GEORGIA

STATE DIVISION OF CONSERVATION

DEPARTMENT OF MINES, MINING AND GEOLOGY
GARLAND PEYTON, Director

THE GEOLOGICAL SURVEY
Information Circular 21

STREAMFLOW MAPS OF GEORGIA'S MAJOR RIVERS

by

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United States Geological Survey

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Department of the Interior, Washington, D. C.

ATLANTA
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STREAMFLOW MAPS OF GEORGIA'S MAJOR RIVERS

by M. T. Thomson

Maps are commonly used to show the approximate rates of flow at all localities along the river systems. In addition to average flow, this collection of streamflow maps of Georgia's major rivers shows features such as low flows, flood flows, storage requirements, water power, the effects of storage reservoirs and power operations, and some comparisons of streamflows in different parts of the State.

Most of the information shown on the streamflow maps was taken from "The Availability and use of Water in Georgia" by M. T. Thomson, S. M. Herrick, Eugene Brown, and others published as Bulletin No. 65 in December 1956 by the Georgia Department of Mines, Mining and Geology. The average flows reported in that publication and shown on these maps were for the years 1937-1955. That publication should be consulted for detailed information. More recent streamflow information may be obtained from the Atlanta District Office of the Surface Water Branch, Water Resources Division, U. S. Geological Survey, 805 Peachtree Street, N.E., Room 609, Atlanta 8, Georgia.

In order to show the streamflows and other features clearly, the river locations are distorted slightly, their lengths are not to scale, and some features are shown by block-like patterns. The range of flows is so great that those of small streams cannot be shown at all. Furthermore, a different scale has to be used for each map. Thus, the differences in scales must be considered when comparing the flows shown on the several maps. The streamflow maps are intended to give a general picture only, and should not be used as a source of precise data.

LOCATION MAP

The locations of the rivers for which the streamflows are given, are shown on a map of the county outlines. The flows of the major rivers are given from the mouths, or the State boundaries, upstream to the uppermost major reservoir, or to where the flow becomes too small to be scaled on the map of the average flow. Flows of tributary streams are not generally given even though some have more flow than portions of the major rivers. The Alapaha River represents the flows of the St. Marys River, three branches of the Suwannee River and the Ochlockonee River, none of which has a large enough flow in Georgia for the differences among them to be scaled on the flow maps.

The location map also shows the major reservoirs, the principal cities on the rivers, and the major hydrologic provinces. These features are also shown on most of the streamflow maps. When using the streamflow maps, the reader can refer to the location map for the names of the rivers and their correct locations.

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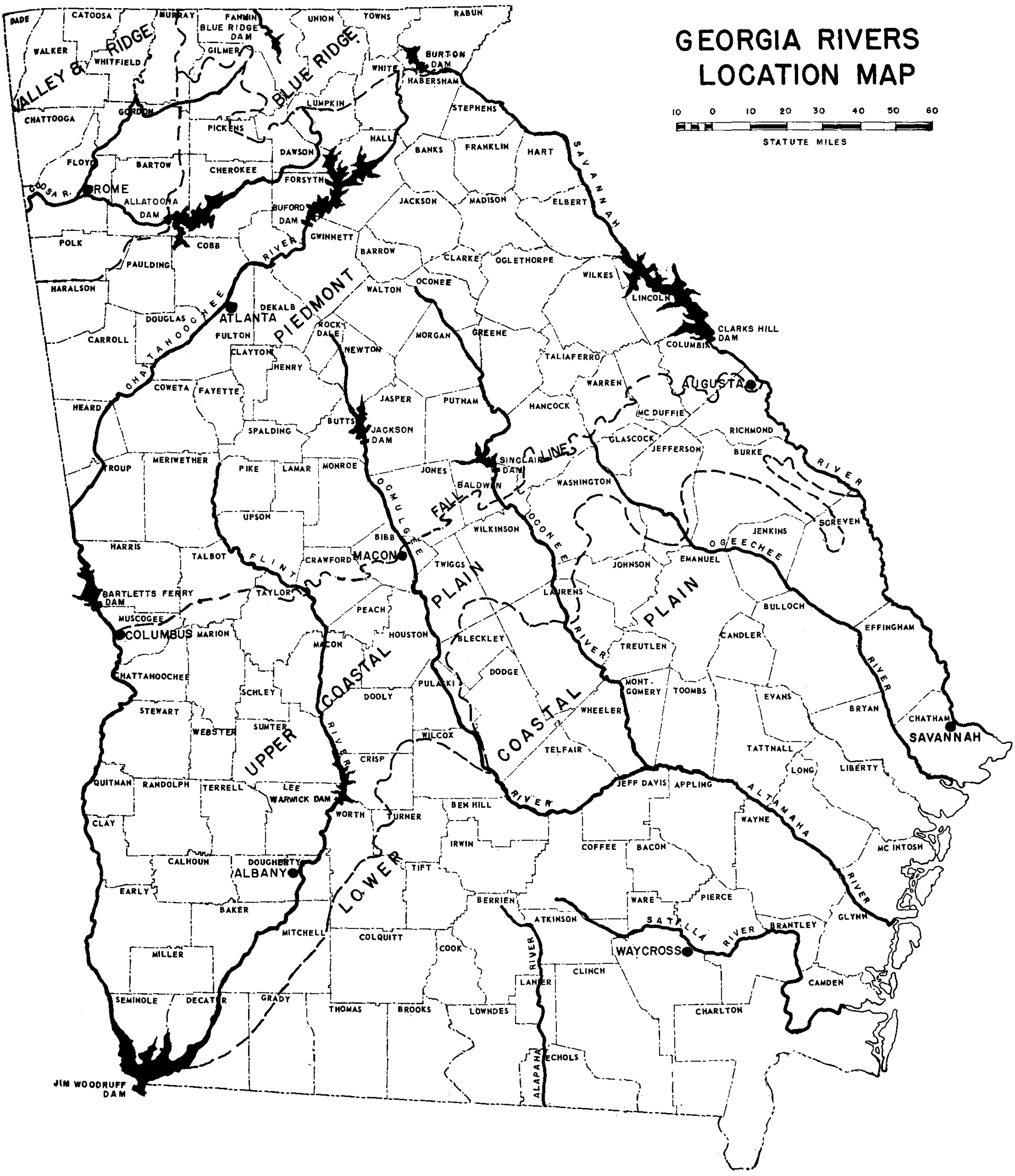

AVERAGE FLOW

The average flow represents the total water resource of the river. Usually, not all of the averflow can be used economically. Even in the most intensive river developments some water is lost by evaporation during critical drought periods, and some flood waters are wasted. No more water than that indicated by the average flow can be obtained, on a continuing basis, except by diverting water from another source, such as another river, artesian aquifers, or by changes in land use. The average flow shown on the map may be scaled approximately in either of two units commonly used, cubic feet per second or million gallons per day.

The flows of the four rivers that enter the Atlantic Ocean are shown by dashed lines near their mouths to indicate that the flows are estimated in those reaches, which are downstream from any gaging stations. The graphs are not reliable below the lowest gaging stations, but they are extended to the ocean for clarity.

The average flow of a river generally increases from the source to the mouth in a series of steps as each tributary or large spring adds its flow, rather than gradually as shown on the map. Steps are shown only at the mouths of large tributaries.

The increase in the average flow in the down stream direction is governed primarily by the increase in the area drained by the river.

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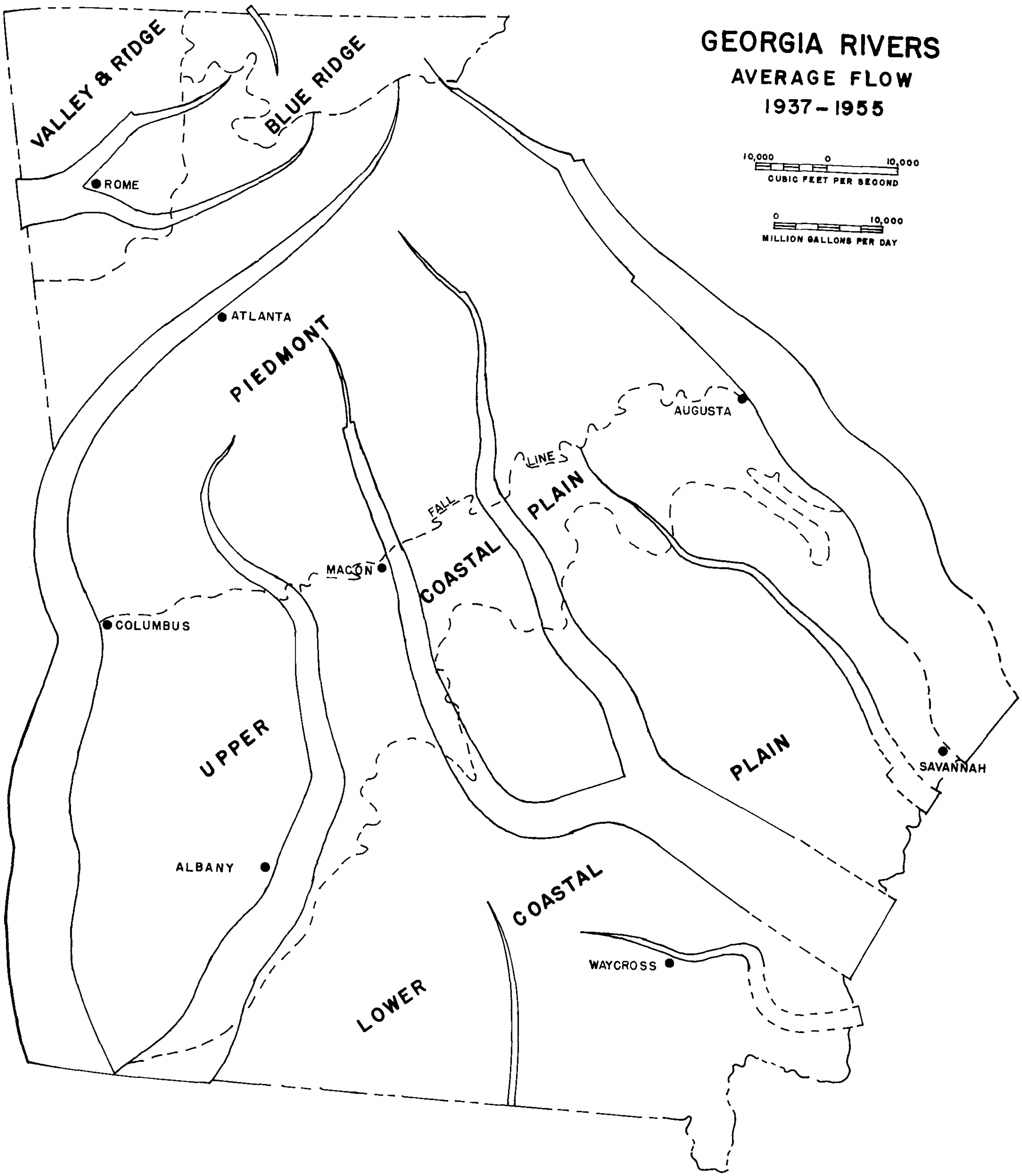

GEORGIA RIVERS
AVERAGE FLOW
1937-1955

AVERAGE FLOW PER SQUARE MILE AND RUNOFF IN INCHES

The average flow depends mostly on the size of the drainage area. It is interesting, and frequently very useful, to know the average flow per square mile which is directly related to runoff per year. One cubic foot per second per square mile is equivalent to 13.55 inches of runoff. Both scales are shown on the map.

In general, the runoff is greatest in the mountains of the Blue Ridge province and diminishes as the rivers approach their mouths. The rivers that lie wholly within the lower Coastal Plain have less runoff than the rivers that rise in the other provinces.

The map does not demonstrate clearly the differences in local runoff because the differences are obscured by the cumulative effect of upstream runoff as the rivers cross the several hydrologic provinces. In fact, the graphs show a uniformity in the runoff which is misleading. The differences are more clearly defined by comparing the runoff of segments of the rivers.

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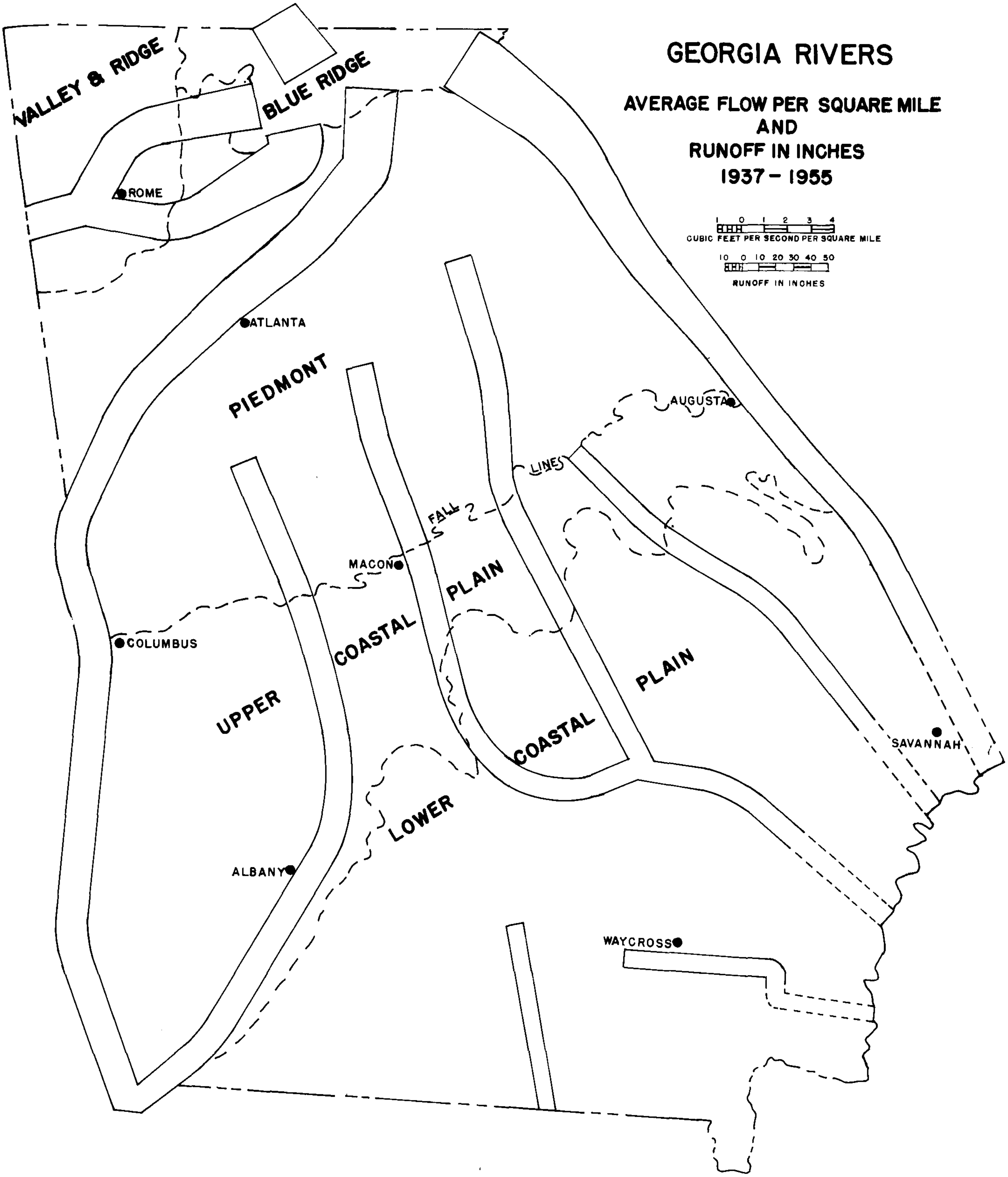

AVERAGE FLOW PER SQUARE MILE AND RUNOFF BY SEGMENTS

The average flow per square mile and runoff are shown by segments, each of which is the reach of river between successive gaging stations. The runoff shown for each segment is an average for that segment.

The high runoff in the mountains of the Blue Ridge province is clearly shown. The runoff in the Piedmont province diminishes from the mountains in the direction of the coast, the lowest in the Piedmont being that of the Savannah River just above Augusta.

In the Valley and Ridge province, the Oostanaula River has appreciably higher runoff than the Etowah River.

Differences in runoff are most apparent in the upper Coastal Plain. The Flint River, for example, has comparatively high runoff in the segments immediately below the Fall Line and below Albany. The lowest segments of the Flint and Chattahoochee Rivers, shown as one because they are now part of the Jim Woodruff Reservoir also have high runoff.

The segments of the rivers in the lower Coastal Plain have the lowest runoff in the State.

The runoff for the segments of the major rivers indicates the runoff that may be expected of smaller tributary streams in the Blue Ridge and Piedmont provinces, and lower Coastal Plain. However, in the Valley and Ridge province, and upper Coastal Plain, the runoff of small streams differs radically from that of the segments of the major rivers.

The differences in the runoff of local streams is not due entirely to differences in rainfall.

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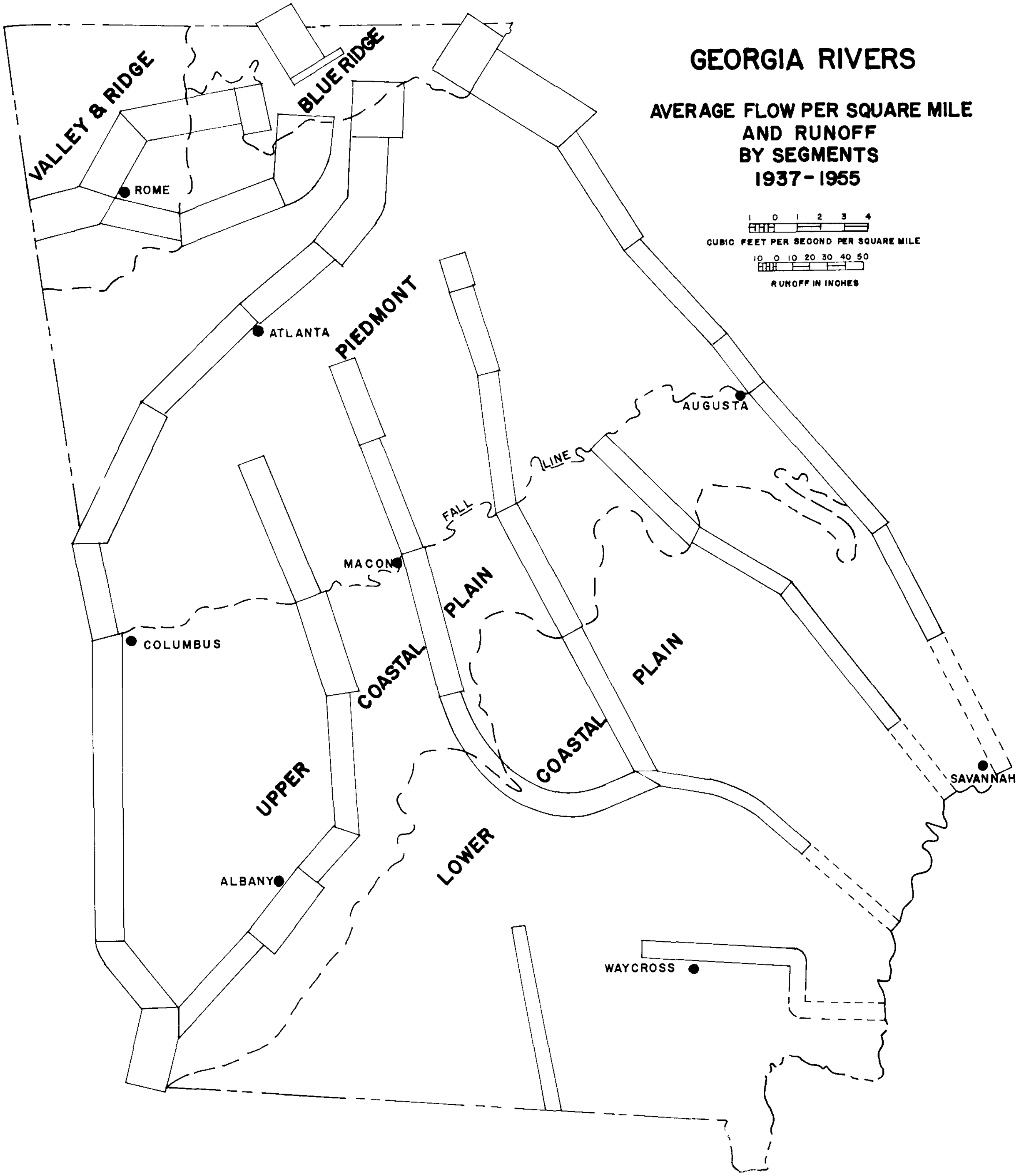

RUNOFF IN PERCENT OF RAINFALL, BY SEGMENTS

The runoff of the segments of the rivers is shown in percent of the rainfall on the areas draining into the segments. By showing runoff in this proportional manner, many of the local differences in runoff caused by rainfall are eliminated and the differences caused by the land itself are more clearly shown.

The proportional runoff is highest in the mountains of the Blue Ridge province and diminishes in the Piedmont province from the mountains toward the coast.

The proportional runoff in the lower Piedmont segments of the Savannah, Oconee, and Ocmulgee Rivers is similar, demonstrating that the low runoff previously noted in the Savannah River segment is partly due to low rainfall.

In the upper Coastal Plain, the differences in the proportional runoff of the segments of the Flint River are as prominent as proportions of the rainfall as they were as runoff. Geologic influences are the most likely causes of these differences.

In the lower Coastal Plain, the low proportional runoff may be partly due to high temperatures which cause severe evaporation and transpiration losses from the drainage basins that have large areas of lakes and swamps.

Differences in runoff due to geologic influences are much more prominent during low-flow periods.

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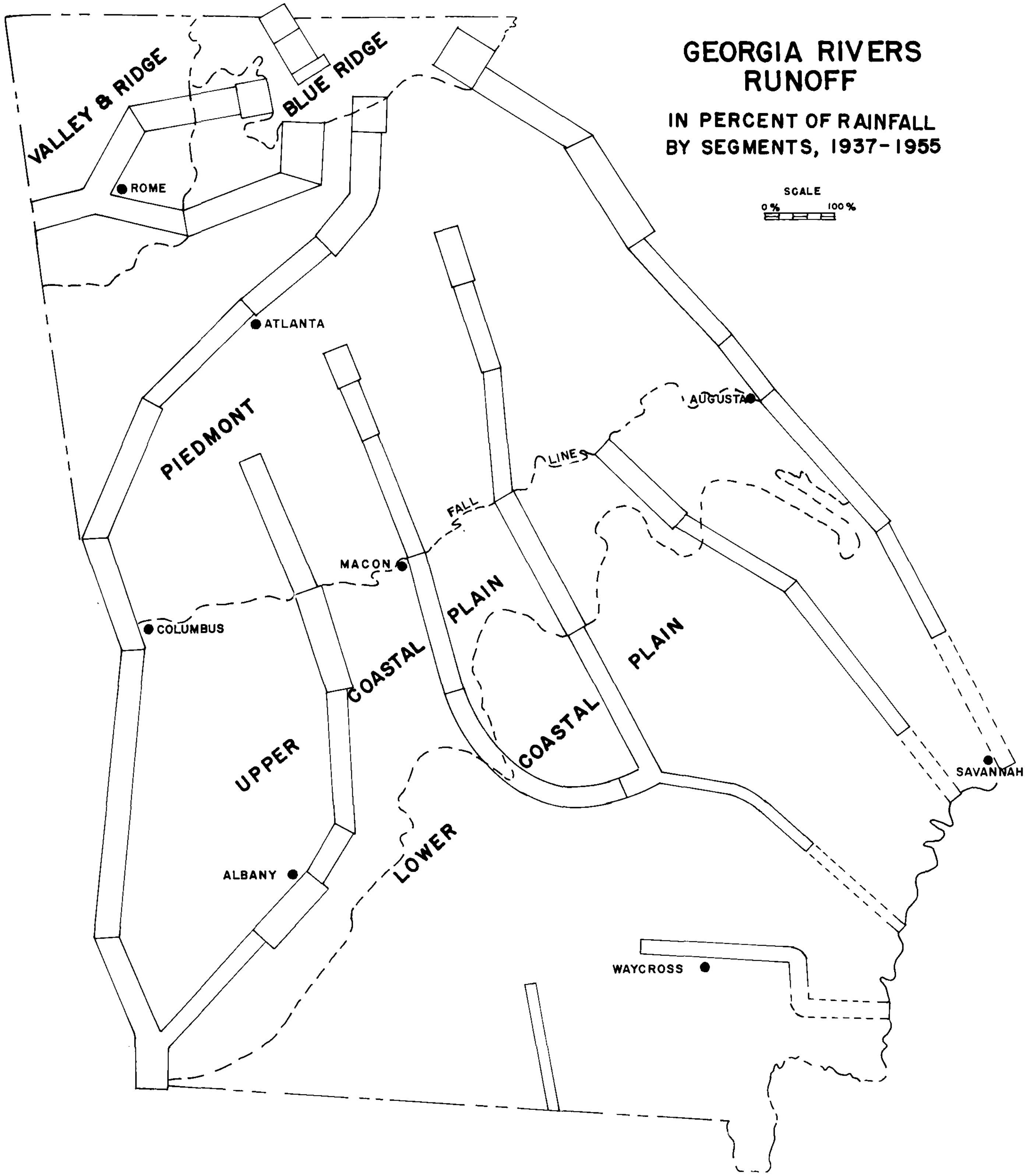

GEORGIA RIVERS RUNOFF

IN PERCENT OF RAINFALL BY SEGMENTS, 1937-1955

NATURAL MINIMUM MONTHLY FLOW BY SEGMENTS

The natural minimum monthly flow per square mile in the drought year 1954 is shown for the same segments used in the preceeding runoff maps. Despite a three-times larger scale, the minimum flows of some segments are so small that they can be shown only by narrow lines.

The natural minimum flows per square mile for segments of the major rivers are difficult to determine because many of the rivers are affected by releases from storage reservoirs, which during low flows may comprise most of the water. The difficulties in computing natural low flows on regulated rivers limits the results generally to monthly averages.

The flow per square mile shown for each segment is an average of a variety of flows from the several parts of the area that drain into the segment.

Low flows occur nearly every year in Georgia during September and October. The drought flows in 1954 were not entirely unprecedented, and were not much smaller than those experienced every few years.

Except in the Blue Ridge and Valley-and-Ridge provinces, where the rainfall deficiency during the 1954 drought was less severe than in the rest of the State, the minimum streamflows per square mile indicate generally the differences that may be expected during most of the September-October low-flow periods. The severe differences are associated with geology.

The minimum streamflows per square mile, like the average flows, tend to diminish in the Piedmont province from the mountains to the Fall Line. Sharp differences appear in the several segments of the Chattahoochee River between Buford Dam and Columbus.

The abrupt increases at the Fall Line reflect geologic influences in the upper Coastal Plain. The differences in the several segments of the Flint River are much more pronounced during low flow conditions than for average flows.

The minimum flows per square mile on the segments of the rivers in the lower Coastal Plain are notably low, except on the Ocmulgee and Oconee Rivers. Both of these river segments maintain good yields during low-flow periods. This good yield is probably due to underground inflow to the rivers themselves because the yield of their tributaries is similar to that of other lower Coastal Plain streams such as the Alapaha River. Some rivers in the lower Coastal Plain that drained up to 1,000 square miles were dry for a month or more in 1954.

The low flows per square mile for segments of the major rivers is useful in estimating the low flows of the rivers at localities between gaging stations. Increments of natural inflow between gaging stations can be estimated more accurately from the data for the segments than from the flow per square mile at a gaging station on the river itself or on a tributary. This is particularly true on rivers that are affected by storage and power operations and diversions, as most major rivers are. The effects of such man-made regulation are far more prominent during low flows than they are for average flows.

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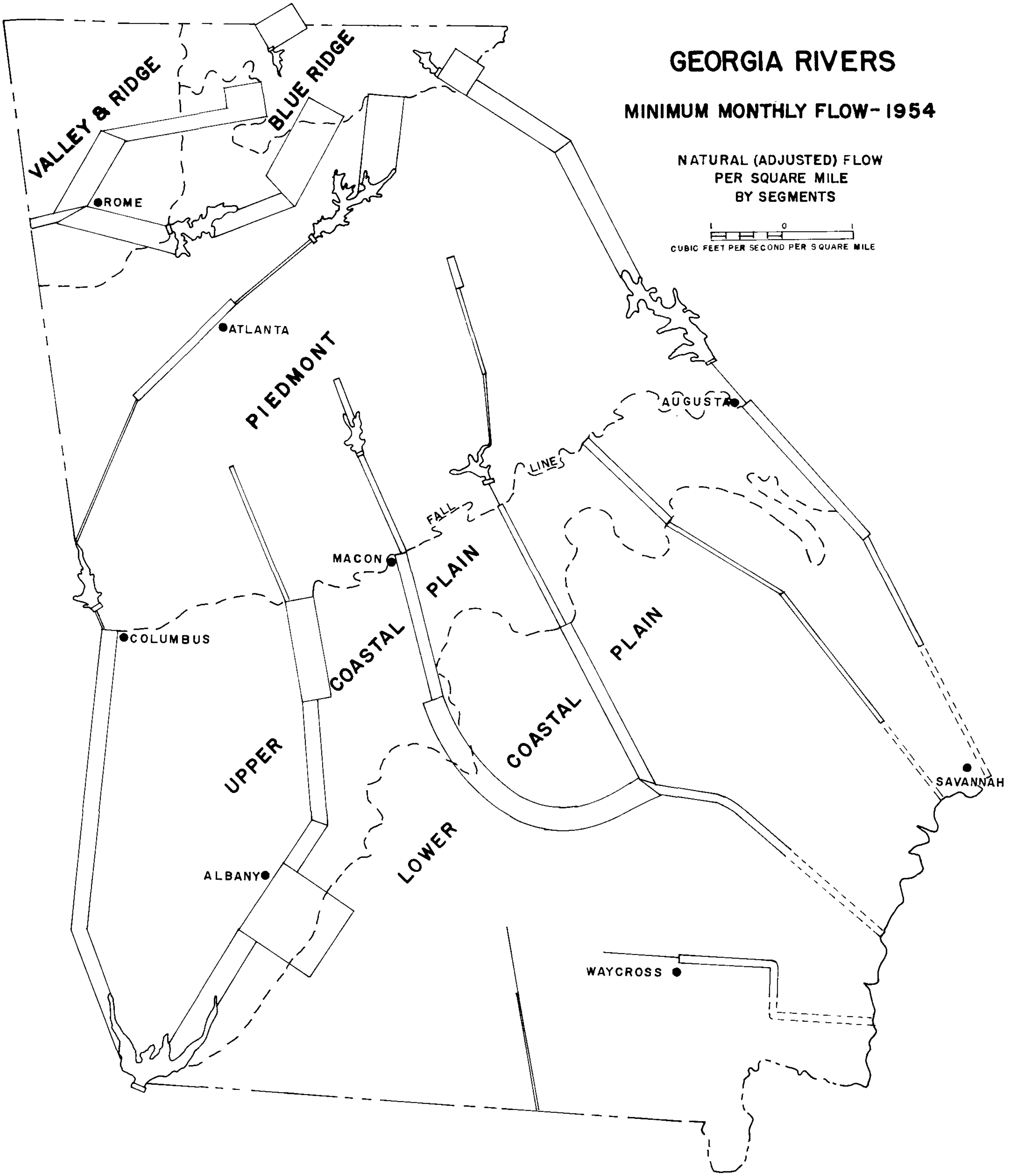

MINIMUM MONTHLY FLOW

The natural minimum monthly flow is shown by the open graph and the effect of storage reservoirs is shown by the shaded graph. The sum of the two is the graph of the actual flows observed at the gaging stations in 1954. To compute the natural flows, the releases from storage in the reservoirs are deducted from the observed flows.

The efect of flows released from storage in the reservoirs remains nearly constant downstream until changed by the operations at another reservoir. Thus each shaded graph has a uniform width. The natural flow, however, usually increases in the downstream direction as shown by the expanding width of the graph. In segments where the natural dry-season runoff is good, the graphs widen (the flow increases) rapidly as on the lower Flint River. In segments where the natural dry-season runoff is poor, the graph widens only imperceptibly as on the Chattahoochee River between Atlanta and Bartletts Ferry Reservoir.

Buford Reservoir and Jim Woodruff Reservoir were not in operation in 1954 and are not shown on the map.

The relative improvement in the low flow from storage operations, as shown by the proportion of the shaded graph to the open graph. differs radically below the several reservoirs. Some of the differences are due to the relative proportion of the water stored — the releases from Lake Jackson at the head of the Ocmulgee River, for example, made a sizeable improvement for a short distance downstream, but the reservoir does not control enough water to make much improvement in the lower river. Other differences are due to the circumstances that governed the operations of the reservoirs in 1954. For example, the water in some reservoirs was held in reserve for emergency use, otherwise the reservoirs would have made more substantial improvements to the low flows.

The actual reservoir operations in 1954 do not necessarily indicate the potential or average improvements in low flows that the reservoirs may provide in future years, as more reservoirs are added to the systems, and as the needs for water downstream change.

The graphs of the minimum monthly flow show the immense amount of improvement that can be accomplished by seasonal storage operations at major reservoirs. The improvements are not necessarily so pronounced for shorter periods, as shown by the records of minimum daily flows.

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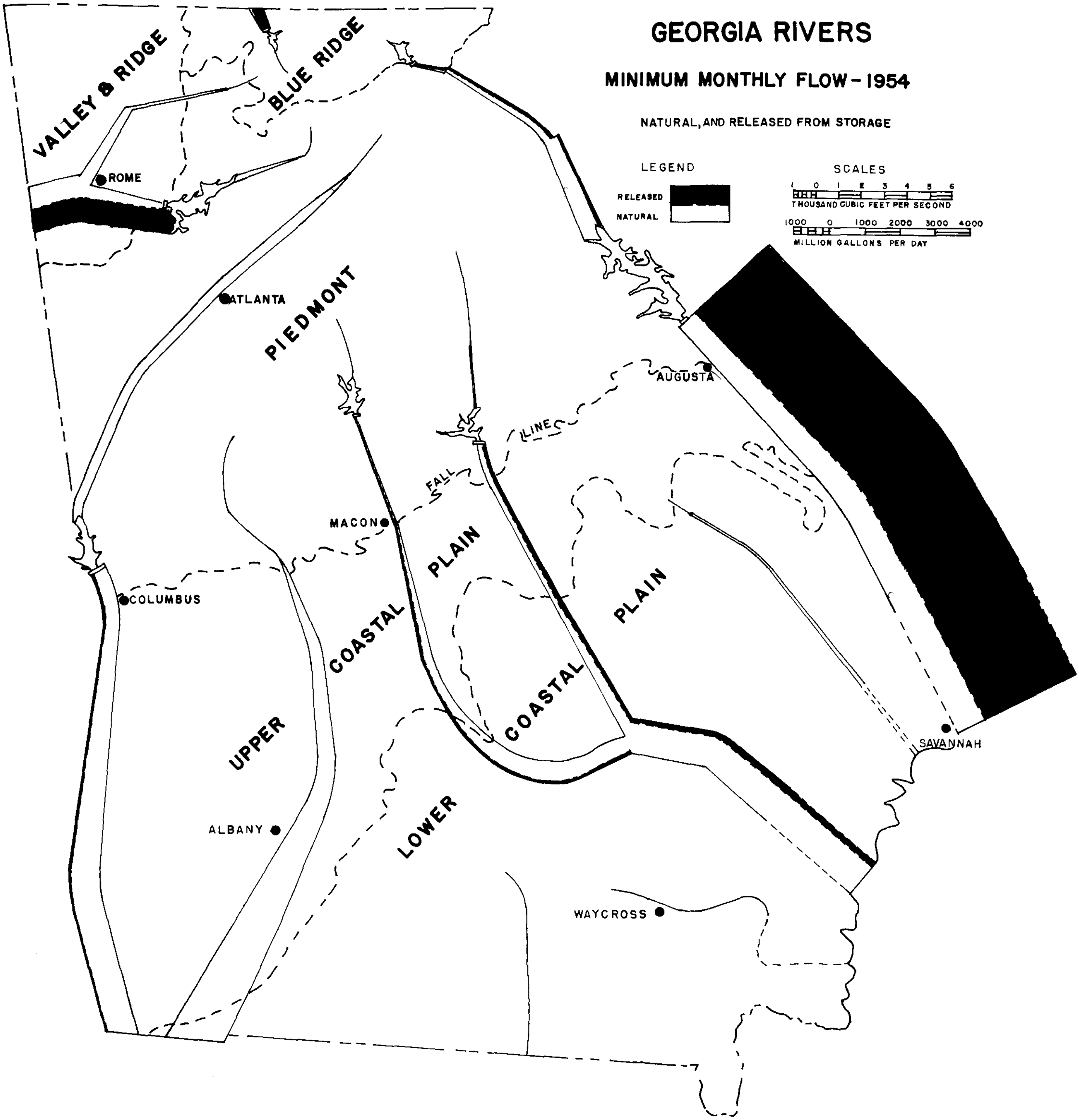

GEORGIA RIVERS

MINIMUM MONTHLY FLOW - 1954

NATURAL, AND RELEASED FROM STORAGE

MINIMUM MONTHLY AND DAILY FLOWS BELOW MAJOR RESERVOIRS

The minimum monthly flows below major reservoirs generally show improvements over the natural flows that would have occurred if the reservoirs had not been in operation. However, hydroelectric power plants at the dams do not release water continuously at the average rate during a low month. Instead water is released in "peaks" when the power is needed, usually the daylight hours on Mondays through Fridays. When the power is not needed little or no water is released. Usually this operation, called "pondage" to distinguish it from seasonal "storage" operations, results in low releases on Saturdays and Sundays, during what is called the "weekend holdover." The minimum daily flows show the effect of the holdovers.

Buford Dam and Jim Woodruff Dam were not in operation in 1954 but they have been shown on the map.

The graphs show the minimum daily flows to be must less than the minimum monthly flows during the holdovers on the Savannah River between Burton Dam and Clark Hill Dam, on the Oconee River for some distance below Sinclair Dam, on the Flint River below Warwick Dam, on the Etowah River below Allatoona Dam and on on the Toccoa River below Blue Ridge Dam. The storage in Warwick Reservoir on the Flint River is too small to affect the minimum monthly flow but it is sufficient for the pondage operations to affect the minimum daily flow.

The minimum daily flow is not much less than the minimum monthly flow on the Savannah River below Clarks Hill Dam. Actually the weekend flow is very low immediately below Clarks Hill Dam, but the very low flows are eliminated within a few miles by the small reservoir above Stevens Creek Dam, which is operated to "reregulate" the fluctuations caused by operations at Clarks Hill Dam. The reregulation causes the relatively uniform flow below Augusta, for navigation and industrial use.

The minimum daily flow is not much less than the minimum monthly flow on the Ocmulgee River below Jackson Dam because the flow is maintained for industrial use. It is not much less on the Chattahoochee River below Bartletts Ferry Dam because the flow is maintained for navigation below Columbus.

The minimum monthly flow on the Chattahoochee River below Buford Reservoir is estimated to show what the effect of Buford Reservoir would have been if it had been in operation in 1954.

The increase in the minimum monthly flow from the seasonal storage at Buford Reservoir would probably have continued below Bartletts Ferry Reservoir, and below Jim Woodruff Reservoir had it also been in operation. The minimum daily flow below Bartletts Ferry however, might not have been changed.

The minimum daily flow caused by power operations is most severe immediately downstream from the dam, but the effect diminishes in the downstream direction. On the Flint River below Warwick Dam, for example, the minimum daily flow increased from only 19 percent of the minimum monthly flow at the dam to 87 percent at the head of Jim Woodruff Reservoir.

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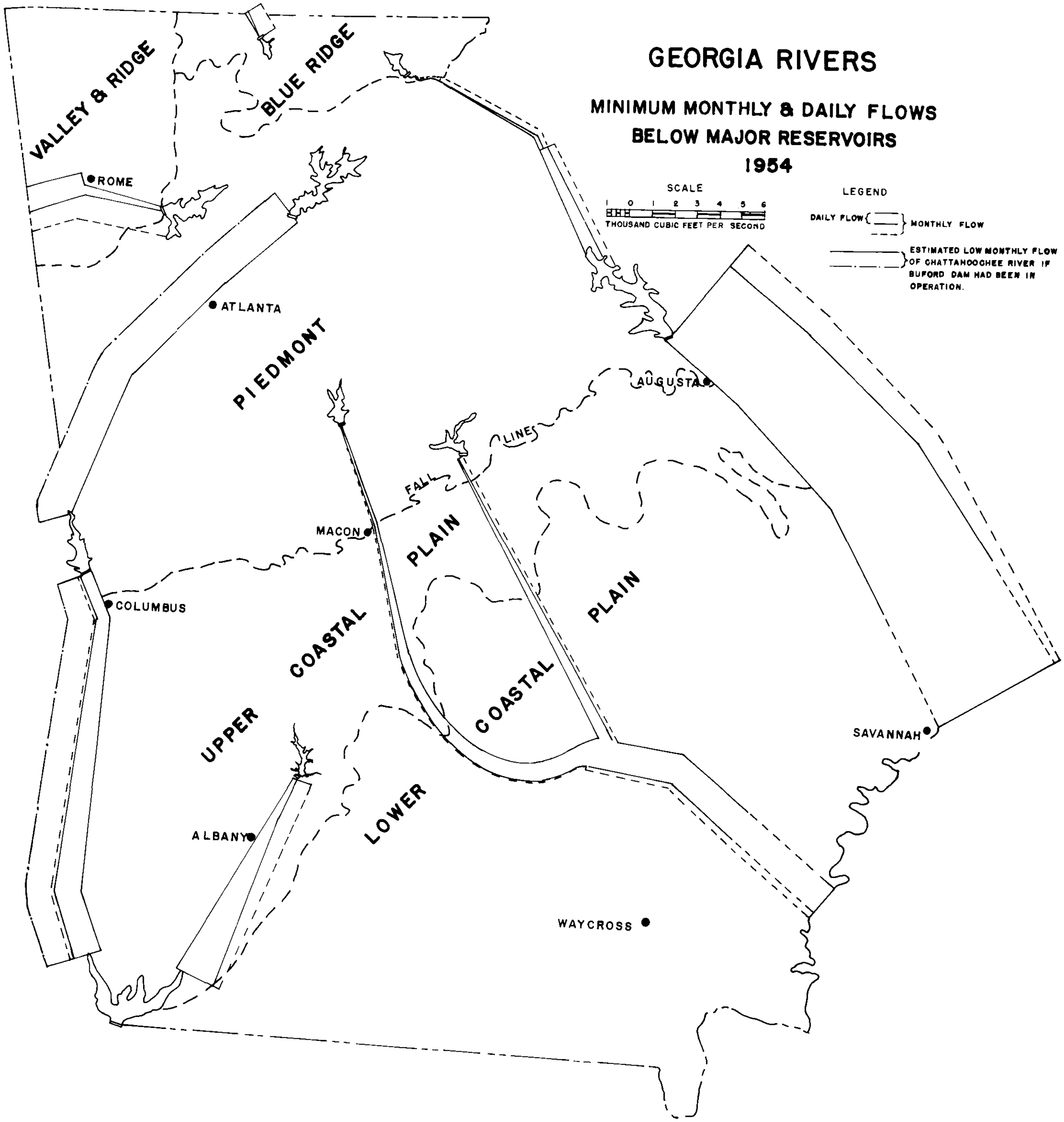

STORAGE REQUIRED AND AVAILABLE

The storage required to improve the low flow of a river depends on the flow that the storage is to maintain at all times. Usually the flow to be maintained is determined by ecnomic factors rather than hydrologic factors. However, in a humid area such as Georgia, the capacity of a reservoir has to be much greater to maintain flows in excess of the average flow for a low year, such as that during the drought conditions of 1954 and 1955, than it needs to be to maintain flows up to that amount. For example, in the Piedmont province the average flows for the period from 1937 to 1955 are 1.5 to 2.3 times as much as the average flows for the low year of 1954-1955, but to maintain the higher flow would require 9 to 16 times as much storage. The low year is the 12-month period that has the lowest average flow during the two calendar years. Water stored in a reservoir in the amount required to maintain this flow would all have been used during the drought of 1954 and the reservoir would have been replenished before the low-flow season began in the following year.

The map shows the storage that would have been required to maintain the average flow for the low year of 1954 at all times. The storage required is shown as the width between the solid lines. The storage available is shown by the total width of the crosshatched part and shaded part. The crosshatched width shows the storage available that is equal to or less than the storage required. The shaded width shows the part of the storage available that exceeds the storage required. Thus the open part of the width between the solid lines represents the storage required but still undeveloped. The storage required increases in downstream direction. The storage available remains a constant amount downstream unless it is increased by other reservoirs.

Four reservoirs on Georgia's major rivers provide storage in excess of that required to maintain a flow equal to the average flow for the low year of 1954 — Burton Reservoir on the Tallulah River, Buford Reservoir on the Chattahoochee River, Allatoona Reservoir on the Etowah River, and Blue Ridge Reservoir on the Toccoa River. The storage in Buford Reservoir, augmented by that in Bartletts Ferry Reservoir and in the smaller reservoirs above Columbus could maintain a flow equal to that for the low year downstream nearly to the head of Jim Woodruff Reservoir.

Storage in excess of that required to maintain the average flow for the low year of 1954 may be very desirable at major headwater reservoirs because the benefits may be extended for a long distance downstream, as on the Chattahoochee River. The use of large storage reservoirs in the headwaters permits fuller development of the water power downstream because less of the fall available in the downstream reaches would need to be reserved for storage operations.

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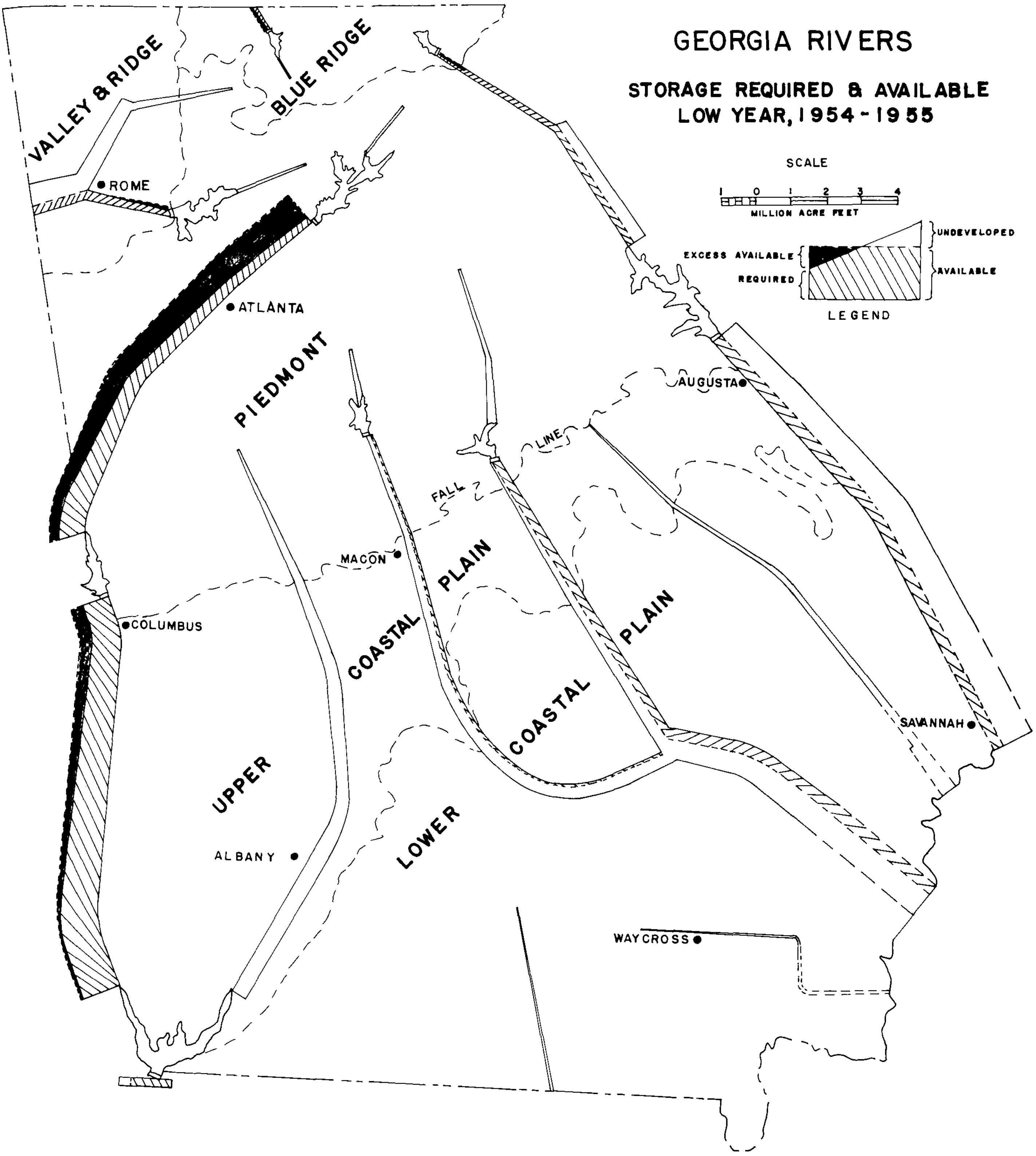


GEORGIA RIVERS

STORAGE REQUIRED & AVAILABLE
LOW YEAR, 1954-1955

AVERAGE FLOW, LOW YEAR 1954-1955

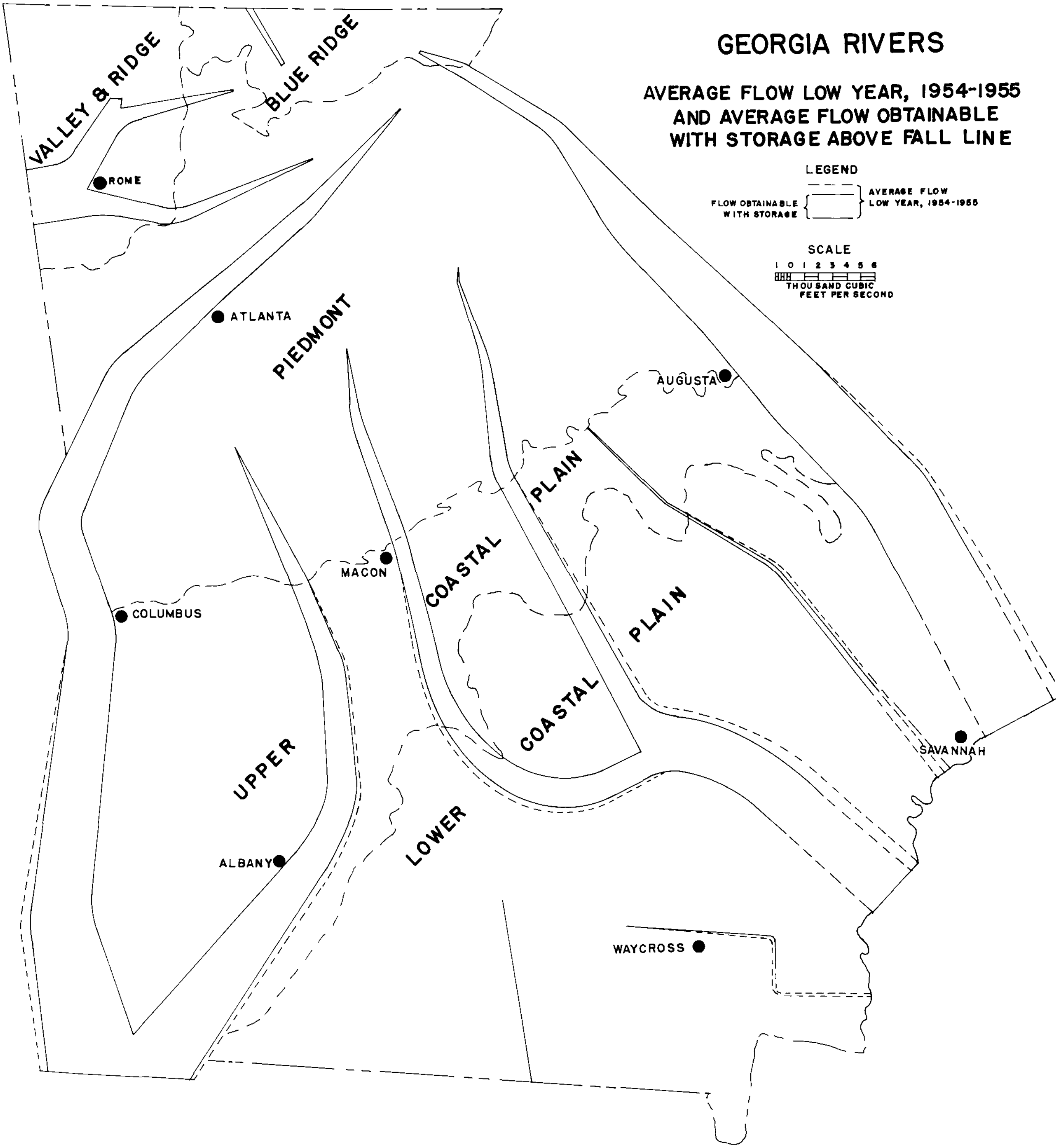
The map shows the average flow for the low year during the drought of 1954-55 that were used to define the storage requirements shown on the preceeding map.

The pattern is similar to that shown by the average flows for the 18-year period 1937 to 1955, but the magnitudes of the low-year average flow are considerably smaller. In most of the State, the low-year average was 40 to 70 percent of the 18-year average, but on the rivers of the lower Coastal Plain it was generally 6 to 15 percent. On the Suwannee River below Okefenokee Swamp it was less than 1 percent of the 18-year average.

Major storage reservoir sites are scarce in the Coastal Plain largely because of the flat terrain. Consequently, improvement in the low flows of Coastal-Plain rivers will most likely be from reservoirs in the Piedmont province. The map shows the dependable flow — one that would have been available all the time 1937-55 — if storage were available in the Piedmont province sufficient to provide the low-year average flow down to the Fall Line. In the Coastal Plain the flows resulting from storage above the Fall Line would be less than the low-year average flow.

The graphs demonstrate that the improvement possible from storage reservoirs is closely related to the proportion of flow that is subject to control above the Fall Line. For example, the difference is relatively small on the lower Savannah River where most of the water comes from above the Fall Line and considerable on the lower Ogeechee River where relatively little water comes from above the Fall Line.

Rivers that lie wholly within the Coastal Plain would have a dependable flow no greater than the minimum flow. Dry-weather streamflows in the Coastal Plain are more likely to be improved by means other than major storage reservoirs. Limited improvement might be economically feasible by diversions from major rivers, operation of a number of small reservoirs, or by reduction of evaporation and transpiration in the swampy bottomlands. Water pumped from the artesian aquifers by industries and drained into the rivers might increase the low flow locally, but much of the water pumped might be lost by evaporation and transpiration before it reaches the rivers, owing to high temperatures and the wide, low, densely wooded bottomlands.



GEORGIA RIVERS

AVERAGE FLOW LOW YEAR, 1954-1955
AND AVERAGE FLOW OBTAINABLE
WITH STORAGE ABOVE FALL LINE

MEAN ANNUAL FLOOD FLOW

The mean annual flood shown on the map is the average of the one highest flood of each year and can be expected to be equaled or exceeded about 56 times in each century. Ten-year floods, expected on the average, 10 times per century, have peak flows roughly twice as great as those for the mean annual flood. Fifty-year floods, expected on the average, twice per century, have peak flows roughly three times as great as those for the mean annual flood.

The graphs show that above the Fall Line the mean annual flood increases as the drainage area increases. In the Coastal Plain, however, the graphs show little or no increase as drainage areas increase, and on the lower Savannah River the flood flows actually decrease. The differences in the patterns may be due partly to climatic differences, but mostly they reflect differences in land characteristics. In the Piedmont province the steeper land slopes underlain by impervious rocks tend to produce higher flood flows than in the Coastal Plain where the land is flat and underlain by pervious materials. Also, when floods, caused by rainstorms in the Piedmont province, cross the Fall Line into the Coastal Plain, their peak flows tend to be reduced because the flood water is stored by the lower and broader flood plains, which have the same effect as detention reservoirs.

Flood flows tend to be consistent from place to place on the same stream; flood stages, or water levels tend to vary with local channel characteristics. This variation is indicated on the map by the bars, which show the flood flows at the gaging stations when the rivers are just bankfull at those places. The bars show that bankfull-flood flows are extremely inconsistent even on the same river within the same hydrologic province.

Only three of the major reservoirs in Georgia (in operation in 1960) were designed for multiple purposes including flood control. The estimated reductions in the annual floods produced by the reservoirs is shown by the shaded areas down stream from them. The estimated reductions below Clarks Hill Reservoir on the Savannah River and below Allatoona Reservoir on the Etowah River are based on the floods that have occurred since their completion. Those below Buford Reservoir on the Chattahoochee River are based on the floods expected from the drainage area below the reservoir, superimposed on the flows released from the reservoir under normal power operations.

Clarks Hill Reservoir on the Savannah River makes the most substantial reduction — to well below the bankfull flow at Augusta, but still not that low at the two gaging stations in the Coastal Plain. Buford Reservoir makes reductions to well below bankfull flow at the first three gaging stations. Allatoona Reservoir makes substantial reductions on the Etowah River, but relatively little on the Coosa River. The effect of Buford Reservoir is very small in the lower Chattahoochee River because of the great length of the river below the reservoir and because a relatively small part of the water in the river as it flows through the Coastal Plain is subject to control at the reservoir.

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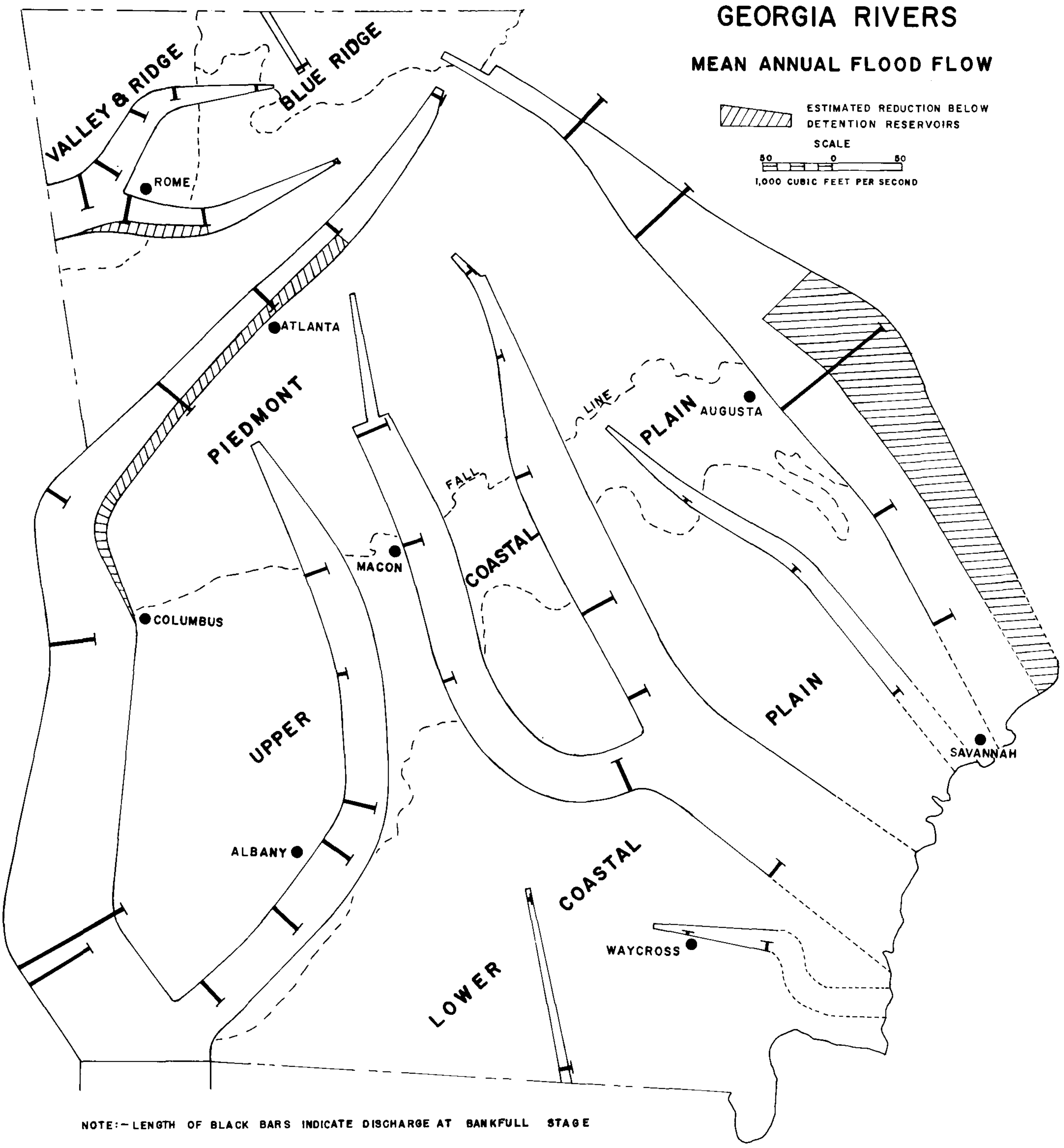

MEAN ANNUAL FLOOD FLOW PER SQUARE MILE

The map shows the natural mean annual flood in cubic feet per second per square mile in the same manner as the average and low flows, to provide an opportunity for comparisons without the complication of the difference in areas drained. Flood flows per square mile are highest in the mountains of the Blue Ridge province and tend to diminish in the downstream direction.

Some of the diminishing trend is inherent because flood flows per square mile almost invariably decrease as drainage areas increase. True comparisons of relative floods should take that tendency into account — by comparing flood flows only for streams draining comparable areas. The relative flows per square mile in the several provinces are shown by those at the upper ends of the rivers where the sizes of the drainage areas are reasonably comparable.

The fact that the size of the drainage area is so pertinent to relative flood intensities, as expressed by the flow per square mile, dictates that the flow shown on the map must not be applied to small tributary streams. To do so would yield grossly incorrect results. For example, streams draining 300 square miles (approximately the areas shown at the heads of the graphs) have mean annual flood flows per square mile as follows:

Blue Ridge province,	23 to 40	cubic feet per second per square mile.
Ridge & Valley province,	35 to 63	“ “ “ “ “ “ “
Piedmont province,	23 to 40	“ “ “ “ “ “ “
Coastal Plain,	10 to 15	“ “ “ “ “ “ “

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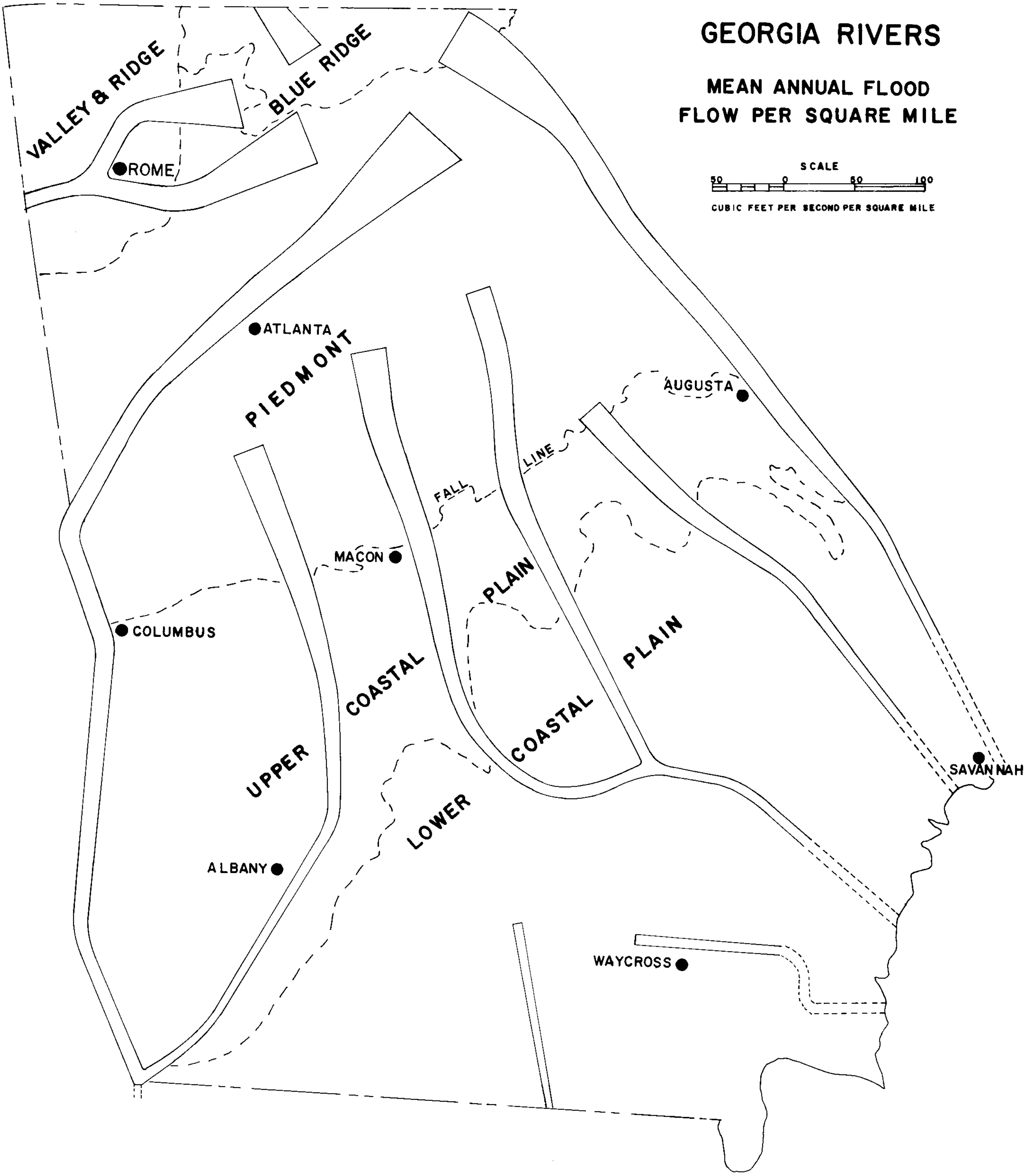


GEORGIA RIVERS

MEAN ANNUAL FLOOD FLOW PER SQUARE MILE

RANGE IN STAGE FOR INDICATED FLOWS

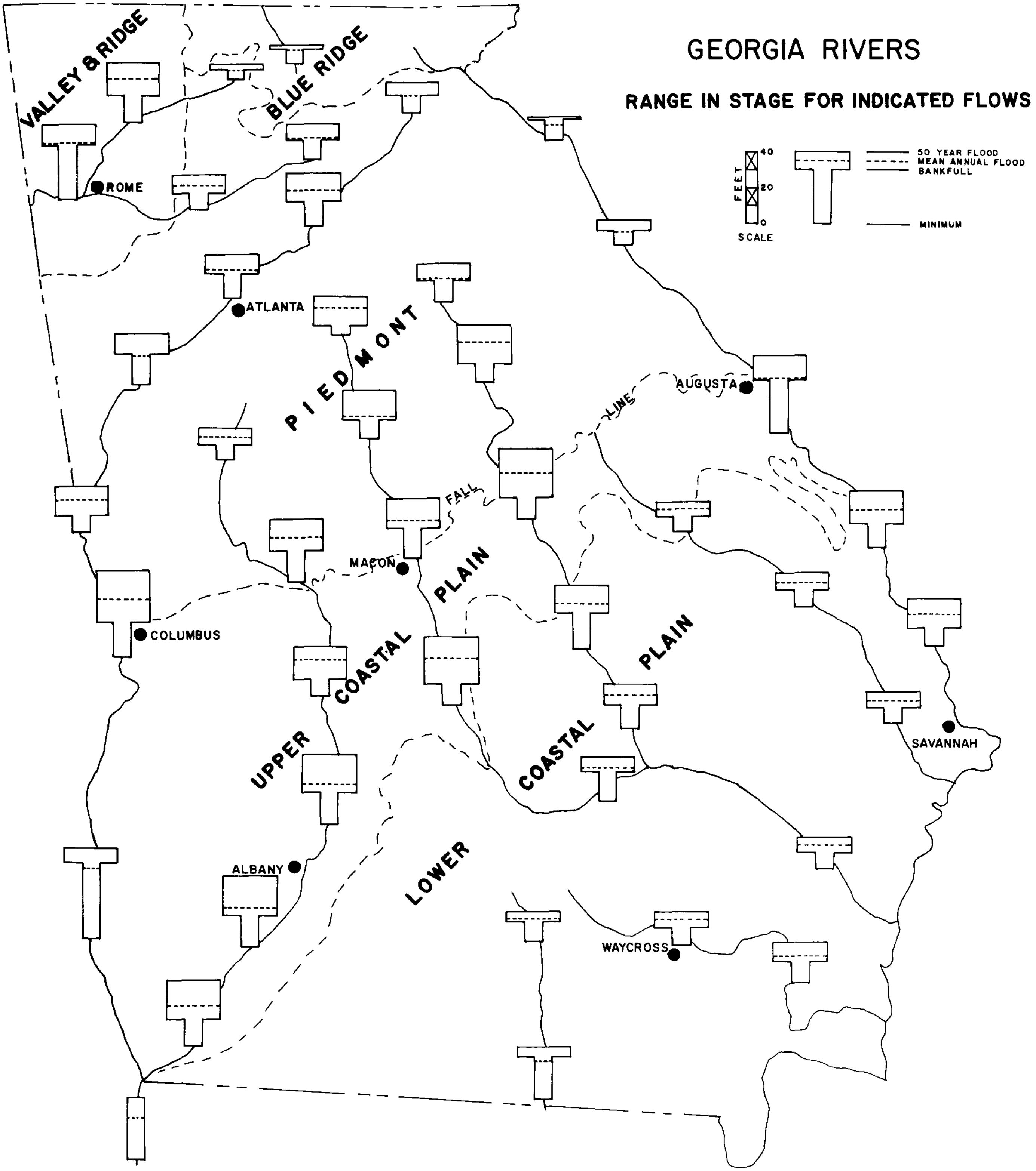
The flows of rivers for bankfull conditions vary from place to place, and are not readily comparable. This is true also for the range of stage between low flows and bankfull, and for flood heights of various frequencies above bankfull stage. Because stages cannot be interpolated between gaging stations, the map shows the range of stage only at selected gaging stations.

The T-shaped symbol represents the channel by its stem, and the flood plain by its cross bar. The widths of the symbol are not significant — it is impractical to show the widths to scale for the major rivers of Georgia, which are as little as 100 feet on small rivers at low stages and as much as 30,000 feet on big rivers in floods.

The depths of the channels below bankfull stage generally increase in the downstream direction, but there are some notable exceptions. On the Savannah River in the Coastal Plain, for example, the channel depth is much less than at Augusta. In other words, the river tends to have low banks up to Augusta where they become high. The Chattahoochee River in the Coastal Plain tends to have higher banks than the other Coastal Plain rivers of Georgia.

The depths of flooding over bankfull stage for the 50-year flood also tend generally to increase in the downstream direction, but again there are many exceptions. For example, they decrease below the Fall Line on the Oconee River and Chattahoochee River.

The relative heights of the mean annual floods vary considerably as shown by the dashed lines. At a few gaging stations it is close to bankfull stage, but at many others it is higher than bankfull stage, and at a few it is below bankfull stage. Where it is close to bankfull stage, flooding will occur about 56 times per century. Where it is above bankfull stage, flooding will occur more frequently, and where it is below, flooding will occur less frequently. At the gaging station on the Apalachicola River flooding does not occur even twice a century, as shown by the absence of the cross bar.



GEORGIA RIVERS

RANGE IN STAGE FOR INDICATED FLOWS

POTENTIAL AND DEVELOPED HYDROELECTRIC POWER GENERATION PER MILE

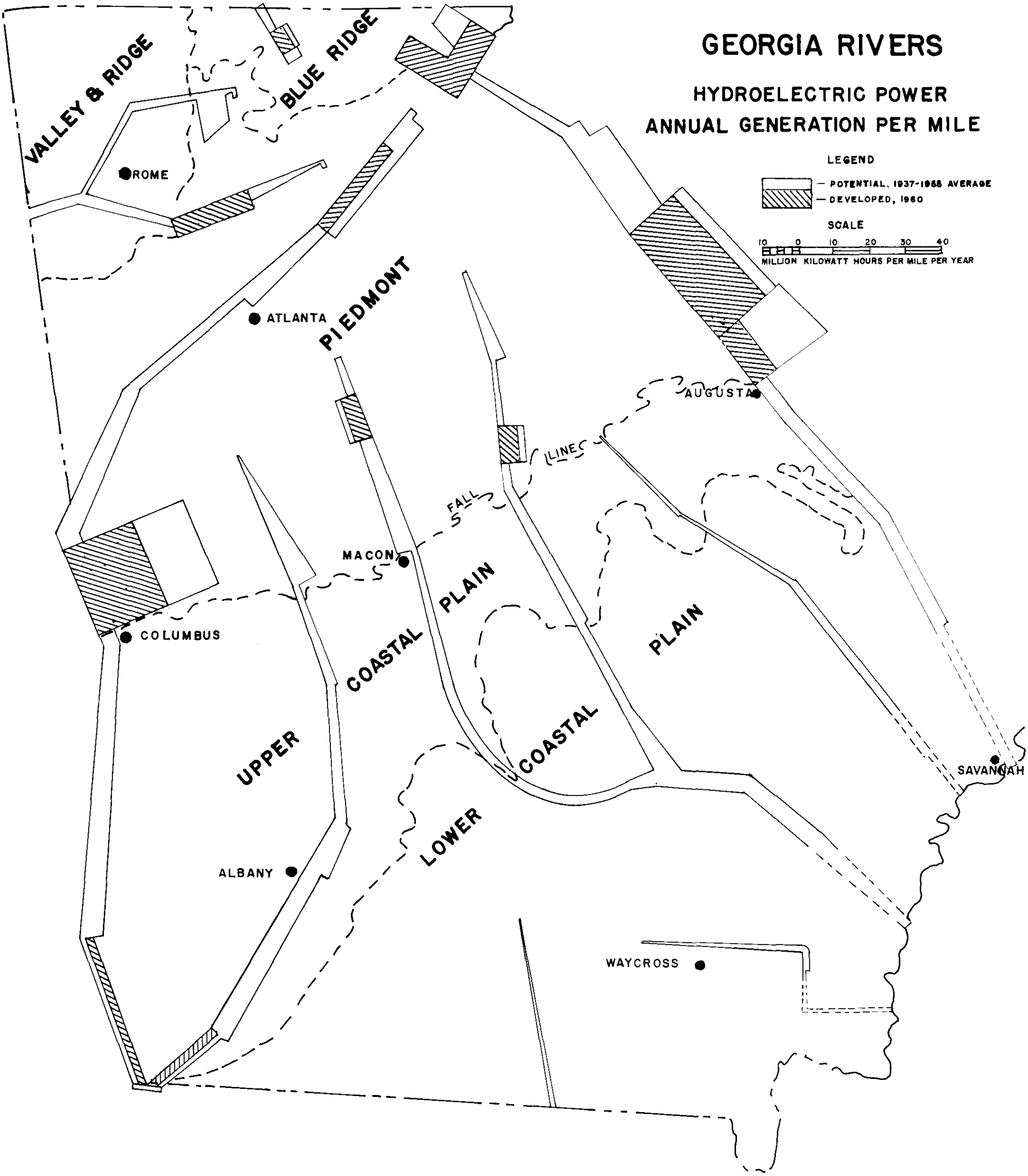
This map shows a product of the river resource — hydroelectric power. Power is a function of streamflow and the fall developed at a dam. The potential water power can be shown by the product of the average flow and the fall per mile by segments of the river. The fall per mile in each segment is averaged, but the flow increases in the downstream direction. Consequently, the graphs of potential power show an irregular "saw-tooth" pattern. If the fall for each mile within each segment were used, the graphs would be extremely "zig-zagged," being extremely wide at the natural shoals and mere lines between shoals. Where a dam, or series of dams, exist in a segment, the flow at the downstream end of the segment is assumed to be available for power throughout the segment. Consequently the pattern for such a segment is composed of parallel instead of tapered lines.

The developed water power is shown as that reported, divided by the number of miles of the reservoir length in order to make the graphs of developed and potential power comparable. The actual power developed at the dams then is indicated by the areas of the shaded rectangles. (As the lengths of the river segments and reservoirs cannot be shown to scale, the areas of the rectangles are not accurate.) The developed power shown is not limited to the one dam for which the reservoir was shown in preceding maps, but includes all of the hydroelectric power plants in the segment of the river. For example, six plants were included in the upper Savannah River development, and eight in the middle Chattahoochee River development.

The map shows the tremendous potential power on the upper Savannah River in the Blue Ridge province as well as the fact that the power is almost completely developed. The Savannah River above Augusta also has great potential power already well developed by Clarks Hill Dam. The Chattahoochee River above Columbus shows spectacular potential power which is also well developed.

Not all of the potential power of a river can be developed economically. For example, some of the fall that is available theoretically is used for storage operations. As more storage is provided in the headwaters, more of the potential power can be developed at the lower power dams. The full development of the Tallulah River is an example of the value of a major storage reservoir, Lake Burton, in the headwaters. Also, Buford Reservoir now provides headwater storage on the Chattahoochee River which will make more of the fall available for power in the segment above Columbus. Consequently, the power plants in that segment are being modernized to improve their power capacities.

The map shows why certain rivers, particularly the parts in the Blue Ridge and Piedmont provinces, have been well developed for hydroelectric power. Plans are nearly completed for the dam and reservoir to develop the large potential power shown on the Coosawattee River.


GEORGIA RIVERS
HYDROELECTRIC POWER
ANNUAL GENERATION PER MILE
LEGEND
— POTENTIAL, 1937-1958 AVERAGE
— DEVELOPED, 1960
SCALE
10 0 10 20 30 40
MILLION KILOWATT HOURS PER MILE PER YEAR
VALLEY & RIDGE
BLUE RIDGE
ROME
ATLANTA
PIEDMONT
AUGUSTA
FALL LINE
MACON
COLUMBUS
PLAIN
COASTAL
PLAIN
COASTAL
UPPER
LOWER
ALBANY
SAVANNAH
WAYCROSS