Arkansas Water Resources Center

THE ECONOMIC IMPACT OF BEAVER LAKE RESERVOIR: A COST BENEFIT STUDY

By

Don Market

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September 1973

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ABSTRACT

THE ECONOMIC IMPACT OF BEAVER LAKE RESERVOIR:
A COST BENEFIT STUDY

This study was undertaken to determine the impact of Beaver Lake Reservoir on four contiguous Arkansas counties. Analysis of economic data indicated that lake related personal income in the area has, since the project was completed, been about 2.5 percent higher than it would have been had the lake not been constructed. The greatest impact has been associated with the counties having the largest share of the shore line. In the aggregate, however, the most significant cause of economic growth in the area has been associated with growth of manufacturing employment. Also the relative economic position of each of the counties remained virtually unchanged since the project was undertaken. From the viewpoint of economic efficiency, revenues to the Federal Government attributable to the project have been sufficient to result in the project having a net annual yield of 2.8 percent even without considering the "free" recreational benefits of the lake.

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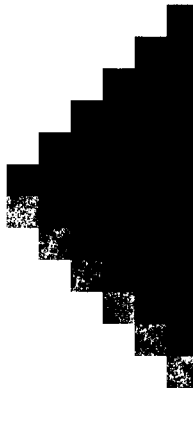

CHAPTER I

INTRODUCTION

The purpose of the present study is to determine the extent to which the construction and subsequent operation of Beaver Lake Reservoir has had an economic impact on the four Arkansas counties that are contiguous to the lake: Benton, Carroll, Madison, and Washington. Specifically, answers to the following questions were sought: (1) Has economic performance within the four-county region become significantly different than it would have been had the Beaver Project not been undertaken by the U.S. Army Corps of Engineers?, and (2) Do those changes in economic performance (if any) that may be construed as economic benefits exceed the costs of the project by a margin sufficient to establish that the project is economically efficient?

One method of seeking answers to these questions would be to determine the rate of return on the capital investment represented by the Beaver Lake Project. The problem could be stated in the general form:

$$K = \frac{R_1 - C_1}{(1 + r)} + \frac{R_2 - C_2}{(1 + r)^2} + \ldots + \frac{R_n - C_n}{(1 + r)^n}$$

where K is the cost of the capital investment represented by the project, R is the marginal output (income) attributal to the project annually, and C is the annual cost of operating the completed project. If K, R, and C are known, a solution for r would yield a rate

of return that could serve as a yardstick to measure the efficiency of the project against alternative uses of K amount of capital.

This approach to a cost-benefit analysis of Beaver Lake Reservoir is complicated by both costs and benefits that are not directly measurable since no direct market test can be applied. For example, while total money outlays associated with the construction of Beaver Lake Reservoir are known, there exist unmeasurable social costs such as psychological hardship to the families displaced by inundation, unsightliness and noise of the dam during construction, For purposes of this study, such costs were considered to be sufficiently small so as to be negligible

The value of many of the benefits emanating from the lake, such as recreational and esthetic values, are not subject to a market test, but may be estimated by using travel costs to the lake as a proxy for price

Insofar as the four county region is concerned, the economic benefits attributable to the lake may be catalogued as follows:

I. Direct economic benefits (measurable by changes in income)

   A. Short-run increases in income resulting from construction, land acquisition, etc.

   B. Long-run increases in income resulting from increased productivity of the area

      1. New industrial locations and the associated growth in supportive industries (services, trade, etc.)

      2. Retirement industry

         a. Retirement home construction

         b. Services and trade outputs required by retirees

      3. Tourist industry

a. Food, lodging, and auto service facilities

b. Recreational facilities

1) Boat docks

2) Golf courses, etc.

II. Direct economic benefits (not measurable because of non-price nature)*

III. Windfall gains to landowners (on or near the land-lake interface)

IV. Government finance

V. Water resources availability

THEORETICAL ISSUES IN THE MEASUREMENT OF ECONOMIC IMPACT

The construction of reservoirs by the U.S. Army Corps of Engineers represents additions to the nation's stock of social capital which should, directly or indirectly, add to the utility generating capacity of the national economy, whether in the form of additional outputs of goods and services through the market mechanism, or in the form of additional utility yielding recreational services that or may not, be measurable in the market place

In a very broad sense, increments to the stock of social capital (such as Beaver Lake Reservoir) may have an impact that is nationwide in scope; however, it is most probable that economic impact diffuses rapidly as the distance from the project increases. Given assumption, it follows that impact will be greatest in the immediate area, and that impact can be measured in terms of changes in relevant economic variables in the immediate area.

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*It should be noted that recreational benefits to residents outside the area are not considered in this analysis, except to the extent that increased tourism affects area income.

If the decision to allocate an increment of resources to social capital formation (of the Beaver Lake type) is based upon a criteria of economic efficiency, it would follow that the expected return should equal or exceed that which could be expected on other available capital-use alternatives. Specifically, the expected net yield should, at least, equal the real rate of return of long-term capital investment (public or private) in the economy

To meet the test of economic efficiency (in a financial context), a capital expenditure of the Beaver type made from tax revenues, therefore, should generate additional income via the private sector of the economy that would, in turn, generate additional tax revenues over annual operating costs of the project equal to marginal efficiency of capital in the economy. If the real rate of return of AAA corporate bonds (approximately 4 percent) is taken as an approximation of marginal efficiency of long-term capital then, for example, the Beaver Lake Project would have to account for an increase in private income in the range of $25 to $35 million annually in the four-county region in order to meet the test of economic efficiency.

To the extent that lake attributable increments to income do not generate sufficient tax revenues to make the project self-supporting, the net effect of the project would be a redistribution of income from all taxpayers in the United States to citizens of the four-county region. If redistribution does in fact occur, it must be justified on some other grounds than economic efficiency

One may justify a project such as Beaver Lake Reservoir on the grounds that it, if nothing else, improves the quality of life of the nation's citizens; that even if it generated no new income, its

esthetic and recreational values are worthwhile in and of themselves since they provide utility to those who choose to avail themselves of the facility. Moreover, while all taxpayers bear the costs of the project, all taxpayers have access to the benefits This line of reasoning is sound as far as it goes. The economist cannot deny that an additional lake will provide someone with lake related utility that might not otherwise have been available at some price. Likewise, the economist cannot deny that the user of the esthetic and recreational services of a lake may derive refreshment and renewal that will enable him to return to his occupation as a more productive and happy citizen than he or she might otherwise have been. The economist must also agree that the therapeutic benefits to one citizen may have neighborhood effects that benefit others who do not avail themselves of the lake. A few days of fishing, or swimming, or whatever, may result in the automobile mechanic doing a better job of repairing ailing engines, or make the accountant account better, or the teacher teach better, and as a result, benefits radiate out to those who may never go near the lake

Granting the above analysis, however, does not bar economic analysis on the grounds that benefits are not economically measurable. The decision to build one more lake remains economic in nature. Dam construction and land acquisition require resources that must be diverted from other uses, and lakes, like other goods, must certainly be subject to the law of diminishing returns. And perhaps most importantly, lakes, man-made or otherwise, are not "free goods" to their users. The "quality of life" benefits suggested above must be purchased by the expenditure of time and resources

necessary to travel to them. Thus, there automatically arises geographic price discrimination in a "free" public good. At the same time there is no like, or even mitigating, geographic discrimination in the taxing process that generates funds used to construct and maintain a Beaver Lake Reservoir. It follows that the taxpayer in Detroit probably gets far less utility for his tax dollars that are used to build and maintain Beaver Lake than a ike taxpayer in Joplin, Missouri, or Springdale, Arkansas

POTENTIAL IMPACT ON THE AREA ECONOMY

Tourism. The construction of a lake in a scenic environment such as Northwest Arkansas enhances the area's tourism potential for reasons suggested above. The increase of tourist traffic within the area, and the associated increases in income and tax revenues may be considered a measurable impact in the region's economy. The increase of tourists traveling by private automobile results in increased local demand for restaurant, lodging, and automobile support services, thus adding to private sector income and to tax revenues. At the same time the increased automobile traffic increases necessary expenditures on highway maintenance and also necessitates the construction of additional access roads to the lake. These additional public expenditures necessary to make the lake a viable tourist center must be considered along with initial impoundment and construction costs.

From the viewpoint of regiona economic development, the nature of the "tourist industry" itself must be considered. First, the peak tourist season in Northwest Arkansas is imited to a 120-day

period extending from approximately late May to early October (13). Secondly, the three primary tourist service businesses--food, lodging, and service stations--tend to generate employment that requires low skill levels, and as a result, pays low wages. Such employment

little to raise per capita income. Thirdly, an analysis of cost-of-goods-sold in these businesses suggests that a large percentage of tourist expenditures immediately flow out of the area to wholesalers, jobbers, etc. For example, the average cost-of-goods-sold for service stations averages approximately 80 percent of sales Thus, estimates of tourist expenditures grossly overstate the economic impact of tourism on an area.

Flood Control. One measurable impact of such projects as Beaver Lake is flood control. However, flood control benefits of Beaver Lake Reservoir would probably accrue downstream from the dam and therefore outside the region under study. Thus, this benefit, while probably significant, is not considered in this study.

Industrial Location and Agriculture. Granting the basic premise that area income levels are raised by increased production for export, perhaps the most significant impact of the lake would be in attracting industry. The availability of plentiful water resources might not only be an attraction to industry, but enhance agricul

output as well.

SUMMARY OF FINDINGS

In the chapters that follow, findings on lake related economic impacts during the period studied are reported. These findings are summarized below:

1. In the four-county area it was found that the completed project has caused income to be about 2.5 percent (on the average) higher than it would have been had the lake not been constructed.
2. The major sources of income growth in the area were found to be in the growth of manufacturing employment. During the period studied the presence of the lake appears to have had only marginal impact on new industrial locations.
3. The distribution of income and population among the four counties has not been appreciably altered since the completion of the project. The two counties that were most populous and prosperous prior to the project remain the most populous and prosperous after completion of the project. However, during the last year studied (1970), it was noted that relative gains were made by Benton County and Carroll County.
4. The primary economic impact on the area was found to be in increased sales and employment in the tourist and retiree serving industries. Benton and Carroll Counties were the primary beneficiaries in this category
5. Agricultural activity appears to have been only minimally affected since the project removed only 1.8 percent of the land area of the four-county region. Latest available data indicate that irrigated farmland in the four-county region has increased only slightly and, as a percent of total land in farms, is still far below the state average.
6. Land values near the lake have increased significantly.

However, the assessment process has been sluggish and the revenue benefits to local governments have lagged behind these increases in land values. By 1971, general reassessments in the four-county area had occurred, indicating that increased revenues will soon accrue to the local political entities

7. Analysis of population trends in the area show a significant increase in population during the period 1960-1970, particularly in the retiree-aged population groups. While a substantial part is attributable to the Bella Vista Village retirement complex (which is not near Beaver Lake), our analysis suggests that Beaver Lake has enhanced the retirement industry in the area
8. The recreational services provided by the lake were found to have an estimated value of approximately $6.5 million per year. However, based on cost of using alternative lakes, it is estimated that area residents are receiving a recreational "subsidy" of approximately $2.6 million per year.
9. The most significant benefits to the area will probably result from improved water resource availability. During the period covered by this study these benefits were only just beginning to be realized by the area. While the lake itself has had only minor impact on the economy of the area as a whole, thus far, indications are that it will in the near future be a major factor in maintaining the level of economic activity that the area--especially Benton and

Washington Counties--currently enjoys.

10. When all directly measurable impacts were considered it was found that the project will be self-liquidating from the viewpoint of the Federal Government (i.e., taxpayers). The additional federal revenues collected via lake induced increments to private income in the area, plus direct revenues from the sale of electricity, indicate that the original costs of the project will be recovered within 22 to 34 years (depending on method of calculation). When all costs (implicit and explicit) are considered, from the federal viewpoint, the lake is yielding a net 2.8 percent on original capital investment.

CHAPTER II

THE BEAVER LAKE RESERVOIR PROJECT

Beaver Lake Reservoir is one of four multipurpose projects in the upper White River Basin for control of floods and generation of electric power. Beaver Dam is located 9 miles northwest of Eureka Springs, Carroll County. Construction on the project began in November 1960, and was completed in June 1966.

The four counties affected by the project have a total land area of 2,135,535 acres. The project required a total of 38,031 acres, 1.8 percent of the four-county area. Benton County lost 27,780 acres (4.8 percent) of its land area to the project; Carroll County lost 5,962 acres (1.5 percent); Washington County lost 4,278 acres (0.7 percent); and Madison County lost 11.5 acres (less than 1/10 of 1 percent).

The reservoir at the top of the conservation-water supply pool has a surface area of 28,220 acres and a shore line of 449 miles. The total storage capacity of the lake is 1,942,000 acre-feet with an ultimate water supply capacity of 120 million gallons per day.

Most of the lake, in terms of both surface acres and miles of shore line, is located in Benton County with 70.2 percent and 77.7 percent, respectively, of the lake totals. Tables II-1 and X-5 present summaries of lake surface area and shore line area.

The maps in this chapter show the four-county area. Also shown are more detailed maps of the lake contained by each of the

four counties. These maps (provided by the Arkansas Highway Department) show each county for both 1967 and 1971 (except Benton County which is for 1972). Comparison of maps for these two years generally reveals the development of the area around the lake. It should be noted that the dots on the maps indicate structures with roofs.

Table II-1

B E A V E R L A K E R E S E R V O I R

County	Land Area (1959) Acres	Land Taken by Reservoir Project	
		Acres	Percent
Benton	580,341	27,780.0	4.78
Carroll	405,578	5,962.0	1.47
Madison	532,802	11.5	*
Washington	616,814	4,278.0	0.69
Total	2,135,535	38,031.5	1.78

*Less than 1/10 of 1%.

Source: U.S. Army Corps of Engineers, Little Rock, Arkansas.

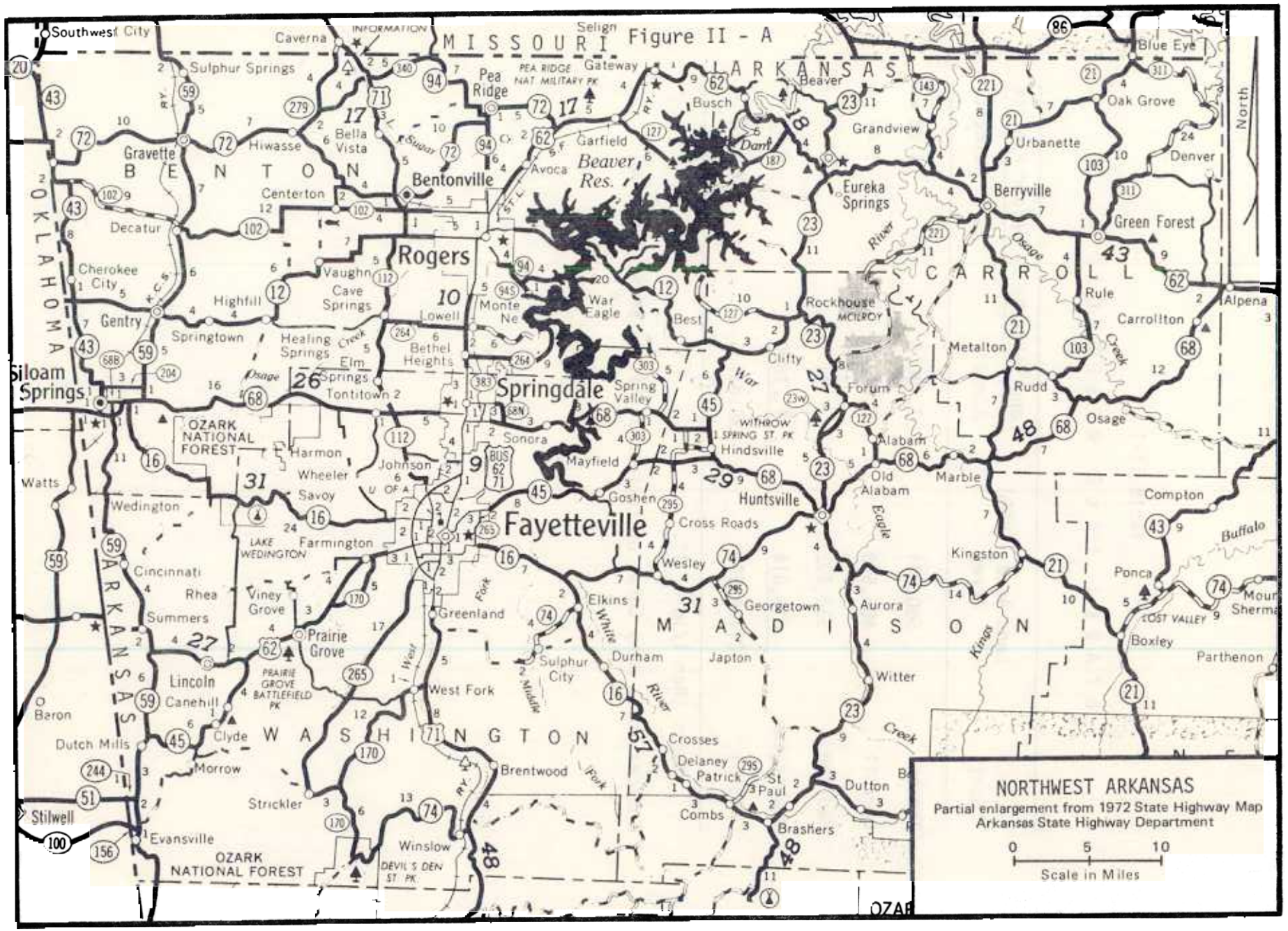


Figure II - A
NORTHWEST ARKANSAS
Partial enlargement from 1972 State Highway Map
Arkansas State Highway Department
0 5 10
Scale in Miles
North
Southwest City
Caverna
Sulphur Springs
Gravette
Bella Vista
Bentonville
Rogers
Centerton
Decatur
Cherokee City
Gentry
Springtown
Siloam Springs
Highfill
Vaughn
Cave Springs
Lowell
Springdale
Healing Springs
Elm Springs
Tontitown
Bethel Heights
Spring Valley
Sonora
Mayfield
Fayetteville
Goshen
Cross Roads
Wesley
Farmington
Lake Wedington
Wedington
Watts
Cincinnati
Rhea
Summers
Viney Grove
Prairie Grove
Lincoln
Canehill
Baron
Dutch Mills
Clyde
Morrow
Stilwell
Evansville
Strickler
Greenland
West Fork
Brentwood
Winslow
Elkins
Sulphur City
Durham
Japton
Georgetown
Huntsville
Hindsville
Withrow Springs
Alabam
Old Alabam
Marble
Compton
Kingston
Ponca
Boxley
Parthenon
Aurora
Witter
Crosses
Delaney
Patrick
St Paul
Combs
Brashears
Dutton
Rudd
Forum
Metalton
Clifty
Rockhouse
McElroy
Best
War Eagle
Monte Ne
Garfield
Avoca
Busch
Beaver
Gateway
Pea Ridge
Selign
Blue Eye
Oak Grove
Grandview
Urbanette
Denver
Berryville
Eureka Springs
Green Forest
Rule
Carrollton
Alpena
Osage
Ozark National Forest
Devil's Den St. Pk.
Pea Ridge Nat. Military Pk.
Prairie Grove Battlefield Pk.
Beaver Res.
White River
Kings River
Buffalo
Eagle
War Eagle
Osage Creek
Middle Fork
West Fork
Missouri
Oklahoma
Arkansas
Carroll
Madison
Washington

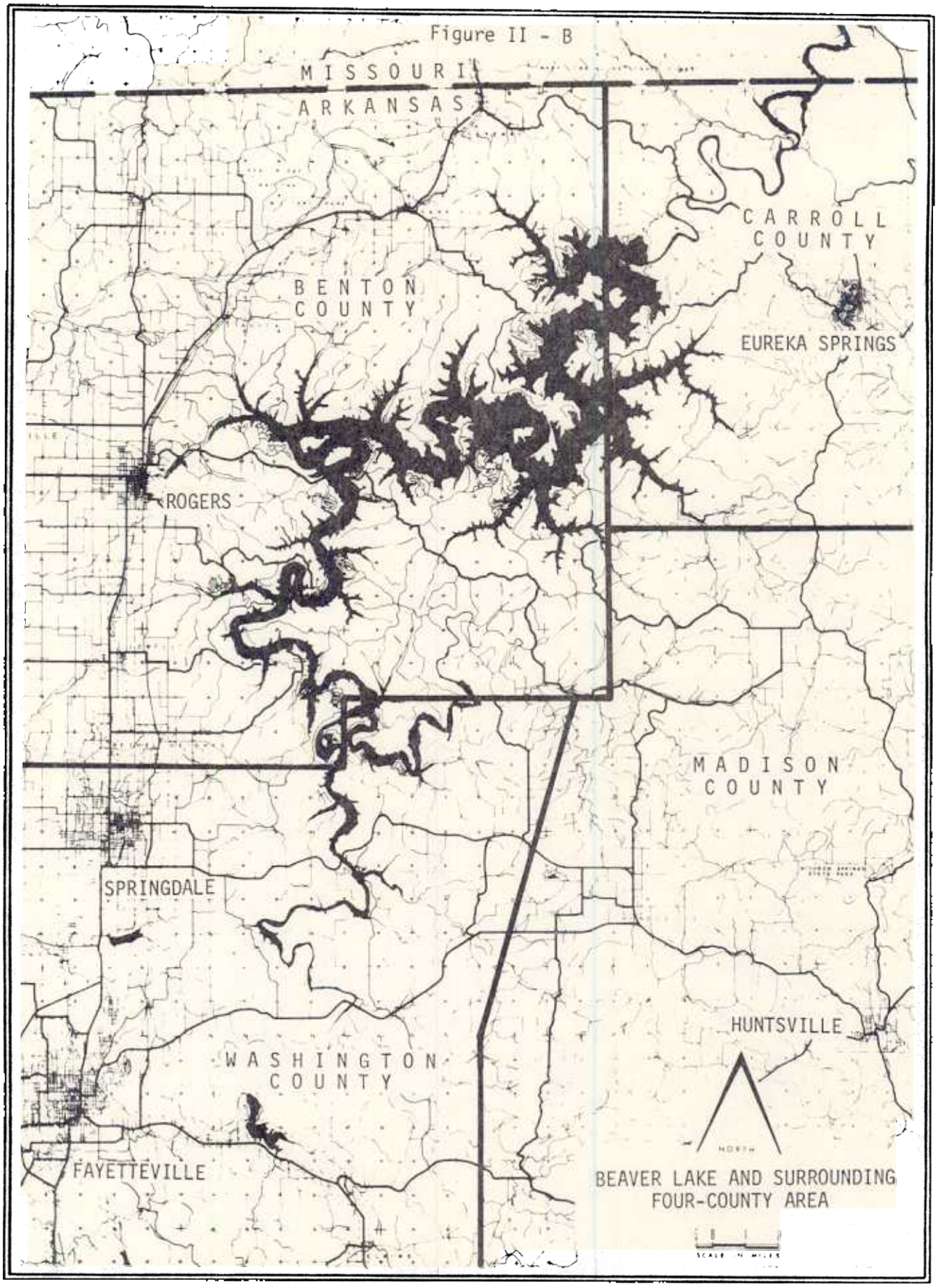


Figure II - B
MISSOURI
ARKANSAS
CARROLL COUNTY
BENTON COUNTY
EUREKA SPRINGS
ROGERS
MADISON COUNTY
SPRINGDALE
HUNTSVILLE
WASHINGTON COUNTY
FAYETTEVILLE
NORTH
BEAVER LAKE AND SURROUNDING FOUR-COUNTY AREA
SCALE IN MILES

Figure II - D

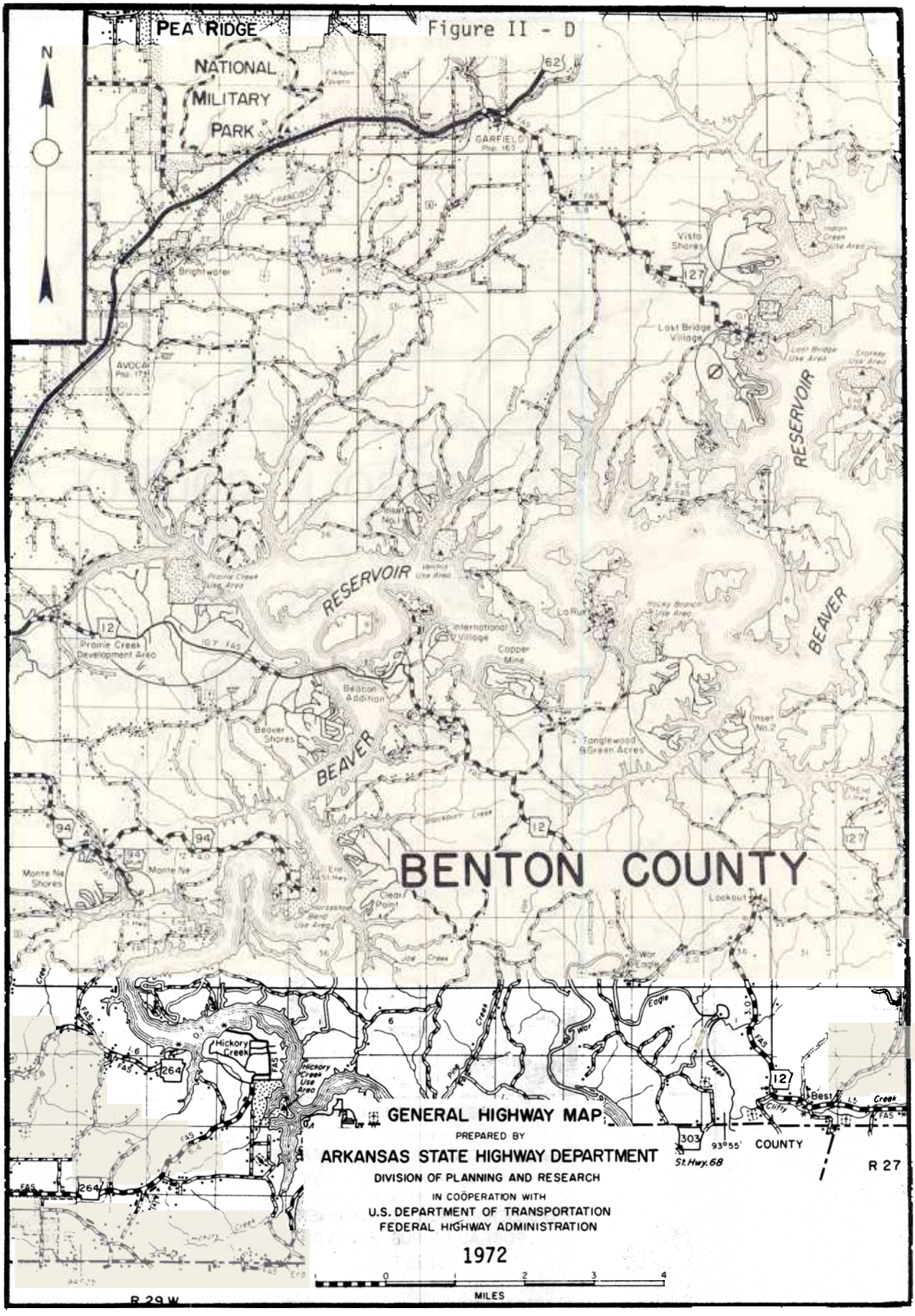

PEA RIDGE
NATIONAL
MILITARY
PARK
N
BENTON COUNTY
RESERVOIR
BEAVER
RESERVOIR
BEAVER
GENERAL HIGHWAY MAP
PREPARED BY
ARKANSAS STATE HIGHWAY DEPARTMENT
DIVISION OF PLANNING AND RESEARCH
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
1972
MILES
R 29 W
R 27

Figure II - E

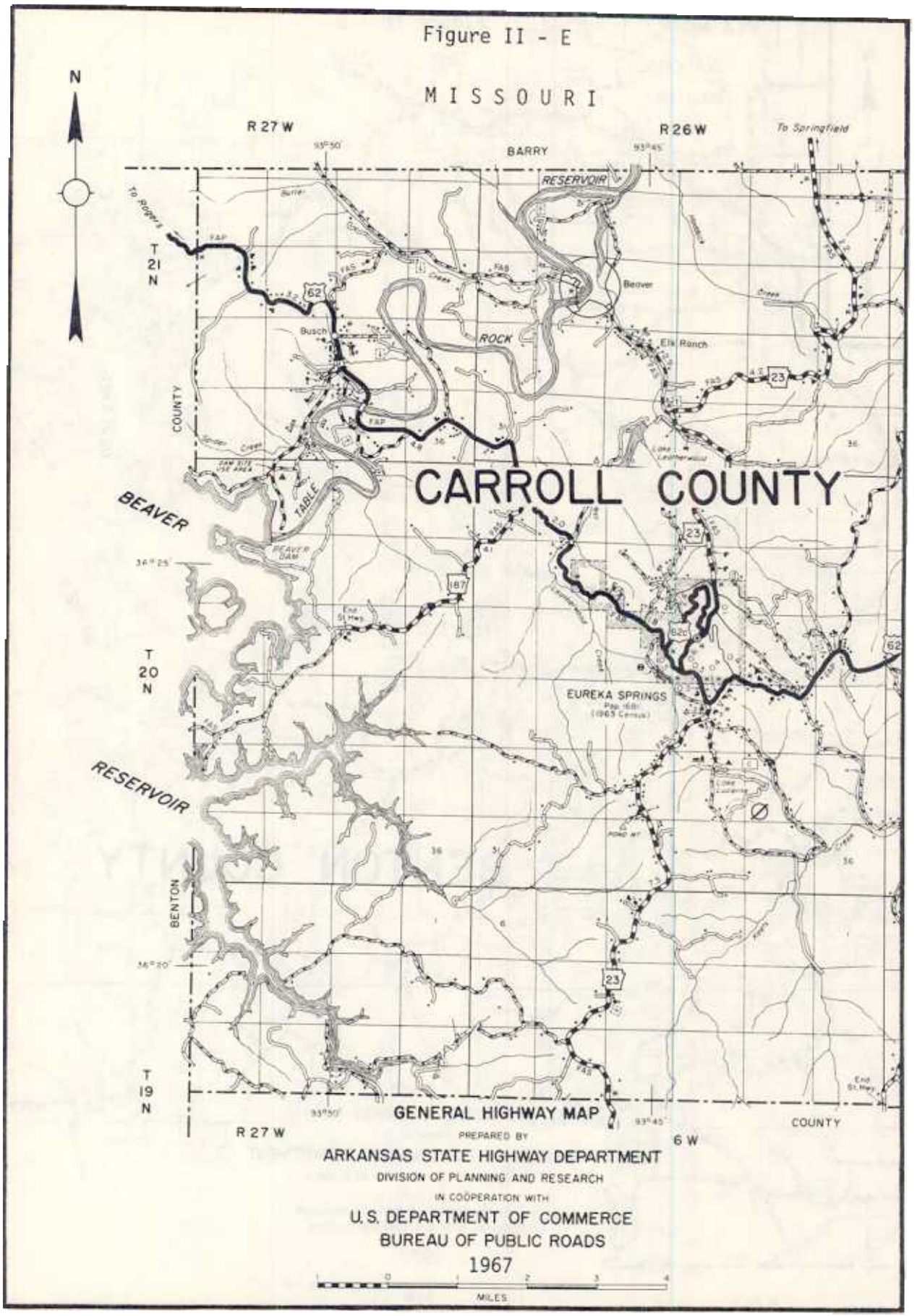

MISSOURI
N
R 27 W
R 26 W
BARRY
To Springfield
RESERVOIR
T 21 N
Busch
ROCK
Beaver
Creek
Eis Ranch
COUNTY
CARROLL COUNTY
BEAVER
TABLE
BEAVER DAM
T 20 N
EUREKA SPRINGS
RESERVOIR
BENTON
T 19 N
R 27 W
6 W
COUNTY
GENERAL HIGHWAY MAP
PREPARED BY
ARKANSAS STATE HIGHWAY DEPARTMENT
DIVISION OF PLANNING AND RESEARCH
IN COOPERATION WITH
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
1967
MILES

Figure II - F

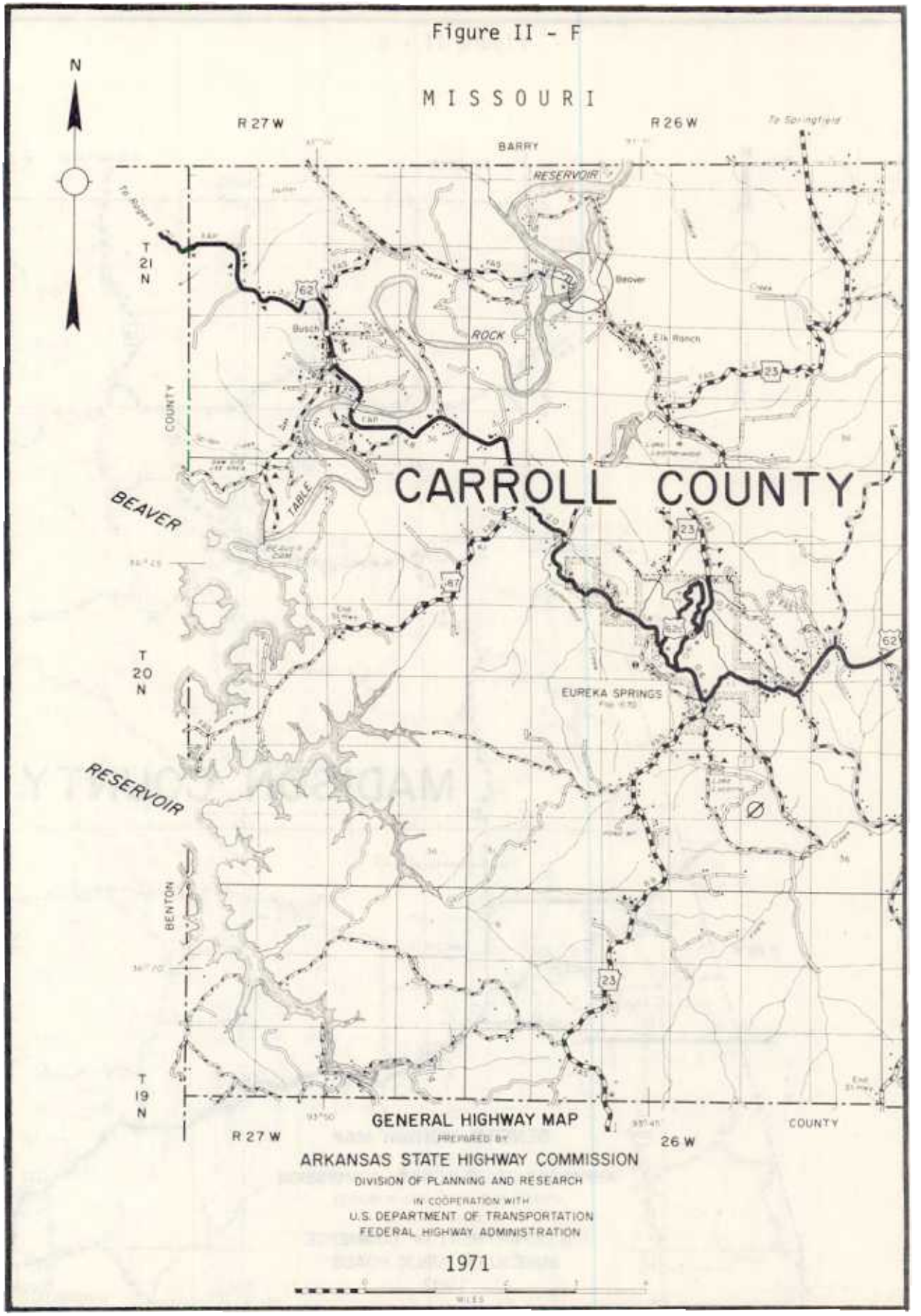

N
MISSOURI
R 27 W
R 26 W
BARRY
RESERVOIR
To Springfield
To Rogers
T 21 N
62
Busch
ROCK
Beaver
Elk Ranch
23
COUNTY
CARROLL COUNTY
BEAVER
TABLE
87
T 20 N
EUREKA SPRINGS
RESERVOIR
BENTON
T 19 N
R 27 W
26 W
COUNTY
GENERAL HIGHWAY MAP
PREPARED BY
ARKANSAS STATE HIGHWAY COMMISSION
DIVISION OF PLANNING AND RESEARCH
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
1971
MILES

Figure II - G

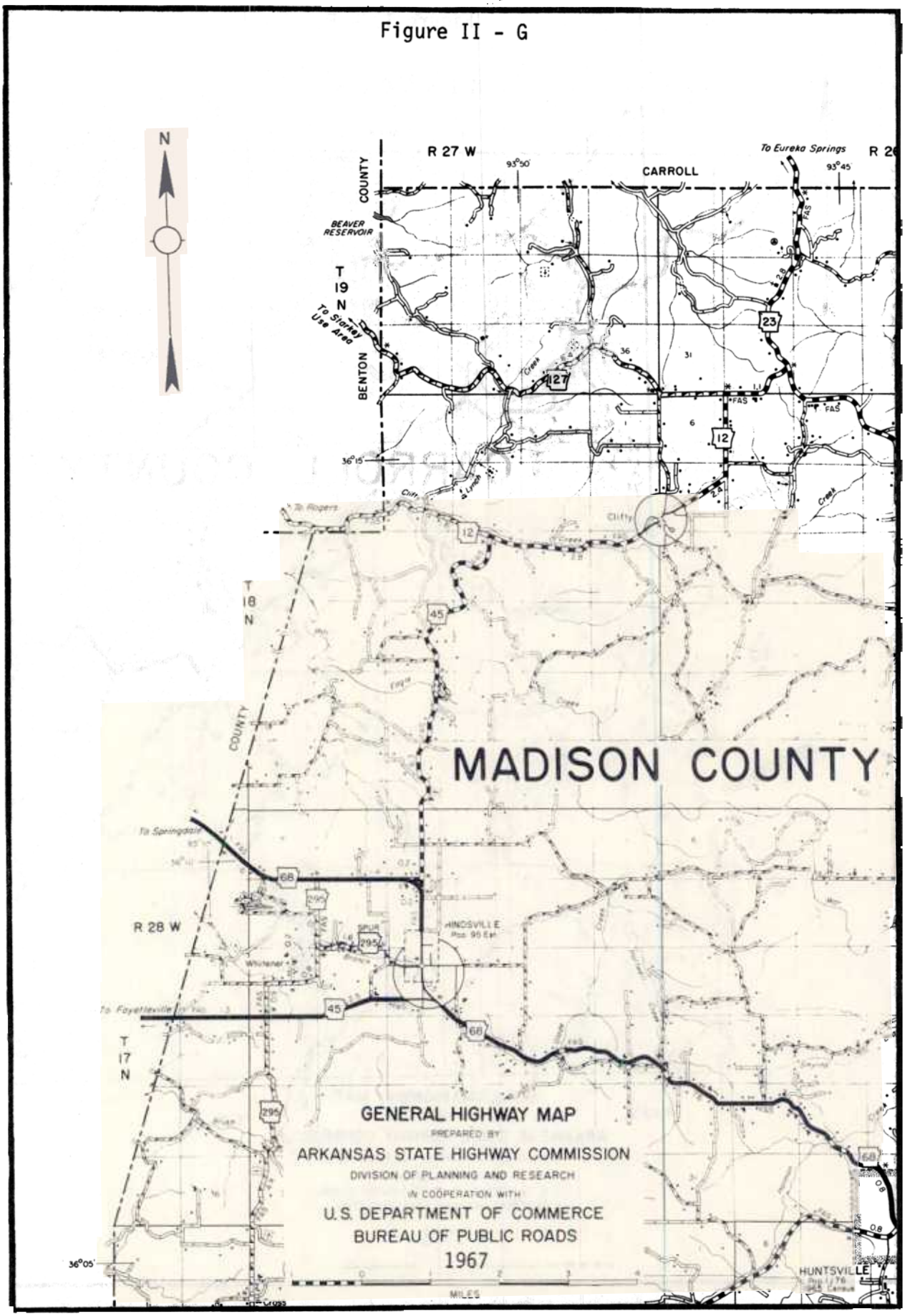

N
R 27 W
93°50'
CARROLL
To Eureka Springs
93°45'
R 26
COUNTY
BEAVER RESERVOIR
T 19 N
To Storey Use Area
BENTON
36°15'
Clifty
St. Joe
Creek
T 18 N
COUNTY
MADISON COUNTY
To Springdale
R 28 W
HINDSVILLE
Pop. 95 Est.
Whichard
To Fayetteville
T 17 N
GENERAL HIGHWAY MAP
PREPARED BY
ARKANSAS STATE HIGHWAY COMMISSION
DIVISION OF PLANNING AND RESEARCH
IN COOPERATION WITH
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
1967
MILES
HUNTSVILLE
Pop. 1,176
36°05'

Figure II - H

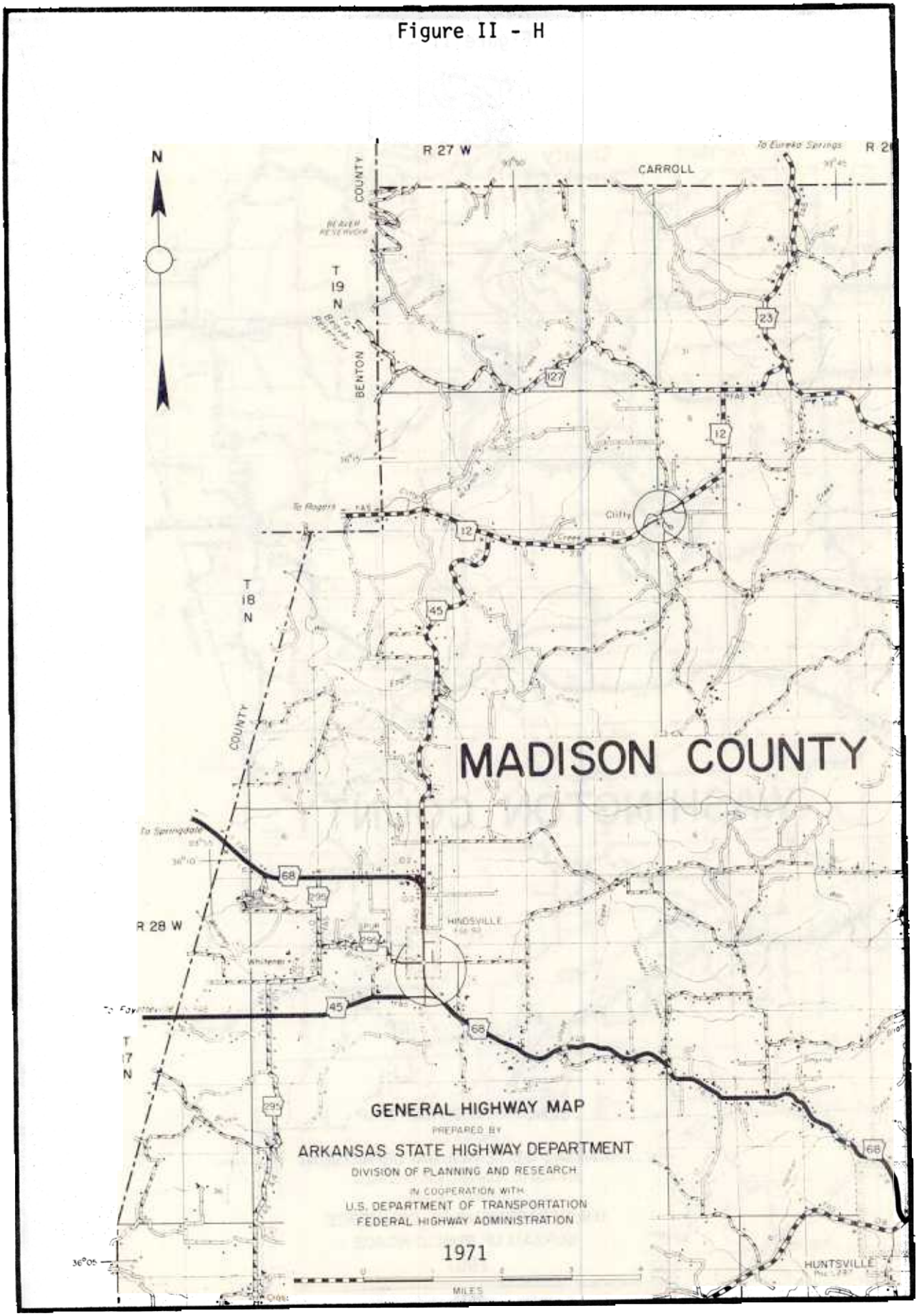
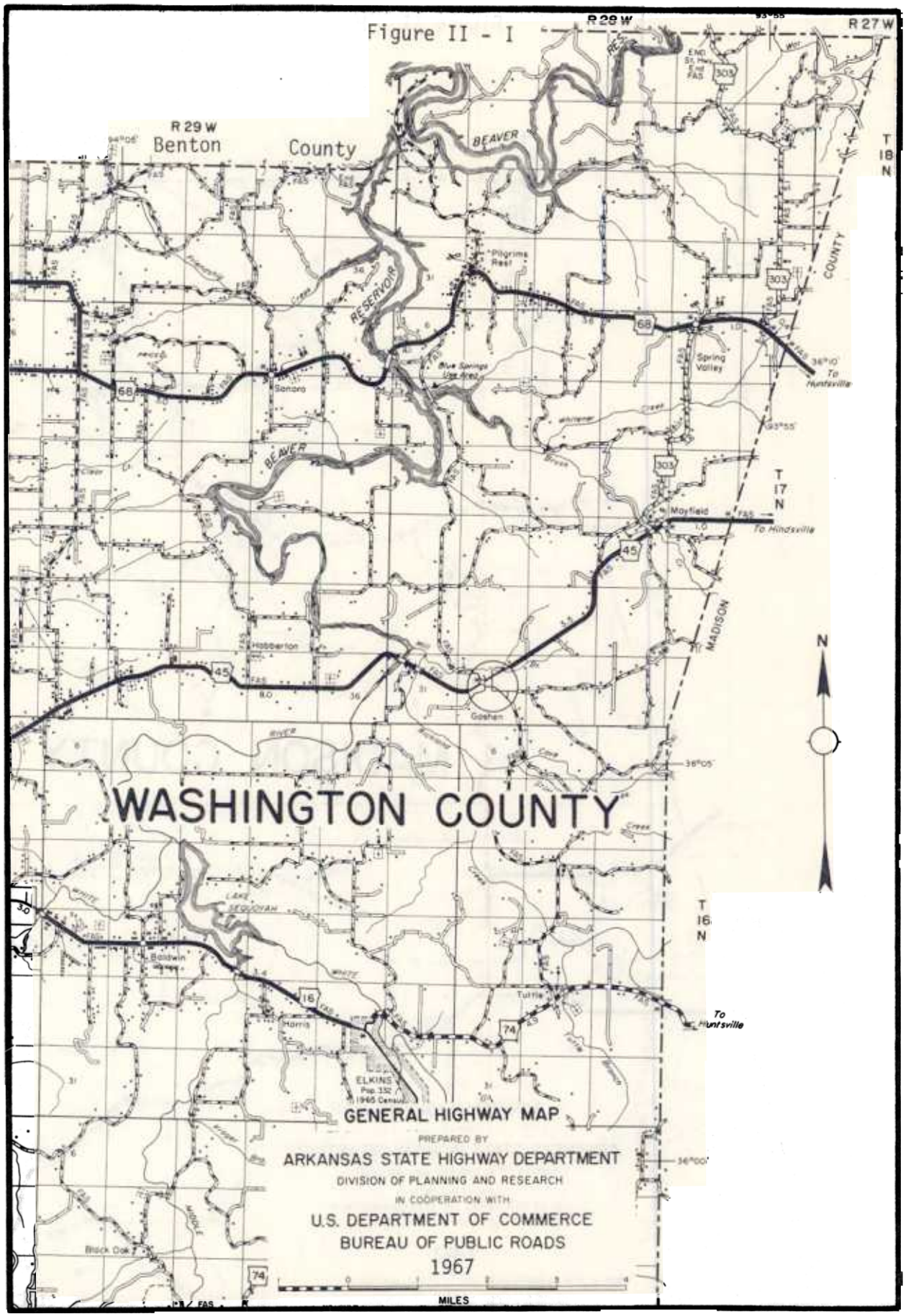

MADISON COUNTY
GENERAL HIGHWAY MAP
PREPARED BY
ARKANSAS STATE HIGHWAY DEPARTMENT
DIVISION OF PLANNING AND RESEARCH
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
1971
MILES
R 27 W
R 28 W
CARROLL
BENTON
T 19 N
T 18 N
T 17 N
Huntsville
Hindsville
Cliffy
To Rogers
To Springdale
To Eureka Springs

Figure II - I


R 29 W
Benton
County
R 28 W
R 27 W
T 18 N
T 17 N
T 16 N
BEAVER
RESERVOIR
Pilgrims Rest
Blue Springs Use Area
Spring Valley
Sonora
Mayfield
To Hindsville
To Huntsville
Hobberton
Goshen
MADISON
COUNTY
WASHINGTON COUNTY
LAKE SEQUOYAH
Baldwin
Harris
Turlie
ELKINS
Pop. 332
1960 Census
Brick Oak
GENERAL HIGHWAY MAP
PREPARED BY
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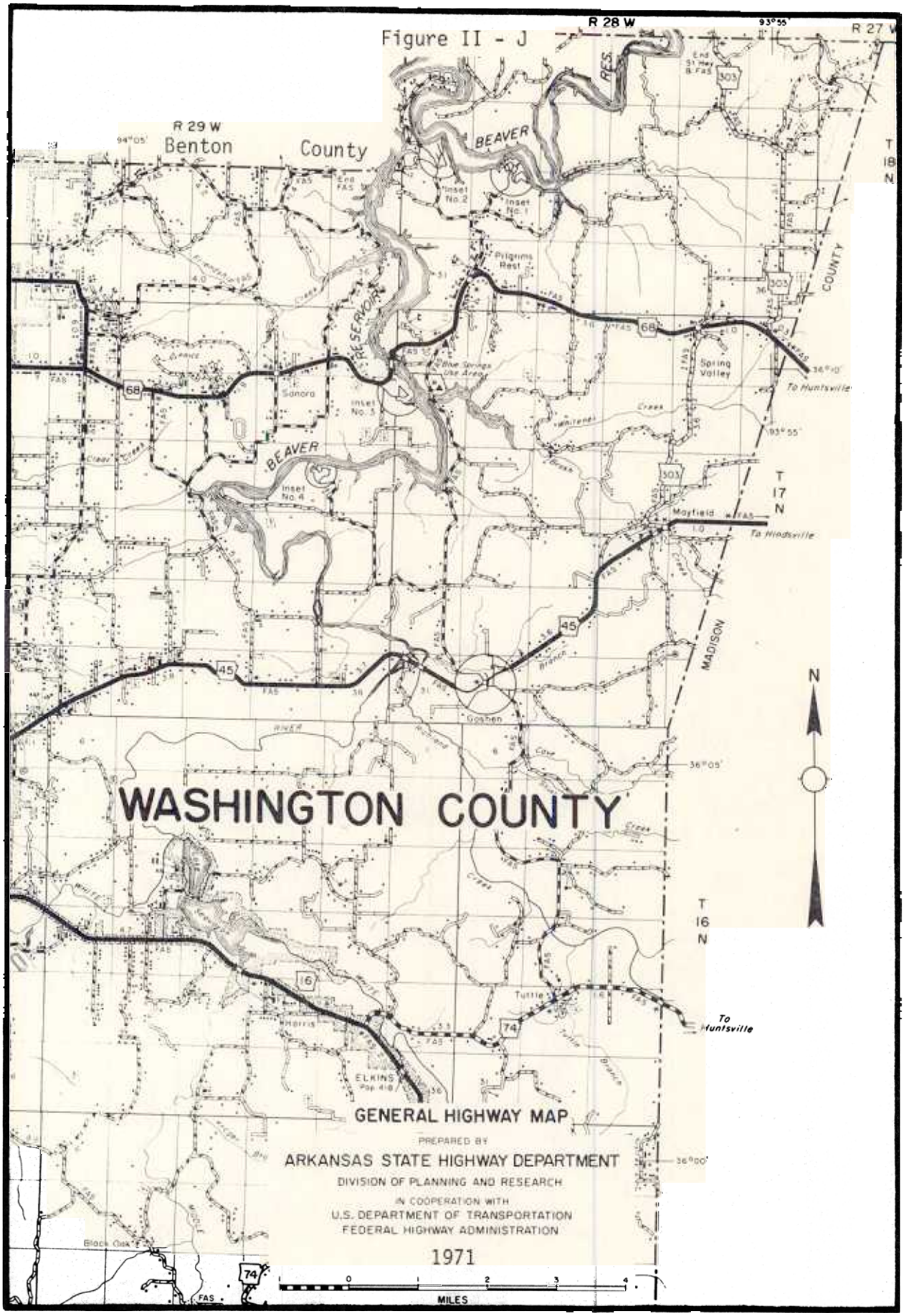
DIVISION OF PLANNING AND RESEARCH
IN COOPERATION WITH
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
1967
MILES
N

Figure II - J


R 28 W
93°55'
R 27 W
R 29 W
94°05'
Benton County
BEAVER RES.
BEAVER RESERVOIR
Inset No. 1
Inset No. 2
Inset No. 3
Inset No. 4
Pilgrims Rest
Blue Springs Lake Area
Sonora
Spring Valley
Mayfield
To Huntsville
To Hindsville
MADISON COUNTY
WASHINGTON COUNTY
Gosheen
Tuttle
Morris
ELKINS
Pop. 418
Black Oak
T 18 N
T 17 N
T 16 N
36°10'
36°05'
36°00'
68
45
16
74
303
FAS
N
GENERAL HIGHWAY MAP
PREPARED BY
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IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
1971
0 1 2 3 4
MILES

CHAPTER III

FOUR COUNTY REGION INCOME GROWTH

Assuming that the Beaver Lake project had a meaningful impact on the economy of the region, it would follow that such impact would evidence itself in altered patterns of income growth. The following method was employed to test the hypothesis that county income changed significantly as a result of the Beaver Project.

Estimates were made of income in the four-county region based upon the historical period 1950-1960. All data (4) were reduced to constant (1958) dollars by use of the Implicit Gross National Product Deflators. Real Personal Income was linearly and curvi-inearly regressed; the curvilinear projections had correlation coefficients of higher significance than did the linear regressions, indicating that the curvilinear regressions expressed a better fit of the data. Thus, the curvilinear regression equation was used as the projection technique. Projections of Real Personal Income were made for the four Northwest Arkansas counties individually and for the aggregate of the counties for the years 1950 through 1970. These estimates, based on historical data, were used as a first approximation of economic performance of the area in the absence of Beaver Lake Reservoir.

For Madison County, the curvilinear regression equation was $8458.4242 - 810.1259X + 69.8135X^2$ with an R^2 of .9284. The

curvilinear regression equation used for Washington County was computed as 66062 - 3101.7552X + 439.2448X^2 with an R^2 of .9732. The equation associated with projections for Benton County was 48564.0242 - 3949.0930X + 375.1737X^2 with an R^2 of .9102. And for Carroll County, the equation used was 12489.7636 - 506.2741X + 53.2168X^2 with an R^2 of .8447. These data are summarized in Tables III-1 through III-5. Since construction of Beaver Lake began in November 1960, curvilinear projections of Real Personal Income for 1961-1970 (derived from the above equations based on 1950-1960 data) were compared to actual Real Personal Income for 1961-1970 to facilitate comparison of income growth between the actual growth experienced in the area since 1961 and the growth which might have been expected utilizing past historical trends had the lake not been built. On the basis of this particular test, it appears that Beaver Lake has contributed little to the growth of income in Northwest Arkansas. However, this conclusion may be altered by other factors which this test fails to consider.

ESTIMATES AND ACTUAL PERFORMANCE COMPARED

Estimated Real Personal Income utilizing figures derived from the previously mentioned curvilinear regression equations (under the "no lake" assumption) exceeded actual Real Personal Income for the period 1961-1970. For the four-county region, the "no lake" estimate exceeded actual Real Personal Income by an annual average of 6.33 percent. In only one year, 1961, did actual Real Personal Income exceed the estimate (by 0.16 percent).

When the counties are considered individually, the following

results were obtained (see Table III-6):

Benton County. Estimated Real Personal Income exceeded actual during the period 1961-1970, by an average of $11,494,000 per year, of 13.89 percent. The estimate exceeded the actual in each year and the differences became greater in each successive year from 1961.

Carroll County. Actual Real Personal Income exceeded the estimates by 2.94 percent, 0.84, and 1.19 percent, in 1961, 1962, and 1963, respectively. This indicates that the construction of the dam resulted in income gains of $426,000; $127,000; and $190,000 during these years. From 1964 through 1971, the estimate exceeded the actual so that for the entire period, 1961-1970, the estimate was in excess of the actual by an annual average of 7.03 percent.

Madison County. Madison County showed the greatest difference between actual and estimated Real Personal Income. The estimate exceeded the actual by an annual average of 31.30 percent.

Washington County. This county showed the least differences between the actual and estimated levels of Real Personal Income. The average annual difference between estimated and actual was 3.28 percent.

The period 1950-1960, being one in which economic decline was replaced by growth, probably resulted in a statistical phenomenon that would project "high" estimates for the 1961-1970 period. The difference becomes most pronounced after 1965, and, of course, should not be interpreted to mean that the completed lake is somehow causally associated with lower levels of income in the area than might have occurred had the lake not been constructed.

The high growth rates of the late 1950's and early 1960's would probably have not been sustainable in any event.

INTERCOUNTY GROWTH PATTERNS

Since the shoreline of the lake is unevenly divided among the four counties, it could be expected that the economic impact would be unevenly distributed and, therefore, discernable by observed changes in county income. It could therefore be hypothesized that the county with the greatest length of shoreline would exhibit the greatest changes in income; the county with the second longest length of shoreline would exhibit the second greatest changes, and so on. This would be especially true if shoreline is associated with tourism and retirement activity.

DISTRIBUTION OF SHORELINE AMONG THE FOUR COUNTIES

Beaver Lake Reservoir has a total shoreline of 449 miles distributed among the four counties as follows: Benton, 369 miles; Carroll, 45 miles; Washington, 35 miles; and Madison, 1 mile (see Table II-2).

DISTRIBUTION OF PERSONAL INCOME AMONG THE FOUR COUNTIES*

In 1950, Real Personal Income in the four-county region was $120,616,000 distributed among the four counties as follows: Benton, 34.67 percent; Carroll, 9.37 percent; Madison, 6.09 percent; and Washington, 49.85 percent. Between 1950 and 1960, Personal Income for the region experienced real growth of 24.15 percent; however, Washington County accounted for the greatest share of this growth as evidenced by its growth from 49.85 percent to 54.30 percent of the total. The other three counties, while

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*All income figures presented are expressed in 1958 dollars.

experiencing varying amounts of real growth during this period, declined in shares of the total as follows: Benton, from 34.67 to 31.94 percent; Carroll, from 9.37 to 8.69 percent; and Madison, from 6.09 to 4.05 percent (see Table III-7).

This trend continued between 1960 and 1965. While growth in Real Personal Income for the four-county area accelerated from an annual rate of 2.4 percent (1950-59) to an average annual rate of 9.35 percent, Washington County's share grew each year, reaching 58.12 percent in 1965. All other counties registered declining shares reaching the following levels: Benton, 30.26; Carroll, 7.07, and Madison, 4.54 percent. These trend patterns, which were essentially the same as those which prevailed during the 1950's (pre-lake) suggest that the bulk of the income generated by the construction of the dam, etc., may have accrued to Washington and Benton Counties. For example, $5,175,170 was expended on local labor during the period of dam construction. Assuming an income multiplier of 1.5, the increment to income would have equaled $7,762,755. However, in the county where the dam is located (Carroll) income rose by a total of only $2,761,000 between 1960 and 1965. The sum of differences between actual and estimated Real Personal Income for this county between 1961 and 1964 was $837,000. Absolute growth in Benton, Madison, and Washington during this period was $18,269,000; $2,528,000; and $48,927,000, respectively.

Between 1965 and 1970, the most significant changes from the trend patterns noted above were associated with Benton and Washington Counties, the former gaining in relative shares of the

region's income while the latter experienced a noticeable decline. During the twenty-year period studied, Washington County's highest percentage share occurred in 1965 (58.11 percent). After that point in time it declined slightly though experiencing absolute growth through 1969 (0.31 percent per year). Between 1969 and 1970, its share of the income declined by 2.85 percent to 54.02 percent. Benton County's experience was almost a "mirror image" of Washington County's. Between 1965 and 1969, Benton County's relative share grew by an average of 0.43 percent per year. Between 1969 and 1970 it increased by 2.46 percent.

The experience of Carroll County was similar in nature to Benton County. Between 1965 and 1969 it's average decline in share of the region's income was 0.07 percent, but in 1970 it experienced a gain of 0.67 percent.

Madison County experienced a net decline over the period 1965-1970 from 4.54 percent to 4.05 percent.

In summary, Benton County, with 82.2 percent of the Beaver Lake shoreline, experienced a net gain in share of the region's income of 4.19 percent. Carroll County, with 10.2 percent of the shoreline, experienced the second greatest relative increase in share of income, 0.39 percent. Washington County and Madison County, with 7.5 and 0.2 percent of the shoreline, experienced declines in shares of 4.48 and 0.49 percent, respectively.

Table III - 1

PERSONAL INCOME AND PERSONAL INCOME ESTIMATES IN THOUSANDS OF DOLLARS FOR 1950-1970

Benton County

Year	Personal Income (Current Dollars)	GNP Deflator 1958=100	Real Personal Income (1958 Prices)	Percentage Change	Curvilinear Projected Real Personal Income
1950	33,544	80.2	$ 41,825		$44,990
1951	38,579	85.6	45,069	7.76	42,167
1952	36,724	87.6	41,922	-7.98	40,093
1953	34,966	88.4	39,544	-5.65	38,770
1954	32,781	89.2	36,586	-7.50	38,198
1955	35,473	90.9	39,024	6.66	38,376
1956	36,047	94.4	38,185	-2.15	39,304
1957	38,111	97.5	39,088	2.36	40,982
1958	43,786	100.0	43,786	12.02	43,411
1959	48,609	101.6	47,844	9.27	46,590
1960	52,187	103.3	50,519	5.59	50,520
1961	56,915	104.6	54,412	7.71	55,200
1962	60,757	105.7	57,481	5.64	60,630
1963	65,015	107.2	60,648	5.51	66,811
1964	70,500	108.9	64,738	6.74	73,742
1965	76,951	110.9	69,388	7.18	81,423
1966	92,050	113.9	80,817	16.47	89,854
1967	94,630	117.6	80,468	-.43	99,036
1968	109,929	122.3	89,885	11.70	108,999
1969	127,675*	128.2	99,591	10.80	119,651
1970	154,316	135.3	114,054	14.52	131,084

* Preliminary

Table III - 2

PERSONAL INCOME AND PERSONAL INCOME ESTIMATES IN THOUSANDS OF DOLLARS FOR 1950-1970

Carroll County

Year	Personal Income (Current Dollars)	GNP Deflator 1958=100	Real Personal Income (1958 Prices)	Percentage Change	Curvilinear Projected Real Personal Income
1950	9,072	80.2	$ 11,312		$12,037
1951	10,399	85.6	12,148	7.39	11,690
1952	10,478	87.6	11,961	-1.54	11,450
1953	10,416	88.4	11,783	-1.49	11,316
1954	9,828	89.6	10,969	-6.91	11,289
1955	10,410	90.9	11,452	4.40	11,368
1956	10,426	94.4	11,045	-3.55	11,553
1957	11,268	97.5	11,557	4.64	11,845
1958	12,200	100.0	12,200	5.56	12,244
1959	13,229	101.6	13,021	6.73	12,749
1960	13,899	103.3	13,455	3.33	13,360
1961	15,171	104.6	14,504	7.80	14,078
1962	15,886	105.7	15,029	3.62	14,902
1963	17,175	107.2	16,022	6.61	15,832
1964	17,500	108.9	16,070	.30	16,869
1965	17,984	110.9	16,216	.91	18,013
1966	20,011	113.9	17,569	8.34	19,263
1967	21,586	117.6	18,355	4.47	20,619
1968	23,892	122.3	19,536	6.43	22,082
1969	27,115*	128.2	21,151	8.27	23,633
1970	33,412	135.3	24,695	16.75	25,327

*Preliminary

Table III - 3

PERSONAL INCOME AND PERSONAL INCOME ESTIMATES IN THOUSANDS OF DOLLARS FOR 1950-1970

Madison County

Year	Personal Income (Current Dollars)	GNP Deflator 1958=100	Real Personal Income (1958 Prices)	Percentage Change	Curvilinear Projected Real Personal Income
1950	5,893	80.2	$ 7,348		$ 7,718
1951	6,444	85.6	7,528	2.45	7,117
1952	6,028	87.6	6,881	-8.59	6,656
1953	5,600	88.4	6,335	-7.93	6,335
1954	5,192	89.6	5,795	-8.52	6,153
1955	5,788	90.9	6,367	9.87	6,111
1956	5,655	94.0	6,016	-5.51	6,208
1957	6,116	97.5	6,273	4.27	6,445
1958	6,889	100.0	6,889	9.82	6,822
1959	7,690	101.6	7,569	9.87	7,339
1960	8,160	103.3	7,899	4.36	7,994
1961	8,842	104.6	8,453	7.01	8,790
1962	9,837	105.7	9,307	10.10	9,725
1963	10,033	107.2	9,359	.56	10,800
1964	10,773	108.9	9,893	5.71	12,015
1965	11,563	110.9	10,427	5.40	13,338
1966	14,263	113.9	12,522	20.09	14,862
1967	13,133	117.6	11,168	-10.81	16,496
1968	14,050	122.3	11,488	2.87	18,269
1969	17,408*	128.2	13,579	18.20	20,181
1970	18,149	135.3	13,414	- 1.22	22,234

*Preliminary

Table III - 4

PERSONAL INCOME AND PERSONAL INCOME ESTIMATES IN THOUSANDS OF DOLLARS FOR 1950-1970

Washington County

Year	Personal Income (Current Dollars)	GNP Deflator 1958=100	Real Personal Income (1958 Prices)	Percentage Change	Curvilinear Projected Real Personal Income
1950	48,225	80.2	$ 60,131		$63,397
1951	55,430	85.6	64,755	7.69	61,611
1952	55,153	87.6	62,960	-2.77	60,704
1953	53,970	88.4	61,052	-3.03	60,675
1954	53,339	89.6	59,530	-2.49	61,524
1955	57,711	90.9	63,488	6.65	63,252
1956	61,139	94.4	64,766	2.01	65,859
1957	66,708	97.5	68,419	5.64	69,344
1958	73,331	100.0	73,331	7.18	73,707
1959	82,619	101.6	81,318	10.89	78,949
1960	87,125	103.3	84,342	3.72	85,069
1961	97,332	104.6	93,052	10.33	92,068
1962	105,696	105.7	99,996	7.46	99,945
1963	114,465	107.2	106,777	6.78	108,701
1964	125,700	108.9	115,427	8.10	118,336
1965	147,796	110.9	133,269	15.46	128,849
1966	173,633	113.9	152,443	14.39	140,240
1967	178,304	117.6	151,619	-.54	143,409
1968	201,812	122.3	165,014	8.83	165,658
1969	226,941*	128.2	177,021	7.28	179,685
1970	241,625	135.3	178,842	1.02	194,590

*Preliminary

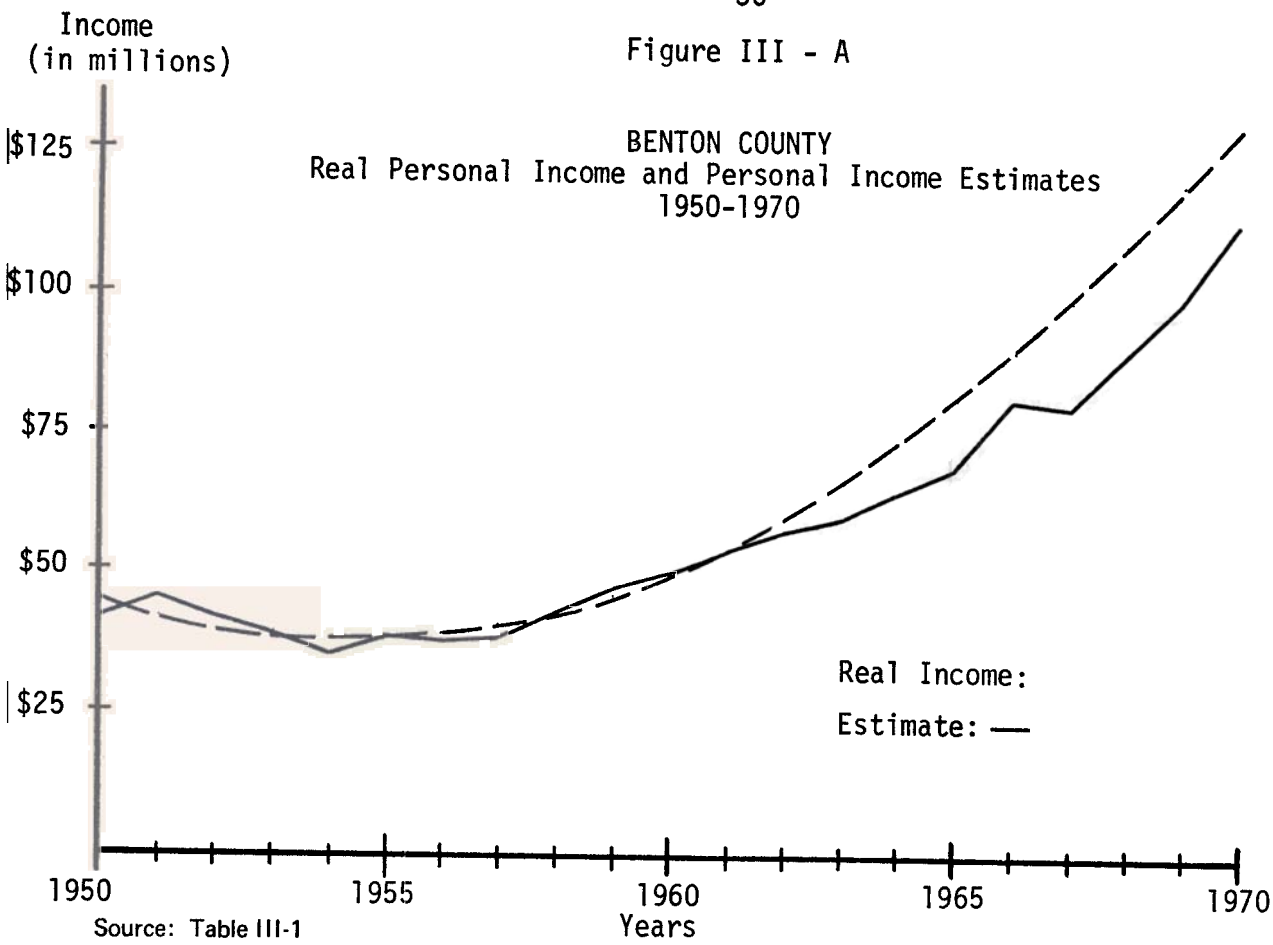
Table III - 5

PERSONAL INCOME AND PERSONAL INCOME ESTIMATES IN THOUSANDS OF DOLLARS FOR 1950-1970

All Counties

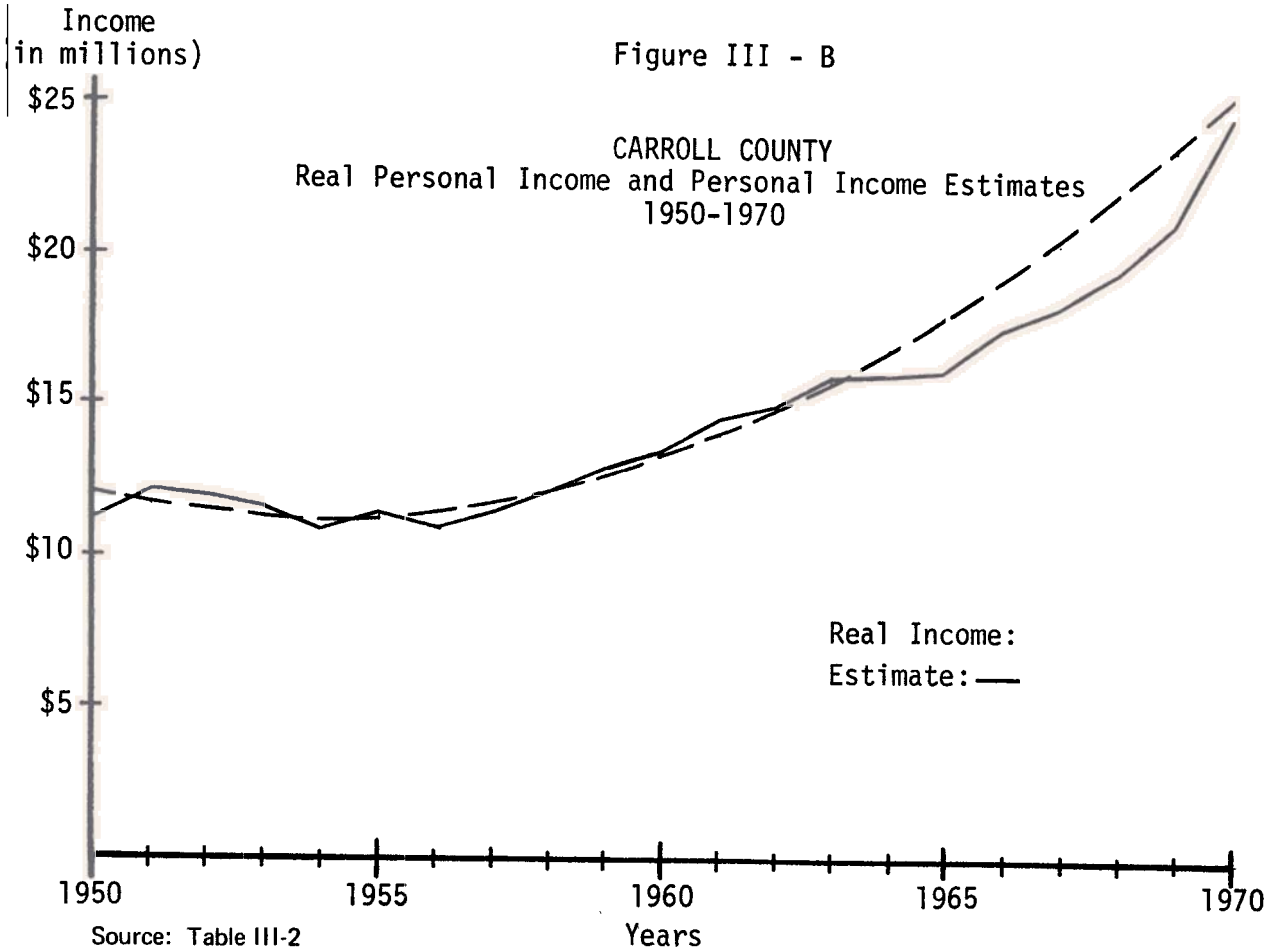
Year	Personal Income (Current Dollars)	GNP Deflator 1958=100	Real Personal Income (1958 Prices)	Percentage Change	Curvilinear Projected Real Personal Income
1950	96,734	80.2	$120,616		$128,141
1951	110,852	85.6	129,500	7.37	122,586
1952	108,383	87.6	123,724	-4.46	118,905
1953	104,952	88.4	118,724	-4.04	117,099
1954	101,140	89.6	112,880	-4.92	117,167
1955	109,382	90.9	120,331	6.60	119,110
1956	113,267	94.4	120,012	-.27	122,928
1957	122,203	97.5	125,337	4.44	128,620
1958	136,206	100.0	136,206	8.67	136,187
1959	152,147	101.6	149,752	9.95	145,629
1960	161,371	103.3	156,215	4.32	156,945
1961	178,260	104.6	170,421	9.09	170,136
1962	192,176	105.7	181,813	6.68	185,202
1963	206,688	107.2	192,806	6.05	202,142
1964	224,473	108.9	206,128	6.91	220,957
1965	254,294	110.9	229,300	11.24	241,647
1966	299,957	113.9	263,351	14.85	264,211
1967	307,653	117.6	261,610	-.66	288,649
1968	349,683	122.3	285,823	9.26	314,964
1969	399,139	128.2	311,342	8.93	343,151
1970	447,502	135.3	330,748	6.23	373,214

Figure III - A



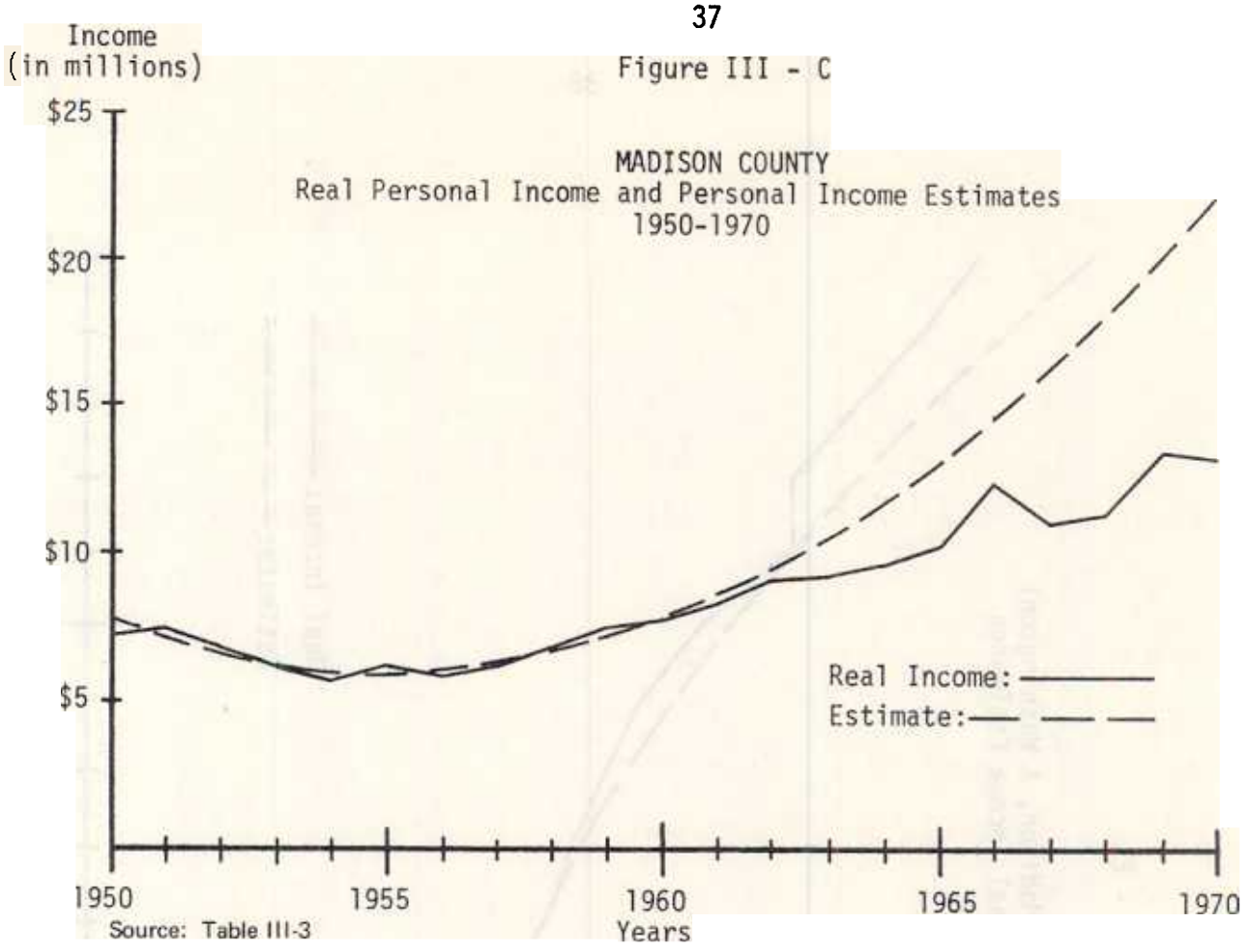
Source: Table III-1

Figure III - B



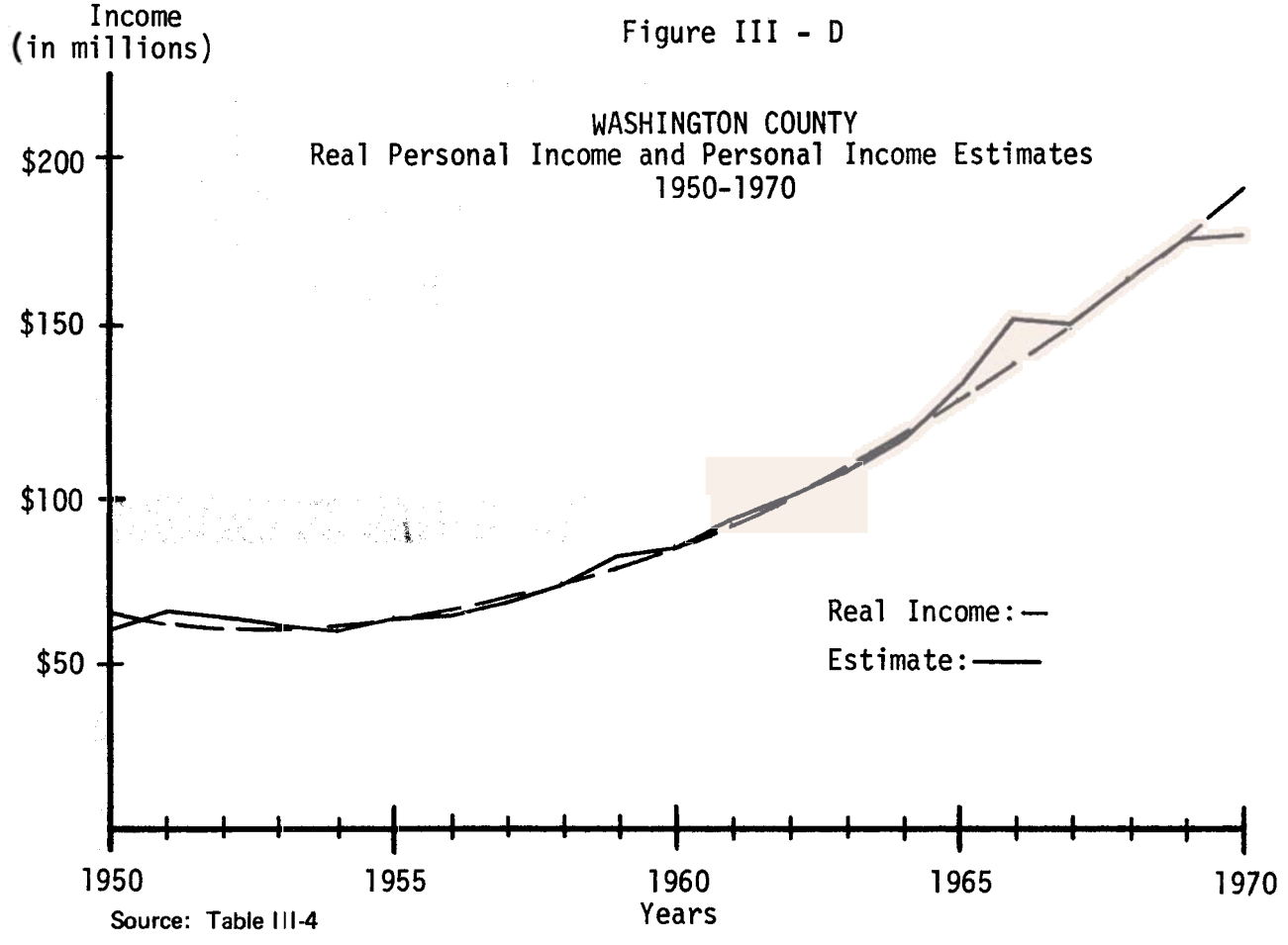
Source: Table III-2

Figure III - C



Source: Table III-3

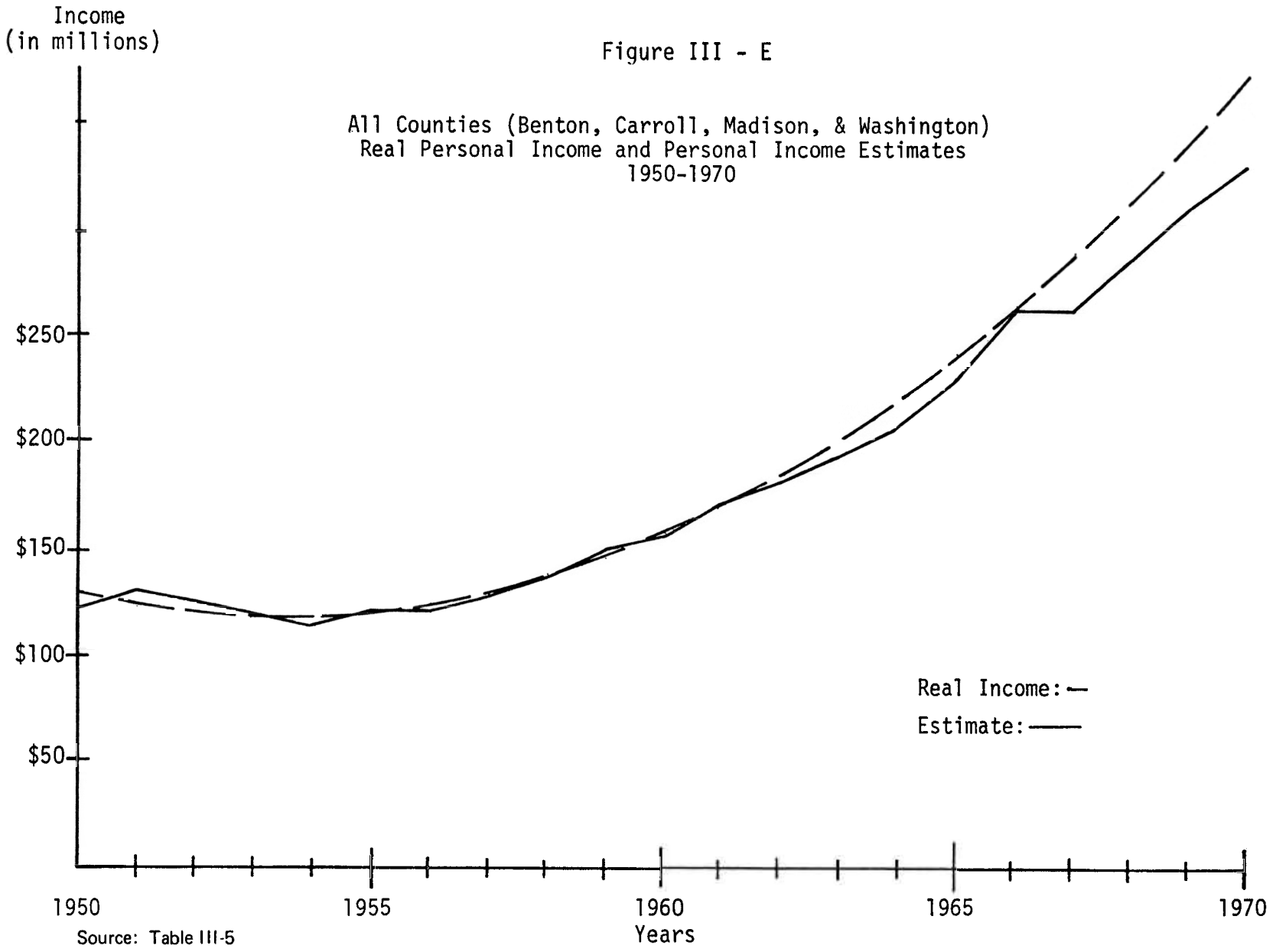
Figure III - D



Source: Table III-4

Figure III - E

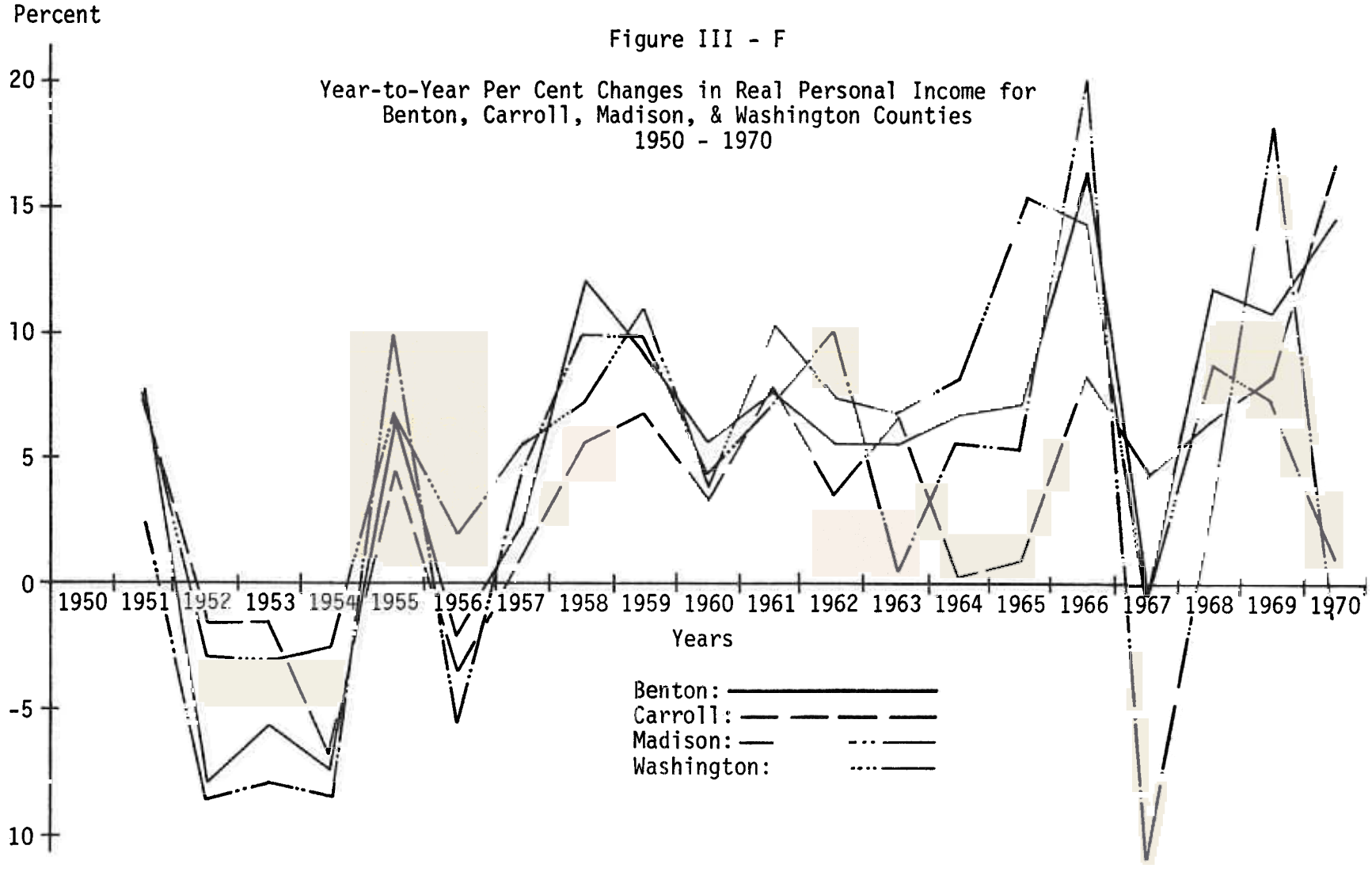
All Counties (Benton, Carroll, Madison, & Washington)
Real Personal Income and Personal Income Estimates
1950-1970



Source: Table III-5

Figure III - F

Year-to-Year Per Cent Changes in Real Personal Income for
Benton, Carroll, Madison, & Washington Counties
1950 - 1970



Source: Tables III-1 - 4.

Table III - 6

AVERAGE ANNUAL DIFFERENCES
BETWEEN REAL PERSONAL INCOME
AND ESTIMATED REAL PERSONAL INCOME
1950-1970

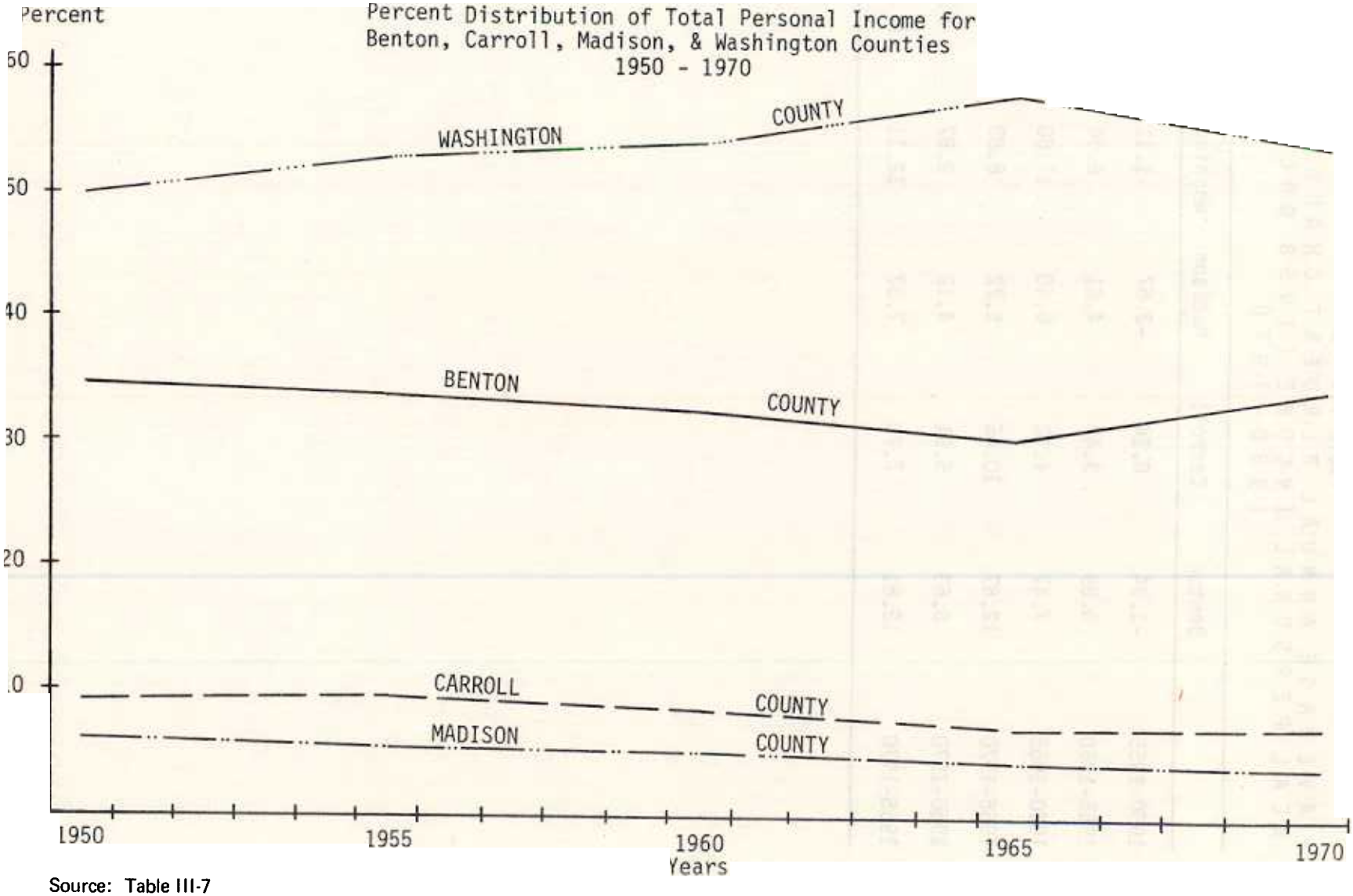
County	Average Annual Difference (In Thousands of Dollars)	Percent
Benton	11,494.8	13.89
Carroll	1,295.7	
Madison	3,710.0	31.30
Washington	4,975.7	
TOTAL	17,150.1	

Table III - 7

PERCENTAGE DISTRIBUTION OF
REAL PERSONAL INCOME
1950-1970

	Benton	Carroll	Madison	Washington
1950	34.67	9.37	6.09	49.85
1955	32.43	9.51	5.29	52.76
1960	32.33	8.61	5.05	
1965	30.26	7.07	4.54	58.11
1970	34.48	7.46	4.05	54.07

Figure III - G



Source: Table III-7

Table III - 8
AVERAGE ANNUAL PERCENT CHANGES IN REAL PERSONAL INCOME (1958 DOLLARS) 1950-1970

	Benton	Carroll	Madison	Washington	Region
1950-1955	-1.34	0.24	-2.67	1.11	-0.04
1955-1960	5.89	3.49	4.81	6.56	5.96
1960-1965	7.47	4.10	6.40	11.60	9.35
1965-1970	12.87	10.45	5.72	6.83	8.85
1950-1970	8.63	5.91	4.12	9.87	8.71
1965-1970	12.81	7.70	7.37	12.11	11.65

CHAPTER IV

ANALYSIS OF COMPONENTS OF INCOME

This section utilizes data published by the Industrial Research and Extension Center on Income Payments Produced by sources (3). This series accounts for all income produced within the counties without regard to the residence of the income recipient, therefore giving a better measure of economic activity within a county than Total Personal Income statistics.

In order to determine the most significant component of income payments, changes in sources of income were treated as individual independent variables and changes in Personal Income Payments Produced were treated as dependent variables. Sources of income are listed in the following categories:

1. Farm Wage and Salary Disbursements + Farm Proprietors Income.

Wage and Salary Disbursements in the Following Employment Categories:

2. Manufacturing
3. Contract Construction
4. Wholesale and Retail Trade
5. Finance, Insurance, and Real Estate
6. Services

7. Federal Government
8. State and Local Government

Non-Wage Income Categories:

9. Property Income
10. Transfer Payments

For each of the counties under study, each independent variable was regressed against Personal Income Payments Produced for the following time periods: (1) 1950-1970; (2) 1950-1960; and (3) 1960-1970. The results of these regressions are summarized in Table IV-1.

The variables most likely to have been influenced by the Beaver Lake Project were assumed to be Contract Construction, Wholesale and Retail Trade, Services, and Transfer Payments. Manufacturing employment (as reported in Chapter VII) and Agricultural Income (Chapter IX) were only minimally affected by the project and are considered to be "non-lake influenced" variables.

With respect to the above mentioned variables for Benton County, some of the correlations were statistically significant (Table IV-1) but in no instance were the coefficients of determinations for the "lake-related" variables above .50 for the period 1960-1970. Specifically, variations in Manufacturing Wage and Salary Disbursements explained more of the variations in Personal Income Payments Produced than did any other variable; Time was second; and Property Income was third.

For Carroll County, the correlation statistics present a somewhat different picture. Both Wholesale and Retail Trade and Services Wages and Salaries payments were highly correlated with income payments between 1960 and 1970. However, there was a similar high

correlation for the 1950-1960 period, but these correlations had a lower level of statistical significance than did those for the latter period.

The correlations for Madison County indicate that changes in Contract Construction and Wholesale and Retail Trade Wage and Salary Disbursements explained more of the variation of income payments between 1960 and 1970 than they did between 1950 and 1960. However, non lake-related variables, Farm Wages and Salary Disbursement plus Farm Proprietors Income and Property Income, had higher coefficients in the 1960-1970 period than did either of the above.

Data for Washington County indicate that the "lake-related" variables explained little of the variation in income payments between 1960-1970. Also, it is significant that the explanatory power of some (Contract Construction and Services Wage and Salary payments) were substantially less in the 1960-1970 period than they were between 1950 and 1960.

In summary, changes in Income Payments Produced from "lake-related" sources appears to explain little of the overall change in income payments produced in any of the four counties between 1960-1970. While, as was to be expected, some "lake-related" variables had more explanatory power in one county than they did in others, in no instance were the coefficients of determination associated with these variables either the highest or the most significant of those examined.

REGRESSION ANALYSIS ON COMPONENTS OF INCOME FOR WASHINGTON, BENTON, CARROLL, AND MADISON COUNTIES 1950-1970, 1950-1960, 1960-1970

County		A	B	C	D	E	F	G	H	I	J	K
Benton												
1950-1970	R^2	.6507	.4440	.8266	.1817	.3194	.5122	.6533	.0682	.5026	.6475	.4233
	F*	(33.52)	(14.38)	(85.81)	(4.00)	(8.45)	(18.90)	(33.92)	(1.32)	(18.19)	(33.06)	(13.21)
1950-1960	R^2	.2587	.9157	.3358	.0042	.2042	.1945	.6206	.0214	.0336	.0335	.0884
	F*	(2.79)	(86.87)	(4.04)	(0.03)	(2.05)	(1.93)	(13.09)	(0.17)	(0.28)	(0.28)	(0.78)
1960-1970	R^2	.5579	.5052	.7670	.0105	.0832	.4082	.4252	.0947	.2337	.5199	.1916
	F*	(10.10)	(8.17)	(26.34)	(0.08)	(0.73)	(5.52)	(5.92)	(0.83)	(2.44)	(8.66)	(1.90)
Carroll												
1950-1970	R^2	.0539	.1800	.1284	.0166	.0939	.0263	.0823	.0172	.1153	.0133	.0398
	F*	(1.02)	(3.95)	(2.65)	(0.30)	(1.86)	(0.48)	(1.62)	(0.31)	(2.34)	(0.24)	(0.75)
1950-1960	R^2	.0600	.9129	.0136	.0508	.2587	.1572	.5954	.0227	.0090	.1008	.0077
	F*	(0.51)	(83.84)	(0.11)	(0.43)	(2.79)	(1.49)	(11.77)	(0.18)	(0.07)	(0.90)	(0.06)
1960-1970	R^2	.2662	.5276	.5605	.2706	.5096	.0710	.6856	.2223	.0091	.1999	.2275
	F*	(2.90)	(8.93)	(10.20)	(2.97)	(8.31)	(0.61)	(17).45)	(2.29)	(0.07)	(2.00)	(2.36)
Madison												
1950-1970	R^2	.0770	.9617	.0134	.2394	.3324	.1869	.1564	.0084	.0106	.6624	.0197
	F*	(1.50)	(452.25)	(0.24)	(5.66)	(8.96)	(4.14)	(3.34)	(0.15)	(0.19)	(29.67)	(0.36)
1950-1960	R^2	.1304	.9796	.0130	.0649	.1070	.0103	.4508	.0075	.1545	.0976	.0333
	F*	(1.20)	(384.46)	(0.10)	(0.56)	(0.96)	(0.08)	(6.56)	(0.06)	(1.46)	(0.86)	(0.28)
1960-1970	R^2	.0011	.9886	.1228	.6308	.5596	.1299	.1609	.0300	.2050	.6737	.3078
	F*	(0.01)	(692.80)	(1.12)	(13.67)	(10.16)	(1.19)	(1.53)	(0.25)	(2.06)	(16.52)	(3.56)
Washington												
1950-1970	R^2	.6695	.3517	.7790	.2970	.5627	.5675	.4071	.0602	.3429	.5815	.4534
	F*	(36.47)	(9.76)	(63.46)	(7.60)	(23.16)	(23.61)	(12.36)	(1.15)	(9.39)	(25.02)	(14.93)
1950-1960	R^2	.2212	.8604	.7267	.6350	.3033	.3483	.5537	.0029	.2418	.0754	.0604
	F*	(2.27)	(49.32)	(21.27)	(13.92)	(3.48)	(4.28)	(9.93)	(0.02)	(2.55)	(0.65)	(0.51)
1960-1970	R^2	.3904	.3938	.8139	.0002	.2352	.2059	.0564	.0120	.0199	.3407	.1817
	F*	(5.12)	(5.20)	(34.98)	(0.00)	(2.46)	(2.07)	(0.48)	(0.10)	(0.16)	(4.13)	(1.78)

*F statistic.

A = Time; B = Farm Wage & Salary Disbursements + Farm Proprietor's Income; C = Manufacturing Wage & Salary Disbursements; D = Contract Construction; E = Wholesale & Retail Trade; F = Finance, Insurance & Real Estate; G = Services; H = Federal Government; I = State & Local Government; J = Property Income; K = Transfer Payments.

Table IV - 2

COEFFICIENT OF DETERMINATION RANKS

	Benton County				Carroll County				Madison County				Washington County		
	R^2 Ranks				R^2 Ranks				R^2 Ranks				R^2 Ranks		
	1950-1970	1950-1960	1960-1970		1950-1970	1950-1960	1960-1970		1950-1970	1950-1960	1960-1970		1950-1970	1950-1960	1960-1970
A	3	4	2	A	6	6	6	A	7	4	11	A	2	8	2
B	7	1	4	B	1	1	3	B	1	1	1	B	8	1	2
C	1	3	1	C	2	9	2	C	9	9	9	C	1	2	1
D	10	11	11	D	10	7	5	D	4	7	3	D	10	3	11
E	9	5	10	E	4	3	4	E	3	5	4	E	5	6	5
F	5	6	6	F	8	4	10	F	5	10	8	F	4	5	6
G	2	2	5	G	5	2	1	G	6	2	7	G	7	4	8
H	11	10	9	H	9	8	8	H	11	11	10	H	11	11	10
I	6	8	7	I	3	10	11	I	10	3	6	I	9	7	9
J	4	9	3	J	11	5	9	J	2	6	2	J	3	9	4
K	8	7	8	K	7	11	7	K	8	8	5	K	6	10	7

A = Time; B = Farm Wage & Salary Disbursements + Farm Proprietor's Income; C = Manufacturing Wage & Salary Disbursements; D = Contract Construction; E = Wholesale & Retail Trade; F = Finance, Insurance & Real Estate; G = Services; H = Federal Government; I = State & Local Government; J = Property Income; K = Transfer Payments.

CHAPTER V

PER CAPITA INCOME

Changes in the economic well-being of the citizens of an area are perhaps better measured by Per Capita Income than by such aggregates as Total Personal Income. An examination of Per Capita Income for the four counties and the state over the period 1950 through 1970(3) revealed trend patterns similar to those noted in Total Personal Income.

As noted in Chapter III in this report, Washington County had the highest Total Personal Income in the region; Benton County was second, Carroll County was third, and Madison, fourth. Each county held the same relative position throughout the period 1950 to 1970. The same pattern prevailed for Per Capita Income.

Per Capita Income was reduced to constant dollars (1958=100) and changes (percent and absolute) were compared at five year intervals between 1950 and 1970 (see Table V-1 and Figures V-A through V-C). The following patterns were noted:

1. Between 1950 and 1955, each county, except Washington County, experienced growth of Per Capita Income in both rate of change and absolute amounts, lower than the state average. Washington County had a lower percent change than the state, but a higher absolute gain than the state.

2. Between 1955 and 1960, all of the counties experienced growth in excess of the state average in both percentage and absolute terms.

3. Between 1960 and 1965, the percentage growth was approximately the same for Benton, Carroll, and Washington Counties as it had been between 1955 and 1960. It was also noted that during this period (the

Beaver Project construction period) these three counties experienced absolute and percentage gains that were less than the state average. Madison County experienced the greatest percentage growth (39.2 percent) and absolute dollar growth ($349) of the four counties.

4. Between 1965 and 1970 (after completion of the Beaver Project) Washington County maintained approximately the same growth rate as it did between 1955 and 1960, and 1960 and 1965.

Benton County Per Capita Income growth accelerated to 24.3 percent between 1965 and 1970 compared with 17.4 percent during the previous five year period.

Carroll County experienced a 36.0 percent increase as compared with 17.2 percent during the previous period. Perhaps of more significance was the absolute dollar gain of $541, which was higher than any of the other three counties and the State. Carroll County's gain relative to the state average is significant. In 1965 its Per Capita Income was equal to 86.1 percent of the state average; by 1970 it was equal to 97.3 percent.

Table V - 1

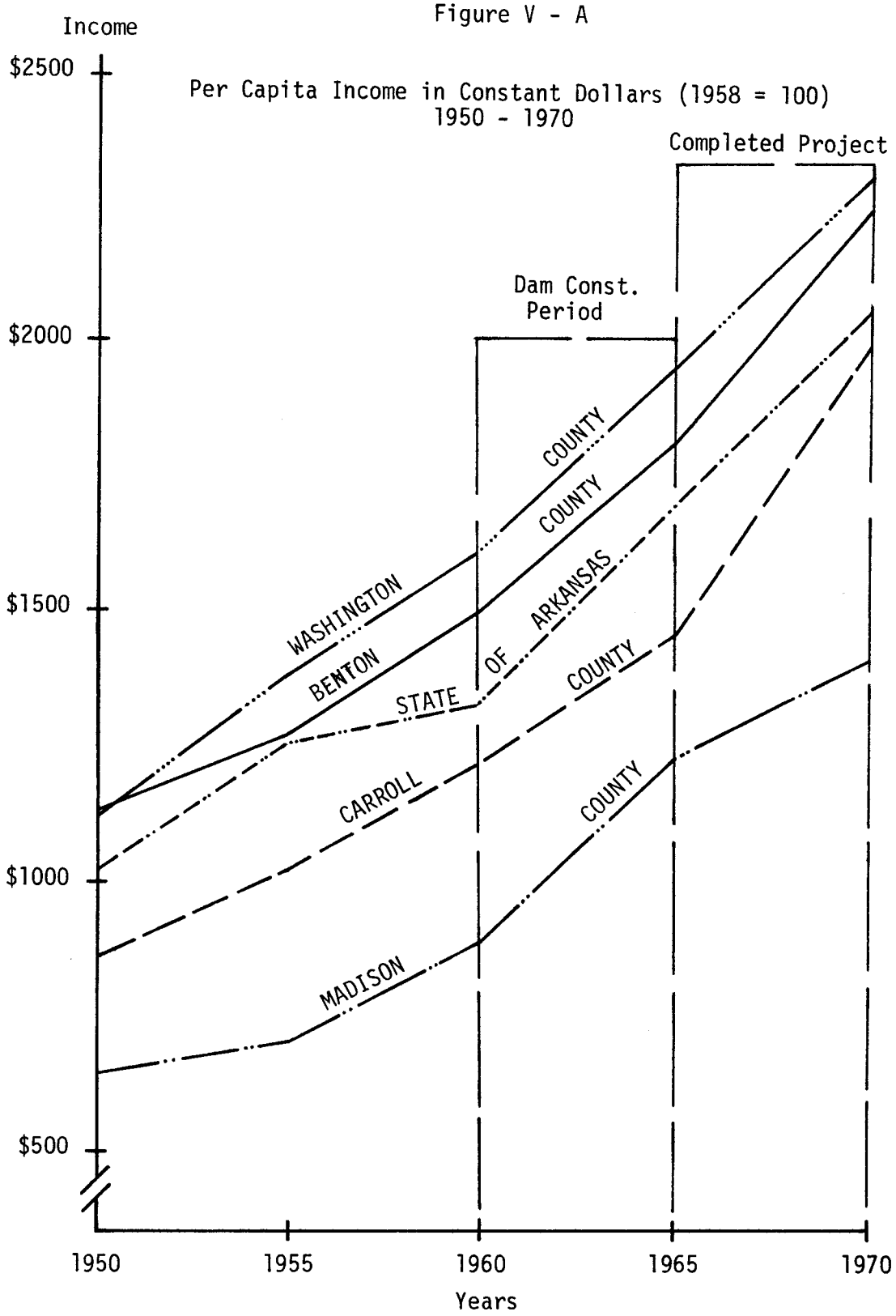
PER CAPITA INCOME

1950 - 1970

	1950	1955	1960	1965	1970
State of Arkansas	$825	$1142	$1374	$1888	$2791
Benton County	908	1158	1551	2016	3057
Carroll County	696	928	1254	1626	2716
Madison County	517	639	918	1373	1920
Washington County	982	1261	1665	2171	3123

Source: Arkansas Personal Income Handbook, Industrial Research & Extension Center, University of Arkansas, Little Rock, Arkansas, 1972.

Figure V - A



Source: Table V-1.

Table V - 2

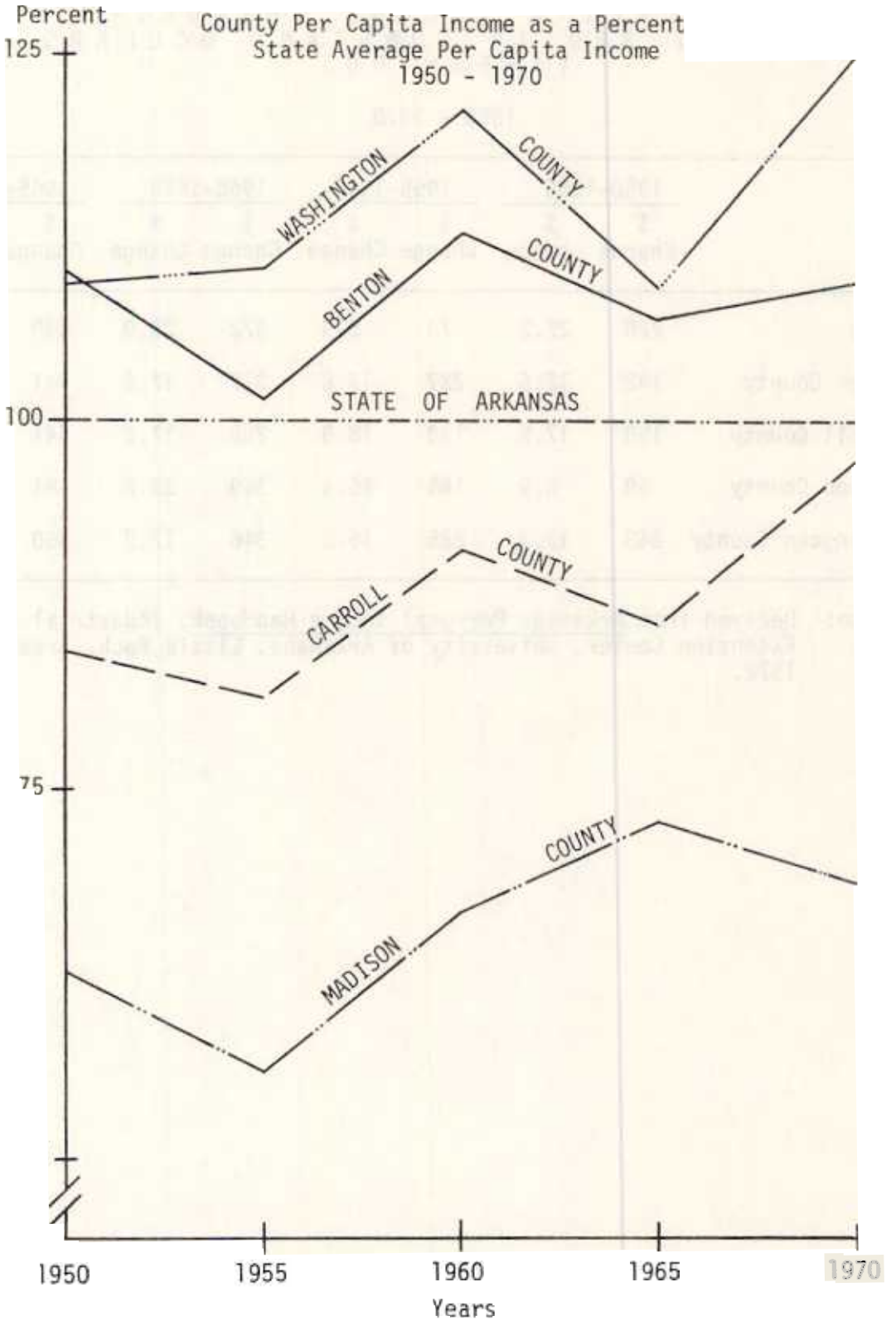
PER CAPITA INCOME IN CONSTANT DOLLARS
(1958 = 100)

1950 - 1970

	1950		1955		1960		1965		1970	
	Per Capita Income	% of State Per Capita Income	Per Capita Income	% of State Per Capita Income	Per Capita Income	% of State Per Capita Income	Per Capita Income	% of State Per Capita Income	Per Capita Income	% of State Per Capita Income
State	1028	100.0	1256	100.0	1330	100.0	1702	100.0	2062	100.0
Benton County	1132	110.1	1274	101.4	1501	112.8	1818	106.8	2259	109.5
Carroll County	868	84.4	1021	81.2	1214	91.2	1466	86.1	2007	97.3
Madison County	645	62.7	703	55.9	889	66.8	1238	72.7	1419	68.8
Washington County	1124	109.3	1387	110.4	1612	121.2	1958	109.1	2308	111.9

Source: Arkansas Personal Income Handbook, Industrial Research & Extension Center, University of Arkansas, Little Rock, Arkansas, 1972.

Figure B



Source Table 2.

Table V - 3

PER CAPITA INCOME CHANGES-
PERCENT AND IN CONSTANT DOLLARS
(958 = 100)

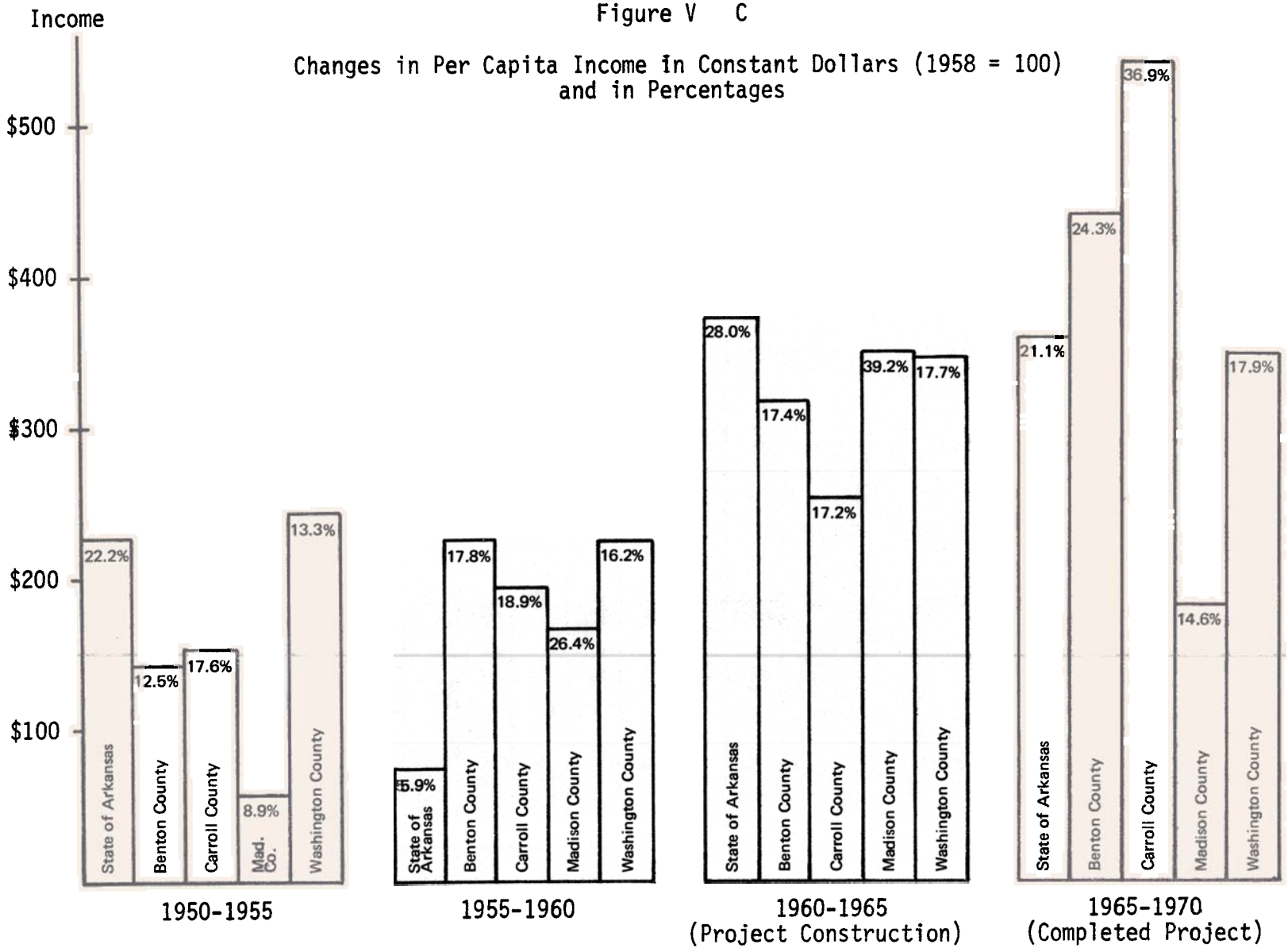
1950 - 1970

	1950-1955		1955-1960		1960-1965		1965-1970	
			$ Change	% Change	$ Change	% Change	$ Change	% Change
State	228	22.2	74	5.9	372	28.0	360	21.1
Benton County	142	12.5	227	17.8	317	17.4	441	24.3
Carroll County	153	17.6	193	18.9	252	7.2	541	36.9
Madison County	58	8.9	168	26.4	349	39.2	181	14.6
Washington County	243	13.3	225	16.2	346	17.7	350	17.9

Source: Derived from Arkansas Personal Income Handbook, Industrial Research & Extension Center, University of Arkansas, Little Rock, Arkansas, 1972.

Figure V C

Changes in Per Capita Income in Constant Dollars (1958 = 100)
and in Percentages



Source: Table V-3.

CHAPTER VI

NUMBER OF FAMILIES AND MEDIAN FAMILY INCOME

Changes in Median Family Income revealed essentially the same patterns as were observed in Per Capita Income. However, the number of families in each county had increased between 1959 and 1969 at rates higher than that which occurred between 1949 and 1959

Between 1949 and 1959 the number of families in Benton, Carroll, and Madison Counties changed by -1.0 percent, -10.8 percent, and -18.3 percent, respectively; Washington had a 10.5 percent increase; and the State of Arkansas had a 1.2 percent increase.

Between 1959 and 1969 Benton County experienced the greatest increase in number of families (17.4 percent) followed by Carroll County (11.2 percent); Washington County (10.5 percent); and Madison County (9.0 percent). In absolute terms Benton County gained 3,845 families, Washington County gained 1,550, Carroll 369, and Madison 222. (See Tables VI-1 and VI-2 and Figures VI-A through VI-C,)

MEDIAN FAMILY INCOME

In 1949 Median Family Income was below the state average for all of the counties except Washington. By 1959 Benton County equalled the state average. Carroll County grew from 74.0 percent of the state figure in 1949 to 80.2 percent in 1959. Washington County maintained ts relative position of approximately 115 percent of the state figure. Madison County maintained its position of approximately 62 percent of the state figure

All counties experienced gains relative to the state between 1959 and 1969. However, as was the case with Per Capita Income, the greatest percent and absolute gains were made in Carroll County -- 72.2 percent and $1,816, respectively.

The growth rates between 1959 and 1969 were lower for all counties (with the exception of Madison) than they had been between 1949 and 1959. However, Madison County, while experiencing an increase in its rate of increase in Median Family Income, had an absolute gain of $1,368 which was lowest of the four counties and was lower than the average gain in the state.

Table VI -

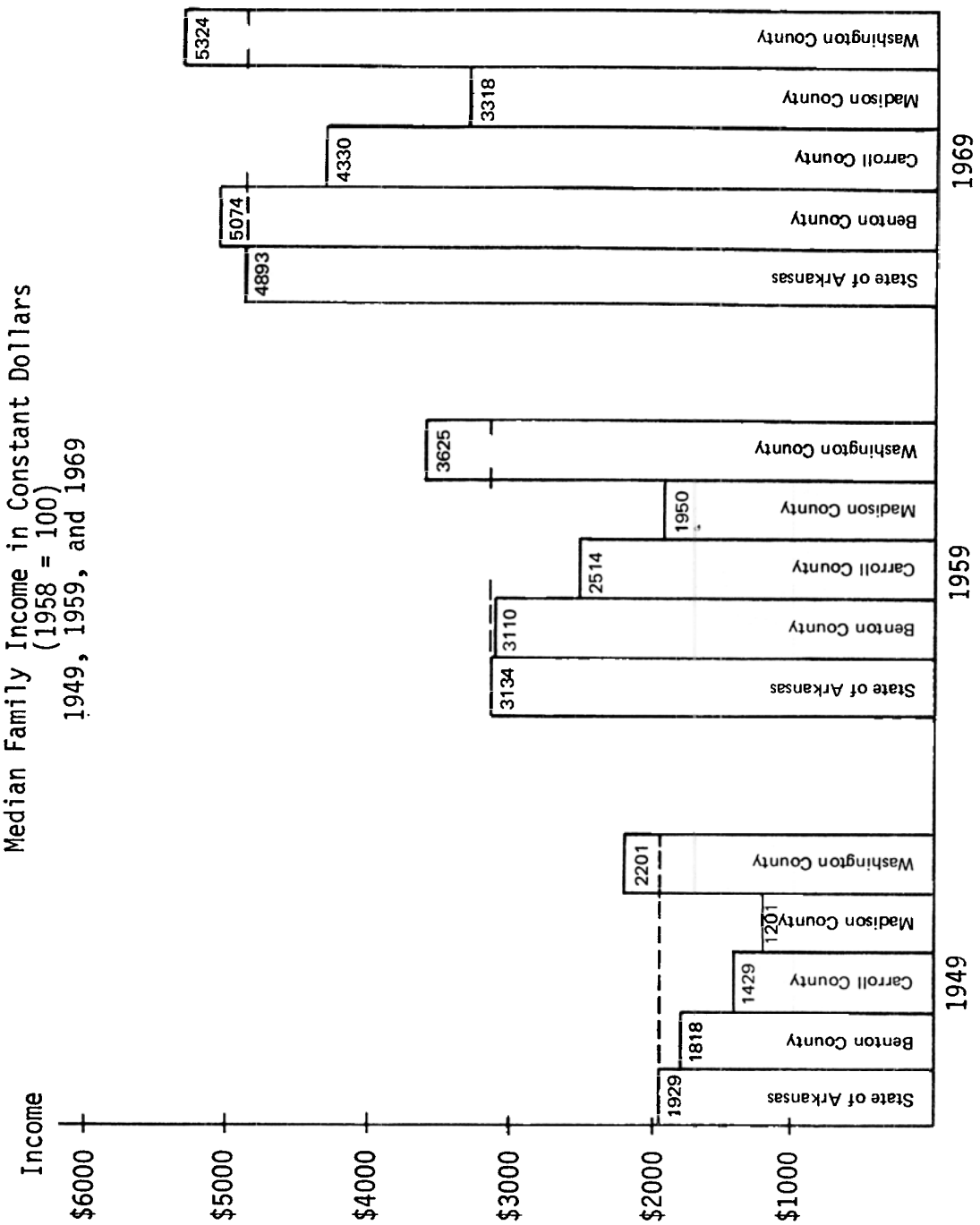
NUMBER OF FAMILIES AND MEDIAN FAMILY INCOME IN CURRENT DOLLARS AND CONSTANT DOLLARS (1958 = 100) FOR THE YEARS 1949, 1959, & 1969

	1949	1959	Absolute Change	Percent Change	1969	Absolute Change	Percent Change
STATE OF ARKANSAS							
Number of Families	447,200	452,471	5271	1.2	505,195	52,724	11.7
Mean Family Income:							
Current Dollars	$ 1,547	$ 3,184			$ 6,273		
Constant Dollars	$ 1,929	$ 3,134	1205	62.5	$ 4,893	1,759	56.1
BENTON COUNTY							
Number of Families	10,380	10,280	-100	-1.0	14,125	3,845	37.4
Mean Family Income:							
Current Dollars	$ 1,458	$ 3,160			$ 6,505		
Constant Dollars	$ 1,818	$ 3,110	1292	71.1	$ 5,074	1,764	63.2
CARROLL COUNTY							
Number of Families	3,700	3,302	-398	-10.8	3,671	369	11.2
Mean Family Income:							
Current Dollars	$ 1,146	$ 2,555			$ 5,552		
Constant Dollars	$ 1,429	$ 2,514	1085	75.9	$ 4,330	1,816	72.2
MADISON COUNTY							
Number of Families	3,005	2,454	-551	-18.3	2,676	222	9.0
Mean Family Income:							
Current Dollars	$ 964	$ 1,982			$ 4,254		
Constant Dollars	$ 1,201	$ 1,950	749	62.4	$ 3,318	1,368	70.0
WASHINGTON COUNTY							
Number of Families	13,090	14,822	1732	13.2	19,972	1,550	10.5
Mean Family Income:							
Current Dollars	$ 1,773	$ 3,683			$ 6,825		
Constant Dollars	$ 2,201	$ 3,625	1424	64.7	$ 5,324	1,699	46.9

Source: General Social and Economic Characteristics, Census of Population, 1950, 1960, and 1970, Bureau of Census, U. S. Department of Commerce, Washington, D. C.

Figure VI A

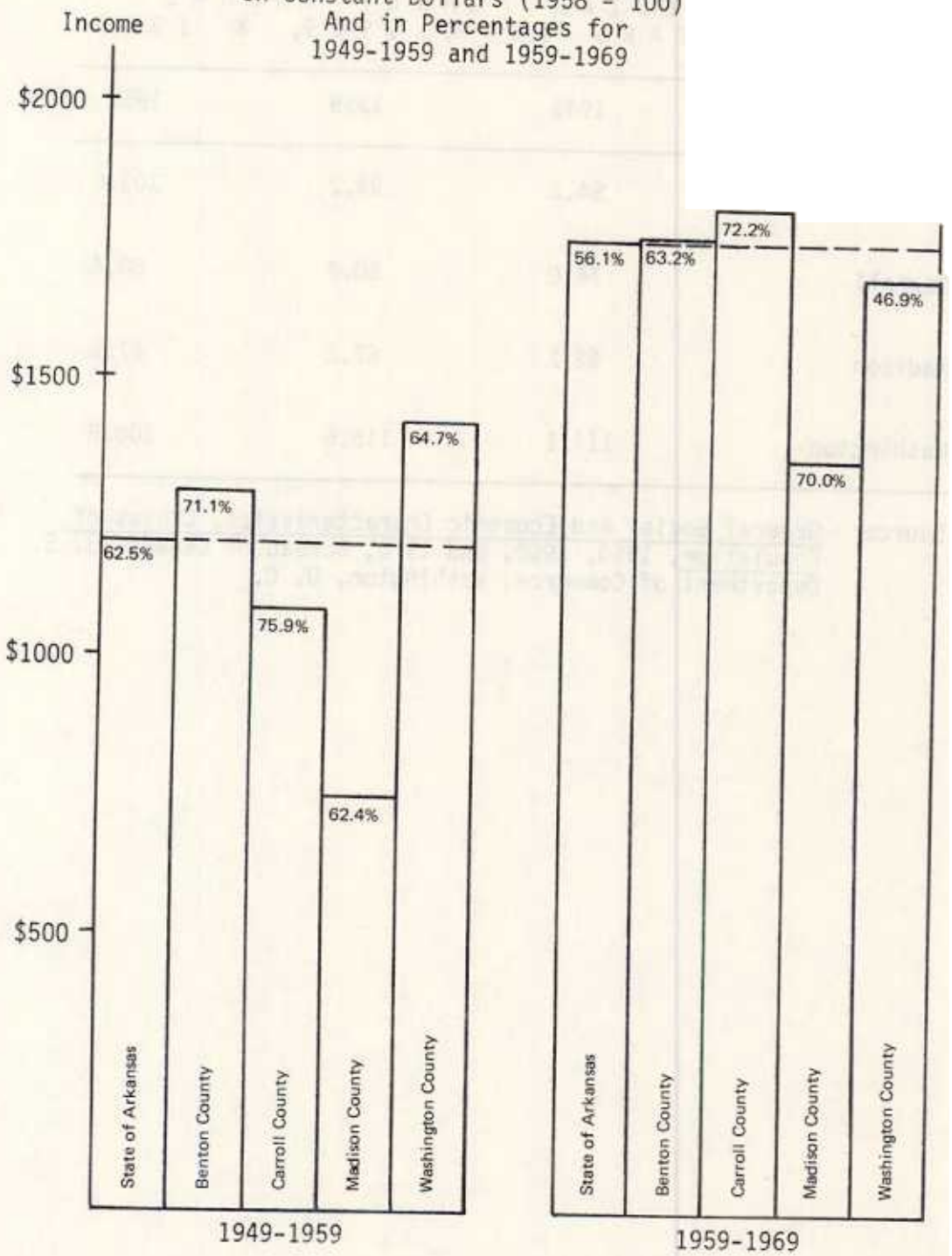
Median Family Income in Constant Dollars
(1958 = 100)
1949, 1959, and 1969



Source: Table VI-1.

Figure VI - B

Changes in Median Family Income
In Constant Dollars (1958 = 100)
And in Percentages for
1949-1959 and 1959-1969



Source: Table VI-1.

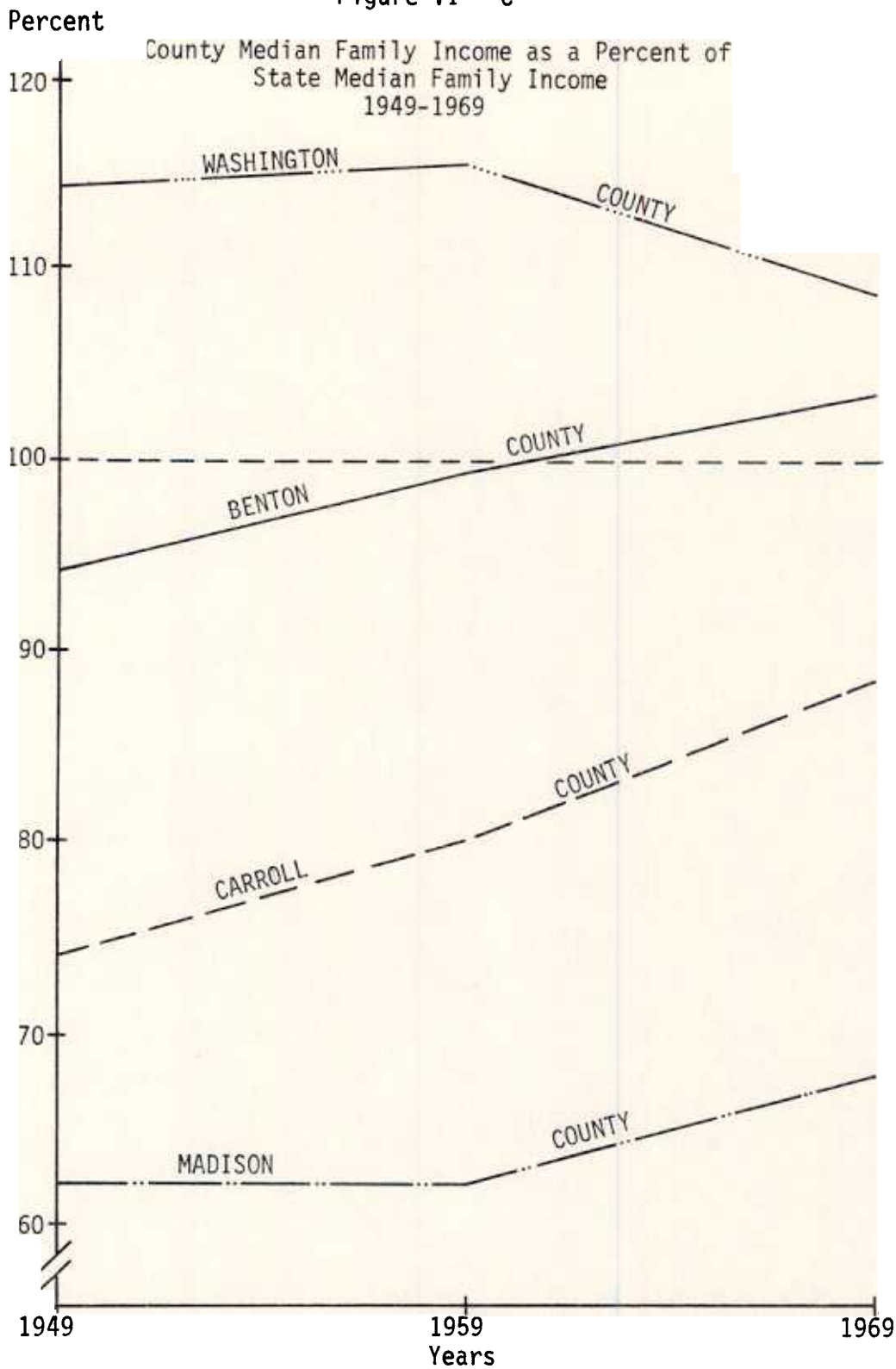
Table VI - 2

COUNTY MEDIAN FAMILY INCOME IN CONSTANT DOLLARS (1958 = 100) AS A PERCENT OF STATE MEDIAN FAMILY INCOME FOR THE YEARS 1949, 1959, & 1969

County	1949	1959	1969
Benton	94.2	99.2	103.6
Carrol	74.0	80.2	88.4
Madison	62.2	62.2	67.8
Washington	114.1	115.6	108.8

Source: General Social and Economic Characteristics, Census of Population, 1950, 1960, and 1970, Bureau of Census, U. S. Department of Commerce, Washington, D. C.

Figure VI - C



Source: Table VI-2

CHAPTER VII

LOCATIONAL DECISIONS OF MANUFACTURING FIRMS IN THE BEAVER LAKE AREA

A survey was conducted concerning the importance of Beaver Lake on location decisions of all manufacturing firms locating in the four-county area (Benton, Carroll, Madison, and Washington Counties) since 1960. The year 1960 was chosen since by then the presence of Beaver Lake would have been known to a prospective employer who was thinking of locating within the region. The results of a telephone survey of the 51 manufacturing firms that located within the four-county region between 1960 and 1970 are provided below.

Benton County. 1. One company employing less than 50 persons indicated that the original location decision was unrelated to any Beaver Lake considerations. However, an additional section was being added to this plant versus plants in other locations due to the plentifulness of the water supply. The additional section was expected to employ less than 10 individuals.

2. One plant employing between 50-99 individuals indicated that recreational facilities for employees associated with Beaver Lake were considered when the location decision was made. It was not of primary importance but was a marginal consideration as to why Benton County was chosen over other locations.

3. All other firms indicated no consideration at all was given to Beaver Lake.

Carroll County. 1. One firm employing between 1-49 persons replied that recreational facilities for employees were given "a little" consideration. Once again it seems to have been a marginal consideration in locating in the area.

2. All other firms gave no consideration to Beaver Lake.

Madison County. 1. One firm in the 50-99 employee category indicated that Beaver Lake was considered "some to the extent of recreational facilities available".

2. No other firms accorded Beaver Lake any consideration.

Washington County. All firms replied that no consideration was given to Beaver Lake with respect to making a location decision.

METHODOLOGY

Table VII-1 depicts the employment and earnings that can be attributed to the impact of Beaver Lake on locational decisions of manufacturing firms. The figures for the average number of jobs were obtained from the industrial code and the annual earnings were derived from annual reports of the Arkansas Employment Security Division. These figures were placed in the year column according to the year in which the firm first located in the Beaver Lake region. By 1970 the direct effect was 180 jobs earning $920,520.

To determine the economic impact of firms locating in the four-county area, the following technique was employed:

First, an average of the number of employees for the firms locating around Beaver Lake for marginal reasons was obtained. This was done by averaging the firms by industrial code. This technique yielded a total figure of 180 employees (both industrial and non-industrial) which was believed to be biased in an upward manner. However, no downward adjustment was made.

Next, a regional employment multiplier was applied to the direct employment attributed to the above mentioned firms. A regional multiplier of 1.50 was chosen since the skill levels of the jobs created were relatively low and also since much of the firms' inputs were not produced within the four-county region but instead were produced in other areas (12). It was further felt that this regional multiplier of 1.50 displayed a slight downward basis which helped to offset the upward bias believed to exist in the average employees figure. Multiplying the two together yielded (1.50 × 180) = 270 as the employment figure which could be attributed to the recreational facilities associated with Beaver Lake. The total effect, therefore, was 270 jobs earning $1,380,780.

CONCLUSION

From the above survey it would appear that the location of firms within the four-county area was based on considerations not specifically related to Beaver Lake (16). Although there may have been no important differences between the primary location factors of the four-county area and other possible location sites, locating around Beaver Lake would be preferable to locating at any of the

other acceptable locations which did not offer the same recreational facilities. To this extent Beaver Lake was a factor in attracting industry. It should be noted that only one firm in Benton County regarded water supply as important in adding an additional section to the existing plant. All other Beaver Lake considerations were concerned with recreational facilities.

Table VII - 1

LAKE INFLUENCED
MANUFACTURING EMPLOYMENT & EARNINGS

	1966		1967		1968		1969		1970	
	Jobs	Earnings	Jobs	Earnings	Jobs	Earnings	Jobs	Earnings	Jobs	Earnings
Benton	5	$ 20,055	5	$ 22,225	5	$ 23,685	80	$409,120	80	$ 409,120
Carroll	- -	- -	- -	- -	- -	- -	- -	- -	25	127,850
Madison	- -	- -	- -	- -	- -	- -	- -	- -	75	383,550
Washington	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	5	$ 20,055	5	$ 22,225	5	$ 23,685	80	$409,120	180	$ 920,520
Total Direct Income (Earnings x 1.5 multiplier)		$30,083		$33,338		$36,528		$613,680		$1,380,780

Source: Derived from Survey and Arkansas Employment Security Division, Annual Reports, 1960-1970.

CHAPTER VIII

EMPLOYMENT PATTERNS
1960 - 1970

This section examines employment patterns in the four-county area from three points of view. First, trends in total employment are considered. Not only are overall changes in employment considered, but changes in proportions of total employment accounted for by wage and salary employment, agricultural employment, and the civilian labor force as a proportion of total population. In each case the emphasis of the investigation is on discovery of changes in patterns that have occurred between 1960-1965 and 1965-1970 (Tables VIII-1 - 5).

Second, a similar investigation was made of covered employment i.e., employment covered under workman's compensation laws (Tables VIII-6 - 10).

Third, a study was conducted, using data on covered employment, to determine if any significant changes have occurred, relative to total population, in specific subcategories of nonmanufacturing employment, such as Wholesale and Retail Trade, Services, etc. (Tables VIII-11 - 18).

In each of the three parts of this investigation, data on the State of Arkansas were used as a "yard stick" for comparison purposes.

TOTAL EMPLOYMENT TRENDS 1960 - 1970

Total Employment. A comparison of 1960 and 1965 revealed that the two counties (Benton and Washington) that account for the bulk of the economic activity in the four-county region experienced growth in total employment at rates in excess of the state average, while the growth rates for the other two counties were below the state average. Benton County employment grew at an average annual rate of 5.71 percent and Washington County at 7.82 percent as compared to the state average of 2.64 percent.

Employment in Carroll County declined at an average annual rate of -0.26 percent during this period. However, when the years 1961 and 1962 are considered, it is noted that employment increased absolutely by 375 and 300, respectively, for a net increase of 675 over the 1960 level of 3875. In 1963 employment declined by 100, and in 1964 by 575 to the level of 3875. This period, of course, coincides with the construction of Beaver Dam in Carroll County and the short-run gain in employment is directly attributable to these construction activities.

In Madison County, total employment declined each year and the average annual rate for the period was -2.91 percent. This suggests that construction activity on the dam had little impact on Madison County employment.

During the period after major construction activities on the Beaver Lake project were completed, 1965-1970, the growth rates of both Benton (7.42 percent) and Washington (5.28 percent) Counties exceeded the state average of 2.45 percent. Carroll County's average growth rate was 2.61 percent while Madison County's

was only 0.45 percent.

It is noted that the average annual growth rates of total employment in Benton, Carroll, and Madison Counties between 1960 and 1970 exceeded that which prevailed in 1960 to 1965, while Washington County's rate of employment growth declined (Figure VIII-A).

Labor Force Participation Rates. With the exception of Carroll County, general trends in the relationship between the total civilian labor force and county population were roughly the same in the 1960-1965 period and the 1965-1970 period. Carroll County had the highest rate during the years 1960 through 1963 (the dam construction period). By 1966 its rate was approximately the same as the state average and remained approximately so through 1970.

Both Benton and Washington Counties had rates higher than the state average throughout the ten-year period under study. It should be noted that the rates for both of these counties and for the state increased steadily through the ten-year period.

Madison County's labor participation rate continued to decline between 1965-1970 as it had between 1960 and 1965 (Figure VIII-B).

Wage and Salary Employment. Throughout the entire period, 1960-1970, the trend was for wage and salary employment to increase as a proportion of total employment for all of the counties and for the state. Washington County had a higher proportion than the state for the entire period and Benton County's proportion was slightly below the state figure. Carroll and Madison Counties, in that order, had proportions lower than Benton County. These relative positions were maintained throughout the ten-year period.

Benton County's proportion increased most rapidly during the

period 1960-1965, and was approaching the state average by 1970. As with the other employment variables considered, the effect of dam construction is noted in Carroll County as the wage and salary proportion of total employment grew rapidly between 1961 and 1963, then declined slightly through 1965. Since that year it has grown at about the same rate as Benton and Washington Counties (Figure VIII-C).

Manufacturing Employment. Throughout the period 1960-1970 manufacturing employment as a percent of total employment grew for each county (except Madison County) and the state. For both Benton and Washington Counties the most rapid change occurred between 1960 and 1966. For Benton County, the manufacturing share increased from 24.00 percent in 1960 to 34.74 percent in 1966, and reached 36.15 percent in 1970. The comparable figures for Washington County are 20.02 percent (1960), 25.66 percent (1966), and 22.32 percent (1970).

For Carroll County the manufacturing share grew from 22.22 percent in 1965 to 24.86 percent in 1970. In 1960 the figure was 21.29 percent. In Madison County manufacturing employment ranged between 5 percent and 7 percent of total employment during ten-year period (Figure VIII-D).

Agricultural Employment. Agricultural employment as a share of total employment declined between 1960 and 1970 in the state and in the four counties; however, the rate of decline decreased during the 1965-1970 period.

For the state, agricultural employemnt as a percent of the total declined from 16.07 percent to 8.38 percent in 1966, and has remained between 8.40 percent and 8.95 percent through 1970.

In Benton County the share declined from 21.09 percent in 1960

to 9.50 percent in 1966, and to 7.47 percent in 1970. Comparable figures for Carroll County are 29.03 percent (1960), 18.42 percent (1966), and 16.18 percent (1970); for Madison County the figures are 52.43 percent (1960), 39.29 percent (1966), and 38.44 percent (1970); and for Washington County, 15.18 percent (1960), 9.69 percent (1966), and 8.04 percent (1970), (Figure VIII-E).

Between 1960 and 1970 the decrease in the absolute level of agricultural employment averaged approximately -3.50 percent for the state and the four counties (with the exception of Washington County where the average decline was -0.69 percent). However, the annual rate of decline in Benton, Carroll, and Madison Counties ranged between -5.94 percent and -6.29 percent between 1960 and 1965, compared to the state average of -5.40 percent. Between 1965 and 1970 the average annual rate of decline ranged from -0.64 percent to -1.62 percent, compared with the state average of -2.06 percent.

COVERED EMPLOYMENT

The patterns of change in covered employment were approximately the same as those noted in the previous section of this chapter. It was observed that covered employment grew at a faster rate than total employment. This is caused, partially, by changes in laws that have extended coverage. However, it is generally noted that the counties experiencing the greatest economic growth were also those with the highest proportion of covered employment. Benton County, for example, had covered employment (as a percent of total employment) in excess of the state average for the entire period 1960-1970, and by 1970 the percentage was higher than that of the other three counties and the state.

Total Covered Employment. Total covered employment in Benton County grew at a faster rate than the state and the other three counties between both 1960 and 1965, and 1965 and 1970. While total covered employment in the state grew at an average annual rate of 5.09 percent between 1960 and 1965, Benton County's growth rate was 9.93 percent, followed by Washington County (9.33 percent), Madison County (1.78 percent), and Carroll County (1.40 percent).

Benton County's growth rate declined only slightly to 9.32 percent between 1965 and 1970. Carroll County's rate increased to 5.12 percent and Madison County's to 2.37 percent. Washington County's growth rate declined to 5.26 percent. It is noted that during the 1965-1970 period, Carroll County's growth rate accelerated from the 1960-1965 rate and exceeded the state average of 3.39 percent. Only Madison County, of the four counties, experienced growth of covered employment at below the state average (Figure VIII-H).

Covered Manufacturing Employment. A similar pattern merges when covered manufacturing employment is considered. Benton County's average annual growth rate of 13.57 percent between 1960 and 1965 was over twice the state rate of 6.14 percent. Washington County also exceeded the state rate with 9.84 percent, while Carroll County's covered manufacturing employment grew at only 0.75 percent. Madison County had an average annual decline of 6.29 percent.

Between 1965 and 1970, Benton County again maintained an average growth rate that was over twice the state average, 10.78 percent compared with 5.10 percent. Carroll County's growth rate also exceeded the state average, having accelerated to 5.40 percent. Washington County's growth rate declined to 4.44 percent. Madison County's growth

rate increased over the earlier period and became positive, 0.65 percent (Figure VIII-H).

Covered Nonmanufacturing Employment. Between 1960 and 1965 covered nonmanufacturing employment increased less rapidly than covered manufacturing employment in those two counties (Washington and Benton) that exhibited the greatest overall economic growth (Figure VIII-I). The ratio of growth rates in manufacturing employment to nonmanufacturing employmentwas 2.250 for Benton County and 1.095 for Washington County. The ratio for the state during this period was 1.380. In Carroll and Madison Counties nonmanufacturing employment grew faster than manufacturing as reflected by ratios of 0.364 and -0.636, respectively (Figure VIII-J).

Between 1965 and 1970, nonmanufacturing growth continued to exceed manufacturing growth, but the ratio became a positive .2500. In Washington County nonmanufacturing employment also grew at a faster rate as reflected by its ratio which declined to .7629 from 1.095.

Benton County continued to have manufacturing employment growth at a rate in excess of the rate of growth in nonmanufacturing employment. However the relative growth of manufacturing declined as indicated by the ratio declining to 1.506 from 2.250.

Carroll County experienced growth in nonmanufacturing at a rate higher than it had between 1960 and 1965; however, the increase was less than that of manufacturing as evidenced by its ratio increasing to 1.111 as compared to .3640 between 1960 and 1965.

Between 1965 and 1970 all of the four counties experienced growth in nonmanufacturing employment greater than the state average. The growth of manufacturing employment was, for the four-county region,

greater than the state average; however, between 1965 and 1970, the ratio of manufacturing to nonmanufacturing employment growth for the state was 2.2270, greater than any of the counties in the four-county region.

IMPLICATIONS OF COUNTY EMPLOYMENT DATA

An examination of county employment data offers few indications that the construction and operation of the Beaver Lake Reservoir caused any changes that probably would not have occurred in any event.

Madison County, the poorest of the four counties prior to the construction of the lake, remained the poorest after the project was completed and became operational. It remained primarily dependent upon agriculture. It had, by far, the lowest percentage of wage and salary employment and manufacturing employment before and after 1965. Moreover, the relevant rates of change remained consistently below the state average.

Benton County had consistently high rates of employment growth in both manufacturing and nonmanufacturing employment, total and covered employment, prior to and after completion of Beaver Lake Reservoir. In fact, manufacturing employment growth (which is only minimally attributed to the lake) has been the most rapidly growing component of employment in Benton County. This is particularly significant since, by all measures, Benton County contains the greatest portion of Beaver Lake.

The impact of the construction period seems to have been most heavily felt by Carroll County. Between 1961 and 1963 it experienced high growth in total employment and in the percentage of employees in

contract construction. After 1965, Carroll County's growth in manufacturing employment increased to an annual average of 5.40 percent as compared to 0.75 percent between 1960 and 1965.

Washington County employment patterns exhibited no changes that can be attributed directly to the presence of the lake.

While the lake undoubtedly made some difference in employment patterns in the four-county region, they have apparently been sufficiently small that they are not revealed by changes in the employment data considered above.

SUBCATEGORIES OF COVERED NONMANUFACTURING EMPLOYMENT

The observed county employment patterns indicate that growth in manufacturing employment leads growth in nonmanufacturing employment. This is consistent with the theory of economic development (33) which indicates that the population of a geographic area derives its basic income from the production of goods and services for export. Normally, manufacturing, mining, and agricultural industries may be considered primary income producing industries in a given area. The existence of previously unexploited (or underexploited) opportunities in primary income producing areas of economic activity will result in an inflow of population to exploit these opportunities and, concurrently, increased aggregate (and probably per capita) income. In the case of the four-county region this has taken the form of manufacturing activity.

That part of the population engaged in production of goods for export requires the outputs of supportive economic activity such as wholesale and retail trade, residential construction, legal and medical

services, public utilities, etc. As levels of income rise it is generally noted that there is a relative increase in the demand for what has been termed here as supportive, or "services," industry, (16, 27).

In this section, employment data and population statistics have been employed to determine relative amounts of labor per capita involved in selected nonmanufacturing activities. Trends over time were observed to determine changes in demand for various types of services, and to also determine if any such changes in demand (in terms of labor required) might reflect impacts of Beaver Lake Reservoir that might have been masked by overall movements in county employment statistics.

The method employed in this section was to compute for each of the counties, and the State of Arkansas, population per employee for each year between 1960 and 1970 in each of the following subcategories of covered nonmanufacturing employment.

1. Contract Construction
2. Transportation, Communications, and Public Utilities
3. Wholesale and Retail Trade
4. Finance, Insurance, and Real Estate
5. Services
6. The sum of Categories 1 through 5.

Rates of change were compared between 1960 and 1965 and between 1965 and 1970 for each county and for the State of Arkansas. Patterns for each county were compared with state patterns. The results of this investigation were as follows:

1. Contract Construction. Generally, a constant population would require a relatively constant quantity of labor in this category, pri-

marily for purposes of maintaining the existing stock of residential housing, commercial structures, public facilities, etc. Thus, the population per employee ratio in this category would remain constant. Improvements in construction technology would result in an increase in population per employee, while rising levels of family income could necessitate a declining ratio as demand increases for "housing facilities per family." A rising population would result in a decrease in the population per employee ratio. Short period declines would be expected to be quite rapid due to the long-lived nature of housing and most other structures. Likewise, a declining population would result in more than proportionate increases in population per employee in the short run

It should be noted that since employment in the contract construction includes more than residential construction, the findings must be considered as only approximate. However, this limitation may be mitigated if the assumption is made that changes in construction will generally be in the same direction as changes in population. For example, rising population necessitates additional construction, not only for housing, but for streets and highways, schools, wholesale and retail distribution facilities, etc.

Between 1960 and 1965 population per employee in Benton County declined from 193.97 to 86.76, or at an average rate of -11.05 percent. During this period its population grew at an average annual rate of 2.86 percent. Between 1965 and 1970, population per employee declined at an average rate of -.028 percent while its population grew at an average rate of 4.34 percent. It may be inferred that the absolute growth of the construction industry during the first half of the decade provided ample capacity for the expansion required during the second

half of the decade's population growth. The very sharp declines in population per employee during the period 1960-1963 may have been as a direct result of the Beaver project; however, population growth throughout the decade resulted in population per employee being a relatively stable declining function over time rather than the erratic function as evidenced in Carroll County, site of Beaver Dam.

In Carroll County during the period of dam construction, population per contract construction employee fell rapidly from 182.00 in 1960 to 26.60 in 1963, increased slightly to 32.50 in 1963, and then increased rapidly, as dam construction neared completion, to 206 in 1965. When 1960 and 1965 are compared (which ignores the short-run effects of dam construction) population per employee increased at an average rate of 2.65 percent while population declined at an average rate of -0.26 percent. Between 1965 and 1970 population per employee declined at a rate of -4.70 as population increased at an annual average rate of 2.09 percent.

Population per employee decreased in Washington County between 1960 and 1965 at an annual average rate of -3.50 percent, and between 1965 and 1970 at a rate of -2.48 percent. Population increases during the two subperiods were 4.62 percent and 3.68 percent, respectively.

Generally, of the three counties for which data were available, the period of dam construction obviously affected the amount of Contract Construction in Benton and Carroll Counties. When the period of construction is not considered, the ratios of population per employee in contract construction are generally related to population change (Figure VIII-K).

2. Transportation, Communications, and Public Utilities. (Figure VIII-L).

3. Wholesale and Retail Trade. The general patterns observed in Washington and Carroll Counties as well as the state revealed a decreasing population per employee in Wholesale and Retail Trade. The behavior of this ratio in Benton County was erratic, both during and after the period of construction of the Beaver Lake project. To the extent that the completed lake resulted in increased tourist travel in the area, it would be expected that labor in this activity would have increased faster than in the counties containing a smaller portion of the lake. This would have reflected itself in a decline in resident population per employee more rapid than that of the other counties or the state; however, the opposite occurred, with population per employee actually increasing between 1965 and 1970 at an annual rate of 3.36 percent, while for the state, Carroll and Washington Counties, the ratios declined by -1.91 percent, -1.11 percent, and -0.85 percent, respectively (Figure VIII-M).

4. Services. Of all categories of Nonmanufacturing Employment, Services--which includes employment in hotels, rooming houses, camps, and other lodging places; personal services; miscellaneous business services; automobile repair; automobile services and garages; and miscellaneous business services--would be most influenced by lake related leisure activities. An unusually low population per employee ratio would indicate that a portion of the labor force was producing "services for export" via tourists or retirees, rather than for resident population engaged in current productive activities.

In 1960 population per employee for the state, Carroll, and Washington Counties was in the 60 to 65 range, while in Benton County the

ratio was 82. Between 1960 and 1965 the ratio declined at an annual average rate of -5.61 percent in Benton County compared with -4.20 percent for the state, and -0.61 percent and -2.77 percent for Carroll and Washington Counties, respectively. Between 1965 and 1970 population per employee declined for all entities, but the fastest rate was experienced by Benton County (-7.79 percent). In absolute terms the Washington County ratio was approximately the same as the state during the period 1965-1970, and Carroll County had about 10 persons per employee above the state average. The Benton County ratio fell below the state ratio by 1967 and the difference each year through 1970 has widened (Figure VIII-N).

If it can be assumed that the differences between the state and Benton County were caused by Beaver Lake, it can be estimated that the net employment in Services attributable to the lake was 71 in 1967, 117 in 1968, 206 in 1969, and 233 in 1970, or an average of 132 jobs per year. Based upon wage rates prevailing in services this would have amounted to total wage and salary income of approximately $515,000 per year in Benton County. However, it should be pointed out that some of the relative increase in service employment may be partially associated with the development (which roughly coincides chronologically with the lake) of the Bella Vista retirement, vacation home, and recreational complex which is located approximately 20 miles northwest of the lake, and Pea Ridge National Park which is located north of the lake.

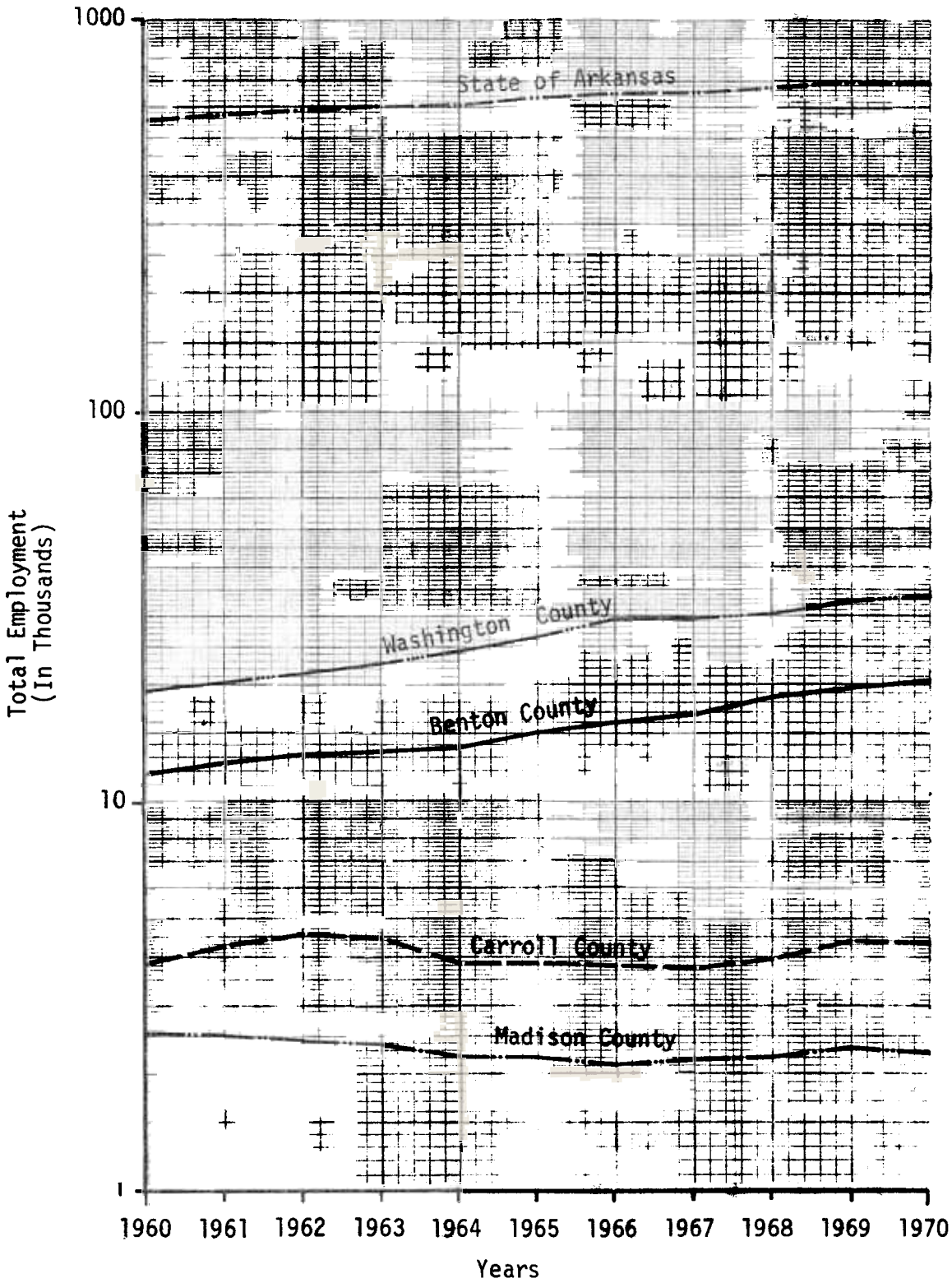
5. Finance, Insurance, and Real Estate. A significant relative increase in this category of employment in Benton and Carroll Counties since 1965 is reflected by the decline in population per employee ratios.

The decline in Benton County between 1965 and 1970 was -7.28 percent per year compared to -2.90 percent between 1960 and 1965. While data were not available for this employment category for Carroll County from 1960 through 1962, its rate of decline to 1965 was estimated to be about that of Benton County. Between 1965 and 1970 its rate of decline was -7.11 percent. Although data on each subcategory of this employment grouping are not available, it is estimated that the greatest increase occurred in real estate due to the increased promotion of real estate developments near Beaver Lake and at the Bella Vista complex (Figure VIII-O).

6. All Subcategories Combined. When all subcategories of Non-manufacturing Employment are combined, the population per employee ratio declined most rapidly in Washington County between 1960 and 1965, and in Benton County between 1965 and 1970. In both periods, the rates of decline were greater for the counties studied than for the state. In absolute terms between 1965 and 1970, population per employee was greater in Benton and Carroll Counties than the state while Washington County was lower than the state (Figure VIII-P).

Figure VIII - A

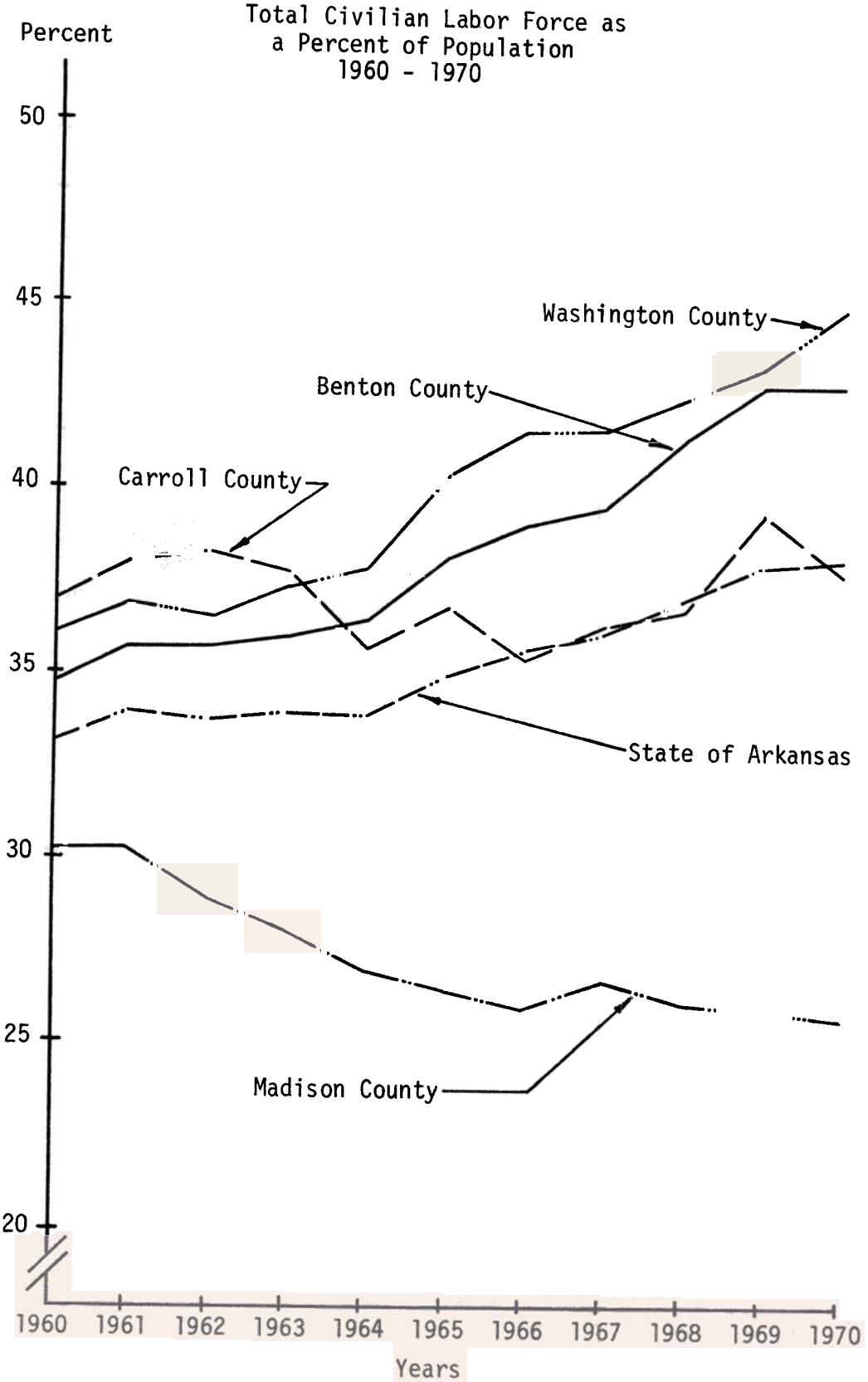
Total Employment
1960 - 1970



Source: Tables VIII- - 5.

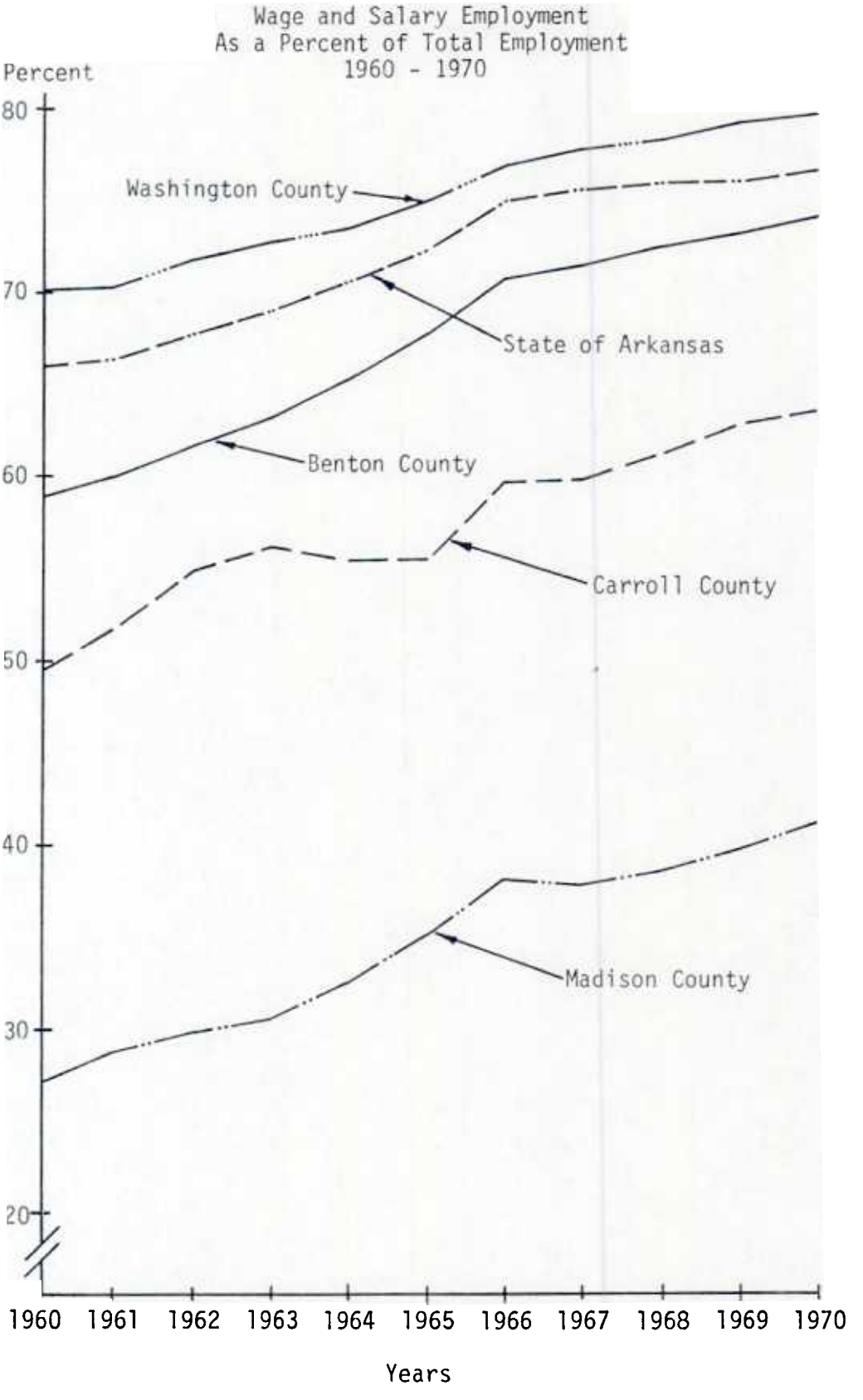
Figure VIII - B

Total Civilian Labor Force as a Percent of Population 1960 - 1970



Source: Tables VIII-11 - 15.

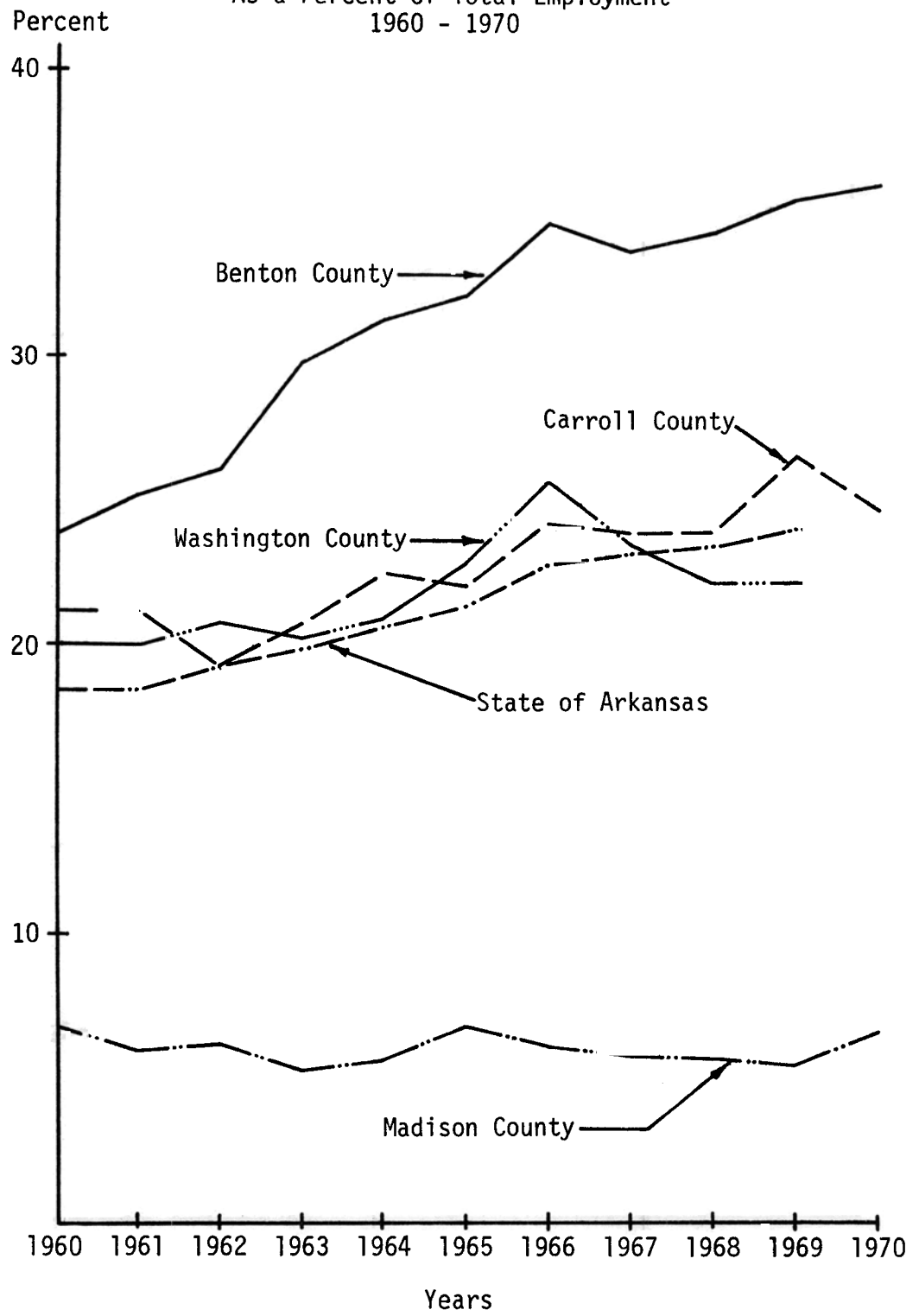
Figure VIII - C



Source: Tables VIII-11 - 15.

Figure VIII - D

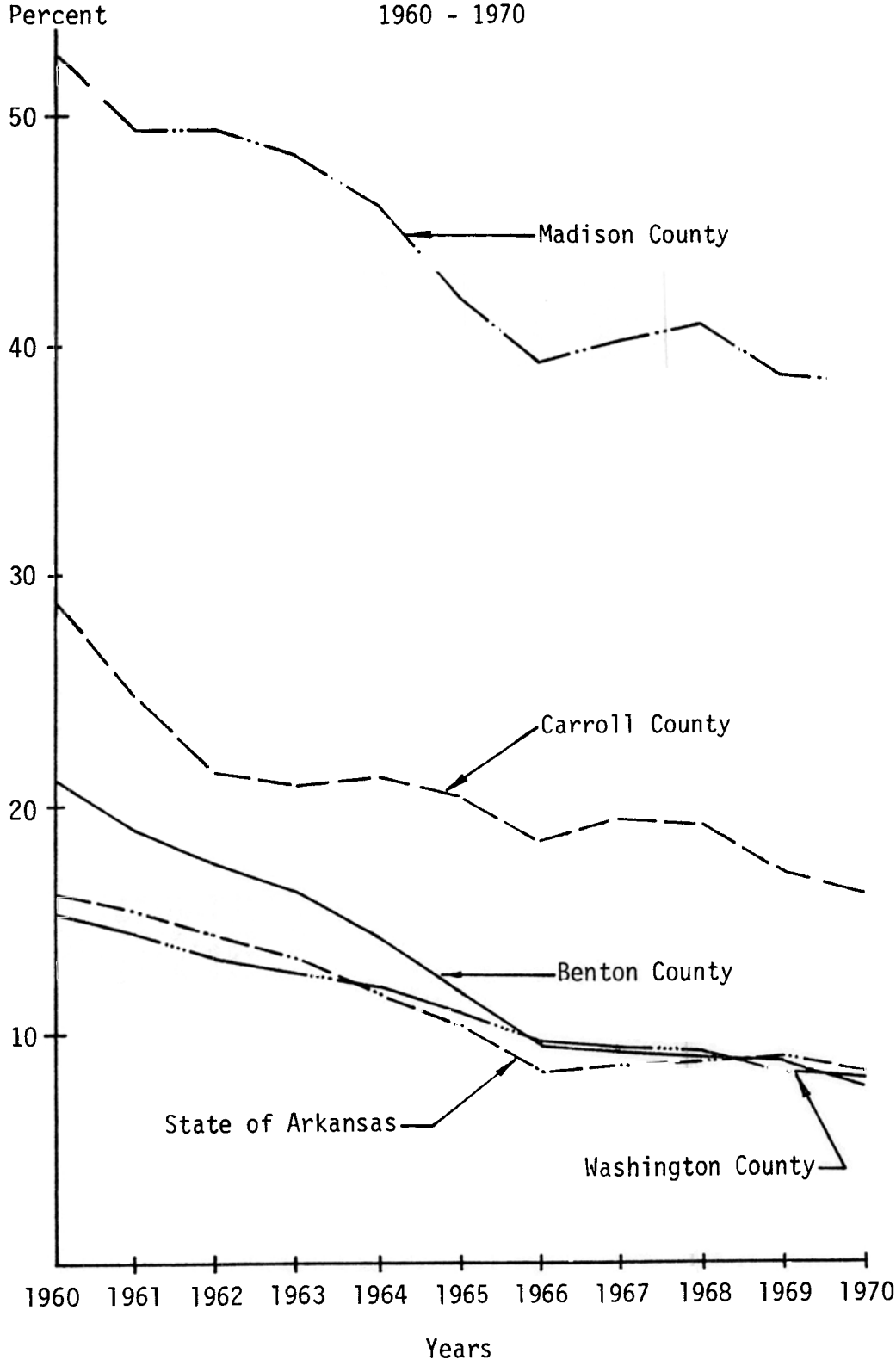
Manufacturing Employment
As a Percent of Total Employment
1960 - 1970



Source: Tables VIII-11 - 15

Figure VIII - E

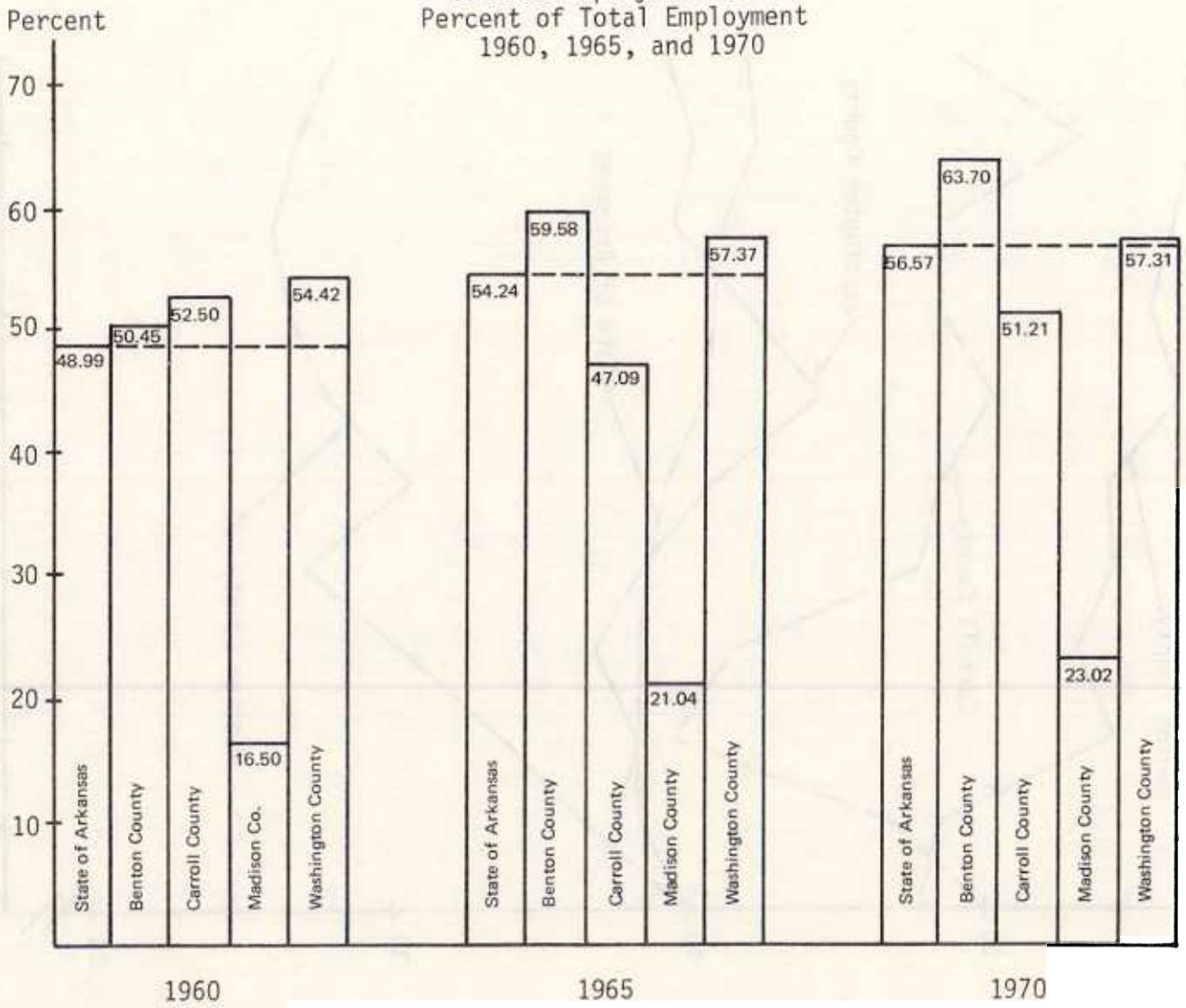
Agricultural Employment
As a Percent of Total Employment
1960 - 1970



Source: Tables VIII-11 - 15

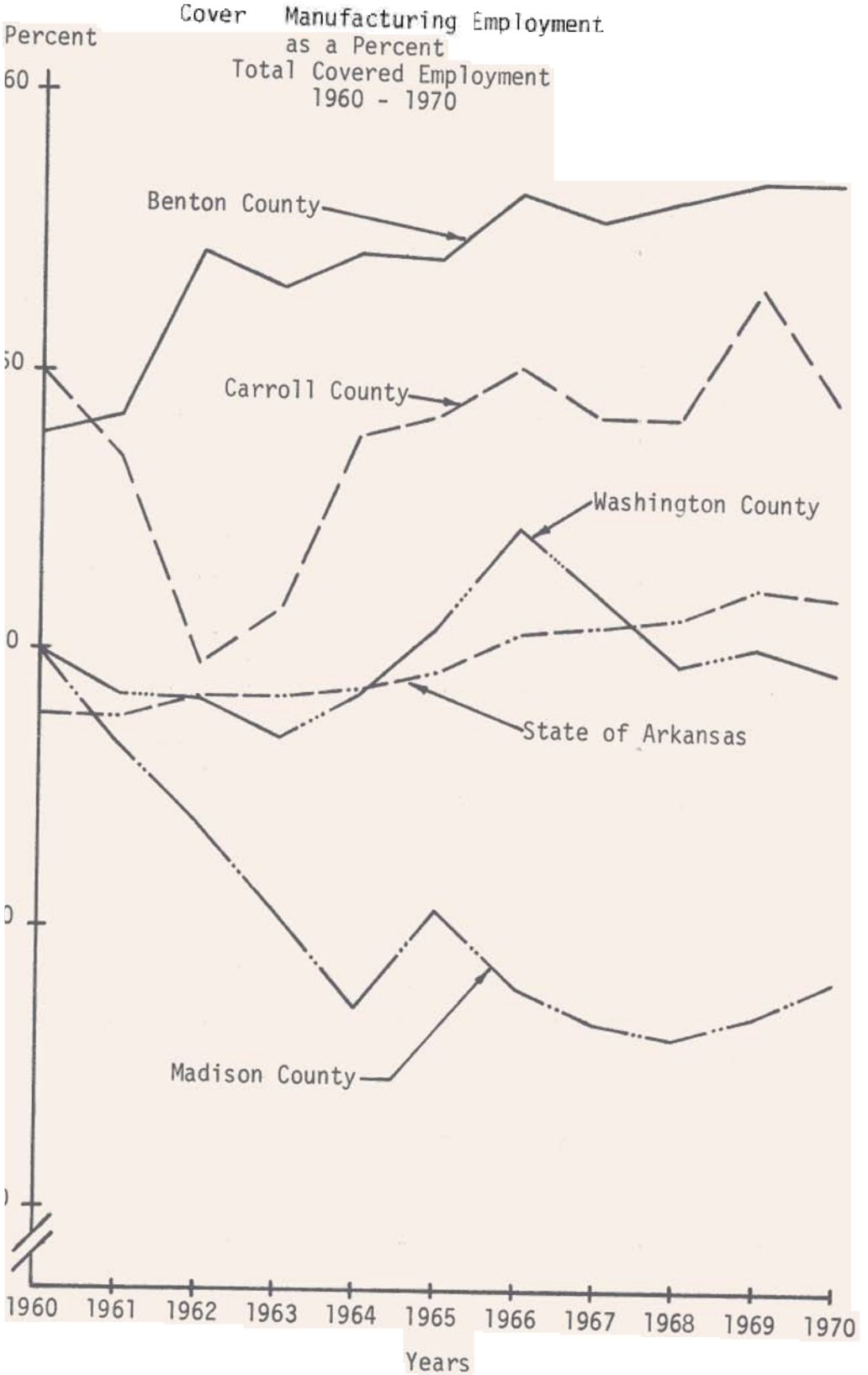
Figure VIII - F

Covered Employment as a
Percent of Total Employment
1960, 1965, and 1970



Source: Table VIII-18.

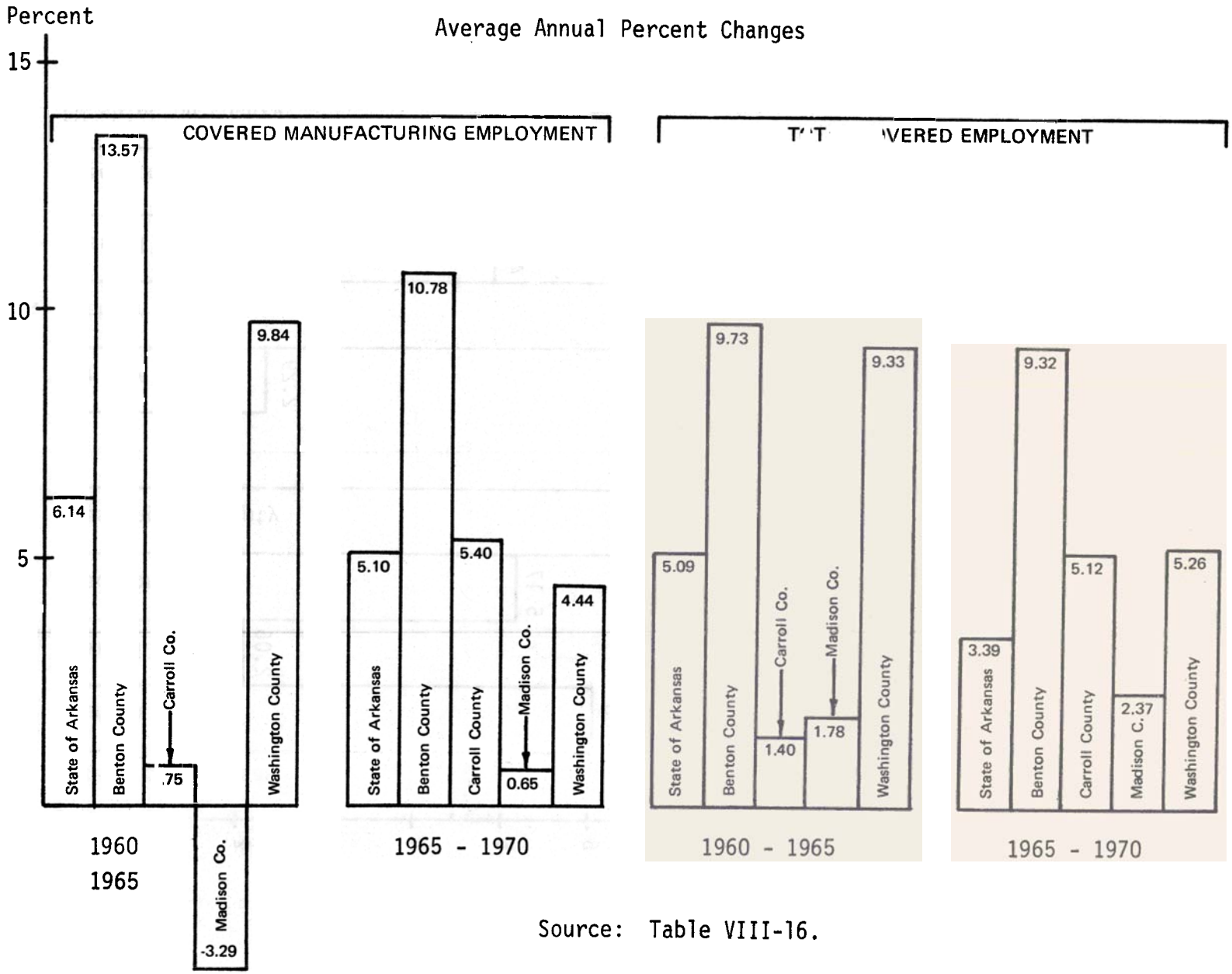
Figure VIII



Sour Tables VIII

Figure VIII - H

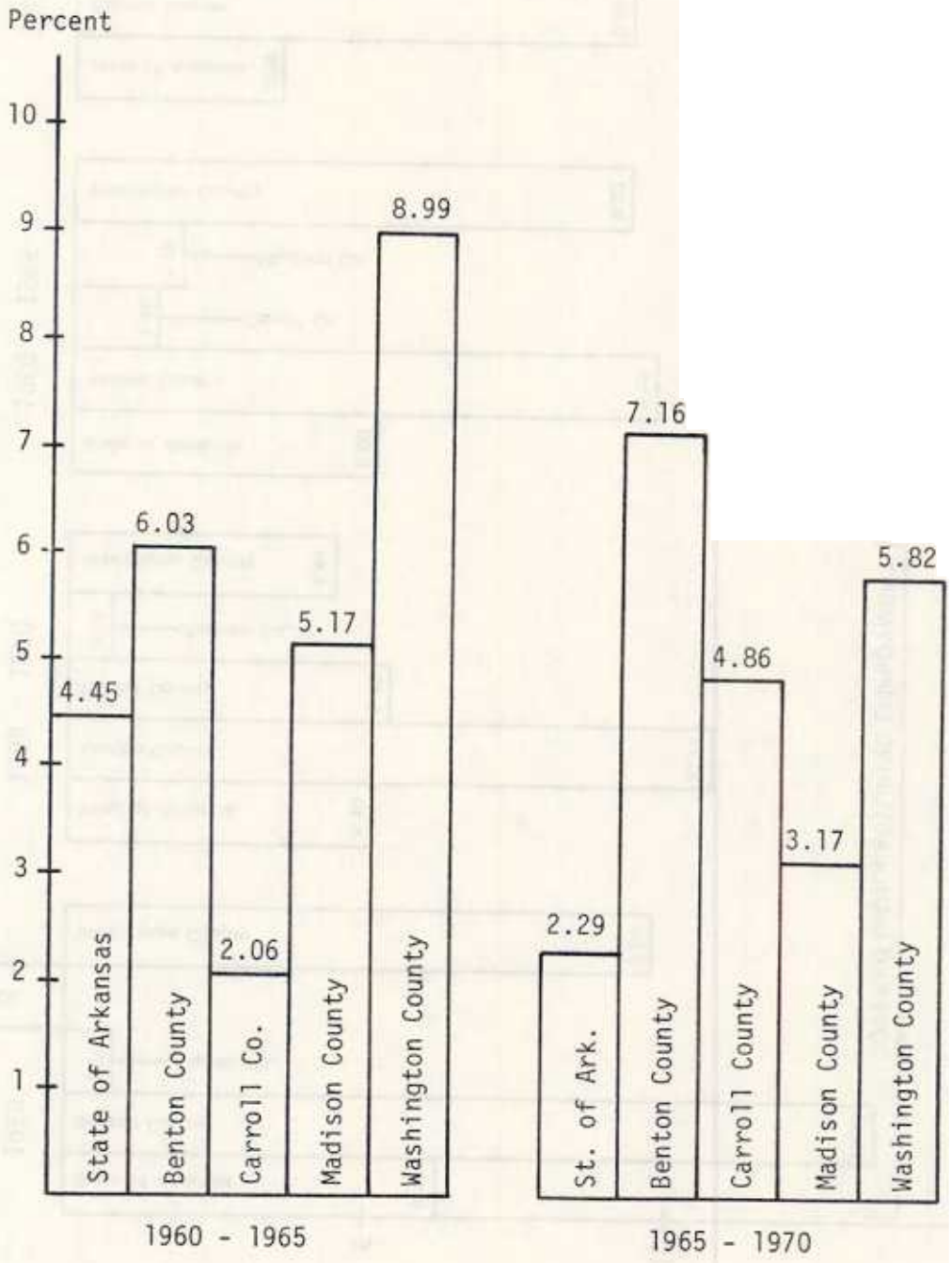
Average Annual Percent Changes



Source: Table VIII-16.

Figure VIII

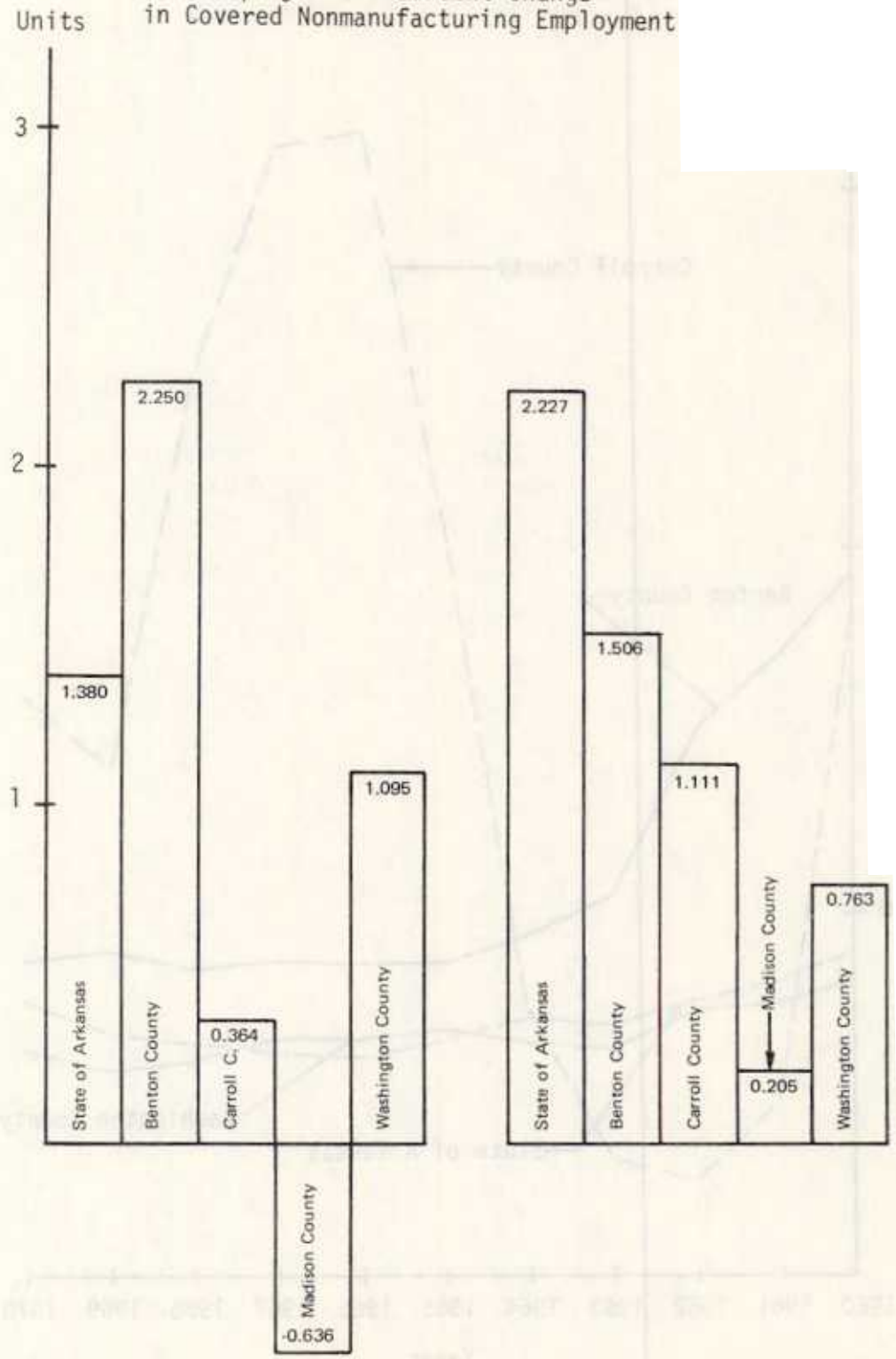
Average Annual Percent Changes
Covered Nonmanufacturing Employmen



Source: Table VIII-16.

Figure VIII - J

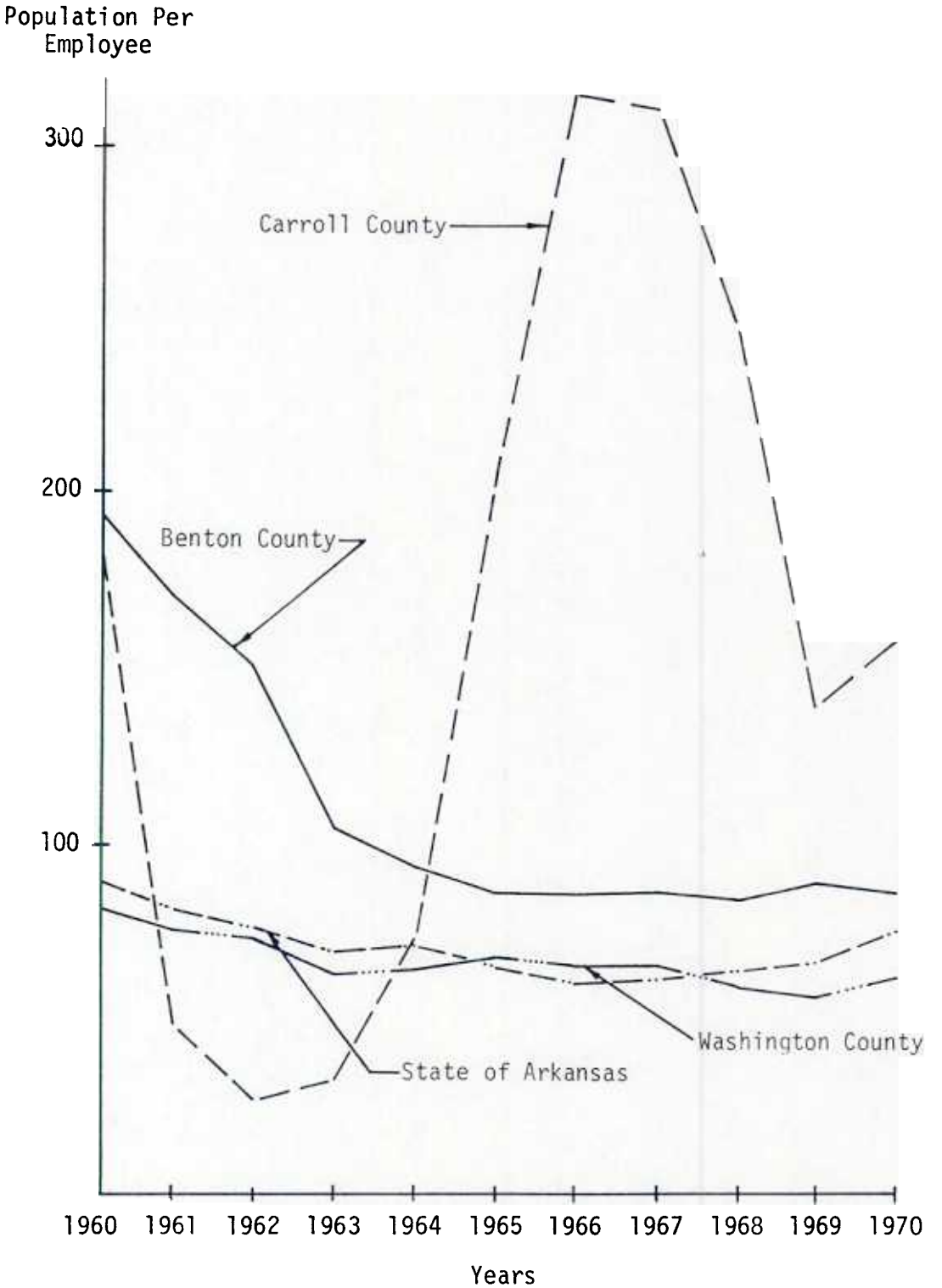
Percent Change in Covered Manufacturing Employment : Percent Change in Covered Nonmanufacturing Employment



Source: Table VIII-16.

Figure VIII - K

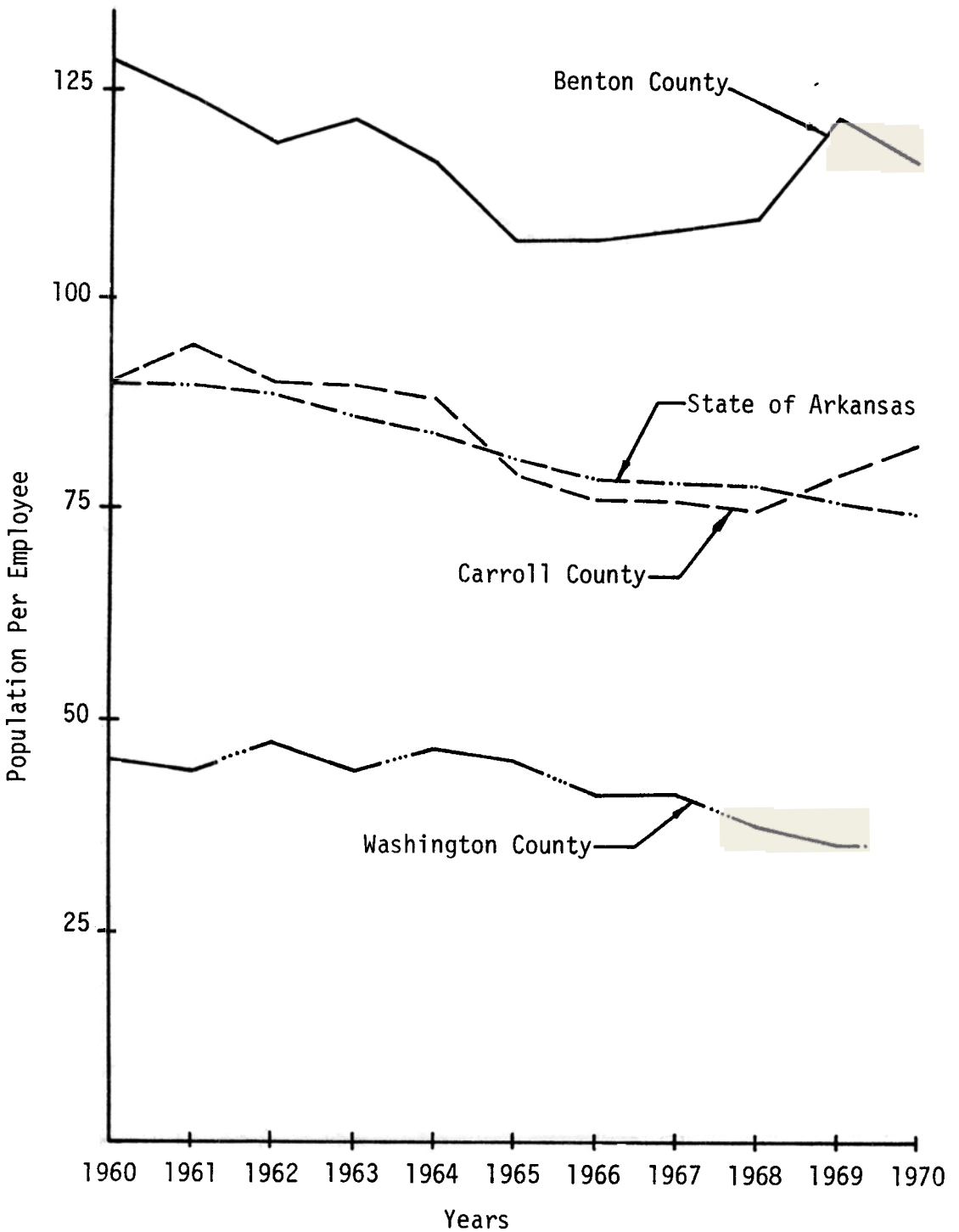
Population Per Employee
in Contract Construction



Source: Tables VIII-7 - 10.

Figure VIII - L

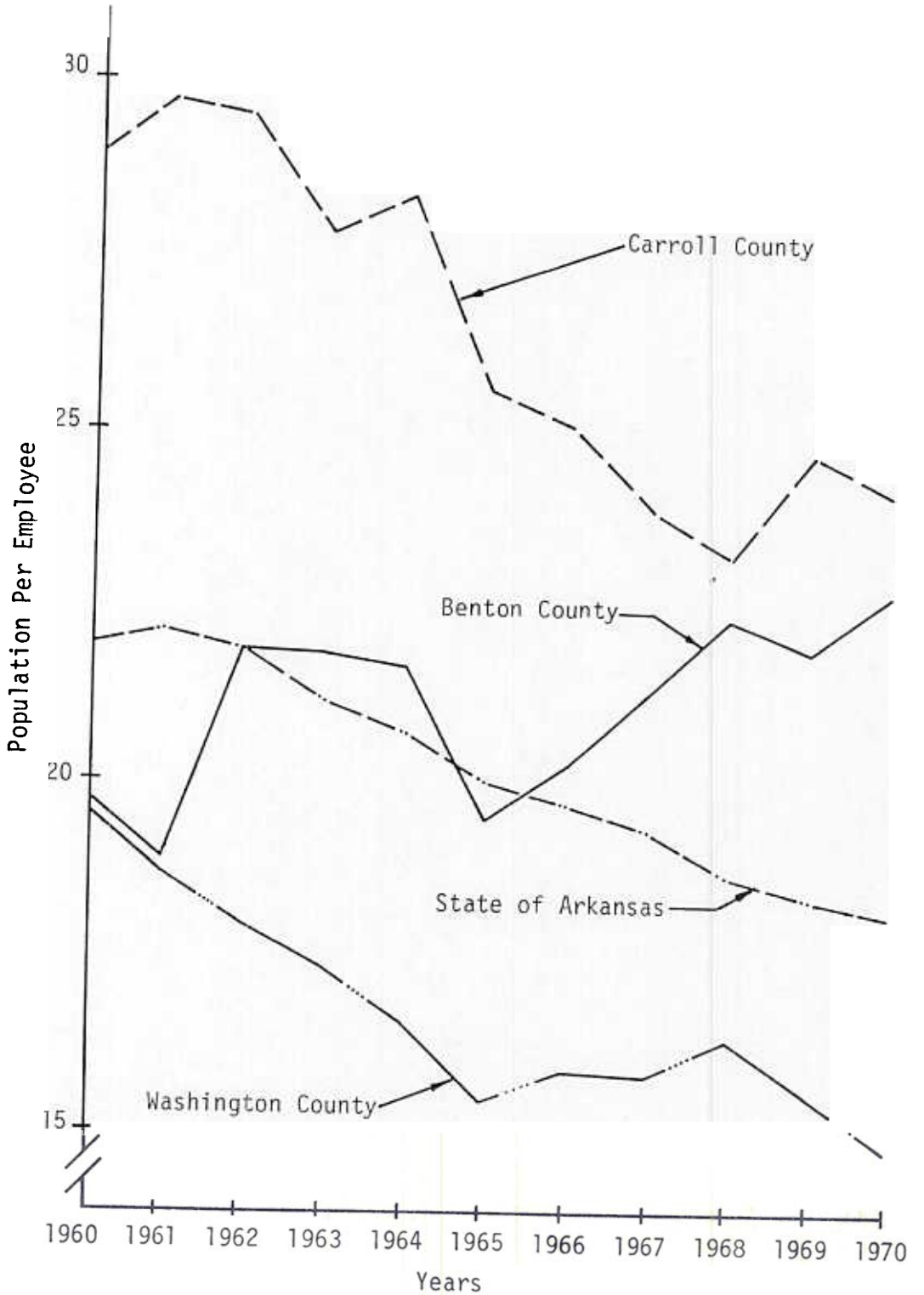
Population Per Employee In
Transportation, Communications,
and Public Utilities



Source: Tables VIII-7 - 10.

Figure VIII - M

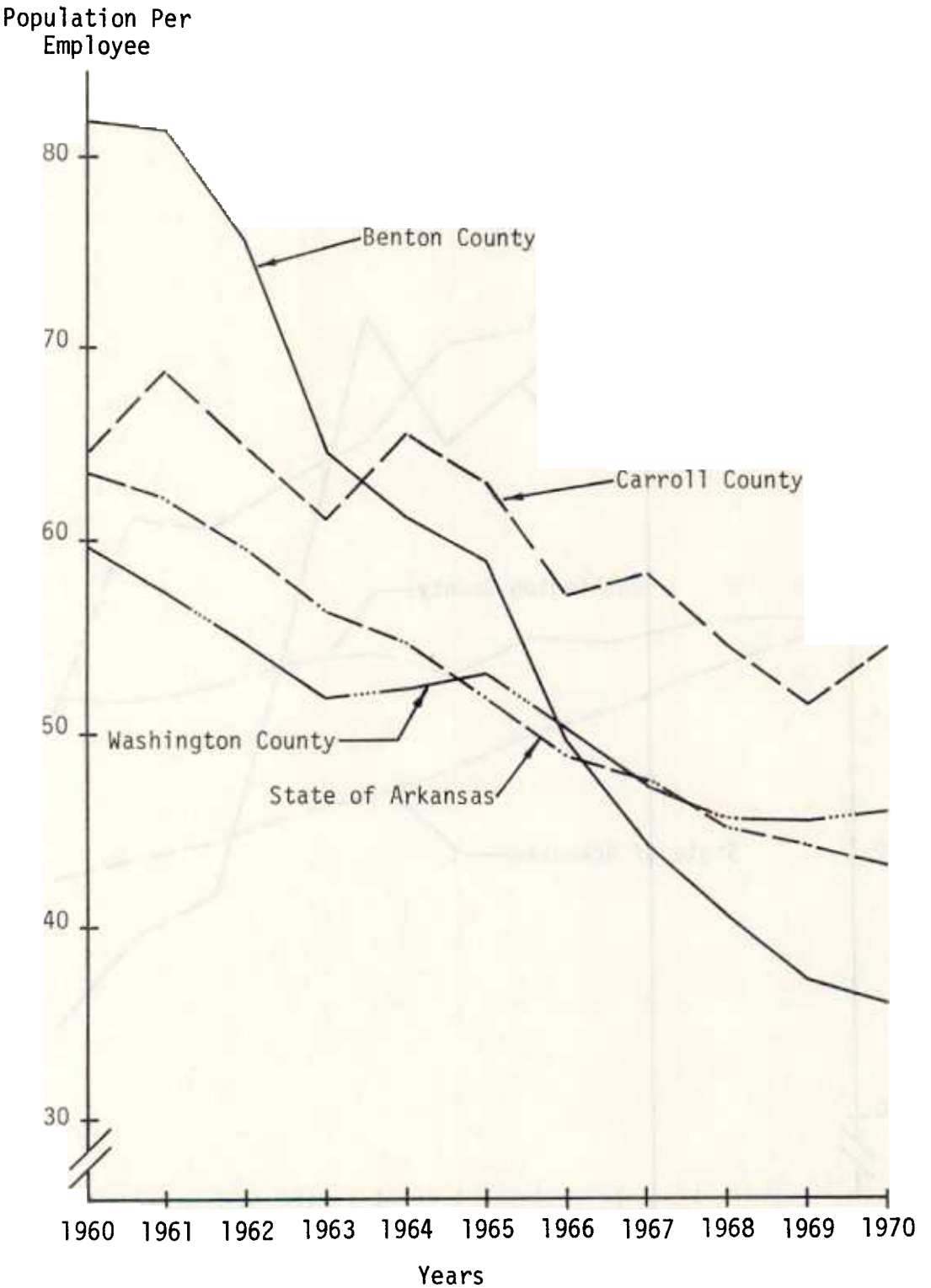
Population Per Employee In
Wholesale and Retail Trade



Source: Tables VIII-7 - 10

Figure VIII - N

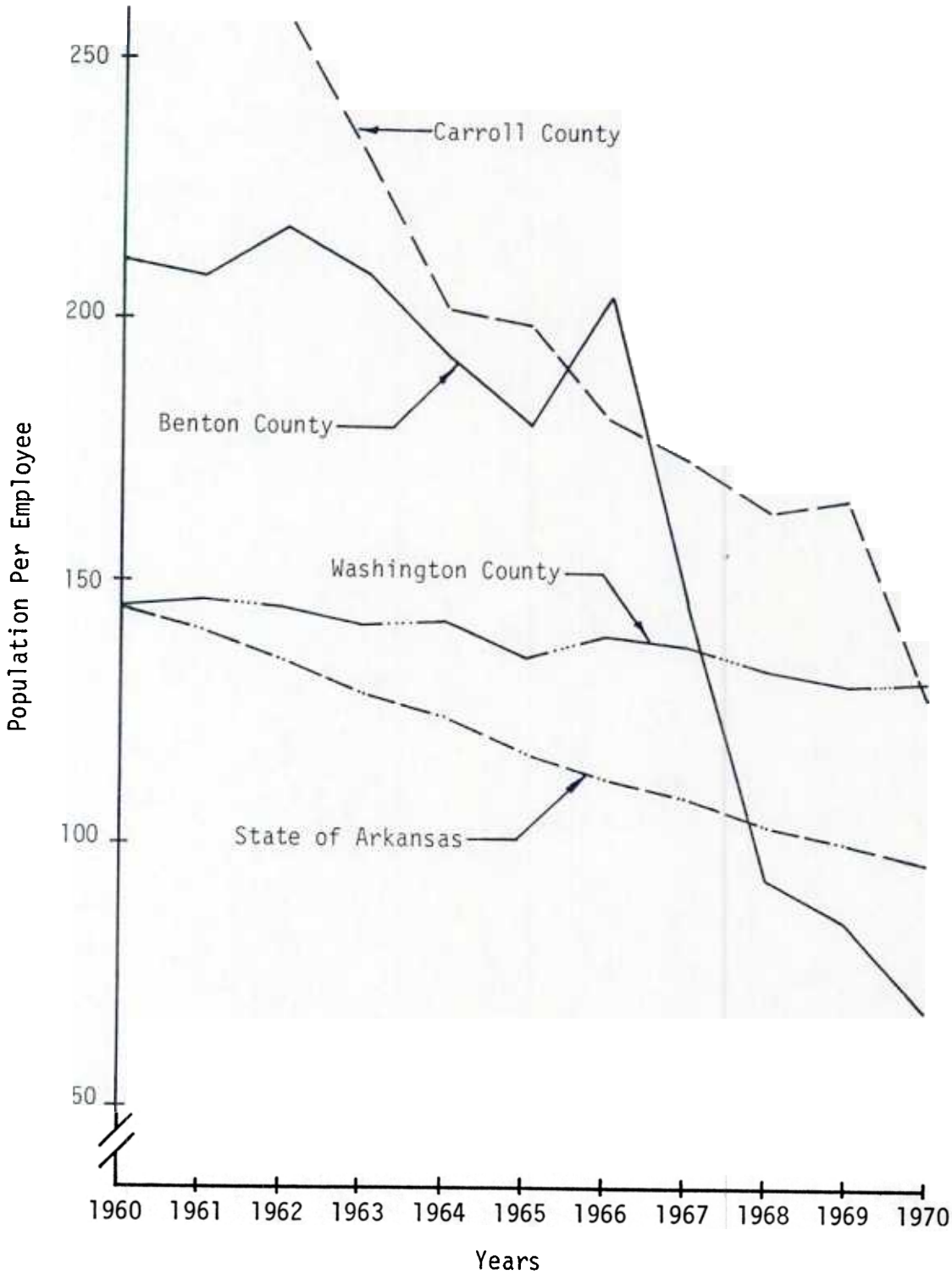
Population Per Employee
in Services



Source: Tables VIII-7 - 10.

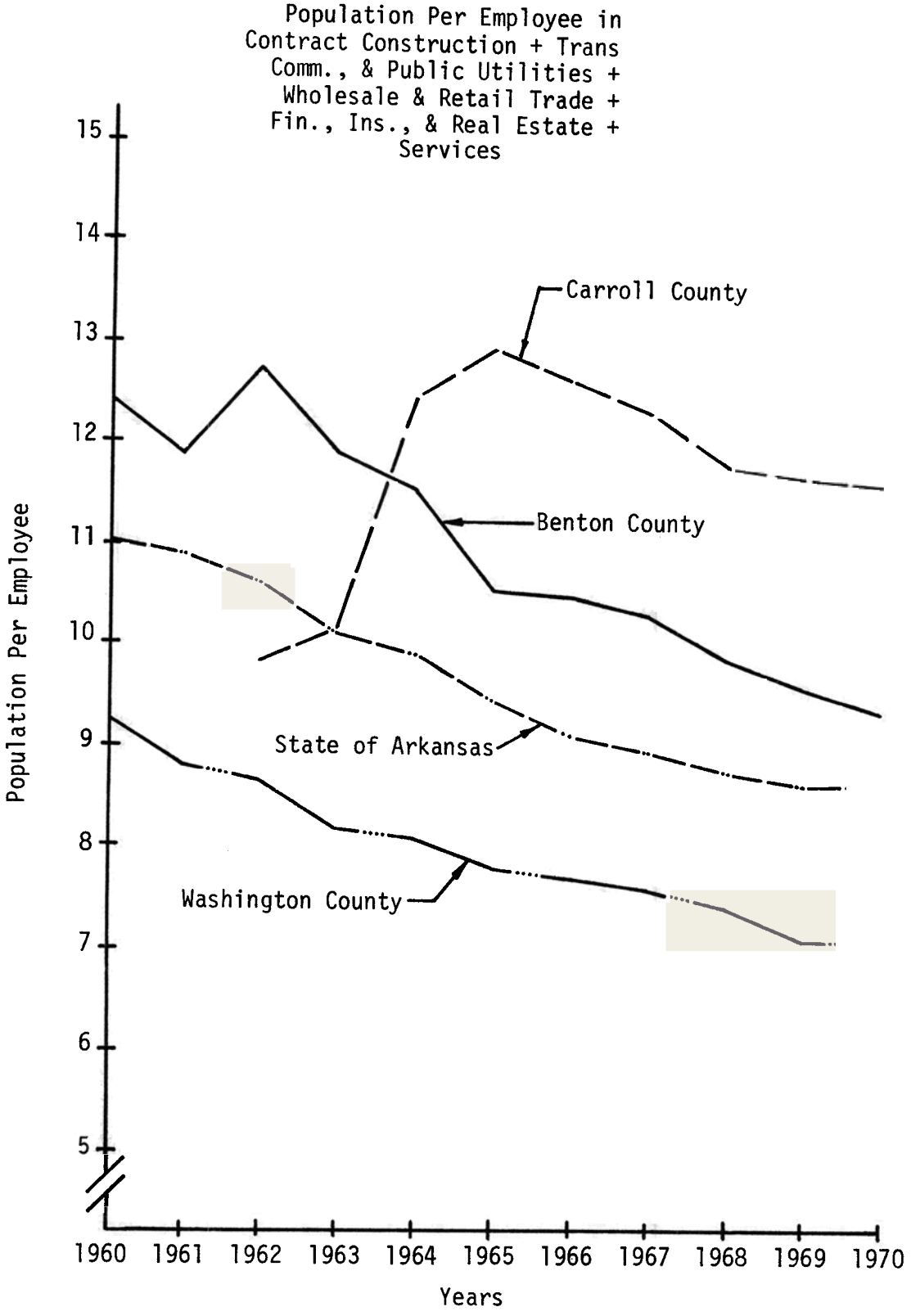
Figure VIII - 0

Population Per Employee In
Finance, Insurance and Real Estate
1960 - 1970



Source: Tables VIII-7 - 10.

Figure VIII - P



Source: Tables VIII-7 - 10.

Table VIII - 1

TOTAL EMPLOYMENT DATA

STATE OF ARKANSAS
(In Thousands)

ITEM	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	1,786	1,806	1,853	1,875	1,897	1,894	1,899	1,901	1,902	1,913	1,923
Total Civilian Labor Force	595.1	615.2	627.4	639.0	642.8	663.2	677.8	688.9	703.7	726.8	733.0
Unemployment	40.0	49.2	42.6	38.3	35.6	34.7	30.7	30.5	29.8	30.0	36.6
Unemployment Rate	6.7	8.0	6.8	6.0	5.5	5.2	4.5	4.4	4.2	4.1	5.0
Persons Involved in Labor Disputes	0.2	0.1	0.1	0.1	0.3	0.3	0.6	0.6	0.4	0.4	1.0
Employment	554.9	565.9	584.7	600.6	606.9	628.2	646.5	657.8	673.5	696.4	695.4
Agriculture	89.2	86.7	83.5	80.5	70.8	65.1	54.2	56.2	58.9	62.3	58.4
Nonagriculture	465.7	479.2	501.2	520.1	536.1	563.1	592.3	601.6	614.6	634.1	637.0
Domestic Service, Self-Employed and Unpaid Family Workers	98.5	103.2	104.4	105.2	107.1	107.8	106.9	103.7	102.1	103.4	102.7
Wage and Salary	367.2	376.0	396.8	414.9	429.0	455.3	485.4	497.9	512.5	530.7	534.3
Manufacturing	102.3	104.5	113.2	119.4	125.4	134.2	147.9	152.2	158.9	168.1	167.8
Nonmanufacturing	264.9	271.5	283.6	295.5	303.6	321.1	337.5	345.7	353.6	362.6	366.5

Source: Arkansas Labor Force Statistics, Annual Averages, State and Areas. Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensal Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

Table VIII - 2

T O T A L E M P L O Y M E N T D A T A

BENTON COUNTY

ITEM	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	36,272	37,820	39,186	39,588	40,318	41,473	42,613	44,938	46,467	47,417	50,476
Total Civilian Labor Force	12675	13525	14025	14275	14725	15850	16675	17800	19275	20325	21650
Unemployment	700	875	775	800	850	775	625	825	850	900	975
Unemployment Rate	5.5	6.5	5.5	5.6	5.8	4.9	3.7	4.6	4.4	4.4	4.5
Persons Involved in Labor Disputes	0	0	0	0	0	0	0	0	0	0	0
Employment	11975	12650	13250	13475	13875	15075	16050	16975	18425	19425	20675
Agriculture	2525	2400	2300	2200	1950	1775	1525	1600	1675	1700	1600
Nonagriculture	9450	10250	10950	11275	11925	13300	14525	15375	16750	17725	19075
Domestic Service, Self-Employed and Unpaid Family Workers	2400	2650	2750	2750	2850	3075	3150	3225	3375	3500	3725
Wage and Salary	7050	7600	8200	8525	9075	10225	11375	12150	13375	14225	15350
Manufacturing	2875	3200	3925	3950	4350	4850	5575	5725	6350	6900	7475
Nonmanufacturing	4175	4400	4275	4575	4725	5375	5800	6425	7025	7325	7875

Source: Arkansas Labor Force Statistics, Annual Averages, State and Areas. Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensal Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

Table VIII - 3

TOTAL EMPLOYMENT DATA

CARROLL COUNTY

ITEM	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	11,284	12,103	12,849	12,707	11,747	11,135	11,269	11,135	11,346	11,855	12,301
Total Civilian Labor Force	4175	4600	4925	4825	4200	4100	4000	4050	4200	4675	4650
Unemployment	300	350	375	375	325	275	200	250	250	275	325
Unemployment Rate	7.2	7.6	7.6	7.8	7.7	6.7	5.0	6.2	6.0	5.9	7.0
Persons Involved in Labor Disputes	0	0	0	0	0	0	0	50	0	0	0
Employment	3875	4250	4550	4450	3875	3825	3800	3750	3950	4400	4325
Agriculture	1125	1050	975	925	825	775	700	725	750	750	700
Nonagriculture	2750	3200	3575	3525	3050	3050	3100	3025	3200	3650	3625
Domestic Service, Self-Employed and Unpaid Family Workers	825	1000	1075	1025	900	850	825	775	775	875	875
Wage and Salary	1925	2200	2500	2500	2150	2200	2275	2250	2425	2775	2750
Manufacturing	825	900	875	925	875	850	925	900	950	1175	1075
Nonmanufacturing	1100	1300	1625	1575	1275	1350	1350	1350	1475	1600	1675

Source: Arkansas Labor Force Statistics, Annual Averages, State and Areas. Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensal Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

Table VIII - 4

TOTAL EMPLOYMENT DATA

MADISON COUNTY

ITEM	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	9068	9169	9085	9164	8997	8897	8584	8898	9091	9448	9453
Total Civilian Labor Force	2750	2775	2625	2575	2425	2350	2225	2375	2375	2450	2425
Unemployment	175	250	200	200	200	150	125	200	175	125	175
Unemployment Rate	6.4	9.0	7.6	7.8	8.2	6.4	5.6	8.4	7.4	5.1	7.2
Persons Involved in Labor Disputes	0	0	0	0	0	0	0	0	0	0	0
Employment	2575	2525	2425	2375	2225	2200	2100	2175	2200	2325	2250
Agriculture	1350	1250	1200	1150	1025	925	825	875	900	900	850
Nonagriculture	1225	1275	1225	1225	1200	1275	1275	1300	1300	1425	1400
Domestic Service, Self-Employed and Unpaid Family Workers	525	550	500	500	475	500	475	475	450	500	475
Wage and Salary	700	725	725	725	725	775	800	825	850	925	925
Manufacturing	175	150	150	125	125	150	125	125	125	125	150
Nonmanufacturing	525	575	575	600	600	625	675	700	725	800	775

Source: Arkansas Labor Force Statistics, Annual Averages, State and Areas. Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensal Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

Table VIII - 5

T O T A L E M P L O Y M E N T D A T A

WASHINGTON COUNTY

ITEM	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	55,797	57,928	61,141	63,759	66,536	68,713	72,203	73,051	73,180	75,411	77,37(
Total Civilian Labor Force	20200	21375	22400	23850	25250	27600	30050	30425	31175	33825	3485(
Unemployment	1100	1075	1050	1050	1025	1025	925	1125	1150	1025	120(
Unemployment Rate	5.4	5.0	4.7	4.4	4.1	3.7	3.1	3.7	3.7	3.0	3.4
Persons Involved in Labor Disputes	0	0	0	25	0	0	0	0	0	0	50
Employment	19100	20300	21350	22775	24225	26575	29125	29300	30025	32800	33600
Agriculture	2900	2925	2850	2900	2875	2900	2825	2750	2800	2775	2700
Nonagriculture	16200	17375	18500	19875	21350	23675	26300	26550	27225	30025	30900
Domestic Service, Self-Employed and Unpaid Family Workers	2800	3075	3150	3275	3500	3700	3875	3750	3675	3975	4050
Wage and Salary	13400	14300	15350	16600	17850	19975	22425	22800	23550	26050	26850
Manufacturing	3825	4075	4450	4600	5075	6225	7475	6875	6675	7325	7500
Nonmanufacturing	9575	10225	10900	12000	12775	13750	14950	15925	16875	18725	19350

Source: Arkansas Labor Force Statistics, Annual Averages, State and Areas. Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensal Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

Table VIII - 6

AVERAGE ANNUAL COVERED EMPLOYMENT - STATE OF ARKANSAS

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Manufacturing	102,386	104,338	113,250	119,257	125,214	133,823	147,868	151,997	158,322	168,767	167,990
Nonmanufacturing	169,490	173,530	182,288	192,867	198,566	207,271	216,365	220,283	225,886	229,606	231,038
Contract Construction	20,272	22,352	24,606	27,181	27,010	29,321	31,848	31,369	30,189	28,941	25,736
Transportation, Communications & Utilities	19,908	20,177	20,953	21,744	22,601	23,375	24,192	24,247	24,376	25,097	25,668
Trade, Wholesale & Retail	81,379	81,658	84,759	88,869	91,864	94,736	96,668	98,679	102,011	104,598	106,394
Finance, Insurance & Real Estate	12,263	12,857	13,668	14,477	15,239	16,076	16,851	17,406	18,336	18,955	19,832
Services	28,116	28,995	31,052	33,281	34,670	36,600	39,019	40,331	42,129	43,285	44,612
All of the above	161,938	166,039	175,038	185,552	191,384	200,108	208,578	212,032	217,041	220,876	222,242
Other Nonmanufacturing	7,552	7,491	7,250	7,315	7,182	7,163	7,787	8,251	8,845	8,730	8,796

Source: Arkansas Average Covered Employment and Wages by Industry and County. Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 7

POPULATION PER EMPLOYEE RATIOS

AVERAGE COVERED EMPLOYMENT
State of Arkansas

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population (In Thousands)	1,786	1,806	1,853	1,875	1,897	1,894	1,899	1,901	1,902	1,913	1,923
Population per Employee In:											
Contract Construction	88.12	80.80	75.31	68.98	70.23	64.60	59.63	60.60	63.00	66.10	74.73
Transportation, Communication, and Public Utilities	89.73	89.51	88.44	86.23	83.93	81.03	78.50	78.40	78.03	76.24	74.93
Wholesale and Retail Trade	21.95	22.12	21.86	21.10	20.65	19.99	19.64	19.26	18.65	18.29	18.08
Finance, Insurance, and Real Estate	145.66	140.47	135.57	129.52	124.48	117.82	112.69	109.22	103.73	100.92	96.98
Services	63.53	62.29	59.67	56.34	54.72	51.75	48.69	47.43	45.15	44.20	43.11
All of Above	11.03	10.88	10.59	10.10	9.91	9.46	9.10	8.97	8.76	8.66	8.65

Source: Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 8
P O P U L A T I O N P E R E M P L O Y E E R A T I O S
AVERAGE COVERED EMPLOYMENT
Benton County
1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	36,272	37,820	39,186	39,588	40,318	41,473	42,613	44,938	46,467	47,417	50,476
Population per Employee In:											
Contract Construction	193.97	171.13	150.14	104.73	93.76	86.76	85.74	86.42	83.88	88.30	85.55
Transportation, Communication, and Public Utilities	128.62	123.59	118.39	121.44	116.19	107.22	107.34	108.80	109.85	121.89	117.11
Wholesale and Retail Trade	19.67	18.83	21.86	21.81	21.62	19.42	20.16	21.22	22.30	21.86	22.69
Finance, Communications, and Public Utilities	210.88	208.95	217.70	209.46	192.90	180.32	204.89	146.38	93.68	85.90	68.86
Services	81.88	81.50	75.65	64.48	61.46	58.91	49.60	44.14	40.55	37.10	35.95
All of Above	12.39	11.89	12.71	11.92	11.52	10.54	10.45	10.27	9.88	9.63	9.38

Source: Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 9
POPULATION PER EMPLOYEE RATIOS
AVERAGE COVERED EMPLOYMENT
Carroll County
1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	11,284	12,103	12,849	12,707	11,749	11,135	11,269	11,135	11,346	11,855	12,301
Population per Employee In:											
Contract Construction	182.00	48.03	26.60	32.58	72.96	206.20	313.03	309.31	246.65	139.47	157.71
Transportation, Communications, and Public Utilities	89.56	94.55	89.85	89.49	88.32	79.54	76.66	76.27	75.14	79.56	83.11
Whole and Retail Trade	28.93	29.67	29.47	27.81	28.31	25.54	25.04	23.84	23.20	24.70	24.12
Finance, Insurance, and Real Estate	- -	- -	256.98	231.04	202.53	198.84	181.76	173.98	164.43	166.97	128.14
Services	64.85	68.77	64.89	61.09	65.63	62.91	57.20	58.30	54.55	51.54	54.43
All of the Above	- -	- -	9.81	10.15	12.42	12.90	12.63	12.33	11.78	11.68	11.64

Source: Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 10

POPULATION PER EMPLOYEE RATIOS

AVERAGE COVERED EMPLOYMENT
Washington County

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Population	55,797	57,928	61,141	63,759	66,536	68,713	72,203	73,051	73,180	75,411	77,370
Population per Employee In											
Contract Construction	81.81	75.82	72.70	63.57	63.98	67.50	64.99	65.04	58.08	56.03	61.45
Transportation, Communications, and Public Utilities	45.36	44.15	47.10	44.03	46.27	44.93	41.31	41.20	37.62	35.12	35.67
Wholesale and Retail Trade	19.58	18.66	17.98	17.30	16.57	15.40	15.88	15.74	16.28	15.49	14.74
Finance, Insurance, and Real Estate	145.30	146.65	145.23	142.00	143.40	136.07	140.20	138.88	134.02	130.92	131.81
Services	61.32	57.46	54.54	51.79	52.31	52.82	50.14	47.16	45.74	45.32	45.89
All of Above	9.22	8.80	8.63	8.15	8.08	7.80	7.70	7.60	7.43	7.11	7.07

Source: Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 11

STATE OF ARKANSAS

PERCENT DISTRIBUTION EMPLOYMENT STATISTICS

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Total Civilian Labor Force											
As a Percent of Population	33.31	34.06	33.86	34.08	33.89	35.02	35.69	36.24	37.00	38.00	38.11
As a Percent of Total Employment											
Agriculture	16.07	15.32	14.28	13.40	11.67	10.36	8.38	8.54	8.75	8.95	8.40
Nonagriculture	83.93	84.68	85.72	86.60	88.33	89.64	91.62	91.46	91.25	91.05	91.60
Domestic Service, Self-Employed and Unpaid Family Workers	17.75	18.24	17.86	17.52	17.65	17.16	16.54	15.76	15 16	14.85	14.77
Wage and Salary	66.17	66.44	67.86	69.08	70.69	72.48	75.08	75.69	76.10	76.21	76.83
Manufacturing	18.44	18.47	19.36	19.88	20.66	21.36	22.88	23.14	23.59	24.14	24.13
Nonmanufacturing	47.74	47.98	48.05	49.20	50.02	51.11	52.20	52.55	52.50	52.07	52.70
As a Percent of Total Covered Employment											
Manufacturing	37.66	37.55	38.32	38.21	38.67	39.23	40.60	40.83	41.21	42.36	42.10
Nonmanufacturing	62.34	62.45	61.68	61.79	61.33	60.77	59.40	59.17	58.79	57.64	57.90
Contract Construction	7.46	8.04	8.33	8.71	8.34	8.60	8.74	8.43	7.86	7.26	6.45

Table VIII - 11 (continued)

Transportation, Communications, and Public Utilities	7.32	7.26	7.09	6.97	6.98	6.85	6.64	6.51	6.34	6.30	6.43
Wholesale and Retail Trade	29.93	29.39	28.68	28.47	28.37	27.77	26.54	26.51	26.55	26.26	26.66
Finance, Insurance, and Real Estate	4.51	4.63	4.62	4.64	4.71	4.71	4.63	4.68	4.77	4.76	4.97
Services	10.34	10.43	10.51	10.66	10.71	10.37	10.71	10.83	10.96	10.87	11.18
Other Nonmanufacturing	2.78	2.70	2.45	2.34	2.22	2.10	2.14	2.22	2.30	2.19	2.20

Source: "Arkansas Labor Force Statistics, Annual Averages, State and Areas." Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 12

B E N T O N C O U N T Y

PERCENT DISTRIBUTION EMPLOYMENT STATISTICS

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Total Civilian Labor Force											
As a Percent of Population	34.94	35.76	35.79	36.06	36.52	38.21	39.13	39.61	41.48	42.86	42.89
As a Percent of Total Employment											
Agriculture	21.09	18.97	17.36	16.33	14.05	11.77	9.50	9.43	9.09	8.75	7.74
Nonagriculture	78.91	81.03	82.64	83.67	85.94	88.22	90.50	90.57	90.90	91.25	92.26
Domestic Service, Self-Employed and Unpaid Family Workers	20.04	20.95	20.75	20.41	20.54	20.40	19.63	19.00	18.32	18.02	18.02
Wage and Salary	58.87	60.08	61.89	63.27	65.41	67.82	70.87	71.58	72.59	73.23	74.24
Manufacturing	24.00	25.30	29.62	29.31	31.35	32.17	34.74	33.73	34.46	35.52	36.15
Nonmanufacturing	34.86	34.78	32.26	33.95	34.05	35.66	36.14	37.85	38.12	37.71	38.09
As a Percent of Total Covered Employment											
Manufacturing	47.65	48.28	54.34	52.98	54.24	54.15	56.49	55.41	56.15	56.98	56.83
Nonmanufacturing	52.35	51.72	45.66	47.02	45.76	45.85	43.51	44.59	43.85	43.02	43.17
Contract Construction	3.09	3.34	3.61	5.01	5.32	5.32	5.04	50.2	4.89	4.44	4.48

Table VIII - 13

C A R R O L L C O U N T Y

PERCENT DISTRIBUTION EMPLOYMENT STATISTICS

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Total Civilian Labor Force											
As a Percent of Population	37.00	38.01	38.33	37.91	35.75	36.82	35.40	36.37	37.01	39.43	37.80
As a Percent of Total Employment											
Agriculture	29.03	24.71	21.43	20.79	21.29	20.26	18.42	19.33	18.99	17.05	16.18
Nonagriculture	70.97	75.29	78.57	79.21	78.71	79.73	81.58	80.67	81.01	82.95	83.81
Domestic Service, Self-Employed and Unpaid Family Workers	21.29	23.53	23.63	23.03	23.23	22.22	21.71	20.67	19.62	19.89	20.23
Wage and Salary	49.68	51.76	54.95	56.18	55.49	55.52	59.87	60.00	61.39	63.07	63.59
Manufacturing	21.29	21.18	19.33	20.79	22.58	22.22	24.34	24.00	24.05	26.70	24.86
Nonmanufacturing	28.39	30.59	35.71	35.39	32.90	35.29	35.53	36.00	37.34	38.07	38.73
As a Percent of Total Covered Employment											
Manufacturing	50.03	46.86	39.53	41.64	47.58	48.50	50.11	48.40	48.46	53.14	49.03
Nonmanufacturing	49.97	53.14	60.47	58.36	52.42	51.50	49.89	51.60	51.54	46.85	50.97
Contract Construction	3.67	12.98	21.70	17.48	8.55	3.06	1.93	1.96	2.32	3.68	3.52

Table VIII - 12 (continued)

Transportation, Communications, and Public Utilities	4.67	4.62	4.58	4.32	4.29	4.29	4.03	4.00	3.73	3.22	3.27
Wholesale and Retail Trade	30.52	30.34	24.79	24.03	23.06	23.78	21.46	20.47	18.40	17.95	16.89
Finance, Insurance, and Real Estate	2.85	2.73	2.49	2.50	2.59	2.56	2.11	2.97	4.38	4.57	5.56
Services	7.33	7.01	7.17	8.13	8.12	7.84	8.72	9.84	10.11	10.58	10.65
Other Nonmanufacturing	3.89	3.67	3.03	3.03	2.38	2.06	2.16	2.28	2.34	2.25	2.31

Source: "Arkansas Labor Force Statistics, Annual Averages, State and Areas." Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 13 (continued)

Transportation, Communications, and Public Utilities	7.65	6.59	6.42	6.36	7.06	7.94	7.86	7.94	7.62	6.45	6.68
Wholesale and Retail Trade	23.68	21.01	19.59	20.48	22.04	24.73	24.06	25.34	24.68	20.81	23.02
Finance, Insurance, and Real Estate	*	*	2.25	2.47	3.08	3.18	3.32	3.48	3.48	3.07	4.33
Services	10.56	9.06	8.89	9.32	9.51	10.04	10.53	10.39	10.50	9.97	10.20
Other Nonmanufacturing*	4.31	3.50	1.62	2.24	2.18	2.55	2.19	2.50	2.92	2.86	3.25

*"Finance, Insurance, and Real Estate" included in "Other Nonmanufacturing" for 1960 and 1961.

Source: "Arkansas Labor Force Statistics, Annual Averages, State and Areas." Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 14

MADISON COUNTY

PERCENT DISTRIBUTION EMPLOYMENT STATISTICS

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Total Civilian Labor Force											
As a Percent of Population	30.32	30.27	28.89	28.09	26.95	26.41	25.92	26.69	26.12	25.93	25.65
As a Percent of Total Employment											
Agriculture	52.43	49.50	49.48	48.42	46.06	42.05	39.29	40.23	40.91	38.71	38.44
Nonagriculture	47.57	50.50	51.52	51.58	53.93	57.95	60.71	59.77	59.09	61.29	62.22
Domestic Service, Self-Employed and Unpaid Family Workers	20.39	21.78	20.62	21.05	21.35	22.72	22.62	21.84	20.45	21.50	21.11
Wage and Salary	27.18	28.71	29.90	30.53	32.58	35.23	38.10	37.93	38.64	39.78	41.11
Manufacturing	6.80	5.94	6.19	5.26	5.62	6.82	5.95	5.75	5.68	5.38	6.67
NonManufacturing	20.39	22.77	23.71	25.26	26.97	28.40	32.14	32.18	32.95	34.41	34.44
As a Percent of Total Covered Employment											
Manufacturing	40.00	36.57	33.72	30.43	27.15	30.67	27.91	26.68	26.17	26.89	28.18
Nonmanufacturing	60.00	63.43	66.28	69.57	72.85	69.33	72.09	73.32	73.83	73.11	71.81

Table VIII - 14 (continued)

Source: "Arkansas Labor Force Statistics, Annual Averages, State and Areas." Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

PERCENT DISTRIBUTION EMPLOYMENT STATISTICS

1960 - 1970

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Total Civilian Labor Force											
As a Percent of Population	36.24	36.89	36.64	37.41	37.94	40.49	41.62	41.65	42.60	43.46	45.04
As a Percent of Total Employment											
Agriculture	15.18	14.40	13.34	12.73	11.86	10.91	9.69	9.38	9.33	8.46	8.04
Nonagriculture	84.81	85.59	86.65	87.26	88.13	89.08	90.30	90.61	90.67	91.54	91.96
Domestic Service, Self-Employed and Unpaid Family Workers	14.65	15.14	14.75	14.37	14.44	13.92	13.30	12.79	12.24	12.12	12.05
Wage and Salary	70.15	70.44	71.89	72.88	73.68	75.16	76.99	77.81	78.43	79.42	79.91
Manufacturing	20.02	20.07	20.84	20.19	20.94	23.42	25.66	23.46	22.23	22.33	22.32
Nonmanufacturing	50.13	50.36	51.05	52.68	52.73	51.74	51.33	54.35	56.20	57.09	57.59
As a Percent of Total Covered Employment											
Manufacturing	40.04	38.36	38.23	36.85	37.76	40.74	44.28	42.05	39.52	40.21	39.42
Nonmanufacturing	59.95	61.63	61.76	63.14	62.23	59.26	55.72	57.95	60.47	59.78	60.57
Contract Construction	6.56	6.95	7.23	8.00	7.73	6.68	6.46	6.54	7.26	7.12	6.54
Transportation, Communications, and Public Utilities	12.30	11.94	11.15	11.54	10.69	10.03	10.19	10.32	11.21	11.36	11.26

Table VIII - 15 (continued)

Wholesale and Retail Trade	27.40	28.25	29.24	29.37	29.84	29.26	26.45	27.00	25.90	25.76	27.24
Finance, Insurance, and Real Estate	3.69	3.59	3.61	3.58	3.45	3.31	3.00	3.06	3.15	3.05	3.05
Services	8.75	9.17	9.63	9.81	9.45	8.53	8.38	9.02	9.22	8.81	8.76
Other Nonmanufacturing	1.70	1.72	.87	.83	1.08	1.44	1.27	2.01	3.72	3.69	3.72

Source: "Arkansas Labor Force Statistics, Annual Averages, State and Areas." Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Intercensual Population Estimates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

"Arkansas Average Covered Employment and Wages by Industry and County." Employment Security Division, Department of Labor, Little Rock, Arkansas.

Table VIII - 16

AVERAGE ANNUAL RATES OF CHANGE

SELECTED EMPLOYMENT CATEGORIES

	Covered Manufacturing Employment			Covered Nonmanufacturing Employment			Total Covered Employment			Total Employment (Covered + Noncovered)			Agricultural Employment		
	1960-1965	1965-1970	1960-1970	1960-1965	1965-1970	1960-1970	1960-1965	1965-1970	1960-1970	1960-1965	1965-1970	1960-1970	1960-1965	1965-1970	1960-1970
State	6.14	5.10	6.40	4.45	2.29	3.63	5.09	3.39	4.67	2.64	2.45	2.71	-5.40	-2.06	-3.45
Benton Co.	13.57	10.78	16.00	6.03	7.16	7.97	9.73	9.32	11.80	5.71	7.42	7.26	-5.94	-0.84	-3.62
Carroll Co.	0.75	5.40	3.17	2.06	4.86	3.17	1.40	5.12	3.44	-0.26	2.61	1.16	-6.22	-0.64	-3.33
Madison Co.	-3.29	0.65	-1.41	5.17	3.17	2.18	1.78	2.37	2.18	-2.91	0.45	0.22	-6.29	-1.62	-3.70
Washington Co.	9.84	4.44	8.24	8.99	5.82	8.71	9.33	5.26	8.78	7.82	5.28	7.59	0.00	-1.38	-0.69

Source: Arkansas Labor Force Statistics, Annual Averages, State and Areas. Arkansas Employment Security Division, Little Rock, Arkansas.

Arkansas Average Covered Employment and Wages by Industry and County. Employment Security Division, Department of Labor. Little Rock, Arkansas.

Table VIII - 17

AVERAGE ANNUAL RATES OF CHANGE: POPULATION PER EMPLOYEE IN SELECTED CATEGORIES OF EMPLOYMENT

1960 - 1970

	State	Benton	Carroll	Washington	State	Benton	Carroll	Washington	State	Benton	Carroll	Washington
	1960 - 1965				1965 - 1970				1960 - 1970			
Population	1.20	2.86	-0.26	4.62	0.30	4.34	2.09	2.51	0.76	3.91	0.90	3.68
Contract Construction	-5.34	-11.05	+2.65	-3.50	+3.13	-0.28	-4.70	-1.79	-1.52	-5.58	-1.33	-2.48
Transportation, Communications & Public Utilities	-1.94	-3.32	-2.23	-0.19	-1.50	-1.84	+0.89	-4.12	-1.65	-0.89	-0.72	-2.13
Wholesale & Retail Trade	-1.78	-0.25	-2.34	-4.27	-1.91	+3.36	-1.11	-0.85	-1.76	+1.53	-1.66	-2.47
Finance, Insurance, & Real Estate	-3.82	-2.90	N.A.	-1.27	-3.55	-7.28	-7.11	-0.62	-3.34	-6.73	N.A.	-0.92
Services	-4.20	-5.61	-0.60	-2.77	-3.34	-7.79	-2.69	-2.62	-3.21	-5.61	-1.60	-2.51
All of the Above	-2.84	-2.98	N.A.	-3.08	-1.71	-2.20	-1.95	-1.87	-2.15	-2.43	N.A.	-2.33

Source: Arkansas Intercensual Population E timates, By County, 1960 and 1970. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas.

Table VIII - 18

COVERED EMPLOYMENT AS A PERCENT OF ALL EMPLOYMENT (1960, 1965, 1970)

	1960	1965	1970
State	48.99	54.29	56.57
Benton County	50.45	59.58	63.70
Carroll County	52.50	47.09	51.21
Madison County	16.50	21.04	23.02
Washington County	54.42	57.37	57.31

Source: Arkansas Average Covered Employment and Wages by Industry and County. Employment Security Division, Department of Labor, Little Rock, Arkansas.

CHAPTER IX

AGRICULTURE

Since the Beaver Lake Reservoir Project removed only 1.78 percent of the land area of the four county area it did not cause an appreciable change in agricultural land use. Each of the four counties had a higher percentage of land in farms than the state average through 1964. An increase in percent of land in farms occurred between 1945 and 1950 for the state and the four counties. Since 1950 a declining percentage of land in farms has been noted for each of the four counties and the state. One exception to this trend pattern occurred in Washington County between 1964 and 1969 when agricultural land use increased from 57.5 percent to 59.6 percent of total land area.

Between 1964 and 1969 Benton County, which lost 4.78 percent of its land area to the project, had an average annual rate of change in number of acres in farms of -1.92 percent as compared with -1.02 percent between 1959 and 1964. Agricultural acerage for Carroll and Madison Counties also decreased at an increased rate between 1964 and 1969 as compared to 1960 - 1964.

The percent of land in farms in Madison County declined below the state average in 1969. However, since the Beaver Project took less than 1/10 of 1 percent of this county's land area, this must be attributable to other factors.

Carroll and Benton Counties lost the greatest amount of land to the project. Thus, their accelerated rates of decrease in agricultural land use can be partially attributed to the Beaver Project.

Washington County registered an absolute increase in number of acres in farms between 1964 and 1969.

IRRIGATED LAND

The water resources development attributable to Beaver Reservoir has apparently had little impact on the number of acres of irrigated farm land. Less than one percent of farm land in the four county region was irrigated in 1969 compared to the state average of 6.34 percent. In absolute terms, the four county region had 3,710 irrigated acres in 1969 compared to 859 in 1959, and 2,433 in 1954.

LAKE IMPACT ON AGRICULTURE

Agricultural Loss Associated with Lake. As noted above, rate of change in agricultural land use does not appear from data reported in the Census of Agriculture to have been greatly altered by the loss of land taken by the Beaver Reservoir Project. (It should be noted that the 1969 Census of Agriculture "Percentage of Land in Farms" was computed after allowing for total land loss associated with impoundment, etc.)

Data presented do make possible calculations of approximate net farm income and agricultural sales losses associated with the Beaver Project.

Method. It is estimated that approximately 30 percent of the land lost to the Beaver Project was in agricultural use. Employing 1964 and 1969 Census of Agriculture data, annual average Farm

Sales per acre and Net Farm Income (from Sales) per acre was computed. The following results were obtained.

1. The average annual loss in "Value of Agricultural Products Sold" was $2,284,175 for Benton County; $198,707 for Carroll County; $389 for Madison County; and $506,711 for Washington County. The total was $2,989,982.

2. The average annual loss in Net Farm Income was $199,920 for Benton County; $26,157 for Carroll County; $46 for Madison County; and $58,136 for Washington County. The total was $284,439.

Table IX - 1

AGRICULTURAL VARIABLES

A. Number of Farms

Area/Year	1945	1950	1954	1959*	1964	1969
State	198,769	182,429	145,076	95,007	79,898	60,433
Benton	5,162	5,225	4,492	3,619	3,217	2,650
Carroll	2,196	2,166	1,828	1,463	1,291	1,121
Madison	2,243	2,347	1,918	1,471	1,392	1,057
Washington	4,639	4,903	4,094	3,351	3,072	2,693

*Decrease in number of farms due to redefinition of farms, decrease by area--State, 9,681; Benton, 305; Carroll, 93; Madison, 182; Washington, 471.

B. Acres in Farms

Area/Year	1945	1950	1954	1959	1964	1969
State	17,455,900	18,871,244	17,944,367	16,458,515	16,565,299	15,694,527
Benton	483,914	448,516	418,975	389,114	343,176	310,247
Carroll	314,578	324,741	318,449	295,667	277,890	247,721
Madison	304,280	331,582	308,197	276,524	271,593	234,267
Washington	420,934	450,954	405,999	371,939	354,677	365,364

(Table IX - 1 continued)

AGRICULTURAL VARIABLES

C. Average Value of Land and Building Per Farm

Area/Year	1945	1950	1954	1959	1964	1969
State	$3,334	$6,062	$8,451	$18,915	$36,734	$67,532
Benton	3,549	6,404	8,872	13,722	21,975	39,309
Carroll	3,288	6,079	8,551	12,681	19,845	35,452
Madison	2,333	3,317	5,209	7,718	18,602	35,998
Washington	3,875	6,404	8,316	12,705	26,233	42,127

D. Average Value of Land and Buildings Per Acre

Area/Year	1945	1950	1954	1959	1964	1969
State	$37.97	$60.18	$72.96	$109.19	$177.51	$260.03
Benton	41.74	74.63	94.91	128.95	198.97	335.76
Carroll	22.95	39.78	44.57	65.24	89.95	160.72
Madison	17.20	23.54	32.38	45.04	96.07	162.42
Washington	42.71	69.99	84.42	120.67	228.64	310.15

(Table IX - 1 continued)

A G R I C U L T U R A L V A R I A B L E S

E. Average Size of Farm (Acres)

Area/Year	1945	1950	1954	1959	1964	1969
State	87.8	103.4	123.7	173.2	207.3	259.7
Benton	85.0	85.8	93.3	107.5	106.7	117.0
Carroll	143.3	[2]149.9	174.2	202.1	215.3	220.5
Madison	135.7	141.3	160.7	188.0	195.1	221.6
Washington	90.7	92.0	99.2	111.0	115.5	135.6

F. Total Value of All Farm Products Sold

Area/Year	1945	1950	1954	1959	1964	1969
State	$268,718,603	$392,850,799	$491,764,584	$639,186,957	$830,392,714	$972,836,733
Benton	8,519,571	15,260,815	17,273,773	24,431,291	32,151,740	54,060,358
Carroll	2,193,814	3,433,983	5,151,434	7,671,473	11,076,803	15,462,378
Madison	1,633,524	2,445,133	3,405,546	6,924,826	11,629,319	20,393,966
Washington	6,423,017	13,291,575	16,268,292	25,971,108	50,002,283	96,521,282

AGRICULTURAL VARIABLES

G. Percent of Land in Farms

Area/Year	1945	1950	1954	1959	1964	1969	1969*
State	51.8	56.0	53.2	49.0	49.3	47.2	(46.7)
Benton	77.4	79.1	73.9	68.6	60.5	57.0*	(53.4)
Carroll	77.5	80.0	78.5	72.9	68.5	61.7	(61.0)
Madison	57.1	62.3	57.9	51.9	51.0	44.0	(43.9)
Washington	68.2	73.2	65.9	60.3	57.5	59.6	(59.2)

*Acres in farms as a percent of total land area in 1959.

H. Value of Farm Per Acre

Area/Year	1945	1950	1954	1959	1964	1969
State	$15.40	$20.81	$27.40	$38.83	$51.95	$61.98
Benton	17.60	34.02	41.22	62.78	93.68	174.24
Carroll	6.97	10.57	16.17	25.94	39.86	62.41
Madison	5.36	7.37	11.04	25.04	42.81	87.05
Washington	15.25	29.47	40.06	69.82	140.97	264.17

I. Percent of Farm Land Irrigated

Area/Year	1950	1954	1959	1964	1969
State	2.55	3.27	4.32	5.88	6.43
Benton	0.02	0.31	0.14	0.20	0.32
Carroll	0.0	0.04	0.05	0.03	0.32
Madison	-	0.04	0.05	0.08	0.18
Washington	0.03	0.21	0.08	0.32	0.54

(Table IX - 1 continued)

A G R I C U'L T U R A L V A R I A B L E S

J. Irrigated Land (Number of Farms)

Area/Year	1950	1954	1959	1964	1969
State	3,050	6,218	5,652	6,220	5,728
Benton	10	60	24	25	36
Carroll	0	12	1	2	8
Madison	1	11	0	6	14
Washington	18	46	12	41	35

K. Total Acres Irrigated

Area/Year	1950	1954	1959	1964	1969
State	481,871	857,863	711,812	974,295	1,010,200
Benton	75	1,308	529	693	998
Carroll	0	107	6	71	456
Madison	1	155	0	229	273
Washington	170 246	863 2,433	324 859	1,163 2,156	1,983 3,710

Source: United States Census of Agriculture, Arkansas. U.S. Department of Commerce, Bureau of the Census, 1950, 1954, 1959, 1964, and 1969.

Table IX - 2

AGRICULTURAL VARIABLES
AVERAGE PERCENTAGE CHANGE

A. Number of Farms

Area/Year	1945-1950	1950-1954	1954-1959	1959-1964	1964-1969
State	-1.64	-5.12	-6.90	-3.18	-4.87
Benton	0.38	-3.50	-3.88	-2.22	-3.52
Carroll	-0.27	-3.90	-3.99	-2.35	-2.63
Madison	0.92	-4.57	-4.66	-1.07	-4.81
Washington	1.13	-4.12	-3.44	-1.66	-2.46

B. Average Value of Land & Buildings Per Farm

Area/Year	1945-1950	1950-1954	1954-1959	1959-1964	1964-1969
State	16.36	7.88	30.95	20.37	16.77
Benton	16.08	7.70	13.66	12.02	15.77
Carroll	16.97	8.13	12.07	11.29	15.72
Madison	8.43	11.40	12.04	28.20	18.70
Washington	13.05	5.97	13.19	21.29	12.11

C. Average Size of Farm Acres

Area/Year	1945-1950	1950-1954	1954-1959	1959-1964	1964-1969
State	+3.55	4.90	8.00	3.93	5.05
Benton	0.18	2.18	3.04	-0.15	1.93
Carroll	2.09	4.05	3.20	1.30	.48
Madison	0.82	3.43	3.39	0.75	2.71
Washington	0.28	1.95	2.37	0.81	3.48

(Table IX - 2 continued)

AGRICULTURAL VARIABLES
AVERAGE PERCENTAGE CHANGE

D. Acres in Farms

Area/Year	1945-1950	1950-1954	1954-1959	1959-1964	1964-1969
State	1.62	-1.23	-1.35	0.13	-1.05
Benton	-1.46	-1.65	-1.43	-1.02	-1.92
Carroll	0.65	-0.49	-1.43	-1.20	-2.21
Madison	1.79	-1.76	-2.06	-0.36	-2.79
Washington	1.43	-2.49	-1.68	-0.93	0.60

E. Average Value of Land & Buildings Per Acre

Area/Year	1945-1950	1950-1954	1954-1959	1959-1964	1964-1969
State	11.70	5.31	9.93	12.57	9.29
Benton	15.76	6.79	7.17	10.86	13.74
Carroll	14.67	3.01	9.28	7.54	15.73
Madison	7.37	9.39	7.82	22.66	13.81
Washington	13.19	5.16	8.59	17.90	7.16

F. Total Value of All Farm Products Sold

Area/Year	1945-1950	1950-1954	1954-1959	1959-1964	1964-1969
State	9.24	6.30	6.00	5.98	3.43
Benton	15.82	3.30	10.36	6.32	13.62
Carroll	11.30	12.50	9.78	8.88	7.91
Madison	9.93	9.83	20.66	13.59	15.07
Washington	21.39	5.60	11.93	18.51	18.60

(Table IX - 2 continued)

AGRICULTURAL VARIABLES
AVERAGE PERCENTAGE CHANGE

G. Irrigated Land (Number of Farms)

Area/Year	1950-1954	1954-1959	1959-1964	1964-1969
State	25.96	-1.82	2.00	-1.58
Benton	125.00	-12.00	0.83	8.80
Carroll	-	18.33	20.00	60.00
Madison	250.00	-20.00	-	26.66
Washington	38.80	-14.78	48.33	2.92

H. Irrigated Land (Number of Acres)

Area/Year	1950-1954	1954-1959	1959-1964	1964-1969
State	19.50	-3.40	7.37	8.38
Benton	411.00	-11.91	6.20	8.80
Carroll	-	-18.88	216.66	108.45
Madison	3,850.00	-20.00	-	3.84
Washington	101.91	-12.49	51.79	14.10

I. Irrigated Land as a Percent of Total Land in Farms

Area/Year	1950	1954	1959	1964	1969
State	2.55	3.27	4.32	5.88	6.43
Benton	.02	.31	.14	.20	.32
Carroll	*0.0	.04	.05	.08	.18
Washington	*0.0	*0.0	*0.0	*0.0	*0.0

*Less than 0.01%

Source: United States Census of Agriculture, Arkansas, U.S. Department of Commerce, Bureau of the Census, 1950, 1954, 1959, 1964, and 1969.

Table IX - 3

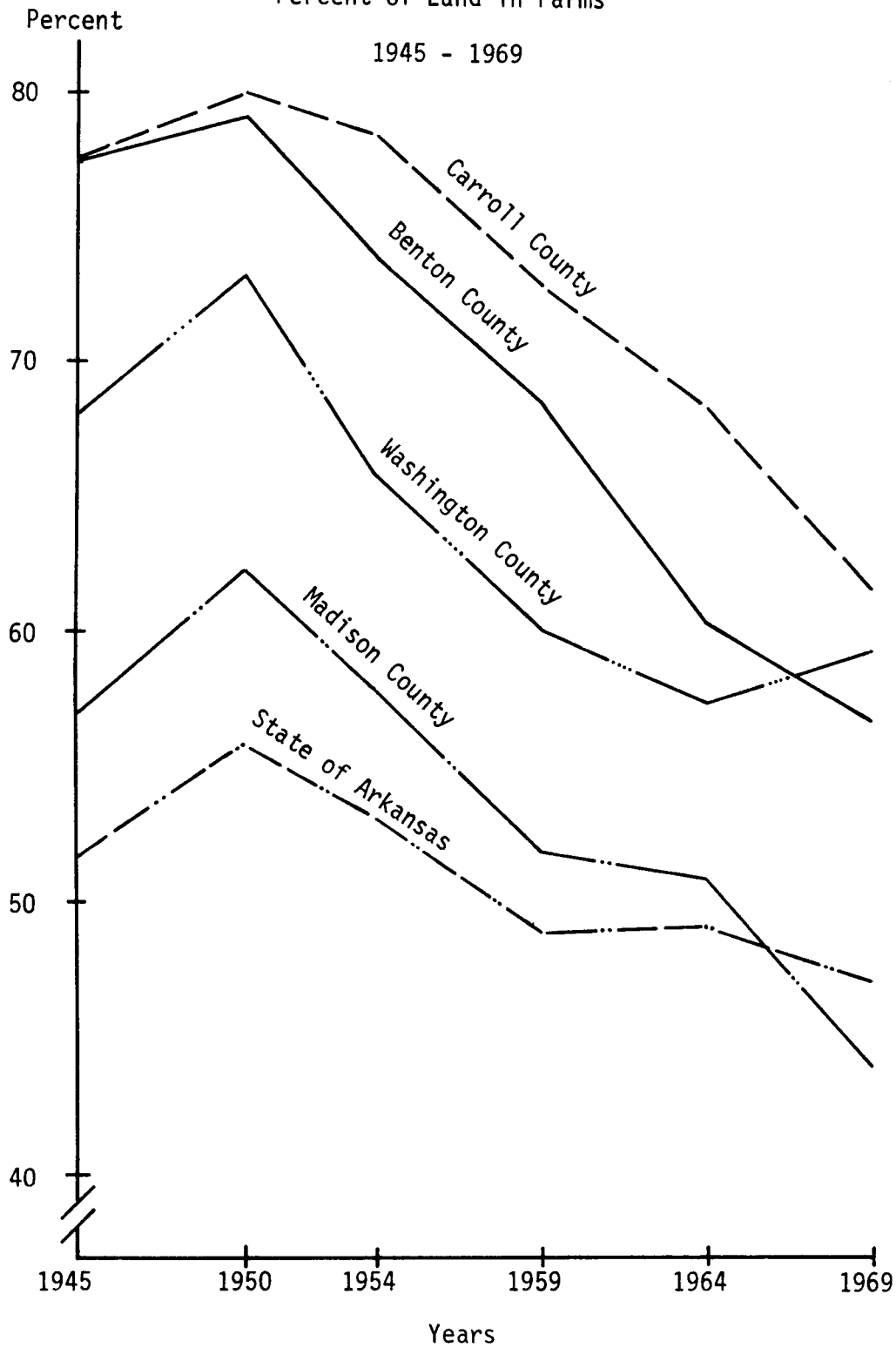
ESTIMATE LOSS OF VALUE OF FARM PRODUCTS SOLD AND NET FARM INCOME DUE TO LAND LOSS TO BEAVER LAKE PROJECT

	1964	1965	1966	1967	1968	1969	1970
Benton County							
Acres	8,334						
Sales Per Acre ($)	93.69	109.79	125.89	141.99	158.09	174.23	190.29
Total Sales ($000's)	780.80	915.00	1,049.00	1,183.30	1,317.50	1,452.00	1,585.80
Net Income Per Acre ($)	8.41	9.86	11.31	12.76	14.21	15.64	17.09
Total Net Income ($000's)	70.10	73.80	94.30	106.30	118.40	130.30	142.40
Carroll County							
Acres	1,780	4,003	3,922	3,841	3,760	3,679	2,598
Sales Per Acre ($)	39.86	44.39	48.92	53.45	57.98	62.53	67.04
Total Sales ($000's)	71.00	79.00	87.10	95.10	103.20	111.30	119.30
Net Income Per Acre ($)	5.26	5.85	6.44	7.03	7.62	8.21	8.80
Total Net Income ($000's)	9.40	10.40	11.50	12.50	13.60	14.60	15.70
Madison County							
Acres	4	6	6	5.5	5	5	5
Sales Per Acre ($)	42.82	51.66	60.50	69.34	78.18	87.05	95.86
Total Sales ($000's)	0.20	0.20	0.20	0.30	0.30	0.30	0.40
Net Income Per Acre ($)	5.10	6.15	7.20	8.24	9.29	10.34	11.39
Total Net Income ($000's)	0.02	0.02	0.03	0.03	0.04	0.04	0.05
Washington County							
Acres	1,425	2,477	2,495	2,512	2,532	2,550	2,568
Sales Per Acre ($)	140.98	165.62	190.26	214.90	239.54	264.18	288.82
Total Sales ($000's)	200.90	236.00	271.10	306.20	341.30	376.50	411.60
Net Income Per Acre ($)	16.21	19.04	21.87	24.69	27.52	30.35	33.18
Total Net Income ($000's)	23.10	27.10	31.20	35.20	39.20	43.20	47.30
Four County Totals							
Total Sales ($000's)	1,052.90	1,230.20	1,407.40	1,534.90	1,762.30	1,940.10	2,117.10
Total Net Income ($000's)	102.60	111.30	137.00	154.00	171.20	188.10	205.50

Figure IX - A

Percent of Land in Farms

1945 - 1969



Source: Table IX-1-G.

CHAPTER X

RETAIL TRADE PATTERNS

Retail Trade data reported in the U.S. Department of Commerce, Census of Business were examined to determine if any discernible changes were detectable that could be attributed to Beaver Lake tourist activity. Since 1967 is the latest year for which data are available, all findings must be considered tentative and meaningful only when considered along with other data presented in this study.

If tourist trade was increased as a result of Beaver Lake reservoir, it should be reflected in relative increases, not only in retail trade, but in specific categories of trade most likely to be influenced by tourist activity: gasoline service stations, eating and drinking places, and lodging facilities.

FINDINGS

It was found that total retail sales, gasoline service station sales and sales of eating and drinking places increased between 1963 and 1967 at rates in excess of the state average. Also, rates of growth for the four counties, aggregated and individually, accelerated over the rates observed during the period 1958-1963. These changes suggest the influence of Beaver Lake (Table X-1); however, they also occurred during a period when other non-lake related economic variables were influencing economic growth in the area, e.g., growth of manufacturing employment.

Of more significance is the increasing share of retail sales accounted for by gasoline service stations in Benton County. In 1963 this category accounted for 7.0 percent of total retail sales, but increased to 8.8 percent of the total in 1967. In the other three counties this category experienced relative declines (Tables X-2 and X-3).

Sales of eating and drinking places as a percent of total retail sales were below state proportions in 1954 but were approximately equal to the state ratio by 1967. In terms of rates of change, Washington County had the fastest growth since 1963 while Benton and Carrol Counties had rates of growth approximately equal to the state average (Tables X-4 and X-5).

Estimating the Economic Impact of Tourist Trade. As part of another study on tourism (6) in a seven-county area in Northwest Arkansas, which includes the four-county area under study here, a survey of various tourist-serving businesses was conducted to determine the extent to which sales were attributable to tourist trade (Table X-6).

Using data for 1967 from the Census of Business (30) in conjunction with the results of the survey it was possible to estimate sales to tourists as a percent of total sales in two tourist serving categories: gasoline service stations and eating and drinking places. From this base of 1967, estimates of lake related tourist sales were made for 1966 through 1970 by using the annual growth rate of lake visitations (See Chapter XIII).

Based upon operating ratios of these two categories (6) estimates were made of wages paid to employees and owners compensations.

(See Table X-7).

Since cost-of-goods sold generally represents an outflow of funds from the immediate area, total sales figures tend to overstate the impact of tourist expenditures. Compensation to owners plus employee compensation were considered to be the primary impact of tourist trade. It was assumed that these net income increments would have a multiplier effect on area income of 1.5, thus tourist attributable primary impact income multiplied by 1.5 was used to measure lake impact in these two areas of retail trade.

Comparable data were not available for determining impact of such specific categories as hotels, etc.; however, the employment data reported in this study (Chapter XIII) revealed approximations of lake related employment in services. Total lake related wages paid to service employees were computed using data published by the Arkansas Employment Security Division. From the wage income figures it was then possible to estimate owners' compensation and total primary economic impact and total impact of the lake on general service trades in the area.

Data furnished by the U.S. Army Corps of Engineers on sales of fishing tackle, motors, etc., in conjunction with operating ratios were used to determine economic impact of retail sales in this area. These data were not reported by county, but pertain primarily to Benton County and were allocated by county in proportion to total area tourist sales, service stations, and eating and drinking places.

FINDINGS

It was found that between 1966 and 1970 lake related sales had an impact that accounts for approximately 2.0 percent of Total Personal

Income in the area (Table X-8). The dollar amount of impact was greatest for Benton County, ranging from $1,412,022 in 1966 to $4,193,868 in 1970. These estimates were based on an annual average increase in lake visitations of 8.9 percent for the county.

Carroll County, based upon an average annual increase in visitation of 24.0 percent, experienced a net impact of $244,621 in 1966 to $613,685 in 1970.

Madison County, which has the least shoreline, was allocated impact based upon the Benton County visitation growth rate. The impact ranged from $59,877 in 1966 to $84,887 in 1970.

Washington County estimates were also based upon the Benton County visitation growth rate. The actual annual growth rate at the one Washington County access point was 118 percent. This, notwithstanding, its total visitations were only about 5 percent of the total. The Benton County rate seemed appropriate since U.S. Highway 71 through Washington County represents the major southern approach to the Benton County access points. The impact in Washington County was $589,021 in 1966 and grew to $835,026 by 1970.

Sales of fishing tackle, motors, etc., were not reported on a county basis; however, its impact on the area was estimated to be $403,363 in 1966 and $794,000 in 1970.

Table X-1
AVERAGE ANNUAL PERCENT CHANGES IN RETAIL SALES

	State	Four-County Total	Benton	Carroll	Madison	Washington
1954-58	1.8	3.7	3.6	5.8	8.8	2.4
1958-63	1.4	-1.6	-3.6	-2.2	-1.4	0.3
1963-67	3.9	4.8	6.5	0.1	1.4	5.6

Table X-2
AVERAGE ANNUAL PERCENT CHANGES IN SALES OF GASOLINE SERVICE STATIONS

	State	Four-County Total	Benton	Carroll	Madison	Washington
1954-58	8.4	11.3	3.4	11.1	- -	16.8
1958-63	5.2	6.0	2.0	2.8	17.6	8.6
1963-67	8.5	8.1	10.9	8.9	.5	7.1

Table X-3
SALES OF GASOLINE SERVICE STATIONS AS A PERCENT OF TOTAL RETAIL SALES

	State	Four-County Total	Benton	Carroll	Madison	Washington
1954	6.9	6.1	7.7	7.2	N.A.	5.2
1958	8.0	7.1	7.5	7.4	6.0	6.8
1963	7.8	7.0	7.9	6.7	7.8	6.6
1967	8.1	6.7	8.8	7.0	7.3	5.8

Source: Tables X-1 - 3 — derived from data in Census of Business, Retail and Wholesale Trade, Department of Commerce, Washington, D.C., 1954, 1958, 1963, and 1967.

Table X-4
SALES OF EATING AND DRINKING PLACES AS A PERCENT OF TOTAL RETAIL SALES

	State	Four-County Total	Benton	Carroll	Madison	Washington
1954	4.7	3.8	2.0	6.1	2.0	4.9
1958	4.5	3.5	2.6	6.4	0.6	3.6
1963	4.2	4.0	3.5	5.8	2.4	4.2
1967	4.4	4.3	3.7	5.9	3.5	4.4

Table X-5
AVERAGE ANNUAL PERCENT CHANGES IN SALES OF EATING AND DRINKING ESTABLISHMENTS

	State	Four-County Total	Benton	Carroll	Madison	Washington
1954-58	2.5	4.2	12.9	11.3	-12.9	-1.3
1958-63	4.0	9.8	8.2	2.7	95.5	13.8
1963-67	8.4	11.8	8.4	8.2	15.0	13.8

Source: Tables X-4 - 5 — derived from data in Census of Business, Retail and Wholesale Trade, Department of Commerce, Washington, D.C., 1954, 1958, 1963, and 1967.

Table X-6
ESTIMATES OF TOURIST TRADE AS PERCENT OF TOTAL SALES

	Gasoline Service Stations	Eating and Drinking Places	Lodging
Benton	15	35	55
Carroll	45	50	90
Madison	25	25	85
Washington	15	15	45

Source: Burns, Kenneth. "The Economic Impact of Tourism in the Northwest Arkansas Economic Development District. Doctoral dissertation in progress (Donald R. Market, Associate Professor of Economics, director) College of Business, University of Arkansas, Fayetteville, Arkansas. Unpublished.

Table X-7
DIVISION OF VARIOUS KINDS OF RECREATION EXPENDITURES ACCORDING TO RECIPIENT OF MONEY

	Percent Distribution of Expenditure			
Item	For Goods Purchased	Owner's Compensation	Wages	Other
Food				
Restaurants	52	8	20	20
Groceries	85	5	5	5
Lodging	25	15	30	30
Transportation				
Gas and Oil	75	8	8	9
Other	65	10	10	15
Miscellaneous	60	15	7	18

Table X-8

TOURIST GENERATED LAKE INCOME
RETAIL TRADE AND SERVICES

	1966	1967	1968	1969	1970
Benton County					
Eating and Drinking Places					
Wages	$ 129,726	$ 142,400	$ 155,073	$ 168,874	$ 183,903
Owner's Compensation	51,908	56,980	62,051	67,574	73,587
Gasoline Service Stations					
Wages	53,567	58,800	64,033	69,732	75,938
Owner's Compensation	53,567	58,800	64,033	69,732	75,938
Services					
Wages	316,290	347,190	574,587	990,448	1,193,273
Owner's Compensation	316,290	347,190	574,587	990,448	1,193,273
TOTAL	921,348	1,011,360	1,464,364	2,356,808	2,795,912
TOTAL X 1.5	1,412,022	1,517,040	2,196,546	3,535,212	4,193,868
Carroll County					
Eating and Drinking Places					
Wages	72,124	94,900	117,676	145,918	180,938
Owner's Compensation	28,849	37,960	47,070	58,367	72,375
Gasoline Service Stations					
Wages	31,054	40,860	50,666	62,826	77,905
Owner's Compansation	31,054	40,860	50,666	62,826	77,905
TOTAL	163,081	214,580	166,078	329,938	409,123
TOTAL X 1.5	244,621	321,870	399,117	494,907	613,685

Table X-8 (cont.)

	1966	1967	1968	1969	1970
Madison County					
Eating and Drinking					
Wages	$ 13,027	$ 14,300	$ 15,572	$ 16,959	$ 18,468
Owner's Compensation	5,211	5,720	6,229	6,783	7,387
Gasoline Service Stations					
Wages	10,840	11,900	12,959	14,112	15,368
Owner's Compensation	10,840	11,900	12,959	14,112	15,368
TOTAL	39,918	43,820	47,716	51,966	56,591
TOTAL X 1.5	59,877	65,730	71,574	77,949	84,887
Washington County					
Eating and Drinking Places					
Wages	160,235	175,890	191,544	208,592	227,157
Owner's Compensation	64,094	70,356	76,618	83,437	90,863
Gasoline Service Stations					
Wages	84,176	92,400	100,624	109,579	119,332
Owner's Compensation	84,176	92,400	100,624	109,579	119,332
TOTAL	392,681	431,046	469,410	511,187	556,684
TOTAL X 1.5	589,021	646,569	704,115	766,781	835,026

Source: Derived from Census of Business, Retail Trade, U.S. Department of Commerce, Bureau of the Census, and data gathered in course of this study.

Table X-9

RETAIL TRADE STATISTICS

	Number Retail Establishments	% of Total	Average % per Year	Retail Sales ($ thous)	% of Total	Average % per Year	Payroll Entire Year ($ thous)	% of Total	Average % per Year	Paid Employees (number)	% of Total	Average % per Year
FOUR COUNTY TOTALS												
1948	1,457	- -	- -	75,716	- -	- -	4,705	- -	- -	3,213	- -	- -
1954	1,215	16.6	2.8	94,096	24.3	4.1	6,679	42.0	7.0	3,133	2.5	.4
1958	1,396	14.9	3.7	118,520	26.0	6.5	8,608	28.9	7.2	3,913	24.9	6.2
1963	1,283	8.1	1.6	154,222	30.1	6.0	13,320	54.7	11.0	4,779	22.1	4.4
1967	1,531	19.3	4.8	213,619	38.5	9.6	18,259	37.1	9.3	5,650	18.2	4.6
BENTON												
1948	527	- -	- -	27,415	- -	- -	1,615	- -	- -	1,105	- -	- -
1954	448	15.0	2.5	35,515	29.6	4.9	2,256	39.7	6.6	1,018	-7.9	1.3
1958	513	14.5	3.6	41,805	17.7	4.4	2,014	33.6	8.4	1,306	28.3	7.1
1963	422	17.7	3.6	43,130	+3.2	.6	3,596	19.3	3.9	1,285	1.6	.3
1967	532	26.1	6.5	55,809	29.4	7.4	4,785	33.1	8.3	1,647	28.2	7.0
CARROLL												
1948	211	- -	- -	5,787	- -	- -	310	- -	- -	283	- -	- -
1954	167	20.9	3.5	7,104	22.8	3.8	390	25.8	4.3	252	11.0	1.8
1958	206	23.4	5.8	9,898	39.3	9.8	568	45.64	11.4	314	24.6	6.2
1963	183	11.2	2.2	12,413	25.4	5.1	962	69.37	13.9	402	28.0	5.6
1967	184	.6	.14	16,235	30.8	7.7	1,119	16.32	4.1	361	10.2	2.6
MADISON												
1948	124	- -	- -	2,224	- -	- -	84	- -	- -	96	- -	- -
1954	74	40.3	6.7	3,156	41.9	7.0	152	81.0	13.5	89	7.3	1.2
1958	100	35.1	8.8	5,145	63.0	15.8	201	32.2	8.1	112	25.8	6.5
1963	93	7.0	1.4	7,522	46.2	9.2	471	134.3	26.9	169	50.9	10.2
1967	98	5.4	1.4	8,147	8.3	2.1	485	3.0	.7	171	1.2	.3
WASHINGTON												
1948	595	- -	- -	40,290	- -	- -	2,696	- -	- -	1,729	- -	- -
1954	526	11.6	1.9	48,321	19.9	3.3	3,881	44.0	7.3	1,774	2.6	.4
1958	577	9.7	2.4	61,672	27.6	6.9	4,816	24.1	6.0	2,181	22.9	5.7
1963	585	1.4	.3	91,147	47.8	9.6	8,291	72.2	14.4	2,923	34.0	6.8
1967	717	22.6	5.6	133,428	46.4	11.6	11,870	43.2	10.8	3,471	18.8	4.7

Table X-9 (cont.)

	Gasoline Stations					Eating, Drinking Places				
	Stores (number)	Sales ($ thous)	% of Total Stations	Total % of Sales	% of Per Year Sales	Stores (number)	Sales ($ thous)	% of Total Retail Sales	Total % of Sales	% of Per Year Sales
FOUR COUNTY TOTALS										
1948	179	3,281	4.3	- -	- -	200	2,820	3.7	- -	- -
1954	146	5,756	6.1	75.4	12.6	166	3,569	3.8	26.6	4.4
1958	190	8,350	7.1	45.1	11.3	184	4,163	3.5	16.6	4.2
1963	181	10,834	7.0	29.8	6.0	193	6,201	4.0	49.0	9.8
1967	225	14,343	6.7	32.4	8.1	245	9,133	4.3	47.3	11.8
BENTON										
1948	73	1,431	5.2	- -	- -	63	666	2.4	- -	- -
1954	70	2,744	7.7	91.8	15.3	40	714	2.0	7.2	1.2
1958	71	3,120	7.5	13.7	3.4	64	1,081	2.6	51.4	12.9
1963	61	3,425	7.9	9.8	2.0	55	1,524	3.5	41.0	8.2
1967	79	4,913	8.8	43.5	10.9	64	2,035	3.7	33.5	8.4
CARROLL										
1948	16	269	4.7	- -	- -	31	394	6.8	- -	- -
1954	18	508	7.2	88.9	14.8	30	435	6.1	10.4	1.7
1958	24	734	7.4	44.5	11.1	34	631	6.4	45.1	11.3
1963	20	836	6.7	13.9	2.8	37	715	5.8	13.3	2.7
1967	23	1,135	7.0	35.8	8.9	38	949	5.9	32.7	8.2
MADISON										
1948	13	168	7.6	- -	- -	8	60	2.7	- -	- -
1954	5	N.A.	- -	- -	- -	6	64	2.0	6.7	1.1
1958	9	310	6.0	- -	- -	4	31	0.6	51.6	12.9
1963	17	583	7.8	88.1	17.6	9	179	2.4	477.4	95.5
1967	14	595	7.3	2.1	0.5	13	286	3.5	59.8	15.0
WASHINGTON										
1948	77	1,413	3.5	- -	- -	98	1,700	4.2	- -	- -
1954	53	2,504	5.2	77.2	12.9	90	2,356	4.9	38.6	6.4
1958	86	4,186	6.8	67.2	16.8	82	2,236	3.6	5.1	1.3
1963	83	5,990	6.6	43.1	8.6	92	3,783	4.2	69.2	13.8
1967	109	7,700	5.8	28.6	7.1	130	5,863	4.4	55.0	13.8

Source: Derived from Census of Business, Retail Trade, U.S. Department of Commerce, Bureau of the Census, and data gathered in course of this study.

Table X-10

RETAIL TRADE STATISTICS

	Number Retail Establishments	% of Total	Average % per Year	Retail Sales ($ thous)	% of Total	Average % per Year	Payroll Entire Year ($ thous)	% of Total	Average % per Year	Paid Employees (number)	% of Total	Average % per Year
ROGERS												
1948	136	- -	- -	9,795	- -	- -	656	- -	- -	414	- -	- -
1954	123	9.6	1.6	11,791	20.4	3.4	891	35.8	6.0	377	8.9	1.5
1958	121	1.6	.4	14,237	20.7	5.2	1,258	41.2	10.3	452	19.9	5.0
1963	119	1.7	.4	14,754	3.6	.7	1,370	8.9	1.8	473	4.7	.9
1967	139	16.8	4.2	22,512	52.6	13.2	2,062	50.5	12.6	680	43.8	10.9
FAYETTEVILLE												
1948	232	- -	- -	20,215	- -	- -	1,723	- -	- -	1,070	- -	- -
1954	232	0.0	0.0	24,888	23.1	3.9	2,322	34.8	5.8	1,057	1.2	.2
1958	227	2.2	.5	29,073	16.8	4.2	2,837	22.2	5.6	1,251	18.4	4.6
1963	255	12.3	2.5	46,536	60.1	12.0	4,853	71.7	14.2	1,777	42.1	8.4
1967	295	15.7	3.9	62,445	34.2	8.6	6,487	33.7	8.4	1,894	6.6	1.7
SPRINGDALE												
1948	137	- -	- -	13,054	- -	- -	676	- -	- -	422	- -	- -
1954	150	9.5	1.6	14,452	10.7	1.8	1,060	56.8	9.5	457	8.3	1.4
1958	131	12.7	3.2	19,674	36.1	9.0	1,357	28.0	7.0	617	35.0	8.8
1963	180	37.4	7.5	35,438	80.1	16.0	2,897	113.5	22.7	919	49.0	9.8
1967	185	2.8	.7	55,987	58.0	14.5	4,127	42.5	10.6	1,123	22.2	5.6
STATE												
1948	22,250	- -	- -	1,083,262	- -	- -	86,333	- -	- -	54,818	- -	- -
1954	18,783	15.58	2.6	1,333,632	23.1	3.9	112,284	30.1	5.0	53,985	1.5	.25
1958	20,159	7.3	1.8	1,536,734	15.2	3.8	134,419	19.7	4.9	60,261	11.6	2.9
1963	18,273	6.8	1.4	1,984,375	29.1	5.8	183,534	36.5	7.3	64,035	6.3	1.3
1967	21,130	15.6	3.9	2,534,619	27.7	6.9	233,469	27.2	6.8	72,781	13.7	3.4

Table X-10 (cont.)

	Gasoline Stations					Eating, Drinking Places				
	Stores (number)	Sales ($ thous)	% of Total Stations	Total % of Sales	% of Per Year Sales	Stores (number)	Sales ($ thous)	% of Total Retail Sales	Total % of Sales	% of Per Year Sales
ROGERS										
1948	12	153	1.6	- -	- -	18	264	2.7	- -	- -
1954	14	382	3.2	149.6	25.0	12	260	2.2	1.5	0.25
1958	12	392	2.8	2.6	0.7	12	340	2.4	30.8	7.7
1963	18	848	5.8	116.3	23.3	13	531	3.6	56.2	11.2
1967	13	1,137	5.1	34.1	8.5	15	666	3.0	25.4	6.4
FAYETTEVILLE										
1948	25	674	3.3	- -	- -	45	1,122	5.6	- -	- -
1954	20	1,279	5.1	89.8	15.0	47	1,254	5.0	11.8	2.0
1958	43	2,078	7.2	62.5	15.6	32	1,202	4.1	4.2	0.1
1963	36	2,972	6.4	43.0	8.6	47	2,213	4.8	84.1	16.8
1967	42	3,577	5.7	20.4	5.1	56	2,782	4.5	25.7	6.4
SPRINGDALE										
1948	12	345	2.6	- -	- -	19	326	2.5	- -	- -
1954	16	813	5.6	135.7	22.6	23	470	3.3	44.2	7.4
1958	12	1,143	5.8	40.6	10.2	21	562	2.9	19.6	4.9
1963	18	1,882	5.3	64.7	12.9	24	1,081	3.1	92.4	18.5
1967	24	1,646	2.9	12.5	3.1	28	1,649	3.0	52.5	13.1
STATE										
1948	N.A.	- -	- -	- -	- -	N.A.	- -	- -	- -	- -
1954	2,102	91,765	6.9	- -	- -	2,379	62,937	4.7	- -	- -
1958	2,589	122,503	8.0	33.5	8.4	2,658	69,235	4.5	10.0	2.5
1963	3,500	154,106	7.8	25.8	5.2	2,619	82,976	4.2	19.9	4.0
1967	3,008	206,356	8.1	33.9	8.5	3,021	110,693	4.4	33.4	8.4

Source: Derived from Census of Business, Retail Trade, U.S. Department of Commerce, Bureau of the Census, and data gathered in course of this study.

CHAPTER XI

LAKE LAND VALUES

One of the most dramatic changes among the economic variables considered in this study was land values in the immediate vicinity of Beaver Lake. As would be expected, land on or near the land-lake interface gained in value more rapidly than land of similar characteristics located elsewhere. This increase in land values may be considered a form of Ricardian rent, i.e., the differential in productivity between "near lake" land and other land was increased by forces exogenous to the land owners.

Specifically, the project which resulted in the creation of Beaver Lake caused an increase in the productivity of land on or near the land-lake interface. The increase in "productivity" generally takes the form of increased utility generating capacity of land that is situated near a sizable body of water. The additional utility thus provided is to a large extent associated with the aesthetic and recreational properties of land so situated.

About 70 percent of land that was impounded for Beaver Lake Reservoir was of a quality in terms of topography and soil quality that resulted in its having low economic value.* While the value of this land was assessed at $137.13 per acre by the U.S. Army Corps of

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*For example, the 40,205 acres taken for the project supported only 180 families, or one family per 224 acres.

Engineers, county records indicated assessed values of between $9.32 and $71.02 per acre in 1958. The counties that lost the most land in the project--Benton, Carroll, and Washington--had the lake area assessed at $47.10, $9.40, and $34.85, respectively. Indications are that assessed values in the four-county region are probably below actual market value, and that the average price paid by the U.S. Army Corps of Engineers ($137.13 per acre) was probably a fair approximation of actual market values at the time of acquisition.*

Interviews with persons knowledgeable of land values in the area revealed that land that traded in the $125 to $150 price range prior to 1960 now trades at prices between $1,000 and $2,000 per acre. These prices refer to unimproved land that is accessible only by low quality (dirt) roads. Currently, one-half acre lots on or near the lake accessible by improved roads have a market price in the $1,000 to $2,000 price range. Generally, the market value of land increases with nearness to (1) improved access roads, and (2) the land-lake interface. By way of comparison, land of similar topography and accessability in Northwest Arkansas, but not near a lake, river, etc., currently trades in the range of $200 to $500 per acre.

ASSESSED VALUE OF LAND FOR TAX PURPOSES

Due to the shortage of data on market values of land in the lake region, especially prior to 1960, county records of assessed valuation for tax purposes were chosen as a proxy variable that

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*A precise determination of market values was not possible because of the infrequency of land sales in the lake area prior to 1960, and because of the nature of information recorded in the several courthouses.

would reflect rates of change in land values. The policy in the region is to assess real property for tax purposes at approximately 20 percent of its market value, thus making it possible to compute and approximate market value. While the assessed value has probably been below 20 percent of actual market value, consistent under-assessment makes it possible to estimate the rate of change in land values.

FINDINGS

The process of reassessment of land values by County Tax Assessors has lagged behind the economic processes which have affected land values in the Beaver Lake Region. An examination of county records revealed that general reassessments were made in Benton, Carroll, and Madison Counties in 1958 and 1971. Washington County had a reassessment in 1958 and was in the process of reassessment when this study was made. While general reassessments have been infrequent, the counties have generally increased the tax yields of the land under study by raising the tax rate. These increases in tax rates, it should be noted, have applied to all land in the county, and were not restricted to the Beaver area. It should also be noted that the maximum tax rates (millage) is set by the state legislature (see Table XI-1).

Market Values. In the three counties that had reassessments in 1958 and 1971 implied market values (assessed value/.20) changed as follows:

1. Benton County. Between 1950 and 1958, land values increased at an annual average rate of 7.87 percent. Between 1958 and 1971,

the average increase was 633.14 percent.

2. Carroll County. The average annual change between 1950 and 1958 was -1.78 percent; between 1958 and 1971 it was 29.4 percent.

3. Madison County. This was the only county to have decreases in the rate of change during the later period. Between 1950 and 1958, implied land values increased at an average annual rate of 23.17 percent, but between 1958 and 1971 the annual rate declined to 1.84 percent.

Tax Rates. All of the counties increased tax rates at a faster rate in the later period.

Tax Yield Per Acre. Changes in tax yields per acre, in absolute terms, were greater in the 1958-1971 period vis a vis the 1950-1958 period. Two counties (Benton and Carroll) experienced increased rates of increase during the later period, while Madison and Washington experienced decreased rates of increase. The experience of each county was as follows:

1. Benton County. The annual rate of change increased from 12.57 percent in the earlier period to 1000.31 percent in the later period. The absolute gain in this period was approximately $22.00, the largest in the four counties.

2. Carroll County. Between 1950 and 1958, yields per acre changed at an average annual rate of -0.19 percent, but increased at an annual rate of 32.4 percent between 1958 and 1971. The absolute increase per acre ($0.3635) was second highest of the four counties.

3. Madison County. The average rate of increase in the earlier period was 9.44 percent, but declined to 6.70 percent during the

later period. Its absolute gain of $0.0509 per acre was by far the lowest of the four counties.

4. Washington County. The tax yield per acre grew at an average rate of 11.87 percent between 1950 and 1958 and declined to 2.69 percent between 1958 and 1971. While this county's percent rate of growth was the lowest of the four counties, its absolute gain of $0.1895 was almost four times that of Madison County.

The rate of increase in values of land in the immediate Beaver Lake area was generally greater than that for land in the rest of the counties and the state as a whole. While data on land values (separate from other real property) for the counties and the state were not readily available for dates coinciding with the reassessment dates (1958 and 1971) an approximate comparison can be made by employing data published by the Assessment Coordination Division of the Arkansas Public Service Commission.

It is noted that between 1960 and 1970 assessed value of real property (land and improvements, structures, etc.) increased for all counties except Carroll at an average annual rate greater than the state. The same pattern holds true for the period 1966-1970. It is also noted that the annual average increase for land near Beaver Lake between 1958 and 1971 (reassessment dates) was greater than assessed value of real property for the county as a whole in each case (see Table XI-2).

Finally it is noted that the rate of increase for each county was greater for the post-lake period (1966-1970) than the pre-lake period (1960-1966).

Lake Configuration and Land Values. The changes in land values

reported above bear a close relationship to the configuration of Beaver Lake. As noted on the maps in Chapter II, the lake contains numerous "branches" that were formed in the areas inundated around various tributaries of the White River after completion of the dam. As a result, in many instances the lake represents little more than a widening, to a greater or lesser degree, of the White River or one of its tributaries. This, for example, generally characterizes that portion of the lake contained in Washington County. In Benton County the various "branches" are wider and the "lake mass" is greatest. When lake configuration characteristics, other than simply "miles of shoreline" were considered the following results were obtained.

Total Land Values. There are approximately 94,000 acres within a one mile radius of the Beaver Lake shoreline. This land is distributed among the four counties as follows: Benton, 61.7 percent; Carroll, 13.8 percent; Madison, 2.1 percent; and Washington, 22.3 percent.

Based upon data contained in county records, this land had an estimated total value of approximately $1,605,850 in 1958 distributed among the counties as follows: Benton, 45.14 percent; Carroll, 8.9 percent; Madison, 0.40 percent; and Washington, 45.57 percent.

By 1971, the value of this land in all of the counties had increased, with the estimated aggregate value reaching approximately $101,268,692; however, the Benton County share more than doubled its 1950 level, reaching 97.19 percent (although it accounted for only 61.7 percent of the land), while the proportion of the value of land in Washington County declined to 2.20 percent of the total (see Table XI-3).

Acres Per Mile of Shoreline. Of the land in Benton County within

one mile of the shoreline the number of acres per mile of shoreline was the smallest among the four counties, 165.7. Carroll County has a ratio of 288.9; Washington, 381.8; and Madison, 4000. The reciprocals of these figures, which would yield miles of shoreline per acre, serve as an approximate index of "lake per acre of land" and thus the lake related utility recreational and aesthetic potential of land in the various counties. It is noted that Benton with the greatest index had the greatest increase in land values; Carroll with the second highest index had the second highest increase; Washington was third in index and value increase, while Madison was last in both (see Tables XI-4 and XI-5).

Acres of Lake Surface. The same relationships were noted with respect to share of lake surface (see Tables XI-4 and XI-5).

Table XI-1

VALUE PER ACRE, TAX RATES, AND TAX YIELDS PER ACRE: LAND LOCATED ON OR NEAR BEAVER LAKE RESERVOIR

1950 - 1971

	1950	1958	1971	Average Annual Percent Changes 1950-58	1958-71
BENTON COUNTY					
Value Per Acre	12.50	20.37	1697.00	7.87	633.14
Tax Rate (Mills per .20 of Value)	34.5	42.5	67.5	2.8	4.5
Tax Yield Per Acre ($)	.08025	.1731	22.67	12.57	1000.31
CARROLL COUNTY					
Value Per Acre	10.96	9.40	45.38	-1.78	29.4
Tax Rate (Mills per .20 of Value)	40	42	60.5	0.62	3.38
Tax Yield Per Acre ($)	.0877	.0863	.4498	-0.19	32.40
MADISON COUNTY					
Value Per Acre	3.27	9.32	11.54	23.17	1.84
Tax Rate (Mills per .20 of Value)	26	30	50	1.92	5.20
Tax Yield Per Acre ($)	.0331	.0581	.1090	9.44	6.70
WASHINGTON COUNTY					
Value Per Acre	34.85	71.02		12.97	
Tax Rate (Mills per .20 of Value)	36	38	50	0.69	2.42
Tax Yield Per Acre ($)	.2769	.5399	.7294	11.87	2.69

Source: Sample of records of County Assessors for Benton, Carroll, Madison and Washington Counties (Survey conducted - Fall 1972).

Table XI - 2

VALUE OF REAL PROPERTY (BY ASSESSOR)
BENTON, CARROL, MADISON, AND WASHINGTON COUNTIES
1960 - 1970

	1960	1966	Average Annual Percentage Increase 1960-1966	1970	Average Annual Percentage Increase 1966-1970	Average Annual Percentage Increase 1960-1970
Benton	$ 14,713,860	$ 22,636,320	8.97	$ 34,290,150	12.87	13.30
Carroll	4,453,790	5,512,090	3.96	6,626,345	5.05	4.88
Madison	1,337,170	1,892,455	6.91	3,804,280	25.26	18.45
Washington	29,736,105	44,810,930	16.67	63,949,965	10.68	11.50
State of Arkansas	811,591,755	1,056,638,921	5.03	1,327,153,935	6.39	6.35

Source: 1st, 3rd, and 7th Biennial Report of the Assessment Coordination Division of the Arkansas Public Service Commission, Justice Building, Little Rock, Arkansas.

Table XI - 3

ESTIMATED VALUE OF LAND LOCATED WITHIN ONE MILE OF BEAVER LAKE RESERVOIR

1950, 1958, 1971

County	Acres	Percent of Total	1950 Value	1950 Percent of Total	1958 Value	1958 Percent of Total	1971 Value	1971 Percent of Total
Benton	58,000	61.7	$ 725,000	45.14	$1,118,460	40.66	$ 98,426,000	97.19
Carroll	13,000	13.8	142,480	8.90	122,220	4.44	589,940	0.58
Madison	2,000	2.1	6,450	0.40	18,640	0.67	23,080	0.02
Washington	21,000	22.3	731,850	45.57	1,491,420	54.20	2,229,672*	2.20
Total	94,000	100.0	$1,605,850	45.57	$2,750,740	100.0	$101,268,692	100.0

*Washington County for 1971 estimated on assumption that land within one mile of lake increased in value at the same rate between 1958-1971 as the total assessed value of real property in the county between 1960 and 1970 (see Table XI-2).

Source: Based on data from county tax assessors' records; Benton, Carroll, Madison and Washington Counties.

Table XI - 4

LAKE CONFIGURATION CHARACTERISTICS

By County

	Surface Area of Lake (Acres)	Percent of Total	Miles of Shoreline	Percent of Total	Ratio of Acres Within one Mile of Shore Per Mile of Shoreline	1 / Ratio of Acres Within one Mile Of Shoreline Per Mile of Shoreline
Benton	20,000	70.15	350.0	77.69	165.7	.006035
Carroll	5,000	17.53	45.0	9.98	288.9	.003461
Madison	10	0.03	0.5	0.11	4000.0	.000250
Washington	3,500	12.27	55.0	12.20	381.8	.002619
Total	28,510	100.0	450.5	100.0	208.6	.002682

Source: Computed from data supplied by U. S. Corps of Engineers.

Table XI - 5

LAKE CONFIGURATION CHARACTERISTICS AND LAND VALUE CHANGES

1958 - 1971

By County

County	Average Annual Percent Change in Estimated Land Value 1958 - 1971	Acres Within One Mile of Shoreline as a Percent of Total	$\frac{1}{\text{Acres Within One Mile of Lake Per Mile of Shoreline}}$	Miles of Shoreline as a Percent of Total	Acres of Lake Surface as Percent of Total
Benton	663.14	61.70	.006035	77.69	70.15
Carroll	29.54	13.80	.003461	9.98	17.35
Madison	1.84	2.20	.000250	0.11	0.04
Washington	11.49	22.30	.002619	12.20	12.28
Total	275.52	100.00	.002682	100.00	100.00

Source: Configuration characteristics computed from data supplied by Corps of Engineers, and maps. Average Percent Change in Land Value taken from Table XI - 1.

CHAPTER XII

POPULATION

HISTORICAL POPULATION GROWTH THROUGH 1960

During the last half century the four counties of Benton, Carroll, Madison, and Washington have witnessed some interesting patterns of population change as can be seen in Table XII-1. Carroll County had continuous population losses for every censual period from 1920 to 1960 with a slight gain of 1,017 from 1960 to 1970. Washington County exhibited an opposite pattern by registering population gains throughout the 50 year period. Benton and Madison Counties had fluctuating population patterns with 19 more persons residing in Benton County in 1960 than 40 years earlier. Madison County had 5,850 less people in 1960 than in 1920. It would appear that 1960 represents a demarcation in the population growth pattern since the population in all four counties in the Northwest Arkansas area moved in the same direction (upward) for the first time in the 50 year period.

THE 1960 TO 1970 PERIOD

The 1960 to 1970 period is not only the most recent but it is also the most revealing with respect to the population profile of the four-county area.

Following the decline in population of 612 persons, or .5 percent, for the four-county area from 1950 to 1960, there was a strong upsurge from 1960 to 1970 as seen in Table XII-2. During this period

there was a growth in population of 37,179, which represented a growth rate of 33.1 percent for the aggregate of the four counties. Since this percent change far exceeded the percent change in the population of the state (7.7 percent), the area represented 7.8 percent of Arkansas total population in 1970 versus 6.3 percent in 1960. A close look at the figures reveals that whereas all four counties had population increases, Benton and Washington Counties accounted for 96.2 percent of the growth experienced by the area.

Table XII-3, entitled Components of Population Change - 1960 and 1970, reveals other facts about the population growth of the area. Madison County managed to achieve a higher population in 1970 than in 1960 due solely to natural increase since there was 1.0 percent out-migration during the period. Carroll County faced slightly better with a 6.6 percent net in-migration, an inflow of 773 people. Benton County had a net in-migration of 11,852, which equalled a 27.3 percent in-migration rate for the ten-year period. Washington County had an in-migration of 14,225 which represents an increase of 21.4 percent. During this same time it should be noted that the state suffered a net out-migration of 2.8 percent so it is apparent that the Northwest Arkansas area was attracting population at a time when people were still leaving the State of Arkansas for one reason or another.

Since the population growth of the 1960 and 1970 time period coincides with the development of Beaver Lake, it is necessary that an attempt be made to determine the impact that the lake had upon the population change of the area. With construction beginning

in 1960, impoundment of waters in 1964, and full commercial power generation in 1965, Beaver Lake's influence had been in existence for over half of the censual period. Where then has the population growth of the area occurred and what has been the influence of Beaver Lake?

The answer to the above question is partially found in Table XII-4 which shows the total resident population of the counties and the cities of over 1,000 persons within the counties. As can be seen, the majority of the population growth is occurring in the non-rural or urbanized areas. In Benton and Washington Counties (the counties which provided 96 percent of the population growth of the four-county area for the 1960-1970 period) the population growth for cities was 69.8 percent for Benton County and 55.5 percent for Washington County. Whereas the population in these two counties grew at a remarkable rate, the cities within the counties grew even faster. By 1970, 55.2 percent of the population in the four-county area lived in cities of over 1,000 while in 1960 the figure was 47.1 percent. It should be noted that this urbanized growth accounted for approximately 75 and 83 percent of the total growth in Benton and Washington Counties, respectively.

Obviously, Fayetteville, being the home of the University of Arkansas, is greatly influenced by the growth in student enrollment and this, therefore, has considerable bearing on the population growth in Washington County. In fact Fayetteville alone accounted for 48.5 percent of the total county growth. What remains to be determined is whether residents were attracted to the other cities because of

the proximity of Beaver Lake, which is not very close in the case of most of the cities under consideration, or whether they were attracted for other reasons, and if so, to what extent Beaver Lake influenced these reasons.

A study entitled Migration Into Four Communities in the Ozarks Region (14) sheds much light on this subject. Rogers and Springdale, Arkansas were two of the four communities studied. The comparisons between the in-migrant household heads of Springdale and Rogers are quite revealing as the following statistics in Table XII-5 bear out. The study concludes that Rogers is more affected by extremes in in-migrants since it attracted some retired people (25 percent) and a still sizeable number of younger, well-trained persons. Springdale, however, of all the four communities studied, had in-migrants who exhibited the characteristics of younger age, higher education, higher income and a higher proportion in the labor force. Springdale (and Rogers to a lesser degree) attracted persons for the most basic economic reason--labor tends to move from low paying to high paying occupations and areas. As Figure XII-A shows both Benton County and Washington County have been growing exceedingly fast in both population and personal income. Persons are attracted to the higher paying areas, of which Benton and Washington Counties are good examples.

Tables XII-6 through XII-10 reveal other characteristics of the general population of the area and the effects of in-migration. It should be noted that by age breakdown Benton County had smaller percentages of its population under 18 and 65 and older in 1970 than it did in 1960. The increases in percent of population by age group

appear in the 15-29 age group. This indicates Benton County has primarily attracted young, labor force aged people and not the older person that one associates with a retirement area. In fact, the median age decreased from 36.1 to 31.6 while the 65 and older, as a percent of total population, decreased from 16.1 percent to 14.5 percent. The Carroll County and Madison County figures reveal an increasing median age and an increasing percentage of persons 65 and older which is indicative of much slower growth. Washington County displays the same pattern as Benton County -- more young, working age persons and less 65 and older as a percent of the total. Due to the largeness of Benton and Washington Counties in the total, the four-county area as a group exhibits the more young, less old, pattern. It would appear that the four-county area is attracting an inflow of population for a variety of reasons (education at the University, retirement, etc.), but the major reason is still occupational in nature in that there are jobs available in the area. From the development pattern of the different cities and from the survey of industrial firms which was presented in Chapter VII of this report, it should be concluded that the conditions necessary for the economic take-off of the Northwest Arkansas area were developed outside the realm of influence of Beaver Lake. Obviously there has been some industry whose location was influenced slightly by Beaver Lake. Even taking into consideration the recreational benefits and increased tourist trade attributed to Beaver Lake, it appears that the area developed independent of Beaver Lake.

POPULATION PROJECTIONS

Numerous projection techniques were employed in an effort to come up with reliable estimates of future population. First, a least squares attempt was made to project the 1970 population. This technique produced an estimate that was 22,880 below the actual 1970 population or an error of over 15 percent. As already stated there were structural changes in the economy of the area which did not show up in the estimating technique. Next a cohort-survival projection was made for the separate counties where the birth and death rates and the net migration figures by cohort grouping for 1950-1960 were assumed to continue.

All four counties had suffered net out-migration for the 1950-1960 period; however, and, as a result, this projection technique produced an estimate for 1970 which was 37,259 too low or an error of approximately 25 percent. Following this an attempt was made to adjust the migration rates to reflect the 1960 to 1970 period such that a better cohort-survival projection could be made. The birth rates were updated to give two series: the first series assumed a total fertility rate, or total children born to a group of 1,000 women upon completion of childbearing, of 2,465. The second series had a total fertility rate of 2,128. Mortality projections were based upon the 1966 actuarial rates of the U. S. Department of Health, Education and Welfare. Next, the migration rates were adjusted to the 1960-1970 period. The study on migration revealed that 24 percent of the new in-migrants listed "recreation or climate" as the most important reason for the household move.

Therefore, to the extent that Beaver Lake was the reason for the "recreation," the migration rate of the area was adjusted downward by 24 percent. To the extent that "climate" was the reason for the household move, it was felt that this offset any other Beaver Lake influences such as new industrial firms location decisions. Table XII-11 presents these projections for 1970, 1980, and 1990. As can be seen from the 1970 projection series and the actual 1970 population the difference is 1,600 for Series I and 2,700 for Series II. These comprise the population figures which could be associated with the development of Beaver Lake since the series were projected as if Beaver Lake had not been in existence.

Another method was utilized in an effort to determine the impact of Beaver Lake upon the population base of the four counties. The population data were collected by townships for the census years 1960 and 1970 with the cities excluded. Then an aggregate total of all townships which bordered Beaver Lake proper was calculated for the two dates. The total resident population in townships bordering Beaver Lake in 1960 was 7,158 and in 1970 the population had grown to 9,427. This comprises a net increase of 2,269 which is a growth rate of 31.7 percent but interestingly is equal to 24 percent of the 1970 population figure. This figure is also only 119 off of the difference between the actual 1970 population and the average of the two projected series which is a figure of 2,150.

Table XII - 1

POPULATIONS OF BENTON, CARROLL, MADISON, AND WASHINGTON COUNTIES

1920 - 1970

	1920	1930	1940	1950	1960	1970
Benton County	36,253	35,253	36,148	38,076	36,272	50,476
Carroll County	17,786	15,820	14,737	13,244	11,284	12,301
Madison County	14,918	13,334	14,531	11,734	9,068	9,453
Washington County	35,468	39,255	41,114	49,979	55,797	77,370
Four-County Total	104,425	103,662	106,530	113,033	112,421	149,600

Source: 1920, 1930, 1940, 1950, 1960, 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

Table XII - 2

TOTAL RESIDENT POPULATION

1960 and 1970

	1960 Population	1970 Population	Change 1960-1970		Area as a Percent of State Total	
			Number	Percent	1960	1970
Benton Co.	36,272	50,476	14,204	39.2	2.0	2.6
Carroll Co.	11,284	12,301	1,017	9.0	0.6	0.6
Madison Co.	9,068	9,453	385	4.2	0.5	0.5
Washington Co.	55,797	77,370	21,573	38.7	3.1	4.0
Four-Co. Total	112,421	149,600	37,179	33.1	6.3	7.8
State of Ark.	1,786,272	1,923,295	137,023	7.7	100.0	100.0

Source: 1960 and 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

Table XII - 3

COMPONENTS OF POPULATION CHANGE
1960 and 1970

	1970 Population	1960 Population	Births	Deaths	Natural Increase	Net Migration	
						Number	Percent
Benton County	50,476	36,272	7,580	5,228	2,352	11,852	27.3
Carroll County	12,301	11,284	1,834	1,590	244	7 3	6.6
Madison County	9,453	9,068	1,547	1,070	477	-92	-1.0
Washington County	77,370	55,797	13,089	5,741	7,348	14,225	21.4
Four County Total	149,600	112,421	24,050	13,629	10,421	26,758	20.4
State of Arkansas	1,923,295	1,786,272	381,693	193,648	188,045	-51,022	-2.8

Source: State and County Economic Data for Arkansas, Industrial Research and Extension Center, College of Business Administration University of Arkansas.

Table XII - 4

TOTAL RESIDENT POPULATION OF COUNTIES AND CITIES OF MORE THAN 1,000

1960 and 1970

	1960 Population	1970 Population	Change 1960-1970 Number	Change 1960-1970 Percent
Benton County	36,272	50,476	14,204	39.2
Bentonville	3,649	5,508	1,859	50.9
Gentry	686	1,022	336	49.0
Gravette	855	1,154	299	35.0
Pea Ridge	380	1,088	708	186.3
Rogers	5,700	11,050	5,350	93.9
Siloam Springs	3,953	6,009	2,056	52.0
Total - Benton County cities	15,223	25,831	10,608	69.8
Carroll County	11,284	12,301	1,017	9.0
Berryville	1,999	2,271	272	13.6
Eureka Springs	1,437	1,670	233	16.2
Green Forrest	1,038	1,354	316	30.4
Total - Carroll County cities	4,474	5,295	821	18.4
Madison County	9,068	9,453	385	4.2
Huntsville	1,050	1,287	237	22.6
Washington County	55,797	77,370	21,573	38.7
Fayetteville	20,274	30,729	10,455	51.6
Lincoln	820	1,023	203	24.8
Prairie Grove	1,056	1,582	526	49.8
Springdale	10,076	16,783	6,707	66.6
Total - Washington County cities	32,226	50,117	17,891	55.5
Four Counties - Total	112,421	149,600	37,179	33.1
Total - Cities of Four Counties	52,973	82,530	29,557	55.8

Source: 1960 and 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

Table XII - 5

ALL IN-MIGRANT HOUSEHOLDS: SELECTED CHARACTERISTICS OF HOUSEHOLD HEAD

By Community

Characteristics	Unit	Rogers	Springdale
Age (Years)			
Under 50	Percent	52	70
50 - 59	Percent	17	16
60 and Over	Percent	31	14
Median Age	Years	47	43
Average Number of Persons in Household		3.2	4.0
Education (Years)			
8 and Less	Percent	27	30
9 to 12	Percent	57	37
Over 12	Percent	16	33
Median Education	Years	10	12
Labor Force Status			
In Labor Force	Percent	73	84
Fully Retired	Percent	25	10
Selected Occupations			
Professional, Managerial	Percent	18	30
Clerical, Sales, Service	Percent	7	8
Craftsmen and Operators	Percent	31	21
Households' Income			
Under $3,000	Percent	25	12
$3,000 to $8,999	Percent	63	58
$9,000 and Over	Percent	12	30
Median Income	Dollars	5,000	6,853
Types of In-migrants			
Returnees to Community	Percent	35.2	49.0
New In-migrant	Percent	64.8	51.0

Source: Tables 3&5, Migration into Four Communities in the Ozarks Region, Agricultural Experiment Station, University of Arkansas, Fayetteville, Arkansas, June 1970.

Table XII - 6

POPULATION OF BENTON COUNTY BY AGE
1960 - 1970

Years	1960 Population	1960 Percent of Total	1970 Population	1970 Percent of Total	Change 1960-1970 Population	Change 1960-1970 Percent of Total
Under 5	3,220	8.9	4,001	7.9	781	-1.0
5-9	3,214	8.9	4,499	8.9	1,285	.0
10-14	3,347	9.2	4,743	9.4	1,396	.2
15-19	2,751	7.6	4,420	8.8	1,669	1.2
20-24	1,682	4.6	3,629	7.2	1,947	2.6
25-29	1,712	4.7	3,145	6.2	1,433	1.5
30-34	1,793	4.9	2,515	5.0	722	.1
35-39	1,919	5.3	2,568	5.1	649	-.2
40-44	2,065	5.7	2,548	5.0	483	-.7
45-49	2,251	6.2	2,684	5.3	433	-.9
50-54	2,327	6.4	2,723	5.4	396	-1.0
55-59	2,224	6.1	2,822	5.6	598	-.5
60-64	1,930	5.3	2,869	5.7	939	.4
65-69	2,088	5.8	2,504	5.0	416	-.8
70-74	1,655	4.6	1,960	3.9	305	-.7
75-79	1,142	3.1	1,454	2.9	312	-.2
80-84	608	1.7	824	1.6	216	-.1
85 & over	344	.9	568	1.1	224	.2
Total	36,272	99.9	50,476	100.0	14,204	
Under 18	11,601	32.0	16,082	31.9	4,481	-.1
65 & over	5,837	16.1	7,310	14.5	1,473	-1.6
Median age	36.1		31.6			

Source: 1960 and 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

Table XII - 7

POPULATION OF CARROLL COUNTY BY AGE
1960 - 1970

Years	1960 Population	1960 Percent of Total	1970 Population	1970 Percent of Total	Change 1960-1970 Population	Change 1960-1970 Percent of Total
Under 5	862	7.6	849	6.9	-13	-.7
5-9	898	8.0	957	7.8	59	-.2
10-14	1,042	9.2	1,009	8.2	-33	-1.0
15-19	836	7.4	943	7.7	107	.3
20-24	486	4.3	677	5.5	191	1.2
25-29	495	4.4	642	5.2	147	.8
30-34	562	5.0	556	4.5	-6	-.5
35-39	586	5.2	574	4.7	-12	-.5
40-44	633	5.6	636	5.2	3	-.4
45-49	769	6.8	684	5.6	-85	-1.2
50-54	777	6.9	708	5.8	-69	-1.3
55-59	739	6.5	833	6.8	94	.3
60-64	701	6.2	870	7.1	169	.9
65-69	651	5.8	828	6.7	177	.9
70-74	525	4.7	662	5.4	137	.7
75-79	379	3.4	427	3.5	48	.1
80-84	228	2.0	261	2.1	33	.1
85 & over	115	1.0	185	1.5	70	.5
Total	11,284	100.0	12,301	100.2	1,017	
Under 18	3,373	29.9	3,468	28.2	95	-1.7
65 & over	1,898	16.8	2,363	19.2	465	2.4
Median age	38.9		39.5			

Source: 1960 and 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

Table XII - 8

POPULATION OF MADISON COUNTY BY AGE

1960 - 1970

Years	1960 Population	1960 Percent of Total	1970 Population	1970 Percent of Total	Change 1960-1970 Population	Change 1960-1970 Percent of Total
Under 5	718	7.9	672	7.1	-46	-.8
5-9	837	9.2	830	8.8	- 7	-.4
10-14	1,023	11.3	929	9.8	-94	-1.5
15-19	830	9.2	840	8.9	10	-.3
20-24	400	4.4	523	5.5	123	1.1
25-29	343	3.8	497	5.3	154	1.5
30-34	400	4.4	433	4.6	33	.2
35-39	498	5.5	454	4.8	-44	-.7
40-44	528	5.8	494	5.2	-34	-.6
45-49	605	6.7	582	6.2	-23	-.5
50-54	567	6.3	557	5.9	-10	-.4
55-59	526	5.8	602	6.4	76	.6
60-64	455	5.0	563	6.0	108	1.0
65-69	472	5.2	490	5.2	18	.0
70-74	345	3.8	381	4.0	36	.2
75-79	300	3.3	281	3.0	-19	-.3
80-84	151	1.7	186	2.0	45	.3
85 & Over	70	.8	139	1.5	89	.7
Total	9,068	100.1	9,453	100.2	385	
Under 18	3,164	34.9	2,983	31.6	-181	-3.3
65 & Over	1,338	14.8	1,477	15.6	139	.8
Median Age	34.8		35.0			

Source: 1960 and 1970 Census of Population, U. S. Department of Commerce, Bureau of the Census.

Table XII - 9

POPULATION OF WASHINGTON COUNTY BY AGE
1960 - 1970

Years	1960 Population	1960 Percent of Total	1970 Population	1970 Percent of Total	Change 1960-1970 Population	Change 1960-1970 Percent of Total
Under 5	5,617	10.1	6,192	8.0	575	-2.1
5-9	4,901	8.8	6,628	8.6	1,727	-.2
10-14	4,834	8.7	6,648	8.6	1,814	-.1
15-19	5,394	9.7	8,707	11.3	3,313	1.6
20-24	5,336	9.6	10,136	13.1	4,800	3.5
25-29	3,617	6.5	5,747	7.4	2,130	.9
30-34	3,050	5.5	4,151	5.4	1,101	-.1
35-39	3,216	5.8	3,885	5.0	669	-.8
40-44	2,839	5.1	3,787	4.9	948	-.2
45-49	2,939	5.3	3,858	5.0	919	-.3
50-54	2,786	5.0	3,397	4.4	611	-.6
55-59	2,708	4.9	3,378	4.4	670	-.5
60-64	2,295	4.1	3,022	3.9	727	-.2
65-69	2,271	4.1	2,693	3.5	422	-.6
70-74	1,728	3.1	1,969	2.5	241	-.6
75-79	1,266	2.3	1,573	2.0	307	-.3
80-84	645	1.2	903	1.2	258	.0
85 & over	355	.6	696	.9	341	.3
Total	55,797	100.4	77,370	100.1	21,573	
Under 18	17,928	32.1	23,259	30.1	5,331	-2.0
65 & over	6,265	11.2	7,834	10.1	1,569	-1.1
Median age	27.5		25.3			

Source: 1960 and 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

Table XII - 10

POPULATION OF THE FOUR-COUNTY REGION BY AGE 1960 - 1970

Years	1960 Population	1960 Percent of Total	1970 Population	1970 Percent of Total	Change 1960-1970 Population	Change 1960-1970 Percent of Total
Under 5	10,417	9.3	11,714	7.8	1,297	-1.5
5-9	9,850	8.8	12,914	8.6	3,064	-.2
10-14	10,246	9.1	13,329	8.9	3,083	-.2
15-19	9,811	8.7	14,910	10.0	1,099	+1.3
20-24	7,904	7.0	14,965	10.0	7,061	3.0
25-29	6,167	5.5	10,031	6.7	3,864	1.2
30-34	5,805	5.2	7,655	5.1	1,850	-.1
35-39	6,219	5.5	7,481	5.0	1,262	-.5
40-44	6,065	5.4	7,465	5.0	1,400	-.4
45-59	6,564	5.8	7,808	5.2	1,244	-.6
50-54	6,457	5.7	7,385	4.9	928	-.8
55-59	6,197	5.5	7,635	5.1	1,438	-.4
60-64	5,381	4.8	7,324	4.9	1,943	.1
65-69	5,482	4.9	6,515	4.4	1,033	-.5
70-74	4,253	3.8	4,972	3.3	719	-.5
75-79	3,087	2.7	3,735	2.5	648	-.2
80-84	1,632	1.5	2,174	1.5	542	.0
85 & over	884	.8	1,588	1.1	704	.3
Total	112,421	100.0	149,600	100.0	37,179	
Under 18	36,066	32.1	45,792	30.6	9,726	-1.5
65 & over	15,338	13.6	18,984	12.7	3,646	-.9

Source: 1960 and 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census.

Figure XII - A

RELATIONSHIP OF CHANGES IN TOTAL PERSONAL INCOME AND TOTAL RESIDENT POPULATION FOR ALL ARKANSAS COUNTIES
BENTON, CARROLL, MADISON, & WASHINGTON COUNTIES IDENTIFIED
1960 - 1970

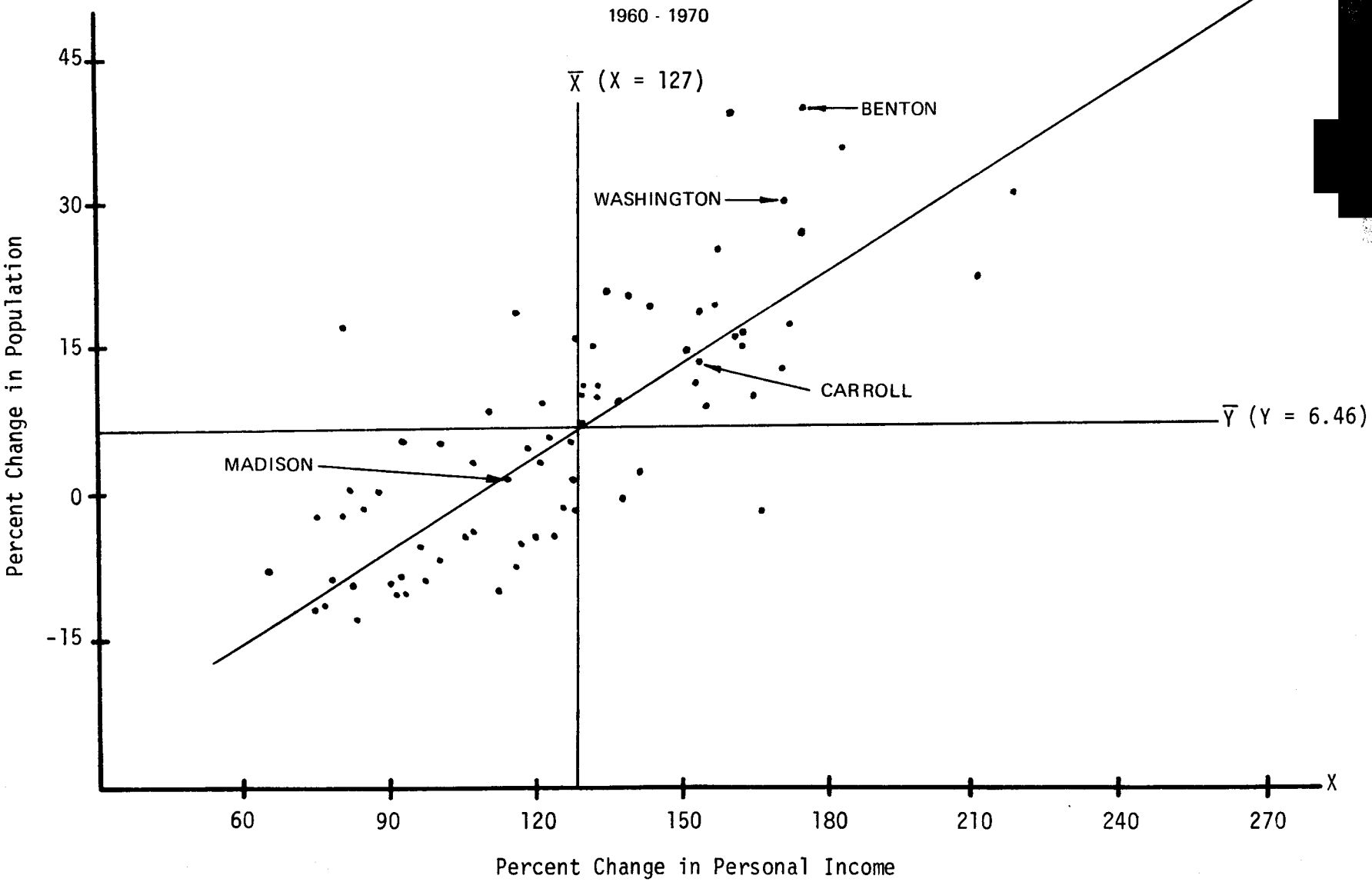

Table XII - 11

POPULATION PROJECTIONS

1970, 1980, and 1990

	1970		1980		1990	
	Series I	Series II	Series I	Series II	Series I	Series II
Four-County Total	148,000	146,900	183,600	181,400	227,900	221,300
Actual 1970	149,600	149,600				
Difference-Actual Less Projected	1,600	2,700				

CHAPTER XIII

THE LEISURE INDUSTRY

TOURISM

In this section the economic impact of Beaver Lake Reservoir via leisure activities is evaluated. The findings reported here are based upon research conducted by Kenneth Burns. Basic data were obtained from the U.S. Army Corps of Engineers, U.S. Census of Business, and by field surveys.

U. S. Corps of Engineer data provided a basis for estimating the value of lake recreation services. Census of Business data were employed to determine changes in retail trade and services activity in the area that might be attributable to the operation of the completed project and is reported in Chapter X of this report.

Lake visitations. Data supplied by the U. S. Corps of Engineers show that since 1966 annual visitations to Beaver Lake have grown from approximately 1.5 million to 2.3 million in 1971. The Corps' estimates show that approximately 16 percent of the automobile traffic into the lake area has come from out-of-state and 84 percent from within Arkansas. Approximately 90 percent of the visitors have reached the lake via Benton County access points (see Tables XIII-1,2,3).

In terms of man days the most popular leisure activities have been camping, skiing, swimming, etc. (41.65 percent); sightseeing (38.64 percent); boating (7.0 percent); fishing (6.68 percent); and

hunting (0.2 percent). Since many users of the lake take part in more than one activity, some double counting may be involved in estimating the total value of recreational services.

To obtain an estimate of recreational services, total visitations were employed in conjunction with air-mile distances traveled by visitors. It was found that approximately 67 percent of lake visitors came from within 40 miles of the lake, while 18.6 percent traveled distances greater than 250 miles.

Based upon population in each zone, per capita day use rates were computed. The highest per capita day use rate was 13.1938 for visitors who lived between 10 and 20 miles from the lake. The first two zones which include all people living from 0 to 20 miles of the lake had a per capita day use rate of 8.0956, i.e., an average of slightly over 8 days was spent at the lake by each person living within 20 miles of the lake. With each more distant zone the per capita visitation rate generally declined.

Assuming that travel cost to the lake represents the minimum price that visitors would be willing to pay for lake services, it was estimated that the recreational value of the alke is approximately $4.5 million per year for persons living within 250 miles of the lake. However, as reported by James (18, pp. 62-63) in a study of reservoirs in Kentucky, visitors living within 50 miles of a reservoir had the reservoir visit as the sole purpose of their trip, while visitors living over 200 miles from the lake were found to travel an average of 150 miles out of their way to get to the reservoir no matter how much further away they lived.

Assuming this is true for visitors to Beaver Lake Reservoir, an additional $1,978,236 in value of recreational services is attributable to the project. Based upon the estimated aggregate value of recreational facilities completed above it is estimated that the average recreational benefits per visitor day is $2.54.

In various use categories the same general pattern is observed as for total visitations, i.e., a per capita use rate that varies inversely with distance. However, it was noted that 37.8 percent of campers came from beyond 250 miles of the lake.

In summary, it was found that most of the users (67 percent) of the recreational facilities of the lake came from within 50 miles of the lake. This radius generally includes the four-county area under study.

The direct non-cost benefits to the immediate area users of the lake may be estimated by computing the additional expenditure that would be required to travel to the nearest alternative reservoir. Since alternative reservoirs are located approximately 75 miles east, west, and north of the amjor population centers in the four-county area, it is estimated that the same visitor-day usage would cost area users approximately $3.2 million as opposed to $706,573 currently. Thus the difference represents a recreational "subsidy" of $2.6 million per year to residents of the four-county area.

All of these estimates, of course, consider only travel cost. Travel time also represents a significant part of the total cost of obtaining the "free" services of the lake. Thus the subsidy to area residents is probably understated.

RETIREMENT

The area, especially Benton County, has developed as a second home and retirement home center. This is reflected in both age distribution and migration data.

Beekhuis and Fothergull (5) reported that in 1970 six recreation/retirement communities in Benton and Carroll Counties had a homesite capacity (number of lots) of 17,030 in 1970 with future expansion planned to 23,781. Of the 16,221 in Benton County, 1,253 (7.9%) are located on or near Beaver Lake. All of the 1,009 sites in Carroll County are near the lake. The largest of these developments, Bella Vista Village (14,774 lots in 1970) is not located adjacent to Beaver Lake.

The Beekhuis and Fothergull study estimated that the average "high budget" retired family spends $6,800 per year locally which would result in $2,040 in additional personal income to the area ($6,800 x 30% local labor factor). The recreation/retirement communities developed in Benton and Carroll Counties are designed to attract this type of retiree.

Assuming that the homesites constructed adjacent to the lake (as reported by the Corps of Engineers) are of the retiree type, then estimates of lake related retirement income can be estimated.* An estimated $2,040 indirect personal income to the area via retail

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*While homesites constructed within the immediate vicinity probably include some homes that are not "second homes" or "retiree homes," there are retiree homes out of the immediate vicinity of the lake, e.g. Fayetteville, etc., that have been constructed due to the relative ease of utilizing lake facilities. Thus, the homesite figure used here for estimating purposes probably represents a conservative estimate of lake influenced retiree home building.

purchases of goods and services was allocated per family, plus 60 percent of the total value of homesites constructed. (Note: 60 percent is assumed local labor and profits from homesite construction.)

It was found that retiree related increments to regional income averaged approximately $2.3 million since 1965 in the area adjacent to Beaver Lake.

Table XIII-1

Benton County — BEAVER LAKE - VISITATION DATA ALLOCATED BY COUNTY

Beaver Lake Access:		1965	1966	1967	1968	1969	1970
Hickory Creek:	Vehicles	27,146	52,904	46,814	62,843	65,971	60,697
	Party Visits	81,188	161,887	141,343	177,090	169,632	161,756
Horshoe Bend:	Vehicles	11,324	16,855	24,691	33,802	40,691	27,187
	Party Visits	33,997	51,832	76,943	97,250	104,811	74.510
Indian Creek:	Vehicles	8,566	2,743	3,695	4,989	6,088	5,729
	Party Visits	25,815	8,883	13,185	13,748	16,582	17,760
Lost Bridge:	Vehicles	5,518	11,345	10,675	12,092	14,414	28,403
	Party Visits	16,503	33,166	27,624	34,937	34,997	73,347
Dam & App. Works:	Vehicles	1,477	9,857		11,066	28,531	12,903
	Party Wisits	4,431	30,475	24,762	29,307	83,165	34,489
Prairie Creek:	Vehicles	74,209	76,625	77,820	94,025	81,888	78,370
	Party Visits	226,845	238,135	250,294	275,257	214,436	213,810
Rocky Branch:	Vehicles	18,772	24,936	35,478	31,352	21,462	25,618
	Party Visits	54,884	73,233	108,591	85,113	59,036	76,365
Starkey:	Vehicles	10,518	9,330	13,439	11,217	10,300	9,721
	Party Visits	31,580	28,489	41,764	31,776	26,518	25,761
Ventris:	Vehicles	2,870	836	1,353	2,859	1,407	1,934
	Party Visits	8,202	2,118		6,869	3,672	5,152
War Eagle:	Vehicles	11,533	20,385	14,521	12,624	16,603	17,499
	Party Visits	34,557	62,850	45,181	35,465	42,985	46,645
Unimproved Accesses:	Vehicles		248,613		287,760	325,463	365,145
	Party Visits		680,511	741,516	748,639	840,406	932,991
Walk in Visits:	Vehicles						
	Party Visits					37,909	21,129
Launch Complexes:	Vehicles					33,540	28,991
	Party Visits					75,968	76,153
TOTALS		181,450	522,186	557,486	651,849	766,114	783,632
		548,170	1,536,046	1,667,670	1,781,805	2,040,879	2,088,127

Source: U.S. Army Corps of Engineers

Table XIII-1
(continued)

BEAVER LAKE-
Carroll County VISITATION DATA ALLOCATED BY COUNTY

Beaver Lake Access:		1965	1966	1967	1968	1969	1970
Dam Site-North Access:	Vehicles	1,479	9,221	14,703	24,553	18,526	15,086
	Party Visits	4,431	27,879	145,287	69,930	47,286	40,107
Dam Site-South Access:	Vehicles		9,857	15,004	21,023	26,554	26,857
	Party Visits		30,475	39,629	61,220	69,964	74,084

Washington County

Beaver Lake Access:		1965	1966	1967	1968	1969	1970
Blue Springs Access:	Vehicles	7,866	16,518	13,215	15,072	36,485	50,540
	Party Visits	25,287	61,808	33,166	39,358	106,186	136,447

Source: U.S. Army Corps of Engineers

Table XIII-2

BEAVER LAKE VISITATION DATA BY COUNTY

1965 - 1970

	1965		1966		1967	
	Visitors	% of total	Visitors	% of total	Visitors	% of total
Benton County (13 access points)	548,170	94.8	1,536,040	95.0	1,667,670	88.4
Carroll County (2 access points)	4,431	0.7	58,354	3.6	184,916	9.8
Washington County (1 access point)	25,287	4.3	21,808	1.3	33,166	1.7
TOTAL	577,888	100.0	1,616,202	100.0	1,885,752	100.0

	1968		1969		1970	
	Visitors	% of total	Visitors	% of total	Visitors	% of total
Benton County (13 access points)	1,781,805	91.2	2,040,879	89.7	2,088,127	89.2
Carroll County (2 access points)	131,150	6.7	117,250	5.1	114,191	4.8
Washington County (1 access point)	39,358	2.0	166,186	7.3	136,447	5.8
TOTAL	1,952,313	100.0	2,274,315	100.0	2,338,765	100.0

	AVERAGE ANNUAL PERCENT CHANGE 1966-1970	AVERAGE SHARE OF TOTAL VISITORS 1965-1970
Benton	8.9	91.4%
Carroll	24.2	5.1%
Washington	131.4	3.7%
TOTAL	11.1	

Source: U.S. Army Corps of Engineers.

Table XIII-3

B E A V E R L A K E V I S I T A T I O N & E C O N O M I C D A T A

1965 - 1970

	1965	1966	1967	1968	1969	1970
Visitors to Area	548,200	1,536,000	1,687,900	1,781,800	2,040,900	2,088,127
Fishing - Man days	145,273	184,400	212,100	282,200	122,800	165,700
Hunting - Man days	2,025	2,973	5,773	5.947	4,890	4,630
Boating:						
Privately owned and moored	348	773	1,070	1,358	1,572	1,838
Total boat day use-private & rental	92,975	121,842	68,046	131,550	223,483	173,735
Camping & day use:						
Man-days camping (public campgrounds)	45,100	143,518	295,100	771,700	449,600	1,033,100
Man-days picnicing	81,507	122,424	183,636	60,097	72,926	144,466
Visitors sightseeing, skiing, etc.	405,403	976,312	957,767	895,574	978,538	958,591
Automobiles:						
Home state vehicles	152,418	438,636	468,221	547,553	643,535	650,415
Out-of-state	29,032	83,550	89,185	104,296	122,579	133,217
Total	181,450	522,186	557,406	651,849	766,114	783,632
Number of vacation resorts, cottages, camps, lodges, etc.	59	64	66	73	78	79
Number of overnight accomodations in above	2,048	2,270	2,310	2,518	3,142	3,543
Estimated value of establishments	$3,401,000	$3,787,000	$3,870,000	$4,207,000	$4,428,000	$5,048,000
Number of dining establishments in lake vicinity	69	72	74	76	81	82
Number of real estate transfers	7,372	7,461	7,529	7,380	8,125	7,781
Percent change in property value since 1960	34	48	59	71	91	110
Number & value of homesites constructed adjacent to lake in year:						
Number	153	195	154	116	106	108
Value	1,777,600	2,602,000	1,569,000	2,352,000	2,136,250	2,178,975

Table XIII-3
(continued)

B E A V E R L A K E V I S I T A T I O N & E C O N O M I C D A T A

1965 - 1970

	1965	1966	1967	1968	1969	1970
Value of new non-residential construction	2,195,895	1,802,000	3,907,521	4,215,500	8,811,000	12,710,000
Number of persons employed in service trades or businesses in lake vicinity	62	82	148	159	194	210
Value of fishing tackle, bait & motors sold annually in vicinity	769,769	1,344,546	1,522,830	1,742,500	2,073,404	2,647,000
Value of privately owned boats	545,700	1,572,922	1,848,114	2,451,370	3,140,638	3,190,153
Value of commercial boat docks, boats, motors	434,895	572,914	624,572	753,595	756,075	
Value of privately owned boats, docks		66,000	112,000	155,800	197,800	221,000
Value of concession facilities	424,934	615,269	599,347	731,509	734,861	
Operating expense	194,549	454,316	472,027	477,434	528,637	
Gross income	152,710	409,289	515,277	425,804	471,248	
Net income	(41,839)	(45,027)	43,250	(51,630)	(57,389)	

Source: U.S. Corps of Engineers, Little Rock, Arkansas

Table XIII-4

LAKE RELATED RETIREMENT GENERATED INCOME

1965-1970

	1965	1966	1967	1968	1969	1970
A. Homesites constructed[a]	153	195	154	116	106	108
B. Direct personal income to area via purchases of goods & services*	(312,120)	(709,920)	(1,024,080)	(1,260,720)	(1,476,960)	(1,697,280)
C. Total value of homesites constructed[b]	1,777,600	2,602,000	1,564,000	2,352,000	2,136,250	2,178,957
D. Direct personal income to area: Profits, labor, etc. = 60% of value	1,066,560	1,561,200	992,400	1,411,200	1,281,750	1,307,374
Total Area Impact: (B + D)X 1.5 interegional multiplier	2,068,020	3,406,680	3,294,720	4,007,880	4,138,065	4,506,981

*Figures in parentheses are increments attributable to retirees entering the area in the year. The expenditure is assumed to continue through the period, thus the increment cumulates.

Source: a. U.S. Army Corps of Engineers, Little Rock, Arkansas.

b. Computed by method reported by Beekhuis and Fother ull, Promoting Retirement to Arkansas, Prepared for Ozarks Regional Commission, Washington D.C., 1971.

CHAPTER XIV

WATER RESOURCES POTENTIAL

In 1972 a dissertation, entitled The Financial Feasibility of the Regional Approach to Public Water Supply, was completed by Norman C. Williams at the University of Arkansas.* This dissertation dealt with the financial feasibility of supplying water from Beaver Lake to the two-county region of Washington and Benton Counties. The following description of the financial benefits and costs of an integrated two-county water system utilizing Beaver Lake is quoted from the eighth chapter of the dissertation (28, p. 127-134):

Summary

As a result of the anticipated growth in the demand for water and the increasing costs of supplying water, there has been a move toward discovering methods which will provide adequate water supply at the lowest cost. An inquiry into the financial feasibility of providing water on a regional basis, thus reducing per unit costs,

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*Dr. Williams' research was funded by the Arkansas Agricultural Experiment Station. The following published articles--co-authored by Norman C. Williams and J. Martin Redfern--report on this research: "A Financial Evaluation: The Regional Approach to Public Water Supply," Arkansas Farm Research, Sept.-Oct., 1972; "The Financial Feasibility of Regionalization," The Journal of the American Water Works Association, March, 1973; "A Model for Measuring the Financial Feasibility of Regionalizing Domestic Water Supplies," Municipal South, August, 1973. A detailed report of the research will be published as an Arkansas Agricultural Experiment Station Bulletin in the fall of 1973.

was the purpose of this dissertation. The region consisting of Washington County and Benton County, Arkansas, was chosen for the study area. To carry out this study, a 1980 water demand model was developed (Projected water demand = Projected households x Projected water use per household + water loss). This model required a 1980 population projection for the areas within the study region. Two population projections were made. A high projection assumed that the same rate of growth in population that occurred between 1960 and 1970 would prevail between 1970 and 1980. A target projection assumed that population will increase in the region at the rate of 75 percent of the growth rate that prevailed between 1960 and 1970. The population projection was converted to a household projection by dividing the projected population per household into the projected population. Next the household water usage coefficient was established for all areas in the region. This coefficient included domestic, commercial, and industrial use in the area. The 1980 daily demand for water in the region was established by multiplying the projected number of households in the region times the water usage coefficient associated with the households in the region. To complete the demand model a 10 percent system loss was assumed. The projected demand for the region in 1980, based on the target population projection, is 27,363,000 gallons per day. The projected demand based on the high population projection is 31,557,000 gallons per day.

Using Beaver Lake as the water source, a regional water system was designed to meet the 1980 demand for water. The system was designed to supply enough water to meet average daily peak demand. (Peak demand equals twice average daily demand.) The proposed

regional system will cost $24,350,338 to construct, in terms of 1970 construction costs. This includes the construction cost of transmission lines, storage facilities, treatment facilities, pumping facilities and the construction cost of the reservoir. For purposes of adjusting the construction costs of 1980, the "Handy-Whitman Index of Water Utility Construction Costs," was used. The projected cost of the regional system in 1980 is $37,582,293. To establish the total investment necessary for the regional system, an "interest charge during construction" was added to the construction cost. Assuming a three year construction period and an interest rate of 4.5 percent, the interest during construction is $2,536,805. The total investment required to place the system in service in 1980 is $40,119,098.

Next, the incremental investment necessary for the 1980 regional system was calculated. To obtain the incremental investment, the investment of $40,119,098 was reduced by the projected investments that will be made by the single systems if the regional system is not implemented. It is projected that an investment of $22,210,362, including interest during construction, will be made by the systems between 1970 and 1980 under the alternative of independent systems. This investment in water facilities must be made if the systems are to meet 1980 demand. To establish the incremental investment necessary under the regional system alternative, the total investment of $40,119,098 was reduced by the $22,210,362 investment that will occur if the single systems remain independent. This results in an incremental investment of $17,908,736.

The regional system relying upon Beaver Lake is still subject

to the normal costs of operation, maintenance and repair. The projected cost of operating the 1980 regional system is 6.75 cents per thousand gallons of treated water produced. This includes the cost of pumping, treating, and maintenance and repair of the system. The use of Beaver Lake as a single source of water for the region eliminates certain relevant operating costs of the individual systems. The costs that will be eliminated by the regional system, adjusted to 1980 costs, amount to 33.13 cents per thousand gallons of water produced. The anticipated costs of operating the regional system, when adjusted to 1980 costs, amount to 11.94 cents per thousand gallons of water produced. This results in a cost savings of 21.19 cents for each thousand gallons of water produced by the regional system. The annual savings resulting from the incremental investment of $17,908,736 is $2,116,350. This annual savings is based on the target population projection. The rate of return on the incremental investment is 11.8 percent. If the high population projection is realized, a rate of return on the regional system of 13.6 percent will be realized. The cost of capital for the water system is defined as the cost of obtaining the funds required for the investment. The cost of capital for the project is stated as a range from 4 percent to 6 percent.

The amortization periods of a bond issue to finance the project were computed for a range of financing costs. Interest rates from 4 percent to 6 percent were used as the cost of financing the project. The annual savings flowing from the regional system under the two demand patterns--target population projection, and high population projection--were used to repay the interest and principal on the bond issue. Assuming the savings flow of $2,116,350 (savings based

on target population projection), the amortization period is approximately 11 years for 4 percent bonds, 11 years for 4.5 percent bonds, 11 years for 5 percent bonds, 12 years for 5.5 percent bonds and 12 years for 6 percent bonds.

The economic benefits and cost of the regional water system were also examined, but not in depth. The regional water system will remove water as a limiting factor in industrial expansion of the area. The dispersion of water supply in the region should help to reduce the concentration of population in the municipalities in the region. A central treatment facility for the raw water supply will provide better water quality control. The regional water system will create a need for a multi-county government body. This additional layer of government will require operating funds. With the expansion of water facilities in the region, the sewage problem will magnify. Sewage treatment facilities must be provided to accommodate the additional water usage.

Conclusions

To gauge the financial feasibility of providing treated water on a regional basis, two measures of efficiency were used. (1) The rate of return generated by the incremental investment in the system was compared to the cost of financing the system, and (2) the amortization period of a bond issue necessary to finance the regional system was compared to the estimated life of the system.

The rates of return calculated for the system under the anticipated demand patterns (target population projection, and high population projection) exceed the cost of financing the system. Assuming

the highest anticipated cost of financing--6 percent--and the lowest rate of return--11.8 percent--the rate of return on the regional system exceeds the cost of financing by 5.8 percent. This spread increases to 9.6 percent under the conditions of a 4 percent cost of financing and 13.6 percent rate of return based on the high demand pattern. Based on this criterion, the regional system is feasible. The magnitude of the financial advantage to be gained from the regional concept hinges on the rate of growth in demand for water in the region and the cost of financing the system at the time of construction. This proposition is valid under the assumption of relatively stable operating costs of the regional system after 1980. Relatively stable operating costs will exist within a range of output, but as the system reaches its maximum output operation costs will increase because of the excessive wear on the components of the system.

The effective rate of return from the regional system will be altered by the economic benefits and costs stemming from the system. A quantification of the net benefits accruing from the system is not within the scope of this study but an analysis of the economic costs and benefits lends support to the conclusion that the benefits arising exceed the economic costs in the region. If one can assume that economic benefits exceed economic costs (although non-quantified in this thesis), the true rate of return including the net economic benefits will exceed the rate of return based on the annual flow of savings from the regional water system.

Based on the incremental investment of $17,908,736 and the annual savings flowing from the system, the payout period on a supporting bond issue ranges from 8 years to 12 years. Assuming an

annual savings flow of $2,117,350--based on the target population projection--and an interest rate on bonds of 6 percent, the payback period is 12 years. Assuming a savings flow of $2,440,729--based on the high population projection--the payout period is 8 years with 4 percent bonds and 10 years with 6 percent bonds. Revenue bonds are usually issued for a period of 20 to 30 years. Under conditions of the longest payout period of 12 years, revenue bonds can be used as a source of funds.

The water system has an estimated life of 50 years with some of the components such as the main transmission lines, storage facilities and reservoir having a life expectancy of 75 to 90 years. Based on a system life of 50 years, the amortization period of the bond issue is much shorter than the anticipated life of the annuity from the investment. Restated, savings will flow from the investment for a period of 50 years, while the period of time necessary to pay out the bond issue, assuming savings are applied to repayment of principal and interest, amount to less than 13 years. Based on this payout criterion, the regional system is feasible. The system will generate enough savings to repay the financing costs including bond principal and interest. Also the system is capable of paying out during the early part of its estimated life. The exact payout period depends upon the cost of financing and the savings flow that is forthcoming. The magnitude of the savings flow depends on the demand pattern in the region existing after the inservice date of the system.

To summarize, the Beaver Lake regional system is feasible as measured by the anticipated rate of return on the system and the amortization period of the bond issue supporting the investment.

This research has been concerned with the financial feasibility of the regional approach to water supply. This type of analysis does not consider the economic impact of the system on the region concerned; instead it focuses on the cash savings of the regional water system. This analysis should provide municipal officials with criteria for investment decisions concerning the expansion of existing facilities versus merging facilities into a single unit.

CHAPTER XV

SUMMARY LAKE ATTRIBUTABLE ECONOMIC IMPACTS 1966 - 1970

Tables XV-1 and XV-2 present summaries of the lake attributable economic impacts on the four-county region that have been reported in earlier chapters of this report. Table XV-1 summarizes income by county by source, and Table XV-2 shows a comparison (in 1958 dollars) of area income with and without the presence of Beaver Lake Reservoir.

The period 1966-1970 covers a five-year period after the Beaver Project was completed.

FINDINGS

1. It was found that for the entire four-county region, lake related income has accounted for an annual average of 2.4 percent of Total Personal Income. It should be noted that these estimates include manufacturing based income (see Chapter VII) which may result in an overstatement of lake induced income since manufacturing firms indicated only that the lake was "one consideration" in choosing the area for a plant site.

2. These data also indicate that income growth rates have been only slightly altered by lake induced economic activity. For example, Benton County's actual Total Personal Income grew at an average annual rate of 10.2 percent. When lake induced income is deducted

it was found that annual income growth (with no lake) would have been 9.6 percent, 0.6 percent less than actual measured personal income.

Carroll County, the location of Beaver Dam, experienced actual real income growth at a 9.7 percent rate between 1966 and 1970. Lake attributable income averaged 3.4 percent of total income. When lake attributable income was deducted from actual, the annual growth rate fell to 9.3 percent.

In Madison County lake attributable income was about 1 percent of total income between 1966 and 1969. As the result of industrial location in 1970 the lake attributable share increased to 4.1 percent. Between 1966 and 1970 the growth of real personal income grew by 1.8 percent. After lake related income was deducted the growth rate declined.

Washington County, the largest of the four counties in terms of population and income, had lake attributable income equal to an average of 0.7 percent of total income. Its growth rate with and without the lake was 4.3 percent.

Table XV - 1

SUMMATION OF LAKE ATTRIBUTABLE
PRIVATE INCOME BY COUNTY
BY TYPE OF INCOME
1966-1970

	1966	1967	1968	1969	1970
Benton County					
Tourism	$1,458,700	$1,517,040	$2,282,211	$3,853,381	$4,822,948
Retirement	2,047,755	1,959,000	2,629,590	2,906,113	3,029,891
Sales of Bait, Fishing Tackle, etc.	242,461	271,641	340,571	451,027	581,440
Manufacturing	30,083	33,338	35,528	613,680	631,680
Less loss of Agriculture Net Income	(141,450)	(159,450)	(177,600)	(195,450)	(213,600)
TOTAL	3,637,549	3,591,569	5,110,300	7,628,751	8,852,359
Carroll County					
Tourism	252,708	321,870	414,682	539,449	705,737
Retirement	361,449	514,464	474,132	420,013	482,698
Sales of Bait, etc.	42,768	57,608	61,841	63,135	85,048
Manufacturing	- -	- -	- -	- -	191,775
Less Loss of Agriculture Net Income	(17,250)	(18,750)	(20,400)	(21,900)	(23,500)
TOTAL	639,675	893,942	930,255	1,000,697	1,441,749
Madison County					
Tourism	61,856	65,730	74,365	84,964	97,620
Retirement	88,232	84,674	84,967	65,795	66,703
Sales of Bait, Motors, etc.	10,447	11,741	11,082	9,890	11,753
Manufacturing	- -	- -	- -	- -	575,325
Less Loss of Agriculture Net Income	(45)	(45)	(60)	(60)	(75)

Table XV - 1 (continued)

	1966	1967	1968	1969	1970
Washington County					
Tourism	608,490	646,569	731,575	835,791	960,279
Retirement	870,006	834,882	851,461	650,503	656,667
Sales of Bait, Motors, etc.	103,019	115,765	109,150	97,781	115,700
Manufacturing	- -	- -	- -	- -	- -
Less loss of Agriculture Net Income	(46,800)	(52,800)	(58,800)	(64,800)	(70,950)
TOTAL	1,534,715	1,574,416	1,633,386	1,519,275	1,732,646
FOUR COUNTY TOTAL	5,972,429	6,222,027	7,844,295	10,309,312	12,778,115

Table XV - 2

COMPARISON OF LAKE RELATED
PRIVATE INCOME & TOTAL INCOME
(In 1958 Dollars)
1966 - 1970

	1966	1967	1968	1969	1970	Average Annual Percent Change
Benton County						
Actual	$ 80,817,000	$ 80,468,000	$ 89,885,000	$ 99,591,000	$114,054,000	10.3
Lake Induced Income	3,193,633	3,054,055	5,178,495	5,950,664	6,542,763	
Lake Induced/Actual	3.9%	3.7%	4.6%	5.9%	5.7%	
Actual-Lake Induced	77,623,367	77,413,945	85,706,650	93,640,356	107,511,237	9.6
Carroll County						
Actual	17,769,000	18,355,000	19,536,000	21,151,000	24,695,000	9.7
Lake Induced Income	561,169	760,154	760,609	780,574	1,065,594	
Lake Induced/Actual	3.1%	4.1%	3.8%	3.6%	4.3%	
Actual-Lake Induced	17,207,831	17,594,846	18,775,391	20,370,426	23,629,406	9.3
Madison County						
Actual	12,522,000	11,168,000	11,488,000	13,579,000	13,414,000	1.8
Lake Induced Income	141,782	137,840	139,291	125,264	555,359	
Lake Induced/Actual	1.1%	1.2%	1.2%	0.9%	4.1%	
Actual-Lake Induced	12,380,218	11,030,160	11,348,709	13,453,736	12,858,641	1.0
Washington County						
Actual	152,443,000	151,619,000	165,014,000	177,021,000	178,842,000	4.3
Lake Induced Income	1,347,423	1,338,789	1,335,556	1,185,081	1,280,595	
Lake Induced/Actual	0.8%	0.8%	0.8%	0.6%	0.7%	
Actual-Lake Induced	151,095,577	150,280,211	163,678,444	175,835,919	177,561,405	4.3
Four-County Totals						
Actual TPI	229,300,000	263,351,000	261,610,000	311,342,000	330,748,000	11.1
Lake Induced Income	5,243,572	5,290,839	6,413,977	8,041,585	9,444,312	
Lake Induced/Actual	2.2%	2.0%	2.4%	2.5%	2.8%	

CHAPTER XVI

OPERATIONS OF THE COMPLETED PROJECT 1960 - 1970

Data supplied by the U. S. Army Corps of Engineers along with other findings reported in this study provide a basis for evaluating the operations of the completed project from an economic point of view.

As stated in Chapter I of this study, one criteria of economic efficiency from the standpoint of the investor (i.e., all taxpayers) is that the excess of revenues over costs be sufficient to provide a yield equal to or greater than alternative uses of capital.

The gross revenues of the completed project were considered to be the sum of (1) revenue from sale of electric power, and (2) Federal Income Tax payments on the increments to area income attributable to the completed project (summarized in Chapter XV).

In computing annual cost of operations the dam and power station were depreciated on a straight line basis assuming a 100 year life expectancy. Annual costs of labor, maintenance and supplies, and contracts were supplied by the U. S. Army Corps of Engineers. Annual land rent was assumed to be equal to a 4 percent return that would have been attainable had the amount used to acquire the land for the project been invested in some alternative use. Table XVI-1 contains a summary of these costs and revenues.

FINDINGS

It was found that the sales of electric power have been sufficient to cover all costs of operations, including depreciation and implicit land rent; however, the net yield or original investment when only power sales were considered was 1.2 percent. When additional Federal Income Tax collections (derived from lake attributable income increments) are also considered, the net yield or original investment was 2.8 percent.

Assuming the cost and revenue experience of the 1966-1970 period continues the estimated pay-back period for the project (when all costs are considered) is 34.6 years. Based upon the net cash inflow from the project (which excludes noncash expenses--rent and depreciation) the project will have a pay-back period of 22.4 years.

Table XVI-1

BEAVER LAKE RESERVOIR PROJECT OPERATIONS
1966-1970

	1966	1967	1968	1969	1970
Revenue From Operations					
Electric Power Sales	$1,570,000	$1,570,000	$1,570,000	$1,570,000	$1,570,000
Federal Income Tax Collections* (estimated) from increments to private sector income derived from lake related economic activity in the four county area.	387,342	445,018	613,377	874,848	1,169,201
Total Revenue to Federal Government	1,957,342	2,015,018	2,183,377	2,444,848	2,739,201
Cost From Operations					
Depreciation of dam, power station and appurtenant works	450,610	450,610	450,610	450,610	450,610
Labor	116,200	131,700	187,300	197,500	226,000
Maintenance and Supplies	27,900	59,000	49,000	50,000	59,800
Contracts	200	3,400	7,100	15,617	63,800
Implicit Land Rent**	276,300	276,300	276,300	276,300	276,300
Total Cost of Operations	871,210	921,010	970,310	990,022	1,076,510
Net Income From Operations	$1,086,132	$1,094,008	$1,213,067	$1,454,826	$1,662,691

Average net revenues per year: $1,302,145
Average yield on original investment: 2.8%
Estimated payback period on original investment:
A. Based on Explicit & implicit costs: 34.6 years
B. Based on cash flow (including noncash expenses): 22.4 years

*Tax rates derived from County Personal Income Data.

**Cost of land multiplied by 4 percent.

Table XVI - 2

STATE OF ARKANSAS

LAKE INDUCED REVENUES AND EXPENDITURES

	1966	1967	1968	1969	1970
Estimated sales tax collections from lake induced retail sales*	$603,993	$673,070	$751,324	$844,345	$962,108
Estimated personal income tax collections from lake induced private income**	47,179	49,150	61,153	81,438	100,940
Total Revenues	651,172	722,220	812,495	925,690	1,063,048

*Based on Average Rate of 7.0 percent

**Based upon ratio of Income Tax Collections to Total Personal Income for State.

BIBLIOGRAPHY

1. Arkansas Labor Force Statistics, Annual Averages, State and Areas. Arkansas Department of Labor, Employment Security Division, Little Rock, Arkansas, (1960 through 1970).

2. Arkansas Average Covered Employment and Wages by Industry and County. Arkansas Department of Labor, Employment Security Division, Little Rock, Arkansas, (1960 through 1970).

3. Arkansas Personal Income Handbook. Industrial Research and Extension Center, College of Business Administration, University of Arkansas, Little Rock, Arkansas, 1972.

4. Armenakis, A.A., R. F. Pearson, and W. P. Neely. The Relation of Water Resources to the Industrial and Recreational Potential of the Mississippi Gulf Coast. Water Resources Research Institute, Mississippi State University, State College, Mississippi, 1968.

5. Beekhuis, Jeanne V., and W. Fothergull. Promoting Retirement to Arkansas. Beekhuis and Fotherfull, Economic Consultants, Washington, D. C., 1971.

6. Burns, Kenneth. The Economic Impact of Tourism in the Northwest Arkansas Economic Development District. Doctoral dissertation in progress (Donald R. Market, Associate Professor of Economics, director) College of Business, University of Arkansas, Fayetteville, Arkansas. Unpublished.

7. Clark, Charles T., J. E. Willis, and Charles A. Pieper. The Highland Lakes of Texas. Bureau of Business and Economic Research, The University of Texas, Austin, Texas, 1967.

8. Deal, Richard E., and Michael H. Halbert. The Application of Value Theory to Water Resources Planning and Management. Institute for the Study of Inquiring Systems, Philadelphia, Pennsylvania, 1971.

9. Dinius, S. H. "Social Accounting System for Evaluating Water Resources." Reprinted from Water Resources Research, U.S. Department of Interior, Washington, D. C., Vol. 8, No. 5, October 1972.

10. Easterwood, C. B., Paul R. Lowry, and Owen Thornberry. The Socio-economic Impacts of the Proposed Potomac National River on the Contiguous Counties. Bureau of Business and Economic Research, Memphis State University, Memphis, Tennessee, 1969.

11. Eilert, John W. A Profile and Economic Impact Analysis of Four Cumberland Gap Counties. Bureau of Business and Economic Research, Memphis State University, Memphis, Tennessee, 1968.

12. First, Third and Seventh Biennial Report of the Assessment Coordination Division of the Arkansas Public Service Commission, Justice Department Building, Little Rock, Arkansas.

13. Focus on Tourism-Recreation in the Northwest Arkansas Economic Development District. Checchi & Company, Washington, D. C., 1971.

14. Green, Bernal L., Lloyd Bender, and Rex R. Campbell. Migration into Four Communities in the Ozark Region. Agricultural Experiment Station, University of Arkansas, Fayetteville, Arkansas, 1970.

15. Green, Bernal L., et. al. The Emerging Role of Outdoor Recreation in the Economic Environment of Arkansas. Agricultural Experiment Station, University of Arkansas, Fayetteville, Arkansas, 1972.

16. Hoover, Edgar M. An Introduction to Regional Economics. Alfred A. Knopf, New York, New York, 1971.

17. Impact of Job Development on Poverty in Four Developing Areas, 1970 (Ag. Econ. Report No. 225). U.S. Department of Agriculture, Washington, D. C., 1972.

18. James, L. Douglas. A Perspective on Economic Impact-Research Report No. 37. University of Kentucky, Water Resources Institute, Lexington, Kentucky, 1972.

19. Keeling, William B., et. al. Economic Impact of the Proposed Cumberland Island National Seashore. Bureau of Business and Economic Research, Graduate School of Business Administration, University of Georgia, Athens, Georgia, 1968.

20. Ludtke, Richard L., and Rabel Burdge. Evaluation of the Social Impact of Reservoir Construction on the Residentail Plans of Displaced Persons in Kentucky and Ohio. University of Kentucky, Water Resources Institute, Lexington, Kentucky, 1970.

21. Pearson, John E., and Kenneth E. Heideman. A Study of the Economic Impact of Water Impoundment Through Validity Testing of a Comparative-Projection Model. Water Resources Institute, Texas A & M University, College Station, Texas, 1969.

22. Peden, Guy T., Jr., Vance Vardman, and Barry Oden. Economic Benefits Accruing to Construction and Operation of Thompson Creek Reservoir. Bureau of Business and Economic Research, State College, Mississippi, 1965.

23. Projected Ad Valorem Taxes Arising from the Development of Toledo Bend Reservoir. Division of Business and Economic Research, Louisiana Polytechnic Institute, Ruston, Louisiana, 1969.

24. Smith, Charles Robert. Anticipations of Change: A Sociological Economic Description of a Kentucky County Before Reservoir Construction. University of Kentucky, Water Resources Institute, Lexington, Kentucky, 1970.

25. Sparks, Jared. Arkansas Water Resources: Supply, Use, and Research Needs. Water Resources Research Center, University of Arkansas, Fayetteville, Arkansas, 1967.

26. The Economic Impact of Recreation. State of Wisconsin, Department of Resource Development, 1965.

27. Westkott, James R. Employment Multipliers for the Philadelphia Metropolitan Area. Federal Reserve Bank of Philadelphia, 1966.

28. Williams, Norman. The Financial Feasibility of the Regional Approach to Public Water Supply. Doctoral dissertation, College of Business Administration, University of Arkansas, Fayetteville, Arkansas, 1972.

29. United States Census of Agriculture--Arkansas. U.S. Department of Commerce, Bureau of the Census, Washington, D. C., 1950, 1954, 1959, 1964, 1967.

30. United States Census of Business--Arkansas--Wholesale and Retail Trade. U.S. Department of Commerce, Bureau of the Census, Washington, D. C., 1948, 1954, 1958, 1963, 1967.

31. United States Census of Population--Arkansas--General Population Characteristics. U.S. Department of Commerce, Bureau of the Census, Washington, D. C., 1950, 1960, 1970.

32. United States Census of Population--Arkansas--General Social and Economic Characteristics. U.S. Department of Commerce, Bureau of the Census, Washington, D. C., 1950, 1960, 1970.

33. Zimmermann, Erich W. World Resources and Industries. Harper & Brothers, New York, New York, 1951.