as skunk, cottontail, gray and fox squirrels, woodchuck, raccoon and opossum appear to continue in normal numbers. A few badgers persist in suitable environments. Wildlife species dependent upon oak mast become abundant in good years of acorn production. Chipmunks and other small rodents are present in normal numbers.

Enough big-forest habitat remains to support a normal population of pileated woodpeckers. These crow-sized, scarlet-crested woodpeckers are indeed a spectacle as they fly through the openings of the woodlands. Their loud chortled calls are heard frequently as one floats down the Current, Jacks Fork or Eleven Point Rivers. Among the raptorial birds, the osprey is frequently seen and is of great interest to visitors. The broken plateau country provides good physical conditions for thermal updrafts. Numbers of turkey vultures take advantage of this, and soar in lazy circles overhead, providing a display of considerable interest.

The aquatic life of the streams, ponds and springs is of great interest. Many invertebrate forms occur. Of these, freshwater mussels, the shells of which are strewn along most of the gravel bars of the rivers, and small water snails which are abundant locally in some of the pools and on the rocks of the river shallows, probably are most observed by visitors. Crayfish are relatively abundant, and are represented by several species in differing water conditions.

Probably no dependable sites for observing blind crayfish can be pinpointed without considerable exploration. However, species of these albinistic creatures of the cavern darkness are known from some limestone caves of Missouri, and undoubtedly can be found by search in accessible caves of the Current River country. There are also blind fish in Missouri caves which are identical with, or represent only minor geographic variations from those of the limestone caverns of Kentucky. Dr. Arthur Witt of the Zoology Department of the University of Missouri, who has studied cavern life extensively, believes that interconnected subterranean waters now under the broad falley of the Ohio and Mississippi Rivers have provided avenues for migrations of these small blind fish between the caves of Kentucky and Missouri. Cave crickets, spiders, and some other forms of life adapted or specialized for existence in the dark or semi-darkness also live their entire lives in the caves of the region. Several kinds of bats use the caves regularly for roosting or hibernation.

Quite a few species of frogs and salamanders inhabit the study area. Bullfrogs give bass volume to the nocturnal concerts enjoyed by campers along the river valleys. Toads are commonly seen, but few people realize how often they are heard as they trill loudly in the evening hours. Three or four species of water turtles occur in the region. Snapping turtles reach formidable size in the lower stretches of the rivers in Missouri. There is a good variety of land reptile life including the terrestrial box turtle, several lizards, and a number of species of snakes. Poisonous land snakes are represented by copperheads and rattlesnakes; water moccasin can be expected at least in the lower reaches of the rivers. Nonpoisonous land and water snakes are fairly common throughout the area.

Mink and otter both have survived human settlement and live along the rivers. The latter is not common, but where it occurs, it is more likely to be seen by the visitor than the mink, which tends to be more crepuscular or nocturnal in habit. The beaver has made a successful comeback. On a float trip, one is seldom out of sight of beaver cutting, bank burrows, lodges, runways, or feeding landings. The quiet observer often is successful in seeing the animals themselves in the early evening hours. Muskrats are common locally where food supply and water conditions are favorable.

At present, fish life in the waters of the region seems to hold greatest interest and fascination for the visitor, particularly for those attracted to this region by the fame of the Current, Jacks Fork and Eleven Point Rivers as free-flowing stream-fed fishing waters. Smallmouth and largemouth bass are the species most sought by anglers. Numbers of non-game fish are abundant in the waters. Several forms are either unusual or endemic in the region. These non-game fish actually are seen a great deal more by those taking boat trips than are the more elusive anglers' favorites. Good populations of suckers, buffalo, drum, darters, minnows, garfish, shad and carp are present.

PLANT LIFE

Due to the mobility of animal life, a limited region such as the study area would scarcely be expected to contain any really significant or localized populations. Possible exceptions are some of the forms isolated for extensive spans of time in the darkness of caves or in the unique environment of some of the tremendous cavern-fed springs. In contrast, vegetation moves much more slowly, by reproductive process and the less effective agents of dispersal, tending to develop localized diversities and patterns of great interest, and to considerable degree of unique character. Being south of the glaciated region of central North America, the Ozark plateau soils very largely represent the disintegrated material of the bedrock upon which they have formed. Thus, there is a close relationship between the chemistry of soils and that of the rocks immediately underlying from which they are derived. Since the alkalinity or acidity of soil strongly influences conditions for plant growth, important changes or differences in plant communities occur when one passes from soils derived from rock of different character.

The limestones have produced sedimentary soils classed as suitable for woodland and wildlife. These soils are generally acid. The soil climate (moisture and temperature conditions within the soil) varies widely within the major type and is reflected by the many types and varieties of vegetation supported. Sandstones, which are fairly extensive on the uplands also have produced some acid soil conditions.

The dissection of the plateau into valleys has produced steep cliffs, some in exposed dry situations, and others constantly wet from seepage or dripping of water over their surfaces. These variations provide a wide range of microclimate, from damp and cool to dry and hot, or from relatively even to widely fluctuating daily temperatures. The angle and

direction of exposure of slopes and cliffs are reflected in plant influence in terms of intensity and duration of sunlight. Depth of soils is another factor dependent in some degree upon the character of underlying rock, angles of slope, and the length of time during which soils have formed. The influence of erosion on plantlife conditions most closely relates to the character of precipitation and the gradient of the surface. Porosity or water-retaining capacity of soils due to the physical nature of the soil grains also acts as an influence upon the character and type of plant growth that will thrive upon them. When these many environmental factors influencing plant life in so many different ways occur in varying combinations, the result is a remarkably varied and interesting assemblage of plant associations in a relatively limited area. Also, as discussed earlier, along with these diversified physical environments, the circumstances of central geographic location, glacial influences, and antiquity of the land mass have made conditions ideal for the introduction of many plant species of origins widely distributed on this continent.

Some plant geographers believe that several of the more distinctive woody plants of the Ozark region may have originated there and spread to other regions to the north, south, east or west from this center of origin. Among these are the Ozark chestnut, spring-flowering witch hazel, yellowwood, smoketree (Continus americanus), and Savia phyllanthoides, a rare shrub of the spurge family.

Damp-ground herbaceous species believed to be endemic to the Ozark region include Amsonia illustris, an attractive and interesting plant that grows on stream bars and shallow rapids; Amsonia hubrichtii, which is known only from Arkansas and Oklahoma; and one of the ironweeds, Vernonia crinita, which now extends southwestward to Kansas and northeastern Oklahoma. Portulaca nelgecta is another endemic succulent plant which may be found on fertile bottomland.

Ozark waterlily is considered to be endemic to the Ozarks of Missouri and Arkansas. It is the only truly aquatic plant which is considered to have evolved in this immediate region. It is not known whether it occurs in the study area.

Among the woodland herbaceous plants which are either endemic or have become localized in the environment in which they now occur in the Ozarks are three species of spiderwort, three species or subspecies of Trillium; Harvey's buttercup; poppymallow (Callirhoe involucrata Bushii); the variety ozarkana of the pilose phlox; penstemon; false foxglove (Gerardia calycosa), Ruellia pedunculta, Arkansas bedstraw, Solidago neuroletis, and anomalous aster.

Where they occur in areas suitable for visitor use, each of these plants would be worthy of interpretation as examples of unique or interesting stories of plant geography.

The principal biomes of North America have been variously described. For purposes of this report, terminology adopted by the Ecological Society of America is used. Ecological groupings as discussed below have been distinguished within the study area.

The Deciduous Forest Biome predominates the cover of the entire Ozark region today, except on limited balds or glades where ecological factors or man-made disturbances have created shrub and grasslands. Within the area of this study, before heavy logging at the turn of the century, some of the uplands supported almost pure stands of virgin shortleaf pine. None remain, but some of the timber operations today are directed toward restoration of this type of forest. There are a few remnant patches of mature pine, but nowhere in large enough blocks to produce the open understory effect found in the pine forests that were here 75 years ago.

Subdivisions of the deciduous forest biome well represented within the region today, as far as is known from limited reconnaissance and search of literature, are:

(1) Mixed Mesophytic Forest

The typical makeup of this association is as follows:

White basswood, Tilia heterophylla
Yellow buckeye, Aesculus octandra
Beech, Fagus grandifolia
Sugar maple, Acer saccharum
Red maple, A. rubrum
Chestnut, Castanea heterophylla
Tulip tree, Liriodendron tulipifera
Pignut, Carya glabra
Bitternut, C. cordifornis
Shagbark hickory, C. ovata
Mockernut, C. tomentosa
Chestnut oak, Quercus montana
White oak, Q. alba
Northern red oak, Q. borealis maxima
Black oak, Q. velutina
Scarlet oak, Q. coccineaLocust, Robinia pseudoacacia
Locust, Robinia pseudoacacia
Mountain magnolia, Magnolia fraseri
Cucumbertree, M. acuminata
Bigleaf magnolia, M. macrophylla
Walnut, Juglans nigra
Butternut, J. cinerea
Black tupelo, Nyssa sylvatica
Yellow birch, Betula lutea
Allegheny birch, B. allegheniensis
Cherry, Prunus serotina
Sourwood, Oxydendrum arboreum
Hemlock, Tsuga canadensis

This forest type is characteristic of the Appalachian plateau, typically expressed in the Cumberland Mountains of Kentucky and Tennessee. Further studies are needed to determine the extent of representation of the typical species for this association in the study area. However, with the possible

exception of the American beech, one or two of the deciduous magnolias, the Allegheny birch, yellow birch, and hemlock, all of which at best would be rare and local in occurrence in the study area, the standard composition of the Mixed Mesophytic Forest occurs in some of the cooler coves along the rivers.

(2) Western Mesophytic Forest

This differs from the Mixed Mesophytic Forest in the absence of white basswood and yellow buckeye. These two species are present in many localities but the other elements of the mixed mesophytic forest type frequently occur without these species, thus indicating the classification of some associations in this group.

(3) Oak-Hickory Forest

The typical climax forest in this type is dominated by the following species:

Northern red oak, Quercus robra
Black oak, Q. velutina
White oak, Q. alba
Bur Oak, Q. macrocarpa
Shagbark hickory, Carya ovata
Mockernut hickory, C. tomentosa
Pecan, C. illinoensis

This is the dominant upland forest of the Ozark plateau. Pecan may or may not be present, although aboriginally it probably invaded at least as far north as Doniphan on the Current River, and possibly northward toward Van Buren, Missouri.

(4) Oak-Pine Forest

This forest probably is a subclimax condition normally developing into Oak-Hickory. However, since this type is recognized in the classifications used, the presence of typical Oak-Hickory Forest with liberal mixture of shortleaf pine may best be described as of this subdivision of Deciduous Forest Biome.

Within these four general classifications, there is considerable variation in the expression of flora due to site factors. For example, within the Oak-Hickory Forest surrounding the Sunkland there is a karst fen or marshy pond approximately 200 yards long by 100 yards wide on the uvala floor in which the plant composition bears close affinity to the typical Southern Coastal Plain and lower Mississippi Valley marshes and ponds. Similar but smaller ponds occur in many of the sinkholes - the smaller, usually shallower ones tending toward a dominance of sedges, grasses, rushes and semi-aquatic herbaceous plants. In the Sunkland pond, buttonbush, hairy marsh hibiscus, lance-leaved violet, water-horehound, lance-leaved loosestrife, Clayton's bedstraw, and tall blue lobelia are the prominent

vegetation around the shoreline, along with heavy clumps of various sedges and rushes. At least two species of pondweed, several types of sub-aquatic herbaceous plants, an abundance of algae, watermeal, water buttercup, arrowleaf, bladderwort and water pepper occur in the shallow outer 50 feet or so of the pond. The water-chinquapin or yellow lotus spreads its huge erect leaves and flowering stalks above the deeper water at the center of the pond. Waternymphs or pond lilies occur locally in this kind of pond.

Many interesting incursions of Southern and Southeastern flora are fairly widespread along the river floodplains and around sink ponds and marshes. A good part of the following list are to be looked for in the study area: southern red oak, overcup oak, pin oak, water oak, willow oak, red maple, sweetgum, green haw, American hornbeam (Carpinus carolinana), chittimwood, buckthorn, deciduous holly, styrax, swamp privet, crossvine, meadow beauty (Rhexia mariana), Jussiaea decurrens, swamp milkweed, and leadbush.

The wet bluffs along the river courses, usually north-facing, provide suitable habitat for a quite distinctive group of plants dominated by ferns, with a dense vegetation of shrubs and shade-tolerant herbs along the basal slopes and shaded flats between the cliffs and the rivers. Here occur some of the unusual or rare plants that most distinguish the flora of the region. Venus maidenhair fern forms dripping green drapery under almost every overhanging bluff encountered as one floats on the rivers. This species is quite localized to this region. Various spleenworts, bladder ferns, walking fern, wood fern, and swordfern occur in these sites. Other attractive flowering herbs include: jack-in-the-pulpit, Solomon's seal, trilliums, mocassin flower, orchids, wild ginger, hepatica, red columbine, bloodroot, waterleaf, Dutchman's breeches, squirrel corn, basswood, sugar maple, shooting star, meadow rue, Isopyrum, yellow fumeroot (Corydalis), American spikenard (Aralia racemosa), blue cohosh, Seneca-snakeroot (Polygala senega), harbinger-of-spring (Erigenia bulbosa), sweet cecily, honewort, meadow-parsnip, green violet (Hybanthus concolor), shaggy arrowwood, white snakeroot (Eupatorium rugosum), and golden ragwort. Woody plants most likely to be present are: wahoo, wafer ash, bush hydrangea prickly gooseberry, leatherwood, bladdernut, butternut, hazelnut, spice bush and witch hazel.

The vicinity of Jam Up Bluff, which is the high point along Jacks Fork, is an unusual and somewhat classic area botanically, which was brought to national attention through the field studies of Mr. B. F. Bush. The high magnesium content of the dolomite outcrops at this point and the capping of some of the plateau by Roubidoux sandstone remnants lying upon the dolomite, together with the greatly dissected character of the terrain and the resulting variability of exposure and moisture factors produce a most unusual variety of habitats within a small area. Species of special interest that have been found near Jam Up Bluff are: Scirpus planifolius, Carex careyana, C. leptalea, C. laxiculmis copulata, Zigadenus elegans, Cypripedium reginae, Spiranthes lucida, Berberis canadensis, Potentilla canadensis villossissima, Parnassia grandifolia, Hypericum gymnanthum, Galium boreale hyssopifolium, Campanula rotunifolia, Senecio obovatus umbratilis, Trautvetteria carolinensis, Artemisia campestris caudata, Solidago rugosa aspera, and

S. juncea. Other somewhat boreal plants known from the Jam Up Cave vicinity include: Asplenium cryotolepis, Veratrum woodii, Cypripedium candidum, Ribes cynosbati, Euonymus obovatus, Dirca palustris, Cornus alternifolia, and Solidago caesia. The range of most of the above-listed plants is in the glaciated areas of northern Missouri or northward. The presence in the Current River watershed of this assemblage of plants suggests strongly that this may be a relic colony which survived from the Glacial Age. This more northerly flora once extended much farther south than it does at present. Its occurrence at Jam Up Cave with a mixture of Appalachian types confirms the suitability of the environment for preserving a boreal flora.

A number of not too commonly known herbaceous plants, shrubs, and trees occur in the Missouri Ozarks. On the basis of present investigations and review of literature, specific identities and the associations in which they occur are not fully established, but the following should be found and would be of interest for interpretation where they occur: the cucumber tree (Magnolia acuminata), American yellowwood (Cladrastis lutea), nettle-tree (Celtis occidentalis canina), staff-tree, and Ashe juniper. The latter may not be botanically distinct from Juniperus mexicana, but it has been widely popularized as the Ashe juniper. Its range trends toward the southwestern section of the Missouri Ozarks, but in all probability on suitable slopes it may be found intermixed with or replacing the eastern red-cedar in the Current or Eleven Point drainages. Smoke-tree (Cotinus americanus), one of the rarest of American trees, should be looked for along the river bluffs. Dwarf acacia (Acacia angustissima hirta) and soapberry (Sapindus drummondii) are southwestern species which may show up on exposed south-facing bluffs, where a succulent vine, Cissus incisa, may also occur with them. Missouri currant (Ribes odoratum) is another southwestern type. Buckthorn, hazelnut, fire-pink, bittersweet, spring-flowering witch hazel, and stickleaf (Mentzelia oligosperma) are other interesting rarities or plants out of normal range. Missouri maidenbush (Savia phyllanthoides) is the only woody member of the Euphorbia family represented in such a northerly location. Locally it is called buckbrush, although it is not well known and apparently is not anywhere abundant.

The drier limestone bluffs harbor some interesting wild flower displays featuring tall larkspur, an endemic to the Ozark region; the large-flowered evening primrose, locally known as glade lily; pink or purple-flowered coneflowers; yellow coneflowers; blue wild indigo; black-eyed Susan; and Hymenopappus. Locally, purple-bracted horsemint and the large-flowered purple beard-tongue occur.

Soil factors on the pre-Cambrian domes and around the "shut-ins" where the pre-Cambrian rock is exposed influence the character of plant growth on these sites. Most of the flora characteristic of this type of soil cover undoubtedly will be found within the study region, since this association reaches its best expression in the Iron Mountain section of Missouri only some 60 or 70 miles beyond the limits of the study area. The soil tends to be fairly strongly acidic, supporting a group of so-called oxylophiles. There is a tendency for forest growth to be somewhat stunted on these soils. One of the more striking plants in these places is the rosy azalea. Following is a list of plants which might be expected in wet ground, along stream margins, or on adjacent slopes where granitic or other igneous or highly metamorphosed siliceous rocks outcrop:

Polypodium virginianum
Asplenium pinnatifidum
Athyrium acrostichoides
Thelypteris palustris pubescens
T. spinulosa
T. spinulosa intermedia
Dennstaedtia punctilobula
Lycopodium lucidulum
L. complanatum flabelliforme
L. lucidulum porophilum
Cyperus refractus
Carex glaucodea
C. hystricina
Allium cernuum
Malaxis unifolia
Habenaria peramoena
Salix sericea
Stellaria longifolia
Cerastium arvense oblongifolium
Mitella diphylla
Saxifraga virginiensis
S. pennsylvanica forbesii
Hamamelis virginiana
Crataegus uniflora
Euphorbia obtusata
Linum striatum
Ilex verticillata padifolia
Frasera caroliniensis
Rhododendron nudiflorum roseum
Rhexia virginica
Vincetoxicum obliquum
Phlox glaberrima
P. maculata
Trichostema dichotomum
Salvia lyrata
Collinsonia canadensis
Pedicularis lanceolata
Aureolaria calycosa
Houstonia patens
H. coerulea
Solidago suaveolens
Cirsium virginianum

BIBLIOGRAPHY - BIOLOGY

Forest Flora of the Ozark Region, by E. J. Palmer. Jour. Arn. Arb. 2, pp. 216-232, 1922.

Botanical Areas in the Missouri Ozarks, by Julian Steyermark. Missouri Bot. Gard. Bull. 39, pp. 126-135, 1951.

Natural Plains Associations and Succession in the Ozarks of Missouri, by Julian Steyermark, published in Bo. Ser. Field Museum Natural History, 9, pp. 353-473, 1940.

Phanerogamic Flora of the Fresh-water Springs in the Ozarks of Missouri, by Julian Steyermark, Bot. Ser. Field Museum Natural History, 9, pp. 483-618.

Some Features of the Flora of the Ozark Region in Missouri, by Julian Steyermark. Rhodora 36, pp. 214-233, 1934.

Vegetational History of the Ozark Forest, by Julian Steyermark, University of Missouri, Studies, Volume XXXI.

The Cave, Spring and Swamp Fishes of the Family Amblyopsidae of Central and Eastern United States, by Loren P. Woods and Robert F. Inger. Amer. Midland Naturalist, Vol. 58, No. 1, pp. 232-256, July 1957.

Chapter 3

HISTORY

GENERAL

The Current and Eleven Point drainages in southeastern Missouri and northeastern Arkansas, were a part of the vast Louisiana Territory. During the 16th, 17th and 18th centuries, this region was claimed by both the French and Spanish. Although the Spaniard Hernando De Soto in 1541 reached northeastern Arkansas, it is highly improbable that he touched upon the Current and Eleven Point Rivers area in Missouri. In 1719 the Frenchman Charles Claude Du Tisne passed through the Ozark region enroute to the headwaters of the Osage, but it appears he traversed the country north of the Current and Eleven Point River drainages. It was probably the French trappers who gave the name to the Current River which they called La Rivière Courante.

During early historic times, the region probably was the hunting ground of the Osage Indians, who lived to the north and west. This warlike tribe made frequent forays against the French and later Spanish settlements at Arkansas Post and other points on and near the Mississippi.

As the result of the Seven Years War, known in America as the French and Indian War, the French in 1763 formally ceded their lands west of the Mississippi to Spain. Like their predecessor, the Spanish, without too much success, endeavored to placate the Osage and other tribes. By the Louisiana Purchase in 1803 the area became a part of the United States.

The relentless pressure of the white settlers from the East soon forced the Osage to relinquish their ancestral home and much of their hunting grounds in Missouri. At Fort Clark, better known as Fort Osage, in November 1808, the Great and Little Osage tribes ceded most of their lands in southern Missouri to the United States. Therefore, these tribes were never a serious obstacle to the American settlement of the Ozark region.

The Current and Eleven Point Rivers received little attention from most of the early explorers and travelers. However, Henry Rowe Schoolcraft traversed the Ozark region in 1818-1819 and again in 1821. He and his companions first saw the headwaters of the Current on November 11, 1818. Schoolcraft's remarks in his journal indicate he was impressed with the primitive character of the region:

> ...We wound about among those desolate pine ridges in a mile or two, till, from one of the higher points, we descried a river in a deep valley, having a dense forest of hard wood, and every indication of animal life. Overjoyed at this, we mended our pace, and by a great dint of caution, led our pack-horse into it. It proved to be the river Currents, a fine stream, with fertile banks, and clear sparkling waters. The grey squirrel was seen sporting on the shady margin, and as night approached, the wild turkeys came in from the plains to drink, and make its nightly abode.....

While in the vicinity, Schoolcraft visited several caves, including Ashley Cave, where he and his party camped for three nights.

Captain John H. Bell, a member of the Stephen H. Long Expedition, described the party's return across southeastern Missouri from its historic journey of exploration to the Rocky Mountains in 1820. He recorded that on October 1, the company forded the "Eleven Point River 50 yards wide, high abrupt banks, water deep." On the following day explorers crossed Current River in a scow. Bell described the Current to be "about 80 yards wide, gravel bed, water about five feet deep, perfectly clean."

The first white settlement in the Current and Eleven Point areas was probably during the decade following the War of 1812. Both Schoolcraft and Bell mentioned the settlements on these streams. Bell wrote that the Long Expedition spent a night on the lower Eleven Point River at the "house of Mrs. Black" who had "a fine plantation and good accommodations for travelers." On the Current River, near its junction with the Black River, the party found a new town laid out called "Currenton." Most of the early settlers were from Kentucky and Tennessee. However, settlement of the region appears to have been slow. The first county, Ripley, was not organized until 1833; Shannon County was established in 1841; Carter County in 1859. Of the three leading towns on the Current, Van Buren was founded in 1833; Eminence in 1841; and Doniphan in 1847.

One of the interesting settlement areas in the region, known as the Irish Wilderness, was located in northwestern Ripley and the adjacent counties north and west. Attracted by cheap government lands, Father John Hogan in 1858 founded a Catholic colony. In the following year 40 families, many of them Irish, settled in the area. A colony chapel was built near Pine in Ripley County. However, the colony had a short life, and during the Civil War disappeared, presumably as the result of guerrilla activities in the county.

The Civil War had an adverse effect on the region. Guerrilla bands overran the country. Union troops burned Doniphan and guerrilla bands destroyed Eminence. In the winters of 1862-1863 the Union Army of Southeast Missouri wintered in the vicinity of Van Buren. The Snider House, west of Van Buren, was the site of one of several skirmishes.

Both the French and Spanish showed early interest in the exploitation of the mineral resources of Missouri, particularly of precious metals. During the first half of the 18th century, the French Company of the Indies mined lead in Southwest Missouri. The lead mines continued to be worked by the Spanish. It is quite probable that both France and Spain sent exploratory expeditions into the Ozark regions of Missouri in search of gold and silver. Soon after the Americans obtained control of the region, William H. Ashley of fur trade fame, mined the niter deposits in some of the caves in the upper Current River area for making gunpowder. Missouri's first copper mine was opened near the site of Eminence by Joseph Slater in 1837. However, mining was done only intermittently after copper mines were opened in Michigan in 1846. Iron also was mined

for a time in the vicinity during World War II. Dent County, with 33 iron mines, was one of the State's top producers until 1915.

The coming of the railroads and the development of the lumbering industry during the last three decades of the century greatly accelerated the growth of the region. In 1872 the St. Louis, Salem and Little Rock Railroad (Frisco) entered Salem. Eleven years later the Missouri Pacific built a branch line into Doniphan.

Partially as the result of the building of the railroads came the exploitation of the untapped timber resources of the region. Between the 1880's and 1920's large lumbering companies continued their work of destruction of the forests. For a time West Eminence, Winona, and Birch Tree, were booming lumber camps. In 1888 the town of Grandin was laid out and for almost two decades was an important lumbering center in Missouri. In the early 1900's, Doniphan was the leading railroad tie-producing area of the nation.

The wholesale destruction of the timber in the first two decades of the present century left the region largely denuded and bare. Overgrazing, in addition to the other destructive uses of the land in the 1920's and 1930's. brought the need of better conservation practices to the attention of both state and Federal agencies. With the increased use of the automobile, there came a widespread interest in the Ozarks as a tourist attraction on the part of the people in Missouri and the adjoining States. With the dual objectives of conserving both the scenery and the natural resources, and encouraging tourist visitation to the region, Missouri in 1924 established Alley Spring and Round Spring State Parks. Three years later the State set aside Montauk State Park. From 1933-1939, the Federal Government created Clark National Forest which comprises substantial sections of the region.

SPECIFIC SITES AND FEATURES

There are no historic sites within the Current-Eleven Point area which, on their own merit, warrant preservation by the National Government. However, if the area is to be set aside for the value of nationally significant scenic and scientific resources, a more detailed study should be made of the area's historical potentialities. On the basis of the present survey, there are a number of historic sites and buildings which merit particular mention. These include:

1. Ashley Cave - This cave, located near Montauk State Park, served as a niter mine, probably during the War of 1812 and the years immediately thereafter. William H. Ashley, who later achieved fame as a fur trader, explorer and congressman, extracted saltpeter from this cave for the manufacture of gunpowder. Henry R. Schoolcraft and party, camped in this cave from November 12 - 14, 1818. He described the cavern as "one of those caves which cannot be viewed without exciting our wonder and astonishment." Physical description and discussion of the archeology of this cave are presented elsewhere in this appendix.

2. Old Mill, Montauk State Park - Grist mill, erected in 1893, is now restored and preserved as a part of the Park. This mill had been abandoned for many years. Plans are being made to put it in operation again as a permittee-operated interpretive feature.

3. Red Mill, Alley Spring State Park - Roller type mill, built in 1892 - 1893. It has been restored and is now in operation during the travel season.

4. Snider House - Located on Highway No. 60 about six miles west of Van Buren. This house served as a temporary hospital during the Civil War. A skirmish known as the Battle of Corn Pen Hollow was fought nearby.

5. Greer Mill - Located adjacent to Highway 19 about eight miles northeast of Alton, Missouri. This mill has not been in operation for 20 years. Using the outflow from Greer Spring, it was operated by remote transmission of power by a lengthy cable.

6. Falling Spring Mill - An interesting overshot type of mill with a very picturesque background. Date of construction is undetermined. The overshot wheel is still intact and turns when there is sufficient water. The mill itself has not been in operation for many years.

7. Within the proposed area are several early type current-propelled ferries, notably those at Akers and Powder Mill on major crossings of the Current River. These are typical of many such ferries which at one time dotted the Ozark region but have been largely replaced by bridges.

8. Within the area there are no doubt a number of structures typical of the pioneer period of the Ozarks. In the event the area is preserved by the Federal Government, it is recommended that the feasibility be considered of collecting such pioneer structures into a typical Ozark community of the late 19th century at some one place in the area.

BIBLIOGRAPHY - HISTORY

The Journal of Captain John R. Bell, Official Journalist for the Stephen H. Long Expedition to the Rocky Mountains, 1820, edited by Harlin M. Fuller and Le Roy R. Hafen, Glendale, 1957.

Ozark Mountaineer. Files in the Missouri State Historical Society.

A History of Missouri from the Earliest Explorations and Settlements Until the Admission of the State Into the Union, by Louis Houck. Chicago, 1908. (3 volumes.)

Account of An Expedition from Pittsburgh to the Rocky Mountains, by Edwin James, edited by Reuben Gold Thwaites. Cleveland, 1905. (4 volumes.)

A View of the Lead Mines of Missouri, Including Some Observations of the Mineralogy, Geology, Geography, Antiquities, Soil, Climate, Population and Productions of Missouri and Arkansas and other Sections of the Western Country, by Henry Roe Schoolcraft. New York, 1819.

Scenes and Adventures in the Scenic Alpine Regions of the Ozark Mountains in Missouri and Arkansas, by Henry R. Schoolcraft. Philadelphia, 1853.

Chapter 4

ARCHEOLOGY

INTRODUCTION

The Current and Eleven Point River valleys have not had a planned, intensive archaeological survey conducted in them at any time. Only a very brief reconnaissance was undertaken for the purpose of obtaining a greater familiarity with the entire area under study and to renew acquaintance with archaeological sites and materials visited previously. Most of the information available on the archaeology of the area was reported by amateur archaeologists and individuals that had an interest in the archaeological materials, but had varying amounts of experience and knowledge in archaeology. For example, a great number of "Indian mounds" have been reported in the stream valleys, but whether or not all of these mounds were man-made is far from certain. At least a limited program of controlled and planned test excavations of selected groups of the reported mounds would be necessary before any thoroughly sound conclusions could be drawn concerning the origin and/or purpose of the numerous mounds reported.

The general area under consideration includes portions of Dent, Shannon, Carter, Ripley, Texas, Howell and Oregon counties Missouri. This is near the center of the Ozark Plateau and is physiographically prominent for its big springs and sinkhole (karst) topography. It is a rugged, picturesque country that appeals to the imagination of men today and apparently has for thousands of years in the past. The big springs, boiling up from unknown depths and immediately forming rivers of crystal clear drinking water, teeming with fish, surrounded by virgin forests interspersed at intervals with prairies bounding in game were irresistable attractions to hunters, fishers, gatherers and beauty lovers as far in the past as the first men to explore the region thousands of years ago. The springs, underground rivers, sinkholes and caves were mysterious things,--things that stimulated thoughts of greater powers than those that man posessed. Perhaps the ready abundance of food and drink were the greatest attractions to the first men to enter this wilderness, part of which is known today as the Irish Wilderness. The later pilgrims may have come in part to worship the blue pools and boiling springs waters; clues unearthed at Round Springs suggest this use. A ceremonial center on Eleven Point far removed from the usual range of such "temple mound" Mississippi valley cultures indicates that the area attracted the town-dwelling Indians of the Mississippi period just prior to the invasion of the hills by the French traders and miners followed by our own settlers. Today the attractions are as great with the added lure of the past--the life and time of the first explorers and all those others that visited, used and enjoyed the beauty and mystery rampant in these Ozark valleys.

The information about the archaeology of the Eleven Point-Current River area is only sufficient to make it possible to gain some insight into the possibilities of the area archaeologically and to suggest a program of interpretation. Before a sound program could be recommended, a more extensive archaeclogical reconnaissance would be a necessity.

ARCHAEOLOGY OF THE CURRENT-ELEVEN POINT RIVER VALLEYS IN RELATION TO SURROUNDING ARCHAEOLOGICAL AREAS

The location of the stream valleys may be of a great deal of importance in regard to the occurrence of archaeological cultures. East and south is the cultural center noted first by Holmes (1903) as Middle Mississippi. A view of a physiographic map indicates that the Current-Eleven Point valleys and prairies between them form a relatively low "gateway" between the St. Francis Mountains and the Boston Mountains. This "gateway" leads to the Salem Plateau which in turn connects with the relatively flat Springfield Plateau and on west to the Cherokee Plains. The Salem Plateau extends east to the divide between the Meramec and Big River which tends to be an unobstructed, relatively flat route of travel to the St. Louis area which was one of the greatest centers of cultural development in the Mississippi valley. This great center is usually called Cahokia, referring to the large mound group by that name at East St. Louis, Illinois.

North are the headwaters of the Gasconade River which drains into the Missouri, and the prairies between the Gasconade and Osage Rivers might have been a prehistoric route of travel, leading to contacts with the cultural developments in central and western Missouri along the main stem of the Missouri River. West across the plateau is the route of prehistoric travel leading to the Caddo and Plains areas of cultural development. The Spiro Mound site is an example of a center in the Arkansas River area comparable to Cahokia in certain ceremonial expressions of the Mississippi culture (Hamilton, 1952). The way was there and an Indian trail was still present between St. Louis and Springfield, Missouri leading west from Springfield to the Arkansas River valley. Today the general line of the old Indian trail is followed by U. S. Highway 66 across the State of Missouri (Wood, 1936).

South is riverine lowland area of southeastern United States with the great cultural devevelopments of mound building, agriculture and town-building. This was the place of greatest contact.

In spite of the possible and probable movements of prehistoric peoples into and through the Current-Eleven Point area, there must have been relative isolation due to the two broken areas northeast and southwest, the St. Francois and the Boston Mountains respectively. It might be expected that the isolation would favor a development of a somewhat unique culture, yet reflecting the general cultural advancements in the Mississippi valley area. Closest parallels should be found in the St. Francis Basin and on Crowley's Ridge which are adjacent on the east, and would be the logical areas from which the developments in the Mississippi valley would be obtained.

Only hints to the cultures represented in the Current-Eleven Point area are available in many instances. In general it can be said that a full sequence of cultural advance has taken place in the area from Early Man or the Paleo-Indian some ten thousand years ago through the various periods of Archaic, Woodland, and Mississippi to the time of the historic Indian tribes. There is the further hint that the area has acted as a "filter"

sorting out only a portion of the Mississippi valley cultural developments that took place in the St. Francis basin and perhaps mixing them with elements from the Arkansas valley to the west and elements from the Cahokia center to the northeast. The result appears to have been a unique "Ozark culture" that lagged behind the major cultural developments elsewhere, but in itself was a special unique cultural expression. This parallels the historical development in recent time after first settlement of the area by Europeans, and a bit of the unique cultural expression of the Ozarks in general can be found in the area today. This regional unique cultural expression from ancient man to modern times is a theme of greatest interest that should be interpreted fully and preserved before it is lost by the rapid modern development of the entire Ozark Plateau area.

Early Man or Paleo-Indian left evidences of his discovery and use of the Current river valley at a number of different sites. Fluted, lanceolate shaped spearpoints have been found on two sites in Carter County, (23CT2 and 23CT5, in the Leo Anderson collection) and other lanceolate forms, especially the Dalton lanceolate, have been found at Round Spring and at a site near the southern border of Shannon County (23SH1) and in the Eleven Point river valley in Oregon County (Anderson collection). Similar fluted points and Dalton points have been dated at 9700+ - 500 years ago in Graham Cave in Montgomery County, Missouri (Chapman, 1957). The St. Francois Mountain area to the east may be one of the very earliest centers of development of the Dalton culture and part of this development could and probably did take place in the Current-Eleven Point area. There is a greater concentration of Dalton points in this area than at any other place known at present, indicating the very good possibility of this general area being a major early cultural center. (The Zimmerman and Dale collections at Bonne Terre, both obtained from this highland area, contain more than two hundred of these early lanceolate points and a cache of Dalton points from Iron County was found recently and reported upon by Leonard Blake).

The Archaic Culture of the Southeast penetrated the area, and collections of artifacts from the many prehistoric campsites contain a predominance of Archaic spearpoints, full-grooved axes and other less distinctive items such as knives and scrapers of flint. Iron ore in the form of hematite or specularite was shaped into full-grooved axes by the Archaic peoples and a number of these relatively unique implements have been found by collectors. For example a full-grooved hematite ax in the Leo Anderson collection was found at the Akers Ford site on Current River in Shannon County (23SH23). Some of the Archaic spearpoint types may denote the development or appearance in the area of a unique or presently undescribed or unknown manifestation. As an example a distinctive spearpoint with prominent serrations, a concave base and lobes at the base was noted from site 23CT3 in the Leo Anderson collection.

The Woodland Culture Pattern is well represented in the area, but primarily in its latest manifestations according to the information available. Early Woodland similar to the Burkett Site in southeastern Missouri (Chapman, 1953, pp. 36-7) is probably present, for numerous contracting stemmed projectile points of similar type have been found in the

region. Projectile points similar to Middle Woodland types and the corner-notched "Hopewell" form are of relatively common occurrence. More specifically there is a location which appears to be a good Middle Woodland site in Carter County (23CT95) where a three quarter grooved ax was found (in the Leo Anderson collection). The three quarter grooved ax in this area appears to be a very diagnostic trait of the Middle Woodland period. Further, a cache of blades found at Round Spring was probably associated with the Middle Woodland occupation on the terrace site near the spring.

Late Woodland sites are predominant throughout the Current River drainage and are at least prevalent in the upper Eleven Point. The culture represented on the sites is a part of the unique Ozark Plateau development of culture called the Highland Aspect in archaeological literature (Chapman, 1948, pp.100-110). Recent work in the upper Meramec River valley that is as yet unpublished indicates that the Highland Aspect has a development in the Meramec valley centering around Meramec Spring that is so special to that locality that it has been named the Meramec Spring Focus. This focus includes the upper reaches of the Current River in Dent County where it appears in Ashley Cave. It is not known how far the special development continues downstream, but it appears that another important, unique, Ozark Late Woodland culture appears in the lower reaches of Current and Eleven Point River drainages and this is related to the Mississippi culture advancements in the St. Francis Basin. A similar Late Woodland manifestation was found in the Wappapello Reservoir area before it was inundated (Berry, Wrench, and Chapman, 1940). It is probable that this Late Woodland occupation of the region could be isolated and described as another focus of the Highland Aspect from sites in the Current-Eleven Point area. This is perhaps one of the most important cultures in the area due to its uniqueness as an Ozark Plateau cultural development comparable to the "Ozark Mountain" culture of recent time. One site representing the "Current-Eleven Point Focus" of the Highland Aspect is located at Round Spring State Park.

Middle Mississippi culture is present only in limited form in the upper Current River area where the archaeology is best known. Burials of Middle Mississippi people were made between the Round Spring pool and the spring entrance at Round Spring State Park. The usual custom of placing pottery vessels and/or pipes with the dead was practiced by these late-comers to the area. Burials of the Middle Mississippi people have washed out at Round Spring State Park on several different occasions in the past and one of these was investigated by the University of Missouri in conjunction with the State Park Board in the spring of 1959. Numerous mounds have been reported in the river valleys, that could, from their location, be associated with a Middle Mississippi occupation of the valleys. In most instances it is not known with what culture, if any, the mounds are associated in the Current River valley, but it is probable that farther down the valley toward the Mississippi valley lowland area, strong Middle Mississippi cultural occupation centers will be located. A clue to this possibility is present in the Eleven Point valley.

The Middle Mississippi culture is represented in fullest extent in the Eleven Point valley at one point. At the mouth of Hurricane Creek is located a large "temple mound" approximately two hundred feet in diameter

and more than 15 feet high. It is flat-topped and is pyramidal in shape similar to the "temple mounds" characteristic of the Middle Mississippi culture throughout the Mississippi River valley. This appears to be more than just an extension of the Middle Mississippi into this area. It has the possibilities of being a special ceremonial center on the order of the Spiro Mound of Oklahoma. Downstream at the Narrows is a burial mound of the Middle Mississippi people who lived around the Blue Spring. Pottery comparable to that found in the St. Francis basin has come from this mound. Again the Ozarks area with its narrow stream valleys and its springs and spectacular natural features may have stimulated a little different development of Middle Mississippi culture, channeled into a unique Ozark center. It will take more detailed investigations to determine the fuller story concerning this latest archaeological development.

Historically there is a fair possibility that the Current-Eleven Point area was that visited by some of De Soto's men in 1541 when they made their trip of exploration into the Ozark Plateau. It is evident that this area cannot be discounted as that visited by De Soto's men and this should be taken into consideration in any interpretation of the area archaeologically and historically. It is very possible in any instance that European diseases brought by the De Soto invasion brought about a disruption and partial disintegration of the Middle Mississippi cultures in the St. Francis Basin and that remnants of these flourishing centers were dispersed in the Ozark Plateau. Evidences of this break-down of Middle Mississippi cultures and pockets of migrant occupation should be present in the Current-Eleven Point area if the hypothesis of disease and dispersal is correct. The eye-witness descriptions recorded concerning De Soto's expedition would be of value in the interpretation of the archaeology of the area (Varner and Varner, 1951).

The last Indians to live in the area were the Shawnees or Delawares who had a village or were in the area on the upper reaches of the Current River according to a manuscript map accompanying a letter from William Clark dated January 20, 1821. On the manuscript map it is noted "Shawnees or Delawares from Cape Girardeau" (Rec. Gp. 75, Map 688, National Archives, Washington, D. C.) It is probable that these were the Shawnee, for there is a Shawnee Creek in the vicinity. It is certain that these were nothing more than transients coming from east of the Mississippi River, forced out of their original homeland by European settlers. The last Indians known to be native to the area were perhaps the Quapaw, but even they used the territory only as a hunting ground, not as their homeland. The Osage may have hunted in this area, but only occasionally if so, and no real evidence of the use of the area by the Osage tribe could be obtained. A major Osage Trail between Springfield and St. Louis passed just to the north of Current River headwaters, so occasional use of the area may have been made by the Osage Indians.

General Ashley worked the deposits in Saltpeter Cave, (now called Ashley Cave), for nitrate in 1813 and 1814 disturbing the Indian deposits there to some extent. Evidences of the saltpeter mining operations were noted by Schoolcraft when he made his famous exploratory trip across the Ozarks in 1818-1819 and Schoolcraft stayed in the Ashley Cave when on the

trip in 1818. Evidences of the leaching of saltpeter are still visible, and it is probable that archaeological investigations would reveal the leaching hoppers and other remnants of the operation.

Archaeologically the whole gamut of the archaeology of the Mississippi River valley is represented in the Current-Eleven Point area, but is a changed form representative and typical of the Ozark Highland area. This unique development may start with the Dalton Culture more than 9000 years ago and extend through the Middle Mississippi perhaps as late or later than 1541 when De Soto made his historic venture up the Mississippi River valley. The story of unique cultural development did not end with the Middle Mississippi Indian culture. Here is an unusual opportunity to interpret a unique sequence of cultural development over a ten thousand year period, due perhaps to environmental or physiographic stimuli and limitations.

APPRAISAL OF KNOWN ARCHAEOLOGICAL SITES LEADING TO A PROGRAM OF INTERPRETATION IN THE CURRENT-ELEVEN POINT AREA

The archaeological knowledge of the area under consideration is extremely spotty and in no instance has sufficient controlled and properly supervised investigation been done to properly evaluate the archaeological resources of the area. Furthermore, the area is relatively large and the little evidence that is available indicates that there is at least a noticeable change in culture type or emphasis from south to north in the area. It is apparent that the area is rich in archaeological remains that extend through a full developmental period estimated to last ten thousand years. Perhaps most important is the apparent unique development of an Ozark culture type that is expressed in its fullest within the Current and Eleven Point valleys.

For a full understanding of the archaeology of the area the first recommendation would be for a most necessary planned archaeological reconnaissance of the full area to determine the extent of the archaeological resources and to obtain a full selection of sites valuable for interpretative purposes. Any over-all interpretation will need this first and obvious step. Next, at least preliminary investigations would be needed in the better sites representing the Indian occupation at different periods. The problem of the unique cultural development could thus be solved and fully interpreted through archaeological research on a series of selected sites. In any instance, archaeological surveys and excavations of key sites would be necessary before the valuable interpretation to be presented to the public could be accomplished.

In view of the fact that most of the sites located in the area cannot be evaluated properly due to lack of sufficient information about them, they have been presented in tabular form by legal description, type of site, associated culture if identifiable, and possible or probable importance. This site tabulation has been included as an appendix entitled: "Known Archaeological Sites and their Distribution in the Current-Eleven Point Area."

Known archaeological sites in the area lending themselves to a program of interpretation are (1) Ashley or Saltpeter Cave,(2) the Round Spring State Park sites,(3) the Pigman Mound site and (4) the Morgan Mound and related sites. A number of caves were reported by Mr. Gregg of the National Park Service (personal communication October 28, 1959) in the Jacks Fork area, one of which is probably of much value for interpretation and is "in the limestone bluff facing north just west of the center of the upper half of Section 5, Township 27 North, Range 6 West. The cave is slightly, if at all, smaller than the Ashley Cave, and the amount of fill, particularly toward the front, offers good promise for archaeological investigation." This good site found by H. R. Gregg points up the probability that there are numerous fine sites worthy of interpretation in the area and that a survey to locate and evaluate these resources is badly needed.

Ashley Cave also known as Saltpeter Cave on the right bank of North Ashley Creek in the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 32 Township 32 North, Range 7 West in Dent County has a series of openings the largest being more than 40 feet wide. Inside this large opening is an area of relatively dry deposit that is 40 to 70 feet wide and extends into the cave approximately 75 feet. This deposit contains Indian remains and at least a portion of it does not appear to have been disturbed. A fair portion of the cave floor has been built up in ash beds judged to be the remains of fires built to boil down or evaporate the water obtained by leaching the deposits to obtain saltpeter. It is possible that remains of the saltpeter works could be found by archaeological research and the old works could be reconstructed.

Excavations for archaeological remains would probably give a fair picture of the extension of the Meramec Focus of the Highland Aspect of the Late Woodland culture into this area. Pottery fragments and arrowheads found on the floor of the cave and at the edge of the deposits where drip from the roof had exposed them, were identified as Meramec Spring Focus, a unique Late Woodland cultural development centering in the Meramec River valley to the north. Earlier archaeological cultures would probably be represented in the deposits. Another entrance was 30 feet wide but did not appear to have much deposit in it. The drainage from the cave was through this entrance. Two other entrances were nearly sealed with fill, but one of these yielded pottery fragments on the surface and it is probable that deep undisturbed deposits in these entranceways and under a ledge that may be the filled entrance to another cave, or yet another entrance to Ashley Cave.

Ashley Cave has great possibilities for interpretation of the archaeological sequence of the area of the Meramec Spring focus area from possibly the Archaic period through the important period in our own American History, the war of 1812 and the growth of an important industry of the time, the making of gunpowder utilizing saltpeter mined from caves. Furthermore, Ashley was one of the great men that opened the west to fur trade and eventual settlement. Schoolcraft who visited the cave in 1818 adds a certain amount of interest and glamor to the site and in the interpretation, his route over the highland area of the Ozarks should

at least be presented on a marker.

Round Spring State Park is located in a critical position for a visitor center that should have a museum which shows graphically the interpretation of the archaeology and history of the whole region. Not only is the physical location ideal for a visitor center, but there is archaeology there as well that would lend itself to on the spot interpretation. The round pool of the spring appears to have been an attraction for thousands of years. Weapons and tools of Paleo-Indian people, of the Archaic, Middle Woodland, and Late Woodland have been found washed to the surface on the slopes of the spring pool. Burials and grave offerings of the Middle Mississippi are present among the rock outcrops above the spring. Careful investigation of the area surrounding the spring would no doubt supply interpretations of trailside value as well as exhibits on the spot and in the visitor center.

A small cave on the east side of the spring pool has been used as shelter by the Indians and probably has within it some things of interest that could be left as a trailside exhibit. The fact that burials were made among the rocks a short distance away suggests that some burials might have been placed in this cave. There is no evidence that the cave has ever been disturbed.

The third site of special interest is the Pigman Mound located on the left bank of Eleven Point River on the broad river terrace at the mouth of Hurricane Creek in the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 34, Township 23 North, Range 2 West. The mound is a truncated pyramid and has relatively steep sides that have been rounded considerably by weathering and by the removal of a number of large trees from its sides. The tree removal was done with a bulldozer and although no great part of the mound was disturbed, human bones and pottery sherds were brought to the surface by the operation. The base of the mound is approximately 200 feet in diameter and the height is more than 15 feet from the original surface. The structure free of vegetation, would be very imposing.

The shape and size of the mound and the associated pottery and arrowheads leave no doubt that the people building the structure were participating in the Middle Mississippi culture and that the mound is of the Temple Mound type which always had a ceremonial building on its top. The prime purpose of these flat-topped mounds was as a base for a ceremonial building or chief's house. Such mounds as a rule were the ceremonial center for a village or a series of villages and this may be the case here. In any instance it is extremely unusual for the mound to occur so far away from the usual centers of the Middle Mississippi in the St. Francis basin. When these Middle Mississippi ceremonial centers do occur at the edge of the usual distribution, they often represent a secondary or unusual expression of the culture.

It is recommended that the Pigman Mound be investigated sufficiently to determine whether or not a ceremonial structure was once on the top of it, and if so, further investigations should be conducted to interpret the mound fully. A reconstruction of any ceremonial building found on

its top might be done, or a small trailside exhibit might be made on the top of the mound, depending upon the results of the interpretive study of the mound. At the very least the mound should be sodded and a permanent metal marker placed upon it explaining its structure and use, and marked trails should be made to it from the river's shore. Preferably archaeological investigations should be made surrounding the mound to determine house locations and other features that would aid in the interpretation of the mound and the people who built it.

The Pigman Mound is the most outstanding archaeological site now known in the Current-Eleven Point area and might well be similar to the Spiro Mound, one of the most outstanding sites in North America (Hamilton, 1952). The mound offers such great possibilities that the University of Missouri is starting the investigation of it and surroundings.

There are many caves in the area and if the one reported by Mr. H. R. Gregg is any indication, several of the cave sites should be investigated to obtain the necessary interpretation for the visitor center. It is probable that many of the caves will need trails made to them. Trailside exhibits such as permanent interpretive markers should be located at the more important sites.

KNOWN ARCHAEOLOGICAL SITES AND THEIR DISTRIBUTION
IN THE CURRENT-ELEVEN POINT AREA

LEGAL DESCRIPTION	TYPE	CULTURE	IMPORTANCE
DENT COUNTY			
32-32-7W*	cs** (Ashley Cave)	Late Woodland	Sequence for north Current River, historic saltpeter mine.
SHANNON COUNTY			
(2) 8-24-4W	md & cs	?	Unknown
(3) 18-28-4W	cs	?	?
(4) 2-28-5W)	cs	?	?
(5) 2-28-5W	c	?	Clay mined in it.
(6) 3-28-5W	cs	?	?
(7) 9-28-5W	cs	?	?
(8) 9-28-5W	cs	?	Reportedly rich
(9) 11-28-5W	c	Middle Miss. and Late Woodland	Good interpretative possibilities - dry.
(10) 17-29-2W	cs	?	?
(11) 20-29-3W	cs	?	?
(12) 31-29-3W	c	?	?
(13) 26-29-4W	md & cs	?	Investigation recommended
(14) 29-29-4W	cs	?	?
(15) 13-29-5W	cs & Indian trail	Historic	Importance in tracing Indian trails

* The first number is the Section number, the next is the Township North and the third is the Range and W. or E. is West or East. Thus 32-32-6W. means Section 32, Township 32 North, Range 6 West.

** The abbreviations c, cs, md are for cave, campsite and mound.

LEGAL DESCRIPTION	TYPE	CULTURE	IMPORTANCE
(16) 26-29-5W	c	Late Woodland	Investigation recommended
(17) 35-29-5W	cs	?	?
(18) 36-29-5W	cs	?	?
(19) 20-30-4W	cs, and cemetery (Round Spring)	Early man, Archaic Middle and Late Woodland and Middle Mississippi	Recommended as a logical place for a visitors center.
(20) 28-31-4W	cs and 10 md.	?	?
(21) 13-31-6W	7 md. and 1 cairn	Historic?	Osage cairn?
(22) 13-31-6W	cs	?	?
(23) 13-31-6W and 24-31-6W	cs	?	?
(24) 14-31-6W	10 md.	?	?
CARTER COUNTY			
(1) 13-26-1E	cs	Archaic	?
(2) 9-26-1E	cs	Middle and Late Woodland	Recommend investigation for interpretation.
(3) 5-26-1E and 6-26-1E	cs	Archaic, Middle to Late Woodland and Middle Mississippi	Probably stratified.
(5) 11-27-1W	cs	Late Woodland	?
(9) 23-27-1W	cs	Late Woodland and Middle Mississippi	Early contacts possible.
(11) 23-27-1W	cs	Late Woodland	Pure site?
(15) 14-27-1W	cs	Late Woodland	Pure site?
(25) 24-27-1W	c	?	?
(26) 13-27-1W	c (Rich Bark)	?	?

LEGAL DESCRIPTION	TYPE	CULTURE	IMPORTANCE
(27) 30-27-1E	c (Bowen)	?	?
(36) 32-27-1E	c (Granite)	Middle Mississippi	Should be marked.
(38) 6-26-1E	cs	Late Woodland	Pure site?
(44) 14-27-1W	cs	Late Woodland	?
(54) 15-25-1E	cs	Archaic	?
(60) 2-26-1E	10 md.	?	?
(65) 4-27-1W	cs	Archaic and Middle Mississippi	Stratified?
(73) 30-27-1E	cs	Middle Woodland	Mark for cache found here
(74) 29-27-1E	Indian trail	Historic	Mark trail for hikers.
(81) 14-27-1W	c (Boats Bend)	Middle Mississippi	Excavation for interpretation
OREGON COUNTY			
(21) 34-23-2W	md (Pigman)	Middle Mississippi	Excellent possibilities for interpretation and reconstruction.
16-22-2W	md & cs (Morgan) (Blue Spring)		

BIBLIOGRAPHY - ARCHAEOLOGY

The Archaeology of Wayne County, by B. Berry, J. E. Wrench and C. Chapman. The Missouri Archaeologist, Vol. 6 No. 1, 1940.

A Preliminary Survey of Missouri Archaeology, Part III Woodland Cultures and the Ozark Bluff Dwellers, by Carl H. Chapman, the Missouri Archaeologist, Vol. 10, 1948.

A Report of Progress: Archaeological Research by the University of Missouri 1955-1956, by Carl H. Chapman. A Special Publication of the Missouri Archaeological Society, 1957.

The Archaeological Survey of Missouri, by Carl H. Chapman. The Missouri Archaeologist, Vol. 15, No. 1 and No. 2, 1953.

Archaeological Investigations, by Gerald Fowke. Bureau of American Ethnology Bulletin No. 76, pp. 13-100. 1922.

The Spiro Mound, by Henry W. Hamilton. The Missouri Archaeologist, Vol. 14, Whole Volume. 1952.

Aboriginal Pottery of the Eastern United States, by W. H. Holmes. Annual Report of the Bureau of American Ethnology, 1898-1899. 1903.

The Florida of the Inca, by J. G. Varner and J. J. Varner (Eds. and Trans.) Austin, 1951.

Early Roads in Missouri, (MS), by M. M.Wood. M.A. Thesis. University of Missouri, Columbia, 1936.

Chapter 5

ECONOMIC AND SOCIAL IMPACTS

PREFACE

This chapter contains the report of the University of Missouri entitled "Economic and Social Impacts of Establishing a National Recreation Area along the Current, Jacks Fork and Eleven Point Rivers in Missouri." The report, dated November 16, 1959, results from a preliminary study made by members of the University's Agricultural Economic staff, in accordance with the provisions of Contract No. 14-10-232-396 dated October 20, 1959 between the University and the National Park Service. The report except for the Table of Contents, List of Tables, and List of Figures, appears verbatum in this chapter.

The deadline established for completion of the National Park Service study of the Current and Eleven Point River country was such that final National Park Service conclusions and recommendations were not available in time to be used as the basis for the University analysis. As a result it was necessary that the University base its study on certain premises formulated by the National Park Service, actually prior to the Service's completing its study. The following premises are those on which the University based its study.

1. A national recreation area containing about 80,000 acres would be established along the Current and Eleven Point Rivers. A copy of the map showing the proposed boundary of the area as furnished the University is now on file in the National Park Service's Region Two office in Omaha, Nebraska.

2. The land within the proposed boundary would:

   A. Be owned by the U. S. Government in fee, except for a limited area where easement was deemed sufficient to assure necessary control.

   B. Be removed from the local tax rolls.

   C. Not be used for any agriculture, forestry or mining, but would remain or revert to a natural condition.

   D. Not be available for private building sites.

3. Five years after the national recreation area was established the expected number of visitors to it and four nearby State Parks (Montauk, Round Spring, Big Spring and Alley Spring) would be 1,425,000 persons per year.

4. Each visitor would stay for two days and would spend $6.98 each day. The figure for the average daily expenditure was taken from the 1958 Tourist Survey of the Missouri Resources and Development Division.

5. A ratio of one to one between in-state and out-of state visitors to the national recreation area was assumed.

6. The expected visitation to be predicated upon adequate tourist developments.

The recommendations contained in the National Park Service Report of January 1960 entitled "A Proposal - Ozark Rivers National Monument," differ from the above premises in certain respects. First of all, the area has now been proposed as a National Monument. Also, the area's acreage has been increased to 113,000 acres. In addition, no easement acreage would be involved. Even with these changes, the general conclusions and observations in the University report should be applicable to the Monument proposal.

The cost estimate for acquiring lands within the national recreation area boundary as shown in the University report is considerably lower than the estimate contained in the National Park Service report of January 1960. The higher figure reflects the larger acreage and use of appraisal methods probably more applicable to this particular case.

FOREWORD

The Ozark region of Missouri contains some of the most beautiful scenery in the world. Wooded hills, verdant valleys, mammoth springs and clear streams are common place. It lies near the geographic center of the United States with several metropolitan cities on its periphery. With proper development, it could become one of the principal recreation grounds of the nation. In fact, recreation should be the principal business of its people, yet little has been done to develop the resources for this use. The brief report presented here deals with some of the Economic and Social impacts of moving toward development of these resources.

PART I

DESCRIPTION OF AREA

Location

The Current-Eleven Point area in which the proposed National recreation grounds would be located is in the eastern Ozark section of southern Missouri, (Figure 1). It would include land in the following counties: Dent, Texas, Ripley, Oregon, Carter, and Shannon. However approximately 77 percent of the acreage would be in Shannon County, (Figure 1a). The southern most counties, Ripley and Oregon, border the state of Arkansas.

Transportation Facilities

The principal roads in the area are Missouri State Highways 19, 106, 99, and 21; and U. S. Highways 60 and 160. All of them are bituminous paved highways. One main railroad line runs through the counties which border the area on the east. It is the Missouri Pacific line running from St. Louis to Little Rock, Arkansas.

Climate, Topography, and Soils

The area has a moderately humid continental climate, characterized generally by warm summers, cool winters, and maximum rainfall in late spring. However, rainfall and temperatures are subject to rather wide daily, monthly, seasonal, and annual variations. 1/ The average length of the growing season which varies from 169 to 205 days is adequate for most crops. However, the lack of moisture is often critical for crop growth in July and August.

The topography of the area is rough and steep, making it unsuitable for cultivation of crops. The general area is tree-covered and hilly, with numerous small streams. Several large springs and numerous small ones attract many visitors to the area. The two largest rivers, Eleven Point and Current, afford good fishing, and rank high in scenic value. Float fishing on these streams attract visitors from all parts of the United States.

The Soils in the area have a cherty limestone base, most of them are classified in the Clarksville Soil Series, which is the dominant Ozark soil. It may be described as stony, hilly, and possessing a low degree of fertility. 2/

1/ Climate and Man, Yearbook of Agriculture, 1941, U. S. Department of Agriculture, U. S. Government Printing Office, pp. 945-947.

2/ Soils of Missouri, Missouri Agricultural Experiment Progress Report 12, October, 1950, pp. 7-10.

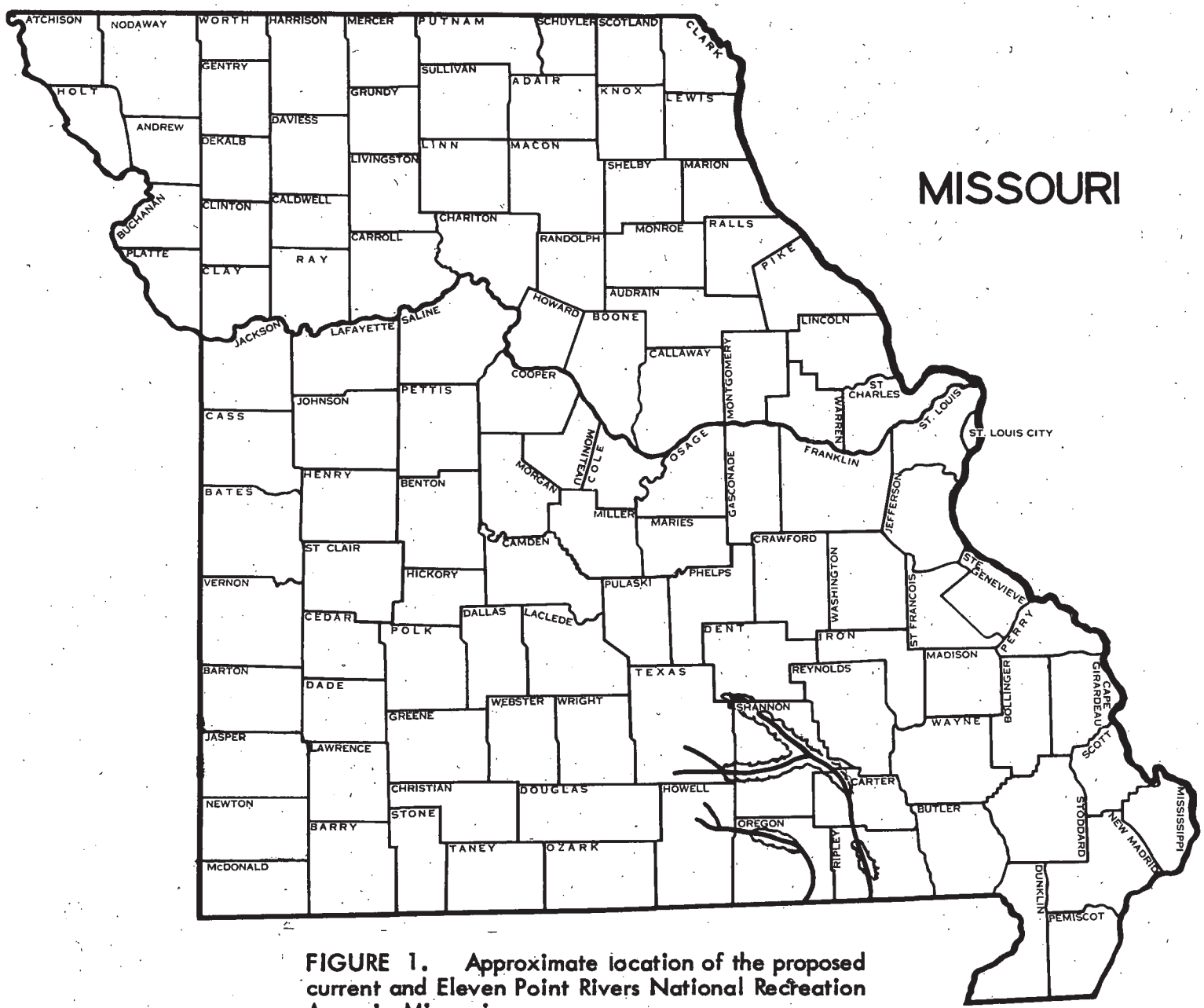


FIGURE 1. Approximate location of the proposed current and Eleven Point Rivers National Recreation Areas in Missouri.

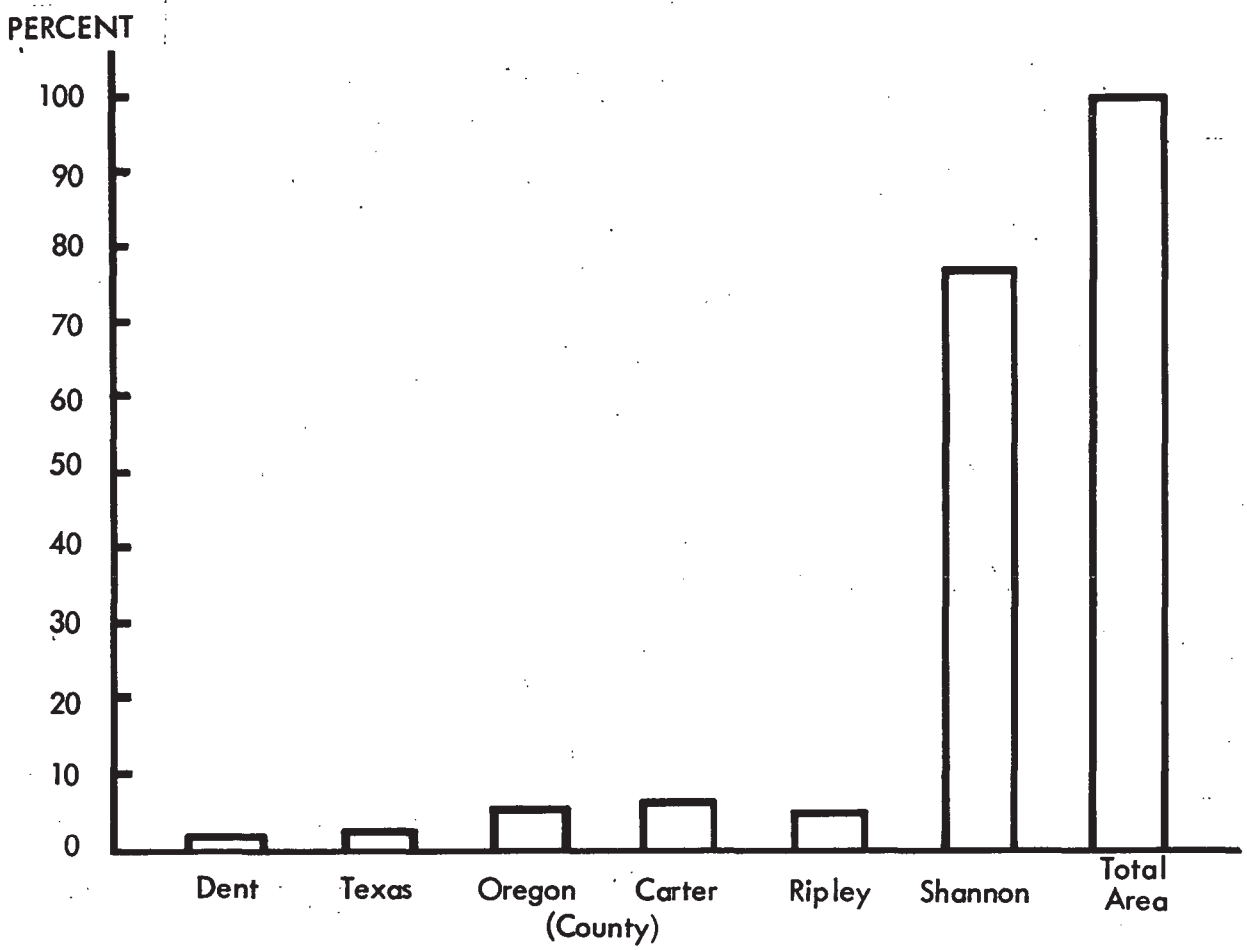


FIGURE 1a. Approximate percentage of the current - Eleven Point Rivers National Recreation Area that would lie in each of six Missouri counties.

PART II

ORIGINS OF THE PEOPLE AND THE INSTITUTIONS UNDER WHICH THEY LIVE

The area of the four counties in which most of the recreational ground lies may be considered as a unit. It has a common history from the time of settlement in the early nineteenth century, through the period of war between the states, through the great lumbering operation extending from the late '80's into the first quarter of the twentieth century, through the great depression of the 1930's, the Federal and state aid programs, and down to the present day.

This section of Missouri was settled initially by people from the mountain regions of Kentucky, Tennessee, Virginia, North Carolina, and other eastern states. The settlers were nearly all of English stock, or descendents of the early colonists. They held Union and anti-slavery sentiments. They brought their industries and their moral codes into the Ozarks which seemed to them to be an area just like their former hill homes.

The area was opened to settlement by the discovery of iron ore, copper ore, carbonate of zinc, and lead about 1819. At that time the fur trade, the rich bottom land, and the Indian ford on Current River just north of the Missouri-Arkansas line were attractions to settlers. The first people who came were poor in this world's goods, but were honorable, industrious, and frugal, with willing hands and stout hearts. Generally they built their dwelling houses of logs. In the construction of these houses, they would take into consideration the room required for a loom and spinning wheel in addition to the bedrooms and living quarters needed for their families. They were noted for their hospitality, sociability, and liberality. They had house raisings, corn shuckings, quiltings, cardings, and other types of work festivals. Gatherings were considered as merrymakings, and the neighboring settlers would come from near and far.

The main stream of westward migration by-passed the Ozark hills, following natural avenues of passage; and the vast pine forest of Central Missouri remained untouched by the ax of the lumbermen, as the insatiable frontiersmen hurried on to more promising fields. This region was an eddy, a backwater, untouched, and almost unnoticed by those who followed the main highroads.

The Civil War came and passed, and gradually civilization began to overflow the fringes of the highlands and push up the narrow valleys. The Graduation Act of 1854 had made it possible for some of the finest timberlands of the nation to pass into the hands of speculators and settlers for a minimum price of 12½ cents an acre. As eastern forests were being rapidly depleted, and former sources of supply were being exhausted, eastern timber barons began to look for new and untouched forests. One factor had prevented earlier penetration of the Ozark plateau--the lack of transportation facilities. At the beginning of the railroad age, two lines of steel began to build southward one on the eastern fringe and one on the western edge of the

great pineries. Lumbermen were quick to take advantage of the new order, and within a decade, the Ozarks became a scene of bustling timber activity. Railroad lines and logging roads began to wind down the ridges. Great mills were established, and new towns grew up around them. The exploitation of the last frontier in Missouri had begun.

As early as 1859, the St. Louis and Iron Mountain Railroad had reached Pilot Knob in Iron County, Missouri. All construction ceased on this road during the Civil War, but by 1872 the Iron Mountain had been completed to the Arkansas line. A railroad line from the eastern city limits of Springfield, Missouri to the Arkansas State line was constructed by the Kansas City, Fort Scott, and Memphis Railroad Company, during the period from September 1881 to October 1882. This line passed through Willow Springs, Missouri in Howell County. By 1883, the Iron Mountain had completed its Doniphan Branch. Doniphan lay on the Current River, the only stream of any importance used by the great saw-mill companies. Also in this year, the Cairo and Fulton Railroad was constructed from Poplar Bluff, Missouri to Cairo, Illinois, thus opening another outlet for lumbermen to the east. On the north and west, the St. Louis and San Francisco Company had purchased the Missouri division of the Atlantic and Pacific Railroad, which had good connections with points in Indian territory.

Great blocks of land had been bought up for investment by the Missouri Lumber and Mining Company. This company dominated the timbering of the area for the next 30 or 40 years. The company owned the buildings and land for stores, barber shops, undertaking establishments, and other types of business. Churches were given money regularly by the company and also some lumber for construction purposes. In Grandin, Missouri, center of the great lumbering operation, four churches were supported, Congregational, Baptist, Methodist, and Catholic, but the latter was converted into a public library as there were too few Catholics to maintain it.

The Company tried to protect the morals of the people. Drinking on the job was forbidden, and an effort was made to keep liquor out of Carter County altogether. When it sold lots, as it did now and then, it reserved the right of selling intoxicating liquors on the premises and also the use of the property for immoral purposes. However, since the Grandin mill company did not own all the land in Carter County, whisky could be obtained by employees. As a last resort, one liquor vendor, J. W. Johnston, was employed by J. B. White, General Manager of the corporation, on condition he would abandon his previous occupation. Illegal distilling was immediately reported to the officials of the corporation, and U. S. Marshals were transported without fare over logging roads to the scene of operations. In 1904, one still was captured on Buffalo Creek, west of the Current River, and four arrests were made. Gambling was forbidden, either on or off the job. A private investigator was hired at one time to gamble with the employees to identify those participating. Employees who disturbed the peace were immediately discharged. A man named Parker was dismissed for firing his pistol in the streets. Dishonesty on the part of employees was rare.

The early operation of the mills was begun by trained men, brought in from Pennsylvania. As business expanded, and after 1899, large numbers of common workers were attracted to the scene from the entire Ozark plateau, and even from other sections of the country. Wages were about the same as elsewhere in the lumbering business, but the year-round operation meant steady work. It was claimed that the company never employed Negroes, Italians, or Hungarians. The policy was to refrain from hiring elements which might cause racial disturbances among the workers. By 1907, Negroes were employed for temporary jobs, such as loading ties on the tram roads. It was said that a careful observer was impressed with the esprit de corps of the workers, and the superb organization of the entire labor force.

Social status was clearly defined among the mill workers by area of housing and rental paid. Centering around the Congregational Church, and east of it were the better homes of the company officials. They were painted, frame houses, and rented at 5 to 10 dollars a month in 1895. There were some good houses on the side of the hill back of the hotel, store and office. West of the Congregational Church were the small, unpainted, frame shacks of the common laborers. These rented at 2 to $2\frac{1}{2}$ dollars a month in 1895. More workers' houses were constructed down the valley nearer the mills and farther from the main street of the lumber town.

Land was continually being bought by the mill company. The purchases averaged between 15,000 and 20,000 acres a year. Tax delinquent land was purchased at a cost that seldom was more than 25 cents per acre. The land was bought from individuals and investment companies. Usually it was purchased in the name of some party unknown in the locality, a sort of "Dummy" name. In 1901, J. H. Berkshire sold 40,000 acres in Shannon County which had been ceded to the Ozark Land and Lumber Company. The reason given for wanting to sell was that Berkshire had "nobody but women partners, and wanted to sell out".

Late in 1907, the pace of the lumber mills began to slacken. All of the good pine adjacent to Grandin had been cut. The mills began to run four days a week, and the company made plans to move its equipment to a more favorable location. September 25, 1909, the whistle blew for the last time, and the mill was dismantled and moved to Shannon County. It continued to operate at West Eminence, until 1919. Lots were sold to individuals in the town of Grandin. Company housing was abandoned except for windows and doors which were removed and hauled to West Eminence to be placed in new houses.

The removal of the mill was catastrophic. The population shrank within a few months to a fraction of what it had formerly been. The High School was abandoned, and the large grade school became a one-room affair. Regular church services were discontinued as no congregation was now large enough or sufficiently prosperous to afford a regular pastor. The newspaper office closed and moved to Doniphan, but before the editor left, he sounded a keynote of optimism which had prevailed for two centuries on the frontier: "The sawmill has proved to be the advance guard of civilization and progress; with the passing of the sawmills, people have turned to the soil". Unfortunately, the barren, rocky soils of the Ozarks were to prove a bitter disappointment to most of the optimistic souls who attempted to wrest a living from them.

The lumber company tried experimental and demonstration farming to entice people to buy the cut-over lands. They tried cattle raising and fruit farming. The company tried to get a State Experimental Station located at Grandin, but it went to Mountain View. Other types of industry were tried, but the "bleak hills of the Ozarks could produce only one resource of any consequence--timber".

Taxes were too high to justify ownership of cut-over land and the companies had to sell or abandon their properties. They tried to get the legislature to absolve them of taxes on properties that were not being worked but were unsuccessful. It was estimated that the tax cost of holding cut-over land was 10 cents per acre per year. Some land was sold to farmers on the installment plan, in lots as small as 40 acres. An investment company of Minneapolis, Minnesota bought a large tract of cut-over timber land in 1903. Real estate agents were hired and given commission on acreage sales. Many others wanted in on the final selling, but the company preferred to try to keep the price up and have a reasonable return, rather than give speculative profits to real estate agencies. Occasionally, cut-over lands were offered for sale through one of the trade journals. In 1898 the Missouri Lumber and Mining Company advertised 65,000 acres as the "finest fruitland in the state", and told the editor of the Timberman to publicize their holdings as the "Land of the big red apple". Many of the tracts were too small for satisfactory family incomes. This uneconomic division of resources led to exploitative practices. Even after 40 years and the creation of State and National Forests in the Ozarks, farmers in the scattered valleys outside the forest boundaries still burned the woods every spring as their forefathers had done before them. Seedling trees were destroyed, and much of the young timber that had managed to survive was stunted and twisted.

Many people in the area still seem to be forced to gain a livelihood from either "timber scrapping"--cutting the immature growth of timber--or from attempting to farm the poor hill lands. Neither of these two sources of income provide more than a mere subsistence. "Timber Scrapping" not only is an unremunerative occupation, but it also causes great waste of the second growth of trees, as they are cut before they attain sufficient size for most profitable use. Farming the hill land has been unsuccessful, because the thin soil when cultivated soon has eroded to the point of complete loss of most of the top soil.

Prior to 1934 most of the acreage that had been considered suitable for farming was held by small private owners. In that year, the United States Forest Service began buying land to be placed in public ownership for forest management. The State of Missouri also bought 200,000 acres and two large companies bought approximately 200,000 acres. The management of these timberlands is handicapped by the mixed non-contiguous ownership pattern. The holdings of individual owners usually are small, and many of the relatively large holdings of public agencies are in non-contiguous tracts scattered throughout the area.

During the 1930's approximately two-thirds of the population in this area had no adequate local source of income. In the Clark Forest Area between 25 and 30 percent of the families were on relief in 1938. In four communities in the area between 60 and 90 percent of the families were dependent on work relief, direct relief, or pensions. The economic wealth of the region was depleted with exhaustion of the timber resources. Many of the local people were glad to sell their woodlands because the acreage had little, if any, value to them. Local governments were near bankruptcy and social institutions such as schools and churches were adversely affected.

The task of reforestation and management for rehabilitation of the people has social customs to overcome. A study of these customs was made in 1939 by Harold Kauffman. He found that the custom of burning the woods every year, timber scrapping, "grandmaing", which means stealing timber from public lands or from land owned by non-residents and reporting that it came from "grandma's" land, open range for unrestricted grazing of livestock on timber land; and squatting, all had social, psychological roots. He also found that the process that seemed to avoid conflict and brought acceptance of National and State programs was related to several factors which can be described as follows:

The fact that reforestation provided employment seemed to be very significant. The group which was most enthusiastic in its support was made up of the employees of the Forest Service. Work with the Forest Service seemed to carry prestige partly because it was relatively permanent and offered better wages than other employment. Several individuals who had not been employed directly by the Forest Service, but who had worked on WPA or CCC projects in the forest related this fact with some pride.

Another factor was the respect for Forest Service personnel. This resulted from visits and acquaintance with Forest Service officers. The statement was frequently made "these forestry men are nice, friendly fellows. Friendly contacts with Forest Service officers were perhaps second in importance only to employment in promoting the acceptance of the reforestation program.

Additional favorable comment on the Forest Service program centered about the "Showboat", an educational tool used with some success. The "Showboat" was a panel truck equipped with an electric generator and carrying a projector, portable screen and sound equipment. A trained operator, usually a high-caliber CCC boy, took the "Showboat" back into the most remote areas where electricity was not available and showed pictures on conservation, old classics, and comedies for the children. These programs were well received. Local forest rangers scheduled the showings (usually at rural school houses), advertised the coming of the "Showboat" by printed placards and by word of mouth, and then attended the shows to assist the operator and to make talks if called upon to do so.

These programs emphasized the need for good forest management practices. The result was a material reduction in number of forest fires. Some of the people who were consulted in this study felt that the fire control program was fine, now that they had the National forest. It meant restoration

of timber, conservation of the soil, protection of wildlife and elimination of the fire hazard from their property. In general, all of the factors that were favorable to reforestation and other government programs appeared to be bringing major changes in their way of living, yet these new procedures gave them a sense of security.

Population of the Area

Since 1930 the age distribution of the rural farm population in this area has shifted drastically. From 1930 to 1940 there was a noticeable increase in the relative proportion of the people between 20 and 34 years of age. While this change was occurring apparently there was a decrease in birth rate since the relative proportion of people in the younger age brackets decreased (Figure 2). This condition probably reflected response to the depression. Marriages were postponed, births decreased, and the outward movement of people from the area was reduced.

The economic recovery of the 1940's caused another shift in population. Migration from the area of persons in the 20 to 39 year age group increased. This resulted in a marked increase in the relative proportion of people in the older age groups. A comparison of the population pyramid for 1956 with that of 1950 shows that the rate of out-migration of farm people in the 20 to 39 year age group has been accelerated since 1950 (Figure 3). If the rate of migration continues, the number of children reared in the area will decline, and the outward movement of workers will tend to stabilize. The population living in the open country in 1956 showed about the same age distribution as rural farm people. The only noticeable difference was a larger percentage of people over 70 years old in the rural non-farm group. Large families are not characteristic of the area. They average a little more than three persons per household. In general, only one-fourth of the households had five or more members.

Ownership of farm and non-farm residences is quite high. In a survey of 785 families in 1956, a low value was generally placed on residences due perhaps to the large number of homes that had been vacated by people who had left the area. Non-farmers were living in residences for which they paid no rent. Those who paid rent averaged $9.90 a month. These low rentals probably encouraged old people with nominal incomes from savings or pensions to remain in the area.

In the general study of a ten county area in 1956 including the counties under consideration for development as a National Recreation Area about 71 percent of the male heads of farm households regarded farming as their major occupation. Another 22 percent regarded non-farm work as their principal occupation. The remaining seven percent were either retired, unable to work or were engaged in other non-farm work. In about 15 percent of the farm and 43 percent of the non-farm households, the total labor accomplished by all members was less than 100 days in 1955. It is generally considered that a full time job requires at least 250 days of labor. In this area more than 200 man work days a year were performed by only 58 percent of the members of farm households, and by 45 percent of those of non-farm households. This situation was caused largely by the health characteristics and

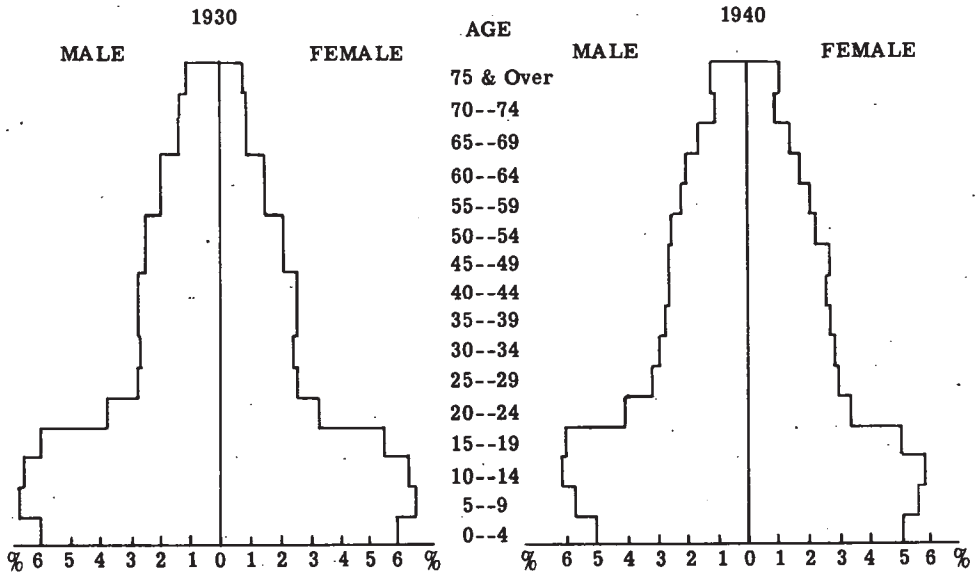


FIGURE 2. Distribution of the rural farm population in Missouri Economic Area 8, by age and sex.

Source: Data from 1930 and 1940 United States Census.

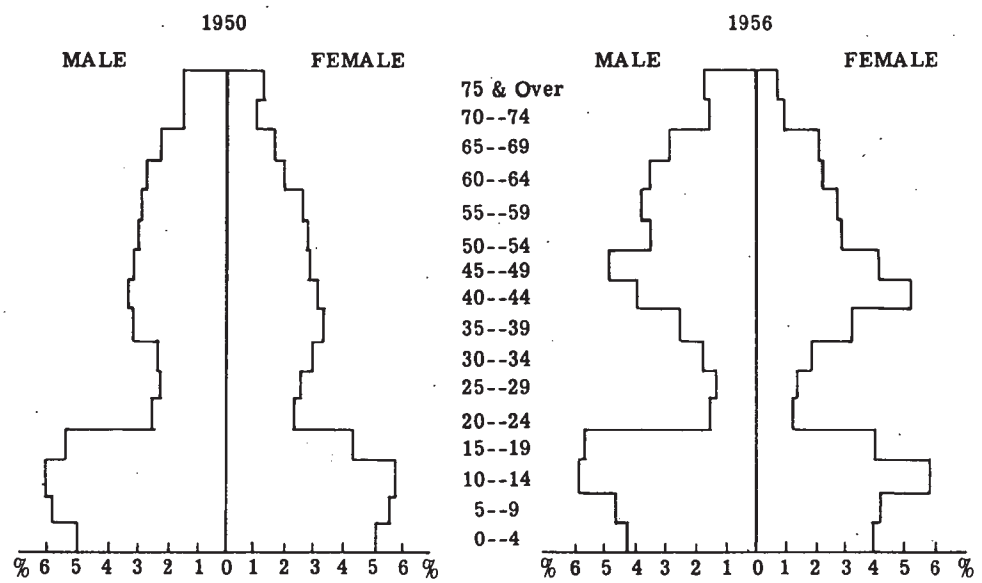


FIGURE 3. Distribution of the rural farm population in Missouri Economic Area 8, by age and sex.

Source: Data from 1950 United States Census and from 1956 survey by Ronald Bird, Frank Miller and Samuel C. Turner.

advanced age of a high percentage of the workers. To utilize these workers fully, industries that provide employment for workers of limited physical capacities seem to be needed. It has been found that approximately one-third of the farm households had less than $1,000 incomes, including the value of home consumed products in 1955. About 58 percent had incomes lower than $2,000. About 54 percent of the non-farm households had cash incomes of less than $2,000. A considerable part of this amount came from non-employment sources such as old age pensions, rents, interest, gifts from children, and some small wage work on other farms.

Children who are reared in families with low incomes are at an economic disadvantage when compared with those reared in better economic surroundings. Usually low income households have a disproportionate share of young children. In this area 44 percent of the farm households and 43 percent of the non-farm group had children 14 years of age or younger. In those households having incomes of less than $1,000 in 1955, 20 percent of the non-farm and 29 percent of the farm groups had children under 14 years of age; 43 percent of the farm households and 34 percent of the non-farm group having incomes from $1,000 to $1,999 had children under 14 years of age. In those households having incomes of $2,000 or greater, a larger percentage of the households had children under 14 years of age than those of lower incomes. These results are opposite to those usually reported in low income areas, and are probably explained by the relatively large out-migration of the younger families.

Another way in which one may get an economic picture of the situation is to classify the enterprises of these people into farms with better than average gross sales ($2,500 or more per year); those with less than $2,500; those who are part time non-commercial farmers; and those who are residential farmers living in the open country, but having less than $250 per year income from the sale of farm products. Very few households in any of the groups depend entirely on farming for their incomes. Important to a rural development program is the fact that the total household incomes of families operating in the second group average much lower than those of other classes even though half of their returns come from non-farm sources. It is apparent that these people need major adjustments in their farm businesses, or some other source of income.

The situation on residential farms is equally unsatisfactory. More than a third of all farms in the area were classified in this group by the 1954 census. Also those who are doing part time farming received only 6 percent of their household incomes from farming. Because of the limited resources of residential farmers and part-time farmers, the solution of their low income problems lie primarily outside of agriculture. Home consumption of farm products represented a relatively large proportion of the farm income of residential and part-time farmers.

Social Conditions

The history of the area provides a basis for understanding the present social structure. The great boom that accompanied the harvesting of the virgin timber has been described. With the exhaustion of the forest, the population declined. But many people stayed on in the area combining

part-time employment in reduced lumbering operations with subsistence agriculture. This has been the pattern during the past 40 - 50 years. A few exceptions are found along the river valleys, on specialized dairy farms or where agricultural operations compare favorably with those in commercial farming areas. For the great number of families, part-time farming and part-time employment seem to be a means of earning a living. Land is cheap and ownership of a small tract gives the family a feeling of security. Opportunities to earn off-farm income are essential to satisfactory levels of living. Also present in shaping the social structure of the area in the last 25 years has been the establishment of State and Federal welfare programs. Most of these programs were designed for an urban commercial society, but their application nation-wide resulted in their being fitted into the economy of this area with little or no change to adapt them to the prevailing social structure. The result has been alteration of the local social structure to fit the general program. Traditional patterns of family living have been changed at times to conform to urban values. Another consequence has been that means for entering the commercial markets have been regularly provided and living patterns have been changed to conform to this situation. The significance of this phenomenon can be more completely understood when it is realized that payments from government welfare and quasi-welfare funds constitute about as great a source of revenue in some of the counties as any single industry, including returns from agriculture. More than one-half of the persons age 65 years or over received old age assistance.

Another obvious but important factor in understanding the social organization of this area is the extreme isolation that existed prior to the last 20 or 30 years. Generally the topography was too severe and the resources too limited to justify construction of a complete transportation system. Short branches of railroads were used in hauling lumber from the area, but many of these feeder lines were abandoned when the timber resource was exhausted. Prior to the construction of highways, and the use of automobiles and motor busses, there was little transportation in or out of the area, and little chance for social and technological innovations to reach the people.

More recently, the widespread use of automobiles, together with radio and television has eliminated many of the barriers that once isolated the people. These changes have already had some effect, but they cannot be said to have eliminated entirely the influences of isolation. The present social structure reflects all of the historical background as well as the general topography and the physical resources of the area. The situation can best be described by saying that the people have retained the folk-culture and general characteristics of early American society. Lack of communication has retarded the diffusion of urban values; and lack of economic resources for entry into commerce which is part of a cash economy has limited the adoption of the technological changes found in readily accessible areas where land is adapted to commercial farming. The individual initiative and ingenuity that played such an important part in the settlement of the country, generally persisted. As a consequence, the people have remained provincial, their value system has tended to remain particularistic rather than shift to the universal pattern prevailing in urban societies.

The persistence of local or particularistic values is reflected in data assembled from a field study that was made in 1953. Values concerning the church were obtained by interviewing a random sample of people in the area. Nearly every respondent objected to people dancing in church owned property, while in some other areas less than one-half of those interviewed were unfavorable toward this practice. With respect to financing the church, relatively fewer of the people here than in other areas were in favor of food sales or church suppers; and relatively fewer were in favor of using a pledge envelope system for collecting money. These methods are in common use in urban churches.

A similar pattern was evident in other lines of thought. In keeping with the historical orientation of early American society, the people gave religion and religious teachings a prominent place in their day to day activities. Further evidence of particular or local values is brought out by the fact that this area was placed near the bottom of the list by all of the interviewers with respect to the people's concern for National affairs. It was also in this area where interviewers encountered the greatest number of provincial or strange expressions in the language, and it was here where people appeared to be the most fatalistic with respect to their control over natural and social phenomena.

Other data tend to show that churches in the Ozark area do not in themselves contain the specialization found in urban areas. Very few of the churches had a choir, a bible study group, a young peoples group, and the like.

Social contact and interaction here do not rest upon the instrumentation of specific economic objectives. It tends to be made more for the satisfaction of needs from multiple points of view. The interviewers ranked the area first with respect to the occurrence of social interaction, mostly on a non-economic base rather than for the pursuit of economic objectives. They also reported that people were more friendly and less hurried than in other areas. Generally, farms were operated in a less business-like fashion than in the rest of the state. The local neighborhood or community and the family appeared to hold more important places in the social groupings of the area, than was true of some of the other areas. This is a natural correlative, and is further manifestation of the folk-nature of the society and the relative isolation that has prevailed in the area. Very frequently the persons interviewed in the Ozarks had close kin located in the same neighborhood. The interviewers also reported that many aged persons were found living in the homes of relatives and that the people placed high importance on kinship ties.

In the event of a National emergency, it would seem that this area is self-sufficient in its folk-ways and value demands on life, and would not be affected like urban areas. Interaction based on diffused attitudes of attachment, organizations designed for multiple purposes, and the prominence of local values, together with self-sufficiency in the economic system, give the people a basis of operations that is independent of the larger society. It is true that National and State welfare programs during the depression of the 1930's and since, have dispersed large amounts of relief in this

section, but it seems that much of this work has been done within the framework of urban values and not within the prevailing value system. To the extent that this is true, these programs have pushed the people toward a more urbanized social structure. Local emergencies such as a drouth, fire, flood, or the like can exceed the capabilities of the local people. Their reliance upon community resources gives them little to work with, if resources are destroyed on a community-wide basis. It is then that they most need the assistance of State or National governments to provide resources with which an ongoing society can again be established. But if such programs are to be most successful, they need to be set within the framework of the prevailing value system of the area and to take advantage of the existing social structure.

Out of the foregoing discussion, we may come to the following conclusions:

1. The social system of these people is near the Folk-end of the Folk-Urban continuum; or it might be stated in terms of the Gemeinschaft-Gesellschaft continuum. We see a Gemeinschaft type society with indications or change in the direction of a Gessellschaft type, influenced by the presence of centralized, "bureaucratic" control through government programs.

2. The experience of the U. S. Forest Service should throw light on the ways that acceptance of such programs may be won within the framework of the prevailing value system.

3. The people of the area do not think of security in terms of the wealth they possess. Rather their sense of security is in a home-place - a piece of land, a place to call home - and in their neighbor or kinship relations. To offer them money to move out or to sell their places, evan at fancy prices, might have little attraction.

Our problem in the present study is to see if there may be indications of ways to accomplish the general purpose of the National Recreation Service with programs that fit into this general framework of social values. This would seem possible if it could be worked out that the people could live on their land as a homeplace with certain restrictions of a general nature as to the use of the land; or stated positively with certain privileges of use such as for a small garden or for raising livestock for family use. Acceptable procedure might require a type of "buying" lands with the granting of life interest to the present owner.

In addition, as far as possible, these people should be given employment in an area development program for recreational uses. The experience of the U. S. Forest Service in 1938 can be used as a guide. It would seem to be of great value to use the method which sociologists call "Cooptation". Key local residents of the area should be brought into the program at all of the stages possible. This would require giving them a place in planning the types and locations of all of the recreational service facilities. Insofar as possible, they should be given opportunities to own and operate them. To suggest bringing in outside capital, interests and strangers to establish and run tourist hotels and motels would be a grave error. A better procedure would be to suggest service needs and to plan with local representatives the way these needs could be met through use of local resources.

PART III

EXTENT AND QUALITY OF LAND THAT WOULD BE TRANSFERRED TO RECREATIONAL USE

The Recreation Area in general lies in 6 counties with only 2 percent in Dent County and 3 percent in Texas County. Oregon County contains 6 percent, Ripley, 5 percent and Carter 7 percent. Approximately 77 percent is in Shannon County. Here about 10 percent of the acreage would be taken. Practically all of this land is poor in every economic respect except for recreation. The resources that are abundant are wooded hills, verdant valleys, springs with clear running streams, and beautiful scenery.

Socio-Economic Standing of the Affected Counties

The map in Figure 4 shows the 1950 level of living indexes of the people residing in each county of Missouri (1945 = 100). The ratings are based on use of electricity, telephones, automobiles, and value of products sold. The lowest counties in Missouri were Carter and Reynolds with indexes of 40 while Shannon County, containing 77 percent of the Park area had a rating of 44. The highest county in Missouri was Clinton with a rating of 171. The state average was 116.

Farm Income

Data from the 1950 census show that the median family income in the four counties of Carter, Oregon, Ripley and Shannon was only 42 percent as much as the average for the State as a whole (Figure 5). Shannon County. the lowest in the area, had family incomes that were only 37 percent as much as in the rest of Missouri.

The cropland is the most valuable farm asset. Data in Table I show that the cropland in the Recreational Area would have a value of approximately $1,384,112. The grazing land that would be removed from private use had a 1959 value of $113,620, and the timber land about $510,532 making a total value of $2,008,264.

Data in Table II show the proportion of land that would be removed from private use in each of four counties where most of the proposed recreational land lies. The National Recreation Area would occupy less than ten percent of Shannon County, less than two percent of Carter, only one percent of Ripley and less than one percent of Oregon County.

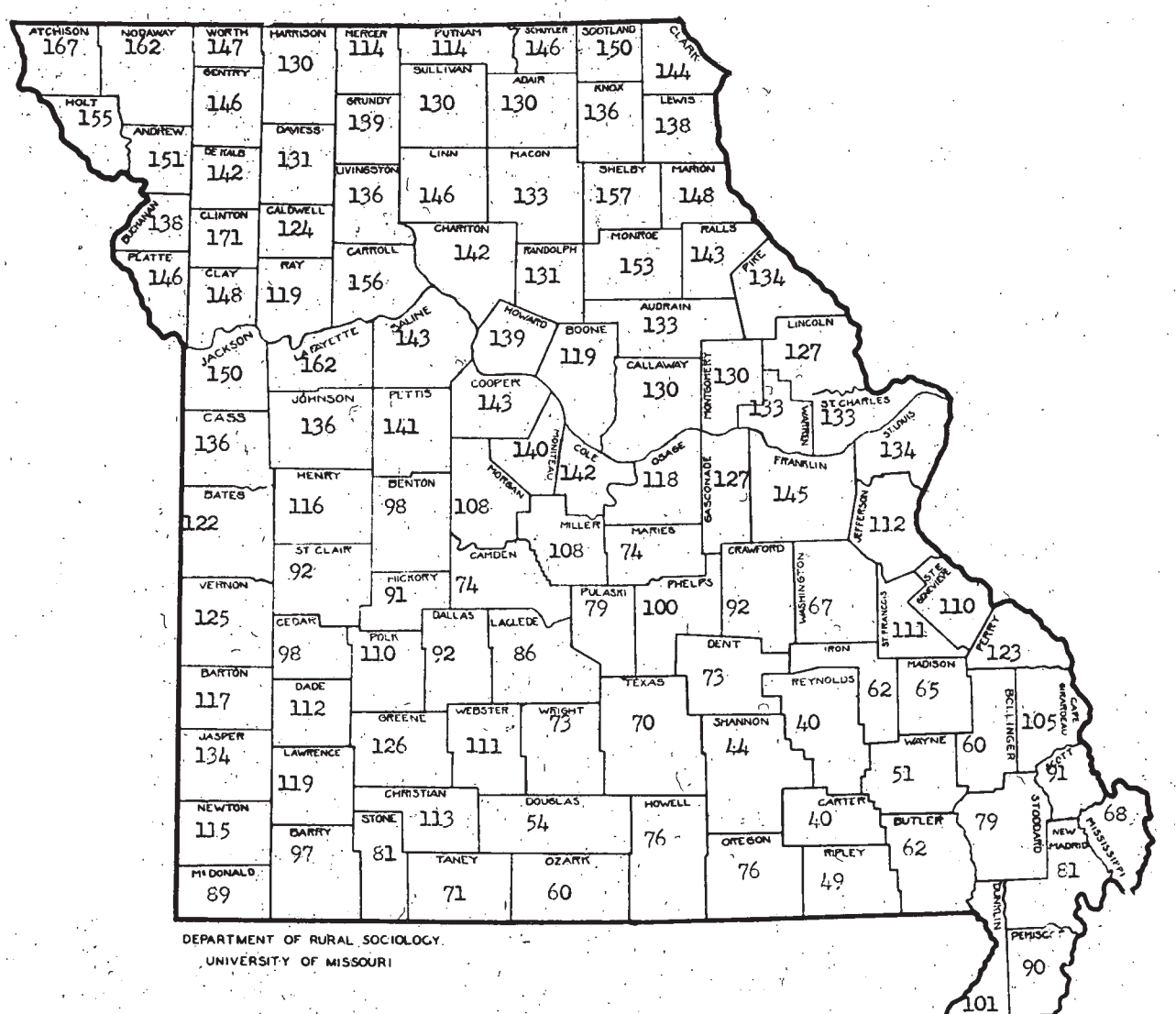


FIGURE 4. Levels of Living in Missouri Counties in 1950 Expressed in Relation to a 1945 Base of 100. The average for all counties was 116.

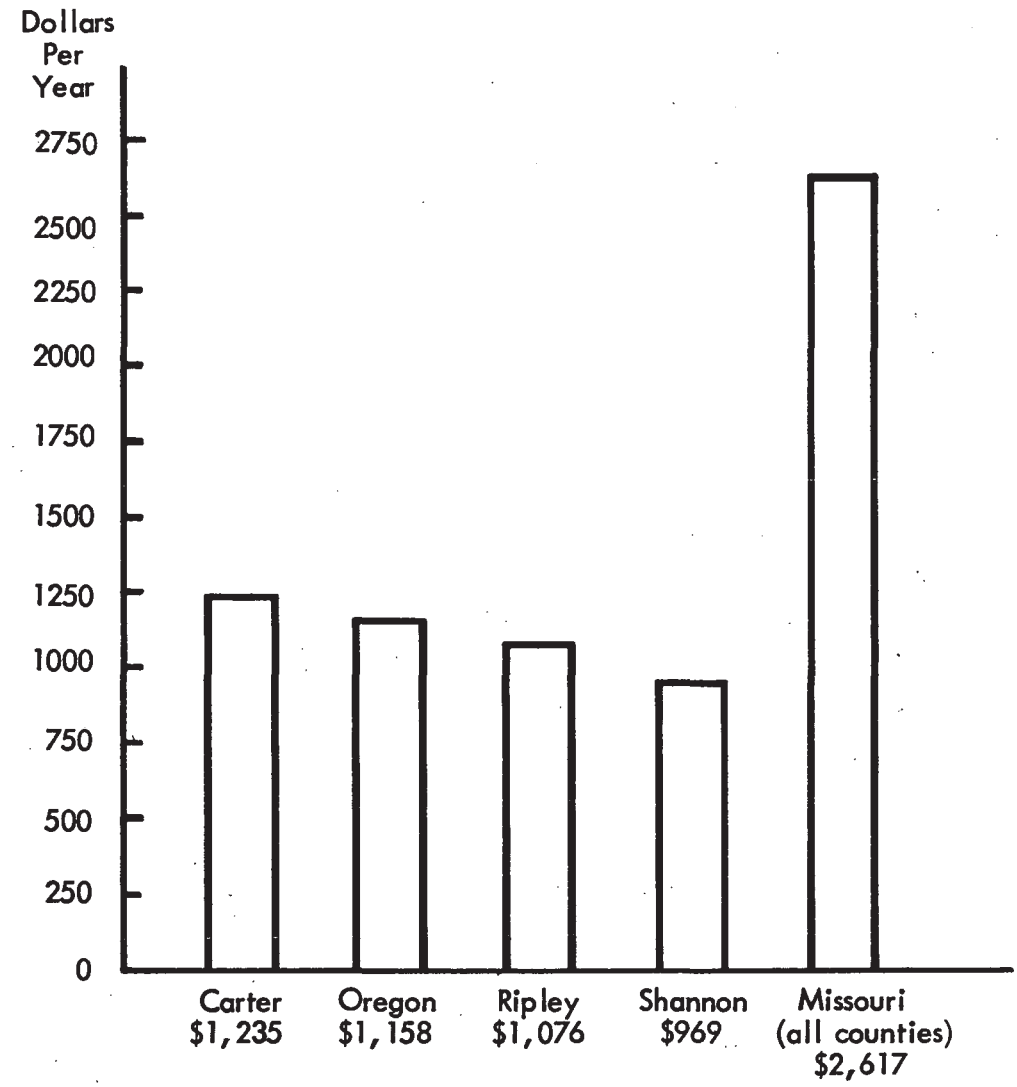


FIGURE 5.

Median Income of Families in Missouri and in the Counties where the National Recreation Area would be located.*

* 1950 Census of Population V-2 Part 25, p. 61 and pp. 139 to 141.

TABLE I

ESTIMATED VALUE OF LAND IN THE RECREATIONAL AREA
1954 CENSUS DATA ADJUSTED TO CURRENT MARKET PRICES

Use of Land	Number of Acres	Estimated Price per Acre	Total Value
Crop Land	9,106	$152.00	$1,384,112.00
Grazing Land	2,990	38.00	113,620.00
Timber Land	68,071	7.50	510,532.50
Total Estimated Sales Price			$2,008,264.50

TABLE II

PERCENTAGE OF TOTAL ACREAGE IN EACH COUNTY THAT
WOULD BE INCLUDED IN THE NATIONAL RECREATION AREA

County	Total acres in county	Total Acres in Recreational Area	Percent of Total Acres
Carter	323,840	5,554	1.7
Oregon	501,460	4,545	.9
Ripley	408,960	4,103	1.0
Shannon	639,360	62,094	9.71

In these (4) counties there are a total of 1,873,620 acres. Of this area approximately 4.07% or 76,296 acres would be included in the National Recreation Area.

PART IV

INFLUENCE OF TRANSFER OF PRIVATE LAND TO RECREATIONAL USES UPON SUPPORT OF LOCAL UNITS OF GOVERNMENT

The Data in Table IV show the total number of acres within the proposed National Recreation Area and the uses that were being made of it in 1958. The Data in Table V show the 1959 taxes collected on these lands and their assessed value.

TABLE IV

PRESENT USE OF LAND WITHIN THE RECREATIONAL AREA, 1958

Total land in Recreational Area (Acres)	Total Crop Land (Acres)	Total Grazing Land (Acres)	Total Timber Land (Acres)
80,686	9,106	2,990	68,071
100 percent	11.2 percent	3.7 percent	84.3 percent

The Data in Table V show that approximately 80,686 acres would be removed from the tax rolls, if the land were purchased for public use.

TABLE V

INFLUENCE OF REMOVING THE LAND IN THE PROPOSED NATIONAL RECREATIONAL AREA FROM THE TAX ROLLS UPON PUBLIC REVENUES DERIVED FROM PRESENT PROPERTY TAX

Total Acres Taxed Within the Affected Townships	Total Assessed Valuation	Amount of Tax in 1958	Acres in Recreational Area	Assessed Value of Land in Recreational Area	Amount of Tax in Recreational Are 1958
117,861 *	$1,077,801	$48,453.99	80,686	$931,552	$32,272

* This figure includes all of the acreage within the townships where part of an owner's land is within the boundaries of the recreational area.

The average assessed value of land within the recreational area was $11.54 per acre. The 1958 tax was about $0.40 an acre.

Of the 80,686 acres that would be transferred to recreational use, 2,179 acres may be acquired by easements of one type or another.

Tables VI to XVII show approximately the number of acres of land contained in the National Recreation Area in each county, the classes according to use, the assessed value, and the 1959 taxes.

TABLE VI

SHANNON COUNTY LAND IN THE NATIONAL RECREATIONAL AREA

	Acres	Cropland Acres	Grazingland Acres	Timberland Acres
Land which may be obtained by easement	630	245	60	325
Land to be acquired in fee simple	61,464	5,173	1,717	54,566
Total	62,094	5,418	1,777	54,891

TABLE VII

ASSESSED VALUATION AND TAXES ON THE RECREATIONAL LAND WITHIN SHANNON COUNTY

	Acres	Assessed Value	Tax on Acres
Land which may be acquired by easement	630	$48,100	$1,765.36
Land to be acquired in fee simple	61,464	$668,595	$23,022.16
Total in the Recreation Area	62,094	$716,695	$24,787.52

TABLE VIII

RIPLEY COUNTY LAND IN THE NATIONAL RECREATION AREA

	Acres	Cropland Acres	Grazingland Acres	Timberland Acres
Lands which may be obtained by easement	none	none	none	none
Land to be acquired in fee simple	4,103	978	260	2,867
Total	4,103	978	260	2,867

TABLE IX

ASSESSED VALUATION AND TAXES ON RECREATION LAND WITHIN RIPLEY COUNTY, 1959

	Acres	Assessed Value	Tax on Acres
Land which may be acquired by easement	none	none	none
Land to be acquired in fee simple	4,103	$76,380	$3,652.59
Total in the Recreation Area	4,103	76,380	3,652.59

TABLE X

CARTER COUNTY LAND IN NATIONAL RECREATION AREA

	Acres	Cropland Acres	Grazingland Acres	Timberland Acres
Land which may be obtained by easement	1,549	440	90	1,019
Land to be acquired in fee simple	4,005	857	279	2,868
Total	5,554	1,297	369	3,887

TABLE XI

ASSESSED VALUATION AND TAXES ON THE RECREATIONAL LAND WITHIN CARTER COUNTY, 1959

	Acres	Assessed Value	Tax on Acres
Land which may be acquired by easement	1,549	$ 17,838	$ 607.21
Land to be acquired in fee simple	4,005	624,204	1,544.96
Total in recreation area	5,554	$642,042	$2,152.17

TABLE XII

TEXAS COUNTY LAND IN THE NATIONAL RECREATION AREA

	Acres	Cropland Acres	Grazingland Acres	Timberland Acres
All land to be acquired in fee simple	2,434	70	231	2,173

TABLE XIII

ASSESSED VALUATION AND TAXES ON THE RECREATIONAL LAND WITHIN TEXAS COUNTY, 1959

	Acres	Assessed Value	Tax on Acres
Land to be acquired in fee simple	2,434	$ 28,219	$738

TABLE XIV

DENT COUNTY LAND IN THE NATIONAL RECREATION AREA

	Acres	Cropland Acres	Grazingland Acres	Timberland Acres
All land to be acquired in fee simple	1,956	510	90	1,356

TABLE XV

ASSESSED VALUATION AND TAXES ON THE RECREATIONAL LAND WITHIN DENT COUNTY 1959

	Acres	Assessed Value	Taxes
Land to be acquired in fee simple	1,956	$20,993	$529

TABLE XVI

OREGON COUNTY LAND IN THE NATIONAL RECREATION AREA

	Acres	Cropland Acres	Grazingland Acres	Timberland Acres
All land to be acquired in fee simple	4,545	833	263	3,397

TABLE XVII

ASSESSED VALUATION AND TAXES ON THE RECREATIONAL LAND WITHIN OREGON COUNTY 1959

	Acres	Assessed Value	Taxes
Land to be acquired in fee simple	4,545	$48,722	$1,545

Taxation of Land in the Forested Area of Missouri

In a recent investigation of taxes on forest land in 26 counties in the Ozark region data were obtained on 836 properties. All were forested and without improvements, as determined from aerial photographs. Data on assessed value and total taxes were traced over a 10 year period from 1944 to 1953. For comparison, similar data were obtained for 281 farms which were essentially cleared and used for crops and pasture. Average taxation levels for 1953 were as follows:

	Forest land	Agricultural land
Assessed value per acre	$4.08	$13.15
Total taxes per acre	$0.106	$ 0.362

The assessed value and the taxes varied widely within counties and among counties for both forest and farm land. Small forest holdings were assessed at a higher rate than were larger ones. On the average, a 40-acre forest property was assessed at $4.75 per acre, a 640-acre tract at $3.82. The average assessed value of all land in four selected counties and in the state as a whole as of January 1, 1957 is given in Figure 6.

From 1944 to 1953, assessed value increased 12 percent for forest land and 18 percent for agricultural land. Taxes per acre increased 83 percent for forest land and 93 percent for agricultural land.

The tenure of forest land in southeastern Missouri was far from stable. One-half of the 55,740 acres included in the study was held by the same owners throughout the 10-year period. The other one-half changed ownership one to nine times.

Forest land was assessed at an average of 99 percent of its market value, with a range from 19 to over 700 percent, as indicated by a study of 251 land purchases by the U. S. Forest Service and by private individuals. Other studies indicate that farms are assessed at about 50 percent of market value and urban property at 30 percent.

TABLE XVIII

ASSESSMENT SALES RATIOS, FOREST LAND PURCHASED IN THE EASTERN OZARK REGION BY THE U. S. FOREST SERVICE, 1944-1954 1/*

County	Tracts (number)	Area (Acres)	Assessment-Sales Ratio		
			Average *	Standard Deviation	Range
Carter	49	8,069	95.5	47.5	22.7-201.4
Oregon	7	1,008	88.1	51.3	30.0-175.0
Ripley	1	3,012	110.0	--	--
Shannon	24	2,731	92.9	39.6	41.0-200.0

1/ Richard C. Smith, Taxation of Forest Land in South Missouri, Missouri Agricultural Experiment Station Bulletin 624, March, 1957, p.29.
* Weighted by area.

Estimated Lodging and Other Tourist Facilities That Would Be Needed to Service the National Recreation Area

The expected number of tourists who will be visiting the area in 1965 with no change in emphasis that would come from establishing a National Recreation Area, based on increased state attendance for the past 8 years is 602,829 persons. The expected number of visitors, if a National Recreation Area is established, is 1,425,000 persons. This gives a gain of 822,171. This number would increase the incomes of people in the state $5,738,753.58. This estimate is based on per capita expenditures of $6.98 a day.

Approximately 19 percent of the tourists' dollar is spent for lodging. Nineteen percent of $5,738,753.58 is $1,090,363.18. The average amount spent for lodging for two people is $5.75; however, 50 percent of the tourists have children. Thus the amount spent per person would average lower or around $2.50 each. This amount ($2.50) divided into the total cost of lodging ($1,090,363.18) gives 436,145 persons staying all night.

The data presented in Figure 7 show that more people visit the Current and Eleven Point Areas of Missouri in August than in any other month of the year. Further analysis shows that 28.2 percent of the cars driven by tourists into the various state parks in 1958 were recorded in August. If it is assumed that these cars were occupied by 28.2 percent of the annual visitors, the number who will be seeking lodging in August in 1965 will be approximately 401,850.

It is estimated that each visitor will remain in the area at least two days. Based on this assumption, sleeping accommodations will be needed for 26,790 people per night. Some of these visitors will be children who will occupy rooms with their parents. If it is assumed that one tourist unit will accommodate an average of 2.5 people, 10,716 units will be needed. Some of the visitors will have camping equipment and will not need sleeping rooms. This number will reduce the room requirement about 17 percent or 1,822 units, leaving 8,894 to be supplied with cabins, motels, hotels, tourist courts and lodges. Based upon 1959 construction costs of $4.00 per square foot and 300 square feet to the unit, the cost of building these units would be $1,200 each. This $1,200 times 8,894 units gives $10,672,800, the value of the additional units required to take care of the increased tourist traffic. Current assessments in the area, on urban property are about 30 percent of sales value. It is therefore estimated that sleeping accommodations alone would add about $3,201,840 as compared to a reduction in the tax rolls, of $931,552 as a result of transferring privately owned land to the National Recreation Area. This figure does not include the assessed value of additional service stations, restaurants, boat houses and other recreation facilities provided for tourists.

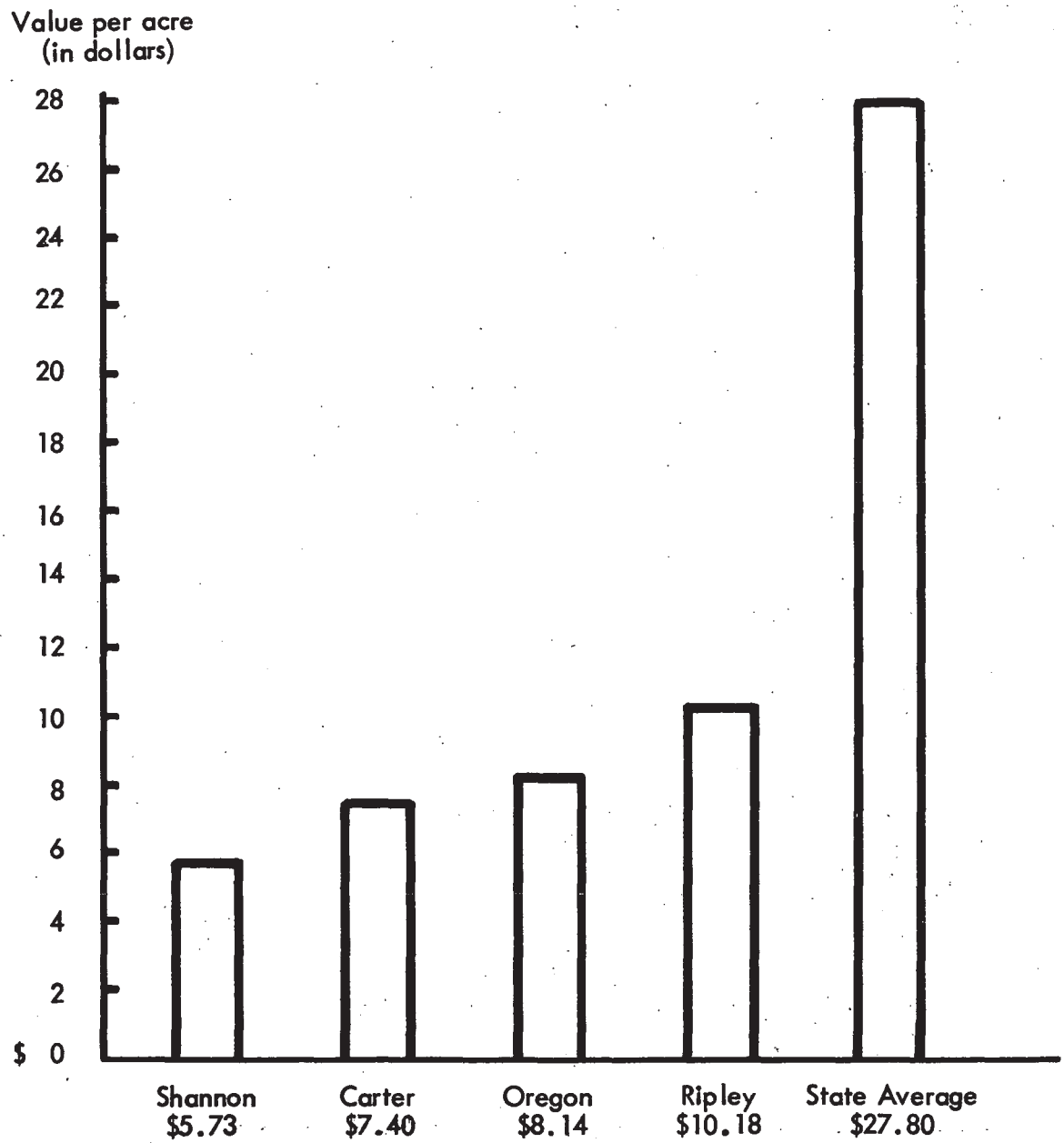


FIGURE 6.

Assessed value per acre of farm land in Missouri and in selected counties, January 1, 1957.*

* 12 Annual Report of Procedings and Decisions of Missouri Tax Commissioner, p. 410.

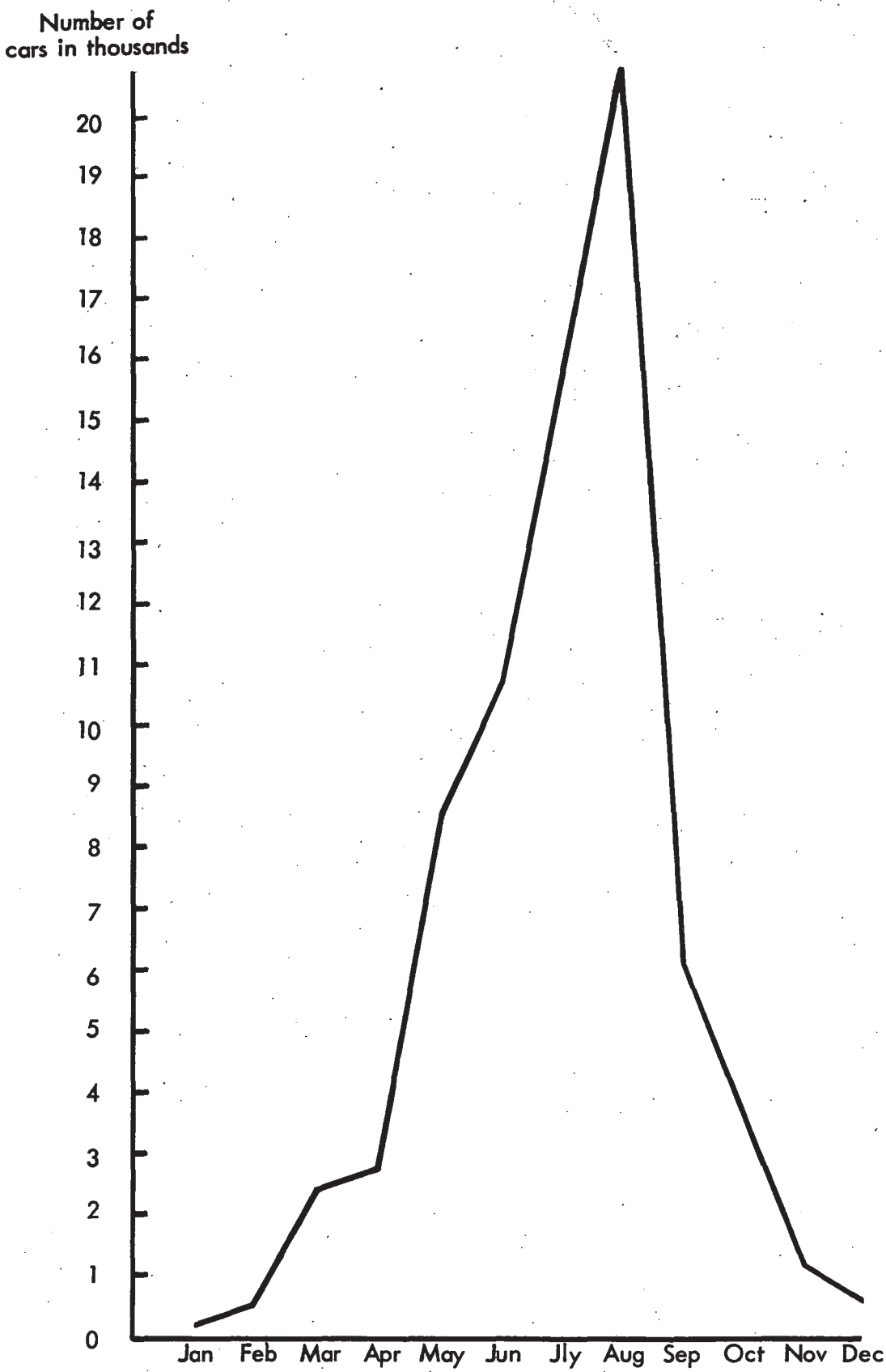


FIGURE 7.

Monthly variation in number of cars driven by toursits entering various Missouri State Parks during 1958. (Round Springs, Montauk, and Alley Springs).

PART V

INFLUENCE OF RECREATIONAL DEVELOPMENT UPON THE ECONOMY OF THE AREA

The number of visitor days at various state parks for the years 1950 to 1958 were used in estimating patronage in the Upper Current, Cardareva, Jacks Fork, Big Springs, Lower Current and Eleven Point sections by 1965. The visitor days were also apportioned to counties, for the purpose of estimating expenditures for service facilities. The results are presented in Table XIX.

TABLE XIX

ESTIMATED NUMBER OF VISITORS TO THE NATIONAL RECREATION AREA IN 1965

	1965 Est. Annual visitor-days attendance	Dent	Carter	Shannon	Ripley	Oregon
Upper Current (including Montauk & Round Springs State Parks)	315,000	130,000		185,000		
Cardareva	300,000		225,000	75,000		
Jacks Fork (including Alley Springs State Park)	155,000			155,000		
Big Springs State Park	280,000		280,000			
Lower Current	300,000		75,000		225,000	
Eleven Point	75,000					75,000
Total	1,425,000	130,000	580,000	415,000	225,000	75,000

The visitor days* attendance for the Alley, Big Springs, Montauk and Round Springs State Parks for the years 1950 to 1958 inclusive, are presented in Figure 8 below. It is noted in the graph however, that the lowest attendance was in the years 1951 and 1955. Also that the highest attendance was achieved in 1953 when a peak of 595,122 visitor days was reached.

* The number of visitor days is equivalent to the number of tourists each day at a given park.

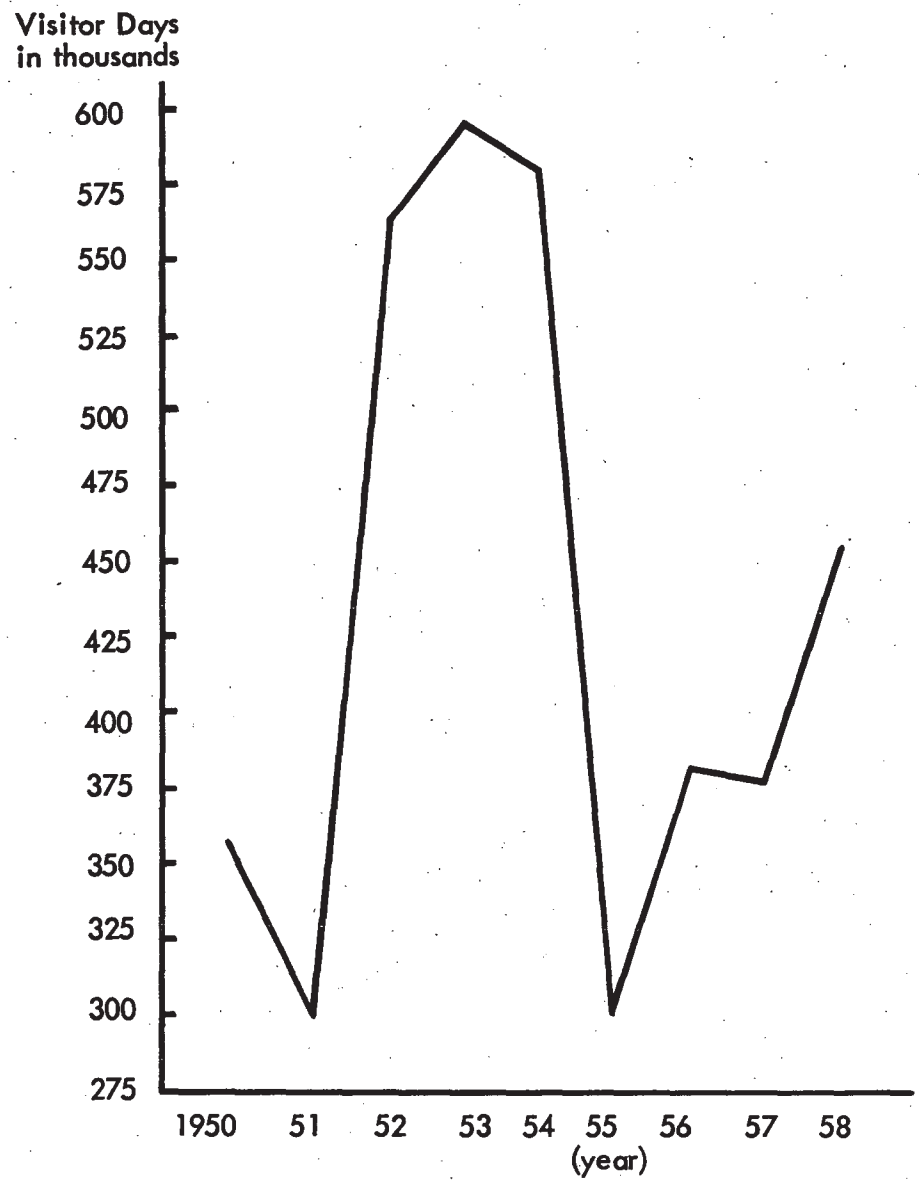


FIGURE 8.

Visitor Days* attendance at the various State Parks for the years 1950 to 1958 (Round Springs, Montauk, and Alley Springs).

* Number of Visitor Days equal number of tourists each day at a given park.

The number of cars both from Missouri and from other states driven into the State Parks in 1958 is shown in Table XX. The monthly variation in these numbers is shown graphically in Figure 4. These data were used in estimating the need for lodging facilities in the National Recreation Area.

TABLE XX

CARS DRIVEN INTO SELECTED STATE PARKS OF MISSOURI IN 1958

	Round Springs	Montauk	Alley Springs	Total
Outstate	11,778	3,151	4,469	19,398
Missouri	13,435	17,827	22,652	53,914
Total	25,213	20,978	27,121	73,312

Two methods were used in estimating the possible Current-Eleven Point visitors per day. One included the use of data from areas in several National Parks for the years 1950 to 1958. The average gain in visitors for the eight years was 3.96 percent per year. When this percentage was applied to Missouri data, the projected number of visitor days was found to be 622,481. The second estimate was made by using the attendance at the Missouri State Parks for 1950, 1951 and 1955 through 1958. In these years the average increase was 3.97 percent. This percentage when projected into 1965 gave a figure of 602,829 visitor days.

A 1958 Tourist Survey conducted by the Missouri Resources and Development Division, indicated average daily expenditures of $6.98 per person. An average tourist stay of two days per year and a ratio of one to one between in-state and out-state visitors were assumed. With no change in the status of the Current Eleven Point area, tourists will be spending more than four million dollars a year to see its attractions in 1965. (Table XXI).

It is generally agreed by students of recreational desires that more people visit National areas than go to State Parks. The data presented in Table XXII compare daily tourist expenditures in the Current and Eleven Point Area if it becomes a National Recreation ground with the projected returns at State Parks.

TABLE XXI

ESTIMATED 1965 VISITOR DAYS ATTENDANCE, AVERAGE EXPENDITURES PER DAY, AND TOTAL EXPECTED YEARLY EXPENDITURES IN THE CURRENT AND ELEVEN POINT AREA IF IT REMAINS IN ITS PRESENT STATUS

Basis for Estimation	1965 Visitor Day Attendance	Average Expenditures Per Visitor Day		Total Expected Expenditures in 1965
National Park data (1950-58)	602,481	X $6.98	=	$4,205,317.38
State Park data (1950-51) & (1955-58)	602,829	X $6.98	=	$4,207,746.42

It appears that development of the area for national recreational coverage would raise the daily expenditures of tourists from $4,207,746.42 to $9,946,500--a gain of $5,738,753.58.

TABLE XXII

COMPARATIVE VISITOR DAY EXPENDITURES OF TOURISTS IN THE CURRENT-ELEVEN POINT RIVER AREA UNDER STATE PARKS AND WHEN DEVELOPED AS A NATIONAL RECREATION AREA

	1965 Visitor Day Attendance	Expenditures Per Visitor Day	Total Expected Expenditures - 1965
National Recreation Area	1,425,000	$6.98	$9,946,500.00
State Parks	602,829	$6.98	$4,207,746.42
Extra Attendance and Expenditures in National Recreation Area	822,171	--	$5,738,753.58

PART VI

IMPACT OF RECREATIONAL DEVELOPMENT ON AGRICULTURE

Farming in the Area

At present the major source of income in Oregon, Carter, Shannon and Ripley Counties is agriculture. In 1949, $6,364,768 of income was from the sale of farm commodities. Returns from manufacturing enterprises in Carter County was approximately one-tenth the amount from agriculture; in Oregon County it was one-twentieth, and in Shannon County, one-half. All of these counties rank low in family income which is no doubt due to major dependencies on agriculture in an area where the topography is steep and most of the soil is low in productivity.

TABLE XXIII

LAND USE IN SELECTED COUNTIES OF MISSOURI, 1959*

Type of Use	Acres in County				
	Carter	Oregon	Ripley	Shannon	Total
Cropland	8,359	52,000	40,700	25,500	126,559
Pasture					
Pasture	16,720	77,000	59,400	34,250	187,370
Water	621	1,710	6,393	2,046	10,770
Woodland:					
Federal	86,119	88,178	87,896	81,658	343,851
Private	202,801	267,190	206,880	483,067	1,159,938
Other	4,826	7,958	6,341	5,200	24,325
Total	323,840	501,760	408,960	639,360	1,873,920

* Preliminary estimates of state committee on soil and water conservation needs in Missouri.

The data presented in Table XXIII show that 343,851 acres of federally owned land and 1,159,938 acres privately owned in the four counties where most of the National Recreation Area will be located are in forest. In other words, 1,503,789 acres of the 1,873,920 acres or 80.2 percent of the total area of the four counties is in woodland. Only 315,929 acres or 16.8 percent are in crops and pastures. The income from timber and woodland products is low. Ronald Bird, Frank Miller and Samuel C. Turner found that only 2.9 percent of the total farm income in Economic Area 8 which includes these four counties came from the sale of forest products while 69.5

percent was from the sale of livestock 1/.

A high percentage of the families living in this section of Missouri have low incomes. Data obtained by interviewing 269 farm families in 1956 indicated that 107 farm households had cash incomes of less than $1,000 in 1955. This figure represented about 40 percent of all farm households. Almost two-thirds (62 percent) received less than $2,000.

Income of the Non-farm Household

Low income has been almost as great a problem among non-farm households as among farmers. In 1949, 39.6 percent of the rural non-farm families had cash incomes of less than $1,000 and 21.5 percent had incomes from $1,000 to $1,999. In 1955, 27.3 percent were in the lowest income group and 27.1 percent in the second group (Table XXIV).

Sources of Income

About 22 percent of the average household income of farmers who received less than $1,000 came from the farm. Approximately 44 percent came from off-farm employment, 32 percent fron nonemployment sources, such as old age pension, and 2 percent from wage work on other farms. Because in the aggregate, farm incomes made up only one-fifth of the household receipts of those farmers with incomes of less than $1,000 a doubling of farm returns would raise receipts by only one fifth.

TABLE XXIV

PERCENTAGE DISTRIBUTION OF FARM AND NONFARM HOUSEHOLDS, BY INCOME CLASS: MISSOURI ECONOMIC AREA 8, 1949 AND 1955 2/

	Farm Households			Nonfarm Households	
Income Class	1949	Income Includes Home-Consumed Products	Income Excludes Home-Consumed Products	1949	1955
	Percent	Percent	Percent	Percent	Percent
$0 -$ 999	52.2	32.3	39.8	39.6	27.3
$1,000-$1,999	26.2	25.3	22.3	21.5	27.1
$2,000-$2,999	12.0	19.7	19.0	16.7	14.9
$3,000-$3,999	6.0	10.8	8.9	13.2	16.3
$4,000-$ more	3.6	11.9	10.0	9.0	14.4
Total	100.0	100.0	100.0	100.0	100.0

1/ Missouri Agricultural Experiment Station Research Bulletin 661, Resources and Levels of Income of Farm and Rural Nonfarm Households, p.49.
2/ Op. Cit.

FIGURE 9.

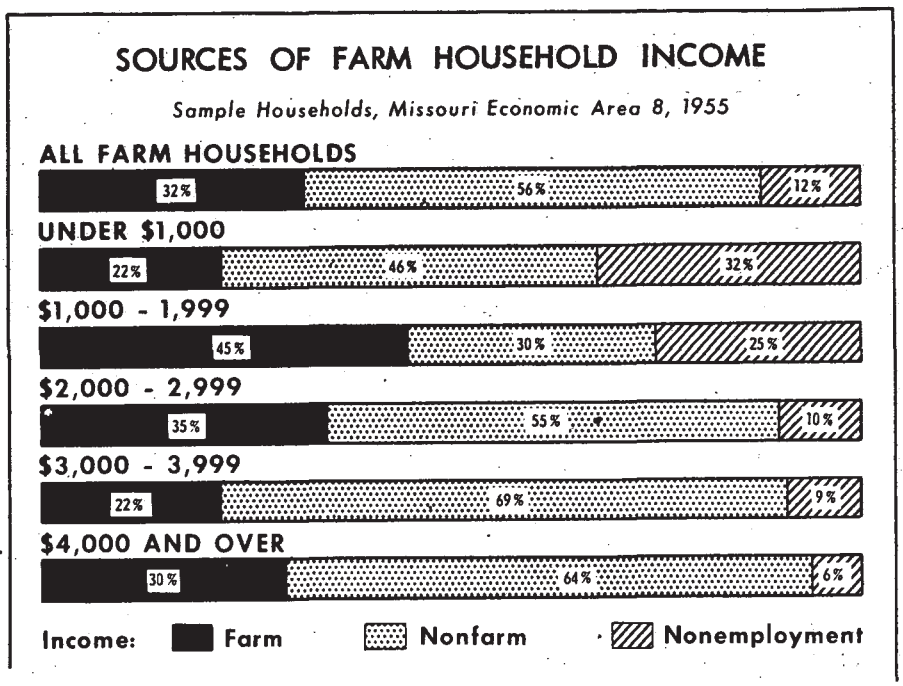
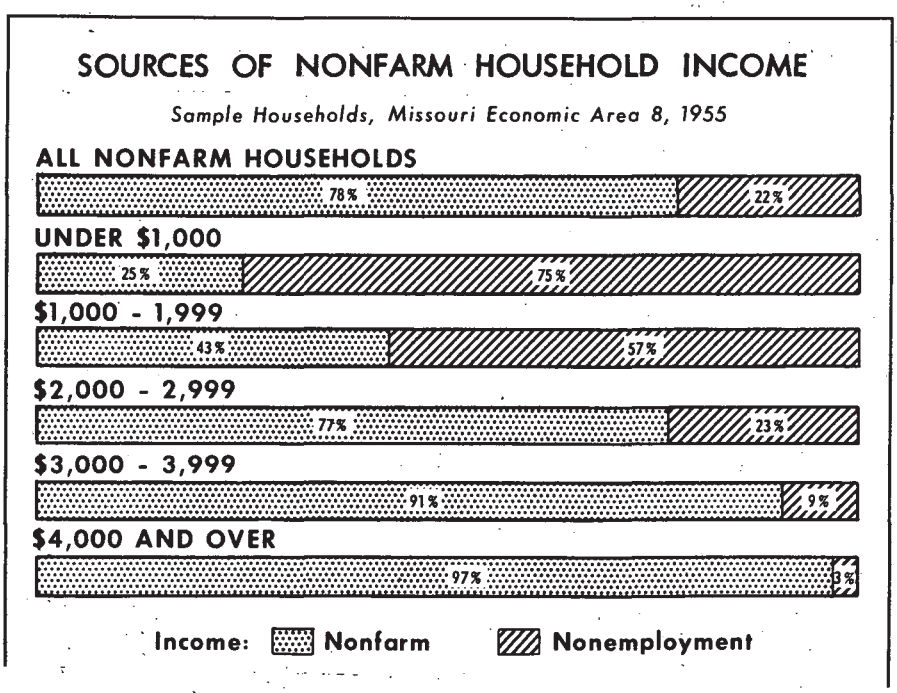


FIGURE 10.



Nonemployment returns were especially important to the low-income families in both groups. The relative importance of receipts from the various sources was somewhat similar for the farm and non-farm groups. Veterans' payments contributed 29.6 percent to the farm group and 20.2 percent to the non-farmers. Old age pensions made up 24.6 percent of the total for farmers and 38.5 percent for the nonfarmers. Social Security payments amounted to 16.1 percent of the total for farmers and 14.4 percent for nonfarmers. In terms of total number of households involved, 88 (32.7 percent) of the 269 farmers and 263 (51 percent) of the 516 nonfarmers reported nonemployment income of some type. Sources of returns to the various income groups are shown graphically in Figures 9 and 10.

The Future of Farming in the Area

Farming in this area is falling behind most other sections of the country. Technological advances benefit the better farming areas and usually have little beneficial effect on the Ozark region because of its poor soils, rough topography and small acreages of cropland.

It is interesting to note that none of the farm household income groups from whom data were obtained in 1956 secured as much as 50 percent of their returns from farming. The group securing the most income from this source (45 percent) was the one with income between $2,000 and $2,999. Those in both higher and lower income classes secured less than 45 percent of their income from the farm. The group securing the lowest percentage of income from the farm was in the $1,000 to $1,999 bracket where this item was only 22 percent of total receipts.

The data in Table XXV show the extent of acreage loss in four selected counties as the result of farm land removal from private ownership in the National Recreation Area. If it is assumed that the income loss would be in proportion to the decrease in cropland acres, net farm returns would be decreased about $113,273. Details of the analysis are presented in Table XXVI. Offsetting this loss and adding to the incomes of people in the area would be the expenditures of visitors to the National Recreation Area which is estimated at more than $5.7 million.

TABLE XXV

RELATIONSHIP OF LAND REMOVED BY THE NATIONAL RECREATION AREA TO THE TOTAL ACRES OF THAT TYPE OF LAND WITHIN FOUR SELECTED COUNTIES OF THE MISSOURI OZARK REGION

	Cropland			Pasture			Timber		
County	County Total (acres)	Within Recreation Area (acres)	Percent	County Total (acres)	Within Recreation Area (acres)	Percent	County Total (acres)	Within Recreation Area (acres)	Percent
Carter	8,359	1,297	15.51	16,720	369	2.20	202,801	3,887	1.91
Oregon	52,000	833	1.61	77,000	263	0.34	267,190	3,397	1.27
Ripley	40,700	978	2.40	59,400	260	0.43	206,880	2,867	1.38
Shannon	25,500	5,418	21.20	34,250	1,777	5.18	483,067	54,891	11.36
Total	126,559	8,526	6.7	187,370	2,669	1.4	1,159,938	65,042	5.6

TABLE XXVI

GROSS AND NET FARM INCOME DERIVED FROM LAND LOCATED IN THE NATIONAL RECREATION AREA IN FOUR SELECTED COUNTIES IN 1954

County	Total in County		From Lands in Recreation Area	
	Gross Farm Income 1/	Net Farm Income 2/	Gross Farm Income 3/	Net Farm Income 4/
Carter	$ 420,800	$ 126,240	$ 65,266	$ 19,567
Oregon	2,290,897	687,269	36,654	11,012
Ripley	1,491,771	447,531	35,803	10,741
Shannon	1,131,339	339,401	239,843	71,953
Total	$5,334,807	$1,600,441	$ 377,566	$ 113,273

1/ United States Census of Agriculture, 1954, Volume 1, part 25, pp. 76-79.

2/ Net farm income derived by multiplying gross farm income by 30 percent as reported by Ronald Bird, Frank Miller and Samuel C. Turner, Resources and Levels of Income of Farm and Rural Nonfarm Households in Eastern Ozarks of Missouri, University of Missouri Research Bulletin 661, 1958, p.52.

3/ Gross farm income derived by multiplying the 1954 Census data by the proportion of total cropland in the proposed National Recreation Area.

4/ Net farm income derived by multiplying gross farm income by 30 percent as reported by Ronald Bird, Frank Miller, and Samuel C. Turner, Resources and Levels of Income of Farm and Rural Nonfarm Households in Eastern Ozarks of Missouri, University of Missouri Research Bulletin 661, 1958, p.52.

PART VII

INDUSTRIAL AND COMMERCIAL DEVELOPMENT IN THE AREA

The area under consideration seems to offer little in the way of inducement to industry. At least up to December 1959 very few manufacturing plants had moved into the area. The four counties of Shannon, Oregon, Ripley and Carter containing 95 percent of the National Recreation Area, had a total of 27 firms employing 585 persons. These were firms that were in operation 20 different calendar weeks and employed four or more persons during that period. Shannon County containing 77 percent of the Recreation Area had eight firms employing 209 persons who were covered under the Unemployment Insurance Law. Thus there appears to be little opportunity for employment in industry at the present time.

The data in Table XXVII show the types of industries and the number of people employed in the four principal counties.

TABLE XXVII

TYPES OF INDUSTRIES WITHIN SELECTED COUNTIES OF MISSOURI, JUNE 1959

	Carter		Oregon		Ripley		Shannon		Total	
	No. of Firms	Employees	No. of firms	Employees	No. of firms	Employees	No. of firms	Employees	No. of firms	Employees
Agriculture	0	0	1	7	0	0	0	0	1	7
Forestry	0	0	0	0	0	0	0	0	0	0
Mining	0	0	3	48	1	26	1	37	5	11
Manufacturing	6	44	6	209	7	123	8	209	27	585
Tourism*	0	0	1	6	0	0	0	0	1	6
Total per county	6	44	11	270	8	149	9	246	34	709

*Tourism is a hybrid concept which does not conform to any standard system of industrial classification. As used herein two industrial groups have been included; namely, amusement and recreation services, except motion pictures (79), and hotels, rooming houses, camps and other lodging places (70).

All industrial designations are made in accordance with the Standard Industrial Manual, Office of Statistical Standards, 1957.

All data contained in the table represent information collected from employers subject to the Missouri Unemployment Insurance Law. For this reason, exclusions may result from the fact that coverage is limited to employers who hire four or more workers during 20 different calendar weeks within the calendar year. Other exclusions will be found in Agriculture. 1/

All employment data relate to June 1959. 2/

TABLE XXVIII

TYPES OF MANUFACTURING WITHIN SELECTED COUNTIES OF MISSOURI, 1959

	Carter		Oregon		Ripley		Shannon		Total	
	No. of Firms	Employees	No. of Firms	Employees	No. of Firms	Employees	No. of Firms	Employees	No. of Firms	Employees
Food	0	0	1	10	0	0	0	0	1	10
Apparel	0	0	1	166	0	0	1	70	2	236
Lumber	6	44	4	33	6	31	6	125	22	233
Printing	0	0	0	0	0	0	0	0	0	0
Chemicals	0	0	0	0	0	0	0	0	0	0
Leather	0	0	0	0	0	0	0	0	0	0
Stone	0	0	0	0	0	0	0	0	0	0
Electric Machinery	0	0	0	0	0	0	1	14	1	14
Transportation	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0	0	0	0	1	92	0	0	1	92
Total per County	6	44	6	209	7	123	8	209	27	585

1/ and 2/ Also applicable to Table XXVIII

PART VIII

MINERAL DEPOSITS AND MINING IN THE AREA

The Fifth Biennial Report of the Division of Geological Survey and Water Resources, July 1, 1954 - June 30, 1956 states that there are high purity quartzite deposits suitable for use by the silicone industry in Southeastern Missouri, and unpublished results of field studies are available. Also, as of June 1956, the uranium content of all samples that had been tested was too low to merit economic consideration.

The book Subsurface Geology of Mississippi Embayment of Southeast Missouri reveals that there is an asphalt formation in the McNairy Community of Ripley County which may be of interest to the petroleum industry.

The active manganese mining which was reported in 1953, carried on by the Thorny Mountain Company in Shannon County, was discontinued in 1957. There is still a possibility of discovering rich manganese deposits in the area by use of deep drills.

The following minerals are known to be present in Southeastern Missouri:

1. Iron: Hematite and limonite ores are found in filled sink deposits in Dent, Reynolds, Texas and Shannon Counties. The deposits range from a few hundred tons to very large quantities. Iron ores have been mined commercially in Ripley, Iron, Carter, Oregon, Reynolds, Shannon and Howell Counties.

A new discovery of major iron ore concentration is located in the northwest part of Washington County. Already a $40 million mining development is underway.

2. Lead: For many years Missouri has led all states in domestic lead production. The principal deposits are in the Southeast and Southwest sections. The St. Joseph Lead Company recently discovered a large deposit of high analysis ore in the vicinity of Viburnum in Iron County. A village is being developed to accommodate approximately 2,500 people. The area where mining actively will be most intense is just slightly outside the Current River Watershed on the Northeast. The same company is reported to have taken options on land in the vicinity of the village of Bunker, Reynolds County, which is within the Watershed.

3. Manganese ores are found in Reynolds, Iron and Shannon Counties. Intense mining activity will depend upon discovery of relatively large deposits through exploration with deep drills.

4. Granite and rhyolite are found in Carter, Shannon and Reynolds counties and were quarried extensively in the last quarter of the nineteenth century.

5. Copper was discovered in Shannon County in the 1880's. It is not mined commercially.

6. Barium: Missouri ranks first among the states in the value of barite produced and some has been mined in Texas County.

The following counties in or near the proposed National Recreation Area produce the types of minerals indicated:

County	Type of Mineral Produced
Carter	None
Dent	Stone, Sand, and Gravel
Howell	Stone, Sand, Gravel, and Iron
Oregon	Stone, Sand, Gravel, and Iron
Reynolds	None
Ripley	Sand and Gravel
Shannon	Stone, Manganese, and Iron
Texas	Stone, Sand, and Gravel

The following mining companies have been operating mines or actively prospecting for minerals in recent years:

1. American Metals Climax Company--prospecting in the vicinity of Salem, Missouri.

2. Bear Creek Mining Company (a division of Kennecott Copper Company)--prospecting in Shannon County. This company has been in the area three years and is reported to have leased approximately 150,000 acres for exploration. It is interested in lead.

3. St. Joseph Lead Company--a mine is being developed at Viburnum where a deposit of high-grade lead ore has been discovered.

4. Thorny Mountain Mining Company--this organization owns some land in Shannon County and prior to 1957 was engaged in the mining of manganese.

As of June 1959 ten mining companies reported 144 employees in the area covered by unemployment insurance.

PART IX

FOREST RESOURCES

Forestry has long been an important industry in Missouri. The reason for its development is obvious in light of the fact that 70 percent (31 million acres) of the land area was covered with timber at the time of settlement. Like in other parts of the United States, early activity was exploitative. Very little thought was given to what would happen when the original supply was exhausted. This exploitative use combined with forest fires, many of which were intentionally started, has resulted in severe deterioration of the forests in the state. It has been estimated that twenty-five years ago one-third of the forest land was burned each year. The severity of damage from this practice can be illustrated by the fact that it was estimated in 1946 that one-third of the board-foot volume was composed of cull trees or non-commercial species.

It was not until the establishment of the National Forests in 1934 that an organized attempt was made to improve the forest resources of Missouri. Establishment of the Division of Forestry in the Missouri Conservation Commission in 1938, and subsequently construction of fire control stations were the next steps in protecting and improving the forest resources. Today about 11 million acres are under organized fire control. The great reduction in fires brought about by organized fire control has permitted gradual rehabilitation of the forest land. The results of past deteriorating practices are still evident, however, and will be until the undesirable and damaged trees are eliminated by cutting or other means.

Present Conditions of Missouri Forest Land and the Forestry Industry in the State

The present area of commercial forest land in Missouri is 15.1 million acres, or approximately 34 percent of the total land area.

About 10.1 million acres or 67 percent of the state total are located in the Ozark region. The following ownership distribution prevails:

Private	13.7 million acres (90%)
Federal Government	1.3 million acres (9%)
State Government	0.1 million acres (1%)

The results of the 1946 survey by the U. S. Forest Service indicated the following size-class distribution of the trees on forest land: (Also see Figures 11 and 12).

Size-class	Area-Acres
Saw timber	2,033,000
Pole timber	6,477,000
Seedling and sapling	4,778,000
Non-stocked	1,776,000

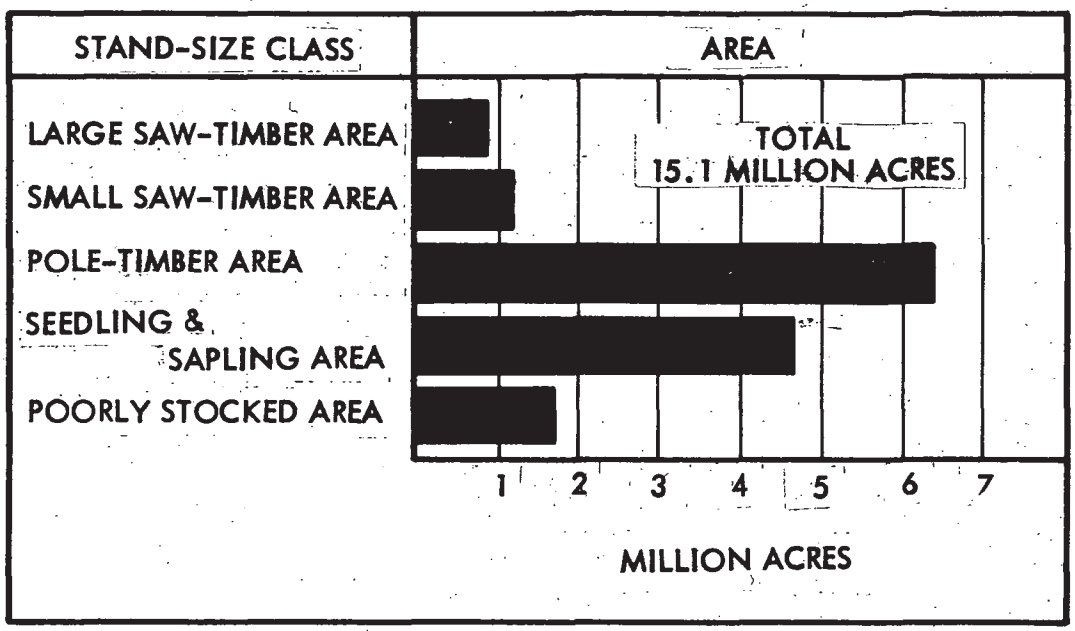


FIGURE 11.

Commercial forest area by stand-size class, Missouri, 1947.

Source: University of Missouri Research Bulletin 452, "Forest Resources and Industries of Missouri."

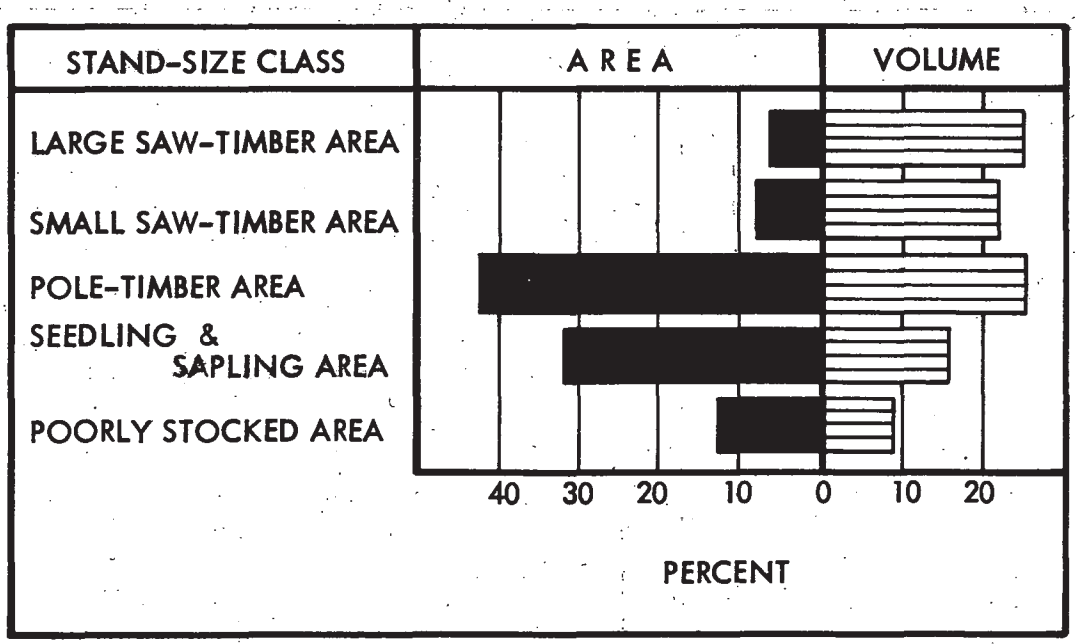


FIGURE 12.

Commercial forest area and net board-foot volume by stand-size class, Missouri, 1947.

Sources: University of Missouri Research Bulletin 452, "Forest Resources and Industries of Missouri."

Foresters at the University of Missouri point out that most of the trees suitable for lumber must come from the forests in the saw timber class, and that in general, the quality is low.

Pole timber is suitable for charcoal wood, fuelwood, posts, and pulpwood. The market for these products in Missouri is small at the present time. During the next 15 to 30 years most of the pole timber will reach saw timber size. The seedling and sapling stands will be pole stands in 15 to 20 years and saw timber stands in 40 to 60 years.

Other Missouri forestry information available from the 1946 survey shows that the net volume of saw timber growing stock is 12 billion board feet. The average annual net growth per acre of saw timber stock is 45 board feet. About 30,000 man years of labor were expended in harvesting and processing forest products in 1946. The annual drain on saw timber (average of recent years) has been 460 million board feet.

Another measure of the quality of a timber stand is volume per acre. These data are presented in Figure 13.

Currently, 38 percent of the hardwood and 73 percent of the softwood saw timber annual growth is being cut. Only 19 percent of the hardwood and 25 percent of the softwood pole timber growth is being cut.

A thorough re-survey of forest resources and uses is currently underway. The results will be available in about one year. At the present time, there is a definite lack of up-to-date data on volume and value of primary forest products. Table XXX shows that $41,749,300 worth of forest products were sold in 1946. Sawlogs and fuelwood were the most important products amounting to over $14 millions each.

An indication of the forest industry processing facilities is the number and size (in terms of output) of sawmills in Missouri. These data for 1946 are presented in Table XXXI. It is likely that the number of sawmills has decreased substantially since 1946.

Present Conditions of Forests and the Forest Industry in the Ozarks and in the Four County Area

As stated earlier, 10.1 million acres, or 67.2 percent of the forest land in Missouri is located in the Ozark region. The quality of the land in somewhat lower in the Ozarks than in the remainder of the state, primarily because of the lower productivity of the soils and greater use in the past of the practice of "burning" the forest land each year. The net board feet volume of timber in the Ozarks amounted to only 53.7 percent of the state total. The area of forest land and the volume of timber by ownership is presented in Table XXXII.

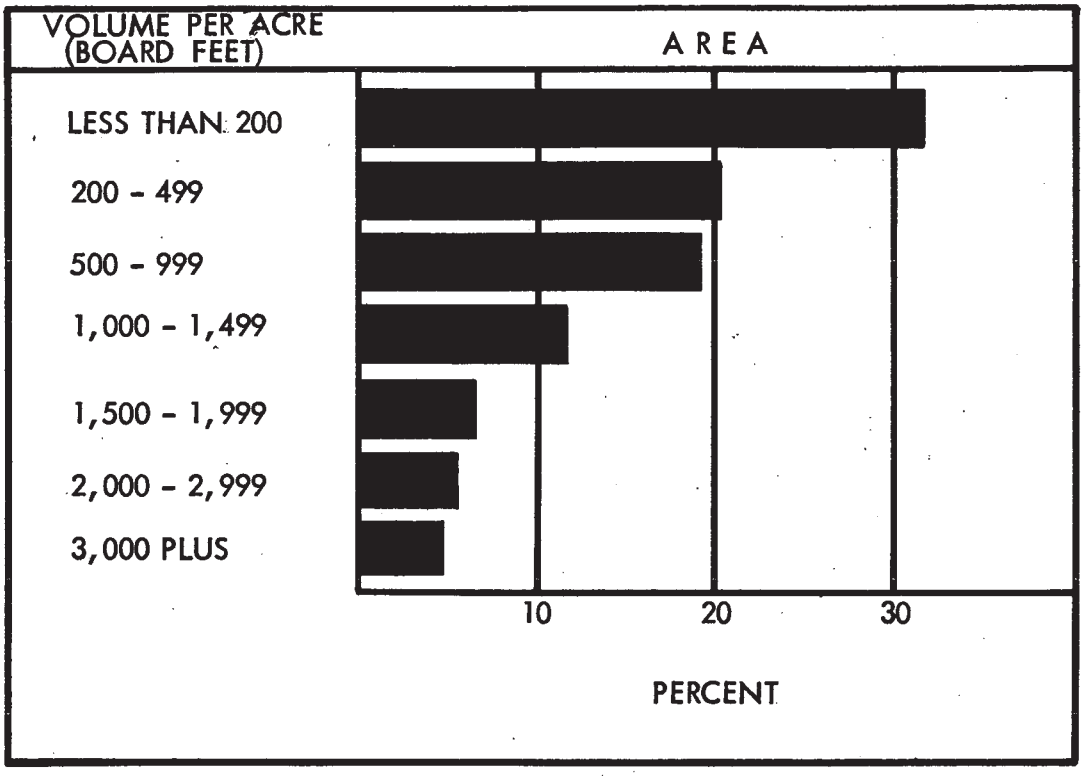


FIGURE 13.

Commercial forest area by board-foot volume-per-acre class, Missouri, 1947.

Source: University of Missouri Research Bulletin 452, "Forest Resources and Industries of Missouri."

TABLE XXX
VOLUME AND VALUE OF PRIMARY FOREST PRODUCTS
BY COMMODITY, MISSOURI, 1946

Commodity	Materials Produced		Value (dollars) 1/
	Unit of Measure	Quantity	
Sawlogs	M board feet (lumber tally)	527,814	$13,195,400
Cooperage bolts	M board feet (Int'l)	96,736	7,738,900
Handle bolts	M board feet (Int'l)	8,474	296,600
Veneer logs	M board feet (Int'l)	9,191	643,400
Fence posts	M pieces	19,977	4,994,400
Hewn cross ties	M pieces	221	330,900
Fuelwood	M standard cords	1,342	13,424,500
Mine timbers	M cubic feet	3,360	840,000
Miscellaneous 2/	M cubic feet	2,351	285,200
Total		----	$41,749,300

1/ Value of logs, bolts, and billets f.o.b. local delivery point. (Compiled by authors from various sources).

2/ Piling, pulpwood, charcoal wood, excelsior bolts, mattress wood, and smelter poles.

Source: University of Missouri Research Bulletin 452 "Forest Resources and Industries of Missouri".

TABLE XXXI

NUMBER OF SAWMILLS AND LUMBER PRODUCTION
BY MILL-PRODUCTION CLASS, 1946 1/ MISSOURI

Mill-production class 2/	Mills		Production	
	Number	Percent	Thousand bd. ft.	Percent
Idle	229	8.1	---	---
Active:				
1-49	873	30.9	41,928	8.1
50-499	1,585	56.2	351,252	67.6
500-999	90	3.2	59,003	11.4
1000-4999	43	1.5)	)	
5000 plus	2	0.1)	3/ 67,236)	12.9
Total active	2,593	91.9	519,419	100.0
Total	2,822	100.0	519,419	100.0

1/ Source: U. S. Forest Service in cooperation with the Civilian Production Administration and the U. S. Bureau of the Census. Production total is 5,572 M less than the previously published figure chiefly because of differences in definitions of lumber. Comparable statistics for 1947 may be obtained from the Census of Manufactures, 1947, U. S. Dept. of Commerce, Bureau of the Census, Report MC24A, 1949.

2/ Annual production in thousands of board feet lumber tally.

3/ Production of mills in these classes combined to prevent disclosure of individual plant production.

TABLE XXXII

COMMERCIAL FOREST AREA BY OWNERSHIP AND NET BOARD FEET VOLUME IN THE OZARK AREA, 1946.

Ownership	Thousand Acres	Net Bd. Ft. Volume Mill. Bd. Ft.
Federal		
National Forest	1,187	967
Other	110	71
Total	1,297	1,038
State	116	93
Private	8,710	5,265
Total	10,123	6,396
Percent of State Total	67.2	53.7

The 1946 survey also provided data on the size-class of trees on the forest land in the Ozarks. In this region, forest land that was classified as pole timber amounted to over 4.4 million acres, and seedling and saplings to nearly 3.6 million acres. These data show the present low quality of forests in the Ozark region. The greatest hope of increasing the output of the forest land in the area lies in the development of the pole timber classed land which has over one-half of the net cubic foot volume into saw timber. (Table XXXIII).

TABLE XXXIII

ACRES OF COMMERCIAL FOREST IN THE OZARKS BY STAND-SIZE CLASS AND NET-CUBIC FOOT VOLUME

Stand-Size Class	Thousand Acres	Net-Cubic-Foot Volume Mill Cubic Foot
Large Saw-timber area	287	166.4
Small Saw-timber area	774	458.0
Pole-timber area	4,436	1,321.1
Seedling and Sapling area	3,589	453.9
Poorly Stocked area	1,037	122.5
Total	10,123	2,521.9

The acreage and net board feet volume of forest land by prevailing species of tree is presented in Table XXXIV. The predominance of oak-hickory species is clearly evident. These species are not among the fastest growing, or most desirable trees for many purposes.

TABLE XXXIV

FOREST TYPE AND NET-BOARD-FOOT VOLUME ON THE COMMERCIAL FOREST AREA OF THE OZARK REGION

Forest Type	Thousand Acres	Mill. Board Feet
Shortleaf pine	222	313
Cedar-hardwoods	349	103
Oak-pine	775	527
Oak-hickory	7,576	4,322
White oak	460	394
Mixed hardwoods	157	143
Pine-oak flats	32	53
Bottomland hardwoods	394	516
Scrub hardwoods	158	25
Total	10,123	6,396

The 1946 survey data are not available by counties so that information on forest quality and volume of timber in terms of board feet are fragmentary. As the counties where the National Recreation Area would be located are typical of the Ozark region, the quality data given in Table XXXIII should be applicable.

TABLE XXXV

INFORMATION ON FOREST AREA AND OWNERSHIP PATTERNS IN THE FOUR COUNTIES

County	Total Land Area 1/ (Acres)	Forest Area 1/ (Acres)	Federal Forest Land 2/ (Acres)	State Owned 3/ (Acres)	Woodland on Farms 1/ (Acres)
Carter	324,000	289,000	86,199	27,520	50,675
Oregon	502,000	352,000	88,178	95,360	176,274
Ripley	409,000	289,000	87,896	-	83,962
Shannon	640,000	525,000	81,658	-	132,391
Four County Area	1,875,000	1,455,000	343,931	122,880	443,302

1/ Data for 1954. Source: U. S. Census of Agriculture.
2/ Data for 1959. Information provided by U. S. Soil Conservation Service.
3/ Data for 1959. Estimated from data from State Resources and Development Division.

As shown in Table XXXV, forest land makes up 77.6 percent of the total land area of the four counties. About 343,931 acres (23.6 percent) of the timber is Federal forest land. The state owns approximately 122,880 acres (8.4 percent). Another 443,302 acres (30.5 percent) is located on farms. The remaining 545,000 acres (37.5 percent) is owned by private interests other than farmers.

The only income data available in the four county area are those pertaining to the sale of forest products off farms. These data are presented in Table XXXVI.

Future Potential of the Forestry Industry in Missouri and in the Four County Area.

Notable progress has been made in the last 20 years in improving forest land in Missouri, but there is still much that could be done in the way of management practices. As stated earlier, the average acre of timber in Missouri was growing at the rate of 45 board feet per year in 1946. Various studies have indicated that the upland timber areas (with the possible exception of some 2 million acres that should be classified as non-commercial) are capable of producing around 200 board feet of timber per acre, per year. There are many examples of bottomland producing 500 to 1000 board feet per acre per year. An example of the recuperative power of Missouri forests under good management is found in the Clark National Forest where the annual growth rate increased from 36 to 93 board feet per acre in less than 10 years (since 1946).

University of Missouri foresters estimate that eliminating the 2 million acres of non-commercial forest land, and assuming that 75 percent of the remainder would justify intensive management, the forests of Missouri are capable of producing close to 2 billion board feet annually. This compares with the present annual use of 460 million board feet.

The increased use of wood for paper in recent years has been phenomenal. Of particular significance from the standpoint of Missouri is the fact that hardwood trees will be used in paper manufacture in ever-increasing quantities. In fact, by 1975 the volume of hardwood pulp is expected to be more than 2.5 times that used presently.

Missouri produces no pulp from Missouri-grown wood. Twenty-two corrugated box manufacturers, however, produce boxes from paper that is shipped into the state. While there are presently no firms producing pulpwood in Missouri, a number of firms are appraising the advantages of locating in the state. With sound community and area leadership, the Ozark region should be able to attract a large pulpwood factory.

At the present time a chipboard producing firm is definitely planning to locate in Central Missouri.

Some clues as to the future potential of forestry in the Ozarks and in the four county area are given in the following paragraphs:

TABLE XXXVI

INFORMATION ON WOOD PRODUCTS SOLD OFF FARMS IN FOUR SELECTED COUNTIES OF MISSOURI

	Year	State	Carter	Oregon	Ripley	Shannon	Four County Area
Value of All Forest Products Sold (dollars).	1944	1,794,825	14,112	36,513	37,407	20,916	108,993
	1949	2,572,582	22,548	46,664	28,783	37,347	135,342
	1954	1,506,768	7,751	26,198	26,065	33,003	93,017
Quantity of Firewood & Fuelwood Cut (Cords 4' x 4' x 8')	1949	1,136,754	5,996	13,391	7,891	11,732	39,010
	1954	768,181	2,702	10,207	6,848	7,116	26,873
Number of Fence Posts Cut	1949	10,893,613	48,864	196,781	97,448	113,129	456,222
	1954	9,327,074	57,234	146,334	93,310	96,840	393,718

Source: U. S. Census of Agriculture, 1950, and 1954.

1. The National Forest Service, as a result of research on resource use and needs, stated in 1953 that there will probably be around a 4 percent reduction in forest lands in Missouri by 1975. It seems likely that the counterbalancing factors of competing uses of land, and the transfer of crop and pasture land to forests will cause the acreage of timber to remain approximately the same in the Ozarks.

2. In the Clark National Forest study (reported above) the annual growth rate of timber increased from 36 to 93 board feet per acre in less than 10 years.

3. Another indication of what good management will do to the value of the forest land is shown in Table XXXVII. These are the average annual net incomes per acre from farm woodlots on designated farms that have followed good management practices for a considerable length of time. Each of these farm owners considered his woodland an important and permanent part of his farm business.

TABLE XXXVII

AVERAGE ANNUAL NET INCOME FROM WOODLOTS WITH GOOD MANAGEMENT, SELECTED COUNTIES IN MISSOURI

Species of Trees	Soil Quality	Location	Net Income Per Acre
High Value Hardwoods	Good Soil	Cape Girardeau County	$16.00
Mixed Oak	Av. Forest Soil	Newton County	3.30
Mixed Oak	Av. Forest Soil	Pettis County	3.25
Mixed Oak	Av. Forest Soil	Bollinger County	6.70
Short Leaf Pine	Av. Forest Soil	St. Genevieve County	3.35

Source: University of Missouri Circular 349, "Value of Farm Woodlot Management in Missouri".

4. The rate of adoption of good management practices is likely to be slow, but will depend upon the development of markets for forest products. (Particularly for low-quality and small-size hardwoods).

Conclusion

Missouri has an extensive area of forest land which has been abused for 75 years. The fire control program and other activities of the National Forest Service and the Division of Forestry of the Missouri Conservation Commission have permitted a gradual rehabilitation of the forest resources, but the problem of cull trees and non-commercial varieties is still present. It is far from inconceivable that one or more firms interested in producing pulpwood and other products that do not need high quality wood will locate in Missouri. If this occurs it would not be improbable that the $41 million value of Missouri forestry products sold in 1946 will be increased to $52 or even $60 million by 1975.

The value of forest products in the four counties could likewise increase materially by 1975. Development of forest production on the land that is near the proposed Recreation Area would preserve the attractiveness of that region for tourists.

PART X

SUMMARY

The area in which the proposed National Recreation Area would be located is in the Southeastern Ozark Region of Missouri. Land in six adjoining counties would be used. However, approximately 77 percent of it would lie in Shannon County. The general area is accessible by means of several bituminous paved state and U. S. highways, but rail and air transportation facilities are limited.

The climate is typically mid-continental, with four distinct seasons. There are wide variations in the daily, monthly, seasonal, and yearly temperature and rainfall.

The topography of the area is rough and hilly. The streams flow through deep gorges or narrow valleys. The landscape is one of tree-covered hills, and small valleys. The area has numerous fresh-water springs, and small streams. The Current and Eleven Point Rivers are the two principal streams. Both rank high in scenic value.

Agriculture is the area is restricted to small acreages of cropland due to rough topography. The soil is low in plant nutrients, stony, and usually droughty in July and August. Only small areas in the valleys are suitable for cultivation. Most of the land is in pasture, or timber. Feeder pigs and feeder calves are two of the most common agricultural enterprises.

The National Recreation Area would include approximately 80,686 acres. This acreage when divided among the six counties affected amounts to less than 10 percent of the total land area in Shannon County, and to less than 2 percent of the total area in each of the other five counties. The present use of the land within the National Recreational Area is as follows: crops, 11 percent; pasture, 4 percent; timber, 85 percent. The estimated value of the land within the National Recreation Area is $2,008,264 or $24.89 an acre.

The people in the area are largely of Anglo-Saxon origin. Many of them are descendants of the early settlers who came from Kentucky, Tennessee, the Carolinas, and neighboring states. The early settlers were probably attracted to the area by the abundance of virgin timber, water, and wild life resources. The original forests had been generally exploited by the early 1900s. The people who remained in the area turned to farming but incomes were low.

The amount of tax in 1958 on land in the proposed recreation area was $32,272. It was collected on real estate that was valued at $931,552. It is estimated that the loss of this amount from the tax base would be offset by lodging places, restaurants, boathouses, service stations and other tourist service facilities valued at more than three million dollars when fully developed.

Total tourist expenditures in the area in 1965, if it becomes a National Recreation Area, are estimated at $9,946,500. Otherwise, the total is estimated at $4,205,317. Thus the additional tourist expenditures are expected to be $5,741,183, if the area becomes a National Recreational ground.

Low income is a problem for most of the farm and non-farm households in the area. In 1955, 32 percent of the farm and 40 percent of the non-farm households received less than $1,000 income.

In June 1959, there were 34 firms employing a total of 709 people in the four county area (Carter, Oregon, Ripley, and Shannon Counties). Exclusions exist in these data, however, because they represent only information collected from employers subject to the Missouri Unemployment Insurance Law. Development of the tourist business is expected to add greatly to the local employment opportunities.

Mineral deposits in the area seem to be stimulating increased interest among national metal producers. Some major mining companies have leases in the general area, and are presently mining lead and iron ores in Iron and Washington Counties which are located north and east of the recreation area. There are surface iron ore deposits throughout the eight counties. In addition to these National Corporations, several small firms produce sand, gravel, stone, and iron ore.

Forest land makes up approximately four-fifths of the total land area of the four counties (Carter, Oregon, Ripley, and Shannon). Of the 1,455,000 acres of forest land, 23.6 percent is owned by the Federal government, 8.4 percent by the State of Missouri, 30.5 percent by farmers, and 37.5 percent by private interests other than farmers. Past use of this land has been exploitative, but the attitudes of people toward timber are changing. The rate of annual growth can be more than doubled through scientific care of the trees. Development of timber as a crop would preserve the attractiveness of the area for tourists.

Chapter 6

GENERAL BIBLIOGRAPHY

BIBLIOGRAPHY - GENERAL

Resources and Levels of Income of Farm and Rural Non-farm Households in Eastern Ozarks of Missouri, by Ronald Bird, Frank Miller, and Samuel C. Turner, Missouri Agri. Exp. Sta., College of Agriculture, University of Missouri, Columbia, Missouri. Research Bull. 661, March 1958.

Agricultural Atlas of Missouri, by James E. Collier. Agri. Exp. Sta., College of Agriculture, University of Missouri, Bull. 645, Columbia, Missouri, February 1955.

Monthly Precipitation in Missouri, by Wayne L. Decker. Missouri Agri. Exp. Sta., Bull. 650, March 1955.

Three Ozark Streams: Log of the Moccasin and the Wilma, by Ward Allison Dorrance. The Missourian Press, Richmond, Missouri. 1938.

Stars Upstream, by Leonard Hall. University of Chicago Press, Chicago. 1958.

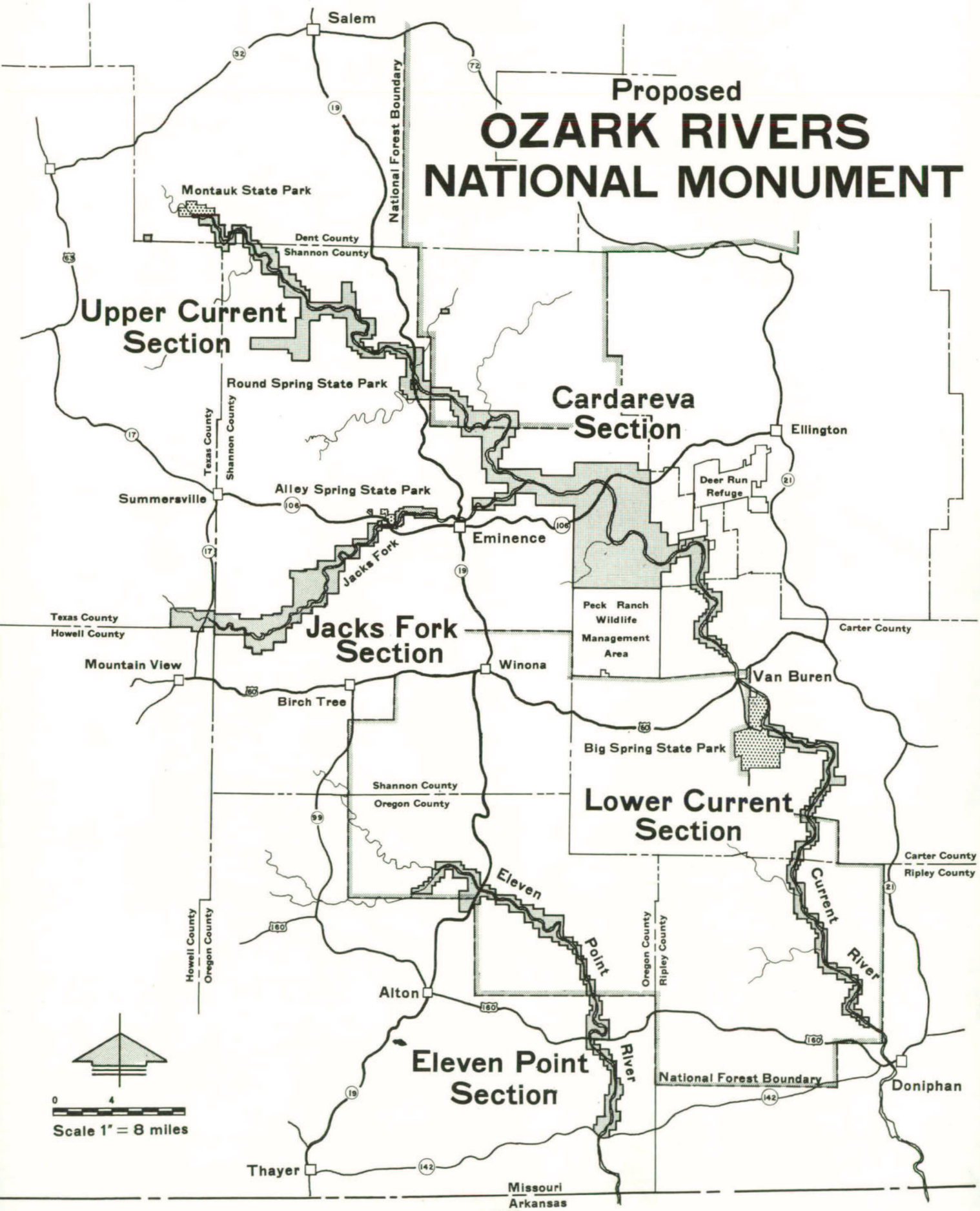
Forest Resources and Industries of Missouri, by D. B. King, E. V. Roberts, and R. K. Winters. University of Missouri, Agri. Exp. Sta. Res. Bull. 452, 1949.

Plan for Preservation and Development of Recreation Resources, Current and Eleven Point River Country, Missouri, by Missouri Division of Resources and Development; Missouri Conservation Commission; Missouri State Park Board; National Park Service, U. S. Department of Interior; 1955. Published by Missouri Division of Resources and Development, October 1956.

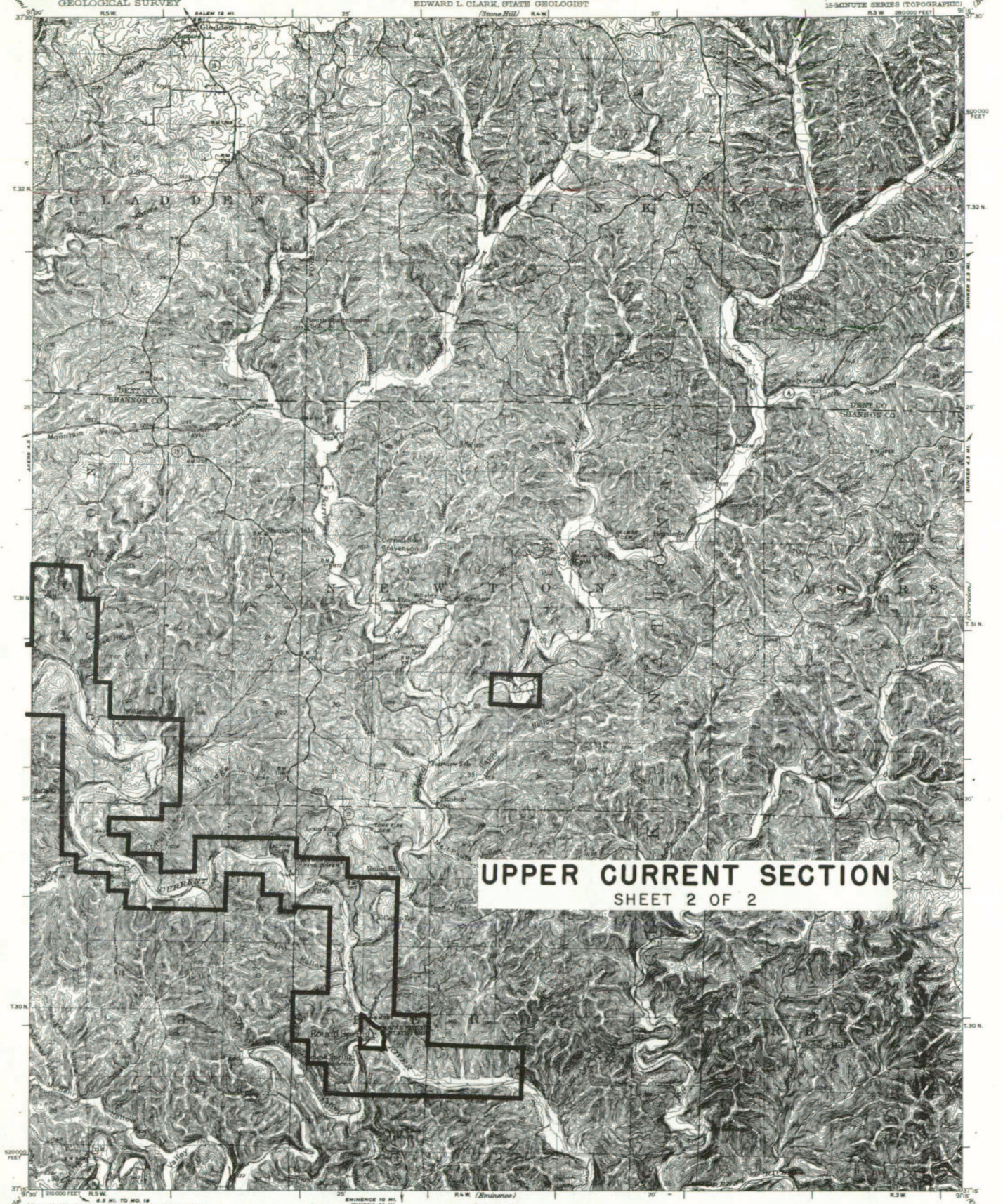
Chapter 7

MAPS

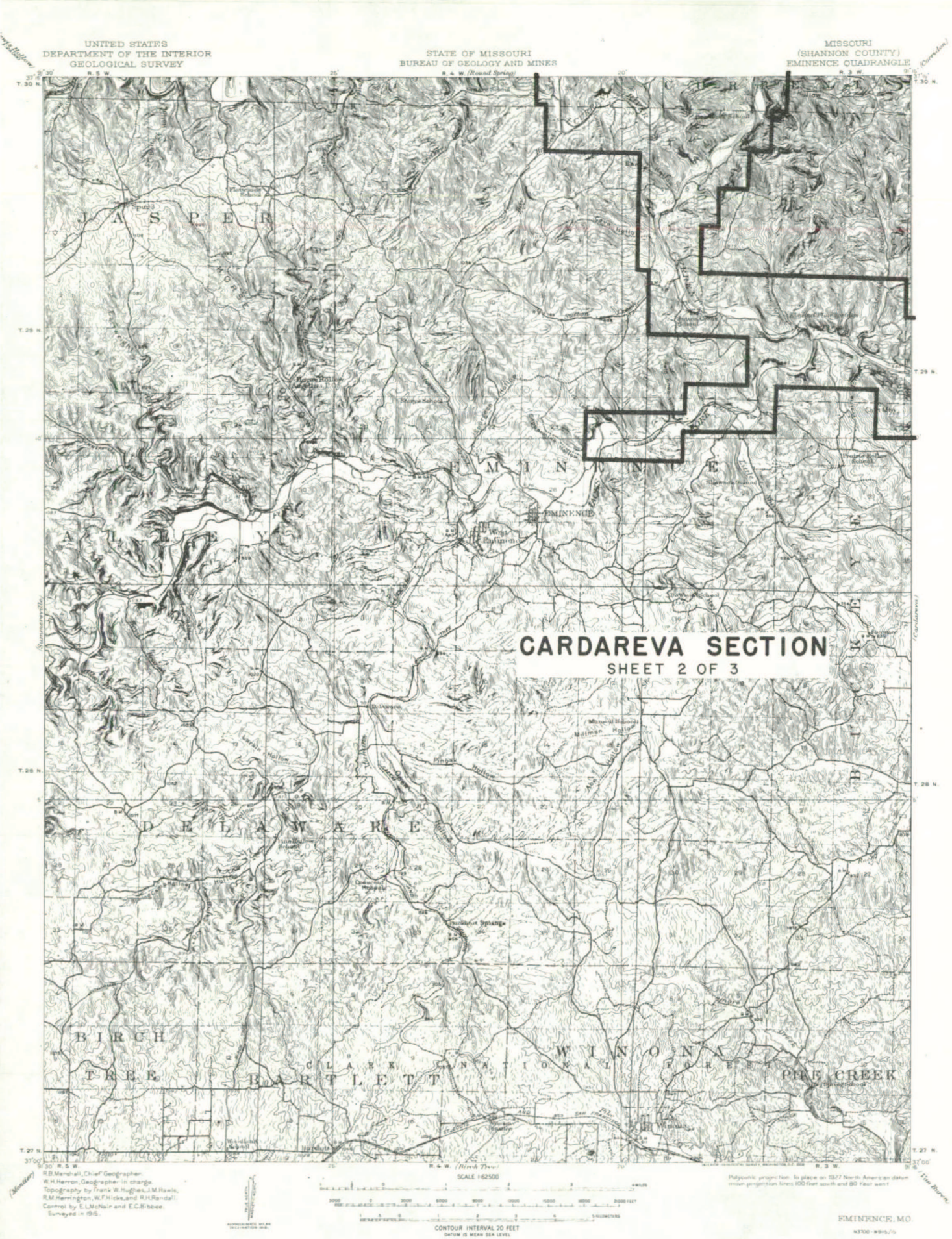
United States Geological Survey Maps
Showing Tentative Boundary of Proposed
Ozark Rivers National Monument

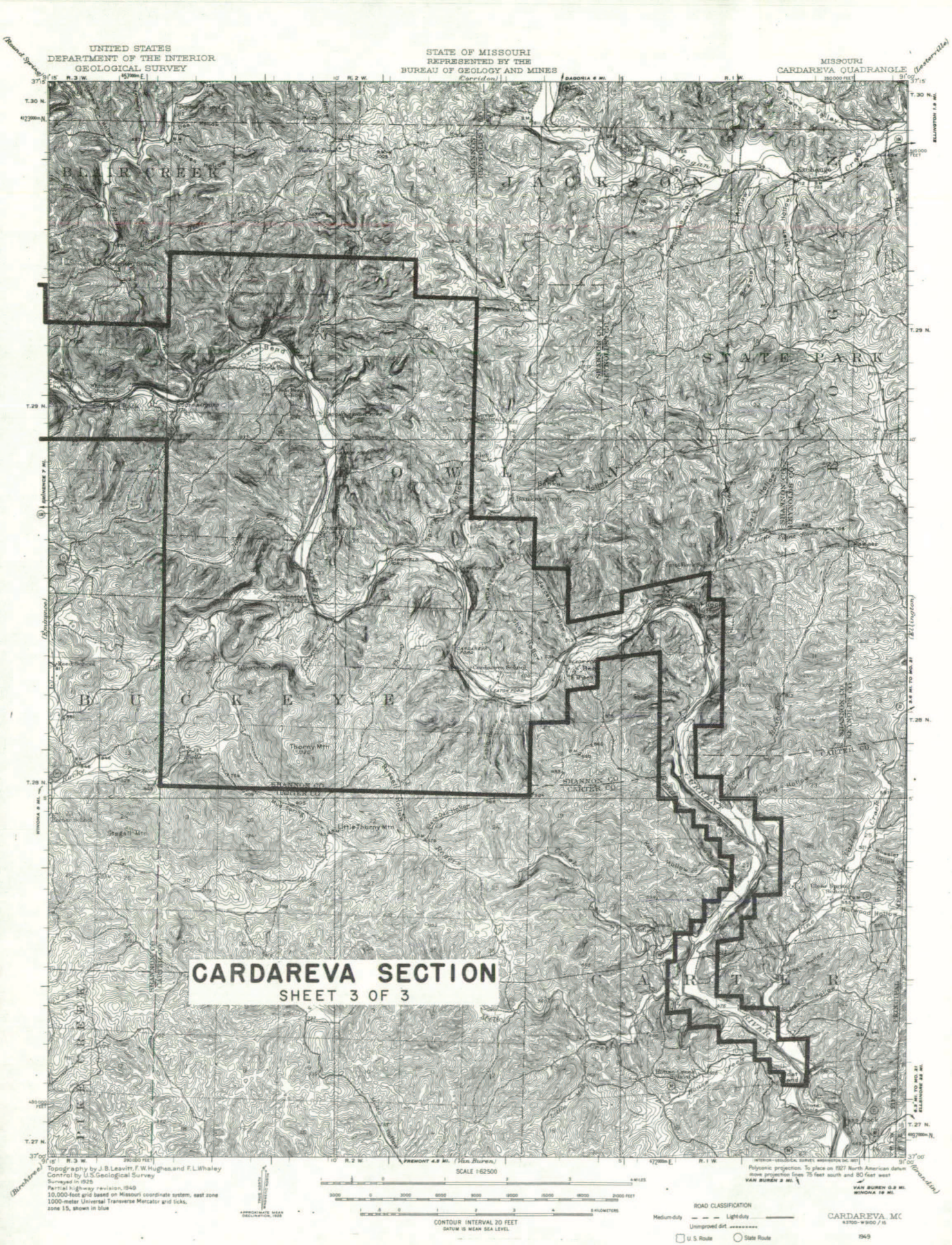

Proposed
OZARK RIVERS
NATIONAL MONUMENT
Salem
National Forest Boundary
Montauk State Park
Dent County
Shannon County
Upper Current
Section
Round Spring State Park
Texas County
Shannon County
Cardareva
Section
Ellington
Deer Run
Refuge
Summersville
Alley Spring State Park
Eminence
Jacks Fork
Peck Ranch
Wildlife
Management
Area
Texas County
Howell County
Jacks Fork
Section
Carter County
Mountain View
Winona
Van Buren
Birch Tree
Big Spring State Park
Shannon County
Oregon County
Lower Current
Section
Carter County
Ripley County
Eleven
Point
River
Current
River
Howell County
Oregon County
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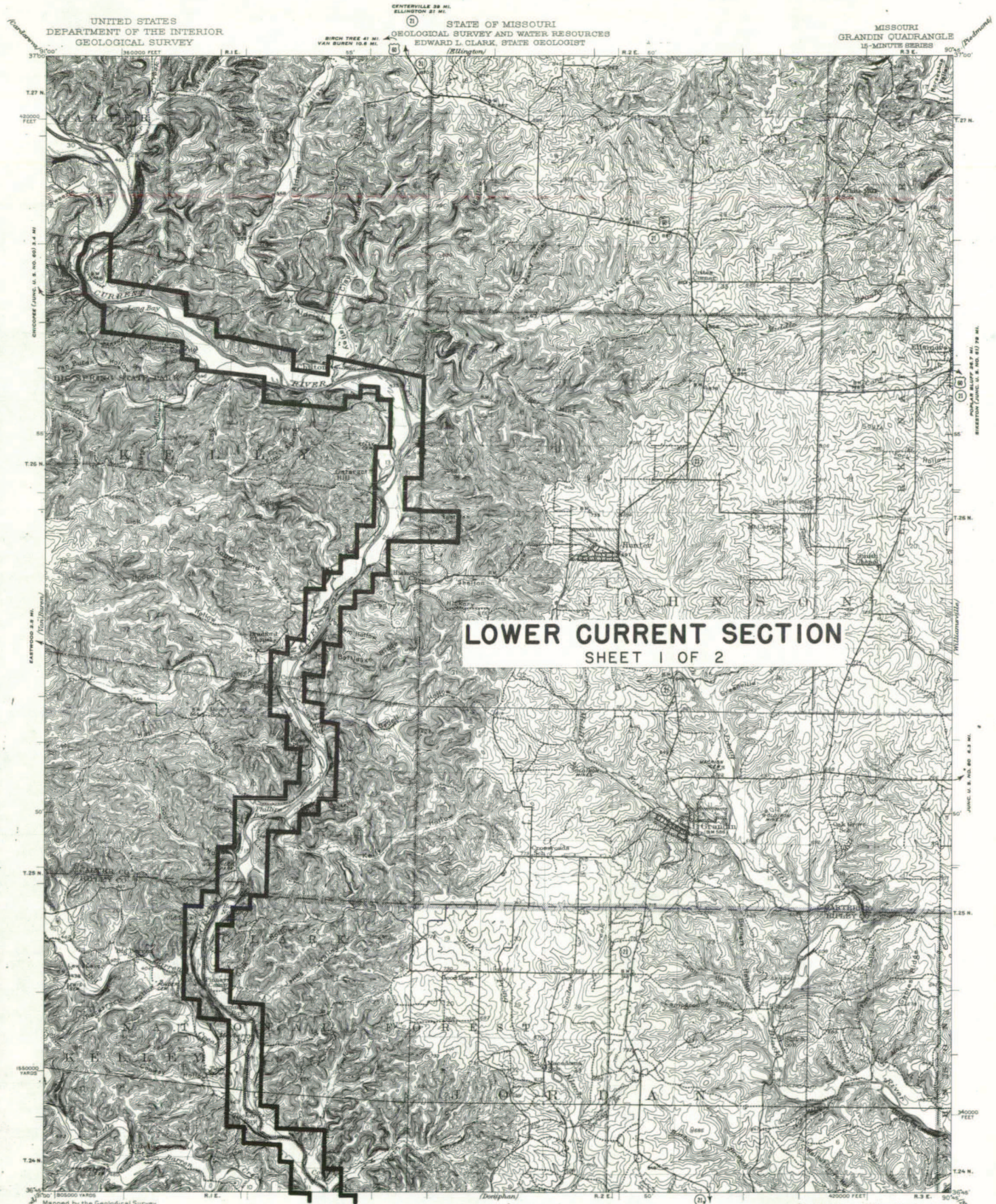
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DEPARTMENT OF THE INTERIOR
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STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
CEDARGROVE QUADRANGLE
MISSOURI
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UPPER CURRENT SECTION
SHEET I OF 2
Mapped and edited by the Geological Survey
Published for civil use by the Geological Survey
Control by USGS and USC&GS
Compiled in 1956 by the Army Map Service from 1:24 000 scale maps of Cedargrove, Montauk, Hartshorn, and Lewis Hollow 7.5 minute quadrangles, surveyed 1951
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1949. Field check 1951
Polyconic projection. 1927 North American datum
10,000-foot grids based on Missouri coordinate system, east and central zones
1000-meter Universal Transverse Mercator grid ticks; zone 15, shown in blue
Unchecked elevations are shown in brown
SCALE 1:62500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL
APPROXIMATE MEAN DECLINATION, 1951
TRUE NORTH
MAGNETIC NORTH
MISSOURI
QUADRANGLE LOCATION
ROAD CLASSIFICATION
Medium-duty
Light-duty
Unimproved dirt
State Route
This area also covered by 1:24 000 scale maps of Cedargrove, Montauk, Hartshorn, and Lewis Hollow 7.5 minute quadrangles, surveyed 1951
CEDARGROVE, MO.
N3715—W9130/15
1951

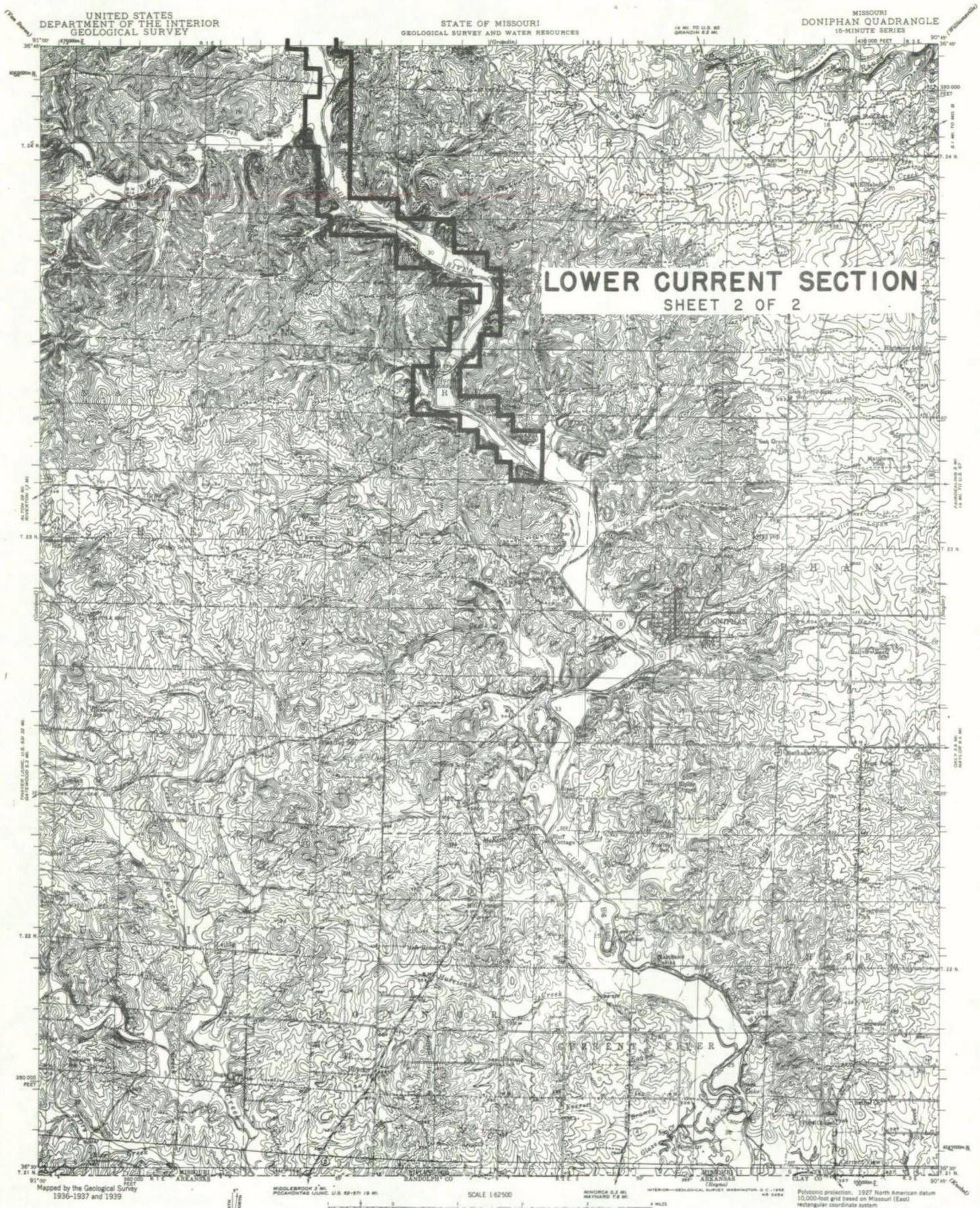

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK, STATE GEOLOGIST
ROUND SPRING QUADRANGLE
MISSOURI
15-MINUTE SERIES (TOPOGRAPHIC)
UPPER CURRENT SECTION
SHEET 2 OF 2
Mapped, edited and published by the Geological Survey
Control by USGS
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1942. Field check 1944 - 1945
Polyconic projection 1927 North American datum
10,000-foot grid based on Missouri (east) rectangular coordinate system
Scale 1:62500
Contour interval 20 feet
Datum is mean sea level
ROAD CLASSIFICATION
ROUND SPRING, MO.
EDITION OF 1949


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK, STATE GEOLOGIST
ROUND SPRING QUADRANGLE
MISSOURI
15-MINUTE SERIES (TOPOGRAPHIC)
CARDAREVA SECTION
SHEET 1 OF 3
Mapped, edited and published by the Geological Survey
Control by USGS
Topography from aerial photographs by multiplex methods
Aerial photographs taken 1942. Field check 1944 - 1945
Polyconic projection 1927 North American datum
10,000-foot grid based on Missouri (east)
rectangular coordinate system
Scale 1:62500
Contour interval 20 feet.
Datum is mean sea level
ROAD CLASSIFICATION
ROUND SPRING, MO.
106


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
BUREAU OF GEOLOGY AND MINES
MISSOURI
(SHANNON COUNTY)
EMINENCE QUADRANGLE
CARDAREVA SECTION
SHEET 2 OF 3
JASPER
EMINENCE
ALLEY
DELAWARE
BIRCH TREE
BARTLETT
WINONA
CLARK NATIONAL FOREST
PINE CREEK
SCALE 1:62500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL
EMINENCE, MO.
1915


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
REPRESENTED BY THE
BUREAU OF GEOLOGY AND MINES
MISSOURI
CARDAREVA QUADRANGLE
BLAIR CREEK
JACKSON
STATE PARK
BUCKEYE
CARTER
Thorny Mtn
Little Thorny Mtn
Stegall Mtn
SHANNON CO
CARTER CO
RIPLEY CO
CARDAREVA SECTION
SHEET 3 OF 3
SCALE 1:62500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL
ROAD CLASSIFICATION
CARDAREVA, MO
1949

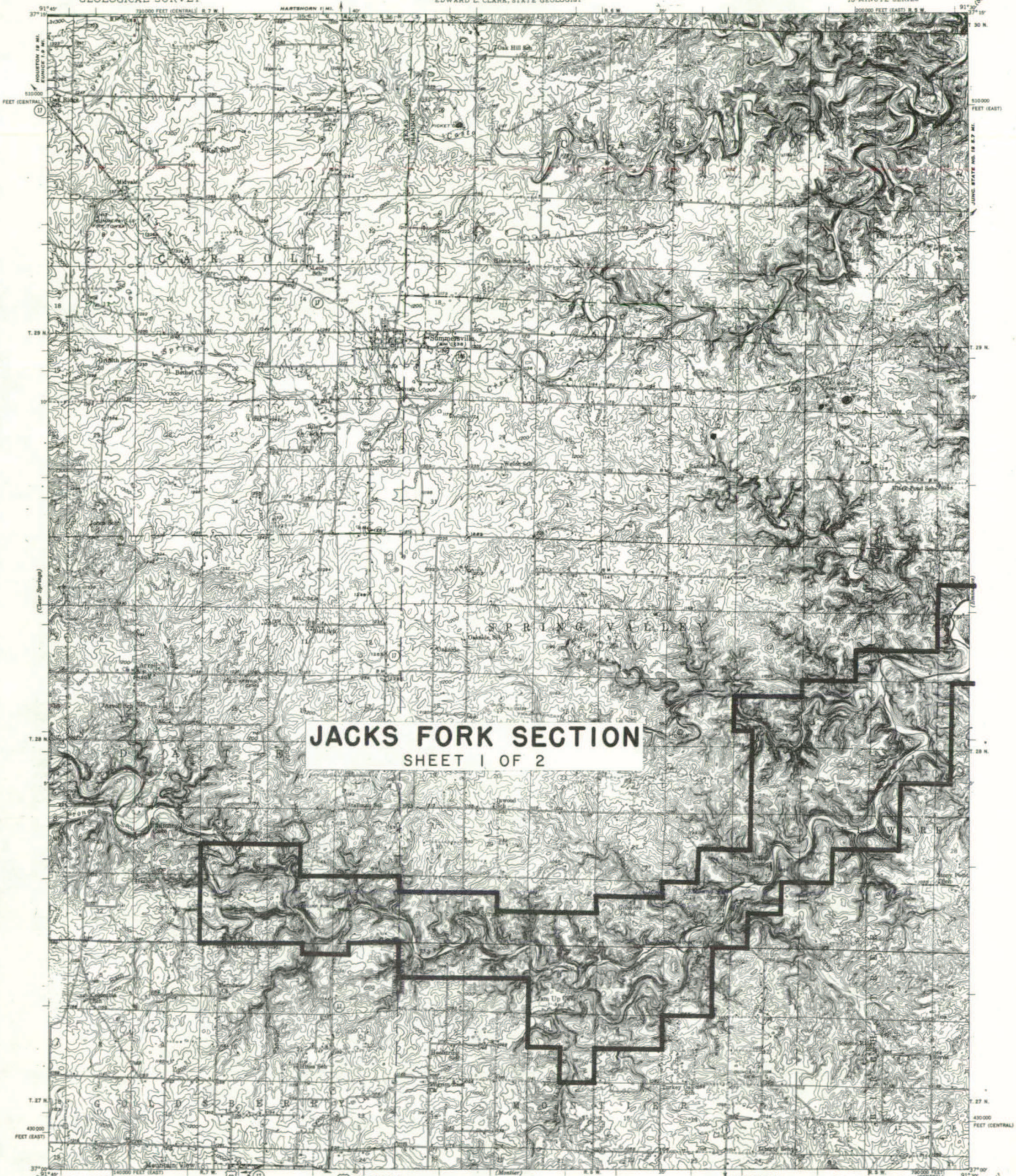

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK, STATE GEOLOGIST
MISSOURI
GRANDIN QUADRANGLE
15-MINUTE SERIES
LOWER CURRENT SECTION
SHEET 1 OF 2
Mapped by the Geological Survey
1932, and 1943-1944
Current River Valley mapped in part
by the Corps of Engineers, U.S.Army
Contour interval 20 feet.
Datum is mean sea level.
Polyconic projection. 1927 North American datum
5000-yard grid based on U.S. zone system, C
10000-foot grid based on Missouri (East)
rectangular coordinate system
GRANDIN, MO.
Edition of 1946


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
MISSOURI
DONIPHAN QUADRANGLE
15-MINUTE SERIES
LOWER CURRENT SECTION
SHEET 2 OF 2
CURRENT RIVER
Mapped by the Geological Survey
1936-1937 and 1939
SCALE 1:62500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U.S. Route
State Route
Polyconic projection. 1927 North American datum
10,000-foot grid based on Missouri (East)
rectangular coordinate system
1000-meter Universal Transverse Mercator grid ticks,
zone 15, shown in blue
DONIPHAN, MO.
N 3630—W 9045/15
1939

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK, STATE GEOLOGIST

MISSOURI
SUMMERSVILLE QUADRANGLE
15-MINUTE SERIES



Mapped by the Geological Survey
1946

ROAD CLASSIFICATION
1947

SCALE 1:62500

4 MILES
21000 FEET
5 KILOMETERS

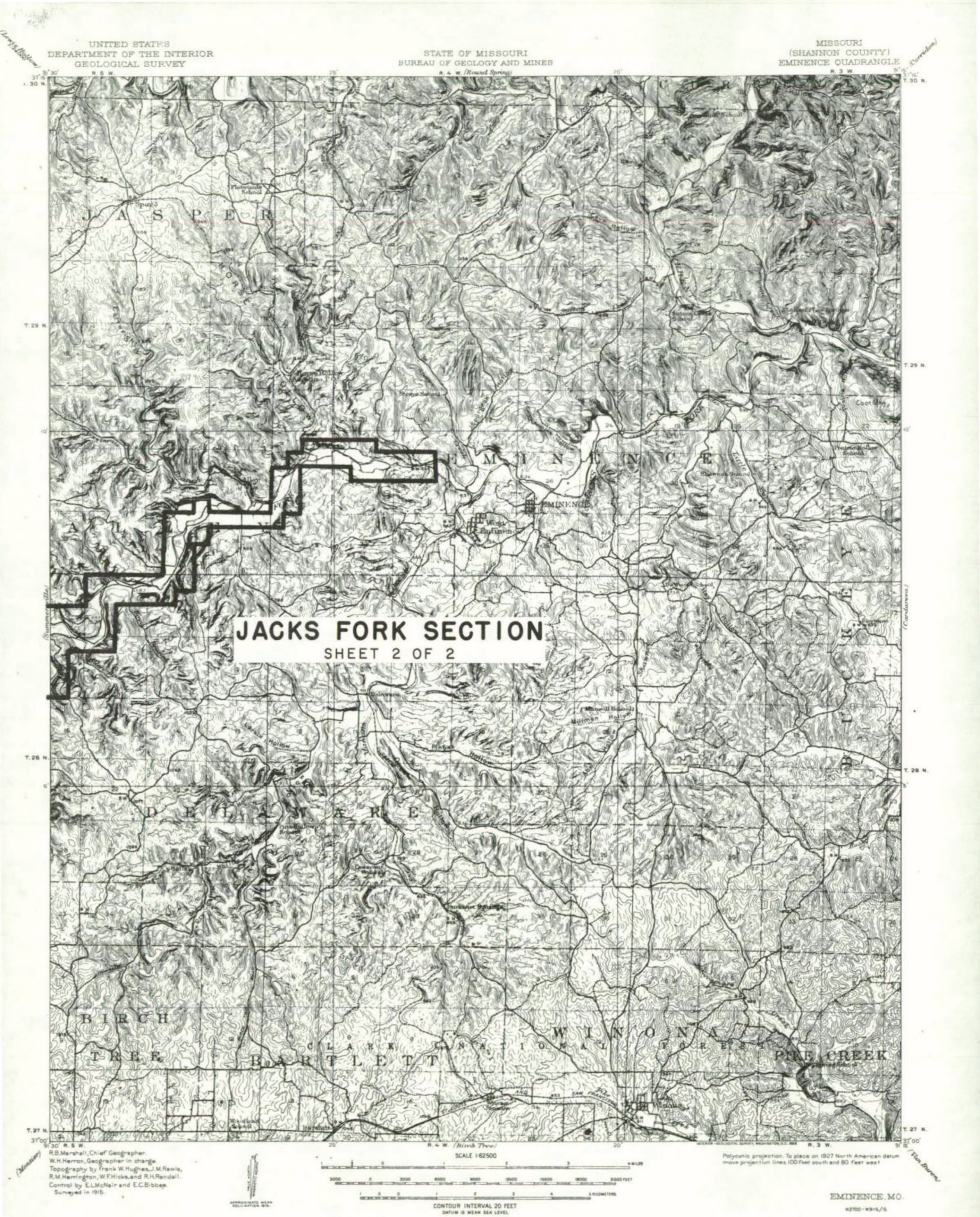
Contour interval 20 feet
Datum is mean sea level

Polyconic projection. 1927 North American datum
10000 foot grids based on Missouri (East) and
Missouri (Central) rectangular coordinate systems

SUMMERSVILLE, MO.
Edition of 1946

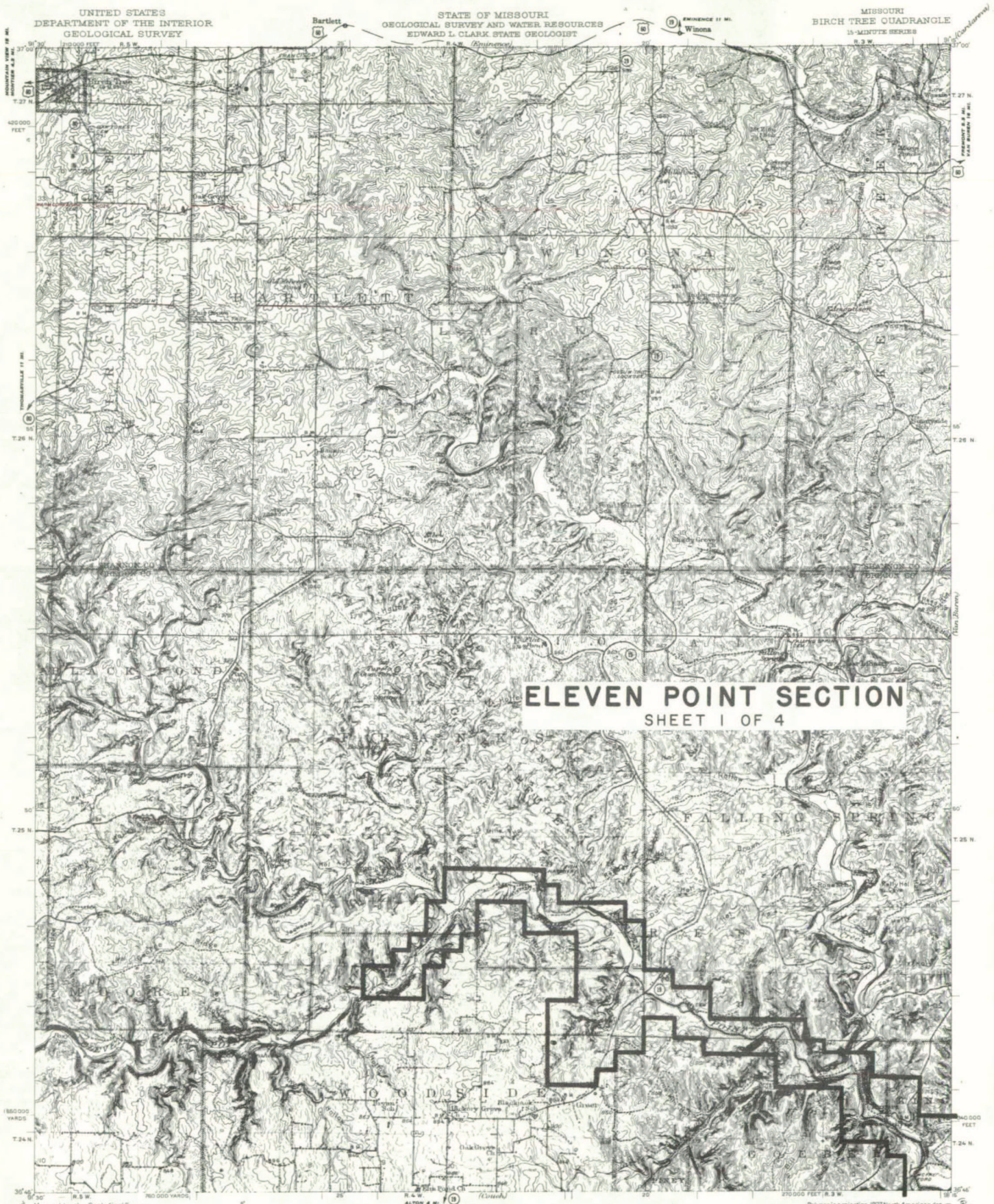
N3700—W9130/15

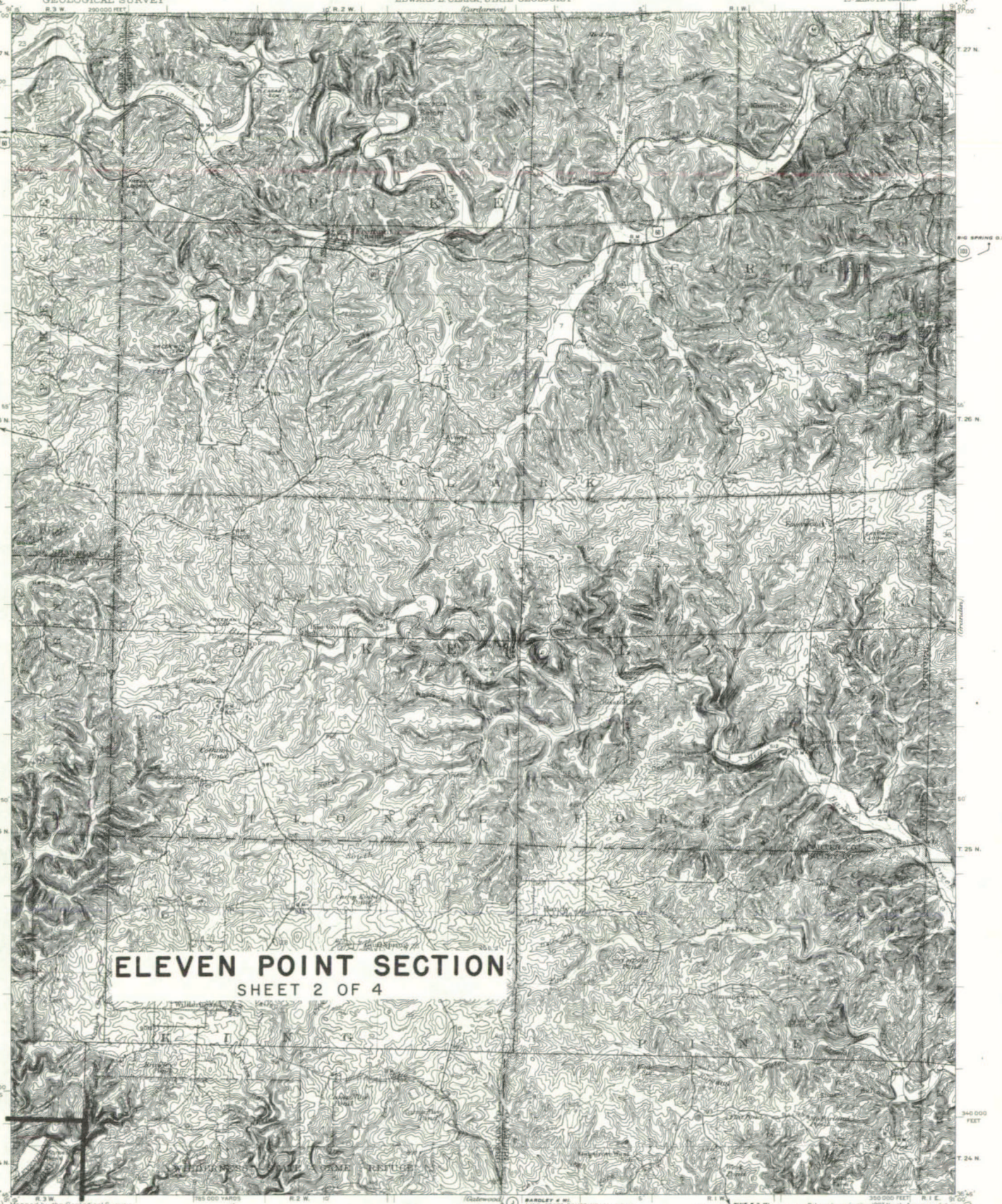
III

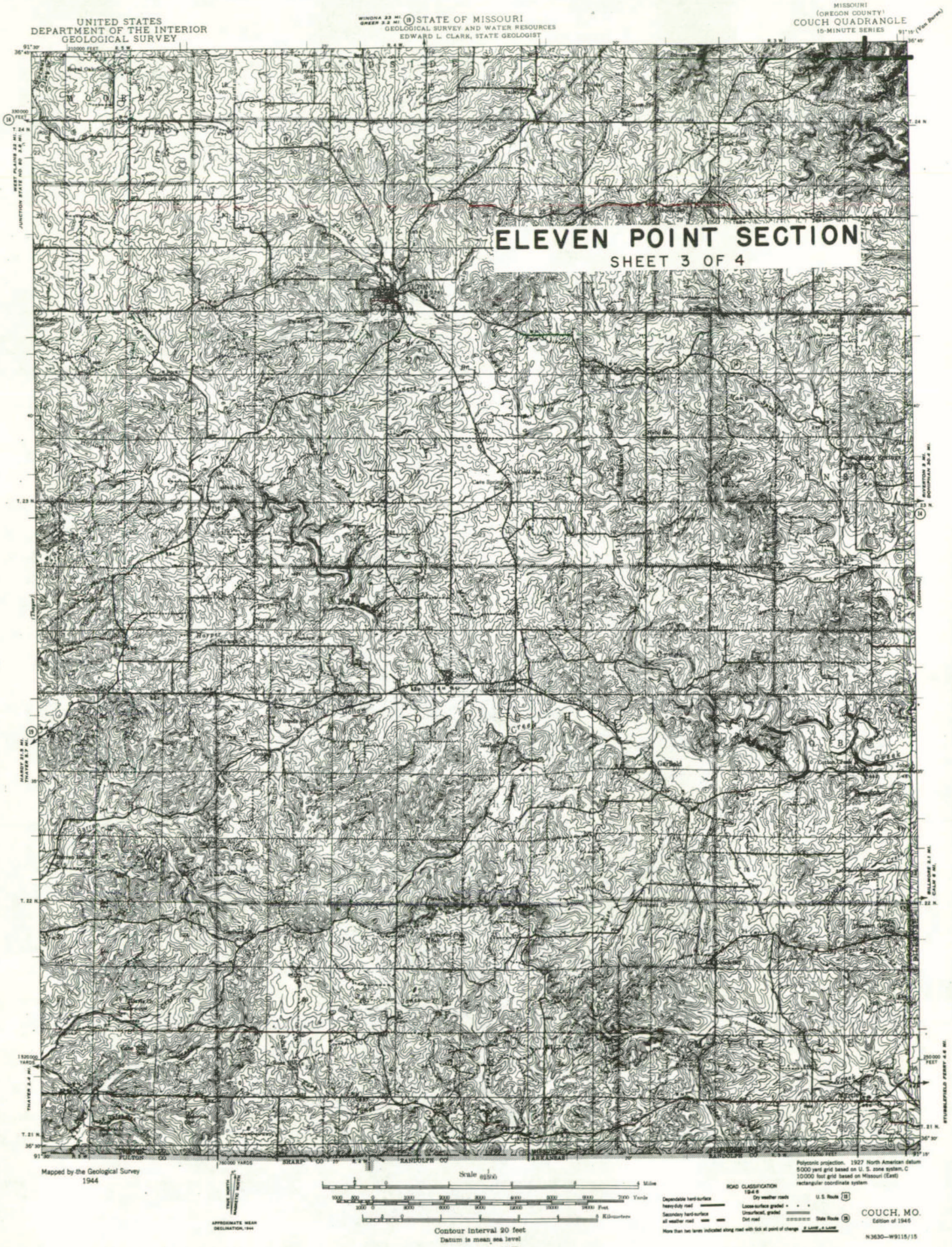


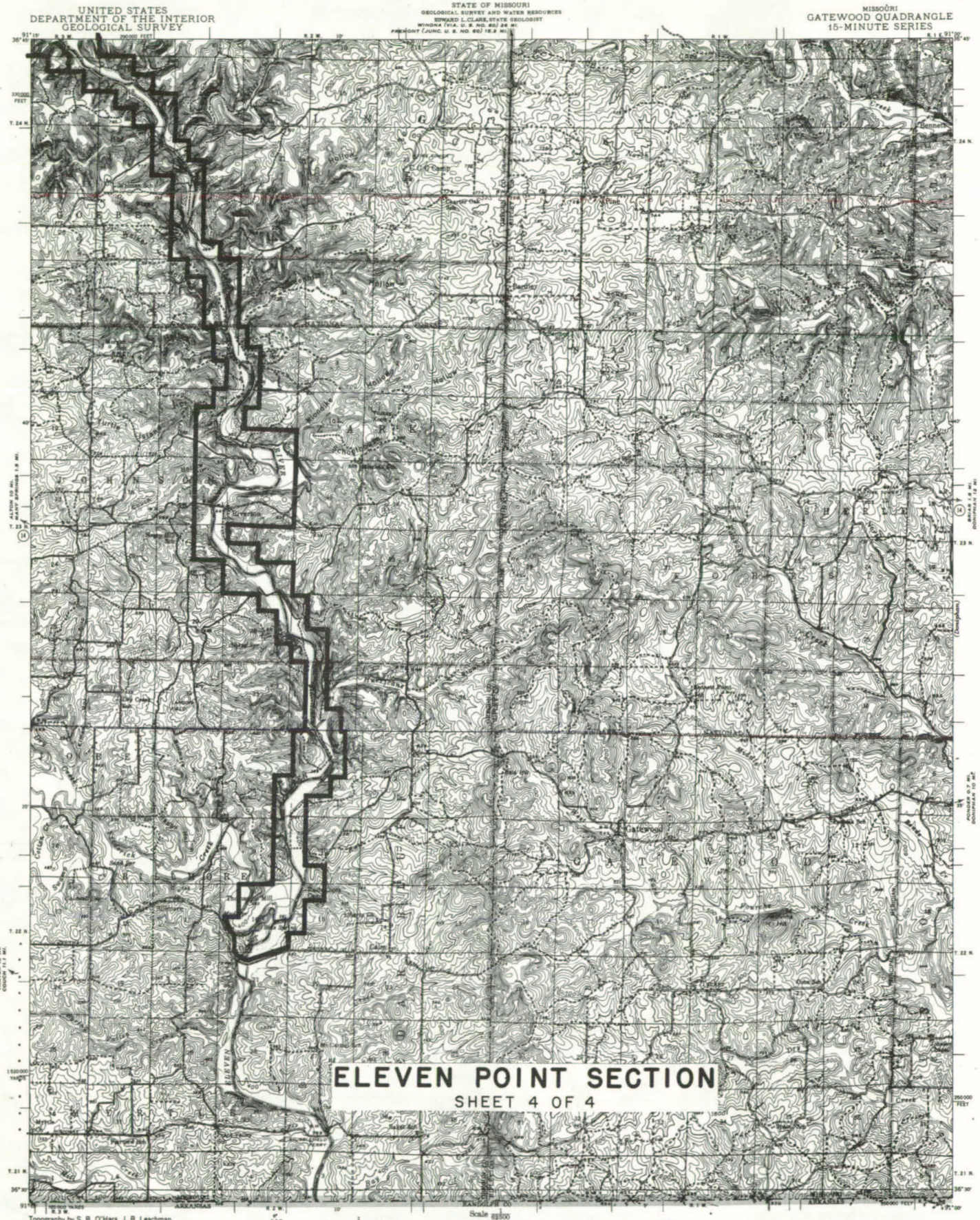
R.B.Marshall, Chief Geographer.
W.H.Herron, Geographer in charge.
Topography by Frank W.Hughes, J.M.Rawls,
R.M.Herrington, W.F.Hicks, and R.H.Randall.
Control by E.L.McNair and E.C.Bibbee.
Surveyed in 1915.

Polyconic projection. To place on 1927 North American datum move projection lines 100 feet south and 80 feet west


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK STATE GEOLOGIST
MISSOURI
BIRCH TREE QUADRANGLE
15-MINUTE SERIES
ELEVEN POINT SECTION
SHEET 1 OF 4
Mapped by the Geological Survey
1931 and 1943-1944
Scale 1:62500
Contour interval 20 feet
Datum is mean sea level
Polyconic projection. 1927 North American datum
5000 yard grid based on U.S. zone system C
10000 foot grid based on Missouri (East)
rectangular coordinate system
To join Eminence map use dotted
projection corners
BIRCH TREE, MO.
Edition of 1948


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK, STATE GEOLOGIST
MISSOURI
VAN BUREN QUADRANGLE
15-MINUTE SERIES
ELEVEN POINT SECTION
SHEET 2 OF 4
Mapped by the Geological Survey
1933 and 1943-1944
Scale 1:31680
Contour interval 20 feet
Datum is mean sea level
Polyconic projection. 1927 North American datum
10,000 foot grid based on Missouri (East) rectangular coordinate system
VAN BUREN, MO.
Edition of 1946


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK, STATE GEOLOGIST
MISSOURI
(OREGON COUNTY)
COUCH QUADRANGLE
15-MINUTE SERIES
ELEVEN POINT SECTION
SHEET 3 OF 4
Mapped by the Geological Survey
1944
Contour interval 20 feet
Datum is mean sea level
Polyconic projection. 1927 North American datum
10,000 foot grid based on Missouri (East)
rectangular coordinate system.
COUCH, MO.
Edition of 1946
N3630—W9115/15


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF MISSOURI
GEOLOGICAL SURVEY AND WATER RESOURCES
EDWARD L. CLARK, STATE GEOLOGIST
MISSOURI
GATEWOOD QUADRANGLE
15-MINUTE SERIES
ELEVEN POINT SECTION
SHEET 4 OF 4
Topography by S. B. O'Hara, J. B. Leachman,
C. D. Mitchell, and J. M. Shields
Surveyed in 1932-1933 and 1937-1938
Scale 1:62500
Contour interval 20 feet
Datum is mean sea level
Polyconic projection. 1927 North American datum
5000 yard grid based on U. S. zone system, C
10000 foot grid based on Missouri (East)
rectangular coordinate system
ROAD CLASSIFICATION
1945
Dependable hard-surface heavy-duty road
Secondary hard-surface all weather road
Dry-weather roads
Loose-surface graded
Unsurfaced, graded
Dirt road
U. S. Route
State Route
GATEWOOD, MO.
Edition of 1945
N3630—W9100/15



FRED A. SEATON *Secretary*



CONRAD L. WIRTH *Director*